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DEPARTMENT OF AGRICULTURE APPROPRIATIONS FOR 1965

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HEARINGS

BEFORE A

SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS HOUSE OF REPRESENTATIVES

EIGHTY-EIGHTH CONGRESS

SECOND SESSION



SUBCOMMITTEE ON DEPARTMENT OF AGRICULTURE AND RELATED
AGENCIES APPROPRIATIONS

JAMIE L. WHITTEN, Mississippi, Chairman

WILLIAM H. NATCHER, Kentucky
JOSEPH P. ADDABBO, New York

WALT HORAN, Washington
ROBERT H. MICHEL, Illinois

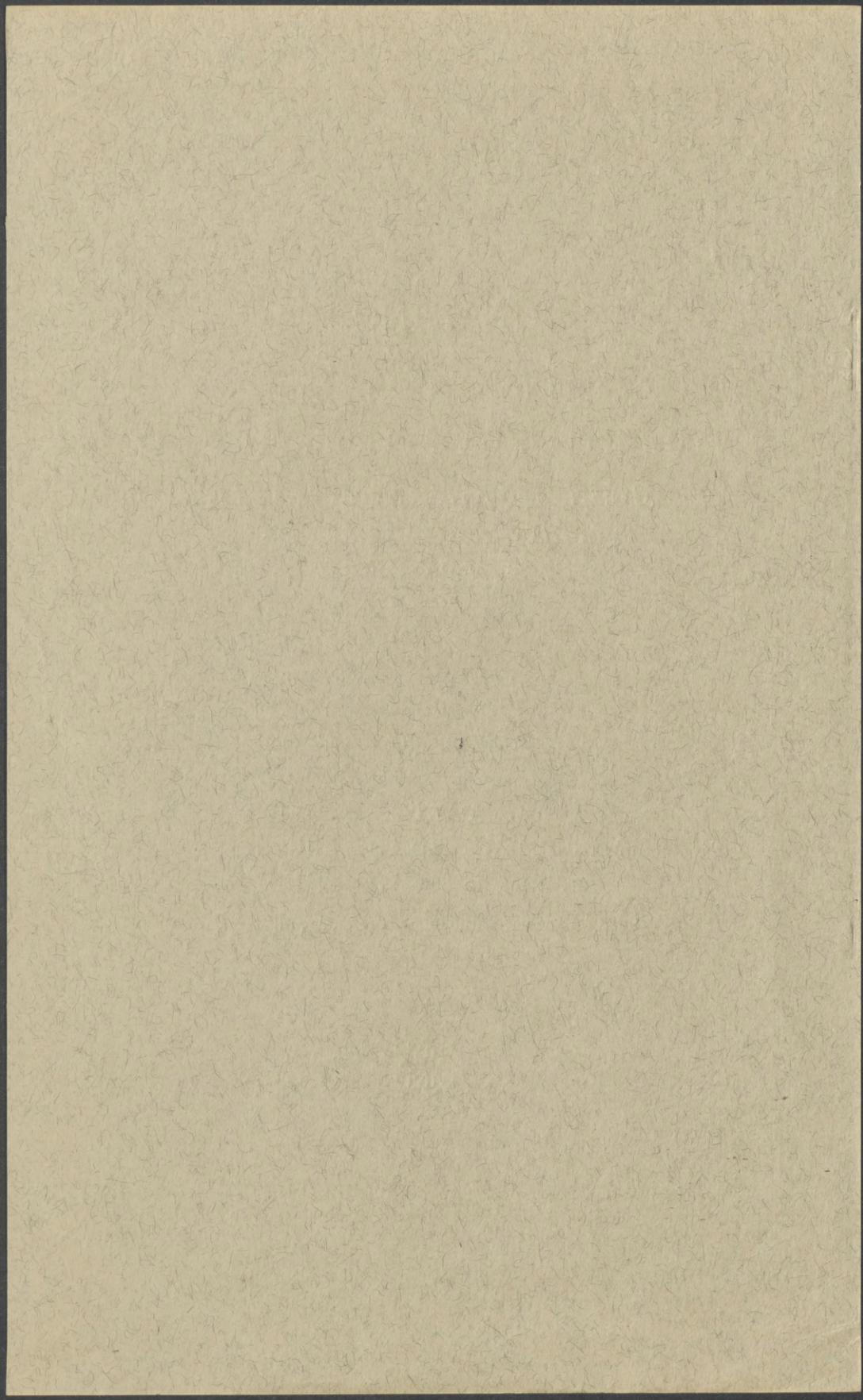
Ross P. POPE, *Staff Assistant to the Subcommittee*

PART 6

AMENDMENTS TO THE BUDGET

Printed for the use of the Committee on Appropriations





DEPARTMENT OF AGRICULTURE APPROPRIATIONS FOR 1965

HEARINGS BEFORE A SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS HOUSE OF REPRESENTATIVES EIGHTY-EIGHTH CONGRESS SECOND SESSION

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DEPARTMENT OF AGRICULTURE
APPROPRIATIONS FOR 1965

HEARINGS

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(II)



DEPARTMENT OF AGRICULTURE APPROPRIATIONS
FOR 1965

MONDAY, JULY 20, 1964.

EXPANDED PESTICIDE RESEARCH

WITNESSES

CHARLES S. MURPHY, UNDER SECRETARY OF AGRICULTURE
DR. NYLE C. BRADY, DIRECTOR, SCIENCE AND EDUCATION
DR. B. T. SHAW, ADMINISTRATOR, AGRICULTURAL RESEARCH
SERVICE
DR. H. A. RODENHISER, DEPUTY ADMINISTRATOR FOR FARM
RESEARCH, AGRICULTURAL RESEARCH SERVICE
DR. R. J. ANDERSON, DEPUTY ADMINISTRATOR, REGULATORY AND
CONTROL, AGRICULTURAL RESEARCH SERVICE
DR. T. C. BYERLY, ADMINISTRATOR, COOPERATIVE STATE RE-
SEARCH SERVICE
DR. H. C. KNOBLAUCH, ASSOCIATE ADMINISTRATOR, COOPERATIVE
STATE RESEARCH SERVICE
DR. E. R. McGOVRAN, PRINCIPAL ENTOMOLOGIST, COOPERATIVE
STATE RESEARCH SERVICE
LLOYD H. DAVIS, ADMINISTRATOR, EXTENSION SERVICE
FOSTER E. MOHRHARDT, DIRECTOR, NATIONAL AGRICULTURAL
LIBRARY
CLARE HENDEE, DEPUTY CHIEF, FOREST SERVICE
G. M. JEMISON, ASSOCIATE DEPUTY CHIEF, FORESTRY RESEARCH,
FOREST SERVICE
CARL P. HEISIG, DEPUTY ADMINISTRATOR, AGRICULTURAL ECO-
NOMICS, ECONOMIC RESEARCH SERVICE
CHARLES L. GRANT, DIRECTOR OF FINANCE AND BUDGET OFFICER,
DEPARTMENT OF AGRICULTURE

JUSTIFICATION MATERIAL

Mr. WHITTEN. Gentlemen, the committee will come to order.
At the outset we shall ask that Senate Document 85 be included in
the record along with the justifications.

(Senate Document 85 and the justifications referred to follow:)

[S. Doc. 85, 88th Cong., 2d sess.]

AMENDMENTS TO THE BUDGET AND A PROPOSED SUPPLEMENTAL APPROPRIATION FOR
THE DEPARTMENT OF AGRICULTURE AND AN AMENDMENT FOR THE DEPARTMENT
OF HEALTH, EDUCATION, AND WELFARE

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., July 8, 1964.

THE PRESIDENT,
The White House.

SIR: I have the honor to submit herewith for your consideration amendments to the request for appropriations transmitted in the 1965 budget and a proposed 1965 supplemental appropriation as follows:

Amendments and a proposed supplemental appropriation for the Department of Agriculture, amounting to a net decrease of \$17,547,000; and

An amendment for the Department of Health, Education, and Welfare in the amount of \$800,000.

The requested changes for the Department of Agriculture would provide an additional \$29 million to accelerate work on pesticide residues, making a total 1965 request of \$69 million for pesticide research, education, and regulation in the Department.

The program now proposed is the result of careful consideration by the Secretary of Agriculture of the recommendations of the President's Science Advisory Committee report on the use of pesticides. It emphasizes research to seek new and nontoxic ways of controlling insects. It provides the foundation for a long-range program covering the whole field of contaminants associated with the production, processing, and marketing of agricultural products. Thus it looks toward the reduction and eventual elimination of the need for using hazardous chemicals in agricultural production and processing.

To carry out the program will require a broader and more intensive research effort in the Department of Agriculture. The proposal also includes funds for planning and construction of critically needed research facilities. In order to bring further resources to bear on the problem so that the work may proceed as rapidly as possible, the use of basic research grants and contracts with universities would be expanded.

The proposed amendments for the Department also include a reduction of \$46.5 million in the funds requested to reimburse the Commodity Credit Corporation for the costs of Public Law 480. Of this amount \$43.5 million applies to commodities disposed of for emergency famine relief to friendly peoples and \$3 million for long-term supply contracts. On the basis of actual experience for the fiscal year 1964, it now appears that the reduced request, along with unused 1964 funds, will be adequate to meet the needs for 1965.

The amendments for Agricultural Research Service, salaries and expenses, are in addition to the amendments transmitted to the Congress on June 24, 1964, Senate Documents 82 and 83.

DEPARTMENT OF AGRICULTURE

Budget appendix page	Heading	Request pending	Proposed amendments	Revised request
	AGRICULTURAL RESEARCH SERVICE			
85	Salaries and expenses:			
	Research.....	\$98,615,000	+\$13,758,000	\$112,373,000
	Plant and animal disease and pest control.....	68,905,000	+700,000	69,605,000
	COOPERATIVE STATE RESEARCH SERVICE			
91	Payments and expenses.....	42,440,000	+8,792,000	51,232,000
	EXTENSION SERVICE			
93	Cooperative extension work, payments and expenses.....	77,679,000	+2,300,000	79,979,000
	ECONOMIC RESEARCH SERVICE			
104	Salaries and expenses.....	9,476,000	+500,000	9,976,000
	FOREIGN ASSISTANCE PROGRAMS			
126	Public Law 480:			
	2. Commodities disposed of for emergency famine relief to friendly peoples.....	264,000,000	-43,547,000	220,453,000
	3. Long-term supply contracts.....	58,000,000	-3,000,000	55,000,000
	NATIONAL AGRICULTURAL LIBRARY			
162	Salaries and expenses.....	1,347,000	+200,000	1,547,000

"FOREST SERVICE

"FOREST PROTECTION AND UTILIZATION

"For an additional amount for "Forest protection and utilization", for 'Forest research', \$2,750,000."

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Budget appendix page	Heading	Request pending	Proposed amendments	Revised request
	PUBLIC HEALTH SERVICE			
414	Water supply and water pollution control.....	\$34,310,000	+\$800,000	\$35,110,000

The proposed amendment is to cover the expenses of conducting an extensive survey and sampling program of the lower Mississippi River to determine the sources and causes of large-scale fish kills. This amount will provide for the establishment of survey stations and the collection, transportation, and laboratory analyses of samples. This effort will be coordinated with those of the Departments of Agriculture, Defense, and Interior. The survey will provide essential information for initiating remedial measures against sources of contamination to fish, wildlife, and human drinking supplies.

I recommend that the foregoing proposals be transmitted to the Congress.

Respectfully yours,

KERMIT GORDON,
Director of the Bureau of the Budget.

[S. Doc. 85]

Agricultural research service, 1965 budget amendment

Page in budget appendix	Heading	Revised budget estimate, fiscal year 1965	Revised estimate	Increase
85	Salaries and expenses:			
	Research ¹	² \$103,074,875	³ \$116,832,875	+ \$13,758,000
	Plant and animal disease and pest control.....	³ 68,905,000	³ 69,605,000	+700,000
	Meat inspection.....	30,837,000	30,837,000	-----
	(New language is italicized and deleted matter in black brackets.)			
	Research: (Immediately following the amount make the following change) * * * of which [\$2,394,300] \$3,952,300 shall remain available until expended for construction, alteration, and improvement of facilities, without regard to limitations contained in the above preamble: * * *			
	Plant and animal disease and pest control: (Immediately after the words "Provided, That," add the following:) <i>\$100,000 shall be available, until expended, notwithstanding the foregoing limitations, for the construction of facilities: Provided further, That</i>			

¹ Adjusted amounts for comparative purposes with budget estimates as follows:

	Revised budget estimates, 1965	Revised estimate	Increase
Agricultural Research Service.....	\$98,615,000	\$110,433,000	+ \$11,818,000
Agricultural Marketing Service (Marketing Research).....	4,459,875	6,399,875	+1,940,000
Total.....	103,074,875	116,832,875	13,758,000

² Excludes reappropriation of \$1,000,000 under "Special fund."

³ Budget estimate, as revised by H. Doc. 240, S. Doc. 82, and S. Doc. 83.

EXPLANATION OF LANGUAGE

The proposed language would provide not only additional funds for research and for plant and animal disease and pest control but would authorize the use of \$1,658,000 of the amount for plans for facilities estimated to cost more than \$1 million and construction of one facility as follows:

Research

Plans for:

1. Facilities for research on livestock insects and toxicological and pathological effects of pesticides on livestock, College Station, Tex. (estimated total cost, including plans, \$3,250,000)..... \$260,000
2. Facilities for research to control plant diseases and nematodes and to develop new and safer methods for control of insects, including insects of stored products, Beltsville, Md. (estimated total cost, including plans, \$4,225,000)..... 338,000
3. Laboratory for insect attractants and environmental research on stored products insects, Gainesville, Fla. (estimated total cost, including plans, \$2,000,000)..... 160,000

Construction:

4. Construction of facilities for expanded research on insect control in agricultural products in marketing channels, Savannah, Ga..... 800,000
- Subtotal, research..... 1,558,000

Plant and animal disease and pest control:

5. Plans for portion of laboratory facilities for expanded registration and enforcement activities under the Federal Insecticide, Fungicide, and Rodenticide Act. (The amount represents pro-rata share of planning costs for laboratory to be consolidated with proposed research facility at Beltsville, Md., described under 2 above). (Estimated total cost, including plans, \$1,250,000.)-----	100,000
Grand total-----	1,658,000

Federal land is available at Gainesville, Fla.; Beltsville, Md.; and Savannah, Ga., for facilities indicated. Land would be needed at College Station, Tex. It is anticipated that the State would furnish the site.

The construction, alterations, and improvements are needed to carry out research, control, and regulatory work necessary to avoid pesticide residues.

PURPOSE AND NEED FOR BUDGET AMENDMENT

The health and comfort of our people depends on control of pests. These pests cost the agricultural economy in excess of \$13 billion per year. Control of these pests is essential to the prosperity of agriculture. It is essential that safe, efficient, and effective means of control should be available at all times for the public welfare. Pesticides are used largely in production and protection of the Nation's supply of food, feed, and fiber.

The importance of pesticides in agriculture and in daily life, including the comforts of our homes, cannot be overemphasized. They are extremely important in relieving and minimizing the losses from diseases and pests of food and feed crops and livestock. They are important in protecting the wholesomeness and cleanliness of foods on their way to market during processing, and in marketing channels in relieving man from the problems of pests, insects, mosquitoes, and biting insects, and, in protecting us from the transmission of disease. However, there are problems connected with this matter that have brought into sharp focus during the past few years the need for substantial additional research.

Within available resources, the Department has endeavored to devise new and improved means of dealing with diseases and pests in ways that eliminate the side hazards, the problems of residues, and the problems of effects of chemicals on soil, water, and on man and livestock, but the problems are so varied and of such magnitude that additional funds are needed for research. Funds have been redirected to place increasing emphasis on new means of dealing with diseases and pests that will eliminate or at least minimize the problems associated with the use of chemicals. Research is underway on the use of lures, attractants, more precise application of chemicals, different formulations of chemicals, methods of handling livestock to avoid or reduce hazards, etc. This redirected research is providing a number of leads for meeting needs which should be developed as soon as possible, and to find new means to provide for control of pests and diseases of crops and of animal parasites.

In cooperation with State and local officials, the Department has made every effort to plan and conduct pest control and eradication programs in the most effective possible manner and with every regard to human safety measures, and for safety of livestock, fish, and wildlife. Available resources and manpower, often combined with the need for emergency measures, have been committed to the conduct of control and eradication operations. As a result there have been only limited opportunities to make special field studies on the environmental impact associated with plant pest control and eradication procedures.

There is urgent need to initiate more extensive field operations to monitor the use of pesticides in agriculture, including both Federal-State-local cooperative control programs, and the general agricultural use of pesticides.

Funds are also needed for a scientific and technical staff to provide for better coordinated and more concerted activities of Federal agencies related to pesticides. The proposed increase would provide for better means for the Department to assure the safe and effective use of pesticides.

Justification for budget amendment, fiscal year 1965

	Latest budget estimate, fiscal year 1965	Amendment to latest budget estimate, 1965	Revised estimate, 1965
Salaries and expenses:			
Research: ¹			
Program	¹ \$100,680,575	+\$12,200,000	\$112,880,575
Construction of facilities	2,394,300	+1,558,000	3,952,300
Subtotal	¹ 103,074,875	+13,758,000	116,832,875
Plant and animal disease and pest control:			
Program	68,905,000	+600,000	69,505,000
Construction of facilities		+100,000	100,000
Subtotal	68,905,000	+700,000	69,605,000
Meat inspection	30,837,000		30,837,000
Total, salaries and expenses	¹ 202,816,875	+14,458,000	217,274,875

¹ Adjusted amounts to include \$4,459,875 for marketing research of the Agricultural Marketing Service.

This budget amendment relates to expanding research and regulatory activities of the Agricultural Research Service to avoid or minimize hazards associated with the control of agricultural pests, and includes agricultural marketing research activities. For convenience, the following justification is organized by the appropriation items affected.

SALARIES AND EXPENSES

Research

This estimate would provide an additional \$12,200,000 for research to avoid or minimize hazards associated with the control of agricultural pests and a nonrecurring increase of \$1,558,000 for plans and for the construction of research facilities needed for further expansion of such research and for the more effective conduct of some of the work now underway. Studies on innocuity of organisms, chemicals, etc., developed would also need to be made.

In connection with the development and use of pesticidal chemicals, such as insecticides, nematocides, fungicides, viricides, herbicides, antiparasiticides, etc., it has always been recognized that chemicals which will effectively destroy pests may create hazards to man, livestock, wildlife, plants, soils, and beneficial insects. Accordingly, for many years within the research resources available, much of the research on such chemicals has been devoted to avoiding such hazards. To the extent possible, efforts have been made to investigate other approaches to pest control.

In efforts to overcome or avoid the current mounting problems of residues and other hazards, and in order to meet the increasing problem of pest resistance to pesticides, much of the research, particularly on insecticides, has been shifted to nonchemical control methods and on chemicals which are highly specific in action which would minimize or avoid residues. Various nonchemical methods and specific chemical applications offer excellent prospects for effective pest control without creating residues or other hazards. Even with the limited resources available, important advances have been made during recent years in the development of nonchemical methods for pest control and in the development of highly specific chemicals which offer unusual opportunities to achieve pest control without adversely affecting other forms of life.

However, due to the thousands of pests involved, the constantly changing agricultural practices, the introduction of new pests, spread and adaptation of pests to new conditions, and urgent demands by farmers, food industries, householders, and the public in general for immediate solutions to pest problems, it has not been possible with available scientists, facilities and funds to enter into intensive, broad, and long-range basic and applied research programs to fully investigate other approaches to pest problems.

The increase requested would be used as follows:

1. BIOLOGICAL CONTROLS, \$6,575,000

Farm research

(a) An increase of \$4,200,000 for research on control of pests by biological, sterility and nonchemical methods, or by use of attractants, etc.

Insects.

Parasites, predators and diseases: Studies are needed of the disease organisms which affect our most destructive insects and determination of which may be useful for control. Such organisms include viruses, bacteria, fungi, and protozoa. The mass production and use of such organisms offers the same general approach to insect control now provided by insecticides, but should be safer to use. Promising pathogens are already under investigation for such major pests as the corn earworm, cabbage looper, tobacco hornworm, tobacco budworm, European corn borer, and European red mite of citrus. It is urgent that we search for, import, evaluate, and establish additional parasites, predators and diseases for insect control. Research would include the integration of biological and chemical control procedures by the development, selection, and use of insecticides in such manner as to cause the minimum of harm to natural enemies and maximum adverse effect on the destructive insect to be controlled.

In addition to the insects named above, research would be concentrated on the cereal leaf beetle, codling moth, plant mites, aphids, Japanese beetle, white-fringed beetle, corn rootworms, cucumber beetles, sugarcane borer, and other major pests responsible for the greatest use of insecticides.

Sterility method of insect control: This method of control offers great promise for reducing the amount of insecticides required. The screwworm fly was successfully eradicated from the Southeastern United States by this method, and from New Mexico, Texas, and States to the north and east. Promising results have been obtained in the laboratory and/or in limited field investigations with other insects, including the boll weevil, pink bollworm, Mexican fruit fly, tobacco hornworm, codling moth, drosophila fruit flies, house flies, and other insects. This would include not only general basic research on sterility in the new laboratory at Fargo, N. Dak., but also on initiating both basic and applied research on a number of specific insects in which the sterility method has shown sufficient promise to warrant full evaluation in pilot field tests, which are relatively costly. Recent experiments on the island of Rota in the Pacific have shown the feasibility of eradicating the oriental fruit fly and melon fly by releasing sterile males.

Nonchemical methods of controlling insects: Such research includes the use of light traps and sound to attract and destroy insects, and the use of mechanical equipment to collect and destroy insect pests. Light traps are being used in a limited way, both for surveys on the emergence and abundance of insect pests, and also to destroy some pests. Investigations should be expanded on the use of such control methods with a wide range of insect pests.

Studies would be made on nonchemical methods of controlling flies, lice, mites, ticks, and other insects in and around dairy and beef cattle, sheep and swine barns and poultry houses, shelters, feedlots, and pastures. These studies would include use of sound, light, electromagnetic energy, etc., particularly for control of flies and mosquitoes. Hordes of male mosquitoes have been attracted by an amplified playback of the recorded call of the female. The use of sound to attract insects to their destruction needs to be thoroughly explored. Studies on management practices would be made to work out methods and practices relating to feed storage and handling, feeding and milking procedures, waste disposal and utilization to avoid breeding places for insects, thus avoiding increases in populations.

Insect attractants: The potential for employing highly specific methods of insect control by use of attractants that would avoid or minimize residues on foods and feeds and hazards to wildlife and beneficial insects has been demonstrated. The development of bait sprays for the Mediterranean fruit fly permitted the eradication of this serious pest from Florida by the use of a minimum amount of the insecticide, malathion. A bait which is highly specific for the fire ant has been developed whereby improved eradication measures are being achieved by the application of only one-seventh of an ounce of the insecticide, mirex, incorporated in 5 pounds of bait per acre. Chemists have recently determined the chemical structure of the sex attractant in the gypsy moth and in the American cockroach and have synthesized the attractant for the gypsy moth. Workers at the new boll weevil laboratory have found a specific substance in the cotton plant which attracts this insect to cotton and another substance which

stimulates feeding by the boll weevil. These examples indicate the great promise that additional research on insect attractants holds for developing superior methods for detecting and controlling insects. Basic and applied research will be conducted on a number of insect pests, as well as practical field tests on the feasibility of controlling insects with attractants now known to be highly active.

Plant diseases, nematodes, and weeds: A major research effort is needed to learn how to use effectively natural biological agents which will control specific plant diseases caused by fungi, bacteria, and viruses. Research on micro-biological populations of soils and their interactions is needed to serve as a basis for developing systems of cropping, soil management, use of organic matter, and related methods which will result in suppressing harmful and favoring beneficial micro-organisms in the soil. Bacterial diseases of plants cause enormous losses annually and the only effective control chemicals leave residues above the tolerance levels found safe for public health. Preliminary research with phages (viruses which kill bacteria) shows promise for effective control and such research should be expanded.

Nematodes are subject to attack by many natural biological control agents, such as fungi, bacteria, predaceous nematodes, viruses, and protozoa. Preliminary investigations indicate that the use of such biological agents offer promising controls. A major research effort is needed to learn how to use effectively these natural control agents and so reduce the use of nematocides with a consequent reduction in their residues.

Weeds are one of the greatest causes of loss in crop production. There is great need to reduce the costs of weed control. Research to avoid herbicide residues by developing new biological and cultural principles and techniques for weed control is needed. Research would be conducted to (a) exploit the potential of insects, plant pathogens, parasites, and predators, (b) develop measures for inducing weed seed germination and inhibiting pollen and weed seed production, and (c) develop improved cultural methods and production practices to provide nonchemical control methods for weeds.

Animal parasites: At present there is an almost complete reliance on chemicals (antiparasiticides) for treatment and control of internal parasites of livestock. Despite great progress during the last 45 years suitable measures are still lacking for control of about two-thirds of the injurious internal parasites of food animals. Losses from parasites are estimated to exceed \$1 billion annually. The objectives of the proposed increased research effort would be to reduce reliance on chemicals for the control of internal parasites. The major effort would be placed on developing biological methods for control. The potential for "vaccine" against parasitic diseases is tremendous and yet, because of the lack of funds, the surface has barely been scratched in this area. Irradiation of lungworm larva has attenuated them to a point whereby they produce immunity in calves against lungworm disease. This approach must be fully explored for other parasitic diseases.

(b) An increase of \$2,175,000 for research on genetic and varietal resistance of plants to insects, diseases and nematodes.

Crop yield and quality is lowered by attacks of insects, fungi, bacteria, nematodes, and viruses. In many parts of the country certain crops cannot be grown because of these pests. For example, tomatoes are not grown in many areas of the West because they become infected with the insect-transmitted virus curly top. A bacterial disease, fireblight, prevents successful growing of high quality pears in the Eastern United States. Most seed crops are now produced in the arid West to avoid losses from diseases favored by rains during the growing season. Diseases also affect dependability of yield.

Losses from insects, diseases, and nematodes affect both farmers and consumers. When they limit production and result in short crops, prices usually increase. Many of them are effectively controlled only at great expense by application of chemicals. This adds to the cost of production and is reflected in higher prices.

Crop varieties differ greatly in their resistance to insects, diseases, and nematodes. Use of resistant varieties approaches the ideal in their control because they would cause no undesirable side effects, such as those from residues from pesticides, and their use would reduce production costs considerably. While breeding for resistance to insects, diseases, nematodes, and other pests is a long-range approach to the problem of minimizing hazards associated with their control, past productiveness in this field indicates that increased funds for an expanded, broad and long-range program on a wide variety of other crops would be a very profitable means of combating the pesticide residue problem.

Disease resistance has already been obtained in many crops such as cereals resistant to powdery mildew, smuts, yellow dwarf, and rusts; cotton, to fusarium wilt; potatoes, to late blight; field beans, to rust, anthracnose, and virus diseases; soybeans, to bacterial diseases; and sugarbeets, to several diseases, including curly top. With limited effort in the past, resistance to insects has been obtained in cereals to European corn borer, wheat stem fly, Hessian fly, greenbug, and chinch bug; and alfalfas to aphids. A few varieties of cotton, alfalfa, and vegetables resistant to nematodes have been developed.

However, many new pests and new races of old ones threaten the production of horticultural and field crops. For example, the virus yellows of sugarbeets in the West has reduced yields as much as 25 percent. This disease is a serious hazard to sugarbeet production in districts that produce more than 50 percent of the sugarbeets in the United States. In some areas, apple scab and other leaf and fruit-damaging diseases require 10 separate sprays. In favorable years bacterial spot causes a \$20 million damage and is largely responsible for preventing commercial production of peaches in many sections of Eastern United States. New races of the fungus causing pecan scab that have developed in the Southern States are attacking formerly resistant varieties.

The cereal leaf beetle represents a major new threat, to cereals. Rice blast, wheat and barley scab, corn earworm, small grain and corn aphids, and rice weevil are increasing in importance. In the forage crops, alfalfa weevil, and alfalfa seed chalcid limit production.

A few nematodes attacking crop plants can be controlled by chemicals, but because of cost and the high dosage rates needed, such treatment is limited to the higher priced annual crops such as vegetables and tobacco. Fortunately, pesticides now in use are less likely to leave undesirable residues than others used formerly, but because of the uncertainty of danger from long-continued use it is desirable to minimize their need where feasible.

Marketing research

(c) An increase of \$200,000 for research on nonpesticidal methods for the control of insects attacking food, feed, and fiber after harvest.

A small amount of work of this nature is already in progress with stored-product insects, but much more is needed to develop control measures that would not leave toxic residues. There are many promising lines of investigation awaiting exploration. Studies would be expanded or initiated along such lines as the use of controlled climatic or atmospheric factors; light or sound; gamma radiation and other bands in the electromagnetic energy spectrum; inert dusts; attractants and repellents; and insect pathogens. The stored products insects against which this research would seek biological controls, annually contaminate and destroy millions of dollars worth of grain, tobacco, dried fruits and nuts, processed cereal foods, animal feeds, and wool, mohair, and other animal fibers.

2. BASIC RESEARCH, \$1,880,000

Farm research

(a) An increase of \$1,530,000 for basic research on biology, taxonomy, ecology, physiology, pathology, metabolism, and nutrition of insects, plants and animals; to develop safe means of control of plant pests and diseases and animal parasites.

In order to adequately carry on research on various methods of pest control it is essential that funds be made available for basic studies to provide necessary information on the biology, taxonomy, ecology, physiology, and nutritional requirements of the problem insects, and similar information on weeds, parasites, etc. Studies would be conducted to provide information on the seasonal occurrence, abundance, and population dynamics of such major insect pests as the cereal leaf beetle, tobacco budworm (bollworm on cotton), tobacco hornworm, sugarcane borer, peach tree borer, cucumber beetle, and others. The nutritional requirements of many of these insects would be determined and methods developed for their mass production. Related taxonomy studies would be carried on as needed.

Research would also be conducted to provide basic information on the metabolism of insecticides and sterilants and on the physiological response of insects to radiations, chemosterilants and other biologically active materials.

Basic research is also needed on artificial propagation of parasites; tissue culture techniques for the propagation of cells of parasites; and immunological and serological procedures applicable to parasitic diseases of livestock.

Diseases of plants constitute one of the chief hazards affecting crop yields. Application of chemical control measures to reduce or prevent losses from plant diseases in an essential farm practice for many crops. Accurate forecasting of the probability of occurrence and spread of plant diseases would eliminate the need for many chemical applications. However, accuracy depends primarily on knowledge of the factors affecting initiation, spread, and severity of plant diseases. Such knowledge can be obtained only through studies of all environmental factors, including weather records involved in epidemic outbreaks of plant diseases.

Success in this field is evidenced by the effective methods of forecasting initial outbreaks of late blight of potatoes and tomatoes, downy mildew of lima beans and cucurbits, and blue mold of tobacco which have been developed in cooperation with the U.S. Weather Bureau. When the late blight forecasting research program was initiated an average of nine spray applications were needed in the East and North Central States. With the development of effective forecasting techniques and an adequate warning service, only four spray applications are now used during an average potato-growing season. This reduces not only production costs, but also the potential for pesticide residues. Research on the correlation of weather records from various segments of the United States with plant disease epidemics, using electronic computing equipment, would be conducted at Beltsville, Md.

With the discovery of new pests in the United States, all-out efforts are made to get rid of them. In the conduct of such eradication programs, often there are many problems related to identification of pests collected in surveys and need for information on effective treatments and other methods of control. Research is needed to find the answers. However, only limited research funds usually can be transferred from other projects to assist in the control programs. Additional funds are needed for currently inadequately financed research related to such control programs as soybean cyst nematode and corn stunt virus.

Basic research is also needed on the tolerance of many various types of pesticides and other chemicals now offered or proposed for use on the levels of intake at which they or their degradation or metabolic products accumulate in the body tissues and appear in milk, eggs, and meat products. Attention also needs to be given to appraisal of undesirable long-time effects of growth and reproduction in livestock and the time required for elimination of chemicals from body tissues. Basic studies would be conducted at the Fargo, N. Dak., laboratory, but applied research and field testing would be conducted at other locations.

Marketing research

(b) An increase of \$350,000 for basic research on the biology, ecology, physiology, and nutrition of stored-product insects.

There is practically no information available on the biology and behavior of stored-product insects under the actual conditions of their natural environments. Most of the information about these insects is based on laboratory studies under the unnatural and artificial conditions of constant temperature and humidity. Little is known about the behavior and migration of insects within areas where food products are stored, processed, or transported; the factors that influence movement from one commodity, storage area, or building to another; how far, when, or under what conditions the insects move about; or what the sources of infestation may be. More effective control methods can be based on these additional data which will better protect agricultural products in marketing channels including grain, tobacco, dried fruits and nuts, processed cereal foods, animal feeds and wool, mohair and other animal fibers.

The new techniques of using radioactive tracers would greatly facilitate this kind of research. Studies are needed to develop information as a guide to designing tests for more scientific evaluation of the effectiveness of current or new control measures. The results would also be examined carefully in a search for possible weak points where the insects might be attacked, or for entirely new approaches to control measures. The insects could be dealt with more effectively if more were known about them. Furthermore, such information is fundamental to a scientific approach to better control with a minimum use of pesticides.

The development of resistance by insects to various pesticides has been a problem with a number of insects for many years. Only recently, resistance to insecticides has been found among stored-product insects. During the past year certain species of flour beetles and grain moths have been found to be resistant to malathion and pyrethrum, the two insecticides considered safe enough

to use on or near food and feed. If these insecticides become ineffective, there are no approved insecticides that can now be substituted for them for the control of insects in food handling, processing, storage, and transportation facilities. It is, therefore, urgent that the mode of action of insecticides on various stored-product insects be studied; and the relationship of this action and the development of resistance be investigated.

3. IMPROVED CONVENTIONAL PESTICIDES AND METHODS OF APPLICATION, \$2,080,000

Farm research

(a) An increase of \$1,530,000 for research on more specific, less persistent conventional pesticides for control of insects, diseases, nematodes, weeds, etc, and for improved equipment for pesticide application.

Insecticides: A continuing need for effective insecticides of the conventional type will exist for the foreseeable future in order to produce the foods, feeds, and fibers needed by man. The problem is to find selectively toxic insecticides which are nonpersistent, and to obtain the information needed to assure that an insecticide can be safely used for the purposes intended. Highly sensitive methods of assay must be used to determine if materials under investigation leave residues in or on treated crops intended for food or feed, or if residues appear in meat, milk, eggs, or other products from animals exposed to the insecticides by contact or in their feed. Studies are also necessary to appraise the hazards of new insecticides to pollinating insects, parasites, or predators, and to fish and wildlife.

Diseases and nematodes: There will be a continuing need for fungicides and nematocides of the conventional type in the foreseeable future; and effective bactericides and viricides are badly needed. Many such new products are being developed by industry. Before these chemicals can be recommended for use it is necessary to obtain information to assure their safe use. This involves extensive and complex research. In the field of nematocides, research is needed to develop new, highly specific, nonphytotoxic chemicals. It is known that certain substances exuded from the roots of certain plants stimulate the hatching of dormant nematodes from cysts. Such leads should be exploited as they offer promise of nematode control with little chemical residue.

Weeds, growth regulators, etc.: Herbicide usage has mushroomed in recent years until today an estimated 85 million acres are treated annually. Development and safe use of herbicides depends on understanding the entry, movement, accumulation, persistence, mechanism of action, and fate of herbicides in and on plants and their products, in and on soils, and in irrigation, drainage, and other waters. Basic information is needed on the identity and importance of degradation products resulting from physiological, chemical, photochemical, and physiochemical reactions as the foundation for safer recommendations on the use of herbicides. Fundamental information is also needed on the metabolism, fate, and mechanism of action of herbicides currently in use.

Growth regulators are used widely to control or regulate the growth of plants and plant parts, to thin fruit from trees, to delay fruit drop, to prevent sprouting of potatoes and onions in storage, to prevent suckers from developing on tobacco plants, etc. Defoliant and desiccants, some of which are toxic to animals, are used as preharvest treatments on cotton. Research is also needed on these.

Improved equipment for pesticide application: Expanded research on the improvement of pesticide application equipment is needed to achieve greater effectiveness in the use of pesticides while reducing the application rates required. Compounds are often applied in excessive quantity or frequency because of such inefficiencies as drift, uneven coverage, or distribution methods that are not sufficiently specific to reach the target pests. This adds to residue problems. A substantial reduction of pesticide residue in corn stover was achieved by use of a granular carrier applied with special equipment. Research to improve spray applications and avoid drift would involve studies to develop devices for producing uniform droplet sprays, studies to determine the effect of various additives on the flow properties of the spray, and research to modify conventional nozzles. Several processes to improve pesticide aerosol deposition should be studied in depth. Research is needed to improve the control of pesticides, both sprays and dusts, applied by aircraft.

Marketing research

(b) An increase of \$550,000 for research to develop more specific, less persistent conventional pesticides, safe methods for their use, and simple rapid detection methods of residues in harvested commodities.

Development of more specific, less persistent conventional pesticides, and safe methods for controlling insects in food handling, processing, shipping, and storage areas: There are serious problems of insect infestation and damage where food and feed are handled, processed, shipped, and stored. Many control measures now used have been developed out of necessity and often by adaptation from other types of uses. Very little research has been conducted under the actual conditions of use. Some measures are of questionable effectiveness and there are potential residue hazards that have not been investigated.

There is urgent need for sound, scientific data on the safety and effectiveness of current procedures so any hazardous methods can be discontinued and so that food and drug tolerances can be established. There must also be a search for pesticides with more specificity for stored-product insects and less toxicity to warm-blooded animals, because there are some situations where control problems can be dealt with only by the use of pesticides. Studies are required on pesticide formulations and methods of application to improve efficiency, thereby reducing the total amount applied and minimizing residues.

Development of detection methods: An important function of the Department is the inspection and grading of large quantities of raw and processed agricultural commodities such as fruits, vegetables, dairy products, poultry, grain and cereal products. The commodity when presented for inspection may have pesticide residues resulting from treatments applied in the field, in the marketing channels, or both.

It is the policy of the inspection services not to approve any commodity or product that may be in conflict with food and drug law requirements. However, in these operations at the present time, it is difficult or impossible to determine promptly whether illegal pesticide residues are present.

There is urgent need to develop simple, rapid methods for detecting pesticide residues, preferably quantitative methods. There would be great value, however, in tests that would merely indicate the absence of a residue, or the presence of a residue that should receive more detailed analysis. Such methods are also urgently needed by and would be of inestimable value to others than those in the Department. Wheat and corn millers, warehousemen, food processors, and farmers need to check on residues before they buy or process raw commodities, feed livestock or poultry, apply further pesticidal controls, or move products out into commerce. Simplified analytical procedures would also facilitate research on stored-product insect control as there are increasing demands for additional residue analyses.

Development of nontoxic mothproofing treatments: Concern has been expressed over possible toxicological hazards associated with a number of the mothproofing treatments in widespread current use. More good can be accomplished by developing new, nontoxic treatments than by conducting costly toxicological studies to learn more about the dangers of toxic treatments already in use.

Preliminary studies indicate there are several groups of compounds that offer the potential of development for safe treatments. Attention to improved methods of application could bind treatments more firmly to the fibers and increase safety by eliminating the hazard of skin absorption.

There is also a need for basic research on the physiology of the unique digestive process of fabric insects and on their nutritional requirements. Team effort of insect physiologists and biochemists could be directed toward finding ways of rendering woollens indigestible or unattractive to fabric insects. This might lead to nontoxic treatments that could be applied to wool during processing. Another possibility is that clues would be developed for making changes in the chemical composition of wool to make it mothproof. These could then be worked out in cooperation with utilization research studies on wool modification.

4. TOXICOLOGY, PATHOLOGY, AND FATE OF PESTICIDES, \$1,665,000

Farm research

(a) An increase of \$345,000 for research on toxicological and pathological effects of pesticides, feed additives, etc., on livestock as found in their feed and on crops.

Expansion of research on toxicological and pathological effects of agricultural chemicals used for control of livestock pests and for control of pests on feeds and plants consumed by livestock and on antiparasitic agents is essential at this time because of current problems connected with residues in the Nation's food supplies.

Although expanded facilities are needed for a comprehensive program, significant research on some urgent phases can be undertaken in the present facilities.

Basic research is needed on mobilizers (stabilizers) and alleviators for use in livestock to eliminate or prevent absorption, stimulate excretion, and prevent accumulation of pesticides.

The proposed increase would provide for research on toxicology of insecticides for livestock and residue studies thereon to provide precise information on insecticides now approved, and on promising new ones developed. There is also an urgent need to determine the effects on the health of livestock of various chemicals now being used externally as insecticides, and to develop full information on the symptoms, lesions, safe doses, toxic doses, and the tissue residues resulting from the use of insecticides. It would also provide for research on herbicides and plant pesticides. It would involve research on the effect on livestock of weedkillers, defoliants, brushkillers, pesticides applied to plants by spraying and dusting.

Studies need to be expanded to determine the levels of residues of specific pesticides on feed crops at various stages of growth, harvesting, and storage; the effects of husbandry practices on the levels in the feeds when fed; and on the relation of the level of intake to the appearance of toxic elements in the body tissues (including the embryo) and organs, in the body excretion, and in milk and eggs. Concurrently, research would be undertaken to develop ways of assisting farmers in ascertaining when feed that they purchase is free of pesticidal residues.

Intensified research is required to evaluate management, feeding, and other methods and at least minimize and preferably eliminate the use of specific chemicals that are prone to leave residues in animal products. Such work should include assessment of grazing practices, feed harvesting and storage methods, handling feeds, and management of livestock.

(b) An increase of \$720,000 for research on fate of and the effects of pesticide residues in soils, and in crop and farmstead water supplies.

Little is known of the fate of pesticides applied to crops as to their interaction, persistence, and adverse effects in different kinds of soils. It is essential that research be undertaken to determine the changes that take place when various insecticides, herbicides and nematocides are added to soil. The reactions between pesticides and natural components of the soil such as clay and iron oxide need to be investigated. The mechanisms whereby soil micro-organisms alter and decompose pesticides need to be known in order to develop sound methods of preventing excessive accumulations. In addition, the influence of the accumulation of residues on the vital processes that the soil micro-organisms perform and whether they alter the interrelationships between soil micro-organisms need investigating. Studies would be undertaken to determine the kinds of organisms that are effective in breaking down these pesticides, which of them are inhibited by the pesticides, which kinds of pesticides are adversely affected by organisms and the kind of organism, and finally, what soil conditions are needed to stimulate the production of those organisms that are most effective in breaking down pesticides.

Practically no information exists on how and to what extent the various materials move or accumulate in different soil layers. The movement of pesticides through erosion and runoff may result in high concentrations of these materials in lowlands or in reservoirs. A basic understanding of these processes is essential to the development of sound recommendations for the use of pesticides.

The movement of pesticides and other contaminants into the massed water supplies of streams, farm ponds, reservoirs, and wells that constitute the major sources of water for livestock, farmstead use, and irrigation is essentially unknown. The mechanisms of retention of pesticide residues by the soils adjacent to such water sources or by the sediments going into such sources must therefore be fully evaluated in relation to their effect on the water quality. The effectiveness of planned buffer areas for reducing translocation of these materials to the water sources must be considered. The relationship between soil and geological stratigraphy and its influence upon the movement of pesticide and other contaminant materials to ground water supplies must be studied. Particular attention would be given to the development of equipment and techniques to assure a safe and dependable supply of farmstead water by protection of the water source from contamination or by treatment of the farmstead water supplies that have already been contaminated.

Nutrition and consumer use research

(c) An increase of \$600,000 for research on the effects of pesticides on the composition and nutritive value of the current food supply.

Government agencies are being harder pressed each year by scientists and con-

sumers for information which does not now exist on the effect of pesticides on the nutritive value of foods, whether from home gardens and orchards or from commercial production. For some 15 years the nutrition research scientists have cooperated with Department organizations engaged in entomology, crops, and marketing research and with other agencies in evaluating the consumer use qualities of foods grown or stored with exposure to various pesticides. The primary objective was to identify the levels of field application below which eating qualities were not affected. Foods studied have included vegetables grown underground (e.g., carrots, potatoes, peanuts), fruits and vegetables grown above ground (e.g., cantaloups, leafy vegetables, peaches), and also meats from treated animals.

The need is urgent to extend the methods of evaluation of cooking and eating quality, and to initiate study of the nutrient content including structural and chemical composition and the nutritional quality of foods treated with pesticides. Analyses of nutrient content by chemical methods are needed to determine whether any nutrients (vitamins, minerals, amino acids in proteins, or types of sugars and fiber) are affected in foods grown and stored under common practices using approved levels of pesticides. Furthermore, studies for biological evaluations of the nutritional quality of the foods treated by approved procedures are essential. In addition to knowing nutrient content, it is important to know whether the availability of any nutrients in the food is affected, and whether the overall nutritional value of the food has been altered in any way that would be of concern to normal consumers or would lower the nutritional quality of our current food supply. In cooperation with other USDA agencies for source of foods of known production history, the nutrition research workers with broad experience in nutritive value analyses are in a unique position to conduct such studies.

The proposed studies would involve analyses of consumer use and nutritional qualities of foods representative of different types of commodities and species commonly exposed to various pesticides in wide use, with first attention to those foods with affinity or high uptake capacity for the pesticide as known from previous work. For most of the research, commodities would be from controlled production, grown with and without pesticide treatments. When available and advisable, samples of market origin would be analyzed for nutrient and pesticide content to aid in application of experimental results to current food supplies. Exploratory work would determine whether any pesticide effect was exaggerated in cooking by usual high heat methods.

Plan of work.—The research would be conducted cooperatively at State agricultural experiment stations and at Federal stations. Close cooperative relations would be maintained with the Food and Drug Administration, Public Health Service, and other Federal and State agencies. About 40 percent of the increase would be used for research contracts and grants so as to utilize most effectively all available talents and facilities which can contribute to a solution of these problems.

The distribution of the research work by projects is estimated as follows:

	Latest budget estimate, 1965	Amendment to latest budget esti- mate, 1965	Revised total, 1965
SALARIES AND EXPENSES			
Research:			
Farm research:			
Animal husbandry.....	\$6, 739, 100	\$500, 000	\$7, 239, 100
Animal disease and parasite.....	12, 380, 600	600, 000	12, 980, 600
Crops.....	20, 677, 900	4, 275, 000	24, 952, 900
Entomology.....	11, 471, 900	4, 125, 000	15, 596, 900
Soil and water conservation.....	12, 259, 300	500, 000	12, 759, 300
Agricultural engineering.....	4, 100, 500	500, 000	4, 600, 500
Subtotal.....	67, 629, 300	10, 500, 000	78, 129, 300
Nutrition and consumer use research:			
Human nutrition.....	1, 774, 900	600, 000	2, 374, 900
All other projects.....	1, 357, 900		1, 357, 900
Subtotal.....	3, 132, 800	600, 000	3, 732, 800
Agricultural Marketing Research.....	4, 459, 875	1, 100, 000	5, 559, 875
All other projects.....	1 25, 458, 600		25, 458, 600
Construction of research facilities.....	2, 394, 300	1, 558, 000	3, 952, 300
Total, research.....	103, 074, 875	13, 758, 000	116, 832, 875

1 Excludes \$1,000,000 reappropriation for "Special fund."

Construction and alterations of research facilities

Existing facilities for research to develop means of avoiding pesticide residues are being fully utilized and in some cases are overcrowded. Construction and alterations of research facilities are needed to carry out the research program. For those facilities estimated to cost over \$1 million the increase provides only for plans for construction as contracts could not be completed and awarded during fiscal year 1965.

(1) An increase of \$260,000 for plans for facilities estimated to cost \$3,250,000 for research on livestock insects and toxicological and pathological effects of pesticides on livestock (College Station, Tex.).

In order to conduct an effective research program on control of livestock insects and to determine minimum toxic and maximum safe amounts of insecticides for livestock, it is important to have adequate research facilities. Present facilities used for this research are meager and makeshift and not adequate for the extent and type of research needed. The research needs to be expanded to meet the critical situation which exists today with regard to use of agricultural chemicals in and on livestock. It is proposed to establish the research at the College Station, Tex., Agricultural Experiment Station to take advantage of other existing research activities. Two research units are proposed as follows:

Research on livestock insects.—There is an urgent need for greatly improved methods of protecting livestock from insects, especially cattle from attack by biting flies. Losses of livestock and poultry caused by insects are estimated to be \$600 million annually. Of great concern is the development of insecticides which will not leave harmful residues in milk, meat, eggs, and other animal products. Investigation of new types of chemicals to reduce residue hazards and to develop noninsecticidal ways of controlling insects would be emphasized. Research would also be conducted to find and develop systemic insecticides for livestock insect control.

Research on toxicology and pathology.—The continuing development of insecticides and their widespread use for better control of livestock pests requires increased study of their toxic and other effects on livestock and livestock products. Methods to remove hazards and to provide antidote procedures for treatment if required need to be devised. Investigations would cover chemical, pathological, physiological, and other changes in livestock. Clinical signs, symptoms, and lesions of poisoning must be determined as well as the effect of repeated exposure to the various agricultural chemicals applied to livestock. Residues or metabolites must be determined in meat, milk, eggs, and other products. Improved techniques must be developed to demonstrate damage due to chemical and physical changes of body tissue, methods of counteracting poisoning or reducing toxicity.

(2) An increase of \$338,000 for plans for (1) facilities estimated to cost \$4,225,000 for research to control plant diseases, nematodes, and insects, for research on safer methods for control of stored-products insects and (2) laboratory facilities estimated to cost \$1,250,000 required for expanded registration and enforcement activities under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended. (An additional \$100,000 would be required for plans for (2), see p. 19.)

(NOTE.—For convenience a single justification of the total increase is presented at this point.)

Research.—One of the primary objectives in current research is the development of less persistent and more specific chemicals for control of pests, and there is urgent need for modern, well-equipped laboratories for current and future research on the control of plant diseases, nematodes, and insects, including stored-products insects. Scientists currently engaged in research on the chemical and related biological aspects of insecticides, nematocides and plant diseases are located in widely scattered, inadequately equipped laboratories at the Agricultural Research Center. Virtually all basic research and much of the applied research in these areas will be greatly facilitated if the scientists can be located in the same facility for mutual consultation and to take full advantage of the many items of costly and specialized equipment needed for fundamental studies on the analysis, mode of action, etc., of various types of synthetic and naturally occurring chemicals that need full exploration in the all-out effort to develop pesticides that will avoid or reduce risks of the nature discussed in the advisory committee report.

The additional facilities are needed for research on new and improved methods of reducing plant diseases and parasitic plant nematodes through fundamental

studies on mode of action of fungicides, nematocides, bactericides, and viricides, and host-parasite relationship; to develop nontoxic pesticides, lower concentrations of currently used pesticides and biological forms of control, and to provide for chemicals and related biological research on materials will lead to effective, specific, and safe ways to meet insect problems, including stored-products insects. Present facilities are inadequate for the highly specialized research required. The new facilities proposed for construction would provide for the following:

1. Controlled environment rooms that will provide reproducible growth conditions so that research on host-parasite relationship can be attacked, with the objective to discover stages in the plant or parasite where control measures can be most successfully applied.

2. Modern chemical laboratories for development of newer, safer, and more efficient chemical methods for controlling fungus, bacterial, virus and nematode diseases of plants. This would involve a search for systemic fungicides, viricides, bactericides, and nematocides, repellants for nematodes, chemosterilants for nematodes, and sporulation inhibitors for fungi.

3. Microbiological, and biological laboratories with modern equipment to investigate integrated biological and chemical control of plant diseases and nematodes. This would involve research on crop residues and other soil amendments to determine the factors involved in suppressing soilborne diseases and nematodes, and the kinds of crop sequences needed to reduce disease and nematode attacks.

4. Research on the development of analytical methods for insecticide residues and for research on the nature and fate of such residues in connection with tolerance requirements on chemical research concerned with the development of new and safer insecticide formulations; on the synthesis of new and highly specific insecticidally active substances such as chemosterilants, repellants, and organic chemical attractants; on basic chemical investigations of such approaches as the use of hormones that would transfer with the growth and development of insects; and on the biological evaluation of insecticidally active candidate substances that might be useful for insect control.

5. Research on the many pests attacking products in storage, processing facilities, and channels of trade carried on by the Agricultural Marketing Service. A better basic understanding of the chemical and physical properties of pesticides and their deposits in relation to their performance is needed, leading to safer and more efficient use for protecting food and feed during storage processing, and market distribution. Basic research is also needed to develop chemicals nontoxic to warmblooded animals but with specific activity against stored-products insects through disrupting their normal physiological processes.

Proposed facilities are as follows:

Laboratory office building, 76,800 square feet.....	\$2,747,000
Greenhouse-headhouse facilities, 29,200 square feet.....	500,000
Growth rooms, 800 square feet.....	160,000
Insecticide mixing building, 2,400 square feet.....	84,000
Land preparation, roads, parking, etc.....	100,000
Plans, specifications, supervision of construction and contingencies..	634,000
Total.....	4,225,000

Regulatory.—Increased regulatory activities under the act require laboratory analyses and greenhouse and field evaluation relating to the fields of chemistry, bacteriology, plant biology, pharmacology, and entomology to evaluate pesticide formulations. Existing facilities are most inadequate. The proposed construction would provide the additional laboratory space needed and would be so constructed to provide for greater utilization of the present space.

Proposed facilities.—The facilities would be located at Beltsville, Md., on federally owned land. They would provide a net total of 23,000 square feet of laboratory-office space and 15,000 square feet of headhouse-greenhouse space as follows:

Pharmacology: Laboratory, animal room, and office space for the evaluation of the potential hazards of pesticide chemicals and their formulations to man and beneficial animals and for the maintenance of a screening program on products designed for direct use on humans or animals or in human environment.

Chemistry: Laboratory and office space for the analysis of pesticide products taken from interstate shipments.

Bacteriology: Laboratory space for the evaluation of the efficiency of sanitizers, disinfectants, and sterilizers for uses including swimming pools, drinking water, and air sanitizer treatments.

Plant biology: Headhouse-greenhouse space for the evaluation of agricultural and industrial fungicides, herbicides, defoliants, desiccants, nematocides, and algaeicides for effectiveness and phytotoxicity.

Entomology: Headhouse-greenhouse space for the evaluation of insecticides used against crop, ornamental, and household pests and against those occurring on livestock, poultry, and pets for effectiveness and phytotoxicity.

Other service building: Storage of animal feeds, cages, equipment, and supplies.

(3) An increase of \$160,000 for plans for an insect attractants and stored-product insects laboratory estimated to cost \$2 million (Gainesville, Fla.).

There is great need for adequate facilities for research on insect attractants and stored-product insects environmental research. Insect attractants are highly specific and avoid or minimize chances of undesirable pesticide residues on foods or feeds, or hazards to wildlife and beneficial insects.

Recent advances in scientific knowledge of attractants indicate there is great promise that further research could result in developing highly desirable methods for detecting and controlling insects on the farm, homes, etc. Success has recently been achieved in (1) development of bait sprays used in eradicating the Mediterranean fruit fly with minimum amounts of malathion, and (2) development of a bait which incorporates the insecticide, mirex, which has permitted a great reduction in the use of pesticides for fire ant eradication. Promising research is now underway to develop attractants for the gypsy moth, the American cockroach, and other important pests.

The facility being proposed at Gainesville, Fla., would house stored-product insect environmental research. The program would emphasize research on the biology, ecology, physiology, and nutrition of stored-product insects, and research on mode of action of insecticides and the relationship to the development of resistance to insecticides by stored-product insects.

Currently available facilities are too limited to undertake research on the scale needed to meet the critical problems related to residues.

Proposed facilities are as follows:

Laboratory-office building, 43,400 square feet.....	\$1, 405, 000
Greenhouse-headhouse, 7,500 square feet.....	130, 000
Storage, 3,400 square feet.....	53, 000
Service shops, 4,000 square feet.....	72, 000
Land preparation, roads, etc.....	90, 000
Plans, specifications, supervision of construction and contingencies..	250, 000
Total.....	2, 000, 000

It is proposed to locate the facility at Gainesville, Fla., where land is federally owned and other entomology work is underway.

(4) An increase of \$800,000 to provide for construction of laboratory facilities for expanded research on insect control in agricultural products in marketing channels (Savannah, Ga.).

There is urgent need for adequate facilities to conduct the expanded research program on nonpesticidal methods for the control of stored-product insects; development of simple and rapid detection methods for residues in harvested commodities; development of more specific, less persistent pesticides; development of nontoxic mothproofing treatments; and research on the fate and effects of pesticide residues in harvested raw agricultural commodities in marketing channels and of processed commodities.

The present facilities at Savannah are not adequate for the urgently needed expanded research programs on marketing problems related to pesticide use. They consist of temporary frame structures, most of which were erected in the 1930's and subsequently used as barracks by the Navy in World War II. The better constructed buildings will be safer and used for applied research. The proposed new facilities would provide the needed laboratory space for the closely related basic research which would be carried on at Savannah and which requires modern laboratories with temperature and humidity control systems and other specialized facilities for commodity storage research.

Proposed facilities are as follows :

Laboratory-office building, 20,000 square feet-----	\$670, 000
Storage, 1, 800 square feet-----	20, 000
Plans and specifications, supervision of construction and contingencies-----	110, 000
Total-----	800, 000

It is proposed to locate the facility at Savannah, Ga., where federally owned land is available. It is expected that plans and specifications can be completed and the construction contract awarded during fiscal year 1965.

Plant and animal disease and pest control

1. An increase of \$420,000 under the project "plant pest control" for evaluation of pest control and eradication programs with special reference to environmental impact associated with control and eradication procedures and initiation of necessary field activities to monitor pesticides in agriculture.

Need for increase.—The President's Science Advisory Committee in its report on "Use of Pesticides" made the following recommendation :

"Provide, as part of the operating budgets of Federal control and eradication programs, funds to evaluate the efficiency of the programs and their effects on nontarget organisms in the environment. Results of these studies should be published promptly."

All available manpower and resources in plant pest control and eradication programs have had to be fully committed to the conduct of the work. These programs are planned and conducted with the full participation of State and local agencies. Every effort has been made to provide for cooperative work plans to protect the public health and minimize the impact of the control efforts to fish, wildlife, beneficial insects, and other values. In the cooperative programs, methods improvement work has provided techniques for field application of pesticides and better chemical treatments such as the corncob grit bait impregnated with "mirex" now being used extensively to control the imported fire ant. As possible, monitoring of these cooperative programs concurrently with their field operation has provided timely information to field personnel to minimize the impact of the program on other than the target organisms.

In fiscal year 1964 Congress provided \$125,000 to initiate a special program in this field. There is an urgent need to conduct additional special field operations to improve control and eradication measures and for more extensive monitoring of pesticides generally in use in agriculture. As Federal-State-local cooperative programs account for only a small proportion of the total uses of pesticides in agriculture, there is need for greater emphasis on monitoring the use of pesticides by farmers.

The proposed increase would permit the establishment of field monitoring operations in different geographical areas of the country. These would provide for (1) field sampling of crops and crop products, soils, water, and domestic animals, (2) conducting surveys to collect data from other agencies concerned with the use of pesticides, and (3) develop and record data on the impact of pesticides on soils, water, crops, livestock, and beneficial insects.

Plan of work.—The proposed increase would provide the necessary funds and resources to implement the recommendation of the report of the President's Science Advisory Committee by extending the present monitoring activities and initiating a program to monitor the general use of pesticides in agriculture.

A specialized unit would be established to direct the acquisition and processing of basic information on the environmental impact of control and eradication programs. Activities would be conducted to—

(1) Determine existing levels (pretreatment) of pesticides in the agricultural environment including soils, water, crops, and other agricultural products.

(2) Sample the areas after treatments and periodically thereafter to determine trends of depletion or accumulation of residues.

(3) Study impact of pesticides on nontarget organisms in the environment including domestic animals, beneficial insects, fish, wildlife, and other values.

(4) Evaluate results of studies and develop reports for appropriate distribution to all interests involved in pesticide use.

(5) Evaluate current and alternate pest control procedures in order to increase effectiveness and reduce residues.

2. An increase of \$180,000 under the project "pesticides regulation" to implement additional activities under interagency agreement with the Departments of Health, Education, and Welfare and the Interior relating to pesticides registration.

Need for increase.—The President's Science Advisory Committee in the report on "Use of Pesticides" emphasized the need for interagency coordination within the Departments of Agriculture; Interior; and Health, Education, and Welfare on the many and varied matters relating to pesticide chemicals. Further, the Congress has repeatedly stressed the need for a better coordinated and more concerted Federal approach in the field of pesticidal formulations. It has been emphasized that agricultural producers must be assured that pesticide chemicals can continue to be used safely and effectively and not render agricultural products unmarketable with subsequent loss of farm income. In response to these recommendations, an agreement has been developed by the three Federal agencies assigning specific responsibilities to each department which will require substantial additional activity.

Since the Department of Agriculture has primary and final responsibility for the registration of pesticides, the agreement will place especially heavy demands on its scientific and professional staff. The Department will be required to provide additional data and to render professional opinions to the other agencies in the critical studies made of information on pesticide chemical products submitted for registration and of petitions for tolerances for pesticide residues. The present undermanned pesticides regulation staff is not adequate to undertake these additional activities. Additional scientific and professional personnel knowledgeable in each of the various fields of pesticide chemicals will be required to maintain the day-to-day liaison with specialists in both the Departments of Interior and Health, Education, and Welfare which is necessary under the agreement. The existing staff is hard pressed to keep abreast of its present workload in carrying out the Department's responsibility for registering pesticide products under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended.

The Department of Agriculture is required by the agreement to furnish the Departments of Health, Education, and Welfare, and Interior with weekly listings of all proposals affecting registration and amendments. It is expected that this will involve from 350 to 500 products each week. Many questions will arise from these listings regarding the actual use of the product under practical conditions from the standpoint of use by the public and any associated health hazards, as well as effects of products on fish and wildlife. All the data furnished by the registrant will be subjected to review by the advisory agencies. This will require additional examination of available data by Department of Agriculture scientific personnel on the physical characteristics of the product which might affect its ability to drift or otherwise cause contamination; its use in combination with other pesticides; the extent of use in a particular environment; manner of application; whether it is applied nationwide or regionally, and numerous other questions. It is expected that additional examinations on pharmacological and chemical matters will be needed also. In some instances, it will be necessary to obtain additional data from the registrant.

Plan of work.—The proposed increase would provide the additional scientific and technical personnel in the specialized fields of pesticide chemicals needed to carry out the day-to-day coordination of activities with specialists in the other Federal agencies.

Construction of facilities

(1) An increase of \$100,000 for plans for construction of laboratory facilities for expanded registration and enforcement activities under the Federal Insecticide, Fungicide, and Rodenticide Act estimated to cost \$1,250,000 (Beltsville, Md.).

The justification for this increase appears on page 15.

AGRICULTURAL RESEARCH SERVICE—SALARIES AND EXPENSES

Program and financing

	Latest estimate 1965	Revised estimate	Increase
Program by activities:			
1. Research:			
(a) Farm research	\$66,671,300	\$77,171,300	\$10,500,000
(b) Utilization research and development	25,452,600	25,452,600	-----
(c) Nutrition and consumer use research	3,096,800	3,696,800	600,000
(d) Construction of facilities	2,896,500	3,718,500	822,000
(e) Contingencies	1,000,000	1,000,000	-----
(f) Marketing research	4,459,875	5,559,875	1,100,000
Total, research	103,577,075	116,599,075	13,022,000
2. Plant and animal disease and pest control:			
(a) Plant disease and pest control	27,068,600	27,488,600	420,000
(b) Animal disease and pest control	39,522,800	39,522,800	-----
(c) Pesticides regulation	2,313,600	2,493,600	180,000
(d) Construction of facilities		100,000	100,000
Total, plant and animal disease and pest control	68,905,000	69,605,000	700,000
3. Meat inspection			
Total, program costs ¹	203,319,075	217,041,075	13,722,000
Change in selected resources ²	-502,200	233,800	736,000
Total obligations	202,816,875	217,274,875	14,458,000
Financing: New obligational authority (appropriation)	202,816,875	217,274,875	14,458,000

¹ Includes capital outlay as follows: Latest estimate, \$12,330,000; revised estimate, \$16,126,000.

² Selected resources as of June 30 are as follows:

	Latest estimate 1965	Revised estimate
Stores	\$581,000	\$581,000
Unpaid undelivered orders	13,237,000	13,973,000
Advances	735,000	735,000
Total	14,553,000	15,289,000

Object classification

	Latest estimate, 1965	Revised estimate	Increase
AGRICULTURAL RESEARCH SERVICE			
11 Personnel compensation:			
Permanent positions.....	\$126,696,000	\$129,129,800	\$2,433,800
Positions other than permanent.....	4,652,700	4,750,700	98,000
Other personnel compensation.....	1,701,000	1,711,200	10,200
Total personnel compensation.....	133,049,700	135,591,700	2,542,000
12 Personnel benefits.....	10,128,900	10,321,400	194,500
21 Travel and transportation of persons.....	5,807,500	5,939,500	132,000
22 Transportation of things.....	1,096,800	1,120,800	24,000
23 Rent, communications, and utilities.....	3,728,600	3,826,600	98,000
24 Printing and reproduction.....	1,108,000	1,126,000	18,000
25 Other services.....	13,521,300	18,290,300	4,769,000
Services of other agencies.....	7,356,100	7,425,100	89,000
26 Supplies and materials.....	13,481,075	14,640,575	1,159,500
31 Equipment.....	8,024,100	10,598,100	2,574,000
32 Lands and structures.....	1,296,000	1,596,000	300,000
41 Grants, subsidies, and contributions:			
Grants for research.....	372,000	1,272,000	900,000
Payment to Mexican United States Commission for the Prevention of Foot-and-Mouth Disease.....	24,000	24,000	-----
42 Insurance claims and indemnities:			
Indemnities:			
Tuberculosis.....	300,000	300,000	-----
Brucellosis.....	1,400,000	1,400,000	-----
Scrapie of sheep.....	250,000	250,000	-----
Hog cholera.....	600,000	600,000	-----
Subtotal.....	201,522,075	214,322,075	12,800,000
Deduct quarters and subsistence charges.....	98,000	98,000	-----
Total, Agricultural Research Service.....	201,424,075	214,224,075	12,800,000
ALLOCATION TO GENERAL SERVICES ADMINISTRATION			
25 Other services.....	117,100	1,039,100	922,000
32 Lands and structures.....	1,275,700	2,011,700	736,000
Total, General Services Administration.....	1,392,800	3,050,800	1,658,000
Total obligations.....	202,816,875	217,274,875	14,458,000

Personnel summary

	Latest estimate, 1965	Revised estimate	Increase
Total number of permanent positions.....	18,993	19,549	556
Full-time equivalent of other positions.....	1,101	1,125	24
Average number of employees.....	18,880	18,778	398
Employees in permanent positions, end of year.....	17,710	18,238	528
Employees in other positions, end of year.....	2,022	2,062	40

COOPERATIVE STATE RESEARCH SERVICE
1965 budget amendment

Budget page	Heading	Original estimate	Revised estimate	Increase
91	Payments and expenses----- (The amounts immediately following the black bracketed amounts should be amended as indicated below; and the italicized language added.) For payments to agricultural experiment stations, for grants for cooperative forestry research, for basic scientific research, and for facilities, and for other expenses, including [\$40,863,000] <i>\$43,863,000</i> to * * * [\$1,000,000] <i>\$1,550,000</i> for grants for cooperative forestry research * * * (16 U.S.C. 582a-582a-7); <i>\$2,000,000</i> , in addition to funds otherwise available, for grants for support of basic scientific research under the Act (approved September 6, 1958 (42 U.S.C. 1891-1893)); <i>\$3,242,000</i> for grants for facilities under the Act approved July 22, 1963 (77 Stat. 90); \$310,000 for penalty mail costs of agricultural experiment stations under section 6 of the Hatch Act of 1887, as amended; and \$267,000 for necessary expenses * * * in all, [\$42,440,000] <i>\$51,232,000</i> .	\$42,440,000	\$51,232,000	\$8,792,000

EXPLANATION OF LANGUAGE

The proposed language would appropriate an additional \$5,550,000 for fiscal year 1965 for research on pesticide residues; and \$3,242,000 for assistance in the construction, acquisition, and remodeling of facilities at the State agricultural experiment stations.

PURPOSE AND NEED FOR BUDGET AMENDMENT

Research on pesticide residues

(a) *Direct research.*—To implement the pressing need for new and better methods for controlling insects, diseases, and other pests of agriculture, and in view of the national concern on problems related to the safe use of pesticides and protection of high-quality products at low cost to the consumer, \$5,550,000 in additional funds are requested in an amendment for 1965. The research funds provided under the Hatch Act (Public Law 84-352), the Cooperative Forestry Research Act (Public Law 87-788), and the Basic Research Act (Public Law 85-934) would be available for research in the following research areas and approximate amounts:

1. Research on control of plant pests and diseases and animal parasites by biological, nonchemical, and sterility methods or by use of attractants, repellants etc., and including studies of innocuity of controls developed; and plant genetic and breeding research to develop plant varieties resistant to plant pests thereby reducing or eliminating the need for chemical controls, \$1,750,000.
2. Basic research on the biology, ecology, physiology, pathology, metabolism, and nutrition of pest insects and their parasites, plant and animals to develop new improved and safe means of reducing plant and animal pests, \$900,000.
3. Research on more specific, less persistent conventional pesticides, improved methods of application, and the development of detection methods for detecting residues in processing and marketing of agricultural products, \$1,400,000.
4. Research on toxicological and pathological effects of pesticides and other agricultural chemicals on insects, plants, and animals, and the fate and effect of such pesticides in the soil and water, \$1,500,000.

(b) *Facilities.*—\$3,242,000 are requested under Public Law 88-74 approved July 22, 1963, to provide new facilities and make possible the renovation of existing structures to accommodate the new and complex equipment of modern research which is essential in the operation of current programs and would make possible expansion in critical areas of research including the research on pesticide residues.

Justification of budget amendment for "Payments and expenses"

	Budget estimates, 1965	Amendment to budget estimates, 1965	Revised estimates, 1965
1. Payments to agricultural experiment stations: (a) For agricultural research under the Hatch Act ¹	\$39,860,721	+\$2,910,000	\$42,770,721
2. Grants for cooperative forestry research.....	1,000,000	550,000	1,550,000
3. Grants for basic scientific research: (a) For research on pesticide residues.....		+2,000,000	2,000,000
4. Grants for facilities.....		+3,242,000	3,242,000
5. Federal administration.....	1,269,279	+90,000	1,359,279
6. Penalty mail.....	310,000		310,000
Total, payments and expenses.....	42,440,000	+8,792,000	51,232,000

¹ Excludes the 3 percent increase provided under this item, which under the act of August 11, 1955, is available for Federal administration, and is included in that item below.

The agricultural experiment stations have played a prominent part in the development of controls for agricultural and other pests. Station staff, due to their close association with pest problems and problem solution, have acquired a high degree of competence in many areas of research study needed to find new methods of control that will eliminate health hazards to consumers of agricultural products and our general population. At present, more than 33 stations, cooperating with the USDA, are participating in regional research to help solve residue problems. The State stations and nine schools of forestry have demonstrated interest and work in pest control as it affects our forests and wildlife. Basic research in the detoxication of residues in soils, the development of specific pesticides that will not harm other forms of life, biological controls, and the use of integrated control methods are urgently needed. Many pesticide residue laboratories at the State stations are in crowded and poorly designed quarters, which limits their maximum usefulness. Renovation of these facilities to provide more efficient use would permit a more effective research program on pesticide residues.

COOPERATIVE STATE RESEARCH SERVICE—1965 BUDGET AMENDMENT, PAYMENTS AND EXPENSES

Program and financing

[In thousands of dollars]

	Latest estimate, 1965	Revised estimate, 1965	Increase
Program by activities:			
1. Payments to agricultural experiment stations: (a) For agricultural research under the Hatch Act.....	39,861	42,771	2,910
2. Grants for cooperative forestry research.....	1,000	1,550	550
3. Grants for basic scientific research.....		2,000	2,000
4. Grants for facilities.....		3,242	3,242
5. Federal administration.....	1,269	1,359	90
6. Penalty mail.....	310	310	
Total program costs.....	42,440	51,232	8,792
Financing: New obligational authority (appropriation).....	42,440	51,232	8,792

Object classification

[In thousands of dollars]

	Latest estimate, 1965	Revised estimate, 1965	Increase
11 Personnel compensation:			
Permanent positions.....	955	988	33
Positions other than permanent.....	5	5	
Other personnel compensation.....	15	15	
Total personnel compensation.....	975	1,008	33
12 Personnel benefits.....	71	74	3
21 Travel and transportation of persons.....	117	143	26
22 Transportation of things.....	10	10	
23 Rent, communications, and utilities.....	315	325	10
24 Printing and reproduction.....	28	30	2
25 Other services.....	23	25	2
Services of other agencies.....	20	20	
26 Supplies and materials.....	10	16	6
31 Equipment.....	10	18	8
41 Grants, subsidies, and contributions.....	40,861	49,563	8,702
Total obligations.....	42,440	51,232	8,792

Personnel summary

	Latest estimate, 1965	Revised estimate, 1965	Increase
Total number of permanent positions.....	111	117	6
Full-time equivalent of other positions.....	3	3	
Average number of all employees.....	96	101	5
Employees in permanent positions, end of year.....	99	105	6
Employees in other positions, end of year.....	2	2	

[S. Doc. 85]

EXTENSION SERVICE

1965 budget amendment

Budget appendix page	Heading	Original estimate	revised estimate	Increase
93	Cooperative extension work, payments and expenses.....	\$77,679,000	\$79,979,000	\$2,300,000
	Payments to States and Puerto Rico:			
	Payments for cooperative agricultural extension work under the Smith-Lever Act.....	(63,135,000)	(65,235,000)	(2,100,000)
	Payments and contracts under the Agricultural Marketing Act.....	(1,570,000)	(1,570,000)	
	Retirement and employees compensation costs for extension agents.....	(7,410,000)	(7,510,000)	(100,000)
	Penalty mail.....	(3,113,000)	(3,113,000)	
	Federal Extension Service.....	(2,451,000)	(2,551,000)	(100,000)

PURPOSE AND NEED FOR SUPPLEMENTAL FUNDS

There is immediate need for a greatly expanded educational program designed to insure that knowledge of the safe, economic use and residue limitations and effects of use of chemicals is applied by—

(1) Producers of farm products need current detailed knowledge of pest control chemicals—their use and limitations, and public regulations governing their use. Due to the currently changing regulations, new chemicals, and recommendations regarding the use of chemicals, users must be kept up to date to avoid severe economic losses and impairment of health. This involves a constant flow of in-

formation to the public. It is proposed that in addition to work now underway specialized area agents supported by competent staff in Federal Extension Service and at the State level be employed to work with producers to insure that they understand alternative applications of different uses, how to use chemicals, and exhibit necessary skills in using chemicals. Producers must be aware of the need for consumers' protection and wildlife conservation as well as economic values accruing by the use of chemicals. Producers must be made aware of their public responsibilities as they use agriculture chemicals.

(2) Many home gardeners and householders have little knowledge of pests and their control. They frequently use chemicals carelessly, with little knowledge of consequences.

Many personnel retailing chemicals to homeowners know little about the products they sell, their proper use, or alternative ways of solving pest problems.

Householders as a group of chemical users is increasing rapidly. Because their use is not subject to health inspection, carelessness in use is widespread. This misuse not only affects the immediate user but also creates dangers to neighbors. Because of the number included in these groups, increased educational work will of necessity include use of all forms of mass media, publications prepared for use by urban dwellers, work with existing organizations and groups—all directed to safe and proper use of chemicals. This educational effort must also provide information in the selection of chemicals which are effective.

(3) Processors, distributors and retailers of food products. This group is increasing their use of chemicals. Many small operators in the marketing process need educational assistance in the use of chemicals. Knowledge of tolerances and consumer protection are high in priority in helping this group use the proper chemicals safely.

(4) The public is called upon to make public decisions governing the use of chemicals. These decisions should be based not on emotion but objective evaluation of scientific facts on all sides of these issues.

The public needs to know and understand safe tolerances, that their interests are of major concern to those using chemicals in production and marketing of food, and are aware of the contributions which safe use of chemicals makes to them through the supply of high quality economical food. They also need to have objective information about other effects of chemicals on wildlife, human beings, and livestock as a basis making judgments regarding public decisions, ordinances, etc., affecting the use of chemicals.

(5) There is a host of local public agencies using chemicals to control insects and other pests. This includes mosquito control commissions, State parks, county and State highway departments, and others. They need thorough knowledge of alternative ways of accomplishing their missions and the various incidental effects as well as knowledge of proper use of chemicals which they apply.

From a point of view of national public interest an intensive educational program is urgently needed to overcome these problems. It is not enough to conduct research on pest control and the use of chemicals—the knowledge from research must be understood and applied. There is currently a great reservoir of knowledge to be applied. The program is needed now.

Justification of budget amendment for "Cooperative extension work, payments and expenses"

Project	Budget estimates, 1965	Amendment to budget estimates, 1965	Revised estimates, 1965
1. Payments to States and Puerto Rico:			
(a) Payments for cooperative agricultural extension work under the Smith-Lever Act.....	\$62,960,000	+\$2,100,000	\$65,060,000
(b) Payments and contracts under the Agricultural Marketing Act.....	1,570,000	-----	1,570,000
2. Retirement and employees' compensation fund costs for extension agents.....	7,410,000	+100,000	7,510,000
3. Penalty mail (for extension agents and State extension directors).....	3,113,000	-----	3,113,000
4. Federal Extension Service.....	2,626,000	+100,000	2,726,000
Total available or estimate.....	77,679,000	+2,300,000	79,979,000

1. Payments to States and Puerto Rico

(a) Payments for cooperative agricultural extension work under the Smith-Lever Act: The pesticides chemicals problem is nationwide in scope. However, the degree of immediate concern varies, therefore funds would be allocated on the basis of special need taking into consideration such factors as the current value, acreage, and type of agricultural production, extent or degree of the pesticides chemicals problem, and total population. The increase of \$2,100,000 would provide for approximately 150 man-years of professional employment by the cooperative extension services in the 50 States and Puerto Rico. These funds would be appropriated under section 3(d) of the Smith-Lever Act. The sum of \$1,500,000 shall be disbursed under the formula, 20 percent shall be paid to the States in equal proportions, 40 percent on the basis of farm population, and 40 percent on the basis of rural population. In addition \$600,000 shall be disbursed on the basis of special projects taking into consideration the severity of the problem and other factors.

2. Retirement and employees' compensation fund costs for extension agents

It is estimated that about 75 percent of the proposed Federal increase of \$2,100,000 for 1965 will be used for salaries of personnel subject to the retirement act. After applying 6.5 percent employer's retirement contribution, the Extension Service will require an increase of \$100,000 to cover the employer's matching requirement for 1965 on a full year's basis.

4. Federal extension service

The nature of the pesticides problem and the need for immediate nationwide action requires strengthening the national leadership and coordination of the educational efforts of the States and the Department. The program can be made more effective and responsive to immediate need by the Federal office (1) keeping the States up to date on changes in Federal regulations regarding use of chemicals and results and application of Department and State research, (2) training State staff in both technical and educational methods and skills, (3) helping in the evaluation of State programs and procedures and recommending adjustments. It is proposed to provide \$100,000 for these purposes.

The addition of well-qualified and experienced personnel to augment the efforts of the current staff will provide the amount and kind of leadership needed to make the program productive.

EXTENSION SERVICE—COOPERATIVE EXTENSION WORK, PAYMENTS, AND EXPENSES

Program and financing

[In thousands of dollars]

	1965 original estimate	1965 revised estimate	1965 increase
Program by activities:			
1. Payments to States and Puerto Rico:			
(a) Payments for cooperative agricultural extension work under Smith-Lever Act.....	62,960	65,060	2,100
(b) Payments and contracts under the Agricultural Marketing Act.....	1,605	1,605	-----
2. Retirement and employees' compensation costs for extension agents.....	7,410	7,510	100
3. Penalty mail.....	3,113	3,113	-----
4. Federal Extension Service.....	2,626	2,726	100
Total program costs, funded ¹	77,714	80,014	2,300
Change in selected resources ²	-35	-35	-----
Total obligations.....	77,679	79,979	2,300
Financing: New obligational authority (appropriation).....	77,679	79,979	2,300

¹ Includes capital outlay as follows: 1965, \$14,000.

² Selected resources as of June 30, 1965, are as follows: Unpaid undelivered orders, \$100,000; advances \$34,000.

Object classification

[In thousands of dollars]

	1965 original estimate	1965 revised estimate	1965 increase
11 Personnel compensation:			
Permanent positions.....	1,965	2,025	60
Positions other than permanent.....	9	9	-----
Other personnel compensation.....	12	12	-----
Total personnel compensation.....	1,986	2,046	60
12 Personnel benefits.....	7,556	7,661	105
21 Travel and transportation of persons.....	230	245	15
22 Transportation of things.....	37	43	6
23 Rent, communications, and utilities.....	3,161	3,163	2
24 Printing and reproduction.....	97	100	3
25 Other services.....	104	106	2
Services of other agencies.....	19	19	-----
26 Supplies and materials.....	25	26	1
31 Equipment.....	9	15	6
41 Grants, subsidies, and contributions.....	64,455	66,555	2,100
Total obligations.....	77,679	79,979	2,300

Personnel summary

	1965 original estimate	1965 revised estimate	1965 increase
Total number of permanent positions.....	231	239	8
Full-time equivalent of other positions.....	2	2	-----
Average number of all employees.....	222	228	6
Employees in permanent positions, end of year.....	224	232	8
Employees in other positions, end of year.....	3	3	-----

Distribution of \$1,500,000 on basis of 20 percent equally: 40 percent on rural population and 40 percent on farm population

Alabama.....	\$38,860	Nebraska.....	\$25,899
Alaska.....	7,496	Nevada.....	7,225
Arizona.....	11,560	New Hampshire.....	9,409
Arkansas.....	30,935	New Jersey.....	15,552
California.....	43,217	New Mexico.....	11,857
Colorado.....	16,261	New York.....	46,135
Connecticut.....	12,873	North Carolina.....	69,829
Delaware.....	8,390	North Dakota.....	18,945
Florida.....	24,311	Ohio.....	55,792
Georgia.....	42,167	Oklahoma.....	26,164
Hawaii.....	7,956	Oregon.....	18,962
Idaho.....	15,277	Pennsylvania.....	55,778
Illinois.....	50,657	Puerto Rico.....	53,053
Indiana.....	45,351	Rhode Island.....	7,314
Iowa.....	47,850	South Carolina.....	35,880
Kansas.....	28,612	South Dakota.....	19,038
Kentucky.....	47,250	Tennessee.....	49,081
Louisiana.....	28,682	Texas.....	61,102
Maine.....	13,030	Utah.....	10,136
Maryland.....	19,707	Vermont.....	10,544
Massachusetts.....	16,548	Virginia.....	41,732
Michigan.....	47,066	Washington.....	22,630
Minnesota.....	44,660	West Virginia.....	23,439
Mississippi.....	43,490	Wisconsin.....	44,739
Missouri.....	44,335	Wyoming.....	9,243
Montana.....	13,981	Total.....	1,500,000

ECONOMIC RESEARCH SERVICE

1965 budget amendment

Budget page	Heading	Original estimate	Revised estimate	Increase
104	Salaries and expenses.....	\$9,476,000	\$9,976,000	\$500,000

PURPOSE AND NEED FOR BUDGET AMENDMENT

Pesticides and some other agricultural chemicals are creating hazards to people, farming, and wildlife. Little information is now available upon which to base any assessment of the economic considerations inherent in use of chemical pesticides or of alternative ways to control pests. Research is urgently needed to explore and evaluate the economic, as well as the physical and biological, facets of chemical control of agricultural pests.

Justification of budget amendment for "Salaries and expenses"

Project	Budget estimates, 1965	Amendment to budget estimates, 1965	Revised estimates, 1965
Farm economics.....	\$3,423,900	+\$500,000	\$3,923,900
Marketing economics.....	2,970,500		2,970,500
Domestic and foreign economic analysis.....	3,081,600		3,081,600
Total, salaries and expenses.....	9,476,000	+500,000	9,976,000

This estimate provides additional funds for economic research on comparative costs and benefits from use of pesticides and collection of basic data on current practices, costs, and methods of controlling pests, involving use of toxic chemicals in major agricultural areas of the Nation, and effects of restrictions on the use of toxic chemicals in agricultural production, \$500,000.

Pesticides and other chemicals play a vital role in assuring an adequate supply of high-quality food and fiber. Proper use of agricultural chemicals increases efficiency in farming, but some chemicals and improper use of others create hazards to people, to farming and wildlife. Elimination or restriction of use of those chemicals regarded as hazardous will have a significant impact on the supply and quality of farm commodities, the income of producers, and the cost of commodities to consumers, unless some less hazardous substitutes can be found that are equally effective and no more costly. Physical and biological research can be expected to produce alternative ways to control plant and animal pests. However acceptance and use of alternative methods of control in commercial farming will depend chiefly on relative costs and results as measured by efficiency of output. Little information is now available upon which to base any assessment of the economic consideration inherent in use of chemical pesticides or of alternative ways to control pests. Appropriate research is needed to explore and evaluate the economic, as well as the physical and biological facets of chemical control of agricultural pests.

Research would be conducted in three areas. First, a national survey of a sample of farms is needed to obtain basic data regarding the current uses of agricultural chemicals, particularly those regarded as toxic to man. Data would include type of chemical used, method, rate and frequency of application, crop and livestock to which applied, acreage covered, numbers of animals treated, and total production of crops and livestock. Such a survey would provide descriptive data regarding current practices and usage of chemicals in agricultural production and data vital to the evaluation of the aggregate economic implications of alternative methods of plant pest control or of restrictions on the use of chemicals. Second, research is needed on the comparative farm costs and returns associated with alternative methods of controlling agricultural pests. Such

research would be closely coordinated with the research of agronomists, entomologists, and other physical scientists both in the Department of Agriculture and in the State agricultural experiment stations. The results of this research in conjunction with data collected in the national survey is essential to the assessment of the aggregative implications with respect to the supply of agricultural commodities associated with alternative methods of control and in turn upon the level of agricultural income. Third, a further essential is research that would draw upon the results of the national survey and the analysis of comparative farm returns together with research already being conducted by the Department of Agriculture. This would involve relating changes in supply to the structure of the demand for agricultural commodities for purpose of assessing the aggregate implications of changing use of agricultural chemicals with regard to prices and farm income as well as implications to food and fiber costs to the ultimate consumer.

ECONOMIC RESEARCH SERVICE—SALARIES AND EXPENSES

Program and financing

[In thousands of dollars]

	Original estimate, 1965	Revised estimate, 1965	Increase
Program by activities:			
1. Farm economics.....	3,424	3,924	500
2. Marketing economics.....	2,971	2,971	-----
3. Domestic and foreign economic analysis.....	3,081	3,081	-----
Total program costs, funded (obligations).....	9,476	9,976	500
Financing: New obligational authority (appropriation).....	9,476	9,976	500

Object classification

[In thousands of dollars]

	Original estimate, 1965	Revised estimate, 1965	Increase
11 Personnel compensation:			
Permanent positions.....	7,369	7,473	104
Positions other than permanent.....	206	206	-----
Other personnel compensation.....	45	45	-----
Total personnel compensation.....	7,620	7,724	104
12 Personnel benefits.....	571	579	8
21 Travel and transportation of persons.....	301	311	10
22 Transportation of things.....	10	10	-----
23 Rent, communications, and utilities.....	120	122	2
24 Printing and reproduction.....	166	176	10
25 Other services.....	255	261	6
Services of other agencies.....	335	687	352
26 Supplies and materials.....	63	66	3
31 Equipment.....	35	40	5
Total obligations.....	9,476	9,976	500

Personnel summary

	Original estimate, 1965	Revised estimate, 1965	Increase
Total number of permanent positions.....	1,066	1,083	17
Full-time equivalent of other positions.....	44	44	-----
Average number of all employees.....	893	907	14
Employees in permanent positions, end of year.....	907	924	17
Employees in other positions, end of year.....	68	68	-----

[S. Doc. 85]

FOREIGN ASSISTANCE PROGRAMS, PUBLIC LAW 480

Budget amendment, 1965

Budget page	Heading	Original estimate	Revised estimate	Decrease
125	Public Law 480:			
	1. Sale of surplus agricultural commodities for foreign currencies.....	\$1,893,000,000	\$1,893,000,000	-----
	2. Commodities disposed of for emergency famine relief to friendly peoples.....	264,000,000	220,453,000	\$43,547,000
	3. Long-term supply contracts.....	58,000,000	55,000,000	3,000,000

PURPOSE AND NEED FOR BUDGET AMENDMENT

The proposed amendment includes a reduction of \$46.5 million in funds requested to reimburse the Commodity Credit Corporation for the costs of Public Law 480. Of this amount, \$43.5 million applies to commodities disposed of for emergency famine relief to friendly peoples and \$3 million for long-term supply contracts. On the basis of actual experience for the fiscal year 1964, it now appears that the reduced request, along with the unused 1964 funds, will be adequate to meet the needs for 1965.

FOREIGN ASSISTANCE PROGRAMS

Justification for budget amendment, fiscal year 1965, for Public Law 480—Commodities disposed of for emergency famine relief to friendly peoples and long-term supply contracts

Project	Budget estimate 1965	Amendment to budget estimate, 1965	Revised estimate, 1965
1. Sale of surplus agricultural commodities for foreign currencies (title I).....	\$1,893,000,000	-----	\$1,893,000,000
2. Commodities disposed of for emergency famine relief to friendly peoples (title II).....	264,000,000	-\$43,547,000	220,453,000
3. Long-term supply contracts (title IV).....	58,000,000	-3,000,000	55,000,000
Total.....	2,215,000,000	-46,547,000	2,168,453,000

These estimates provide for a reduction of funds for titles II and IV of Public Law 480, based on revised estimates of needs for fiscal years 1964 and 1965, as follows:

Under title II, 1964 unrecovered costs are reduced from \$20,453,000 to \$9,500,000 and 1965 gross program costs are reduced from \$243,547,000 to \$210,953,000, a total decrease of \$43,547,000.

Under title IV, at the time the budget was prepared, it appeared that \$10,015,000 of the 1964 appropriation would be available for application to the 1965 program. This amendment reflects that \$13,015,000, or an increase of \$3 million, will be available for use in 1965, thus permitting a reduction in the budget estimate.

Determination of actual costs for the fiscal year 1964 cannot be made until all applicable transactions have been recorded in the financial records of the Corporation. It is estimated that actual data will not be available until late August or early September 1964.

The rate at which expenditures are made under these programs is influenced by such unpredictable factors as international negotiations, economic conditions abroad, availability of shipping space, and the processing of documents. The Congress has recognized that the amounts provided in the appropriations are not fully controlling since authority under basic law permits the Government to enter into agreements and commit the Government to expenditures which must be financed from subsequent appropriations.

The following tables show a comparison of the transactions for commodities disposed of for emergency famine relief to friendly peoples and long-term supply contracts in fiscal year 1965 as shown in the 1965 budget with the proposed budget amendment:

Title II, Public Law 480, fiscal year 1965

[Quantity and value in thousands]

Commodity and unit of measure	Original estimate			Revised estimate			Increase (+) or decrease (-)		
	Quantity	Unit rate	Value	Quantity	Unit rate	Value	Quantity	Unit rate	Value
Wheat.....bushels.....	27,000	\$3.60	\$97,200	20,000	\$3.76	\$75,000	-7,000	+\$0.16	-\$22,200
Wheat flour.....pounds.....	375,000	.051	19,125	370,000	.054	20,000	-5,000	+ .003	+875
Bulgar.....do.....	65,000	.085	5,525	75,000	.07	5,250	+10,000	- .275	-1,275
Rollod wheat.....do.....	10,000	.065	650	10,000	.07	700	-	+ .005	+50
Corn.....bushels.....	7,800	1.95	15,200	5,800	2.00	11,600	-2,000	+ .05	-3,600
Corameal.....pounds.....	6,500	.037	240	6,500	.038	247	-	+ .001	+7
Sorghums, grain.....bushels.....	2,000	2.30	4,600	2,000	2.30	4,600	-	-	-
Butter and butter products.....pounds.....	4,000	.58	2,320	7,000	.58	4,060	+3,000	+ .001	+1,740
Milk, nonfat dry.....do.....	80,000	.148	11,840	75,000	.149	11,175	-5,000	-	-665
Vegetable oils.....do.....	63,000	.18	11,340	55,000	.17	9,350	-8,000	- .01	-1,990
Total commodity costs.....			168,040			141,982			-26,058
Ocean transportation:									
Section 416.....			44,566			24,901			-19,665
Title II, Public Law 480.....			30,941			44,070			+13,129
Total program costs (gross expenditures).....			243,547			210,953			-32,594
Unrecovered 1964 costs.....			20,453			9,500			-10,953
Appropriation or estimate.....			264,000			220,453			-43,547

FOREIGN ASSISTANCE PROGRAMS, PUBLIC LAW 480

Program and financing

[In thousands of dollars]

	Original estimate, 1965	Revised estimate, 1965	Decrease
Program by activities:			
1. Sale of surplus agricultural commodities for foreign currencies.....	1,893,000	1,893,000	-----
2. Commodities disposed of for emergency relief to friendly peoples.....	264,000	220,453	43,547
3. Long-term supply contracts.....	68,015	68,015	-----
Total program costs funded—obligations (object class 41).....	2,225,015	2,181,468	43,547
Financing: Unobligated balance brought forward ¹	-10,015	-13,015	3,000
New obligational authority (appropriation).....	2,215,000	2,168,453	46,547

¹ Transferred to Commodity Credit Corporation.

NATIONAL AGRICULTURAL LIBRARY

1965 budget amendment

Budget page	Heading	Original estimate	Revised estimate	Increase
162	Salaries and expenses.....	\$1,347,000	\$1,547,000	\$200,000

PURPOSE AND NEED FOR BUDGET AMENDMENT

Considerable research is required to provide answers to the well-recognized pesticide residue problem currently confronting the Nation. A basic prerequisite in effectively conducting such research is access to and knowledge of information about current and past research efforts in the field. Effective support of the proposed program will require the acquisition of essential scientific publications, prompter and more comprehensive notification to scientists of new information in the field, specialized literature searches, and expanded reference and lending services. Present funds are not adequate to finance the intensive program now required to support research related to pesticides residues.

Justification of budget amendment for salaries and expenses

Project	Budget estimates, 1965	Amendment to budget estimates, 1965	Revised estimates, 1965
Agricultural library services:			
a. General library services.....	\$704,000	-----	\$704,000
b. Specialized services to research.....	643,000	+\$200,000	843,000
Total, agricultural library services.....	1,347,000	+200,000	1,547,000

This estimate provides additional funds to establish and maintain a Pesticides Information Center to support expanded research on pesticides residues. This research requires a more adequate publications procurement program, indexing in greater depth of pertinent literature, prompter notification to research and regulatory workers of publications of interest, and increased lending and reference services.

The Pesticides Information Center would provide biweekly notification to scientists of new information in the field, specialized literature searches and essential bibliographic service. Information available in collections at the National Library of Medicine, Department of Interior, Food and Drug Administration, and other agencies acquiring related publications would be utilized.

Funds budgeted for the current fiscal year provide for only an incidental and incomplete coverage of pesticides-related literature, and make no provision for the required thorough indexing, prompt notification and other services essential to the scientists working in this field. Such funds will not be adequate to finance the intensive program now required to support research related to reducing pesticide hazards and plant pest control and pesticide regulation.

NATIONAL AGRICULTURAL LIBRARY—SALARIES AND EXPENSES, 1965 BUDGET AMENDMENT

Program and financing

[In thousands of dollars]

	Original estimate, 1965	Revised estimate, 1965	Increase, 1965
Program by activities: Agricultural library services.....	1,347	1,547	200
Financing: New obligational authority (appropriation).....	1,347	1,547	200

Object classification

[In thousands of dollars]

	Original estimate, 1965	Revised estimate, 1965	Increase, 1965
11 Personnel compensation:			
Permanent positions.....	1,027	1,115	88
Positions other than permanent.....	7	7	-----
Other personnel compensation.....	6	6	-----
Total personnel compensation.....	1,040	1,128	88
12 Personnel benefits.....	76	83	7
21 Travel and transportation of persons.....	6	6	-----
23 Rent, communications, and utilities.....	11	11	-----
24 Printing and reproduction.....	27	34	7
Binding.....	50	50	-----
25 Other services.....	2	27	25
Services of other agencies.....	32	96	64
26 Supplies.....	13	13	-----
31 Equipment.....	90	99	9
Total obligations.....	1,347	1,547	200

Personnel summary

	Original estimate, 1965	Revised estimate, 1965	Increase, 1965
Total number of permanent positions.....	183	198	15
Full-time equivalent of other positions.....	2	2	-----
Average number of all employees.....	153	166	13
Employees in permanent positions, end of year.....	165	180	15
Employees in other positions, end of year.....	4	4	-----

FOREST PROTECTION AND UTILIZATION, FOREST RESEARCH, 1965

Appropriation to date.....	\$198,584,000
Request.....	2,750,000
Employment:	
Average number, latest estimate for 1965.....	18,586
Average number, involved in this estimate.....	80
Estimated employment, July 1, 1964.....	25,279

PROPOSED LANGUAGE

"For an additional amount for 'Forest protection and utilization', for Forest research, \$2,750,000, of which \$900,000 for Forest research construction shall remain available until expended."

EXPLANATION OF LANGUAGE

This proposed supplemental appropriation of \$2,750,000 would provide for acceleration of forestry research to develop measures for the control of insect, disease, and animal pests critically damaging to America's forests, which would eventually eliminate or reduce the need for chemical control measures which have adverse residual effects. The language would also make the \$900,000 for construction of research laboratories available for obligation during the full period required for the design, award of bids, and construction of the facilities.

PURPOSE AND NEED FOR SUPPLEMENTAL FUNDS

Forest losses from insects, disease, and animal pests total \$300 to \$400 million annually. Losses of wood in use from insects and decay causing organisms are well over \$400 million each year. To keep these losses checked even at a level of over \$500 million per year, extensive application of pesticides on wood in use and extensive spray programs on forest lands have had to be employed.

Recent developments indicate that use of the more effective chemicals, such as the chlorinated hydrocarbons, is being curtailed or may no longer be permitted. In that case uncontrolled forest pest epidemics have the potential for spreading to catastrophic proportions, as in the past, over wide areas with annual damages at many times greater than those described above, and with concurrently intolerable damage to recreation, watershed, range, and wildlife habitat values.

Needs for increasing forestry research to reduce hazards of pesticide residues recognized as important for several years, now appear to be critically urgent. Furthermore, there are promising leads for new biological control measures, for developing resistance through genetic research, for more specific and less persistent pesticides, and for improved silvicultural methods which indicate that an accelerated research program can lead to more effective and safer forest pest control methods.

There are four main areas of research which have high potential for developing control measures to reduce the need for and eventually to eliminate the use of persistent and hazardous chemicals in control of pests attacking forests and wood in use. These problem areas and the applicable research activities which would be accelerated are shown in the following tabulation. About \$500,000 of the \$1,850,000 increase for research would be used for grants and contracts. The remainder would be used for in-house research.

[In thousands of dollars]

Problem areas	Applicable forest research activities				Total
	Timber management research	Watershed management research	Forest insect research	Forest disease research	
1. Research on control of forest tree pests and diseases and wood products pests and decays by biological, nonchemical, and sterility methods, or by use of attractants, repellents, etc.; and forest tree genetic and breeding research to develop resistant varieties to obviate or reduce the need for any chemical or other controls.....	300		505	80	865
2. Research on biology, ecology, physiology, pathology, metabolism, and nutrition of forest insects and forest plants, to develop safe means of control of pests and diseases, etc.....	50		450	50	550
3. Research on more specific, less persistent conventional pesticides and improved methods of application.....			295	40	335
4. Research on the fate and effects on forest soil and water resources of the application of pesticides and other chemicals used in forest land management.....		100			100
Total.....	350	100	1,250	150	1,850

During the past few years the forest pest research program has been steadily oriented toward reducing the extent of or hazards of chemical control. Program adjustments made over the last 2 years have gone as far as feasible to divert funds to the chemical hazard problem.

The only increases in the 1965 appropriation applicable to this problem are \$370,000 in forest insect research, \$61,000 in forest disease research, and \$36,000 in timber management research. These increases were taken into account in developing the estimates of additional funds required.

Justification for supplemental estimate, fiscal year 1965, for forest protection and utilization, forest research

Project	Appropriation to date, 1965	Supplemental estimate, 1965	Revised total, 1965
Forest and range management research:			
Timber management research.....	\$7,164,000	\$350,000 (1a)	\$7,514,000
Watershed management research.....	2,978,000	100,000 (1b)	30,78,000
Forest protection research:			
Forest insect research.....	2,411,000	1,250,000 (2a)	3,661,000
Forest disease research.....	1,847,000	150,000 (2b)	1,997,000
Forest research construction.....	3,951,000	900,000 (3)	4,851,000

An increase of \$2,750,000 is needed for an immediate expansion of programs in those areas of forestry research directly concerned with the pesticide problem. This increase would be used as follows:

1. *Forest and range management research, \$450,000*

(a) *Timber management research, \$350,000.*—This increase would provide for acceleration of that part of timber management research concerned with genetics of pest resistance and with silvicultural control of insect, disease, and animal damage to forest trees. Forest trees, like other plants, show wide variation in pest resistance. This expanded program would concentrate on the heritability of resistance factors as a guide to selection and breeding and to hybridization for resistance. Additional emphasis also would be placed on control of animal damage to seeds and trees, through habitat manipulation and through influencing palatability to nursery stock by physiological means such as with systemics; on silvicultural pest control measures as substitutes for direct pest control by chemicals; on cultural measures for keeping trees vigorous enough to survive the pest-susceptible stage; and on soil-site factors in relation to host resistance.

(b) *Watershed management research, \$100,000.*—This increase would be used for research on the effects on forest soil and water resources of the application of pesticides and other chemicals used in forest land management. Particular attention would be paid to the fate of chemicals as they break down into other compounds, how much accumulates in the humus and mineral soil, and how much moves through or across the soil into water bodies. In the last 5 years an average of 700,000 acres of forest land have been aerially sprayed annually in the United States for the control of forest pests. These forest lands generally occupy the headwaters of the major streams which supply water to cities and towns, for irrigated agriculture and livestock water, for industry, and which are the habitat for fish and wildlife. Little is known about what happens to pesticide chemicals in forest soil and water after spraying. This research is needed especially to check and screen the effects on soil and water of new chemicals that appear to be safer and more effective for pest control. Studies would be done in the laboratory, on experimental plots, and experimental watersheds.

2. *Forest protection research, \$1,400,000*

(a) *Forest insect research, \$1,250,000.*—This increase would be used to step up research leading to more widespread biological control of insects destructive to forests and to wood in use, particularly those causing serious losses now, and to safer chemical control methods. This would provide efficient, effective research in forest insect biology, ecology, physiology, pathology, toxicology, and population dynamics with emphasis on isolating and identifying environmental factors responsible for epidemic outbreaks. With increased knowledge of life histories and behavior, more rapid and effective search can be made for appropriate insect parasites, predators, pathogens, attractants, growth regulants, and

other biological control agents. Research would also be intensified in development of more specific, less persistent conventional insecticides and of safe and better application techniques. Attractants, repellents, and sterilization techniques would be investigated for applications to each insect problem. A large increase in forest insect research is important to allow acceleration in all pertinent forest insect research activities simultaneously. Success in materially reducing and eventually eliminating the use of persistent and hazardous chemicals shows the greatest promise through "integrated control" which employs several completely different control measures simultaneously, though each one by itself is not effective.

(b) *Forest disease research, \$150,000.*—This increase would be used to investigate biological substitutes for the chemical sprays now applied extensively for forest disease control and to develop and evaluate antibiotic formulations that are more specific, more effective, safer, and less costly. Particular attention would be given to identification of the factors responsible for resistance in white pines to blister rust, to exploring new leads for using naturally occurring antagonistic soil microorganisms in lieu of the arsenical or other toxic chemicals now used to control root diseases of forest trees, and to develop practical measures for stimulating increased activities of these beneficial organisms in young stands.

3. *Forest research construction, \$900,000*

Expanded research in the above program areas can be accommodated now in existing laboratories, but continuation of intensified efforts in subsequent years will require expansion of these existing facilities and installation of new equipment. This request includes \$900,000 for construction and equipping of such facilities at two locations. The appropriation language has been changed to provide that the construction funds would remain available until expended. This provision is necessary as most of the construction will be performed for the Forest Service by the General Services Administration. Funds must be available to cover the costs for design, contract award, and contract supervision. Contract awards would probably be made not later than June or July of 1965 with construction beginning within 30 days of award so the buildings would be available for occupancy during fiscal year 1966. Laboratory facilities included in this supplemental request are:

Berkley, Calif., \$50,000.—Research on the pesticide problem at this location seeks more selective and less persistent chemicals for use in suppressing outbreaks of highly destructive forest insects. This unit serves as the principal chemical screening facility for forest pesticide applications in this country. Studies will be accelerated on the modes of action of different chemicals both on and in insects and their tree hosts. New chemicals offering promise in control under conditions less hazardous to the plant and animal environment will be formulated and their effectiveness tested in pilot applications. Adequate laboratory space is available, but this increase would provide special facilities and equipment for the storage, mixing, and test applications of chemical formulations. University land is available for this structure.

New Haven, Conn., \$850,000—Laboratory facilities provided on the campus of Yale University were destroyed by fire on March 26, 1964. Cooperators now are providing temporary space for our scientists, but new construction is critically needed and architectural and engineering planning of the laboratory is now underway. This location is a major center for basic research on the insects and diseases of forest trees of the northeast. The proposed laboratory is needed to house research now underway and additional investigations planned to speed progress on biological control of important forest pests in New England and adjacent States. A wide variety of pests in the northeast attack mature forests, younger stands, and plantations—both broadleaves and coniferous species. Many of the insect pests are defoliators against which chemical sprays, often applied from the air, are the only known control. Possibilities of reducing or preventing much of the damage caused by the gypsy moth and other serious insect pests and eliminating chemical residue problems appear particularly promising through speeded-up research on insect parasites, predators, and disease pathogens. The research would also include investigations of sterilization techniques and the development of more vigorous strains of insect enemies. A site is available for these facilities.

FOREST SERVICE—FOREST PROTECTION AND UTILIZATION

Program and financing

	1965, presently available	1965, revised estimate	Increase
Program by activities:			
1. Forest land management	\$150,794,000	\$150,794,000	
2. Forest research:			
(a) Forest and range management	12,399,000	12,849,000	\$450,000
(b) Forest protection	6,106,000	7,506,000	1,400,000
(c) Forest products and engineering	5,669,000	5,669,000	
(d) Forest resource economics	3,510,000	3,510,000	
(e) Forest research construction	2,751,000	2,901,000	150,000
Total, forest research	30,435,000	32,435,000	2,000,000
3. State and private forestry cooperation	16,955,000	16,955,000	
Total program costs, funded ¹	198,184,000	200,184,000	2,000,000
Change in selected resources ²	1,100,000	1,850,000	750,000
Total obligations	199,284,000	202,034,000	2,750,000
Financing: Advances and reimbursements: Cooperative range improvements	-700,000	-700,000	
New obligational authority	198,584,000	201,334,000	2,750,000

¹ Includes capital outlay of \$43,050,000.² Selected resources as of June 30 are as follows:

	1964	1965
Stores	3,200,000	3,300,000
Unpaid undelivered orders	15,000,000	16,750,000
Advances	750,000	750,000
Total selected resources	18,950,000	20,800,000

Object classification

	1965 presently available	1965 revised estimate	Increase
FOREST SERVICE			
11 Personnel compensation:			
Permanent positions	\$85,498,000	\$86,048,000	\$550,000
Positions other than permanent	25,136,000	25,161,000	25,000
Other personnel compensation	3,110,000	3,113,000	3,000
Total personnel compensation	113,744,000	114,322,000	578,000
12 Personnel benefits	7,960,000	8,000,000	40,000
21 Travel and transportation of persons	6,560,000	6,630,000	70,000
22 Transportation of things	6,437,000	6,457,000	20,000
23 Rent, communications, and utilities	3,679,000	3,709,000	30,000
24 Printing and reproduction	1,330,000	1,340,000	10,000
25 Other services	13,162,000	13,524,000	362,000
Services of other agencies	3,225,000	3,240,000	15,000
26 Supplies and materials	12,537,000	12,587,000	50,000
31 Equipment	5,713,000	5,913,000	200,000
32 Lands and structures	5,423,000	6,298,000	875,000
41 Grants, subsidies, and contributions	16,141,000	16,641,000	500,000
Subtotal	195,911,000	198,661,000	2,750,000
Deduct quarters and subsistence charges	1,371,000	1,371,000	
Total, Forest Service	194,540,000	197,290,000	2,750,000
ALLOTMENT ACCOUNTS			
Total, allotment accounts	4,744,000	4,744,000	
Total obligations	199,284,000	202,034,000	2,750,000
Obligations are distributed as follows:			
Agriculture, Forest Service	194,540,000	197,290,000	2,750,000
Interior	1,244,000	1,244,000	
General Services Administration	3,500,000	3,500,000	

Personnel summary

	1965 presently available	1965 revised estimate	Increase
FOREST SERVICE			
Total number of permanent positions.....	13,837	13,917	80
Full-time equivalent of other positions.....	6,276	6,281	5
Average number of all employees.....	18,489	18,569	80
Employees in permanent positions, end of year.....	13,488	13,565	77
Employees in other positions, end of year.....	11,921	11,929	8
ALLOTMENT ACCOUNTS			
Total number of permanent positions.....	27	27	-----
Full-time equivalent of other positions.....	70	70	-----
Average number of all employees.....	97	97	-----
Employees in permanent positions, end of year.....	26	26	-----
Employees in other positions, end of year.....	244	244	-----

Mr. WHITTEN. We are glad to have with us today the Under Secretary of Agriculture, Mr. Murphy, along with his associates, Dr. Brady, Dr. Shaw, and the record will show the names of the others who are in attendance.

INCREASED FUNDS IN HOUSE BILL FOR PESTICIDES ACTIVITIES
PROVISIONS OF HOUSE REPORT

We called this committee together because, as you know, in our own earlier hearings and in our report we touched on this matter of pesticide research, recognizing that the public has become exercised, though without evidence of danger to the public health. I would like at this point in the record to include the provision of our committee report on this matter.

(The provision referred to follows:)

THE PESTICIDE RESIDUE PROBLEM

The need for additional research on development, testing, and use of pesticides and insecticides, together with the effects of sprays or other residues from products used in agricultural production is very acute. Recent well-publicized books and articles, not always based on complete and objective information, have increased public concern about this matter. Current statements in the press which make certain claims concerning the effect of agricultural pesticides on fish in the lower Mississippi River present a completely one-sided point of view, and in this instance it is not claimed that health is affected.

To enable the Department to protect agriculture and the consumer by developing and presenting full and complete facts on this matter and to develop improved methods of insect and pest control, some expansion of research activities in this area is necessary. Congress provided for the establishment of a weed control laboratory last year. Since the work at this location will be directly concerned with the use of pesticides, insecticides, other agricultural chemicals, materials, and methods, plans for this facility should be modified to permit testing and development of pesticides, insecticides, and other materials necessary to agriculture, including effects of residues.

For expanded research on use of pesticides and control of insects and pests, the committee has included the budget estimate of \$1,500,000 under section 32 for next year, including such amount as may be needed for the modification of plans at the weed control laboratory provided last year to include this type of research.

Both the Department of Health, Education, and Welfare and the Department of Agriculture are deeply interested in protecting the public health. Both

Departments have responsibility for approving materials for use as pesticides and insecticides for agricultural purposes.

Neither Department, we are sure, would want to needlessly deprive the American consumer of any part of the finest and cheapest food any nation has ever enjoyed. In recent weeks, however, after materials have been approved and put into use, new means of detection of minute amounts of residue have resulted in news releases, press accounts, and headlines which needlessly frighten the consumer, do financial damage to the manufacturer and the farmer, and lessen the supply of food for the consuming public, though there is no claim that the public health is endangered. Neither the Department of Health, Education, and Welfare, nor the Department of Agriculture would want to needlessly destroy any American business or agricultural enterprise. Yet that is what present policies are doing in cases where there is no evidence of danger to the public health.

The members of the committee recall the cranberry incident in 1960, when a whole industry was practically destroyed by reckless statements and charges. It took \$10 million recommended by President Eisenhower to compensate for the damage and bring back public acceptance of this commodity. The public health must be protected. However, the supply of food and the processes which make food and fiber plentiful and cheap must also be protected where there is no evidence that public health is endangered.

In an effort to prevent further financial damage to American producers and loss of food for consumers as a result of reckless handling of this problem, the committee has set up \$250,000 for the use of the Secretary of Agriculture to collaborate with the Department of Health, Education, and Welfare in working out rules and regulations *including the recommendation of such changes in the law as may be necessary* to protect our high standard of living with the most plentiful, cheapest and finest food and fiber any Nation ever had—while at the same time protecting the public health.

The food supply shortage is said to be Russia's "Achilles heel." Russia's monumental failure to provide food for her people and their allies is her chief weakness in the world of today. We must prevent our Nation, where only 18 percent of total income goes for food, from sinking to Russia's level, where some 50 percent or more of national income is spent for food.

It is the firm belief of this committee that news releases or other public statements regarding any pesticide or other material which such departments have authorized for use should not be made unless at least one of such departments states that there is evidence that the continued use of such material would injure the public health.

Further, some provision should be made for payment of financial losses to any producer, processor, or manufacturer resulting from statements or actions concerning the use of approved pesticides, insecticides, chemicals, or other materials, where there is no evidence that their use endangers the public health. The payment for such damages should be made by the department issuing or negligently permitting the issuance of such statement or action.

PROTECTION FROM DISEASE AND PESTILENCE

It is estimated by officials of the Department that, if it were not for the use of fertilizers, insecticides, and pesticides, in 5 years the cost of a very inferior quality of food to the American consumer would double, and in 10 to 15 years the people of this Nation would be short of essential foods.

The threat from insects and diseases becomes increasingly serious as the speed and volume of travel increases between all areas of the world. Nearly 57 million more persons entered the United States during fiscal year 1963 than in 1954. The number of planes, ships, and other carriers in 1963 was over 26 million as compared to 14 million in 1954. The number of pieces of baggage inspected increased threefold in 6 years—from 9 million in 1957 to over 27 million in 1963.

The opening of additional ports along the St. Lawrence Seaway and increased nonstop oversea air flights to airports in the interior of the country are also increasing the threat of introduction of new pests from abroad.

It has been estimated by Agriculture experts that the damage to crops by the more than 600 different kinds of major destructive plant insects in the United States amounts to nearly \$4 billion each year. Cotton insects account for nearly \$600 million annually, cereal and forage insects account for some \$400 million annually, and stored grain and household insects cause annual damage of

over \$1 billion. It is further estimated that annual losses caused by plant diseases total \$2,500 million, and that livestock losses due to diseases and parasites exceed \$2 billion per year.

If foot-and-mouth disease should become established in this country, it is estimated that annual losses would be in the billions of dollars. It is further predicted that the introduction of fowl pest in this country could virtually eliminate the poultry industry. The introduction of rinderpest would cost the Nation \$1 billion annually.

To fully appreciate the effects of these destructive diseases and pests, it is necessary only to look to other parts of the world where food production is subject to their ravages. In the Middle East, desert locusts have been sweeping the semiarid lands for centuries, leaving ruined crops and starvation in their wake. In Pakistan, severe locust, caterpillar, and cricket outbreaks have caused losses as high as 80 percent in some areas. It is almost impossible to maintain supplies of grain in storage in India because of the ravages of weevils, bran beetles, and the world's worst pest of stored grain—the khapra beetle, which is now a threat in the United States.

Stored-grain pests are so bad in tropical areas of the world that the race to eat the grain before insects devour it results in frequent periods of starvation. The people compete with the pest for survival. Their low standard of living thus becomes understandable.

The distribution of cattle in Africa is determined primarily by the presence or absence of the tsetse fly. This is a major reason why an African child, once weaned, may never again taste milk. The cattle tick and the human warble or torsiolo fly cause tremendous losses to hides, beef, and milk production in Central and South America. Mortality among calves may be as high as 70 percent in some of the most heavily infested areas.

A recent report from Argentina indicates that 50,000 calves succumbed in 1 year's time to screwworm—the same one found in this country. The Argentines have had no effective means of dealing with this pest.

ACTION TAKEN TO IMPLEMENT HOUSE REPORT

Mr. WHITTEN. I would like to ask you, Mr. Murphy, what actions the Department has taken with regard to the committee recommendations in that report. I do not know if you wish to answer that or if you wish one of your associates to answer it. In other words, I want to find out what the Department did with that prior to considering the new document that has come up from the Bureau of the Budget.

Mr. MURPHY. Mr. Chairman, I think Dr. Brady or Dr. Shaw might be able to speak on that.

Dr. BRADY. I am sorry, I did not get the question.

Mr. WHITTEN. The report that this committee wrote in connection with the agricultural appropriation bill for the coming fiscal year, or actually for the immediate fiscal year, was released by this committee back in May and was approved by the House of Representatives on May 8, 1964. As I understand, the Senate has not yet acted upon that bill and it is still pending. The point I make now is, with that situation, though this committee had taken the action of providing additional funds—I believe \$1.5 million for pesticide research and \$250,000 for the Secretary's Office—for the same purpose, all of which was on the basis that we wanted cooperation and coordination between the Department of Agriculture, HEW, and I am sure the Interior Department, too, now while that is pending and while it is before the Department, we find that the Department presumably has requested the Bureau of the Budget to approach it from an entirely new angle. You are requesting \$29 million, as I understand it, to be divided between 50 States and six agencies. I want to know where does the committee action that we took in May stand?

Mr. MURPHY. We are undertaking to get the Senate to agree with the House with respect to those items that were provided by this committee, Mr. Chairman. In addition to that, this program for pesticides research has been under consideration in the Department for a good many months and, as you know, the Department of Agriculture being one of the departments in the executive branch of the Government, these programs have to be developed and cleared with the Executive Office of the President, so it is only fairly recently that the Department of Agriculture has known what it could ask the Congress to do with respect to appropriations for this subject.

This subject of pesticides has taken on increasing importance in recent months. There has been a great deal of public discussion about the subject. It has seemed, I think, increasingly to the Secretary of Agriculture and to all the people in the Department of Agriculture that this is a very important field and that we must greatly accelerate and intensify our efforts in the problems that arise here.

FUNDS PROPOSED TO BE ALLOCATED TO NUMEROUS AGENCIES

Mr. WHITTEN. Mr. Secretary, our hearings before this committee certainly would show the interest the committee has and the committee, in turn, reflects the public interest, in my opinion. However, I have been here long enough to know that frequently the fact there is great interest in a matter of this kind prompts everyone to want to get in on the money and, if I may say so, in looking at the various agencies interested and the various experiment stations interested in this, it makes me wonder if we are wanting to do more about pesticides and insecticides and herbicides or get more money. Let us say you have more money, and any time you have a budget estimate of \$29 million over and above the \$40 million in the bill I presume it is dealing with the problem as an emergency to some degree.

Now, when you see it is handled in such a way as to have six different agencies included and to have construction to the tune of eight different locations, then it has another catchall where all 50 States are included, do you not think your emergency gets lost in the shuffle and we are dividing the 52 cards out?

Mr. MURPHY. I would say this reflects an increasing awareness of the very broad scope of work that needs to be done. Dr. Brady and the heads of the agencies concerned are here and they can give you the specifics of why we consider this necessary and why we consider this expenditure justified far better than I can. All I could say at this point is that on the basis of the problems as they have presented them and on the basis of the possibilities as they have presented them, we are convinced, in the Department of Agriculture, that this would be a wise and necessary expenditure of public funds even in this rather large amount. It is, of course, up to the Congress to make a judgment as to whether or not the facts as we understand them are enough to justify this expenditure. As you know very well, the Congress is the one who decides how much money will be expended.

Mr. WHITTEN. I am aware that that is right. However, I would point out at this point I have not raised the question of the amount but the slices of pie you will cut this amount into. That is the point I now make.

Mr. MURPHY. Again I think the testimony will indicate why the funds are allocated among the various agencies in this way.

Mr. WHITTEN. That is the reason I raised that point at the start because now they are on notice and if they have justification for it they can give it to us.

FISH KILLS IN MISSISSIPPI RIVER

Now, I read your hearings at Memphis, your hearings at New Orleans, and your hearings in Washington and certainly I have sat on this committee some 15 or 18 years and I know there is a continuing and constant battle going on between insects and pests and diseases and pestilences of mankind, and I know that the Department has continuously been engaged in that research; but I cannot see in any of these hearings where the Department has fallen down on anything. And I say this for the record. You will recall some years ago under President Eisenhower another department of Government issued news releases after the dangers, if any, to public health had been gotten rid of and greatly injured the cranberry industry. President Eisenhower asked us to bail the cranberry industry out to the extent of \$10 million. I am glad to see their business has been restored and now, as I understand it, it is prosperous.

It strikes me from reading all these things that our major problem is one of lack of coordination between the departments of Government—HEW, Interior, Agriculture, and the local health departments and other agencies. And from reading the hearings that you had in connection with the fish kill and everything, I cannot for the life of me see that Agriculture has failed in any of these, but the injury has come from misuse by others, and in the case of the fish kill it is accepted by all concerned that the fish had two other unknown substances known as X and Y, which leads to some doubt in the matter.

CURRENT PESTICIDES PROGRAM

Briefly, tell me how much money you have for research in pesticides and insecticides now and who is doing the work and where. Tell us in general terms and then supply for the record the details of where the work is being done, how the money is being spent, how many employees you have, and how much is being spent at the different locations.

Mr. MURPHY. Might I, Mr. Chairman, just comment on one thing you said, that you did not see where the Department of Agriculture has fallen down on anything in this matter?

Mr. WHITTEN. From the reading I have done.

Mr. MURPHY. I am very happy to hear you say that and from what I know about the subject I agree with you completely.

Mr. WHITTEN. You might proceed, then.

Dr. BRADY. Thank you. I would like to second what Mr. Murphy said and to point out much of the success of the Department has come from the support of this committee through the years.

In terms of places where the research work is being done, this, to a degree, influences our request of where we would like to have the work done. It is being done in the Agricultural Research Service.

Mr. WHITTEN. I do not want to restrict you and I want you to feel

free, when you leave here, to complete the record, but go further than to say the Service. Tell us where are the locations and so forth.

Dr. BRADY. We can give to the committee in detail the locations for each of the agencies.

(The information requested follows:)

RESEARCH RELATED TO PESTICIDE RESIDUE HAZARDS, FISCAL YEAR 1964¹

Agricultural Research Service

BY PROGRAM

	Funds	Man-years
1. Biological controls:		
Farm research:		
(a) Research on control of pests by biological sterility and non-chemical methods or by use of attractants, etc.:		
Parasites, predators, and diseases: Entomology research.....	\$1,506,100	151.2
Sterility methods of insect control: Entomology research.....	1,053,500	89.1
Nonchemical methods of controlling insects:		
Animal husbandry research.....	134,000	4.8
Entomology research.....	107,600	8.6
Agricultural engineering research.....	139,100	13.0
Total.....	380,700	26.4
Insect attractants: Entomology research.....	833,100	81.1
Plant diseases, nematodes, and weeds: Crops research.....	901,500	76.0
Animal parasites: Animal disease and parasite research.....	400,600	39.3
Total.....	5,075,500	463.1
(b) Genetic and varietal resistance of plants to insects, diseases, and nematodes:		
Crops research.....	3,545,000	316.4
Entomology research.....	635,000	60.5
Total.....	4,180,000	376.9
Marketing research:		
(c) Research on nonpesticidal methods for the control of insects attacking food, feed, and fiber after harvest: Nonchemical methods and insect attractants.....	205,000	23.0
Total, biological controls.....	9,460,500	863.0
2. Basic research:		
Farm research:		
(a) Basic research on biology, taxonomy, ecology, physiology, pathology, metabolism, and nutrition of insects, plants, and animals; to develop safe means of control of plant pests and diseases and animal parasites:		
Animal husbandry research.....	170,000	13.5
Animal disease and parasite research.....	500,600	48.2
Crops research.....	3,059,900	249.0
Entomology research.....	2,702,200	248.7
Soil and water conservation research.....	40,300	2.3
Total.....	6,473,000	561.7
Marketing research:		
(b) Basic research on the biology, ecology, physiology, and nutrition of stored-product insects.....	162,000	19.3
Total, basic research.....	6,635,000	581.0

¹ Excludes research of the Forest Service; for this information see p. 35.

Agricultural Research Service—Continued

	Funds	Man-years
3. Improved conventional pesticides and methods of application:		
Farm research:		
(a) Research on more specific, less persistent conventional pesticides for control of insects, diseases, nematodes, weeds, etc., and for improved equipment for pesticides application:		
Insecticides:		
Animal disease and parasite research	\$100,000	8.8
Entomology research	2,847,300	285.7
Total	2,947,300	294.5
Diseases and nematodes: Crops research	453,400	56.0
Weeds, growth regulators, etc.: Crops research	775,000	78.0
Improved equipment for pesticide application: Agricultural engineering research	327,700	26.9
Total	4,503,400	455.4
Marketing research:		
(b) Research to develop more specific, less persistent conventional pesticides, safe methods for their use, and simple rapid detection methods of residues in harvested commodities:		
Development of more specific, less persistent conventional pesticides, and safe methods for controlling insects in food handling, processing, shipping, and storage areas	448,000	40.7
Development of detection methods	89,000	7.2
Development of nontoxic mothproofing treatments	37,000	3.2
Total	574,000	51.1
Total, improved conventional pesticides and methods of application	5,077,400	506.5
4. Toxicology, pathology, and fate of pesticides:		
Farm research:		
(a) Research on toxicological and pathological effects of pesticides, feed additives, etc. on livestock as found in their feed and on crops:		
Animal husbandry research	137,800	5.5
Animal disease and parasite research	284,300	27.9
Total	422,100	33.4
(b) Research on fate of and the effects of pesticide residues in soils, and in crop and farmstead water supplies:		
Crops research	190,000	18.7
Soil and water conservation research	55,800	2.8
Total	245,800	21.5
Nutrition and consumer use research:		
(c) Research on the effects of pesticides on the composition and nutritive value of the current food supply: Food equality	40,000	3.1
Total, toxicology, pathology, and fate of pesticides	707,900	58.0
Total, research	21,880,800	2,008.5

BY LOCATION

	<i>Funds</i>
Alabama :	
Auburn-----	\$99,900
Florala-----	47,100
Alaska :	
Palmer-----	17,200
Petersburg-----	27,900
Arizona :	
Flagstaff-----	27,800
Mesa-----	124,800
Tempe-----	116,200
Tucson-----	112,800
Arkansas :	
Clarkdale-----	14,800
Fayetteville-----	23,300
Stuttgart-----	20,600
California :	
Albany-----	61,200
Berkeley-----	12,600
Brawley-----	3,300
Davis-----	91,100
Fontana-----	13,400
Fresno-----	196,100
Indio-----	66,500
LaJolla-----	46,500
Riverside-----	250,000
Salinas-----	197,100
Shafter-----	125,900
Colorado :	
Denver-----	42,800
Fort Collins-----	68,800
Greeley-----	55,000
Florida :	
Belle Glade-----	41,600
Canal Point-----	159,900
Fort Lauderdale-----	2,500
Gainesville-----	536,500
Lake Alfred-----	23,800
Orlando-----	309,600
Quincy-----	16,500
Albany-----	61,100
Blairsville-----	8,300
Experiment-----	29,400
Fort Valley-----	65,900
Savannah-----	394,500
Tifton-----	917,000
Watkinsville-----	10,200
Hawaii :	
Hilo-----	25,400
Honolulu-----	236,100
Idaho :	
Aberdeen-----	46,400
Parma-----	3,100
Twin Falls-----	70,500
Illinois :	
Carbondale-----	27,300
Urbana-----	64,000
Watseka-----	10,800
Indiana :	
Lafayette-----	131,800
Vincennes-----	138,400
Iowa :	
Ames-----	183,900
Ankeny-----	96,900
Kansas :	
Hays-----	11,400
Manhattan-----	302,500

BY LOCATION—Continued

	<i>Funds</i>
Kentucky : Lexington-----	\$43, 300
Louisiana :	
Baton Rouge-----	239, 900
Bogalusa-----	41, 600
Crowley-----	5, 400
Houma-----	325, 500
Lake Charles-----	100, 000
Shreveport-----	43, 800
Tallulah-----	60, 000
Maine :	
Orono-----	15, 700
Presque Isle-----	31, 200
Maryland :	
Beltsville-----	4, 961, 600
Glenn Dale-----	31, 500
Upper Marlboro-----	29, 500
-----	3, 500
Massachusetts : Amherst-----	93, 900
Michigan : East Lansing-----	225, 500
Minnesota : St. Paul-----	27, 700
Mississippi :	
Meridian-----	1, 024, 800
State College-----	340, 200
Stoneville-----	98, 500
Missouri : Columbia-----	203, 300
Montana : Bozeman-----	49, 300
Nevada : Reno-----	218, 100
Nebraska :	
Lincoln-----	2, 500
Mitchell-----	13, 500
New Hampshire : Durham-----	31, 800
New Jersey :	
Hoboken-----	179, 400
Moorestown-----	26, 400
New Brunswick-----	114, 300
New Mexico :	
Albuquerque-----	44, 500
Las Lumas-----	31, 600
University Park-----	15, 800
New York :	
Farmingdale-----	27, 400
Geneva-----	60, 500
Ithaca-----	126, 600
North Carolina :	
Oxford-----	179, 400
Raleigh-----	8, 900
Waynesville-----	12, 400
Whiteville-----	890, 100
North Dakota :	
Fargo-----	38, 100
Minot-----	62, 100
Ohio :	
Delaware-----	162, 800
Wooster-----	125, 600
Oklahoma :	
Stillwater-----	7, 800
Woodward-----	449, 900
Oregon :	
Corvallis-----	126, 500
Forest Grove-----	12, 700
Hood River-----	12, 900
Pennsylvania :	
Landisville-----	69, 400
University Park-----	

BY LOCATION—Continued

	Funds
South Carolina :	
Charleston	\$194,200
Clemson	40,400
Florence	218,300
South Dakota : Brookings	482,900
Tennessee :	
Greenville	72,800
Jackson	16,500
Knoxville	10,700
Texas :	
Beaumont	29,400
Brownsville	511,400
Chillicothe	2,700
College Station	299,200
Kerrville	600,500
Lubbock	18,800
Mission	172,100
Nacogdoches	22,600
Waco	55,300
Weslaco	126,600
Utah :	
Logan	268,700
Provo	4,100
Virginia :	
Blacksburg	34,300
Holland	21,400
Radford	2,400
Richmond	51,100
Washington :	
Prosser	143,600
Pullman	247,100
Summer	28,100
Wenatchee	135,400
Yakima	296,400
West Virginia : Kearneysville	12,200
Wisconsin :	
La Crosse (formerly Lancaster)	5,100
Madison	112,100
Wyoming :	
Cheyenne	6,200
Laramie	28,000
District of Columbia	302,600
France : Paris	101,300
Guam : Agana	26,600
Italy : Rome	43,500
Mexico : Mexico City	193,400
Puerto Rico : Mayaguez	93,100
Virgin Islands : St. Croix	15,000
Total, Agricultural Research Service	21,880,800

COST OF CONTROL OF PESTS AND POTENTIAL DAMAGE FROM INTRODUCTION
OF FOREIGN PESTS

Mr. WHITTEN. Also, at this point in the record I would like to insert several tables from our hearings on the proposed amendment to quarantine regulation 37 which show the cost of pests we now have to the American economy and the potential damage which could be caused by pests which have not yet been introduced into this country. (The tables are as follows:)

Cost of control programs resulting from introduced pests

Pest	Year first reported in United States	Control program		Estimated cumulative cost of program		
		Started year	Terminated year	Federal	Cooperators	Total
Barberry eradication—account of <i>Puccinia graminis</i>	1726	1918	-----	\$26,637,500	\$7,508,600	\$34,146,100
Gypsy moth.....	1869	1907	-----	42,621,600	66,063,000	108,674,600
Sweet potato weevil.....	1875	1938	-----	4,816,100	11,510,400	16,326,500
White pine blister rust.....	1898	1916	-----	99,519,000	18,542,000	118,061,000
Mexican fruit fly.....	1903	1928	-----	5,769,800	2,071,100	7,840,900
European corn borer.....	1910	1919	-----	15,999,700	-----	15,999,700
Citrus canker.....	1910	1915	1942	2,435,400	2,062,800	4,498,200
Japanese beetle.....	1916	1920	1950	18,300,000	17,143,600	35,443,600
Pink bollworm.....	1917	1917	-----	38,708,400	11,798,900	50,507,300
Imported fire ant.....	1920	1958	-----	14,821,000	10,105,700	24,926,700
Burrowing nematode.....	1926	1955	-----	2,677,100	4,170,100	6,847,200
Mediterranean fruit fly.....	1929	1929	1931	6,500,000	748,800	7,248,800
-----	1956	1956	1958	5,000,300	8,054,500	13,034,800
Dutch elm disease.....	1931	1934	1949	571,600	622,900	1,194,500
Hall scale.....	1934	1941	1960	22,312,200	2,488,600	24,800,800
White fringed beetle.....	1936	1938	-----	1,518,200	397,700	1,915,900
European chafer.....	1940	1955	-----	18,778,300	10,890,500	29,668,800
Golden nematode.....	1941	1946	-----	960,200	691,100	1,651,300
Khapra beetle.....	1953	1955	-----	5,672,100	4,692,100	10,364,200
Citrus blackfly.....	1954	1954	-----	5,950,100	5,019,900	10,970,000
Soybean cyst nematode.....	1954	1956	-----	2,405,200	9,689,800	12,095,000
Witchweed.....	1956	1957	-----	2,790,700	1,313,200	4,103,900
Hoja blanca.....	1957	1959	1962	14,681,100	452,100	15,133,200
Cereal leaf beetle.....	1962	1963	-----	153,800	62,400	216,200
-----	-----	-----	-----	250,000	150,000	400,000
Total.....	-----	-----	-----	360,149,400	196,219,800	556,369,200

COST OF FEDERAL RESEARCH RELATED TO REDUCING LOSSES RESULTING FROM INTRODUCED
PESTS

For the 10-year period, 1954 to 1963, inclusive, the Federal obligations for entomology research totaled approximately \$58 million. It is estimated that around 60 percent of these funds, or about \$35 million was used for research on eradicating, controlling, and reducing losses resulting from introduced insect pests. In addition, it is estimated that several million dollars also obligated during the period for research to develop methods to control introduced plant diseases and nematodes.

Examples of damage caused by introduced pests

Year first reported in United States	Pest	Crops attacked	Estimated damage and control costs
1726	Stem rust (<i>Puccinia graminis</i>)	Wheat	\$78,000,000 annual loss.
1779	Hessian fly (<i>Phytophaga destructor</i>)	do.	Annual losses up to \$47,400,000 have been reported.
Early 19th.	Powdery mildew (<i>Uncinula necator</i>)	Grape	\$1,455,000 annual loss.
Do.	Bunt smuts (<i>Tilletia foetida</i> and <i>T. caries</i>)	Wheat	\$7,000,000 annual loss.
Do.	Leaf curl (<i>Taphrina deformans</i>)	Peach	\$1,290,000 annual loss.
Do.	Scab (<i>Venturia pyrina</i>)	Pear	\$248,000 annual loss.
Do.	Rust (<i>Melampsora lini</i>)	Flax	\$2,121,000 annual loss.
Do.	Cercospora leaf spot (<i>Cercospora beticola</i>)	Beet	\$6,274,000 annual loss.
1834	Scab (<i>Venturia inaequalis</i>)	Apple	\$8,475,000 annual loss.
1840	Late blight (<i>Phytophthora infestans</i>)	Potato	\$31,953,000 annual loss.
		Tomato	\$1,254,000 annual loss.
1856	Sugarcane borer (<i>Diatraea saccharalis</i>)	Sugarcane	\$3,871,000 annually during period 1942-51.
1857	Onion thrips (<i>Thrips tabaci</i>)	Onion	\$10,527,000 annually during period 1942-57.
1875	Sweetpotato weevil (<i>Culac formicarius elegantulus</i>)	Sweetpotato	\$1,740,000 annual loss.
1877	Pea aphid (<i>Macrosiphum pisi</i>)	Peas	\$3,969,000 loss in 1944.
		Alfalfa	\$30,580,000 loss in 1944.
1880	Head smut (<i>Sphacelotheca reiliana</i>)	Sorghums	\$6,890,000 annual loss.
1882	Greenbug (<i>Toxoptera graminum</i>)	Wheat, oats, barley.	\$25,559,000 loss in 1953.
1890	Shot hole (<i>Coccomyces hiemalis</i>)	Cherry	\$2,244,200 annual loss.
1892	Clubroot (<i>Plasmodiophora brassicae</i>)	Cabbage, cauliflower, turnip, mustard, etc.	\$522,000 annual loss.
1892	Rust (<i>Uromyces phaseoli</i>)	Beans	\$2,000,000 annual loss.
1892	Bollweevil (<i>Anthonomus grandis</i>)	Cotton	\$450,000,000 annual loss (damage, \$350,000,000; control, \$100,000,000).
1898	White pine blister rust (<i>Cronartium ribicola</i>)	White pine	\$40,000,000 spent for control during period 1916-44.
1903	Mexican fruit fly (<i>Anastrepha ludens</i>)	Citrus	10 percent crop loss annually.
1904	Chestnut blight (<i>Endothia parasitica</i>)	Chestnut	Destroyed native chestnuts.
1906	Blast (<i>Piricularia oryzae</i>)	Rice	\$3,998,000 annual loss.
1907	Cyst nematode (<i>Heterodera schachtii</i>)	Beet	\$7,604,000 annual loss.
1910	Citrus canker (<i>Xanthomonas citri</i>)	Citrus	Eradicated at cost of \$13,000,000, including economic losses.
1910	European corn borer (<i>Ostrinia nubilalis</i>)	Corn and related crops.	\$144,313,000 annually during period 1949-59.
1913	Southern cornstalk borer (<i>Diatraea crambidoides</i>)	Corn	\$9,660,000 in 1953
1913	Oriental fruit moth (<i>Grapholitha molesta</i>)	Peach and other stone fruits.	Annual loss of 4 percent during period 1942-51.
1915	Mosaic virus (<i>Marmor sacchari</i>)	Sugarcane	\$485,000 annual loss.
1916	Japanese beetle (<i>Popillia japonica</i>)	Fruits, vegetables, ornamentals.	\$10,000,000 annual damage.
1918	Potato wart (<i>Synchytrium endobioticum</i>)	Potato	Has not reached commercial plantings; known to be very destructive; controlled by States.
1919	Flag smut (<i>Urocystis tritici</i>)	Wheat	\$5,000 annually; more destructive strains have been prevented entry.
1926	Burrowing nematode (<i>Radopholus similis</i>)	Citrus, pepper	\$1,000,000 annual loss.
1931	Vetch bruchid (<i>Bruchus bruchialis</i>)	Vetch	\$2,290,000 loss reported in 1944.
1932	Bacterial ring rot (<i>Corynebacterium sepedonicum</i>)	Potato	\$2,500,000 annual loss.
1939	Quick decline (<i>Tristeza virus</i>)	Citrus	\$5,000,000 annual loss.
1957	Spotted alfalfa aphid (<i>Therioaphis maculata</i>)	Alfalfa	\$76,273,800 loss during period 1955-56.

Examples of foreign pests that have not gained entry into the continental United States and are a threat to U.S. agriculture

Crop and value of U.S. production, 1962	Pest	Distribution	Periodic reports of damage
Cotton, \$2,676,117,000	Spiny bollworm (<i>Earias insulana</i>) Egyptian cottonworm (<i>Prodenia litura</i>) Red bollworm (<i>Diparopsis castanea</i>) South American bollworm (<i>Sacadas pyralis</i>) Cotton jassid (<i>Empoasca lybica</i>)	Mediterranean area, Africa, southern Asia. Mediterranean area, southern Asia, Africa. Southern Africa. Venezuela, Colombia, Nicaragua. Mediterranean area, eastern Africa.	Losses from 40 to 90 percent reported. Losses up to 75 percent reported; Egypt reported loss of 500,000 bales in 1 year. Reports of crop losses from 60 to 80 percent. 20 percent crop losses reported in Colombia. 25 percent crop losses reported in Sudan.
Corn, \$8,923,228,000 Sorghum, \$563,891,000	Maize stalk borer (<i>Bussola fusca</i>) Durra stalk borer (<i>Sesamia cretica</i>) Jowar borer (<i>Chilo zonellus</i>) Downy mildews (<i>Sclerospora</i> spp.) Senn pest (<i>Eurygaster integriceps</i>)	Southern Africa. Mediterranean area. Indian region. Asia, Africa, Australia, and Pacific islands. Near East.	Losses from 50 to 90 percent reported. Also attacks broomcorn. Infestations up to 90 percent reported in Italy. Infestations up to 20 percent reported. Also attacks sugarcane. May cause losses up to 100 percent under optimum conditions. One of the most destructive pests of grain in Near East. Losses seldom less than 25 percent; entire crops sometimes destroyed.
Cereals: Wheat, \$2,204,661,000; oats, \$639,691,000; barley, \$394,881,000; rye, \$39,688,000.	Cereal leaf miner (<i>Syringopais temperatella</i>) Pupation virus disease (<i>Fractilinea avena</i>) Karnal hunt (Smut) (<i>Neovossia indica</i>) Red-tail moth (<i>Dasychira pudibunda</i>) Garden chafer (<i>Phyllopertha horticola</i>) Nun moth (<i>Lymantria monacha</i>) Pine moth (<i>Panalis flammea</i>) Pine lappet (<i>Dendrolimus pini</i>)	Middle East. U.S.S.R. Europe, Asia. U.S.S.R., Siberia, Europe Europe, Asia. Europe, Japan. Europe, U.S.S.R., Japan.	Major pest of cereals. Annual wheat loss in Jordan up to 20 percent. Crops reported to be completely destroyed on occasion. Sometimes causes almost total loss of oats. Causes up to 20 percent loss of wheat. Defoliates deciduous forest trees. Serious outbreaks reported in U.S.S.R., Germany, Sweden. Important pest of many plants, including forest trees, ornamentals, and small grains. Defoliates conifers and deciduous trees, rivaling gypsy moth in importance. Destructive defoliator of conifer forests. In 1 year about 425,000 acres of forest were defoliated in Poland and Germany. Defoliates pine forests. In heavy outbreaks, complete defoliation may occur within a few days. Defoliates oak forests, causing dieback and weakening of trees. Especially destructive to new plantings. Destructive to pines in British Isles and continental Europe. Causes severe damage to pine forests by defoliation. Attacks 2- and 3-leafed pines. Especially injurious on Scotch pine in Europe.
Forests, \$20,000,000,000	Green oak tortrix (<i>Tortrix viridana</i>) Banded pine weevil (<i>Pissodes natus</i>) Pine looper (<i>Bupalus piniarius</i>) Pine sawfly (<i>Diprion pini</i>) Rust (<i>Cronartium flaccidum</i>) Beet weevil (<i>Cleonus punctiventris</i>) Beetbug (<i>Pisma quadratum</i>) Sugarbeet crown borer (<i>Gnorimoschema ocellatella</i>)	Europe. U.S.S.R. Europe, U.S.S.R. Europe, U.S.S.R. Europe, Japan. U.S.S.R., Central Europe U.S.S.R., Europe Mediterranean area.	Destructive defoliator of conifer forests. In 1 year about 425,000 acres of forest were defoliated in Poland and Germany. Defoliates pine forests. In heavy outbreaks, complete defoliation may occur within a few days. Defoliates oak forests, causing dieback and weakening of trees. Especially destructive to new plantings. Destructive to pines in British Isles and continental Europe. Causes severe damage to pine forests by defoliation. Attacks 2- and 3-leafed pines. Especially injurious on Scotch pine in Europe. Particularly damaging to seedlings: At Kiev, U.S.S.R., up to 92 percent of beets had to be replanted 1 year. Transmits leaf crinkler virus disease. Has caused losses up to 75 percent; reduced sugar content of beets up to 35 percent. 100 percent of crop may be infested in outbreak years.

Tobacco stem borer (<i>Gnorimoschema heliope</i>)	Africa, Australia, southern Asia	Up to 30 percent loss of plants has been recorded.
Irish potato weevil (<i>Epicaeus cognatus</i>)	Mexico	Frequent heavy losses reported.
Andean potato weevils (<i>Premnotrypes</i> spp.)	South America	Serious losses reported in several South American countries.
Potato coccinella (<i>Eupitachna niponica</i>)	Orient	Destructive to potatoes and related plants.
Smut (<i>Tilletia solani</i>)	South America	Very destructive in Venezuela.
Queensland fruitfly (<i>Dacus tryoni</i>)	Australia	Also attacks pome and stone fruits. Systematic control necessary to avoid heavy losses.
Oriental fruitfly (<i>Dacus dorsalis</i>)	Southern Asiatic area, Hawaii	This destructive pest attacks over 100 fruit varieties in addition to citrus.
Citrus leaf miner (<i>Phyllocnistis citrella</i>)	Orient, southern Asia	Severe pest of young citrus trees.
Citrus blackfly (<i>Aleurocanthus woglumi</i>)	Mexico, Central America, Hispaniola, southern Asia	Causes serious damage to trees unless controlled.
False codling moth (<i>Cytophlebia leucotreta</i>)	Southern Africa	Infestations up to 70 percent reported in Rhodesia. Attacks many plants, including cotton.
Citrus psylla (<i>Diaphorina citri</i>)	Southern Asia	Causes defoliation, loss of production, and sometimes death of tree.
Orange spiny whitefly (<i>Aleurocanthus spiniferus</i>)	Southern Asiatic region	Destructive pest of citrus trees.
Mal secco disease (<i>Deuterophoma tracheiphila</i>)	Mediterranean region	Killed almost all lemons in some areas of Italy.
Sweet orange scab (<i>Elsinoe australis</i>)	South America	Report that up to 1/2 of orange crop in Brazil rendered unfit for export.
Citrus black spot (<i>Guignardia citricarpa</i>)	Orient, Australia, South America, South Africa	Serious damage to orchards and fruit.
Australian scab (<i>Sphaedroma fawcetti</i> var. <i>scabiosa</i>)	Australia, New Zealand	Serious annual losses.
Citrus canker (<i>Xanthomonas citri</i>)	Asia, Oceania, South America	Destructive to groves. Eradicated in United States at cost of \$13 million.
Cancerosis "B" (<i>Xanthomonas</i> sp.)	South America	Comparable to citrus canker in destructiveness.
Rice stem borer (<i>Schoenobius incertulus</i>)	Southern Asia	Losses up to 65 percent reported.
Asiatic rice borer (<i>Chilo suppressalis</i>)	Orient, southern Asia	Annual damage of 5 to 10 percent; local damage up to 60 percent reported. Also attacks corn, sugarcane, sorghum.
Rice stem gall midge (<i>Pachydiplaxis aryzae</i>)	Southern Asia	Damage up to 75 percent reported in India. Losses from 50 to 100 percent reported in Indochina.
Rice hispid (<i>Dicladispa armigera</i>)	do	Crop losses from 40 to 50 percent reported.
Utra disease (<i>Ditylenchus angustatus</i>)	India	Complete crop losses caused in some years.
Soybean pod borer (<i>Grapholitha glycinivorella</i>)	Orient	Larvae destroy pods. Up to 94 percent of beans attacked in Hokkaido; seed losses of 20 to 30 percent reported in Soviet Far East.
Vine moth (<i>Lobesia botrana</i>)	Europe, North Africa, Near East, Japan	Serious pest of grapes in many areas. As much as 7/8 of vintage has often been destroyed in parts of Syria, Israel, U.S.S.R., Yugoslavia.
Sugarcane leaf scald (<i>Bacterium albi lineans</i>)	Most sugarcane areas outside continental United States	Entire fields may be destroyed.
Fiji disease virus (<i>Galla fijiensis</i>)	Fiji, Java, New South Wales, New Guinea, New Caledonia	No cane produced in badly infested fields.
Smut (<i>Ustilago scitaminea</i>)	South America, Asia, Africa	Serious menace to sugar industry.
Bacterial gummosis (<i>Xanthomonas vasculorum</i>)	South America, Oceania, West Indies, Mexico, Puerto Rico	Very destructive to sugarcane.

Tobacco, \$1,351,512,000.

Potatoes, \$449,610,000.

Citrus, \$429,008,000.

Rice, \$323,484,000.

Soybeans, \$1,562,720,000.

Grapes, \$200,033,000.

Sugarcane, \$89,397,000.

Examples of foreign pests that have not gined entry into the continental United States and are a threat to U.S. agriculture—Continued

Crop and value of U.S. production, 1962	Pest	Distribution	Periodic reports of damage
Deciduous fruits: Apples, \$239,955,000; cherries, \$46,458,000; pears, \$52,883,000; peaches, \$138,176,000; plums, \$12,103,000; apricots, \$23,812,000; prunes, \$47,357,000.	Light brown apple moth (<i>Austrorhiz psorittana</i>). Plum fruit moth (<i>Laspeyresia junibrana</i>). Peach weevil (<i>Rhynchites heros</i>) Peach fruit moth (<i>Carposina niponensis</i>). European cherry fruit fly (<i>Ebaeoidis cerasi</i>). Pear fruit borer (<i>Nephoterz rubrizonella</i>). Yellow peach moth (<i>Dichocrocis punctiferalis</i>). Apple Proliferation virus Brown rot (<i>Monilinia fructigena</i>). Cabbage butterfly (<i>Pieris brassicae</i>) Cabbage moth (<i>Mamestra brassicae</i>) Celery fly (<i>Acidita heraclei</i>) Asparagus fly (<i>Platyptera poctioptera</i>). Bean fly (<i>Melanagromyza phaseoli</i>) Melon fly (<i>Dacus cucurbitae</i>) 12-spotted melon beetle (<i>Epilachna chrysomelina</i>). Red pumpkin beetle (<i>Raphidopalpa foveicollis</i>). "Ishuku", virus disease Virus disease Scab (<i>Elsinoe batatas</i>)	Australia, New Zealand, Hawaii, England. Europe, U.S.S.R., Asia Minor, North Africa. Japan, Korea, Formosa, China. Orient. Europe. Orient. Australia, southeast Asia. Europe, Japan, Manchuria, South Africa. Southern Asia, Middle East, Europe. Europe, Asia. Europe, U.S.S.R. Africa, Australia, southern Asia. Southern Asiatic region, Hawaii. Mediterranean area, Africa. North Africa, Italy, Greece, Iran. Ryukyu Islands. Uganda, Congo. Japan, Guam, Brazil.	Has caused up to 25 percent losses in apple yields in Tasmania. France has reported up to 75 percent loss of plum crop; over 60 percent infestation reported in Black Sea area; U.S.S.R. reports 40 to 90 percent losses in 1959. Causes severe injury to peach, pear, apple, cherry, plum, and apricot. Serious pest of apple, pear, plum, peach, and other fruits. From 80 to 100 percent damage to apple, pear, and apricot reported in Russian Far East in 1959. From 80 to 100 percent damage to some orchards in Bulgaria; up to 90 percent infestation reported in Norway. Causes serious losses in Japan, Korea, China, Manchuria, and Russian Far East. Also attacks peach, apple, and other fruits. Also attacks cotton, corn, sorghum, and other crops. Cotton boll infestation of 27 percent reported in Queensland. Yield losses up to 55 percent reported. Causes severe fruit loss of apples and pears. Attacks many crops, including crucifers, cotton, garden and ornamental plants. A report of 90 percent damage to cotton in Turkestan. Very destructive to vegetables, particularly cabbage and other crucifers. Up to 80 percent loss of cabbage reported in Bulgaria. Reports of infestation from 90 to 100 percent in celery beds. Severe attacks reported on asparagus in southern Europe, England, and U.S.S.R. Reported to cause total loss of crop on occasion. Particularly injurious to seedling beans. Attacks more than 80 crops. Entire crops sometimes ruined in absence of control measures. Serious damage to watermelons reported in Egypt; heavy losses to cucurbits reported in Israel and Jordan. Serious threat to melon production; seedling plantings sometimes destroyed. So destructive that culture has been discontinued in some areas. Causes severe losses. Causes serious damage to foliage.

DISTRIBUTION OF FUNDS UNDER CURRENT AND PROPOSED PROGRAMS

Mr. WHITTEN. We would be glad for you orally to tell us as much as you can about how the Department now handles research on pesticides and insecticides and herbicides.

Dr. BRADY. For every one of the programs for which we are submitting requests there is work being done in almost every State in the Union. Pests are everywhere—on agricultural crops, in the forests, they are in our households, in our lawns, and so forth. So in terms of the locations of the research work, I think we can say in every State in the Union, this work is being carried on by both State and Federal agencies. There is a small amount of work being done, for example, in the biological control of pests, throughout the country. There is also a small amount of work being done on basic research on insects but this must be expanded if we are going to carry the program out.

I think we could ask Dr. Shaw to give examples in the Agricultural Research Service where the largest amount of work is being done and the locations.

Mr. WHITTEN. Dr. Shaw, I believe from the statement that has been made by Dr. Brady that if you would take this up by pest or insect we might get this broken down as to where this work is going on. We devoted some several days to develop it in our own hearings but I want in this record a showing of who does what and where. So would you start with that?

Dr. SHAW. In the 1964 base we were spending \$1.5 million on parasites, predators, and diseases, and this is to be increased by the proposal before you. Part of it would be done at Moorestown, N.J., part at Beltsville, some at our laboratory in Paris, and as far as this is concerned there would be very few new locations for any of the proposed work.

We are also spending in 1964, \$1,054,000 on sterility methods of insect control.

I have a table that would show all of this.

Mr. WHITTEN. We would be glad to have it included in the record at this point.

(The table referred to follows:)

AGRICULTURAL RESEARCH SERVICE

Distribution of proposed 1965 budget amendment on research on pesticide residues

[In thousands of dollars]

	1964 base	Amount in 1965 budget estimate	Budget amend- ment, S. Doc. 85	1965 amended total
RESEARCH PROGRAM				
Biological controls:				
Farm research:				
(a) Research on control of pests by biological sterility and nonchemical methods or by use of attractants, etc.:				
Parasites, predators, and diseases:				
Entomology research.....	1,506	1,775	+1,200	2,975
Sterility methods of insect control:				
Entomology research.....	1,054	1,251	+840	2,091
Nonchemical methods of controlling insects:				
Animal husbandry research.....	134	186	+110	296
Entomology research.....	108	97		97
Agricultural engineering research.....	139	216	+250	466
Total.....	381	499	+360	859
Insect attractants: Entomology re- search.....	833	988	+500	1,488
Plant diseases, nematodes, and weeds:				
Crops research.....	902	915	+1,000	1,915
Animal parasites: Animal disease and parasite research.....	400	456	+300	756
Total.....	5,076	5,884	+4,200	10,084
(b) Genetic and varietal resistance of plants to insects, diseases, and nematodes:				
Crops research.....	3,545	3,684	+1,675	5,359
Entomology research.....	635	845	+500	1,345
Total.....	4,180	4,529	+2,175	6,704
Marketing research:				
(c) Research on nonpesticidal methods for the control of insects attacking food, feed, and fiber after harvest: Non-chemical methods and insect attractants.....				
	205	295	+200	495
Total, biological controls.....	9,461	10,708	+6,575	17,283
2. Basic research:				
Farm research:				
(a) Basic research on biology, taxonomy, ecology, physiology, pathology, metabolism, and nutrition of insects, plants, and animals; to develop safe means of control of plant pests and diseases and animal parasites:				
Animal husbandry research.....	170	251	+245	496
Animal disease and parasite research.....	501	558	+100	658
Crops research.....	3,060	3,163	+450	3,613
Entomology research.....	2,702	2,968	+735	3,703
Soil and water conservation research.....	40	41		41
Total.....	6,473	6,981	+1,530	8,511
Marketing research:				
(b) Basic research on the biology, ecology, physiology, and nutrition of stored-product insects.....				
	162	251	+350	601
Total, basic research.....	6,635	7,232	+1,880	9,112

Distribution of proposed 1965 budget amendment on research on pesticide residues—Continued

[In thousands of dollars]

	1964 base	Amount in 1965 budget estimate	Budget amendment, S. Doc. 85	1965 amended total
3. Improved conventional pesticides and methods of application:				
Farm research:				
(a) Research on more specific, less persistent conventional pesticides for control of insects, diseases, nematodes, weeds, etc., and for improved equipment for pesticides application:				
Insecticides:				
Animal disease and parasite research.....	100	101		101
Entomology research.....	2,847	3,068	+350	3,418
Total.....	2,947	3,169	+350	3,519
Diseases and nematodes: Crops research.....	453	463	+845	1,308
Weeds, growth regulators, etc.: Crops research.....	775	782	+155	937
Improved equipment for pesticide application: Agricultural engineering research.....	328	382	+180	562
Total.....	4,503	4,796	+1,530	6,326
Marketing research:				
(b) Research to develop more specific, less persistent conventional pesticides, safe methods for their use, and simple rapid detection methods of residues in harvested commodities:				
Development of more specific, less persistent conventional pesticides, and safe methods for controlling insects in food handling, processing, shipping, and storage areas.....	448	488	+220	708
Development of detection methods.....	89	90	+240	330
Development of nontoxic moth-proofing treatments.....	37	38	+90	128
Total.....	574	616	+550	1,166
Total, improved conventional pesticides and methods of application.....	5,077	5,412	+2,080	7,492
4. Toxicology, pathology, and fate of pesticides:				
Farm research:				
(a) Research on toxicological and pathological effects of pesticides, feed additives, etc., on livestock as found in their feed and on crops:				
Animal husbandry research.....	138	164	+145	309
Animal disease and parasite research.....	284	388	+200	588
Total.....	422	552	+345	897
(b) Research on fate of and the effects of pesticide residues in soils, and in crop and farmstead water supplies:				
Crops research.....	190	193	+150	343
Soil and water conservation research.....	56	57	+500	557
Agricultural engineering research.....			+70	70
Total.....	246	250	+720	970
Nutrition and consumer use research:				
(c) Research on the effects of pesticides on the composition and nutritive value of the current food supply:				
Food composition.....			+175	+175
Food quality.....	40	40	+175	+215
Biological value of food.....			+250	+250
Total.....	40	40	+600	640
Total, toxicology, pathology and fate of pesticides.....	708	842	+1,665	2,507
Total, program.....	21,881	24,194	+12,200	36,394

Distribution of proposed 1965 budget amendment on research on pesticide residues—Continued

[In thousands of dollars]

	1964 base	Amount in 1965 budget estimate	Budget amend- ment, S. Doc. 85	1965 amended total
Construction and alterations of research facilities:				
1. Livestock Insects and Toxicological and Pathological Effects of Pesticides on Livestock, College Station, Tex.....			+260	+260
2. Research Laboratory for the Control of Plant Diseases, Nematodes, and Insects, Beltsville, Md.....			+338	+338
3. Insect Attractants and Basic Research Laboratory, Gainesville, Fla. (includes \$40,000 for marketing research).....			+160	+160
4. Stored Products Insects Laboratory, Savannah, Ga.....			+800	+800
Total, construction and alterations of research facilities.....			+1,558	+1,558
Total, research.....	21,881	24,194	13,758	37,952
PLANT AND ANIMAL DISEASE AND PEST CONTROL PROGRAM				
1. Evaluation of pest control and eradication programs with special reference to environmental impact associated with control and eradication procedures and initiation of necessary field activities to monitor pesticides in agriculture.....	125	125	+420	545
2. To implement additional activities under inter-agency agreement with the Departments of Health, Education, and Welfare and the Interior relating to pesticides registration.....	1,479	2,313	+180	2,493
Total, program.....	1,604	2,438	+600	3,038
Construction of facilities: (1) Plans for construction of laboratory facilities for expanded registration and enforcement activities under the Federal Insecticide, Fungicide, and Rodenticide Act (Beltsville, Md).....			+100	100
Total, plant and animal disease and pest control.....	1,604	2,438	+700	3,138
Grand total.....	23,485	26,632	+14,458	41,090

DISTRIBUTION OF FUNDS BY LOCATION AND PROJECT

Dr. SHAW. And also a location breakdown by State and town, and by project.

Mr. WHITTEN. We would be glad to have that included in the record also.

(The location breakdown referred to follows:)

AGRICULTURAL RESEARCH SERVICE

1965 pesticides budget amendment, research 1

Location	AH	ADP	CR	ENT	SWC	AE	HN	Market quality research	Total
Alabama: Auburn.....			\$30,000						\$30,000
Arizona:									
Mesa.....				\$30,000					30,000
Tucson.....				10,000					10,000
Total, Arizona.....				40,000					40,000
California:									
Davis.....			30,000						30,000
Fresno.....			30,000					\$143,000	173,000
Riverside.....			30,000	65,000		\$45,000			110,000
Salinas.....			30,000						30,000
Total, California.....			90,000	65,000		45,000		143,000	343,000
Colorado:									
Denver.....			30,000		\$80,000				30,000
Fort Collins.....									90,000
Total, Colorado.....			30,000		90,000				120,000
Florida:									
Canal Point.....			30,000						30,000
Fort Lauderdale.....			40,000						40,000
Gainesville.....				75,000					75,000
Lake Alfred.....				15,000					15,000
Orlando.....				15,000					15,000
Total, Florida.....			70,000	105,000					175,000
Georgia:									
Byron.....			60,000					430,000	60,000
Savannah.....								44,000	480,000
Tifton.....			61,200	19,000		1,800			126,000
Watkinsville.....					40,000	35,000			75,000
Total, Georgia.....			121,200	19,000	40,000	36,800		474,000	691,000
Hawaii: Honolulu.....				30,000					30,000

1965 pesticides budget amendment, plant and animal disease and pest control

States	Plant pest control	Pesticides regulation	Total
Arkansas.....	\$26,000		\$26,000
California.....	53,000		53,000
District of Columbia.....		\$180,000	180,000
Idaho.....	5,000		5,000
Illinois.....	5,000		5,000
Indiana.....	5,000		5,000
Maryland.....	35,000		35,000
Michigan.....	20,000		20,000
Minnesota.....	53,000		53,000
Mississippi.....	132,000		132,000
New Jersey.....	53,000		53,000
Pennsylvania.....	20,000		20,000
Texas.....	8,000		8,000
Wyoming.....	5,000		5,000
Total.....	420,000	180,000	600,000

BUDGET BUREAU ALLOWANCE

Detailed statement of obligations by projects—Salaries and expenses

RESEARCH

Farm research:

Animal husbandry research:

Estimated obligations

Dairy cattle.....	\$190,800
Beef and dual-purpose cattle.....	106,500
Swine.....	74,500
Sheep, goats, fur animals, etc.....	31,800
Poultry.....	96,400

Total, animal husbandry research..... 500,000

Animal disease and parasite research:

Cattle.....	161,000
Swine.....	17,000
Sheep, goats, and fur animals.....	54,000
Poultry.....	57,000
Other parasite investigations.....	111,000
Other disease investigations.....	200,000

Total, animal disease and parasite research..... 600,000

Crops research:

Cereal crops.....	171,900
Cotton and cordage fibers.....	46,400
Forage and range.....	275,000
Tobacco and sugar crops.....	90,000
Oilseed and industrial crops.....	170,000
Crops protection.....	2,780,000
Fruits and nuts.....	145,000
Vegetables and ornamentals.....	476,700
New crops.....	120,000

Total, crops research..... 4,275,000

Entomology research:

Fruit and vegetable insects.....	1,269,600
Field crop insects and bee culture.....	710,500
Insects affecting man and animals.....	375,000
Insect identification and parasite introduction.....	814,900
Pesticide chemicals.....	470,000
Basic research on insect metabolism and on sterilization techniques to develop new approaches to insect control.....	485,000

Total, entomology research..... 4,125,000

Detailed statement of obligations by projects—Salaries and expenses—Continued

Farm research—Continued	
Soil and water conservation research-----	\$500,000
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Agricultural engineering research:	
Crop production engineering-----	180,000
Livestock engineering and farm structures-----	70,000
Farm electrification-----	250,000
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Total, agricultural engineering research-----	500,000
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Total, farm research-----	10,500,000
Nutrition and consumer use research: Human nutrition-----	600,000
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Marketing research:	
Market quality research:	
Stored products insects-----	900,000
Quality evaluation-----	200,000
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Total, market quality research-----	1,100,000
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Total, research-----	12,200,000

PLANT AND ANIMAL DISEASE AND PEST CONTROL

Plant disease and pest control:	
Plant pest control: Evaluation of pest control and eradication programs with special reference to environmental impact associated with control and eradication procedures-----	420,000
Pesticides regulation: To implement additional activities under interagency agreement with the Departments of Health, Education, and Welfare and the Interior relating to pesticides registration-----	180,000
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Total, plant and animal disease and pest control-----	600,000
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Total, salaries and expenses-----	12,800,000

FACILITIES

1. Plans for following facilities:	
Research:	
(a) Livestock insects and toxicological and pathological effects of pesticides on livestock, College Station, Tex-----	260,000
(b) Research Laboratory for the Control of Plant Diseases, Nematodes, and Insects, Beltsville, Md-----	338,000
(c) Insect Attractants and Basic Research Laboratory, Gainesville, Fla-----	160,000
Plant and animal disease and pest control: Laboratory for plant and animal disease and pest control investigations--	100,000
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Subtotal, plans for facilities-----	858,000
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2. Construction of facilities: Research: Stored Products Insects Laboratory, Savannah, Ga-----	800,000
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Total facilities-----	1,658,000
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Total, 1965 budget amendment, ARS-----	14,458,000

CURRENT PROGRAMS IN RESEARCH ON CONTROL OF INSECTS

Dr. SHAW. Would you like me to go ahead then?

Mr. WHITTEN. You might go ahead.

Dr. SHAW. On nonchemical methods of controlling insects—and I am including such things as sound and light and other mechanical methods of controlling insects—we are spending in 1964, \$381,000.

On insect attractants, both sex and other attractants, we are spending a total of \$833,000 in 1964 in the Entomology Research Division.

In the work on plant diseases, nematodes, and weeds, we are spending \$902,000 in 1964.

And in our work on animal parasites where chemicals are used for control, we are spending \$400,000 in 1964.

In terms of breeding resistance in plants to insects, diseases, and nematodes, we are spending \$3,545,000 for crops research and \$635,000 in entomology research, for a total of \$4,180,000 on this breeding method. As you know, over the years we have had quite some success in breeding for disease resistance, but we have not had comparable success in breeding for insect resistance. With varietal resistance in crops there would be no chemicals involved. The farmer would have to change seed in getting control.

In our marketing research, where the problems are the control of insects in storage and processing plants, we are spending \$205,000 on biological controls of insects.

In the area of basic research, in each of our farm research divisions we are spending money amounting to \$6,473,000 on basic research on studying the insect, its biology, taxonomy, ecology, physiology, pathology, metabolism, and nutrition. We are conducting that research in the fields of animal husbandry, animal parasites, crops, entomology, soil and water conservation, and agricultural engineering.

In marketing research we are also spending \$162,000 this year on basic research on the biology, ecology, physiology, and nutrition of stored-product insects.

Another area where we are asking for increases in this work is on improved conventional pesticides and methods of application. What we are aiming at under the increase is to get what we call narrow spectrum insecticides that would kill only the target insect and would not be of the wide band kind like DDT and others that kill a large host of insects. We would want to be sure if we were seeking control of the boll weevil that the pesticide killed the boll weevil and not other insects, particularly the beneficial ones. We are spending in our Entomology Research Division \$2,847,000 on this and in the animal parasite research, \$100,000. In crops research on conventional pesticides for plant diseases and nematodes, we are spending \$453,000; and on weeds, growth regulators, and so forth in our crops research we are spending \$775,000. In our agricultural engineering research we are spending \$328,000 currently on research and improved methods of application of pesticides.

In marketing research in the same area we are spending \$574,000 on both the development of the narrow spectrum insecticides and improvement of detection methods.

In the area of what we call toxicology and pathology of livestock, where we are concerned with the treatment of animals with pesticides and also feed additives, we are spending \$422,000.

On studying what we call the fate of pesticides in soils and in crop and farmstead water supplies, we are spending \$246,000.

In our human nutrition research division we are spending \$40,000 on the effects of pesticides on the composition and nutritive value of the current food supply.

All told for the Agricultural Research Service in 1964 we are spending \$21,881,000.

Mr. WHITTEN. In the extension of your remarks, I wish you would show in connection with the statements you have just made how long you have been active in these activities. In other words, trace it back to when the work started and show us what you have done in the last 8 or 10 years.

Dr. SHAW. I would like to comment one word further. We in the Agricultural Research Service have been trying to get expanded appropriations in this field ever since 1946. We have received some, as you know among them the laboratory at Fargo, N. Dak., and the one on biological control of insects at Columbia, Mo., that is being developed, but we have never gotten the program funds that we think are necessary to really eliminate the environmental hazards associated with pesticides.

LOCATIONS OF RESEARCH FACILITIES

Mr. WHITTEN. How many locations, or how many facilities, does the Department have under the Agricultural Research Service where this work is going on now? At what places and locations does the Government have its own buildings and its own employees?

Dr. SHAW. I would have to count them up. We have the boll weevil facility at State College, Miss.; the two on grain insects, one at Tifton, Ga., and the other at Brookings, S. Dak.; and the laboratory at Fargo, N. Dak.; and the biological control facility at Columbia, Mo. We also have a laboratory at Riverside, Calif. This is not owned by us but it is under our control. We are renting it.

Mr. WHITTEN. Feel free to add in the record any others you may have overlooked.

Dr. SHAW. We have a great many more than those I have mentioned.

(The locations are as follows:)

AGRICULTURAL RESEARCH SERVICE

Principal Federal stations at which research relating to pesticide residue hazards is conducted

California :	
Fresno.....	U.S. Grape Field Station.
Indio.....	U.S. Date Garden.
Salinas.....	U.S. Agricultural Research Station.
Shafter.....	U.S. Cotton Field Station.
Colorado : Greeley.....	Colorado Potato Experiment Station.
Florida :	
Canal Point.....	U.S. Sugarcane Field Station.
Gainesville.....	Insects Affecting Man and Animals Research Laboratory.
Orlando.....	U.S. Horticultural Field Station.
Georgia :	
Albany.....	U.S. Pecan Field Laboratory.
Fort Valley.....	U.S. Horticultural Field Station.
Savannah.....	Stored-Product Insects Laboratory.
Tifton.....	Southern Grain Insects Laboratory.
Louisiana :	
Houma.....	U.S. Sugarcane Field Station.
Shreveport.....	U.S. Pecan Field Station.
Maryland : Beltsville.....	Agricultural Research Center.
Mississippi :	
State College.....	Boll Weevil Laboratory.
Stoneville.....	Weed Control Laboratory.
Missouri : Columbia.....	Biological control of insects.
North Carolina : Oxford.....	Tobacco Research Station.
North Dakota : Fargo.....	Metabolism and Radiation Laboratory.
Ohio : Delaware.....	Shade Tree and Ornamental Plants Laboratory (Forest Service Laboratory).
Pennsylvania : University Park.....	Regional Pasture Research Laboratory.
South Carolina : Charleston.....	U.S. Vegetable Breeding Laboratory.
South Dakota : Brookings.....	Northern Grain Insects Laboratory.
Texas :	
Brownsville.....	Pink Bollworm Investigations Laboratory.
Weslaco.....	U.S. Fruit and Vegetable Laboratory.
Utah : Logan.....	Crops Research Laboratory (sugarbeets, forage, and safflower research).

NOTE.—At the Federal stations listed above, research related to pesticide residue hazards comprises a significant part of the program. Small amounts of such research are carried on at several other Federal stations.

Research program related to pesticides

Location	Forest insect research			Forest disease research			Timber management research			
	Amount (thousands)		Manning	Amount (thousands)		Manning	Amount (thousands)		Manning	
	1965	Amend.	1965	Amend.	1965	Amend.	1965	Amend.	1965	Amend.
Forestry Sciences Laboratory, Athens, Ga.	\$203		24		\$160					
Silviculture, Range Management, and Forest Protection Laboratory, Alexandria, La.	177		18							
Southern Hardwoods Laboratory, Stoneville, Miss.	36		6		41			\$40	6	
Forest Insect and Disease Laboratory, Beltsville, Md.	174		27							
Forestry Sciences Laboratory, Morgantown, W. Va.					22					
Silviculture and Animal Problems Laboratory, Olympia, Wash.										
Silviculture and Brushfield Reclamation Laboratory, Roseburg, Oreg.								75	9	5
Institute of Forest Genetics, Rhinelander, Wis.								20	3	
Northern Hardwoods Laboratory, Marquette, Mich.								66	9	3
Various locations ¹								20	3	
								230	33	
Total in-house	2,243	\$900	276	56	1,111	\$100	144	696	90	14
Grants		350				50		100		
Grand total	2,243	1,250	276	56	1,111	150	144	696	90	14

See footnote on p. 69.

Location	Watershed management research				Total			
	Amount (thousands)		Manning		Amount (thousands)		Manning	
	1965	Amend.	1965	Amend.	1965	Amend.	1965	Amend.
Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.					\$329		48	15
Forest Insect and Disease Laboratory, New Haven, Conn.					150		33	10
Forest Sciences Laboratory, Corvallis, Oreg.					285		24	17
Forest Insect and Disease Laboratory, Delaware, Ohio		\$100		5	372		42	10
Foresty Services Laboratory, Research Triangle, N.C.					185		21	10
Wood Products Insect and Disease Laboratory and Institute of Forest Genetics, Gulfport, Miss.					427		51	8
Forestry Sciences Laboratory, Moscow, Idaho					223	40	30	2
Northern Forest Experiment Station, Juneau, Alaska					72		9	
Pacific Northwest Forest and Range Experiment Station, Portland, Oreg.					113		18	
Forestry Sciences Laboratory, Logan, Utah					55		6	
Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.					100		18	
Forestry Sciences Laboratory, Albuquerque, N. Mex.					87		12	
Plantation Insects Project, East Lansing, Mich.					46		6	
Lake States Forest Experiment Station, main office and laboratory, St. Paul, Minn.					42		6	
Forest Sciences Laboratory, Athens, Ga.					168		18	
Naval Stores and Timber Protection Laboratory, Oulstee, Fla.					42		6	
Forestry Sciences Laboratory, Athens, Ga.					363		48	
Silviculture, Range Management, Forest Protection Laboratory, Alexandria, La.					217		24	
Southern Hardwoods Laboratory, Stoneville, Miss.					77		9	
Forest Insect and Disease Laboratory, Beltsville, Md.					174		27	
Forest Sciences Laboratory, Morgantown, W. Va.					22		3	
Silviculture and Land Problems Laboratory, Olympia, Wash.					100		9	5
Silviculture and Brushfield Reclamation Laboratory, Roseburg, Oreg.					20		3	
Institute of Forest Genetics, Rhinelander, Wis.					66	50	9	3
Northern Hardwoods Laboratory, Marquette, Mich.					20		3	
Various locations					230		33	
Total in-house	100			5	4,050		510	80
Grants					500			
Grand total	100			5	4,050		510	80

¹ Silvicultural research is to develop improved timber production practices, but a second purpose is to work out regional adaptation aimed at reducing damage from insects, diseases, and animals. This related pesticide research is done at many locations where a small part of the effort can be allocated toward solving the pesticide problem.

STATE EXPERIMENT STATIONS, PESTICIDE RESEARCH

Mr. WHITTEN. The Research and Marketing Act of 1946 provided for cooperative research. It provided for a number of things, one of which was cooperative research on a regional basis. Also we are familiar with the fact that you have money for State experiment stations.

Dr. SHAW. All State experiment stations are involved in this program and have been for years and they certainly can make contributions at the present time in terms of increasing their efforts. At the same time we feel that there is a need for an expanded Department program, what we call our inhouse program, and this is why we are asking for additional laboratories. The program has to be cooperative with the States and to my way of thinking it will be a better program if we have the States and the Department working together.

Dr. BYERLY. May I say the 1965 budget estimate for the Cooperative State Research Service contained \$7,261,000 calculated as the base amount against which the increase would be calculated. With respect to the distribution, I would like to summarize for the record and supply the exact locations as to the work.

Every State has problems in this area. Some have larger problems and some have smaller problems but every State has an obligation to be responsive to the needs for research in that State. Thirty-three stations are participating in regional research to help solve pesticide residue problems. Fifteen States are doing research on residues in soils. Under the Research and Marketing Act there are 6 regional projects in which a total of 33 stations are cooperating and in each of the 6 projects there is cooperation with USDA agents.

QUESTION OF CENTRALIZATION OF RESEARCH

Mr. WHITTEN. Let me interrupt you there and ask this question: We are familiar on the committee with the need to have experimentation; that is, to try out these various things and to experiment with new approaches and things of that sort but I have been told in the years I have been here that, other than the experimentation approach, the research could be done better if you had a central location rather than dividing it out to 35 or 40 different locations. In the case of the gypsy moth and screw-worm you did not have that research done in every State.

Dr. BYERLY. Research begins inside a man's head. And man has to have a place to work. I strongly support the Laboratory on Metabolism of Chemicals at Fargo, N. Dak., but it is also necessary to have people where the problems are and those people are distributed in large measure through the States, not only the people employed by the State experiment stations but by the Agricultural Research Service, and they do cooperate together. You have to have it both ways. We do have to have points of concentration. It is not necessary for every State to do research on every problem, nor do they. They concentrate in accordance with the problems that exist in each of the States. We have a fine program consisting of 53 agricultural stations which are autonomous and they cooperate with the USDA agencies and through this research and the concentration in the USDA you have the finest research program there is. You cannot fly on one wing

and one wing is the autonomous stations. I would not want to see the Department's research structure weakened. I served for 28 years in the Agricultural Research Service and its predecessors and I support it very strongly, but in order to have the program balance we must have a strong program in every one of the States, not just one State.

Have I answered all your questions?

MR. WHITTEN. You carried me so fast you may have overanswered them, Doctor, I do not know. The question is whether some phases of research do not lend themselves to being done in 50 States, but should be concentrated. If we divide it in 50 places not only are we dissipating our efforts but weakening our chances of getting results. What part of this do you feel should be done in each State? A boll weevil is a boll weevil and a gypsy moth is a gypsy moth. You do not have to research on them in every State. We have heard of the oak wilt and various and sundry diseases and we have kind of a lawyer's secondhand knowledge of it. But you folks have told us research does not have to be carried on in 50 States.

DR. BYERLY. Let me take boll weevils. The Department built the laboratory at Mississippi State University. It is a fine laboratory, I have been there, and it will do fine work. They have an eager and competent corps of research people there. Mississippi State University at the same time has as the head of its own entomology department a man named Brazell who is acquainted with the head of the boll weevil laboratory. One serves one part of the country and the other serves all. They do complement each other and we need both.

MR. WHITTEN. I certainly did not mean to exclude the State experiment stations. The question is, where does it fit in the scheme of things here?

DR. BYERLY. I am sure no director of any experiment station would differ from the opinion I express that it is absolutely essential to have research in the most basic sense as a component of any program that is responsive to the needs of that State. You cannot have one without the other. It is estimated 35 percent is about the component Dr. Shaw has in the Department. It might grow to 50 percent. I do not think it should grow beyond that lest it gets less responsive to the needs of the State. But you cannot have experimentation without opportunity for the people who do the experiments to maintain their competence.

I said research is done by people. In the entomological area the Department has approximately 398 man-years—this is an estimate—and the State experiment stations have 336. These are scattered among all the experiment stations. Research is done by people. These people are an essential component of this research program that we support.

MR. WHITTEN. Doctor, we have spent days back through the years listening to you folks on that side of the table tell us how much effort it requires not to duplicate these projects. When a State comes in and wants to do something you check to see that it is not something being done by somebody else. How does this fit in?

DR. BYERLY. It fits in very well indeed. We, as you know, screen every program to make sure there is no wasteful duplication in the expenditure of these funds.

Mr. WHITTEN. If our policy through the years has been to see that one State does not do what another is doing, how can you say each State should be involved in this?

Dr. BYERLY. Well, sir; each State is already involved and we need it where the competence is and the competence is not only in the Department but in the States as well.

OUTSTANDING DEVELOPMENTS IN CONTROL OF INSECTS

Mr. WHITTEN. I believe this has been going on since the 1860's. I have dealt with it since 1945. What have you learned from this pesticide and insecticide and herbicide research that the Department has done?

Dr. BYERLY. We made a little summary and this is not just one State and not just USDA because we do work together. In the State of California a summary was made:

Research entomologists at the California Agricultural Experimentation Station estimate that since 1923 the use of beneficial insects instead of chemicals against pest insects has saved \$110 million in their State. The pests and savings are:

Citrophilus mealybug, \$56 million; black scale, \$32 million; Klamath weed, \$21 million; grape leaf skeletonizer, \$750,000; spotted alfalfa aphid, \$5.5 million.

Subtracting \$4.3 million, the amount estimated to have gone into salaries and other expenses connected with the development of these controls, leaves a net gain of \$110 million.

I am making approximations and I want it to be clear a part of this work was by ARS scholars.

Mr. WHITTEN. The amounts you gave are estimated savings?

Dr. BYERLY. Yes; that is correct.

Mr. WHITTEN. I would like you to touch on the discoveries you have made in this area.

Dr. BYERLY. Either for the record or off the record, you know I would not like to steal the limelight.

Mr. WHITTEN. I have never seen you try to steal the limelight but I have seen you succeed in doing so.

Dr. BYERLY. If I may defer for an example, to Dr. McGovern, my colleague, an entomologist. May I defer to Dr. Shaw? I will come up with one or two myself if you insist, Mr. Chairman.

Mr. WHITTEN. We are pleased to have you here. We know how wrapped up you are with your work.

Dr. Shaw, we would like to have for the record the outstanding and successful developments that you have had in this area back through the years. You might tell us briefly some of it here, if you have any of it on your mind. I would like for the record to be fairly complete on this, what you have done in the various approaches—in application methods, equipment to apply the various developments, what you have come up with, not only in connection with these new approaches, biological and sterilization, but in all aspects of controls, including your chemicals, as well as various and sundry other successful results that you have had back through the years.

Dr. SHAW. We have been working for a long time with predators and diseases of insects, finding insects that would prey on one of these insects that are causing us considerable economic loss. For instance, in the case of the citrus blackfly, we found a parasite to keep it under control. We have had partial success, and only partial, in the control of the Japanese beetle with the milky disease. It provides quite a bit of control in the areas where you get it established, but nevertheless the Japanese beetle is still spreading and we are not keeping it controlled.

More recently, starting with the work on the screw-worm where we developed the technique of sterilizing the insect we have gone into a number of newer approaches; that being one. More recently we have been trying to find chemicals that would sterilize rather than having to grow all the flies, then sterilizing them with radiation, and releasing them to accomplish a purpose. If we could develop chemical sterilants, we probably could work out a scheme to apply them to the native population that would eliminate the expense of rearing large numbers of insects. One of our experts on one of the islands in the Pacific demonstrated that we could use a technique using a combination of an attractant to draw the insect, and a sterilant that would sterilize the insects after they came to that point. We were able to effect control by this combination of methods. In the case of chemicals, in terms of general application, we have not yet got to the stage where they can be used in commercial agriculture. We have not yet found one that is not sufficiently biologically active that if there were any residues of this left that it would cause trouble. We are continuing to work on that field.

In the case of attractants, we feel that this is a big area of possibilities. We recently succeeded in synthesizing the insect attractant for the gypsy moth. We have it under field trial this year. We manufactured about 25 pounds of this sex attractant and have got it in traps in a large area in the gypsy moth area, and our hope is that we will be able to attract all of the males out of the population to our traps.

If we can do that, then we eliminate the population. We have had some recent success in developing feeding attractants in the cotton plant, related to the control of the boll weevil. We think we can exploit these to develop some alternate means of control.

I would have to go to the record, Mr. Chairman, to give you the full story on this, but we would like to do it.

Mr. WHITTEN. We would be glad to have it in the record, Dr. Shaw. (The material is as follows:)

OUTSTANDING ACCOMPLISHMENTS IN THE DEVELOPMENT OF PEST CONTROL AND INSECT CONTROL¹

AGRICULTURAL RESEARCH SERVICE

Screw-worm eradicated in Southeastern United States and drastically reduced in Southwest by male sterility method.—The practical application of a new concept in insect control—the release of sterile insects for their own destruction—resulted in the eradication of the screw-worm, an important livestock pest, from

¹ Excludes accomplishments reported by the Forest Service: for these accomplishments see p. 124.

Southeastern United States and its elimination in New Mexico, and in Texas, and States to the north and east. Screw-worm flies were produced by the millions and the males, which were made sterile by gamma radiation, were dispersed on a sustained schedule by aircraft over the infested areas. When the female screw-worm flies in the natural population mated with the sterile males, they could not produce fertile eggs. Eventually, no fertile females remained to deposit eggs and the pest disappeared. The use of sterility induced by gamma radiation or by a chemical sterilant may have wide application for the control of many major insect pests.

Baits responsible for eradication of two tropical fruit flies.—The main weapon used to eradicate the Mediterranean fruit fly in Florida in 1956-57 was a bait spray, which consisted of a protein hydrolysate, that attracted the insects, and a small amount of the insecticide, malathion, that killed the flies when they fed on the bait. In less than 2 years the pest was eradicated. The eradication of the oriental fruit fly on the island of Rota in the South Pacific was accomplished by luring the male flies to a specific attractant, methyl eugenol, combined with a small amount of the insecticide, naled, on small fiberboard squares, that killed them. Similar bait sprays hold much promise in the control of other tropical fruit flies in various parts of the world.

Gypsy moth sex attractant isolated, identified, and synthesized.—Following years of research, the potent sex attractant secreted by the female gypsy moth to attract the male, is now available as a synthetic, known as gyplure. Previously, the attractant could only be obtained by costly collections of female moths. The lure is being used in extensive surveys to detect gypsy moth infestations, and it may be of value in the development of control measures. This breakthrough has stimulated research on sex attractants in other insect pests.

Insect resistant crop varieties developed.—Federal and State entomologists and plant breeders have cooperated in the development of (1) 17 varieties of winter wheat resistant to the Hessian fly; (2) 2 varieties of wheat resistant to the wheat stem sawfly; (3) 5 varieties of alfalfa resistant to the spotted alfalfa aphid; (4) numerous corn inbreds resistant to the European corn borer and corn earworm; (5) several barleys and wheats resistant to the greenbug; and (6) a few sorghums resistant to the chinch bug. This type of insect control can be employed without cost to the grower, without creating a residue problem on food or feed, and without posing a hazard to honey bees, other pollinating insects, beneficial parasites and predators, or fish and wildlife.

Klamath weed in California successfully controlled by insects.—Klamath weed, of European origin, had spread over 2 million acres of rangeland in California, making it unsuitable for grazing and lowering land values. From the status of an important rangeland pest it was reduced to that of a casual roadside weed through the use of two introduced beetles that fed on the plants and destroyed them. Prior to introduction, extensive tests proved that the beetles would not be injurious to agricultural crops in the United States. The principle of biological control of weeds with insects may have wide application in the practical solution of many aquatic and rangeland weed problems.

Aerosols developed for dispensing insecticides adapted to many everyday consumer uses.—Liquified-gas propelled aerosols were developed in the U.S. Department of Agriculture in connection with the dispersal of insecticides to kill insect pests in buildings and other enclosed spaces. Over 50 million aerosol bombs were used by our Armed Forces during World War II to kill mosquitoes and other insect pests. The success of such aerosols was so great that the idea was adopted by industry for the dispersing of more than 200 products, having an annual sales value today of over \$1 billion.

Parasites minimize threat of citrus blackfly.—Threat of invasion of the Southern United States from Mexico by the citrus blackfly has been reduced to a minimum by the introduction into Mexico of several efficient insect parasites. Following study of the parasites and introduction into Mexico by U.S. entomologists, the Mexican Government has colonized the parasites and liberated them throughout the infested areas in that country. This program has been unusually successful and has greatly reduced the blackfly infestations.

Insect pathogens aid in control of several major insect pests.—The milky disease caused by a bacterium that infects the grubs of the Japanese beetle in the soil has been developed and put to practical use in reducing infestations of the pest. A dust containing spores of the milky disease can now be purchased. Another bacterium, *Bacillus thuringiensis*, attacks certain caterpillars, including the tobacco hornworm and the cabbage looper, and is recommended for their

control. Disease organisms are usually highly specific and all evidence indicates that they pose no hazards to man or animals. They may prove useful for the control of a number of insect pests.

CONTROL OF DISEASES, NEMATODES, WEEDS, AND BRUSH

Breeding crops resistant to disease and nematodes.—A continuous program for breeding of resistant varieties of crops, much of it in cooperation with States, has worked very effectively for plant diseases and has resulted in production of some crops with little, if any, pesticides. Examples of such crops are as follows:

Wheat and oats: Success of a continuous plant breeding program has permitted cereals to be grown without the need for leaf sprays to control rusts. When race 1513 of wheat stem rust became an epidemic in 1950, all of U.S. commercial varieties became obsolete and a new set had to be developed. The rust resistance of Spring wheat varieties, such as Sil Kirk, Justin, Crim, Wells, and Lakota, continue to be generally free from rust, whereas small acreages of varieties such as Lee and Langdon, which are susceptible to certain races, continue to be heavily rusted. Well over 90 percent of the Durum wheat acreage and about 75 percent of our Hard Red Spring wheat acreage are sown to varieties highly resistant to black stem rust. Since 1941, there have been three changeovers from disease susceptible to resistant oat varieties. Now more than 95 percent of the U.S. oat acreage is in rust and smut resistant varieties.

Corn: *Helminthosporium* blight of corn became serious in the central Corn Belt States in the late forties and threatened to lower production. Resistance was found in several southern lines and today more than 20 blight resistant inbred lines have been developed which commercial corn breeders have had available to incorporate into hybrids.

Forage crops: Savings to farmers from three improved varieties of alfalfa, Ranger, Lahontan, and Moapa, developed for bacterial wilt, stem nematode, and spotted alfalfa aphid resistance, respectively, are in excess of \$100 million annually.

Gulf annual ryegrass possesses resistance to a destructive leaf rust disease prevalent in the gulf coast area from Florida to Texas.

A recently developed breeding line of sweet blue lupine, possessing resistance to anthracnose and gray leaf spot diseases, is being increased for varietal release in the Southeastern States. In a test where diseases were prevalent, other lupine varieties failed to produce a seed crop, whereas the disease resistant line produced over a thousand pounds of seed per acre. It is anticipated that benefits from this resistance will increase acreage of blue lupines to nearly 500,000, having an annual value approaching \$12 million.

Tobacco: Burley 21, a wildfire resistant variety of tobacco, was first released in 1955 after many years of research. By 1961, about 80 percent of the crop was planted with wildfire resistant varieties, with an estimated annual savings of at least \$5 million to burley growers in an eight-State production area. Burley 37, resistant to black shank and highly resistant to fusarium wilt, has helped to lower production costs.

In 1964, three burrowing nematode-tolerant citrus rootstock varieties were released which will reduce the need for fumigation and permit citrus to be grown where fumigation is not practical.

Vegetables: The development of disease resistant vegetable varieties has, on several occasions, restored the industry in areas virtually being forced out of production, such as brown blight resistant lettuce and powdery mildew resistant melons for the Imperial and Coachella Valleys of California, and mildew resistant lettuce and pink root resistant onions for the Rio Grande Valley of Texas. More often resistant varieties have reversed serious downward trends before inroads of disease have ruined production disastrously, as was the case with fusarium and verticillium-resistant tomatoes, mildew-resistant lima beans for the Atlantic seaboard production area, fusarium-resistant cabbage, mosaic-resistant dry and snapbeans. Michigan bean growers, for example, obtained approximately \$50 million for their 1962 dry bean crop, the highest dollar return for this crop in the history of the Michigan bean industry. Much of this gain can be attributed to introduction of the mosaic- and anthracnose-resistant Sanilac pea bean. Additional disease-resistant varieties include watermelons resistant to anthracnose and fusarium wilt, spinach resistant to blue mold and white rust, and potatoes resistant to late blight, scab, mosaic, and other varieties.

Cotton: In the early 1930's, resistance in cotton to blight was discovered in Tennessee in a Stoneville selection. From this discovery and related discoveries of additional blight resistance, there are now approximately 1,500,000 acres of blight-resistant cotton varieties produced in the country. These varieties are Rex, Auburn, Blight Master, Gregg, and Acala 1517-BR2.

Fusarium wilt reduced cotton yields for many years. Progressive improvement in resistance to the disease begun prior to 1900, has been continuous and now all varieties grown in areas where the disease is a problem, primarily in the southeastern United States, have some measure of effective resistance.

Verticillium wilt has been one of the most difficult disease problems of cotton to control through plant breeding, and the disease has continuously spread to the western producing areas. However, such varieties as Acala 4-42 and Acala 15-17 have been developed with enough tolerance to permit economic production in the trans-Pecos area of Texas and New Mexico and the San Joaquin Valley of California, where this disease is most severe. The areas now planted to verticillium wilt-tolerant varieties approximate 1 million acres.

Nematodes do considerable damage to cotton alone, but perhaps their most serious role is in conjunction with fusarium wilt in those areas where wilt is prevalent. The two organisms complement each other and enhance the effect of wilt. Auburn 56, developed at Auburn, Ala., is highly tolerant to both nematodes and fusarium.

Oilseeds: Losses from a new race of flax rust that appeared in 1948 resulted in losses of over 20 percent of the crop in 1950 and 1951. The substitution of persistent varieties has all but eliminated flax rust with an annual saving of at least \$15 million. Another new race of rust was discovered in 1962 that attacked the important commercial varieties Marine, Arny, and others. As a result of continuing research, varieties Bolley, Redwood, B-5128, Windon, and Summit were available for planting in 1964, and no serious loss in anticipated.

In 1961, varieties of soybeans resistant to one of the leaf diseases increased the estimated returns to southern growers by more than \$5 million, whereas the loss from the same disease in areas where resistant varieties are not yet available were approximately \$15 million.

Losses in Texas to *Alternaria* leafspot of castorbean were estimated at over 20 percent in 1959 and 1960. The use of Hale and other resistant varieties cut this loss materially in 1961, with savings of more than 10 million pounds of castorbeans with a value of \$500,000 to growers.

Phytophthora root rot prevented the growing of safflower in irrigated areas until the resistant varieties Gila and US 10 were released in 1957 and 1959, respectively. Following their release approximately 100,000 acres (about one-fourth of the U.S. acreage) of safflower were grown in southern Arizona and southern California.

Bacterial leaf spot of guar causes losses ranging from a trace to complete destruction of the crop. The resistant variety Brooks, released in 1964, has outyielded leading commercial varieties by about 40 percent in test plantings. Most of the increased yield seems to be due to resistance to bacterial leaf spot.

Fruits: Fire blight has prevented the production of high quality pears in the United States except in a few areas on the Pacific coast. In 1960, two blight-resistant varieties, Magness and Moonglow, were released which will permit this crop to be established in the East.

To control apple scab and other leaf diseases requires in some areas up to 12 separate sprays. Resistance was found in an ornamental apple selection and crosses made to leading commercial varieties. Now promising selections resistant to scab are in the last stages of evaluation, which could greatly reduce the use of pesticides on this crop.

The introduction of Berkeley, Bluecrop, and Coville blueberries resistant to powdery mildew has decreased the need for fungicides.

Less fumigation of land is needed to control red stele root rot of strawberries since the development of resistant strawberry varieties Surecrop, Midway, and Stelmaster.

The release of bacterial spot resistant peach varieties Earlired and Ranger will now permit the growing of peaches in areas where this disease has been serious. In 1959, Nemaguard, a peach rootstock resistant to several races of rootknot nematode, was released.

Sugar crops: Sweet sorghum breeding has resulted in the development of five new varieties, including Mer. 55-1, which has a high sugar content and is resistant to all sorghum diseases. A superior variety for sirup production, Wiley, re-

leased in 1956, is disease resistant, and produces high yields of superior quality of sorghum for sirup under a wide range of conditions from Florida to Kentucky.

In the 1920's, curly top, black root, and *Cercospora* leaf spot caused such serious crop failures to sugarbeets that factories were closed in certain areas. The development of resistant varieties over a period of years has permitted the reestablishment of sugarbeet production in areas where the crop had been abandoned due to diseases.

Current disease problems caused by diseases and nematodes.—Striking as these successes are, there is need to search for higher degrees of resistance to certain diseases, locate sources of resistance where none is now available, and to incorporate resistance to several diseases into a single crop variety. New races of plant pathogens are making formerly resistant varieties susceptible, as has been well illustrated in the cereal crops. Examples of current problems are—

- Crown rot and bacterial canker of peach trees.
- Fire blight in apples.
- Root rot of raspberries.
- Black rot of grapes.
- Brown rot of peaches.
- Pecan scab.
- Cotton varieties immune, rather than merely tolerant, to verticillium wilt.
- Resistance in cotton to seedling diseases.
- Mosaic disease of tobacco, as well as a higher level of resistance to black root rot.
- Complex of root and crown diseases, leafspots, leaf blotch, and leaf and stem rusts in forage crops.
- Virus yellows of sugarbeets.
- Mosaic of sugarcane.
- Stripe rust of wheat.
- Blast of rice.
- Stalk rots of corn and sorghum.
- Corn stunt virus.
- Downy mildew and virus diseases of hops.
- Septoria, macrosporium, and bacterial spots and anthracnose fruit rots of tomatoes.
- Leaf and fruit diseases in cucumbers.
- Better sources of resistance to potato lateblight.

For some time, nematodes have been known to increase the damage from certain root diseases and in some cases to be responsible for providing entry for fungi and bacteria into plants. More recently, plant nematodes have been shown to transmit several virus diseases of grape and tree fruits. Therefore, it is more essential than ever that horticultural and field crops now be developed resistant to nematodes.

Herbicides for weed and brush control

Cotton.—The annual labor costs for hand hoeing and cultivation of cotton once averaged 20 to 41 man-hours per acre. The use of herbicides has reduced the cost of weed control from \$28.82 and 35.04 man-hours per acre to \$26.57 and 9.54 man-hours. Four years ago, 50 to 60 percent of the cotton acreage in Mississippi was given some kind of weed control treatment and 5 percent of the acreage was given a complete chemical weed control treatment. In 1963, 80 percent of the acreage in Mississippi was treated. The diuron surfactant treatment was used on about 1½ million acres of cotton in 1963 at a cost of less than 70 cents per acre.

Rice.—Experimental control of barnyard grass in rice by the proper use of CIPC resulted in an average yield increase valued at \$67 per acre in Arkansas from 1955 to 1957. A more effective herbicide, propanil, is now being used and in 1962, 1½ million acres of rice were treated with herbicides with increased benefits averaging \$35 per acre to the farmer.

Brush control on rangelands.—Spraying shinnery oak-infected range with silvex allowed increasing the number of cattle grazed on a ranch near Arnett, Okla. Grass production was more than doubled from 500 pounds per acre on untreated to 1,100 pounds on the sprayed. In the spring of 1964, the ranch sprayed an additional 3,800 acres of shinnery oak with one-quarter pound per acre of silvex at a cost of \$1.35 per acre.

Nematocides

Citrus.—Experiments in Arizona and California for the control of the citrus nematode by the application of DBCP in irrigation water indicates that improvement in tree growth yield and fruit size lasts for 2 years after the application of 2 gallons of DBCP per acre and 4 years after the application of either 4 or 6 gallons per acre. In Arizona, yield increases amounted to 25 percent per year for the 3 years following treatment. Fruit size was not increased the first year but increased 22 percent the second year. In California, net returns to the farmer through the use of DBCP in lemon groves amount to \$49.35 to \$223.50. Extensive acreages are now treated by the farmers in the California and Arizona citrus areas.

Cotton.—Yield increases of 100 percent occur when cotton in soil infested with root-knot nematode is treated with DBCP. As much as 95 percent of the cotton growing on light sandy soils in some counties of California and Arizona is now treated with nematocides.

Tobacco.—In North Carolina 50 percent of the tobacco acreage is now treated with a nematocide. This percentage may be higher in other tobacco areas. Of 76 experiments in the tobacco-growing areas in which D-D was used, the average yield increase was 10 percent over the untreated control. In 49 experiments where EDB was used the average yield increase was 20.2 percent.

Peanuts.—In 14 experiments in the Southern States where the nematocide, DBCP, was used, yield increases amounted to 64.3 percent.

IMPROVED METHODS AND EQUIPMENT FOR PEST CONTROL

Low pressure sprays have been found to reduce pesticides drift, cost in equipment and power, and have obtained equally good control. Pressures as low as 30 to 50 pounds per square inch using the same application per acre resulted in equal control to pressures of 200 to 250 frequently used. These results were obtained through research on the control of insects and diseases on vegetables and sugar beets in cooperation with the Ohio Agricultural Experiment Station.

Equipment for the application of granular pesticides has been developed for insect and weed control. Some of the advantages of granular applications over liquid are: There is no mixing; pumping, hauling, storing, or measuring of water; nozzle clogging, boom repairing, or pressure regulating; less chance of damaging crops in adjacent fields by drift; and less discomfort to the operator with some chemicals. The use of granular materials for pest control is expanding and the number of granular pesticides available has increased to such an extent, that it is now unusual to find a pesticide that is not available in granular form. There are now over 30 manufacturers of granular chemical applicators in the United States.

Low gallonage, air-blast spray applications has been developed for control of insects and diseases in low-growing crops. Applications of around 40 gallons per acres with this equipment, for instance, give control comparable to that obtained when using 160 gallons per acre with the conventional hydraulic sprayer. Low-gallonage sprays require less labor and lower power costs during the application, and compact the soil less. Farmers are adopting the low gallonage equipment, and major manufacturers of sprayers are now including this type of sprayer in their line.

Livestock sprayer: Research at Kerrville, Tex., has resulted in development of a new design for a cattle sprayer that controls horn flies as well as conventional spray equipment, but with 50 percent less insecticide. The sprayer is actuated by the animals stepping on a foot treadle and applies the spray uniformly over the entire animal. The uniformity of the spray avoids over-application in spots, reduces the possibility of residues on the animal, and is more economical of spray material and labor.

An experimental machine has been developed as a means of controlling early season buildup of the cotton boll weevil by picking up and destroying fallen, punctured squares. During the 1963 season the overall pickup efficiency of this flail-type square removal machine was 84.2 percent, which was comparable to control by conventional insecticidal applications as long as the migration of adult insects from untreated areas was not a factor.

Quick methods of measuring spray deposits have been developed in cooperation with the Forest Service, which should speed up equipment research to reduce chemical residues. A quick way to estimate the average size spray drop has been developed, using measurements of a few of the largest drops. Another method has

also been developed which can be used for a rapid approximation of the amount of chemical landing on crops or drifting away. A small amount of a fluorescent chemical is added to the spray liquid, and the deposit is examined under an ultraviolet light.

Lamps for insect attraction: Discovery of the superior attractiveness of near ultraviolet (blacklight) radiation to several important night-flying insects in 1948 by a Department engineer at Purdue University led to development of the BL insect survey trap. Each week for the past 8 years the USDA economic insect report has included catches by this trap of as many as 10 important insects (now 20) at various locations in the United States. These catches are most useful in determining the need for initiating control methods. Traps equipped with blacklight lamps are also in extensive use to determine the location of new infestations of such insects as the pink bollworm and European canafer.

New lamp for insect attraction: Day-flying insects are not usually attracted by blacklight but may respond to portions of the visible spectrum. A new experimental lamp designed to meet the spectral response of the boll weevil as determined by a Department engineer at the Texas station under laboratory conditions has been developed by a manufacturer for field investigations of attraction to day-flying insects.

Insect control by light traps appears possible: Research on controlling certain insects such as tobacco hornworms and cucumber beetles by light traps alone or in combination with insecticides is being conducted in North Carolina and Indiana. Possibilities of limited control have been indicated. Extensive installations of light traps have been made by tobacco farmers in Kentucky and North and South Carolina during 1964 despite the limited experimental results available from work by Department engineers and entomologists in 1962 and 1963.

STUDIES OF TOXICITY AND METABOLISM IN LIVESTOCK OF PESTICIDES, CHEMICALS, AND DRUGS

Ruminal protozoa found to metabolize certain pesticides: In preliminary studies of metabolism of pesticides it has been shown that ruminal protozoa, cultured as individual species, offer definite promise as a screening technique for determining whether pesticides will leave residues in meat and milk of cattle and sheep. Ruminant animals possess large numbers of microorganisms in their digestive systems, particularly in the rumen which appears to be the natural site for the microbial degradation of complex compounds such as pesticides. These data suggest that pesticides, if suitable, degraded in this manner, should not produce residues in the meat even though they are consumed with the feed. Ruminal protozoa were found to metabolize the following pesticides: Diazinon, dimethoate, lindane, Thiodan, and Sevin. Such studies lend themselves not only to the determination of effects on the pesticide compound, but also offer methods for studying metabolites of pesticides. This area of investigation opens the way to new approaches and techniques on problems of residue metabolism in ruminants at the new laboratory at Fargo, N. Dak.

Corn silage made from dimethoate treated corn safe for beef and dairy animals: In cooperation with the Georgia Coastal Plain Experiment Station, residue studies on both beef and dairy cattle are being conducted on forages treated with new pesticides, among them dimethoate. Steers fed for 27 days on corn silage made from corn with no dimethoate, with 1.1 parts per million, and with 6.7 parts per million dimethoate (field applications were 1 pound and 2 pounds per acre, respectively) showed no effects from consuming 50 pounds of the treated silage per steer per day. The dimethoate treated silage was as palatable as the untreated. Blood samples taken the day before the test period and at six intervals during the 27-day feeding period showed no difference in the blood cholinesterase activity. Based on this test and a concurrent one with dairy cattle dimethoate was shown to be a safe pesticide for use on forage to be ensiled for feeding to beef and dairy animals.

Susceptibility to poisonous effects: Some variations in different breeds of cattle have been found for susceptibility to poisonous effects of four organic phosphorus insecticides tested.

Antidotes for treatment of livestock accidentally poisoned by pesticides through carelessness or misuse have been developed.

Dicalcium phosphate, calcium carbonate, calcium chloride and magnesium sulfate were all of value in treating oxalate poisoning in sheep caused by poisonous plants.

Herbicides: Sheep fed 2 grams of the herbicide 2, 4-D daily for 30, 60, and 90 days developed no clinical signs of toxicity, no apparent tissue residue, or histopathological tissue changes. The amount ingested was greater than would be eaten on any forage treated with this common herbicide.

Feed additives: Salts of antimony, arsenic, bismuth, copper, lead, tellurium, and zinc, which are commonly used as feed additives in mineral-deficient areas, were few ewes throughout their gestation period. Copper and zinc were the only elements that accumulated in the body tissues of the ewe and fetus to levels detectable by the X-ray spectographic method.

CONTROL OF PARASITES

Cattle.—Bovine venereal trichomoniasis can be controlled by a hygienic breeding program and increased surveillance of centers of artificial insemination. Also, a promising systemic treatment has been developed for the disease which obviates tedious, laborious, costly, and dangerous methods of topical application and also complements control through artificial insemination and hygienic breeding.

Rearing of individual dairy calves in small portable pens has been used successfully as a measure for preventing many parasitic diseases.

Methods for preventing spread of anaplasmosis has been provided by the development of the complement-fixation test for detection of infected animals.

Administration of ronnel in the feed of cattle resulted in a marked reduction of lice affecting them.

Sheep.—Studies on CoRal, Korlan, Delnav, Clodrin, Toxaphene and cold lime sulfur dip were made for their effectiveness against sheep scab mites. The results were dependent on the pathogenicity of the strains of mites which varied greatly, indicating that varying degrees of effectiveness are to be expected.

Critical tests on cattle and sheep show thiabendazole is highly effective in removing many of the stomach and intestinal worms.

Clodrin as a dip had a high order of effectiveness for sheep keds, leg mange mites, and the foot louse of sheep.

The compound Bayer ME 3625 was found to be effective in removing adult liver flukes from sheep, but Nегuvon was ineffective at 100 milligrams per kilogram. Geigy compound GS27384 was found to have some effect against the fingered tapeworm at 300 milligrams per kilogram but was quite toxic to the sheep. Bayer 2353 removed 100 percent of the tapeworms from 11 sheep treated at the rate of 600 milligrams per kilogram while 10 untreated controls retained 23 tapeworms each.

Poultry and swine.—Coccidiosis has been prevented and controlled by development of certain practical methods of sanitation in the rearing of chickens.

It has been shown that the long life cycle of the kidney worm in swine makes possible its eradication by use of gilts only for reproduction.

COOPERATIVE STATE RESEARCH SERVICE

ACCOMPLISHMENTS IN THE DEVELOPMENT OF INSECT CONTROL

Studies at the Florida Agricultural Experiment Station indicate that purple scale, a consistently important and widely distributed pest of Florida citrus, is being held in check by a parasite introduced throughout the Citrus Belt in 1959. Prior to this date one to two sprays were required to keep the scale under control each year.

Research at the Indiana Agricultural Experiment Station in the area of alfalfa resistance to insects has resulted in considerable success with the development of spittlebug antibiosis and leafhopper tolerance. Control studies with the use of 400 plants resulted in a number of selections showing promising spittlebug antibiosis as well as favorable agronomic characteristics; 10,500 plants were used in the leafhopper studies, and both field and greenhouse techniques were employed.

A wasp parasite introduced from Iran and Iraq by the California Agricultural Experiment Station has been found to be effective in the control of olive scale. Observations show that where insecticidal applications can be reduced or eliminated, with summer irrigation properly applied and with proper olive tree pruning,

highly satisfactory biological control by the parasite can be realized. In addition, a high degree of control of olive scale in and around residential properties, city streets and parks on a great variety of host plants, is attributed to the action of the parasite.

Research at the California Agricultural Experiment Station has disclosed a new and effective compound useful in fabric-pest control. The material causes a metabolic impairment to insects. Of utmost significance is the fact that this chemical is harmless to warm-blooded animals, yet extremely lethal to insects. The station, in cooperation with industry, is studying formulations that can be used for permanent fabric proofing, as well as laundry rinses.

The Wisconsin Agricultural Experiment Station has taken the lead in the north central regional project on pesticide residues in soils. Their research, in cooperation with other State stations and the USDA, has shown that pesticide residues dissipate more rapidly from cultivated land than from land covered with low growing crops that prevent the free circulation of air over the soil surface.

High soil moisture increases the loss of certain pesticide residues from soils probably by evaporation of water aiding in the volatilization of the pesticide. Crops can be contaminated by pesticide residues in soils. Such contamination is affected by the type of crop and pesticide and other factors. In general, crops in which the usable products are grown in the soil are more affected than crops whose usable products are grown above the soil.

Researchers at the Wyoming Agricultural Experiment Station have been studying the effects of parasites and predators on rangeland grasshopper populations. The grasshoppers have been found to be subjected to attack during all their life stages. In the areas under study, 8 species of birds, 3 species of small rodents, 28 species of insects representing 8 families, 1 mite species, and 4 species of spiders have been definitely established as directly affecting grasshoppers. The parasitism and predation rates for the different species are being determined so that the total effect of the combined predator and prey populations can be separated from the effects of weather and other factors. Preliminary data has shown that predation pressure on the declining population of grasshoppers is almost twice as heavy as that on the ascending population.

The recent introduction of the cereal leaf beetle and its subsequent spread in the Middle West has given rise to an intensive control effort at the Michigan, Indiana and Ohio Agricultural Experiment Stations in cooperation with USDA. Chemical controls have been developed as stopgap measures while research progresses on the use of other methods. Biological control using predators and pathogens is being explored along with host plant resistance. The behavior and life cycle of the beetle are being studied to determine the conditions and areas in which it is capable of surviving. Studies on attractants and cultural practices such as varying planting dates also are receiving attention. Promising leads have been uncovered which may well lessen our dependence on insecticidal control measures.

Field tests have been conducted for codling moth control in walnuts at the California Agricultural Experiment Station with the bacterium *Bacillus thuringiensis*. Four spray applications of the bacterium during the growing season reduced infections to economic levels at harvest time.

Research on virus pathogens of armyworms at the same station revealed that a granulosis virus, though not itself pathogenic to the alfalfa caterpillar, is an effective "stressor" in that it activates a cytoplasmic polyhedrosis virus which is infectious. Continued research may reveal how combinations of various pathogens may be used to reduce insect damage.

The use of natural enemies to control insect pests of peaches is being investigated at the Colorado Agricultural Experiment Station. The importance of parasitic insects in the control of the peach twig borer is being assessed and insecticidal schedules have been modified to take natural enemy populations into account. Parasitic species are being selected for their effectiveness and will be utilized in the laboratory for mass production and subsequent release in orchards. One of them reduced overwintering twig borer populations 57 percent under western Colorado conditions.

The use of pathogenic agents for insect control is being studied at the Hawaiian Agricultural Experiment Station. Promising control of the important cabbage-worm has been obtained with a bacterium which does not affect higher animals adversely. A fungus also is being evaluated for its effectiveness in control of several insect species; among them the green stink bug, a recently introduced

pest. Other pathogens of insects related to the green stink bug are being imported from various parts of the world to determine their place in a control program. Insect enemies of the green stink bug are also being closely scrutinized to determine their effectiveness.

ACCOMPLISHMENTS IN THE DEVELOPMENT OF WEED CONTROL

Research at the Alabama Agricultural Experiment Station has revealed that granular preparations of herbicides can be applied in a more exacting manner than solutions, emulsions, or wettable powders. They are easier to handle and application equipment is easier to operate and maintain.

Research at the Illinois Agricultural Experiment Station indicates that the herbicidal action of 2,4-D lies in a renewal of nuclear activity in the tissue. This leads to a synthesis of RNA (ribonucleic acid) and protein and to tissue proliferation. The cells thus affected revert to a meristematic metabolism which causes them to proliferate themselves to death. This discovery significantly advances our knowledge on the hormone mode of action of 2,4-D.

Oregon Agricultural Experiment Station studies the ability of the plant to detoxify or metabolize herbicides. Results showed that simazine may be used with complete safety on corn because of this plant's amazing ability to completely destroy the chemical. Other weedkillers have been shown to be metabolized by plants and enzyme systems in plants. 2,4-D when applied to young plants caused the plant to switch part of its food energy from maintenance of life to increased synthesis of cellular material.

Studies at the Texas Range Station, Barnhart, indicate that proper grassland management will reduce both bitterweed production and death loss due to livestock poisoning. Combinations of sheep-cattle grazing pastures resulted in lower losses than those on straight sheep pastures.

A search has been undertaken by the Wyoming Agricultural Experiment Station to find parasites to act as biological control agents on undesirable plants. Numerous diseases have been found to date. One, a fungus disease of Canada thistle, indicated good pathogenicity and a reduction in seedling establishment. Use of disease pathogens may aid known methods of Canada thistle control if field tests yield the same results as greenhouse pathogenicity studies.

Of 26 weedkillers or soil sterilants and more than 100 related organic compounds, the Pennsylvania Agricultural Experiment Station has found that none are immune to soil microbial attack. Soil diphtherioids and *Pseudomonas* species have been found responsible for the major share of the microbial destruction of the herbicides studied. Good soil tillage was found essential to rapid decomposition. This is understandable since the chemical process of degradation carried on by soil bacteria is oxidative rather than fermentative in nature.

ACCOMPLISHMENTS IN THE DEVELOPMENT OF PLANTS RESISTANT TO PESTS

A synthetic variety of corn, containing a high degree of resistance to stalk invasion by the southwestern corn borer, has been developed by the Arkansas Agricultural Experiment Station. The insect can be effectively controlled by early planting and insecticidal treatment. The use of this resistant corn eliminates the cost and disadvantage of using insecticides.

Inbred lines of sweetcorn with high resistance to corn earworm have been found at the Tennessee Agricultural Experiment Station in cooperative research with the U.S. Department of Agriculture. This source of resistance may be usable in both sweet and field corn. This resistance reduces damage to the crop and eliminates the cost of insecticides.

Kentucky 12, a burley tobacco variety released in 1962 by the Kentucky Agricultural Experiment Station, has high resistance to tobacco mosaic virus, wild-fire, black root rot, and fusarium wilt. This is an example of how resistance to a number of diseases can be combined into a single variety and the need for disease control with chemical sprays or fumigants be eliminated.

Resistance to greenbugs has been combined with other characteristics needed in a winter barley variety by the Oklahoma Agricultural Experiment Station. This development enables control of insects that could only be partially controlled with insecticides at great cost.

Two new Soft Red Winter wheat varieties were released by the Indiana Agricultural Experiment Station, Knox 62 and Reed, which are resistant to the Hessian fly. Since the fly appears to be acclimating itself to standard varieties, the introduction of the two new ones will permit growers to stay ahead of this continuing problem.

The Florida Agricultural Experiment Station has provided five successful new tomato varieties since 1948 that will aid the tomato industry in maintaining a firm financial position. The varieties, Mannasota, Manalucie, Indian River, Manapal, and Floraleu, each possess a considerable degree of immunity to a variety of diseases. Growers can now replant the same fields for several years before a serious buildup of the disease occurs.

The release of Valverde, a high quality, downy mildew immune, lettuce variety by the Texas Agricultural Experiment Station and the USDA in 1959 provided new hope for the industry in the lower Rio Grande area. Prior to this release, the industry had suffered 2 years of disastrous epidemics of downy mildew.

Polaris, a market-type cucumber with resistance to downy mildew, powdery mildew and anthracnose, was introduced by the South Carolina Agricultural Experiment Station in 1962. This was the first time a variety with resistance to the three major diseases had been available.

Vegetable crop breeders and plant pathologists at the New York (Geneva) Agricultural Experiment Station have developed strains of pea which embody in one "package" resistance to four diseases.

Studies at the Kansas Agricultural Experiment Station conducted to determine the heritability of antibiosis and tolerance of alfalfa to spotted alfalfa aphid and pea aphid resulted in the release of the variety Cody, highly resistant to the spotted alfalfa aphid. This work was cooperative with the USDA.

ACCOMPLISHMENTS IN RESEARCH ON LIVESTOCK DISEASES

Sweet clover disease.—Research at the North Dakota Agricultural Experiment Station (1927) traced the cause of a widespread disease, which produced a severe and often fatal hemorrhage in cattle, to the feeding of sweet clover hay and silage. Only sweet clover hay or silage damaged by mold was found to contain the poisonous substances causing the disease. Research at the Wisconsin Agricultural Experiment Station on the toxic principle led to its isolation and identification as a new chemical known as dicoumarol. This compound, a blood anticoagulant, is now used in circulatory disturbances of man and is credited with saving the lives of one of every three individuals in the United States stricken by coronary thrombosis. Further important agricultural applications of this research have been made in the development of this drug into one of the most successful rodent poisons presently known (Warfarin).

Bovine hyperkeratosis or X-disease.—Bovine hyperkeratosis was first extensively described as a disease entity by the New York (Cornell) Agricultural Experiment Station. Intensive investigations in a coordinated manner were conducted by a number of experiment stations. (Michigan, New York, Pennsylvania, Tennessee, Texas, Virginia, Wisconsin, and others.) In 1952, the Tennessee and Virginia experiment stations were successful in tracing the disease to the presence of highly chlorinated naphthalenes which gained access to the animal metabolism either through ingestion or cutaneous absorption. Such compounds were additives which had been found to improve the lubricating properties of the oil.

Germfree pigs of value in swine disease research.—The Michigan Agricultural Experiment Station has developed a technique for the surgical delivery of bacteria-free baby pigs. Pigs have been kept under these conditions for as long as 6 weeks. Germfree pigs have been used in a study of the disease producing ability of the hog-cholera virus. The results indicate that the symptoms and lesions seen in outbreaks of this disease in the field are produced by the virus itself and are not dependent upon the presence of bacteria in the environment. This technique offers promise for the study of a number of diseases which are of economic importance to swine producers.

Coccidiosis vaccine developed.—Research by parasitologists in the Department of Poultry Science at the Alabama Agricultural Experiment Station has resulted in the development of a method for immunizing chickens against coccidiosis, a disease caused by a one-celled parasite of the group of organisms known as protozoa. Coccidiosis is a disease which particularly affects young chickens and frequently is the cause of high mortality. The material developed for the control of the disease is called a vaccine. It consists of a preparation of the coccidial parasites in the dormant state.

Research progresses toward control of vibriosis in sheep.—Experiment station workers in seven Western stations (California, Colorado, Idaho, Montana, Utah, Washington, and Wyoming) and ARS have joined in regional research to attack vibriosis, a disease of sheep causing massive outbreaks of abortion in flocks

of ewes in Western United States. Early findings established that vibrio infection passes from one animal to another through the ingestion of contaminated feed and water.

ACCOMPLISHMENTS IN THE DEVELOPMENT OF PLANT DISEASE CONTROL AT THE STATE AGRICULTURAL EXPERIMENT STATIONS

Development of carbamate fungicides at the Delaware and Connecticut (New Haven) agricultural experiment stations—safe, effective, nontoxic fungicides, widely used in efficient production of fruits, vegetables, and some field crops, replacing the toxic heavy metal fungicides.

Discovery and biology of the golden nematode of potato at the New York Cornell Agricultural Experiment Station—this achievement has done much to avoid the spread of this destructive organism in the United States.

Discovery at the Illinois Agricultural Experiment Station of bacteria as agents of plant disease—an early achievement in science, at a time when little was known of microorganisms as agents of disease in man, animals, or plants.

Techniques at the California Agricultural Experiment Station for the use of the electron microscope in the study of viruses—this has helped to make possible modern knowledge of many viruses of man, animals, and plants.

The discovery at the California Agricultural Experiment Station of the transmission of virus diseases by nematodes—this achievement has stimulated research leading to the control of a number of destructive virus diseases in commercial crops.

The discovery and biology of the soybean cyst nematode at the North Carolina Agricultural Experiment Station—this achievement by Dr. N. N. Winstead and associates has done much to contain and ultimately control this biological threat to the soybean industry in the United States.

Mechanisms involved in the occurrence of virulent races of the cereal rust pathogens at the Indiana, Minnesota, and Nebraska Agricultural Experiment Stations—these achievements make possible an effective program for control of these pathogens of worldwide importance.

The effect of selected antibiotics on the control of bacteria causing diseases of plants at the Missouri Agricultural Experiment Station.

The identification, characterization, and production at the Illinois Agricultural Experiment Station of antibiotics produced by naturally occurring soil fungi, and useful in control of diseases caused by fungi and bacteria.

Discovery, isolation, and biology at the Florida Agricultural Experiment Station of aflatoxin producing fungi in the United States—leading to current research on this problem and stimulating interest in fungus produced toxins (mycotoxins).

INTERDEPARTMENTAL COORDINATION OF PESTICIDE PROGRAMS

Mr. WHITTEN. I would like to have included in the record what progress, if any, you have made in connection with coordination of your efforts with that of Health, Education, and Welfare and Interior. The point I make is that, while Congress has never gone along with letting either Department veto the action of the other, I have learned, starting with the cranberry incident, that the Department of Agriculture and those engaged in agriculture as well as the consumers sometimes are dependent upon the public reaction that might follow a premature release that may or may not be well founded. In many instances the facts have not supported the press releases that have been issued nor the statements that have been made.

In other instances I have seen headlines that would serve to stir the people up needlessly, where the story under the headline did not support them at all.

I read the record of the recent hearings here in Washington, at Baton Rouge, and Memphis, Tenn., in connection with the Mississippi fish kill. Since others perhaps haven't had the privilege of reading it, the record, speaking from recollection, clearly shows that about 99.9

percent of the fish were killed below Baton Rouge, in that section of the river. It further shows that Baton Rouge itself turns about 19 million gallons of sewerage in the river each day, not to mention what may get into it from Baton Rouge north.

Also in the hearings it is disclosed that the Food and Drug Administration does not contend that there is any chemical that would cause those deaths. If there is any evidence to that effect, I cannot find it in the statements of the witnesses for that agency.

The point I make is that we in Agriculture and on this subcommittee, who are trying to see that the finest and best supply of food at the cheapest price is continually available to the American people, are concerned. Regardless of what the law provides, as long as by going to the press, newspapers, and news media, they can in effect knock out anything that you have approved or anything that you have done, this is a serious matter.

We do not see how the Government can do its job for the American people unless there is a coordination between the people in at least two departments, and I should think three, knowing of the interest that Interior has.

What progress have you made to coordinate, not only your efforts, but this matter of news releases and statements and other things which for all practical purposes do great damage, even when they are not supported by facts?

What progress have you made in that area? Do you have any understandings, any agreements?

Dr. BRADY. In response to not only the interest of the committee but to the dilemma that we found ourselves in, we have taken some positive action. Incidentally, I believe the latest fish kill, or supposed fish kill, in Louisiana indicates we have made some progress because we had a phone call immediately from the Office of the Secretary of Health, Education, and Welfare, just as soon as he found out about it.

We were able to alert our agencies and our field personnel, and it is my understanding that, insofar as possible, our fieldmen have been working hand in glove with them.

Of course, you recognize that the \$250,000 additional appropriation will be dependent upon the action of the other House, but we have gone ahead, with your encouragement, on several fronts.

Mr. WHITTEN. Could we have for the record a statement of any agreements that you may have in writing as between the various and sundry departments?

Dr. BRADY. We would be glad to supply that. There is the interdepartmental agreement signed by the Secretaries of the three departments that you mentioned. We could provide it for the record.

Mr. WHITTEN. Could we have also at this point the regulations under which the Department operates? First, may I say, the law which was passed last year, I believe, requires a little stricter handling of these materials and methods. Could we have the regulations you have issued, either following the law or prior to it?

In other words, could we have the regulations under which you operate?

Dr. BRADY. These can be supplied.

(The information requested follows:)

COORDINATION OF PESTICIDE PROGRAMS

Several significant steps have been taken to bring about coordination of pesticide programs among the agencies concerned. In March 1961, the Secretary of Agriculture wrote to the Secretaries of the Interior, Defense, and Health, Education, and Welfare, suggesting the desirability of creating a Board composed of high-level officers of the principal interested Federal agencies to review all pest-control activities carried out and supported by Federal funds. As a result, the Federal Pest Control Review Board was established in September of that year. The Board studied all pest control programs to be carried out by the Federal Government and only those approved by the Board are implemented.

More recently, an agreement has been completed to establish a Federal Committee on Pest Control to replace the Federal Pest Control Review Board whose functions were limited primarily to Federal pest control programs. The newly established Committee will continue to review such programs and will have broader functions relating to Federal participation in pest control, regulatory, research and information programs involving pesticide chemicals. The Committee will also review and coordinate programs for monitoring pesticides in the environment.

As a further step, the Department recently established a Pest Control Program Evaluation Group to review all USDA control programs involving the use of pesticides on a continuing basis to make sure that the safest and most effective materials and procedures are used. This group includes representatives of regulatory, control and research in order to assure complete exchange of information and integration of activities within the Department.

The interdepartmental agreement recently signed by the Departments of Health, Education, and Welfare, Interior, and Agriculture formalizes relationships of the Departments in the coordination of activities relating to the registration of pesticides. Under the agreement, each Department undertakes to keep the other two Departments fully informed of developments from research or other sources that may come into its possession as well as any pending action on registration or the setting of a tolerance.

In order to assure coordination of pesticide activities at the policy level, the Secretaries of Health, Education, and Welfare and Agriculture have named individuals from their immediate staffs to assume personal responsibility for their respective departments. This has been followed by the designation of additional individuals in each Department to serve as contact points at the operating levels.

A number of beneficial actions have resulted from these arrangements. In recognition of the seriousness of the rapid advance of technology in the development of procedures for the measurement of extremely small amounts of residues, the Secretaries of Agriculture and Health, Education, and Welfare recently agreed to ask the National Academy of Sciences to have the technical questions relating to "zero tolerance" and "no residue" evaluated by a group of experts. This request has been accepted by the Academy with a view to recommending a basis for a solution to this problem.

The Department of Health, Education, and Welfare has agreed to keep Agriculture currently informed concerning more sophisticated methodology to be introduced into their residue-testing program. In addition, the two Departments, whenever possible, are providing an opportunity for review by the other of proposed press releases prior to issuance.

The recent fish kill in the lower Mississippi illustrates the manner in which the departments can work together at the field level. Of vital concern was the question whether contamination of the river had resulted from the normal uses of insecticides for agricultural purposes or from some other source. This caused immediate concern as to whether registration of the insecticides involved for use on agricultural crops should be either modified or withdrawn. On April 6, USDA initiated studies to determine whether wastes from industrial plants may have played a part in contamination of the Mississippi. Four two-man survey teams were established, consisting of a representative of the Agricultural Research Service and a representative of the department of agriculture of the State involved. The Department of Health, Education, and Welfare was informed of our plans, and a representative of the U.S. Public Health Service joined each of the survey teams shortly after the investigations were begun. Representatives of the Food and Drug Administration also participated.

The Department recently initiated extensive nationwide monitoring programs to study the effects of agricultural uses of pesticides on the environment. This work is now underway in the Mississippi Delta area. It involves extensive sampling and chemical analysis of crops, soil, and water in areas where pesticides are used. Special attention will be given to sampling and analysis of water and sediment from various locations along the Mississippi to obtain detailed information on endrin content as it might relate to contamination of the river. The results will be made fully available to HEW and other agencies. This is another example of how the two Departments are working together.

While the measures described above represent a good beginning, much remains to be done if effective coordination is to be achieved. There are many problems in the use of pesticides which have not as yet become known. It is essential that the Departments involved launch a concerted effort to identify these problems and develop answers before they become critical. Special study groups and consultants of outstanding competence in the field will be necessary to get on top of this problem. The need for intensive action has been recognized by the proposed \$250,000 item in the House bill.

There follows an agreement providing for interdepartmental coordination of Federal activities relating to pesticides especially pertaining to pesticide registrations and the setting of tolerances:

INTERDEPARTMENTAL COORDINATION OF ACTIVITIES RELATING TO PESTICIDES BY THE DEPARTMENT OF AGRICULTURE, THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, AND THE DEPARTMENT OF THE INTERIOR

PURPOSE

Coordination of activities of the three Departments pertaining to pesticides with special reference to registration and the setting of tolerances to give effect to the pertinent recommendations of the May 15, 1963, report of the President's Science Advisory Committee on "Use of Pesticides."

EXISTING DEPARTMENTAL RESPONSIBILITIES

The following responsibilities of the respective Departments relate to the registration of pesticides and the setting of tolerances for pesticide residues:

Department of the Interior

Fish and Wildlife Service.—Conserving beneficial wild birds, mammals, fish and their food organisms and habitat, with regard to pesticides.

Department of Health, Education, and Welfare

U.S. Public Health Service.—Protecting and improving the health of man in regard to pesticides.

Food and Drug Administration.—Establishing tolerances for pesticides in or on raw agricultural commodities and processed foods.

Department of Agriculture

Agricultural Research Service.—Providing for the safe and effective use of pesticides, including the registration thereof.

AGREEMENT

1. *Information.*—Each Department undertakes to keep each of the other Departments fully informed of developments in knowledge on this subject from research or other sources which may come into its possession. Additionally, the Department of Agriculture undertakes to furnish to the other two Departments on a weekly basis a listing of all proposals affecting registration and reregistration, and the Department of Health, Education, and Welfare undertakes to furnish to the other two Departments on a weekly basis a listing of all proposals affecting tolerances. Upon request, the Departments of Agriculture and Health, Education, and Welfare, respectively, will furnish to the other Departments full information about any pending action on registration or the setting of a tolerance.

2. *Procedure.*—(a) Each Department will designate a scientist to act on behalf of such Department in carrying out the terms of this agreement. The weekly listings from the Departments of Agriculture and Health, Education, and

Welfare and any additional information relating thereto will be directed to these representatives.

(b) The departmental representative will review the weekly listing of actions pending. If there is reason to question any of the items on that list, this will be communicated to the originating Department within 1 week stating the specific reason for need for further review.

(c) Upon receipt of such request the originating Department will furnish the necessary information and make the necessary arrangements for further review and will withhold final action on the matter for an additional 3 weeks.

(d) If one Department concludes that the proposal should be rejected in whole or in part, this view shall be expressed in writing and shall be supported by appropriate scientific evidence. Upon being notified, the Department responsible for final action will take the initiative to work out a basis for agreement.

(e) In the event agreement is not reached among the Department representatives within 2 weeks of the initial objection, the matter will then be referred directly to the Secretary of the Department responsible for final action with such information, views, and recommendations as the three Department representatives deem appropriate.

(f) The Secretary of the Department charged with final action may then avail himself of whatever administrative and scientific review procedures seem appropriate under the circumstances. The other two Departments will be notified in advance of the proposed final determination of the issues.

(g) The Department representatives will jointly make a quarterly report concerning their activities to the Secretaries of the three Departments.

(h) The departmental representatives are authorized to review questions involving existing patterns of use of pesticides or tolerances upon which they have reason to believe that critical questions exist.

3. *Conference.*—At least once each year the departmental representatives will arrange a general conference to discuss research needs, research program and policy, and the application of research findings in action programs, including public information relating to pesticides.

4. *Federal Pest Control Review Board.*—The Federal Pest Control Review Board may be asked from time to time to consider broad questions on policies relating to pesticides involving the interrelationships of control programs, research, registration, tolerances, and general departmental recommendations to the public.

Dated April 8, 1964.

ORVILLE L. FREEMAN,
Secretary, Department of Agriculture.

Dated March 27, 1964.

STEWART L. UDALL,
Secretary, Department of the Interior.

Dated April 3, 1964.

ANTHONY J. CELEBREZZE,
Secretary, Department of Health, Education, and Welfare.

There follows a recently completed agreement to establish a Federal Committee on Pest Control Functions and Procedures to replace the Federal Pest Control Review Board.

FEDERAL COMMITTEE ON PEST CONTROL

FUNCTIONS AND PROCEDURES

A. *Name*

There is hereby established the Federal Committee on Pest Control. This Committee shall replace the Federal Pest Control Review Board that was established through joint action of the Secretaries of Agriculture, Interior, Defense, and Health, Education, and Welfare by endorsement of the Secretary of Agriculture letter dated June 22, 1961, and which is hereby abolished.

B. *Establishment and purpose*

Proper usage of pesticide chemicals to destroy unwanted pests and disease organisms as they affect man, animals, and plants has an enormous potential for the public good. There must, at the same time, be a recognition that chemicals which will kill or control pests are, in many cases, capable of causing harm. It is, therefore, essential that any contemplated use of a pesticide chemical be first evaluated as to the good that its use is expected to achieve, the harm which may

result, the precautions which should be taken to minimize harmful effects, and a decision made as to whether any risk that may be involved is warranted in the light of the benefits contemplated. Because of this recognition and the fact that the Federal Government both recommends and participates in pest control, regulatory, research, and information programs involving pesticide chemicals, this Committee is being established to replace the former Federal Pest Control Review Board, the functions of which were limited primarily to Federal pest control programs.

This Committee is to review plans for and maintain review of pest control programs in which there is active participation on the part of the Federal Government in planning and developing procedures and some degree of responsibility for supervision or funding. The Committee shall advise the appropriate Department of its evaluation in each instance so that suitable action may be taken. The Committee shall identify potential problems in order that such problems may be avoided or minimized. In particular, the Committee shall consider problems and public views arising from pesticide uses that involve hazards to human health, to livestock and crops, to fish or wildlife, or to the economic well-being of business, industry, or agriculture. Problems arising from use of pesticides, including these that may result from non-Federal programs or use, may be considered by the Committee whenever they are related to the purposes of the Committee. The Committee will advise the various departments and agencies of Government concerning problems in the use of pesticides and other chemicals, especially in cases involving interdepartmental interests and responsibilities, to insure that effective, economical, and safe procedures are followed.

C. Functions

(1) The Committee shall review the various programs proposed and conducted by Federal agencies for the control of animal and plant life which adversely affect man's interests, and shall consider problems and developments in the field of chemical control, with particular reference to possible harmful effects and the adequacy of provisions for the proper use of pesticidal chemicals to insure the greatest public benefit. The Committee shall advise the heads of Federal departments or agencies concerning the administration and operation of such programs to achieve the results desired with minimum undesirable effects.

(2) In order to assure the acquisition of timely, systematic data on pesticide residues in man and his environment, the Committee shall review plans for and facilitate coordination of the various monitoring programs conducted by Federal agencies. The Committee shall promote the development and adoption of standardized collection and analytical techniques, and shall review pesticide monitoring data from all sources.

(3) The Committee shall review on a continuing basis the planned and current pest control research programs of Federal agencies with the objective of coordinating such programs for maximum efficiency, effectiveness, and balance.

(4) The Committee shall review on a continuing basis the various educational programs concerned with pest control of Federal agencies and shall make such recommendations as are deemed necessary to insure adequate public awareness of hazards associated with use of pesticides.

(5) The recommendation of the Committee should be prepared in the light of departmental responsibilities established by law and cannot be construed as limiting any of the statutory mandates of the departments. However, the Committee shall be alert to problems requiring new legislation for their resolution, and shall recommend to the appropriate departments the preparation of needed legislation.

D. Procedures

(1) The member departments of the Committee will submit, as required, descriptions of their proposed and current pest control programs, and monitoring, research, and educational programs pertaining to pest control, for review and identification of those elements of concern to more than one department represented on the Committee.

(2) Programs and problems for review by the Committee may be received from any Federal agency.

(3) Programs and problems referred to the Committee will be screened for interdepartmental interest or responsibility.

(4) When it appears that problems can be satisfactorily resolved they will be referred to the responsible department or departments for direct consultation and

action and the Committee shall be advised of the results of such consultations and actions.

(5) In carrying out its functions, the Committee may establish subcommittees, ad hoc work groups, or panels of specialists to assist in discharging the Committee's responsibilities.

(6) The Committee will evaluate the best technical estimates of the gains and losses to be expected with and without proposed control programs, the methods and procedures which will minimize adverse effects, the advice of other duly constituted and qualified agencies and individuals, and when indicated, will submit its recommendations to the heads of the departments or agencies concerned.

E. Members

(1) Membership is by appointment of not more than two members and two alternates each from the Departments of Agriculture, Interior, Defense, and Health, Education, and Welfare.

(2) Members and alternates are appointed by letter to the Chairman from the departments eligible to make the appointments.

F. Officers and staff

(1) The officers of the Committee shall be:

(a) Chairman;

(b) Vice Chairman;

(c) Executive secretary.

The Chairman and Vice Chairman shall be elected by the Committee from among its members. The executive secretary shall be appointed by the Chairman with the concurrence of the Committee.

(2) It shall be the duty of the Chairman to preside at all meetings and to maintain compliance with established procedures. He shall call meetings of the Committee when he deems it necessary or upon request of any member department. The Chairman shall exercise leadership in seeking timely resolution of interagency differences on matters before the Committee. In the absence of the Chairman, the Vice Chairman will perform the functions of the Chairman. In the absence of both, the Chairman will furnish the secretary with the names of those individuals who successively can assume these duties.

(3) All resolutions and proceedings of meetings of the Committee shall be appropriately recorded by an executive secretary who shall be responsible to the Chairman for preparing and disseminating the minutes to the membership. The executive secretary shall conduct the usual correspondence relative to the Committee, shall issue notice of meetings, and shall perform all duties pertaining to the office of an executive secretary. He shall keep a register of the members of the Committee and shall act as archivist of the organization.

(4) The Committee shall be provided professional and clerical staff resources necessary to perform studies, analyses and other secretarial services as assigned. The executive secretary shall be responsible for the functioning of the staff, and shall carry out the duties prescribed by the Chairman under the general direction of the Committee.

G. Meetings

(1) Meetings shall be held at the call of the Chairman following coordination with members regarding time, place, and date.

(2) Decisions of the Committee shall be made normally at regular meetings where there is an opportunity for discussion, and not by correspondence or telephone calls except in rare cases of urgency.

(3) Minutes of meetings shall consist of a record of important discussions and decisions of the Committee but need not be a verbatim record. Minutes shall be amended as necessary and approved at the first meeting of the Committee following their distribution.

H. Quorum

A majority of the members of the Committee shall constitute a quorum authorized to transact any business duly presented at any meeting of the Committee.

Approved:

ANTHONY J. CELEBREZZE,
Secretary of Health, Education, and Welfare.

Date: June 16, 1964.

ORVILLE L. FREEMAN,
Secretary of Agriculture.

Date: July 10, 1964.

STEWART L. UDALL,
Secretary of the Interior.

Date: June 19, 1964.

ROBERT S. MCNAMARA,
Secretary of Defense.

Date: July 27, 1964

REGULATIONS FOR THE ENFORCEMENT OF THE FEDERAL INSECTICIDE, FUNGICIDE, AND
RODENTICIDE ACT

U.S. Department of Agriculture, Agricultural Research Service, Pesticides Regu-
lation Division, as amended March 27, 1964

TITLE 7—AGRICULTURE

CHAPTER III—AGRICULTURAL RESEARCH SERVICE, DEPARTMENT OF
AGRICULTURE

PART 362—REGULATIONS FOR ENFORCEMENT OF FEDERAL
INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT

REVISION OF SECTIONS

On September 6, 1963, there was published in the Federal Register (F.R. Doc. 63-9541) a notice of proposed rule making concerning the revision of the regulations (7 CFR 362.1-362.25) for the enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act. Interested persons were given until November 30, 1963, to submit written data, views, or arguments. In view of the comments received, certain changes were made and, on January 16, 1964, the proposed revision of said regulations was published in the Federal Register (F.R. Doc. 64-392) for further consideration. Interested persons were given twenty days in which to submit written data, views, or arguments.

After consideration of all relevant matter presented by interested persons, and pursuant to section 6 of said Act (7 U.S.C. 135d.), the proposed regulations (7 CFR 362.1-362.25) as so published on January 16, 1964, are hereby adopted, subject to the changes set forth below.

1. Paragraph (a) (1) of § 362.8 is amended by adding the phrase "which have been fasted for a period of 24 hours" after the word "rats."

2. Paragraph (a) of § 362.9 is amended by adding the phrase "or if the nature of the product is such that it is likely to be used on infants or small children without causing injury under any reasonably foreseeable conditions," after the phrase "extremely remote."

3. Paragraph (e) of § 362.10 is changed by deleting the phrase "a registrant" in the paragraph heading and the word "registrant" in the first sentence and inserting therefor in each instance the phrase "applicant for registration".

4. Paragraph (a) (5) of § 362.14 is not adopted at this time. Further opportunity to submit views on this provision will be afforded in accordance with a notice of extension of time for filing comments on this proposal published concurrently herewith.

5. Paragraph (b) (4) (i) of § 362.17 is amended by deleting the phrase "An affidavit" and inserting therefor the phrase "A certification".

6. Paragraph (b) (6) of § 362.17 is amended by adding a new subdivision (vi).

7. Said paragraph (b) (6) is further amended by transferring the third sentence to a new paragraph following new subdivision (vi).

§ 362.1 Words in singular form.

Words used in the singular form in this subpart shall include the plural, and vice versa, as the case may require.

§ 362.2 Terms defined.

Terms used in this subpart shall have the meanings set forth for such terms in the Act. In addition, as used in this subpart, the following terms shall have the meanings stated below:

(a) *Act*. "Act" means the Federal Insecticide, Fungicide, and Rodenticide Act, as amended.

(b) *Director*. "Director" means the Director of the Pesticides Regulation Division, Agricultural Research Service, United States Department of Agriculture, or any officer or employee to whom he has heretofore lawfully delegated or to whom he may hereafter lawfully delegate the authority to act in his stead.

(c) *Economic poison*. "Economic poison" includes all preparations intended for use as insecticides, rodenticides, nematocides, fungicides, herbicides, amphibian and reptile poisons or repellents, bird poisons or repellents, fish poisons or repellents, mammal poisons or repellents, invertebrate animal poisons or repellents, plant regulators, plant defoliant, and plant desiccants. A product shall be deemed to be an economic poison regardless of whether intended for use as packaged or after dilution or mixture with other substances, such as carriers or baits. Products intended only for use after further processing or manufacturing, such as grinding to dust or more extensive operations, shall not be deemed to be economic poisons. Substances which have recognized commercial uses other than uses as economic poisons shall not be deemed to be economic poisons unless such substances are:

(1) Specially prepared for use as economic poisons, or

(2) Labeled, represented, or intended for use as economic poisons, or

(3) Marketed in channels of trade where they will presumably be purchased as economic poisons.

(d) *Fungicide*. "Fungicide" includes all preparations intended for preventing, destroying, repelling, or mitigating any fungi or any viruses (other than those on or in living man or other animals). Examples of fungicides include but are not limited to: (1) Plant fungicides, seed fungicides, fungicidal wood preservatives, and mildew and mold preventatives, and

(2) Disinfectants, sanitizers, and sterilizers, except those for use only on or in living man or other animals.

(e) *Herbicide*. "Herbicide" means any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any weed, including any algae or other aquatic weed, or any plant parts growing where not wanted.

(f) *Nematocide*. "Nematocide" includes only those products intended for preventing, destroying, repelling, or mitigating nematodes inhabiting soil, water, plants, or plant parts. The term does not include products intended for use against nematodes in or on living man or other animals.

(g) *Plant regulator*. "Plant regulator" includes those substances intended to alter the behavior of ornamental or crop plants or the produce thereof through physiological rather than physical action. The term includes, but is not limited to, substances intended to accelerate or retard the rate of growth or maturation of ornamental or crop plants, enhance fruit set, prevent fruit drop, accelerate root formation and elongation, prolong or break dormancy of ornamental or crop plants or the produce thereof, but shall not include substances intended solely for use as plant nutrients or fertilizers.

(h) *Active ingredient*. An "active ingredient" is an ingredient which: (1) Is capable in itself, and when used in the same manner and for the same purposes as directed for use of the product, of preventing, destroying, repelling, or mitigating insects, fungi, rodents, weeds, nematodes, or other pests, or altering through physiological action the behavior of ornamental or crop plants or the produce thereof, or causing leaves or foliage to drop from a plant, or artificially accelerating the drying of plant tissue.

(2) Is present in the product in an amount sufficient to add materially to its effectiveness; and

(3) Is not antagonistic to the activity of the principal active ingredient: *Provided, however*, That the Director may require an ingredient to be designated as an active ingredient if, in his opinion, it sufficiently increases the effectiveness of the economic poison to warrant such action.

(i) *Official inspector.* "Official inspector" means any employee or agent of the Department of Agriculture or the Treasury Department authorized by the Director or by the Secretary of the Treasury to make investigations in connection with enforcement of the Act.

(j) *Vertebrate animals.* "Vertebrate animals" means all species of the sub-phylum vertebrata including domestic vertebrates and vertebrate species of fish and wildlife.

(k) *Invertebrate animals.* "Invertebrate animals" means all forms of animal life other than vertebrate animals, including both domestic and wild species.

§ 362.3 Administration.

The Director is authorized to take such action as, in his discretion, may be necessary in the administration and enforcement of the Act and the regulations in this part.

LABELING

§ 362.4 Labeling required.

Every economic poison shall bear a label containing the information specified in the Act and the regulations in this part.

§ 362.5 Language to be used.

All statements, words, and other information required by the Act or the regulations in this part to appear on the label or labeling of any economic poison shall be in the English language: *Provided*, That shipments of articles intended solely for sale in foreign countries may bear labels or labeling in the appropriate foreign language. The Director may permit the use of an appropriate foreign language version of the label or labeling in addition to the English version on products intended for distribution in areas of the United States where a large percentage of the population does not speak English.

§ 362.6 Labeling.

(a) *Contents of label and labeling.* The label of every economic poison must show, clearly and prominently, the name, brand or trademark under which the product is sold; the name and address of the manufacturer, registrant, or person for whom manufactured; the net contents as prescribed in paragraph (e) of this section; an ingredient statement as prescribed in § 362.7, and an appropriate warning or caution statement as prescribed in § 362.9. The label or labeling of every economic poison must bear directions for use which are necessary and if complied with, adequate for the protection of the public.

(b) *Placement of label.* The label shall appear on the economic poison or the immediate container thereof. If the immediate container is enclosed within a wrapper or outside container through which the label cannot be clearly read by a person with normal vision, the label must also appear on such outside wrapper or container if it is a part of the retail package.

(c) *Name and address of manufacturer, distributor, packer, formulator, or registrant.* An unqualified name and address given on the label shall be considered as the name and address of the manufacturer. If the registrant's name appears on the label and the registrant is not the manufacturer, or if the name of the person for whom the economic poison was manufactured appears on the label, it must be qualified by appropriate wording such as "Packed for * * *" "Distributed by * * *," or "Sold by * * *" to show that the name is not that of the manufacturer. If a person has two or more locations at which an economic poison is manufactured or packaged, or from which it is distributed, the name and address of the person's principal office will be accepted except in cases where the Director determines that the address of the exact location is necessary for the protection of the public. The address of the manufacturer, registrant, or person for whom manufactured shall include the street address, if any, unless the street address is shown in a current city directory or telephone directory.

(d) *Name, brand, or trade-mark of economic poison.* The name, brand, or trade-mark of the economic poison, appearing on the label shall be that under which the economic poison is registered.

(e) *Net content.* (1) The net content shall be exclusive of wrappers or other material, and shall be deemed to be average content unless stated as a minimum quantity.

(2) Net content shall be stated in the terms of weight or measure in general use by consumers and users of the type of economic poison to give accurate information as to the quantity of the economic poison. If there is no general use, the net content statement shall be in terms of liquid measure if the product is

a liquid, and in terms of weight if it is solid, semi-solid, viscous, or a mixture of liquid and solid. Statements of liquid measure shall be in terms of the United States gallon, quart, pint, and fluid ounce at 68° F. The statements of weight shall be in terms of avoirdupois pound and ounce. All statements of net content shall be in terms of the largest unit present.

(3) If the contents are stated as a minimum quantity, variation below the stated quantity is not permissible and variation above shall not be unreasonably large.

(4) If the contents are not stated as a minimum quantity, variation shall be permitted only to the extent that it represents deviations unavoidable in good packing practice. The average quantity in the packages in a shipment shall not fall below the average quantity stated, nor shall there be any unreasonable variation from the average in the contents of any package.

(f) *Legibility of label and labeling.* All words, statements, graphic representations, or designs required by the regulations in this part to appear on the label or labeling must be clearly legible and easy to read by a person with normal vision. The signal word, when required, and the statement "Keep out of reach of children" prescribed in § 362.9 (a) shall be of a size bearing a reasonable relationship to the other type on the front part of the label and to the size of the container. The signal word, when required, shall not be less than 18 point type and the said warning statement shall not be less than 12 point type, unless the label space on the container is too small to accommodate such type sizes in which case the Director shall prescribe the type size. When the size of the label space requires a reduction in type size, the reductions shall be made to a size no smaller than is necessary and in no event to a size smaller than 6 point type.

§ 362.7 Ingredient statement.

(a) *Location of ingredient statement.* The ingredient statement must appear on the front panel or that part of the label displayed under customary conditions of purchase, except in cases where the Director determines that, due to the size of form of the container, a statement on that portion of the label is impracticable, and permits such statement to appear on another side or panel of the label. Regardless of the placement of the ingredient statement on the label, it shall be sufficiently prominent and in type size which can be easily read by a person with normal vision. The ingredient statement must run parallel with other printed matter on the panel of the label on which it appears and must be on a clear contrasting background not obscured or crowded.

(b) *Names of ingredients.* The well-known common name of each of the listed ingredients must be given or, if an ingredient has no common name, the correct chemical name which conforms most closely with generally accepted rules of chemical nomenclature. If there is no common name and the chemical composition is complex, the Director may permit the use of a new or coined name which he finds to be appropriate for the information and protection of the user. If the use of a new or coined name is permitted, the Director may prescribe the terms under which it may be used. A trade-mark or trade name shall not be used as the name of an ingredient except when it has become a common name.

(c) *Percentages of ingredients.* Percentages of ingredients shall be determined by weight and the sum of the percentages of the ingredients shall be 100. Sliding scale forms of ingredient statements shall not be used.

(d) *Designation of ingredients.* (1) Active ingredients and inert ingredients shall be so designated, and the term "inert ingredients" shall appear in the same size type and be equally as prominent as the term "active ingredients."

(2) If the name but not the percentage of each active ingredient is given, the names of the active and inert ingredients shall, respectively, be shown in the descending order of the percentage of each present in each classification and the name of each ingredient shall be given equal prominence.

(e) *Active ingredient content.* As long as an economic poison is subject to the Act the percentages of active ingredients in the economic poison shall be those declared in the ingredient statement.

§ 362.8 Economic poisons highly toxic to man.

(a) Economic poisons which fall within any of the following categories when tested on laboratory animals as specified in subparagraphs (1), (2), or (3) of this paragraph are highly toxic to man or contain substances or quantities of substances highly toxic to man within the meaning of the Act (such economic poisons being hereinafter in this part referred to as economic poisons highly

toxic to man) : *Provided, however,* That the Director may, upon application and after opportunity for hearing, exempt any economic poison which is in any of these categories, but which is not in fact highly toxic to man, from the requirements of the Act and the regulations in this part with respect to economic poisons highly toxic to man :

(1) *Oral toxicity.* An economic poison which has a single dose LD₅₀ of 50 milligrams or less per kilogram of body weight when administered orally to both male and female rats which have been fasted for a period of 24 hours (or to other rodent or nonrodent species specified by the Director) ; or

(2) *Toxicity on inhalation.* An economic poison which has an LC₅₀ of 2,000 micrograms or less of dust or mist per liter of air or 200 parts per million or less by volume of a gas or vapor, when administered by continuous inhalation for one hour to both male and female rats (or to other rodent or nonrodent species specified by the Director), if the Director finds that it is reasonably foreseeable that such concentration will be encountered by man ; or

(3) *Toxicity by skin absorption.* An economic poison which has an LD₅₀ of 200 milligrams or less per kilogram of body weight when administered by continuous contact for twenty-four hours with the bare skin of rabbits (or other rodent or nonrodent species specified by the Director).

(b) *Tests on other species.* Tests on other specified rodent or nonrodent species may be required by the Director with respect to individual economic poisons or to classes of economic poisons whenever he finds that tests on other species are necessary to determine whether an economic poison is highly toxic to man.

(c) *Terms LD₅₀ and LC₅₀.* An LD₅₀ as used in connection with oral toxicity and skin absorption toxicity tests specified in paragraph (a) (1) and (3) of this section is the dose and LC₅₀ as used in connection with inhalation tests specified in paragraph (a) (2) of this section is the concentration which is expected to cause death within 14 days in 50 percent of the test animals so treated.

(d) *Toxicity based on human experience.* If the Director finds, after opportunity for hearing, that available data on human experience with any economic poison indicate a toxicity greater than that determined from the above described tests on animals, the human data shall take precedence and, if he finds that the protection of the public so requires the Director shall declare such an economic poison to be highly toxic to man for the purposes of this Act and the regulations thereunder.

§ 362.9 Warning or caution statement.

Warning or caution statements, which are necessary and, if complied with, adequate to prevent injury to living man and useful vertebrate animals, useful vegetation, and useful invertebrate animals, must appear on the label in a place sufficiently prominent to warn the user, and must state clearly and in nontechnical language the particular hazard involved in the use of the economic poison, e.g., ingestion, skin absorption, inhalation, flammability or explosion, and the precautions to be taken to avoid accident, injury, or damage.

(a) The label of every economic poison shall bear warnings or cautions which are necessary for the protection of the public, including the statement, "Keep out of reach of children," and a signal word such as "Danger," "Warning," or "Caution" as the Director may prescribe, on the front panel or that part of the label displayed under customary conditions of purchase: *Provided, however,* The Director may permit reasonable variations in the placement of that part of the required warnings and cautions other than the statement "Keep out of reach of children" and the required signal word, if in his opinion such variations would not be injurious to the public. If an economic poison is marketed in channels of trade where the likelihood of contact with children is extremely remote, or if the nature of the product is such that it is likely to be used on infants or small children without causing injury under any reasonably foreseeable conditions, the Director may waive the requirement of the statement "Keep out of reach of children" if in his opinion such a statement is not necessary to prevent injury to the public. The Director may permit a statement such as "Keep away from infants and small children" in lieu of the statement "Keep out of reach of children" if he determines that such a variation would not be injurious to the public.

(b) The label of every economic poison which is highly toxic to man as described in § 362.8 shall bear the word "Danger" along with the word "Poison" in red on a contrasting background in immediate proximity to the skull and crossbones and an antidote statement including directions to call a physician im-

mediately, on the front panel or that part of the label displayed under customary conditions of purchase: *Provided, however*, The Director may permit reasonable variations in the placement of the antidote statement if some reference such as "See antidote statement on back panel" appears on the front panel near the word "Poison" and the skull and crossbones.

REGISTRATION

§362.10 Registration.

(a) *Eligibility.* Any manufacturer, packer, seller, distributor, or shipper of an economic poison is eligible to apply for registration of such economic poison.

(b) *Effect of registration.* If an economic poison is registered under the Act no further registration under the Act by other persons is required: *Provided*, That

(1) The product is in the manufacturer's or registrant's original unbroken immediate container; and

(2) The claims made for it and the directions for its use do not differ from the representations made in connection with registration; and

(3) The product contains the labeling accepted in connection with registration and otherwise complies with the Act.

(c) *Procedure for registration.* Applications for registration should be addressed to Pesticides Regulation Division, Agricultural Research Service, United States Department of Agriculture, Washington, D.C., 20250. Application forms will be furnished upon request. All applications for registration shall be accompanied by duplicate copies of the proposed labeling, including all printed or graphic matter which is to accompany the economic poison at any time and, if requested by the Director, a full description of the tests made and the results thereof upon which the claims for the economic poison are based, together with such other information as may be necessary to assure compliance with the Act and the regulations in this part. If any part of the proposed labeling submitted is in a foreign language, it shall be accompanied by an accurate and complete English translation. Applications should be submitted as far in advance as possible, and at least 30 days, before it is desired that registration take effect. However, the period of time required to process applications to determine the adequacy of the proposed labeling may exceed 30 days in some cases. Applications which require consultation with other governmental agencies will take a longer period of processing. No fees are charged for registration.

(d) *Effective date of registration.* Registration of an economic poison shall become effective on the date the notice of registration is issued.

(e) *Responsibility of applicant for registration.* The applicant for registration is responsible for the accuracy and completeness of all information submitted in connection with his application for registration of an economic poison.

(f) *Changes in labeling or formulas.* (1) Changes in the labeling or changes in the formula of a registered economic poison must be submitted in advance to the Pesticides Regulation Division, Agricultural Research Service, United States Department of Agriculture, Washington, D.C., 20250. The registrant must describe the exact changes desired and the proposed effective date and, upon request, shall submit a description of tests which justify such changes.

(2) After the effective date of a change in labeling or formula, the product shall be marketed only under the new claims or formula: *Provided, however*, The Director may permit a reasonable time for the disposition of stocks of the discontinued product, if in his opinion such an extension would not endanger the public.

(g) *Claims must conform to registration.* Claims made for an economic poison must not differ from representations made in connection with registration, including representations with respect to effectiveness, ingredients, directions for use, or pests against which the product is recommended.

(h) *Duration of registration.* If at any time it does not appear to the Director that the economic poison is such as to warrant the proposed claims for it or if the economic poison and its labeling and other material required to be submitted do not comply with the provisions of the Act, the Director shall notify the registrant of the facts involved and afford him an opportunity to bring the product and its labeling into compliance with the Act. If after a reasonable period of time, the registrant has not made such corrections, the Director may cancel the registration under the provisions of section 4.c. of the Act. Unless cancelled in accordance with this paragraph or with the acquiescence of the registrant, or unless continued in effect in accordance with the provisions of par-

agraph (i) of this section, the registration of an economic poison shall be cancelled at the end of a period of five years following the date of registration of such economic poison, or at the end of five years following the date of any subsequent registered change in formula or labeling, or at the end of five years following the date of any continuance of registration pursuant to paragraph (i) of this section: *Provided, however,* That prior to any such cancellation the Pesticides Regulation Division shall send to the registrant a notice of intent to cancel, and, in the event such notice is not sent to the registrant 30 days prior to the expiration of the five-year period, the registration shall remain in effect until 30 days following the date such notice has been sent to the registrant at his latest address submitted to the Pesticides Regulation Division.

(i) *Continuance of registration.* If a registrant desires to continue the registration in effect, he shall notify the Pesticides Regulation Division in writing and it shall be continued in effect under the same terms as the original registration: *Provided, however,* That if, on the basis of information available at the time, it appears that the product or its labeling fails to comply with the Act, the registrant shall be so notified and afforded the opportunity to make the necessary corrections. If the corrections are not made, registration will be cancelled as provided in section 4.c. of the Act.

(j) *Limitations on registrations.* The Director may refuse to register any economic poison or any specific use thereof if, in his opinion, directions and warnings cannot be written which will prevent injury to the general public when the product is used in accordance with warnings and directions or in accordance with commonly recognized practices. If, however, such an economic poison is proposed for certain acceptable uses, the Director may require the label to bear a warning against specific unacceptable uses such as in the home or home garden.

GUARANTEES

§ 362.11 Guarantee of economic poison.

(a) *By whom given; effect of guarantee.* Any manufacturer, distributor, wholesaler, or other person residing in the United States may furnish to any person to whom he sells an economic poison a guarantee that the economic poison was lawfully registered at the time of sale and delivery to such person, and that the economic poison complies with all the requirements of the Act and of the regulations in this part. The Act provides that penalties for violation of section 3.a. of the Act shall not apply to a person who establishes that he has received a guarantee as specified in the Act.

(b) *Reference to guarantee.* No reference to a guarantee or suggestion that such a guarantee has been given shall be made in the labeling of any economic poison.

(c) *Contents of guarantee.* In order to afford effective protection, each guarantee must:

(1) Be signed by and contain the name and address of the person giving it; and

(2) State that the economic poison was lawfully registered at the time of sale and delivery and that it complies with all other requirements of the Federal Insecticide, Fungicide, and Rodenticide Act.

(d) *Scope of guarantee.* A guarantee may be (1) limited to a specific shipment or other delivery of a product, in which case it may be a part of or attached to the invoice or bill of sale covering such shipment or delivery, or (2) general and continuing, in which case, in its application to any shipment or other delivery of a product it shall be considered to have been given at the date when such product was shipped or delivered by the person giving the guarantee.

(e) *Expiration of guarantee.* Any guarantee shall expire when the product is repacked or relabeled by the purchaser or when it becomes in violation of the Act or the regulations in this part after shipment or other delivery by the person giving the guarantee.

(f) *Forms of guarantee.* The following are suggested forms of guarantee:

(1) *Limited form for use on invoice or bill of sale.*

----- hereby guarantees that the economic
(Name of guarantor)
poison herein listed is lawfully registered with the Secretary of Agriculture and

that the same complies with all requirements of the Federal Insecticide, Fungicide, and Rodenticide Act.

(Signature and post office address of guarantor)

(Date)

(2) *General and continuing form.*

The economic poisons comprising each shipment or other delivery hereafter made by -----, to or on the order of

(Name of guarantor)

----- are hereby guaranteed to be law-
(Name and address of person receiving guarantee)

fully registered with the Secretary of Agriculture and to comply with all requirements of the Federal Insecticide, Fungicide, and Rodenticide Act, as of the date of such shipment or delivery.

(Signature and post office address of guarantor)

(Date)

COLORATION OF ECONOMIC POISONS

§ 362.12 Coloration and discoloration.

The white economic poisons hereinafter named shall be colored or discolored in accordance with this section. The hues, values, and chromas specified are those contained in the Munsell Book of Color, Munsell Color Company, 10 East Franklin Street, Baltimore, Md.

(a) *Coloring agent.* The coloring agent must produce a uniformly colored product not subject to change in color beyond the minimum requirements specified in the regulations in this part during ordinary conditions of marketing or storage, and must not cause the product to be ineffective or result in its causing damage when used as directed.

(b) *Arsenicals and barium fluosilicate.* Standard lead arsenate, basic lead arsenate, calcium arsenate, magnesium arsenate, zinc arsenate, zinc arsenite, and barium fluosilicate shall be colored any hue, except the yellow-reds and yellows, having a value of not more than 8 and a chroma of not less than 4, or shall be discolored to a neutral lightness value not over 7.

(c) *Sodium fluoride and sodium fluosilicate.* Sodium fluoride and sodium fluosilicate shall be colored blue or green having a value of not more than 8 and a chroma of not less than 4, or shall be discolored to a neutral lightness value not over 7.

(d) *Exceptions.* (1) Notwithstanding the provisions of paragraphs (b) and (c) of this section, the Director, after opportunity for hearing, may permit other hues to be used for any particular purpose if he determines that use of the prescribed hues is not feasible for such purpose and that such action will not be injurious to the public.

(2) Any economic poison specified in this part which is intended solely for use by a textile manufacturer or commercial laundry, cleaner or dyer as a mothproofing agent, which would not be suitable for such use if colored and which will not come into the hands of the public except when incorporated into a fabric may be exempted by the Director from the requirements of section 3.a.(4) of the Act and the requirements of this section.

(3) The economic poison sodium fluoride shall be exempt from the requirements of section 3.a.(4) of the Act and paragraph (c) of this section when (i) it is intended for use as a fungicide solely in the manufacture or processing of rubber, glue, or leather goods; (ii) coloration of the economic poison in accordance with said requirements will be likely to impart objectionable color characteristics to the finished goods; (iii) the economic poison will not be present in such finished goods in sufficient quantities to cause injury to any person; and (iv) the economic poison will not come into the hands of the public except after incorporation into such finished goods.

ADULTERATION AND MISBRANDING

§ 362.13 Adulteration.

An economic poison is adulterated if its strength or purity falls below the professed standard or quality as expressed on its labeling or under which it is sold, or if any substance has been substituted wholly or in part for the article, or if any valuable constituent of the article has been wholly or in part abstracted.

(a) A valuable constituent will be considered as wholly abstracted whenever the designation or representation of the product imports its presence therein and such constituent has been wholly omitted therefrom in the preparation of the product or has been wholly removed from the completed product.

(b) A valuable constituent will be considered as partly abstracted whenever the designation or representation of the product imports its presence therein, and such constituent is not present in the usual or customary amount or in the amount indicated in the labeling.

§ 362.14 Misbranding.

An economic poison or device is misbranded if the article or its labeling is false or misleading to the public in any particular.

(a) Examples of statements or representations in the labeling of an economic poison or device which render it misbranded are the following:

(1) A false or misleading statement concerning composition of the product.

(2) A false or misleading statement concerning the effectiveness of the product as an economic poison or device.

(3) A false or misleading statement about the value of the product for purposes other than as an economic poison or device.

(4) A false or misleading comparison with other economic poisons or devices.

(5) [Reserved.]

(6) Any statement directly or indirectly implying that the economic poison or device is recommended or endorsed by any agency of the Federal Government.

(7) The name of an economic poison which contains two or more principal active ingredients if it suggests the name of one or more but not all such principal active ingredients even though the names of the other ingredients are stated elsewhere in the labeling.

(8) Prominent reference in the labeling to one or more active ingredients without giving their percentages in immediate proximity thereto or without giving equal prominence to the other active ingredients or to the inert ingredients.

(9) A true statement used in such a way as to give a false or misleading impression to the purchaser.

(b) *Justification of false and misleading statements not permitted.* (1) The use of any false or misleading statement on any part of the labeling, given as the statement or opinion of any person or based upon such statement or opinion, shall not be justified by the fact that the statement or opinion is actually that of such person.

(2) The use of a false or misleading statement in the labeling cannot be justified by an explanatory statement.

ENFORCEMENT

§ 362.15 Enforcement.

(a) *Collection of samples.* Samples of economic poisons and devices shall be collected by official inspectors or by any employee of the Federal Government, or of a State or Territory, or political subdivision thereof who has been duly authorized by the Director to collect samples.

(b) *Examination of samples.* Methods of examination of samples shall be those adopted and published by the Association of Official Agricultural Chemists, where applicable, or such other methods as the Director may find necessary to determine whether the product complies with the law.

(c) *Notice of apparent violation.* (1) If, from an examination or analysis, an economic poison or device appears to be in violation of the Act, a notice in writing shall be sent to the person against whom criminal proceedings are contemplated, giving him 20 days within which to offer such written explanation as he may desire. The notice shall state the manner in which the sample fails to meet the requirements of the Act and the regulations thereunder.

(2) Any such person may, in addition to his reply to such notice, file within 20 days of its receipt a written request for an opportunity to present his views orally in connection therewith.

(3) No notice or hearing is required prior to the seizure of any economic poison or device.

§ 362.16 Notices of judgment.

Publication of notices of judgments of the courts in cases arising under the criminal or seizure provisions of the Act shall be made in the form of notices, circulars, or bulletins as the Director may prescribe.

TEMPORARY PERMITS

§ 362.17 Limited shipments for experimental purposes.

Temporary permits not to exceed a period of one year may be issued for shipment of limited amounts of a product which is to be tested further, usually on a larger scale, to determine its limitations. Permits will be issued only for bonafide experimental programs under the supervision of qualified persons. The Director may require the submission of such information and data concerning the product and the program which he deems necessary for the protection of the public. If, in the opinion of the Director, such information has not been submitted he may, for the protection of the public, refuse to issue the permit.

(a) *Articles for which no permit is required.* (1) A substance or mixture of substances being put through tests in which the purpose is only to determine its value for economic poison purposes or to determine its toxicity or other properties, and where the user does not expect to receive any benefit in pest control from its use, is not considered an economic poison within the meaning of section 2a of the Act. Therefore, no permit under the Act is required for its shipment.

(2) An economic poison shipped or delivered for experimental use by or under the supervision of any Federal or State agency authorized by law to conduct research in the field of economic poisons shall not be subject to the provisions of the Act and the regulations in this part.

(b) *Articles for which permit is required.* (1) An economic poison shipped or delivered for experimental use by qualified persons but not under the supervision of a Federal or State agency authorized by law to conduct research in the field of economic poisons, for which a permit has been issued by the Director pursuant to the provisions of this section, shall otherwise be exempt from the provisions of the Act and of the regulations in this part. Permits will be of two types, specific and general. A specific permit will be issued to cover a particular shipment on a specified date to a named person. A general permit will be issued to cover more than one shipment over a period of time to the same or different persons.

(2) If an economic poison is to be tested in such a manner that residues may result in or on food or feed, a permit for shipment will not be issued unless:

(i) Sufficient data are submitted to the Director to show that no residue will be present on food or feed involved in the experimental program or

(ii) A tolerance or exemption from the need of a tolerance or a temporary tolerance or exemption from the need of a temporary tolerance, has been established by the Food and Drug Administration to cover any detectable residue which may be present on food or feed involved in the experimental program and sufficient data are submitted to the Director to show that such program will not result in any residue in excess of any such tolerance or

(iii) The food or feed derived from the experimental program will be destroyed or fed only to laboratory animals or otherwise disposed of in a manner which will protect the public and which is approved by the Director.

(3) A permit for shipment of any experimental economic poison for testing in any place likely to be frequented by people will be granted only if it is clearly shown in the application for such permit that the applicant's instructions for use reasonably assure the avoidance of injury to all persons concerned.

(4) All applications for permits covering shipments for experimental use shall be filed in duplicate with the Pesticides Regulation Division, Agricultural Research Service, United States Department of Agriculture, Washington, D.C., 20250, and must be signed by the shipper and must contain the following:

(i) A certification to the effect that food or feed derived from the experimental program will not be used or offered for consumption or sale for consumption, except by laboratory or experimental animals if illegal residues are present in or on such food or feed.

(ii) Name and address of the shipper and place or places from which the shipment will be made.

(iii) Proposed date of shipment or proposed shipping period not to exceed one year.

(iv) A statement of the composition of material to be covered by the permit which should apply to a single material or group of closely allied formulations of the material.

(v) A statement of the approximate quantity of material to be shipped.

(vi) Available data or information, or reference to available data or information, on the toxicity of the economic poison.

(vii) A statement of the nature of the proposed experimental program, including designation of the type of pests or organisms to be experimented with, the crops or animals on which the economic poison is to be used, a statement of the dates during which the proposed experimental program will be conducted, and the states or geographical areas where it is proposed to conduct the program, and including the results of previous tests where necessary to justify the issuance of a permit for the quantity requested.

(viii) The percentage of the total quantity of material specified under subdivision (v) of this subparagraph which will be supplied without charge to the user.

(ix) A statement that the economic poison is intended for experimental use only.

(x) Proposed labeling which must bear (a) the prominent statement "For Experimental Use Only" on the container label and any accompanying circular or other labeling, (b) a warning or caution statement if in the opinion of the Director it is necessary, which statement shall, if complied with, be adequate in his opinion, for the protection of those who may handle or be exposed to the experimental formulations, (c) the name and address of the applicant for the permit, (d) the name or designation of the formulation, (e) an ingredient statement as prescribed in § 362.7, and (f) necessary directions for use including crops or sites to be treated, limitations on dosage to be used, and if the economic poison is to be tested on food or feed crops the number of days required between last application and harvest.

(5) The Director may limit the quantity of economic poison covered by a permit to such less quantity than requested as he may determine if the available information on effectiveness, or toxicity or other hazards, is not sufficient to justify the scope of experimental use proposed in the application, or may make such other limitations in the permit as he may determine to be necessary for the protection of the public.

(6) Reports on experimental program: During the period in which a permit is effective, the holder shall submit to the Director periodic reports regarding the status of the experimental program. Reports shall be submitted at 3-month intervals and at the end of the experimental program. These reports shall include the following information:

(i) Amount of the economic poison shipped during reporting period.

(ii) Name and address of consignee of each shipment.

(iii) A summary of data on effectiveness, phytotoxicity, or other pertinent information obtained during the reporting period.

(iv) Any additional data on residues or analytical methods obtained during the reporting period.

(v) Any additional data on toxicity obtained during the reporting period.

(vi) Such other information and data as the Director may require.

The Director may at any time request additional reports on the experimental program if, in his opinion, such reports are necessary for the protection of the public.

(7) An economic poison shipped under a permit shall not be offered for general retail sale.

(c) *General permit for economic poisons for experimental use which are also subject to the new drug requirements of the Federal Food, Drug, and Cosmetic Act.*

(1) Notwithstanding the provisions of paragraph (b) of this section, a general permit is hereby issued under section 7.a.(4) of the Act to the manufacturers and shippers of economic poisons for experimental use only, to ship such economic poisons: *Provided*, (i) That the product is a "new drug" within the meaning of section 201(p) and 505 of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. sec. 321(p) and sec. 355); (ii) that it is subject to, and the manufacturer or shipper complies with, the provisions of section 505(i) of said Act (21 U.S.C. sec. 355(i)) and § 130.3 of the regulations (21 CFR 130.3) thereunder; and (iii) that the documents referred to in said § 130.3 shall be made

available for inspection upon the request of any officer or employee of the Agricultural Research Service of the United States Department of Agriculture at any reasonable time within two years after the introduction of the product into interstate commerce.

(2) The general permit referred to in the preceding subparagraph shall apply only insofar as the experimental uses are for drug purposes within the meaning of the Federal Food, Drug, and Cosmetic Act. It shall not apply to other experimental uses even though the product may be intended for both drug and non-drug uses.

(d) *Cancellation of permits.* Any permit for shipment for experimental use may be canceled at any time for any violation of the terms thereof or if it shall appear to the Director that the permit should be canceled for the protection of the public.

§§ 362.18-362.24 [Reserved]

DECLARATION OF PESTS

§ 362.25 Forms of plant and animal life and viruses declared to be pests.

(a) Each of the following forms of plant and animal life and viruses is declared to be a pest under the Act when it exists under circumstances that make it injurious to plants, man, domestic animals, other useful vertebrates, useful invertebrates, or other articles or substances:

- Mammals, including but not limited to dogs, cats, moles, bats, wild carnivores, armadillos, and deer;
- Birds, including but not limited to starlings, English sparrows, crows, and blackbirds;
- Fishes, including but not limited to the jawless fishes such as the sea lamprey, the cartilaginous fishes such as the sharks, and the bony fishes such as the carp;
- Amphibians and reptiles, including but not limited to poisonous snakes;
- Aquatic and terrestrial invertebrates, including but not limited to slugs, snails, and crayfish;
- Roots and other plant parts growing where not wanted;
- Viruses, other than those on or in living man or other animals.

Effective date. These regulations shall become effective 30 days after publication in the FEDERAL REGISTER with the following exceptions:

The provisions of paragraph (f) of §§ 362.6 and 362.9 shall become effective sixty days after publication in the FEDERAL REGISTER: *Provided, however,* That the effective date of these provisions with respect to products for which labeling is accepted prior to the expiration of said 60 days, shall be January 1, 1965.

The reporting requirements contained herein have been approved by the Bureau of the Budget in accordance with the Federal Reports Act of 1942.

Done at Washington, D.C., this 23d day of March 1964.

M. R. CLARKSON,

Acting Administrator, Agricultural Research Service.

[F.R. Doc. 64-2985; Filed, Mar. 26, 1964; 8:47 a.m.]

HEARING ON MISSISSIPPI RIVER FISH KILLS

Mr. WHITEN. Please submit for the record a summary of the testimony presented at the public hearings held by the Department on the Mississippi River fish kills, including a list of witnesses and those who submitted written statements, with their affiliations. You should include also a statement on the importance of the pesticides aldrin, dieldrin, and endrin to agriculture.

Dr. BRADY. We will be glad to furnish that information.

(The information is as follows:)

SUMMARY AND EVALUATION OF THE TESTIMONY AND DATA

Presented at the USDA Public Hearing held in Washington, D.C.; Memphis, Tenn.; and Baton Rouge, La., in April 1964 to consider the registration of Aldrin, Dieldrin, and Endrin

The testimony and data submitted in connection with the recent public hearing which was held in an effort to determine all known facts regarding the fish kills in the lower Mississippi and the Atchafalaya Rivers during the past

winter have been reviewed and evaluated by an appraisal committee composed of staff specialists from the Pesticides Regulation and the Entomology Research Divisions.

Testimony presented by the Food and Drug Administration witness was presented at each session of the hearing. The witness spelled out the Food and Drug Administration's activities in investigating possible food contamination as a result of the fish kills in the lower Mississippi River Basin. He stated a number of samples of various types of fish had been analyzed, and gave the results of these analyses. Out of 93 samples of fish analyzed, 89 were found to contain residues of chlorinated hydrocarbons. Those identified were endrin, dieldrin, DDT, DDE, and DDD, lindane, and possibly chlordane. The levels of residues found ranged from zero to 1 p.p.m. endrin, zero to 0.3 p.p.m. dieldrin, zero to 0.3 p.p.m. other chlorinated hydrocarbons.

The witness stated that all samples were taken from local commercial stocks and no interstate shipments of contaminated fish have been located. He stated that Food and Drug Administration scientists believe that the levels of residues found are pharmacologically insignificant; however, they serve as a warning and if levels increase, a potential harmful situation may be indicated.

The Public Health Service witness did not at any time indicate that the present level of dieldrin and endrin contamination presents a public health hazard. From a total of 84 witnesses testifying at the hearing, not one testified or presented data showing that a public health hazard is involved. Of the 83 letters and telegrams received, only 1 indicated that a public health hazard might result from the proper agricultural use of aldrin, dieldrin, or endrin. This was a letter from Dr. J. W. R. Norton, director of the State Board of Health of North Carolina, which expressed concern over the use of endrin in orchards to control mice since many of the orchards drain into public water supplies. Eight other letters expressed concern over the use of aldrin, dieldrin, and endrin as well as other pesticides, however, no account of damage resulting from proper agricultural use was cited. Seven witnesses representing conservation groups as well as 8 of the 83 letters and telegrams expressed concern over the use of persistent pesticides. These varied from complete condemnation by the National Audubon Society witnesses to requests for restraint and caution by certain others.

The testimony by the Public Health Service witness which implicated endrin as the cause of the fish deaths in the lower Mississippi River was presented at the three sessions of the hearing. The written report showed that fish kills in 1961 and 1962 were much lower than in 1960, while the kills in 1963 rose to approximately 5 million. In investigating the cause of the fish kills in the winter of 1963 and 1964, the Public Health Service eliminated as possible causes industrial waste, domestic sewage, oxygen depletion, and certain other known causes of fish death. Details on the data used as a basis for this elimination were not given. The Public Health Service reported that it appeared from its investigation that the pesticide endrin was the cause of death. This was based on tests in which endrin was recovered in all fish tissues analyzed. Endrin residues found in the various fish tissues analyzed were shown as follows:

Muscles-----	0.5 to 1 part per million.
Liver-----	1 to 2 parts per million.
Fat and eggs-----	6 parts per million.
Blood-----	0.12 to 0.56 parts per million.

The report stated that in some cases, only small numbers of fish were available for analyses or tests. Water samples analyzed by the carbon-filter method showed trace amounts of endrin and dieldrin in some samples. Two other substances identified as X and Y were also present. These were later tentatively identified by the Public Health Service as materials used in the manufacture of endrin. Limited data on analysis of samples of New Orleans drinking water were given.

Several witnesses, including William A. Tompkins, chief, aquatic biologist, Massachusetts Institute of Fish and Game, as well as several witnesses from the various pesticide industries presented information that did not fully support Public Health Service findings that endrin was the most likely cause of the fish kill. Dr. Tompkins reported that the levels of endrin in water required to cause mortality exceed those found by the Public Health Service in the lower Mississippi River. He also reported that the symptoms displayed by the fish exposed to lethal levels of endrin in no way resembled those reported by the Public Health

Service to have been displayed by the fish in the Mississippi River. Dr. Tompkins observed no fish floating at the surface before death and palpation failed to indicate the presence of gases in the alimentary tract. He found no evidence of gross external or internal hemorrhaging as was reportedly observed in the case of the Mississippi River fish. Dr. Tompkins stated that the reported observations of the fish kill occurring in the Mississippi River did not parallel the symptomology of endrin or related pesticides.

Data was submitted by the Shell Chemical Co. to show that residues recovered from samples of fish from the Mississippi River and the Missouri River were far below those reported by the Public Health Service. The testimony by Dr. J. S. Forrester, of the Microtek Instrument, Inc., questioned the reliability of the conclusions reached through the use of analytical methods used in recovering pesticides in parts per billion or less. He pointed out the possibility of samples being contaminated in the laboratory when chemists are using such sensitive methods. Similar points were also raised by several other witnesses.

Testimony by the Fish and Wildlife Service of the Department of the Interior was presented at each session of the hearing. This testimony briefly outlined that agency's cooperation with the Public Health Service. Tests were carried out in an effort to determine whether or not pathogenic organisms were involved in the fish kills. These tests were discussed very briefly by the witness and were reported to have produced negative results. Information on the scope and nature of the tests was very limited.

Fourteen witnesses representing farmers or farmers' organizations, 12 witnesses representing agricultural colleges and experiment stations, and 11 witnesses representing other State agencies testified in support of the continued use of aldrin, dieldrin, and endrin. It was conceded by many of these witnesses that local fish kills had occurred from the agricultural use of endrin when heavy rains had immediately followed treatment, thus washing the insecticide into lakes or streams. Most of these witnesses testified that no significant fish kills had been brought to their attention which resulted from the proper agricultural use of endrin, aldrin, or dieldrin. Several witnesses and letters received cited case histories where plantations had been heavily treated with one or more of these chemicals with no adverse effect on fish or wildlife populations. Hunting and fishing were reported to be very good in the delta area.

Out of the 83 letters and telegrams which were entered into the record, 60 took the position that the proper agricultural use of these chemicals do not result in significant fish kills.

Several witnesses representing the pesticide industry did not agree with the Public Health Service report. The accuracy of the analytical methods and the symptoms displayed by the dying fish were challenged by some.

Aldrin, dieldrin, and endrin have been widely used in agriculture for more than 10 years and a considerable volume of data on use in the various States was submitted. This consisted largely of recommendations made by State experiment stations as well as publications from the various land-grant colleges and certain farmer organizations. The principal use of these chemicals in the Mississippi River area consisted of extensive use of aldrin in the Corn Belt as a soil treatment while the principal use of endrin is on cotton and sugarcane in the lower States along the Mississippi. Aldrin is also used extensively as a seed treatment in the rice-growing area of Arkansas. The testimony from witnesses from all parts of the Nation showed that one or more of these chemicals is used in agriculture throughout the United States.

The value of aldrin, dieldrin, and endrin in American agriculture was well demonstrated. Fourteen witnesses representing farmers or farmer organizations, 12 witnesses representing State colleges and experiment stations, and 11 witnesses representing other State agencies supported the continued use of aldrin, dieldrin, and endrin and submitted considerable data which emphasize the economic importance of these chemicals in agriculture. Of the 83 letters and telegrams received, 60 supported the continued use of these chemicals in agriculture and many emphasized the loss which would be suffered in their particular area if the use of these chemicals should be prohibited. Examples of the estimated loss to American farmers are:

George Decker, of the Illinois Natural History Survey, estimated that the Illinois corn farmers would lose approximately \$22 million annually if aldrin or dieldrin could not be used for soil treatment. A letter from D. C. Rierson, director of the New Mexico Department of Agriculture, stated that the loss of aldrin, dieldrin, and endrin would cost New Mexico farmers \$3.2 million per year. It was estimated by one witness that the loss of endrin would cause a

10-percent loss in sugarcane production in Louisiana. One witness and five letters predicted that orchardists in the Appalachian area could not stay in business if endrin could not be used in controlling mice.

It was repeatedly emphasized that the loss of these chemicals would result in heavy losses to the farmer since substitute materials are either unavailable or in some cases much more expensive and less effective.

CONCLUSIONS

The hearing produced no evidence to substantiate a conclusion that the conditions present in the Mississippi fish kill constituted a hazard to public health; on the contrary, statements by both the Food and Drug Administration and the Public Health Service contained assurances that no health hazard was involved.

The hearing produced no evidence to substantiate a conclusion that the prime, or even a significant, source of the endrin found in the river was due to agricultural use of this pesticide.

On the basis of the evidence produced by the hearing, therefore, the Department would appear to have no substantial basis for modifying or withdrawing the registration of aldrin, dieldrin, or endrin at this time.

LIST OF WITNESSES PRESENTING TESTIMONY AT USDA HEARINGS HELD IN APRIL 1964 TO CONSIDER NEED FOR CHANGES IN REGISTRATION OF ALDRIN, DIELDRIN, AND ENDRIN

WASHINGTON, D.C., APRIL 9-10, 1964

ORAL TESTIMONY

- Justus C. Ward, Director, Pesticides Regulation Division, Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C.
- Douglas C. Hansen, Deputy Director, Division of Field Operations, Food and Drug Administration, Department of Health, Education, and Welfare, Washington, D.C.
- Lew Meibergen, president, Oklahoma State Board of Agriculture, Oklahoma City, Okla.
- Roy Rings, Ohio Experimental Station and College of Agriculture, Columbus, Ohio.
- Russ J. Neugebauer, assistant chief, Division of Conservation Education for the National Wildlife Federation, Washington, D.C.
- L. D. Neusom, head, Department of Entomology, Louisiana State University, Baton Rouge, La.
- J. W. Apple, professor, Department of Entomology, University of Wisconsin, Madison, Wis.
- Herbert M. Day, sales manager, Specialities Agricultural Chemical Division, Stauffer Chemical Co., New York, N.Y.
- Leon W. Weinberger, Chief, Basic and Applied Sciences Branch, Division of Water Supply and Pollution Control, U.S. Public Health Service, Department of Health, Education, and Welfare, Washington, D.C.
- R. E. Johnson, Assistant Director, Sport Fisheries, Bureau of Sport Fisheries and Wildlife, Department of the Interior, Washington, D.C.
- Dean F. Lovitt, assistant chief, Plant Industry Division, Michigan Department of Agriculture, Lansing, Mich.
- Roland C. Clement, staff biologist, National Audubon Society, New York, N.Y.
- Dr. Clyde F. Smith, head, Department of Entomology, University of North Carolina, Raleigh, N.C.
- Philip A. Douglas, executive secretary, Sport Fishing Institute, Washington, D.C.
- Clifford C. Roan, Kansas Agricultural Experiment Station, Department of Entomology, Manhattan, Kans.
- Bernard Lorant, director of research, Velsicol Chemical Corp., Chicago, Ill.
- Daniel A. Poole, secretary, Wildlife Management Institute, Washington, D.C.
- Ordway Starnes, director, New Jersey Agricultural Experiment Station.
- Joseph W. Penfold, conservation director, Izaak Walton League of America.
- Sumner Hatch McAllister, general manager, Agricultural Chemical Division, Shell Chemical Co., New York, N.Y.

- Parke C. Brinkley, president, National Agricultural Chemicals Association, Washington, D.C.
 A. A. Muka, New York State College of Agriculture, Cornell University, Ithaca, N.Y.
 Mrs. Ruth Graham Desmond, president, Federation of Homemakers, Arlington, Va.

WRITTEN STATEMENTS FOR INCLUSION IN RECORD

- Frank Horsfall, Jr., professor of horticulture, Department of Horticulture, Virginia Polytechnic Institute, Blacksburg, Va.
 H. A. Keener, dean, College of Agriculture, University of New Hampshire, Durham, N.H.
 H. L. Jones, acting director, Division of Plant Industry, Florida Department of Agriculture, Gainesville, Fla.
 F. E. Price, dean and director, Oregon Agricultural Experiment Station, Oregon State University, Corvallis, Oreg.
 Paul W. Swisher, commissioner, Colorado Department of Agriculture, Denver, Colo.
 S. S. Wheeler, director, Colorado State University, College of Agriculture and Agricultural Experiment Station, Fort Collins, Colo.
 H. J. Sloan, director, Institute of Agriculture, Agricultural Experiment Station, University of Minnesota, St. Paul, Minn.
 Joe Dwyer, director, Department of Agriculture, Olympia, Wash.
 C. K. Dorsey, professor of entomology, West Virginia University, Morgantown, W. Va.
 C. Peairs Wilson, director, Agricultural Experiment Station, Kansas State University, Manhattan, Kans.
 B. H. Kantack, extension entomologist, Cooperative Extension Service, South Dakota State College, Brookings, S. Dak.
 Richard W. Wallace, executive secretary, Florida Pest Control Association, Maitland, Fla.
 Dallas C. Rierson, director, New Mexico Department of Agriculture, jointly with Philip J. Leyendecker, director, New Mexico Agricultural Experiment Station and Cooperative Experiment Station, New Mexico State University, University Park, N. Mex.
 John A. Lofgren, extension entomologist, Institute of Agriculture, University of Minnesota, St. Paul, Minn.
 G. W. Simpson, professor of entomology, University of Maine, Department of Entomology, Orono, Maine.
 Robert E. Pfadt, head of entomology, University of Wyoming, Plant Science Division, Laramie, Wyo.
 S. P. Darby, chief of reforestation, Georgia Forestry Commission, Macon, Ga.
 David O. Quinn, State extension plant pathology and entomology specialist, West Virginia University, Morgantown, W. Va.
 W. W. Neal, assistant professor of entomology, West Virginia University, Morgantown, W. Va.
 R. N. Hofmaster, entomologist, Virginia Truck Experiment Station, Eastern Shore Branch, Painter, Va.
 W. Julian Walden Parrish and Walden Farms, Midway, Ky.
 John C. Campbell, secretary, New Jersey State Potato Association, New Brunswick, N.J.
 N. W. Meadows, wholesale sales manager, Cooperative GLF Exchange, Inc., Ithaca, N.Y.
 Oregon State Department of Agriculture, Salem, Oreg.
 W. T. Mendenhall, State entomologist, Arizona Commission of Agriculture and Horticulture, Phoenix, Ariz.
 B. W. Beadle, executive director, Research and Development Consumers Cooperative Association, Kansas City, Mo.
 Doyle Conner, commissioner, Florida Department of Agriculture, Tallahassee, Fla.
 United Cooperative, Inc., Alliance, Ohio.
 Lawrence E. Davis, president, Florida Pest Control Association, Orlando, Fla.
 B. C. Webb, dean, School of Agriculture, Agricultural and Technical College of North Carolina, Greensboro, N.C.
 John W. Koon, executive secretary, Kentucky Farm Bureau Federation, Louisville, Ky.

- G. W. Hertoma, Lynk Bros. & Baird Hybrid Corn Co., Marshalltown, Iowa.
 E. L. Newdick, commissioner, Maine Department of Agriculture, Augusta, Maine.
 William J. Champion, president, Riverdale Chemical Co., Chicago Heights, Ill.
 Selco Supply Co., Eaton, Colo.
 H. O. Lund, Governor's pesticide review board, Atlanta, Ga.
 H. A. Woodbury, Woodbury Chemical Co., St. Joseph, Mo.
 Wayne R. Olson, commissioner of conservation, St. Paul, Minn.
 Ralph G. Carpenter, director, New Hampshire Fish and Game Department, Concord, N.H.
 T. W. Collins, General Chemical Division, Allied Chemical Corp., Morristown, N.J.
 D. H. Marsden, head, Agricultural Chemicals Research, Eastern States Farmers Exchange, Springfield, Mass.
 Wendell P. Butler, commissioner, Kentucky Department of Agriculture, Frankfort, Ky.
 Owen J. Newlin, production manager, Pioneer Hi-Bred Corn Co., Des Moines, Iowa.
 Mrs. Charles Hogan, 1020 Monroe Avenue, River Forest, Ill.
 J. P. Redston, manager, Drew Chemical Corp., Textile Chemicals Department, New York, N.Y.
 Denver T. Loupe, specialist (agronomy), Louisiana State University, Baton Rouge, La.
 William A. Healy, technical secretary, New Hampshire Water Pollution, Concord, N.H.
 G. A. Walker, acting director, Michigan Department of Conservation, Lansing, Mich.
 Tim Babcock, Governor, State of Montana, Helena, Mont.
 Richard H. Wilcox, State health officer, Oregon State Board of Health, Portland, Oreg.

MEMPHIS, TENN., *April 16, 1964.*

ORAL TESTIMONY

- Robert M. Schneider, director, Illinois Department of Agriculture, Springfield, Ill.
 Justus Ward, Director, Pesticides Regulation Division, Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C.
 O. Henry Engendorff, commissioner, Wyoming Department of Agriculture, Cheyenne, Wyo.
 Phillip Agee, Nebraska Game, Forestation & Parks Commission, Lincoln, Nebr.
 Denzel E. Ferguson, Department of Zoology, University of Mississippi, State College, Miss.
 Ralph E. Heal, executive secretary, National Pest Control Association, Inc., Elizabeth City, N.J.
 Grover Dowell, extension entomologist, University of Arkansas, Little Rock, Ark.
 L. H. Senn, chairman, southern plant board and assistant State entomologist, South Carolina State Crop Pest Commission, Clemson College, Clemson, S.C.
 Louis A. Mclean, secretary, the Velsicol Chemical Corp., Chicago, Ill.
 George C. Decker, head, Section of Economic Entomology of the Illinois Natural History Survey, and the Illinois Agricultural Experiment Station, Urbana, Ill.
 H. L. Bruer, director, division of plant industry, Tennessee Department of Agriculture, Nashville, Tenn.
 John M. Stubbs, State game and fish commission, Nashville, Tenn.
 Walter K. Porter, Jr., superintendent, Delta Branch, Mississippi Agricultural Experiment Station, Stoneville, Miss.
 Stelmon Bennett, assistant professor of entomology, University of Tennessee, Knoxville, Tenn.
 James R. Whitley, Missouri Conservation Commission, Columbia, Mo.
 Oscar C. Carr, Jr., director, Delta Council, Clarksdale, Miss.
 Maybry I. Anderson, Mississippi Aerial Applicators Association, Clarksburg, Miss.
 Arnold Berner, director of public relations, Arkansas Farm Bureau Federation, Little Rock, Ark.
 J. L. Rutherford, State entomologist, Missouri Department of Agriculture, Jefferson City, Mo.

- K. C. Dodson, director, research and legislation, Tennessee Farm Bureau Federation, Columbia, Tenn.
- Dale L. Porter, chairman, Seeds Treatment and Protection Committee, American Seed Trade Association and on behalf of Pioneer Hi-Bred Corn Co., Des Moines, Iowa.
- Claude L. Welsh, director, Production and Marketing Division, National Cotton Council of America, Memphis, Tenn.
- National Council of Farmer Cooperatives.
College of Agriculture, University of Tennessee, Knoxville, Tenn.
- Leon W. Weinberger, Chief, Basic and Applied Sciences Branch, Division of Water Supply and Pollution Control, U.S. Public Health Service, Department of Health, Education, and Welfare, Washington, D.C.
- Lehman Fowler, Arkansas Farm Bureau Federation, Brinkley, Ark.
- Ralph R. Lloyd, Jr., manager, pesticide products, Olin Mathieson Chemical Corp., Little Rock, Ark.
- Robert R. Rawlings, head, Warehouse Division, Arkansas Rice Growers Cooperative Association, Stuttgart, Ark.
- Jerry A. Williams, vice president, Head Chemical Co., West Helena, Ark.
- Owen Newlin, production manager, Pioneer Hi-Bred Corn Co., Des Moines, Iowa.
- J. B. McPherson, East Carroll Parish Police Jury, Lake Providence, La.
- H. L. Haller, Assistant Administrator, Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C.
- John M. Fairall, chemical engineering consultant, Division of Water Supply and Pollution Control, U.S. Public Health Service, Cincinnati, Ohio.
- D. N. McDowell, director, Wisconsin Department of Agriculture, Madison, Wis.

WRITTEN STATEMENTS FOR INCLUSION IN RECORD

- R. B. Stimson, Stimson Veneer & Lumber Trust, Dumas, Ark.
- Stanley I. Trenhaile, commissioner, Idaho Department of Agriculture, Boise, Idaho.
- Owen J. Newlin, production manager, Pioneer Hi-Bred Corn Co., Johnston, Iowa.
- Raymond G. Rowley, commissioner, Vermont Department of Agriculture, Montpelier, Vt.
- James F. Griffin, Jr., executive secretary, Florida Nurserymen & Growers Association, Key Biscayne, Fla.
- Richard H. Wilcox, State health officer, Oregon State Board of Health, Portland, Oreg.
- Miss Monica Ann Evans, Kalamazoo Nature Center, Inc., Kalamazoo, Mich.
- A. H. Van Landingham, director and associate dean, West Virginia University, Morgantown, W. Va.
- William R. Freeman, president, Michigan Audubon Society, Lansing, Mich.
- Alden K. Barton, chairman, Utah State Board of Forest and Fire Control, Salt Lake City, Utah.
- H. D. Purswell, entomologist, Cotton Producers Association, Atlanta, Ga.
- Harry Lutz, Leeland Farms, Leesburg, Ga.
- Milton G. Savos, extension entomologist, Cooperative Extension Service University of Connecticut, College of Agriculture, Storrs, Conn.
- Robert B. Moorman, extension wildlife conservationist, Cooperative Extension Service, Ames, Iowa.
- W. M. Smith, Jr., president, Bank of Cherry Valley, Cherry Valley, Ark.
- H. A. Rollins, Jr., extension horticulturist, Agricultural Extension Service, Virginia Polytechnic Institute, Blacksburg, Va.
- H. Lewis Batts, Jr., professor of biology, Kalamazoo College, Kalamazoo, Mich.
- J. W. Ramsey, president, Tennessee Conservation League.
- Walter W. Wightman, president, Michigan Farm Bureau, Lansing, Mich.

BATON ROUGE, LA., APRIL 23, 1964

ORAL TESTIMONY

- Justus Ward, director, Pesticides Regulation Division, Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C.
- C. W. Kennedy, assistant State agent and manager of livestock shows, University Station, Baton Rouge, La.
- W. C. Gallagher, Water Supply and Pollution Control Division, U.S. Public Health Service, Dallas, Tex.

- William A. Tompkins, chief aquatic biologist, Massachusetts Division of Fisheries and Game, and project director, Massachusetts pesticides studies, Northboro, Mass.
- Bernard H. Lorant, director of research, Velsicol Chemical Corp., Chicago, Ill.
- J. E. Sexton, J. E. Sexton & Sons Fish Co.
- Fred Huenefeld, Jr., farmer, Monroe, La.
- Sidney Sylvester, farmer, school principal, and State representative, Parish of St. Landry, and chairman, Sweet Potato Advisory Committee for the Louisiana Farm Bureau Federation.
- Charles A. Petrus, manager, Cotton States Chemical Co., Inc., Monroe, La.
- Mitchell R. Zavon, associate professor of industrial medicine, University of Cincinnati, Cincinnati, Ohio.
- Robert Munson, State representative, Rapides Parish, Chayenville, La.
- L. D. Newsom, head, Department of Entomology, Louisiana State University, College of Agriculture, Baton Rouge, La.
- C. Walter Mattingly, Orleans Parish Medical Society, New Orleans, La.
- Lloyd L. Lauden, agronomist and field representative, American Sugar Cane League of the U.S.A., Inc., New Rhodes, La.
- Lyle S. St. Amant, chief, Oyster and Seafood Division, Louisiana Wildlife and Fisheries Commission, Hammond, La.
- Louis A. McLean, secretary, Velsicol Chemical Corp., Chicago, Ill.
- Glen Lehker, extension entomologist, Purdue University, Lafayette, Ind.
- M. J. Foster, chairman, Sugar Advisory Committee for the Louisiana Farm Bureau Federation, Franklin, La.
- Edgar Paul Booth, chiropractor.
- Sumner H. McAllister, general manager, Agricultural Chemicals Division, Shell Chemical Co., New York, N.Y.
- John S. Forrester, vice president and technical director, Microtek Instruments, Inc., Baton Rouge, La.
- Erin Gunter, Louisiana Forestry Commission.
- Robert A. Lafleur, executive secretary, Louisiana Stream Control Commission, Baton Rouge, La.
- Minor S. Gray, president, Delta Pine Land Co., Scott, Miss.
- Montana Agricultural Experiment Station, Bozeman, Mont.
- William H. Herke, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, Baton Rouge, La.
- Richard Carlton, State entomologist, Louisiana Department of Agriculture, Baton Rouge, La.
- James R. Dogger, chairman, department of entomology and State entomologist and J. T. Schulz, associate professor of entomology and, Wayne J. Colberg, extension entomologist, North Dakota State University, Fargo, N. Dak.

WRITTEN STATEMENTS FOR INCLUSION IN RECORD

- Harold E. Myers, dean, University of Arizona, College of Agriculture, Tucson, Ariz.
- Frank Horsfall, Jr., professor of horticulture, Virginia Polytechnic Institute, Virginia Agricultural Experiment Station, Blacksburg, Va.
- G. J. Stadelbacher, extension horticulturist, cooperative extension work, University of Maryland, College Park, Md.
- Fred W. Burrows, executive vice president, International Apple Association, Inc., Washington, D.C.
- Lowell H. Watts, director, agricultural programs and director of extension, cooperative extension service, Colorado State University, Fort Collins, Colo.
- G. E. McDaniel, director, division of disease control, State board of health, Columbia, S.C.
- Robert W. Anderson, chief inspector, Arkansas State Plant Board, Little Rock, Ark.
- J. W. R. Norton, State health director, State board of health, Raleigh, N.C.
- C. D. Porterfield, entomologist, Coahoma Chemical Co., Inc., Clarksdale, Miss.
- Lacy K. Rea, Hearty-Virginia, Inc., Mount Jackson, Va.
- Harold G. Wilm, commissioner, New York Conservation Department, Albany, N.Y.
- Mrs. Roberta Reubell, executive secretary, Oklahoma Cotton Ginners' Association, Inc., Oklahoma City, Okla.
- Arthur N. Whitney, chief of fisheries division, department of fish and game, Helena, Mont.
- William A. Healy, technical secretary, water pollution commission, Concord, N.H.

THE IMPORTANCE OF THE PESTICIDES ALDRIN, DIELDRIN, AND ENDRIN TO AGRICULTURE

Aldrin, dieldrin, and endrin are the most effective pesticides available for the control of a number of destructive insects which attack many of our more important crops. The cost of production, and hence the ultimate cost to the consumer, would be considerably greater if these pesticides were not available. Furthermore, in many cases much poorer quality product would result.

It is difficult to estimate the crop losses that would occur if aldrin, dieldrin, and endrin were not available. This would depend upon many factors, including crop conditions, the kind and extent of insect infestations, and other considerations which not only vary widely in agricultural areas throughout the country but change from year to year. A rough estimate can be made, however, on the basis of the reported farm value of specific crops, known insect problems associated with those crops, the availability of alternate pesticides, and their degree of effectiveness and related factors.

To illustrate, 10 of our major crops now dependent upon aldrin, dieldrin, or endrin for effective pest control are corn, cotton, rice, sugarcane, apples, peaches, strawberries, cauliflower, potatoes, and sweet potatoes. The estimated total farm value of these crops in 1963 was \$7,788,126,000. If no insecticidal treatments had been applied to these crops, it is estimated that growers would have suffered a combined loss of \$1,587,500,000, or more than one-fifth of the total production. Had it been necessary to use less effective pesticides than aldrin, dieldrin, or endrin, estimated losses totaling \$640,750,000 would have been sustained.

RESEARCH ON BIOLOGICAL CONTROL OF INSECTS

Mr. WHITTEN. I would also like you to furnish a statement showing when the Department began research on biological control of insects, and on the use of sterilization methods.

Dr. BRADY. Yes, sir.

(The information requested follows:)

BIOLOGICAL CONTROL OF INSECTS

Entomologists in the U.S. Department of Agriculture have, for many years, recognized that certain hazards are associated with the use of conventional insecticides. As a result, they early gave a great deal of attention to the use of insect parasites, predators, and diseases as important aids in the control of insect pests. With the breakthrough in the development of new highly effective insecticides during and after World War II, much effort was devoted to the development of these new and vitally important materials to protect agricultural crops, livestock, and man from pests and pest-borne diseases. However, in recognition of the complex hazard problems associated with the increasing use of many pesticides and the development of insecticide resistance in insects, the Department in 1955 began to redirect much of the research effort from conventional insecticides to the development of biological, specific chemical, and physical methods of control that would avoid or minimize hazards to man and his environment. At the same time research continued on insecticides but with primary emphasis on the development of kinds of materials and methods of use which would minimize or avoid residues on agricultural products.

In the field of biological control, for three quarters of a century Department entomologists have been searching for natural enemies of insect pests. In 1888 the introduction into California of the vedalia, a lady beetle from Australia, quickly brought under control the cottony cushion scale which was destroying California citrus groves. Since then many parts of the world have been searched for parasites and predators. Over 650 species have been collected and brought into the United States and at least 100 of them have become established. Outstanding control of the following 20 insect pests can be credited to the introduction of these beneficial insects: Black scale, yellow scale, cottony cushion scale, citrus mealybug, citrophilus mealybug, longtailed mealybug, olive scale, purple scale, Rhodesgrass scale, apple mealybug, comstock mealybug, European wheat stem sawfly, European Spruce sawfly, oriental moth, larch case bearer, larch sawfly, satin moth, European fruit lecanium, and holly leaf miner.

In addition, partial control has been obtained with parasites and predators released against such important pests as the Japanese beetle, gypsy moth, brown-tail moth, European corn borer, spotted alfalfa aphid, and alfalfa weevil. Although these and other introduced insects continue as major pests, the introduction of parasites and/or predators has substantially reduced their capacity to do damage. The potential value of parasites and predators of insect pests is never disregarded in the Department's research program and if there is hope that the introduction of such natural enemies will provide a complete or partial solution to a program, intensive efforts are made to solve it in this manner.

We might cite the citrus black fly as an example of the extent of efforts that are made when circumstances warrant and if research resources are available. In 1935 the black fly was discovered in Mexico, and heavy infestations developed. Threat of invasion of this insect into our citrus areas resulted in an intensive cooperative effort to help contain the spread of this pest by the introduction into Mexico of several insect parasites, that were known to be efficient in other areas where the insect occurred. In 1943 the Mexican Department of Agriculture and the USDA imported the principal parasite of the citrus black fly, which was effective in Cuba, to Mexico but it was not adapted to the hot, dry climate there. An entomologist of the USDA went to India in 1949-50 to search for more suitable parasites. Through his efforts in India and Mexico and those of Mexican entomologists in Mexico, four species of parasites (small wasps) well suited to the Mexican climate were successfully established and millions of these parasites were distributed over a major portion of the citrus-producing area of Mexico. These natural enemies now keep the pest under excellent control in much of Mexico and greatly minimize the use of insecticide sprays and the hazard of spread of the insect into the United States.

Insect pests are attacked by many diseases caused by bacteria, viruses, protozoa, fungi, and nematodes. The manipulation of such pathogens to produce severe infections among populations of insect pests has much promise and is being investigated by U.S. Department of Agriculture researchers. The milky disease, a bacterium, which infects Japanese beetle grubs was discovered in 1933 and developed for commercial use. It has been applied to thousands of areas of turf in the Eastern United States and has become an important factor in the control of the pest. Another bacterium *Bacillus thuringiensis*, is in commercial production. It is recommended by the Department for the control of tobacco budworm and is registered for use against a number of crop pests. At present considerable emphasis is being placed on the development of a polyhedrosis virus for control of bollworms infesting cotton. Another virus has been used for the successful control of the European pine sawfly, a serious forest pest in Eastern and Central United States.

As a result of funds appropriated by the Congress in fiscal year 1962, a new Biological Control of Insects Research Laboratory will be constructed in fiscal year 1965 at Columbia, Mo., for basic research on insect parasites, predators, and diseases that will be applicable to the development of practical control procedures against injurious insects in various parts of the United States.

In spite of outstanding successes in some instances, and partial successes in others, Department scientists have long recognized that parasites, predators, and insect diseases alone under nature's balance do not provide a solution to most insect problems. They can be expected to solve some problems and provide substantial aid in meeting many others. Our scientists believe, however, that with man's help in mass producing such organisms and by releasing them in adequate numbers and at the appropriate time, the value of natural enemies of insects can be greatly extended. This way of supplementing the help that biological agents can provide in meeting insect problems is largely unexplored. With the great advances in techniques in ways to mass produce insects, which in part have been advanced by other research on the sterility method of insect control, greater emphasis will be placed on ways to utilize beneficial organisms to greater advantage and with greater efficiency in meeting insect pest problems.

INSECT CONTROL BY STERILIZATION

The theory proposed by E. F. Knipling about 1938 that control of screw-worm flies could be achieved by introducing sterile males into the natural population led to research by the U.S. Department of Agriculture on appropriate techniques.

Research first got underway in Texas in 1949. Following progress in the laboratory on methods for rearing and sterilizing the insect using atomic energy, pilot field experiments were undertaken which culminated in the successful demonstration of the technique when the insect was eradicated from the island of Curacao in 1954. This method was then further developed and utilized in 1958-59 for the eradication of the screw-worm fly from the Southeastern United States. The procedure is now being used in the current program for eradication and control of screw-worms in Texas and New Mexico and infestations within the area under control have been reduced by about 99.9 percent. In view of the success of this new and novel control technique against one of our most important livestock pests, research to the limit of available resources has been undertaken on other major pests. Research on the new method was started on tropical fruit flies in 1955. In 1962-63 the melon fly was eliminated from Rota in a pilot experiment.

Research undertaken by the Department in 1954 with chemicals that impaired insect development led to subsequent determination that, like X-rays or gamma rays from cobalt 60, sterility could be induced in many insects by the use of chemicals without serious adverse effects on normal mating behavior and other activity. In 1960 it was demonstrated that sterility could be induced in house flies by several chemical compounds, and chemically sterilized Mexican fruit flies are now being released along the California-Mexican border to control native flies accidentally introduced into Northwestern Mexico in infested fruits.

The chemosterilant approach to insect control involving the sterilization of insects in the natural populations, offers far greater potential in controlling insects than the conventional procedure of destroying insects. This was pointed out by Department scientists in 1959. This has established a new principle of pest control and there is worldwide interest in this approach to develop this method of control for vertebrate pests as well as invertebrate pests. Available chemosterilants are regarded as too toxic to utilize where the public might be exposed to them and their experimental use.

ADDITIONAL RESEARCH FACILITIES REQUESTED

Mr. WHITTEN. Now we turn to the buildings for which you request funds. I notice you ask for three new research facilities. Can you tell us where you are doing that type of research now? Where are the existing facilities that are being used to meet the need for which you now ask additional buildings or facilities at new locations?

Dr. BRADY. Several of these facilities are being requested by the Agricultural Research Service, a couple by the the Forest Service, and also facilities at State experiment stations. Perhaps it would be well for Dr. Shaw, Dr. Jemison, and Dr. Byerly in turn to respond to that question.

Mr. WHITTEN. We will get around to each item later. I want to know at what locations this work is now being carried on.

Dr. SHAW. The first item in the Agricultural Research Service request for a new building is at College Station, Tex., on the toxicological and pathological effects of pesticides on livestock; the work we now have going on is at Kerrville, Tex. This work is expected to be continued with the addition of this laboratory and the more basic studies would be done in the new laboratory at College Station, Tex., with an application of that work at the station we now have at Kerrville, where we had land and opportunities for large numbers of cattle.

Mr. WHITTEN. What is the distance between Kerrville and College Station?

Dr. ANDERSON. I would say about 250 to 300 miles, I believe.

Mr. WHITTEN. Your next request is for facilities for research to control plant diseases and nematodes, develop new and safe methods for control of insects at Beltsville, Md.

Dr. SHAW. This work is now going on at Beltsville. It is conducted in several buildings and we believe there will be a lot of desirability in bringing the groups together and expanding their efforts in the new facility at Beltsville.

You may recall that the Department of HEW has proposed to build a Laboratory on Environmental Health at Beltsville and having the association of their work and this work would give us probably as good an opportunity for coordination of our activities as would be possible anywhere. We can have a group working together that would solve some of these problems that are causing difficulties at the present time. This is an expansion of the activities we now have at Beltsville, with more modern facilities and a concentration of the work.

Mr. WHITTEN. How many times has Congress turned that down, Dr. Shaw?

Dr. SHAW. The one for HEW, I think twice. My understanding was that it was cleared this year.

Mr. WHITTEN. These amounts that I see here are for preparing the plans.

Dr. SHAW. Plans and specifications, yes.

Mr. WHITTEN. How long would it be before you got into actual work at those locations?

Dr. SHAW. Well, it would be about two and a half years.

Mr. WHITTEN. Where are you doing the work now for which you would build a \$2 million plant at Gainesville, Fla? Where is that work now being done on insect attractants and environmental research?

Dr. SHAW. We do not have a facility where this work is concentrated. We do have some work on attractants at a number of places—at Beltsville and at several of our other laboratories, but what our intentions would be is to have an all-out attack on this area of developing insect attractions by having this special laboratory at Gainesville, Fla.

Mr. WHITTEN. I notice you also have a request for construction of facilities for expanded research on agricultural products in marketing channels, Savannah, Ga., \$800,000.

Dr. SHAW. This work now is at Savannah. This would give them some modernized facilities for the work. As you may recall, they are in Army barracks and other buildings of that type in the location where they are now. We feel we need very badly a new facility.

Mr. WHITTEN. Do you think it would be of any help if you set some of these things up under the joint operation of HEW, the Department of Agriculture, and various others, so that the end result would not be for one group to cause trouble for the other?

Dr. SHAW. These two facilities at Beltsville, the one we propose and the one they propose is a much larger laboratory than this, but certainly there would be advantages in having as close a working relationship in those two as we could have.

Mr. WHITTEN. I have said earlier, that there is some unhappiness on my part about some of the releases that have been made in years past, particularly in regard to the cranberry incident and some things later. I do not want the record to fail to show, however, that I think the Department of Health, Education, and Welfare has done a marvelous job for the Nation and I know the Department of Agriculture in this area has, too. I say that so that I may say this: Certainly,

through the White House or some other means there should be absolute full coordination in the executive branch in news releases and other things that might destroy business, might destroy the very means of living for many of our people.

I just hope you will pursue this matter of having a fully coordinated system, not only of research, but of press releases and things of that sort.

Dr. SHAW. Under the new, recently revised charter for our Plant Pest Control Review Board, which involves the three departments you mentioned along with the Department of Defense, we have provided in the new modified charter that that Board will have an additional responsibility, the coordination of research for all three of our agencies and a special mechanism is being set up so that we will review all programs started, as well as the results from programs that are underway by this Board.

Mr. WHITTEN. The potential damage to business and the potential damage to the food of the American people is such that it makes me wonder if we do not need something on the order of what you do in connection with crop estimates, to insure that there won't be leakage by folks in any Department in this area.

Turning back to this construction, could we have for the record the total amount of cost of these facilities? I notice you have here part for construction in the coming year, part for planning.

According to the figures handed me by the staff show that \$10,725,-000 will be the ultimate cost of these new facilities.

Is that figure correct?

Dr. SHAW. Yes, sir.

OPERATING COSTS OF NEW FACILITIES

Mr. WHITTEN. What will be the increased annual cost of operating these facilities? How many additional man-years will you expect to have to supply?

Dr. SHAW. It will be about \$5 million.

Mr. WHITTEN. Increased operating expenses annually?

Dr. SHAW. Yes.

Mr. HORAN. That is the Federal figure?

Dr. SHAW. Yes.

AVAILABILITY OF SCIENTISTS

Mr. WHITTEN. Congress has been rather liberal, judged by the amounts of money heretofore provided compared with research funds for the last several years. I realize there is never any way to supply all the money that anybody wants for anything. But in connection with that the testimony shows that you have been unable to find manpower; that you have had to wait for the colleges to release their graduates in order to find the people to do this work.

This year's graduates have pretty well been taken up. It will be practically a year before new graduates in the scientific field come out of the colleges. Wouldn't it be far better to wait until next spring to undertake the increased work for which you request funds here? Where are you going to find your people?

Dr. BRADY. Mr. Chairman, I wonder if I could give an answer to this.

MR. WHITTEN. Yes.

DR. BRADY. In the presentation of our budget to the Budget Bureau, this is one of the things that each of the agencies covered very carefully. They went through and made a list, by professions, of the number of people they would need to carry out their program and evaluated this against the expected number of Ph. D.'s coming from the colleges in each of these fields. It appears very definitely that the need for scientific personnel can be met. The Ph. D.'s as you know, do not always become available in the spring of the year. Men getting a doctor's degree complete their training throughout the year. We would not have the same limitation normally found in recruiting bachelor's candidates.

MR. WHITTEN. Do you expect to use any of this money for contract work, this additional budgetary request?

DR. BRADY. Yes. There would be some for contract work in each of the larger agencies.

DR. SHAW. In the Agricultural Research Service we would expect to use about 40 percent of the operating funds that are in this budget for contract work.

MR. WHITTEN. For the rest of it, I do not see any way you can use it. This committee and the Congress have already provided all the money to hire all the people that the executive branch will let you have. So if we gave you this money, you couldn't use it because you cannot hire any more people. Isn't that correct?

DR. SHAW. We certainly made known to the Bureau of the Budget we would have to have increased ceiling on this.

MR. WHITTEN. But they have not given you relief on the ceiling. They just gave you an approval of the money, without any assurance that the ceiling would be lifted. This would be at the expense of other activities in the Department as it now stands; would it not?

DR. SHAW. If they do not give us an increase; yes. My assumption is they will.

MR. WHITTEN. You mean you are willing to take a gamble on them giving you the people if you get the money?

DR. SHAW. No. I think we can make a case. They will have to give us the people.

MR. WHITTEN. Don't you think you are putting the cart before the horse? Don't you think the people should come first, then the money, instead of the other way around? Or are you willing to take either one first?

DR. SHAW. I want to get on with this job. I think we can solve that problem when we come to it.

DR. BRADY. Mr. Chairman, it may be well to point out that support per scientist is also involved here in relation to doing the kind of research work that is needed. It is hoped that with these additional funds there will be increased support for scientists to raise the staff up to the same range of effectiveness as those of many other agencies that carry out research.

MR. WHITTEN. We have witnesses here from each of the services that are involved in this estimate. Up until this point we have been largely dealing with the Agricultural Research Service. Who is here on behalf of the Extension Service?

EXTENSION SERVICE PROGRAM

Mr. DAVIS. I am.

Mr. WHITTEN. What would you expect to do with your portion of this money?

Mr. DAVIS. We would provide for expanded work in the application of available knowledge concerning the control of insects and other pests.

Mr. WHITTEN. Don't you now have all the publications you need, and don't you have difficulty getting them distributed? I know now and then that your Library Service asks us to go along with them on the basis that Congress rarely ever calls on them for all the publications they have, so that they may be permitted to carry just a little cushion down there and keep these bulletins to their credit on the books and then just have enough to meet the needs.

If you are sending out all the information on use of these pesticides, insecticides, et cetera, if you come up with a new one, it looks like you would send that out instead of the old one. I can see where printing costs might come into it, but I cannot see where every time you got a new lawsuit you go to hire a new lawyer in a law firm. I cannot see in this particular area where there would be anything especially new for you to do. You might send out a new bulletin instead of an old one, but you do not print them.

Mr. DAVIS. There is much more to this, I am sure, you are aware, than sending out bulletins.

Mr. WHITTEN. You have all this personnel at land-grant colleges. They are doing a fine job. You have county agents, assistant agents, 4-H Club agents, and others.

Mr. DAVIS. That is right.

Mr. WHITTEN. You already have them. You are not going to displace some of them and hire more because you get the money; are you?

Mr. DAVIS. We would provide added staff to provide more adequate service to farmers, to retailers who sell the products, to more adequately inform the householders who use the chemicals, to inform processors, and storers.

Mr. WHITTEN. I am for the service. There are three or four words around here I am allergic to; one is "morale," the other is "to broaden," or "to strengthen."

You haven't said anything yet that looks like much to me.

Mr. DAVIS. I would be happy to go into more detail on how we would use the money, if you would like.

Mr. WHITTEN. That is what I am asking for.

Mr. DAVIS. In every county now county agents work with producers on their pest-control problems. If a farmer has a pest attack on a crop or livestock, he typically goes to the county agent to find out the best methods of controlling this pest. In every county there is at least one agent who puts an important part of his time on this subject.

Generally the Extension Service approach to working with farmers consists of providing them with recommended methods of control. These are recommendations that the county agent has received from the college, the appropriate specialists there, that have been developed there in conference with the State research people, in reviewing all the available research.

In some cases we have been able to go considerably further with the farmer in helping them develop a deeper understanding of the nature of the pest and the various alternative methods of control so that they are in a better position to make their own decision when a pest hits.

We think that with the growing complexity of this thing we need to put considerably more attention to developing this kind of a basic understanding of the pests, and the alternative methods of control, so that farmers can safely control the pest and make their own decisions in a timely manner.

Mr. WHITTEN. Mr. Davis, you have told me what a good job they are doing now. You still leave me where I cannot see that you need additional money. How many people are you going to hire and where are you going to have them working?

Mr. DAVIS. There would be approximately 110 additional professional workers plus the secretarial staff. These would be largely on the college campus at the specialist level; one of the important needs in most States is for a chemicals leader, who would serve to keep the whole staff informed of new developments in the chemicals field and to coordinate the total extension effort dealing with chemicals, to make sure everybody has the latest in information and keep the whole package tied together.

There are some States that have but one extension entomologist and with the very specialized problems and the very specialized treatment of these problems that are being developed they need more than one specialist in the field of entomology if they are going to adequately cover this field. Other States have but one plant pathologist. Again, with the growing complexity of work here if they are going to adequately cover this they need more than one person, persons who are more specialized in their work will be able to devote more attention to the specific application problems in those States. Another area in which we need a considerably increased attention is in the use of chemicals by nonfarmers. This includes commercial applicators. We are now doing some educational work with commercial applicators. We think we need to hold schools, conferences, intensive training programs with commercial applicators to increase their ability to use these chemicals properly and safely.

Also, we need to work considerably more with people who sell the chemicals, not only to the farmer, but to the homeowner to help them provide the user of the chemical with the information on its use.

These are areas in which we feel the need for considerably increased work.

FOREST SERVICE PROGRAM

We will turn now to the Forest Service, and since this item has been sent to the Senate in connection with the agricultural bill, I would like on behalf of Mr. Kirwan, who heads the subcommittee under which the Forest Service now comes, to see this testimony is kept separate until Mr. Kirwan indicates which way he wishes to handle it.

We would be glad to have you discuss the item for the Forest Service, the basis on which the justifications are made and what you would do with your additional funds if you had them that you are not now doing.

Mr. JEMISON. Thank you, Mr. Chairman. It has been some time since the Forest Service has had the privilege of appearing before this committee. We are glad to be back today.

Mr. WHITTEN. Thank you. We are pleased to have you.

Mr. JEMISON. The Forest Service part of the program we are talking about today would include research to improve biological control for forest pests at nine locations. All nine of these locations are where we now have work underway. Countrywide there are 24 locations where we do research on forest insects, diseases, and animal pests.

The emphasis that will be brought to bear through this program will step up the effectiveness of control through the use of biological agents primarily and will find safer and improved ways of using chemicals. As you know, the forest insect aerial spraying program, for example, which involves the use of the chemicals that have some residue hazards, covers somewhere between 700,000 and 800,000 acres annually.

The emphasis in the research program would be at locations where we have underway strong cooperative work with the universities and colleges. Of the 24 locations where we presently do research on pesticides, 14 are on college campuses.

Specifically, some of the things we would do under this expanded program may be illustrated by plans for Gulfport, Miss. Here we would hope to move ahead faster with work on breeding and developing a fusiform rust resistant southern pine. At this location we concentrate all of the research on disease resistance of southern pine species.

We also feature here at Gulfport, research on the protection of wood in use—the only place in the country where this type of work is underway. Several hundred million dollars' worth of damage to wooden structures is caused every year by insects and diseases, primarily termites. At the present time the only known control of termites is with the chlorinated hydrocarbons, which are those that create, at the present time, the most pressing residue problems.

Mr. Chairman, along the line we have been talking, some of the problems we get into because of the potential dangers of the effects of pesticides are illustrated by a case last summer in the State of Washington that Mr. Horan may remember where a severe attack of the hemlock looper insect was threatening to destroy about 70,000 acres of prime hemlock timber. The Forest Service and the State of Washington were cooperating in the control program and were involved because the only effective control we know required the use of DDT. However, this area was tributary to a bay where prime oyster beds were located. We were more or less forced into the use of a substitute chemical that had not been researched thoroughly because of fears expressed over possible damage to the oysters. The substitute spray turned out to be very ineffective. Following this, some of the local industries did use DDT and successfully controlled the hemlock looper. This shows the kind of problem we are forced into when we do not have adequate research information.

Mr. WHITTEN. I am somewhat behind the times. It has been so long since we have dealt with the Forest Service. As I pointed out earlier, it has been under our mutual friend and colleague, Congress-

man Kirwan. But I know from reading the records and following through on it that you are doing work in these areas all the time.

You have been, through the years. You have done lots of good with it. You use here the words "step it up," and "expand it." You have heard the questioning of other witnesses. Where is the evidence that a few more men doing the same thing will get the end result any quicker, particularly in the area of research?

Mr. JEMISON. Mr. Chairman, some of the things might be stepped up but most of the work we contemplate is new work on the more promising leads. For example, we have a good idea that some of the biological agents may be very effective on certain insects. One example is a bacterium that has been tried in an exploratory way on one or two insects but has not been tried on a number of others. At the present time we have 165 insect outbreak problems in this country and we are only working on a handful of them. You might say that we are letting the others go and we need a lot of basic work on the life cycles of these insects to find a weak link that will be subject to a successful approach.

Mr. WHITTEN. I believe you are asking for a new laboratory here.

Mr. JEMISON. We have two items in this proposal, one, \$50,000 for a small facility at Berkeley, where we have a program begun last year, on improving pesticides and application methods. This would be for a chemical storage and mixing facility. We have a proposal for an \$850,000 laboratory at New Haven, Conn. The laboratory there, where we have done work for a number of years, was destroyed by fire last March. People are now scattered in three locations in the New Haven area. This laboratory would replace the burned structure and provide modern facilities for the continuation of this work. Incidentally, at New Haven we have, or will have as soon as this facility is available, the national center for storing biological agents as a bank for such work wherever needed.

Mr. WHITTEN. Was this item dealt with by the regular subcommittees of the House and Senate in your regular bill? I believe your appropriation bill is the only one that has been signed, is it not, for the current fiscal year?

Mr. JEMISON. That is correct. The fire occurred after our House and Senate hearings had been held. We were in contact later with both committees and they agreed that we would go ahead with the architectural planning. We now have an architectural and engineering contract and a building is being designed.

Mr. WHITTEN. So, then, since this vehicle came along and you were going in the same direction, you just thought it well to get aboard?

Mr. JEMISON. We felt timing was important. We certainly realized that we could make this proposal in the fiscal year 1966 budget. We have learned from GSA, which is handling the contract, that the final plans will be scheduled for completion February 1, 1965. It takes about 60 days to get out bids and award a contract and another 30 days for construction to start, which would give us a summer building season. We think this timing would gain us perhaps 6 or 9 months in occupancy date.

Mr. WHITTEN. That is relatively fast procedure as compared with the slowness with which you get money through Congress sometimes, isn't it?

Mr. JEMISON. I would not say that but we are pushing ahead vigorously to get this building planned and underway.

CURRENT PLANNED STATUS OF PESTICIDES RESEARCH

Mr. WHITTEN. Mr. Jemison, I wish you, too, would put in the record at this point a statement showing where you are doing the types of work for which you want this extra money, and also examples back through the years of the progress that the Forest Service has made in meeting the problems of insects and pests, and in the handling of pesticides and insecticides. Also show the care with which you deal with them and the cooperation or coordination that you might have with the various other departments.

Mr. JEMISON. We would be glad to do that.

Mr. WHITTEN. You may put it in and be sure your segment is included with the other testimony.

Mr. JEMISON. We will do that.

(The information requested follows:)

CURRENT AND PLANNED RESEARCH BY LOCATION

Berkeley, Calif.

Current:¹ Insect research studies include: Susceptibility or resistance of western pines to bark beetles, the biology and ecology of the lodgepole needle miner, mountain pine beetle, pine needle sheath miner, insects destructive of the seeds, flowers, and cones of ponderosa pine and Douglas-fir, and pesticide screening to discover or develop safer and more selective insecticides for use on spruce budworm control projects. Pines and firs are being selected and hybridized for pest resistance as well as for improved growth rate, site adaptability, and wood characteristics. Disease research includes studies to improve nursery disease control, to determine biological and environmental factors contributing to dwarf mistletoe impact on true firs and pines, and to select and breed for blister rust resistance in sugarpine.

Planned:² Develop a complete research program in insect toxicology, with emphasis on determining the mode of action of different chemicals on and in insect pests and their hosts; also develop a full-scale pesticide screening program, with emphasis on (1) formulating and testing new chemicals which offer promise in insect control, and which are specific in action, less persistent, and less hazardous; and (2) on developing new or improved methods of pesticide applications.

Start a specific program to select or create by hybridization pines of suitable growth characteristics which are resistant to both western and mountain pine beetles. Physiological or morphological characters will be sought which might indicate resistance and a practical breeding program will be developed to mass produce the resistant trees.

New Haven, Conn.

Current: Insect studies include (1) possibilities of control of the gypsy moth by male sterilization techniques and through the use of a polyhedral virus disease and by bacterium *Bacillus thuringiensis*; (2) the collection, identification, processing, and storing of insect disease-causing organisms; (3) control of the white pine cone beetle; (4) biology and ecology of the pine leaf aphid and pine-infesting weevils; and (5) preventive or control measures for the root rots of northern hardwoods and conifers, the dieback and declines of hardwoods, and conifer plantation diseases.

Planned: Evaluate and develop biological control of important forest insect pests in the Northeast, with emphasis on the use of insect disease-causing organisms, including viruses and bacteria, and new approaches including the use of attractants, gamma irradiation, chemosterilants, and genetic manipulation of

¹ Brief description of research by location at level authorized by fiscal year 1965 budget.

² Research planned for the fiscal year 1965 budget amendment.

parasites and predators; and determine the population dynamics of important pest species, such as the gypsy moth and spruce budworm, as a basis for developing methods of silvicultural or other indirect methods of control.

Corvallis, Oreg.

Current: Studies are underway on insect disease-causing organisms affecting the hemlock looper and Douglas-fir tussock moth; on latency of viruses of insects; on factors responsible for diapause in important insect pests and their natural enemies; and on the nutrition of the Douglas-fir beetle as a basis for developing techniques for mass rearing of this important pest species. Disease studies are planned to investigate micro-organisms in forest soils, to appraise their significance in the natural control of root pathogens, and to determine the site factors affecting the spread and intensification of root rots of Douglas-fir and ponderosa pine.

Planned: Determine the effect of latency of virus in insects on the initiation, intensity, and duration of virus epizootics; on the possibilities of creating favorable conditions for the development of epizootics in infestation prior to their reaching outbreak proportions. Learn the role of diapause in population dynamics and learn how to circumvent it in the mass rearing of insect parasites and predators for possible release in infestations. Work on bark beetles to develop effective means of mass rearing important species for use in basic research in biological and silvicultural control. Develop biological controls for root rots of Douglas-fir and ponderosa pine through the action of soil organisms antagonistic to root pathogens. Beneficial soil fungi will be isolated and evaluated for control effectiveness and measures to stimulate their frequency in forest soils will be determined. Determine and evaluate the effects on forest soil and water resources of the application of pesticides and other chemicals used in forest land management—what happens to chemicals after they reach the ground, how much accumulates in the humus and mineral soil, how rapidly they break down into other compounds, how much moves through or across the soil into water bodies.

Delaware, Ohio

Current: Insect research is planned to (1) control the bark beetle vector of Dutch elm diseases through the use of systemics; (2) determine the insect vector of the fungus causing oak wilt; (3) determine the substance in elm which makes them attractive to the bark beetle vector of the Dutch elm disease; (4) study the biology, ecology, and control of insect borers in hardwoods, insect enemies of acorns of important species of oaks, and on pine-infecting species of sawflies; and (5) to control the locust borer. Disease research aims to develop preventive measures for oak wilt through chemotherapy, biological control, and genetic resistance; to determine the cause and control of plantation diseases in the Central States.

Planned: Intensify research on biological control of forest insect pests in the Central States, with emphasis on parasites, predators, and diseases of pests of pine plantations and insect borers in valuable hardwoods. Begin research in population dynamics of important pests as a basis for developing silvicultural and other indirect methods of control. Screen promising systemic chemicals as a basis for developing new and safer methods of controlling Dutch elm disease and insect pests of plantations. Evaluate all possibilities of insect sterilization techniques and use of attractants as a basis for developing new approaches for the control of important pests in the Central States.

Research Triangle, N.C.

Current: Studies are underway on the nutrition of important species of bark beetles, on various ecological factors affecting these insects under controlled laboratory conditions, and on diseases affecting these bark beetles to determine their roles in promoting or reducing the intensity of outbreaks. Disease research aims to determine how to prevent annosus root rot losses in southern pine plantations through the use of biological controls and/or safe chemicals.

Planned: Basic research on the control of important pests of southern forest trees through the use of insect parasites, predators, and disease-causing organisms; on sex attractants and insect-host relationships. Begin research to control insect pests through the use of sterilization techniques, including gamma irradiation and chemosterilants; on the relation of outbreaks to genetic change in pest populations; and on possibilities of improving on biological control through the development of extra vigorous strains of parasites and predators through genetic manipulation.

Gulfport, Miss.

Current: Studies are underway on the control of subterranean termites through the use of chemicals applied to the soil, and through their use in combination with wood preservatives in the treatment of wood; on the control of powder-post beetles by treating wood with chemicals and by using different methods of storing or handling wood; on methods of handling or treating logs and lumber and wood in use so as to reduce or prevent insect attack and decay damage; on attraction of subterranean termites to substances produced by disease-causing fungi; and on control of fusiform rust and brown spot of southern pines. Forest management research is aimed at the genetic improvement of the four principal southern pines and important southern hardwoods with major emphasis on selection and hybridization of pines with improved form, high-density wood, rapid growth rate, and resistance to pests.

Planned: Learn the biology and ecology of insects destructive of wood products with major emphasis on developing new, safer and/or improved methods of subterranean termite control and new or improved methods of seasoning, handling, and storing wood products so as to reduce insect attack. Start studies of the nutrition of these insects and the role played by micro-organisms in their ecologies. Intensify research on use of attractants and sterilization techniques. Intensify research on the selection of hybridization of desirable pines resistant to the southern pine beetle and the tip moth and to fusiform rust. The nature of the resistance factors will be sought and breeding schemes for mass production of resistant trees developed.

Moscow, Idaho

Current: Studies include biologies, ecologies, and control of the western pine beetle, Douglas-fir beetle and larch casebearer in the northern Rocky Mountains; possibilities of control of the western pine beetle through sanitation-salvage methods; identifying and evaluating environmental factors, including insect parasites and predators, responsible for outbreaks of the Douglas-fir beetle. Disease research seeks to select and breed for blister rust resistance in western white pine, to improve methods for mass production of resistant seedlings, and to improve disease control in western white pine and associated species, with emphasis on the role of antibiotics.

Planned: New and intensified research for the evaluation of improved formulations of systemic compounds capable of arresting the growth of the white pine blister rust fungus in infected pine tissue without injurious side effects on the host tree or on other plants and animals. Basic physiological studies of translocation and tissue penetration are part of this research.

Juneau, Alaska

Current: Insect studies include biology and ecology of important forest insect pests in coastal Alaska, with emphasis on the black-headed budworm, a destructive defoliator of western hemlock and development of control measures with particular attention to complete protection of the salmon industry.

Portland, Oreg.

Current: Insect studies include biologies, ecologies, and control of several important forest insect pests in the Pacific Northwest; introduction from abroad of important insect predators of the balsam woolly aphid, with followup studies on their establishment and effectiveness in control; effect of aphid feeding on growth of true firs; biology and ecology of the European pine shoot moth and the identification and assessment of its native parasites and predators in western Washington; life histories of insect parasites of the hemlock looper; and on the biology of Oregon pine ips. Disease research aims to develop biologically and economically sound methods of incorporating dwarfmistletoe control measures into ponderosa pine management.

Logan, Utah

Current: Insect studies include biology and ecology of the mountain pine beetle in the intermountain region, with emphasis on population dynamics. Disease research studies include the identification, taxonomy, host relationships, impact and control of native rusts of western conifers.

Fort Collins, Colo.

Current: Insect studies include biology, ecology, and control of important forest insect pests in the central Rocky Mountains; factors responsible for Black Hills beetle attack on ponderosa pines and for the success or failure of develop-

ing broods of the beetle; ecology and natural control of the spruce budworm, with particular attention to its parasites and predators. Disease research studies the causes and methods of preventing and controlling forest and range plant diseases in the central Rocky Mountains, particularly the root rots and the diseases of subalpine species.

Albuquerque, N. Mex.

Current: Insect studies include identification, biology, and role of parasitic nematodes in controlling species of destructive bark beetles in the Southwest; biology and ecology of both the roundheaded pine beetle, a pest of ponderosa pine, and one of its important predaceous enemies; biology, ecology, and control of the Great Basin tent caterpillar, with particular attention to biological control factors. Disease research include the study of causes and methods of preventing and controlling the diseases of southwestern ponderosa pine and associated species, with emphasis on dwarfmistletoe and on the role of nematodes in tension zones.

East Lansing, Mich.

Current: Insect studies include biology and ecology of important forest insect pests of coniferous plantations in Michigan, with emphasis on the European pine shoot moth, European pine sawfly, and pine root collar weevil.

St. Paul, Minn.

Current: Insect studies include biology and ecology of insects destructive of flowers, seeds, and cones of coniferous trees, and of boring insects attacking aspen in the Lake States; silvicultural control of the spruce budworm; and insects attacking shelterbelt trees on the northern Great Plains. Disease research studies microclimate influences on diseases of northern conifers and aspens, biology and life history of important pathogens, and the selection and breeding for blister rust in eastern white pine.

Olustee, Fla.

Current: Insect studies include biology, ecology, and control of insects destructive of the flowers, seeds and cones of slash and longleaf pines; and improvements in chemical control of the black turpentine beetle in naval stores stands.

Athens, Ga.

Current: Insect studies include biology and ecology of insect borers in living hardwoods, the Nantucket pine tip moth in plantations, and the southern pine beetle in the Southeast; biology, ecology, and control of the balsam woolly aphid and elm spanworm, with particular attention to the introduction of foreign predators from abroad to control the woolly aphid, and followup studies on their effectiveness. Disease research includes studies of microflora and microfauna of forest soils and their significance in controlling root pathogens, and the role of mycorrhizae in preventing root diseases in pines.

Alexandria, La.

Current: Insect studies include biology, ecology, and control of insect pests of southern pines, with emphasis on the southern pine beetle in the Deep South. Timber management research aims to develop safer and more effective bird and rodent repellants on forest tree seed used in direct seeding the southern pines and hardwoods.

Stoneville, Miss.

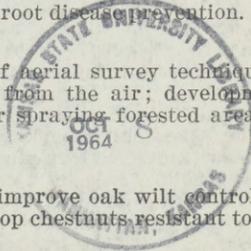
Current: Insect research includes biology, ecology, and control of insects affecting living hardwoods in the Deep South. Disease research includes studies of causes and measures to reduce disease losses in southern hardwoods with emphasis on the role of hardwood mycorrhizae in root disease prevention.

Beltsville, Md.

Current: Insect studies include development of aerial survey techniques and equipment for conducting forest insect surveys from the air; development or improvement of airplane spraying equipment for spraying forested areas; and insect physiology, pathology, and toxicology.

Morgantown, W. Va.

Current: Disease research includes studies to improve oak wilt control measures in the northern Allegheny region and to develop chestnuts resistant to blight.



Olympia, Wash.

Current: Research is being conducted in cooperation with the Department of the Interior's Bureau of Sport Fisheries and Wildlife and Washington State conservation agencies on the control of animal damage by chemical and silvicultural methods. Screening and evaluating chemicals for repellants and studying the cultural modifications of vegetation for indirect control have been emphasized.

Planned: Start research on the biochemical basis for differences in palatability of trees to animals, leading to modifications in species composition for indirect animal damage control. Modification of palatability through the use of systemic repellants that will render trees distasteful to animals also will be emphasized. The safe use of chemicals and the extended use of silvicultural controls such as the manipulation of species mixtures, stand conditions, and initial growth rates will be studied.

Roseburg, Oreg.

Current: Studies include brush field reclamation and control through nonchemical techniques of mechanical equipment, fire, and silviculture; and basic research on the ecology of brush species as a basis for better silvicultural and other control.

Rhineland, Wis.

Current: The present program deals with the genetic improvement of northern conifers, particularly the spruces, and the birches. The selection of racial strains and the creation of interspecific hybrids of spruce for improved growth rate in northern forests has been the primary objective.

Planned: Start a new program to select or create by interspecific hybridization red pines and white pines which are resistant to the shoot moth, the tip moth, and the white pine weevil. Mutation breeding for resistance will be attempted in a gamma-irradiation field now nearing completion. The nature of the resistant factors will be sought and aimed breeding programs developed to mass produce resistant trees.

Marquette, Mich.

Current: Research aims at reduction of animal damage to northern conifers and hardwoods through modification of silvicultural practices to create less favorable environments and an increase in alternate food supplies.

 RESULTS OF PESTICIDE RELATED RESEARCH IN THE LAST 8 TO 10 YEARS

Each year Forest Service scientists publish more than 200 papers related to the pesticide problem. These publications make research results available for application to forest pest control operations and serve to keep other scientists and the public informed of new knowledge.

This brief summary presents samples of research accomplishments during the past 8 to 10 years in two categories: (A) discoveries already in widespread use which have resulted in major savings in forest pest control costs or have greatly reduced losses from forest pests, and (B) findings which provide new biological insights or leads which promise future applications in biological control of forest pests.

(A) RESEARCH DISCOVERIES NOW IN WIDESPREAD USE

1. Development of successful methods for the use of Arasan 75 and sublimed synthetic anthraquinone, and recently the improved Arasan 42-S, has resulted in remarkable success in direct seeding the southern pines and Douglas-fir where there were failures before largely from seed-eating birds and rodents. Since 1955 the acreage direct seeded in the United States has increased steadily until in 1963 over 220,000 acres were seeded. Direct seeding results in savings of \$10 or more per acre over the cost of planting. In 1961 alone, we estimate the savings from this research to be \$2.5 million.

2. A host specific virus spray is now widely used to control European pine sawfly in red pine plantations. The spray is successfully applied from the air or, if plantations are small, from knapsack sprayers.

3. Oak wilt infected logs can now be decontaminated by simple fumigation with methyl bromide. Logs so treated would not longer be hazardous for international shipment even to those countries now having embargoes against import of oak logs from the wilt infected area of the United States.

4. We are now beginning to produce western white pines resistant to blister rust, but it will be 1980 before such planting stock will be generally available.

5. A hybrid between Jeffrey and Coulter pines is resistant to attacks of the pine reproduction weevil which destroys plantations of Jeffrey pine. Methods for mass production of this hybrid have been developed, and it is now being planted in California.

6. New knowledge of the relationships between the dispersal and microclimate needs of blister rust spores and forest microclimate has allowed us to eliminate 2,200,000 acres of low-hazard area, from control operations. This research finding is saving \$225,000 of control costs annually to intensify control in other areas where disease hazards are greater.

7. Methods of protecting wooden structures from subterranean termites by chemical treatment of the soil have been perfected. This research finding is the basis for long-term protection for \$20 billion worth of military structures and has even greater applicability to the civilian economy.

8. Studies of soil fumigants and development of methods of application to control nematode and root rot injury in forest nurseries have saved many forest plantations from future disease losses and have returned to production several forest nurseries which were previously abandoned. In the Southeastern part of the United States, use of methyl bromide in nursery soil fumigation has resulted in a net annual saving in production costs averaging \$1,100 per acre of nursery beds.

9. Seed orchards for the production of trees resistant to blister rust and the pine reproduction weevil have been established.

10. Chemical brush control along national forest roads shows actual savings of \$15 to \$40 per mile as a result of research on herbicide sprays. Periodic brush control is needed on 50,000 miles of such roads.

11. Airplane spraying methods for releasing coniferous reproduction from overtopping low-value hardwoods has cut the cost of release more than half. In 1961, 89,000 acres were treated at the same cost previously required for 25,000 acres.

12. A new spraying method for controlling the lodgepole needle miner has eliminated two-thirds of the cost of previous methods. Almost \$100,000 was saved on one project alone in 1961.

13. Use of lindane to control bark beetles has reduced the cost of chemicals by \$2.20 per tree and has also cut labor and transportation costs. In one project 33,000 trees were sprayed with good success.

14. New aerial insect survey techniques provide a cheaper, faster, and superior system of spotting outbreaks of southern pine beetle. They cost one one-hundredth as much as previously used ground surveys.

15. As a result of increased research on fusiform rust disease, a new spraying schedule based on critical weather patterns was devised which saves 70 to 80 percent of the time and material costs previously required to protect the seedlings in tree nurseries from the disease.

The sample list of 15 research findings described in part A which are now widely used represents for the most part the results of heavy dependence on chemicals and research to apply them to control forest pests. The following sample list of research results illustrates the trend to develop biological controls and less persistent more specific chemicals. Development of biological control of forest pests requires greater research efforts over a longer period of time, therefore, many results important in themselves are still only one link in a long chain of biological interrelationships which must be understood before biological control becomes practical.

B. RESEARCH RESULTS WHICH PROVIDE NEW LEADS TOWARD BIOLOGICAL CONTROL OF FOREST PESTS

1. Biological control findings

(a) Parasites and predators

Sixty-five thousand insect predators (representing 22 species) of the balsam woolly aphid have been introduced into the Pacific Northwest. Five have been successfully established and two show promise of control.

Twelve thousand predators of balsam woolly aphid were released along the Black Mountain range in North Carolina. Some of these have reproduced and overwintered.

Larvae of a predaceous beetle played an important role in controlling an outbreak of the roundhead bark beetle in the Southwest in 1963.

Decline of an outbreak of the spruce budworm in Colorado was associated with a spectacular increase in parasitization by one of the budworm's less common parasites.

Studies of parasitic insect enemies of the lodgepole needle miner in Yosemite National Park showed that Malathion in oil sprayed to kill the needle miner caused damage to the parasites.

A bug has been found that feeds only on red pine scale. Methods of producing this predator are being developed.

A clerid is an important predator of the southern pine beetle. One of these destroys up to 200 southern pine beetles as they emerge from the bark.

(b) *Insect pathogens*

A "disease bank" containing identified insect disease-causing organisms held in storage for research and possible control purposes is maintained at New Haven, Conn.

Twenty-three strains of pathogenic streptococci were isolated from healthy and diseased gypsy moth larvae.

Sprays containing a native polyhedrosis virus and the bacterium *Bacillus thuringiensis*, gave high degrees of kill of Great Basin tent caterpillars in the Southwest.

Bacillus thuringiensis as a spray is being tested with varying success against the lodgepole needle miner, the gypsy moth, spruce budworm, and hemlock looper.

Studies have shown that antibiotics which work against insect pathogens and which may hold pathogenic activity below the level required for natural control of insect pests occur in several species of trees.

(c) *Genetic resistance*

Genetic resistance to three diseases and to insect attack continues to be discovered in selected individual trees—for example, longleaf pine and brown spot disease.

Hybrids are being bred and their progeny checked for resistance to forced disease and insect attack. Examples are: hybrids between shortleaf and either slash or loblolly pine; hybrids between Asian white pines and native white pines are less susceptible to blister rust; hybrids between Jeffrey and ponderosa pine are more resistant to certain bark beetle attacks.

(d) *Sterilization*

In studies of the sterile male technique for gypsy moth control egg hatch was reduced to one-third of normal. This is not adequate for practicable control.

Promising results were obtained in studies with chemosterilants to control locust borers.

(e) *Attractants and repellents*

Studies in Colorado show that when female Black Hills beetles are attacking ponderosa pine, they are attractive to other beetles.

Trap cages with virgin female carpenterworms have attracted male moths for at least one-half mile.

The principal insect vector of the Dutch elm disease is not attracted to elm for any appreciable distance.

(f) *Systemics*

Some specific chemicals which may be distributed through the conducting tissues of trees offer many opportunities for basic studies of systemic action and specific toxicity to a wide range of insects. Some of these chemicals though are highly toxic to man and animals and must be handled carefully. Successful application of the technique has protected loblolly pine against Nantucket pine tip moth, honey locusts from the mimosa webworm, and white pines from white pine cone beetle. Antibiotics for blister rust control have been amazingly successful when sprayed directly on the canker. Systemic action of antibiotics has been less successful and results have been extremely erratic.

2. Some results of basic research in biology and ecology forest pests

Methods were recently developed for mass rearing the southern pine beetle in the laboratory to allow biological studies year round.

Populations of European pine shoot within the Lake States was found to be reduced by winter mortality. Cultural control is achieved by pruning lower, snow-covered limbs of pines.

In the Pacific Northwest, larval development of the hemlock looper on understory shrubs is a good indicator of larval development in the hemlock overstory. Cost of checking larval development is thus easier and cheaper.

Failure of slash pine oleoresin to crystallize may be the most important factor responsible for apparent resistance of this pine to damage by the Nantucket pine tip moth.

Spruce budworm damage in the Lake States can be minimized if spruce and fir are grown as understory to nonhost trees.

We have found that *Fomes annosus* spores may wash down through the litter and soil to infect pine roots directly. This indicates that present stump treatment to control this root disease may be ineffective.

Serological techniques, used for the first time to distinguish various strains of *Fomes annosus* from other closely related fungi, offer completely new and better methods for identification of many disease fungi and for obtaining information necessary to develop disease resistant trees by tree improvement.

HISTORICAL BACKGROUND OF FOREST PESTICIDE RELATED RESEARCH

Insect and disease

There is a long history of research on forest insects and tree diseases in the Department of Agriculture, going all the way back to the turn of the century. In the early years of this work, emphasis was on identifying the principal pests of important tree species, on determining their distributions and the damage they caused. As time went on, field studies of the biologies of certain species were made, as an aid to the development of direct control practices.

Prior to World War II, direct control was largely confined to the suppression of bark beetle outbreaks through the removal of infested trees and destruction of beetle populations in them by burning. Materials and methods were not available for the control of widespread outbreaks of destructive defoliating insects, such as the spruce budworm.

Following World War II, DDT became available to the civilian economy, making it feasible for the first time to attempt control of epidemics of forest insect defoliators. Forest insect research concentrated on the development of effective formulations and on techniques of airplane application, on learning the biologies of important defoliators and on developing methods of evaluation of infestations as a basis for determining the need for widespread aerial control programs.

Before January 1, 1954, forest insect and disease research had been assigned in turn to the Bureau of Entomology and Plant Quarantine and to the Bureau of Plant Industry. They were transferred to the Forest Service on that date. Recently, their research has been reoriented toward more basic studies of the biology and ecology of forest insect and disease pests, toward biological control, toward the development of less persistent more specific chemicals, and toward improved silvicultural practices to prevent the buildup of insect and disease pests.

Research in forest tree breeding started in the midtwenties. The first effort was directed at developing methodology and in finding out the trees which could be crossed and the characteristics of trees which were inherited. The first real evidence of inherited pest resistance came about in 1940 in California at the Institute of Forest Genetics. Research was nearly at a standstill during the war years, and it was not until 1950 that effort was again directed at developing trees resistant to some of the most devastating diseases and insects.

Animal damage

Within the broad field of timber management research, the problems of animal and noxious plant control are commonly included as part of silvicultural studies. Concentrated effort was started on the protection of tree seed from birds and rodents in the mid-1950's at Alexandria, La. Working closely with the Fish and Wildlife Service who conducted initial screening tests of countless chemicals, the Forest Service carried the work forward in field trials of the most promising repellants.

Funds for research by the U.S. Forest Service on animal damage problems in the Pacific Northwest were first made available in September 1959. Since then, the groundwork has been laid for a strong cooperative program of research at Olympia. The Fish and Wildlife Service is primarily responsible for the animal phases of this program and the Forest Service responsible for plant phases. A third party, the Department of Natural Resources, State of Washington, is also actively cooperating by providing land for a laboratory, animal enclosures, and an experimental nursery as well as labor for improvement and maintenance of these facilities.

Fate of chemicals on watersheds

The Forest Service has had to date no in-house research on the fate of chemicals applied to forest watersheds. Cooperative studies with the Public Health Service of North Carolina and with the Ohio State University and others in Ohio have been done in the last few years. The fiscal year 1965 budget amendment would allow a small but important beginning of basic studies in this area.

COORDINATION OF FOREST SERVICE RESEARCH WITH RESEARCH OF OTHER AGENCIES

How is Forest Service Research coordinated within the Department of Agriculture and with research agencies outside the Department to assure proper program emphasis and to avoid duplication of effort?

Coordination of pesticide-related research in the Forest Service is a continuous, intensive, and comprehensive program. It starts with the individual scientist. Each scientist is required to review in writing all research pertinent to each new study before it is started. He is expected to attend scientific meetings in his research area, to correspond personally with his counterparts in other research groups, to participate in graduate and postdoctoral seminars, and to be a part of annual work conferences held in each region of the country. These work conferences allow scientists from universities, private and Government research agencies to review progress of research of each man, to review and critique plans for new research, and to share new knowledge in advance of formal publication.

Coordination continues and is strengthened at each regional Forest Experiment Station by the Director and his staff who make sure that communication channels are open and are used by the scientists, that special program reviews are held and regional advisory committees are called together when necessary. Furthermore, the Director and his staff are responsible, through the formal process of

problem selection and assignment, for research priorities and program balance relative to the urgency of the problem, funds available, and other research underway.

Forest Service research is headquartered for the most part on or near universities' campuses. Nearly every project has some direct cooperative counterpart in a university through cooperative studies, cooperative aid grants, or the sharing of special equipment and facilities. The Forest Service is represented on a number of agricultural experiment station regional project committees; for example, the north-central regional committee dealing with the oak wilt disease. Interdepartmental programs such as that on wildlife habitat research bring coordination to scientific programs. Biologists of the Bureau of Sport Fisheries and Wildlife of the Department of the Interior are located at a number of Forest Service Experiment Stations. At Olympia, Wash., coordinated work on animal damage to forest tree reproduction involves study of the animals' biology by the Department of the Interior scientists concurrently with study of the damage and its control by scientists of the Forest Service. Similarly, biologists of the Bureau of Sport Fisheries and Wildlife are headquartered at the University of California in order to jointly study insecticide problems with Forest Service scientists in Berkeley.

Formal research review within the Department of Agriculture completes planned coordination measures. Broad program plans by major fields of work are reviewed with the Department's Agricultural Research Council which is made up of the administrators of major research units and associated groups. Projects are screened and cataloged through a central projects office. This involves review and formal approval, before work starts, by all groups within the Department who may have an interest in the subject matter of the research. All approved projects go through the same screening process at intervals of 5 years, or oftener when any significant change in the scope of the research is proposed. A file of project descriptions at the central projects office is open to scientists and administrators in the Department and to the general public as well. In addition, abstracts are available at all experiment station headquarters. Anyone can learn what research is being done by the Department, project by project.

Advisory committees and technical committees have as a principal function the review of research underway and plans for the period ahead. The National Forestry Research Advisory Committee performs this function for the Secretary of Agriculture by reviewing the Department's forestry-related research. The forest experiment stations have a similar screening of program by groups at the local level. Examples are the tree improvement committees in each of the five regions where genetics research is developing pest resistant planting stock.

A number of groups organized outside of the Government structure have an important place in program coordination. Through membership in such groups and participation in their meetings, Forest Service personnel keep abreast of the research done by others and also disseminate information about their own work. The Lower Michigan Forest Research Council is an example of such a group; the pest action council and forest research committee of the Western Forestry and Conservation Association are others. Each region has organizations of this type.

FOREST SERVICE
Research program related to pesticides

Location	Forest insect research				Forest disease research				Timber mgmt. research				Watershed mgmt. research				Total				
	Amount (thousands)		Manning		Amount (thousands)		Manning		Amount (thousands)		Manning		Amount (thousands)		Manning		Amount (thousands)		Manning		
	1965	Amend.	1965	Amend.	1965	Amend.	1965	Amend.	1965	Amend.	1965	Amend.	1965	Amend.	1965	Amend.	1965	Amend.	1965	Amend.	
Berkeley, Calif.	\$184	\$245	27	12	\$60	12	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
New Haven, Conn.	198	150	21	10	100	12	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Corvallis, Oreg.	179	125	12	9	90	12	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Delaware, Oreg.	242	150	30	10	130	12	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Research Triangle, N.C.	65	150	9	10	120	12	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Gulfport, Miss.	147	80	15	5	120	18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mesa, Idaho	123	---	15	---	100	40	2	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Juneau, Alaska	72	---	9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Portland, Oreg.	97	---	15	---	16	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Logan, Utah	30	---	3	---	25	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Fort Collins, Colo.	65	---	12	---	35	6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Albuquerque, N. Mex.	65	---	9	---	22	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
East Lansing, Mich.	46	---	6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
St. Paul, Minn.	98	---	12	---	70	6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Otustee, Fla.	42	---	6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Athens, Ga.	203	---	24	---	160	24	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Alexandria, La.	177	---	18	---	41	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Stoneville, Miss.	36	---	6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Beltsville, Md.	174	---	27	---	22	3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Morgantown, W. Va.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Olympia, Wash.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Roseburg, Oreg.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Rhinelander, Wis.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Marquette, Mich.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Various locations ¹	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Total in-house Grants.	2,243	900	276	56	1,111	100	144	5	696	250	90	14	100	5	4,050	1,350	510	80	---	---	---
	---	350	---	---	50	---	---	---	100	---	---	---	---	---	500	---	---	---	---	---	---
Grand total	2,243	1,250	276	56	1,111	150	144	5	696	350	90	14	100	5	4,050	1,850	510	80	---	---	---

¹ Silvicultural research is to develop improved timber production practices, but a second purpose is to work out regional adaptation aimed at reducing damage from insects, diseases, and animals. This related pesticide research is done at many locations where a small part of the effort can be allocated toward solving the pesticide problem.

CONTROL OF SPRUCE BUDWORM

Mr. WHITTEN. I understand that the Department of the Interior has suspended the use of DDT for spruce budworm control. What effect is this having on control of this pest and what is the Forest Service doing in this regard?

Dr. JEMISON. I believe the Department of the Interior has issued an order suspending the use of DDT and other of the persistent chlorinated hydrocarbons for use in controlling spruce budworm and other forest insects on lands under its jurisdiction.

This action means in effect that protection of forests, under the jurisdiction of the Department of the Interior that are infested with defoliating forest insects, is suspended until effective and suitable nonpersistent pesticides can be developed to use in place of DDT. This is so because there presently are no effective cultural or biological controls for checking epidemics of spruce budworm and most other tree defoliators, and DDT is the only pesticide that has been adequately tested and proved wholly effective against such insects. Development of suitable nonpersistent chemicals to use in place of DDT may require several years.

During the period protection is suspended, insect populations will intensify and spread. This will result in greater tree mortality, an enlargement of the area infested, and it will accelerate the reinfestation of lands that have been protected.

Suspension of the use of DDT by the Department of the Interior is bringing up at least some temporary problems where public and privately owned lands are intermingled. For example, a planned spruce budworm control project in the Garnet Range of Montana, in which but 28 percent of the total area needing control treatment is administered by BLM, with the remainder in private and State ownership, had to be canceled in 1964 because private cooperators were unwilling to contribute to a budworm control with substitute chemicals at triple the cost of DDT and doubts as to their effectiveness.

The Forest Service, in keeping with the recommendations of the President's Science Advisory Committee, is striving to reduce its use of persistent pesticides for controlling spruce budworm. We have not only modified control practices by reducing dosage rates, leaving buffer strips unsprayed along major water courses, meadows, farmlands, and the like, but also we began in 1963 a major campaign in field testing the effectiveness of nonpersistent insecticides against defoliating insects. In this regard, several promising organophosphates were tested in Montana, Idaho, and New Mexico. In addition, a microbial insecticide was tested in Maine. Early in 1964, a new pesticidal screening laboratory was established at Berkley, Calif., with primary emphasis on screening and testing promising substitute materials for controlling the budworm. Acceleration of this program is provided for in the budget amendment we are proposing.

ECONOMIC RESEARCH SERVICE

Mr. WHITTEN. Now we turn to the Economic Research Service.

Mr. HEISIG. I am Carl Heisig of the Economic Research Service. The work we propose doing, is concerned primarily with such problems as: what are the economic consequences to farmers, and eventually, of course, to consumers, if new and different types of pesticides and control methods come into use, if particular kinds of chemicals are declared unusable? What would this mean to farmers in terms of their costs of production and the effect on the output of agricultural commodities, this, in turn, on the price that would be received in the market and the consequences to consumers of higher costs of controlling losses from pests?

We have not done this type of research. What would be required here, as we see it, would be, first, to get a knowledge of the current use by farmers of different types of pesticides; the type of crops and livestock on which they are applied, and in what quantities; the extent of the coverage; how many farmers use them and how many do not; the rates of application; the various kinds of practices that are associated with the use of pesticides and their costs; and also the crop yields obtained from different types of chemicals and methods of controls.

Now, in order to do this, we would have to get the information directly from farmers. It is not available anywhere else. We visualize the need to make an enumerative survey of a minimum of 15,000 or so farmers, once every 2 years, so we could keep abreast of changes that are going on, in use of pesticides. We would then have a basis for the analysis that I have mentioned.

In addition, we would visualize the need for some much more detailed studies of the costs and returns from alternative methods of pest control; working with the scientists developing new pesticides, new methods of application, and new methods of control. These, data would provide the additional basic information from which we could make analyses on a broad basis of the probable effects of use of alternative methods of control upon costs to farmers; the income effects

on farmers; the effects on quality, and the total supply of particular agricultural commodities; and how this might affect farm incomes and the costs of food to consumers.

This in brief is what we propose.

Mr. WHITTEN. How many people do you have engaged in that type of activity, now?

Mr. HEISIG. We do not show anything for 1964 and 1965 in the material that you have. We occasionally do a small amount of work such as that shown in this publication I have here called, "Extent and Cost of Using Chemicals in Cotton Production" which happened to be done in fiscal year 1963.

This illustrates the kind of information in part we would hope to get for the entire country and for a large number of commodities in the enumerative survey that I mentioned. For instance, it shows that in the brown loam area of Mississippi, farmers spend about \$7.80 per acre to treat cotton for insect control; in Presidio County, Tex., it costs almost \$40 per acre. This is the kind of information that we need. We do this only occasionally with the funds we have now. We used none in 1964 and 1965. It is a very minor piece of work, now.

NATIONAL AGRICULTURAL LIBRARY

Mr. WHITTEN. We will now consider the National Agricultural Library and its request. Mr. Mohrhardt, will you proceed.

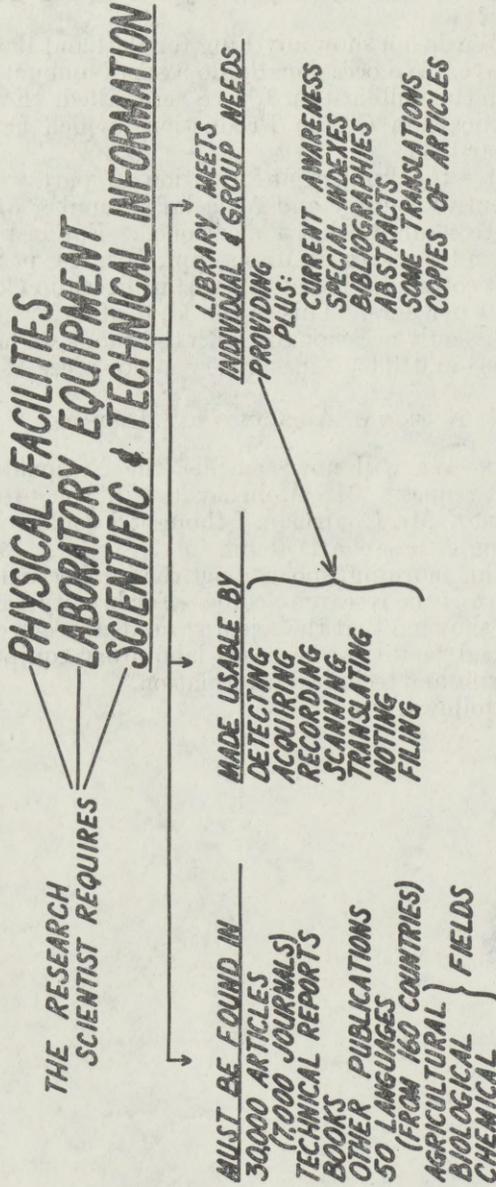
Mr. MOHRHARDT. Mr. Chairman, I thought I could cover this move rapidly if I brought these charts along.

Dr. Byerly, this morning, spoke about the intellectual interests and needs on the part of the research people. For brevity I have prepared a chart (No. 1) showing that the scientist needs three broad resources: He needs physical facilities; he needs laboratory equipment; and he also needs scientific and technical information.

(Chart No. 1 follows:)

CHART 1

LIBRARY/DOCUMENTATION SERVICES for PESTICIDES RESEARCH



PESTICIDES INVESTIGATIONS BASED ON MULTIDISCIPLINARY RESEARCH REQUIRING RAPID ACCESS TO ENTIRE RANGE OF AGRICULTURAL, BIOLOGICAL, CHEMICAL LITERATURE.

In this particular area of pesticides we estimate that there are about 30,000 articles per year coming out in 7,000 journals, bulletins, books, and other publications in about 50 languages from an estimated 160 countries. This is the potential. They cover the general agricultural, biological, and chemical fields. If the scientist is to keep abreast of these publications himself he has to first identify the publication, he has to acquire it, record it, scan it, translate it if possible, then make notes and file it.

The service the library proposes is to do all the locating, screening, acquiring, filing, and indexing plus providing a current awareness and the provision of a bibliography or index that keeps him up to date, plus abstracts, some translations, and copies of articles. So the library, by furnishing a lead to this scientific and technical information, takes a tremendous burden off the scientist and permits him to spend more time in the actual research work.

Mr. WHITTEN. You do not think we ought to provide funds so you could send pamphlets to laboratories which will not be built for two and a half years, do you?

Mr. MOHRHARDT. They would want them as a backstop when the work begins.

Mr. WHITTEN. They probably would be obsolete in two and a half years.

Mr. MOHRHARDT. Actually, there are scientists doing work in this field today who need this help that they are not now getting.

Mr. WHITTEN. You mean in greater volume? You are providing this information now, are you not?

Mr. MOHRHARDT. No, sir. May I supplement this with further charts.

As an example chart 2 shows what is not available. We made a check of chemicals and chemical compounds vital in this field of research. Here is a list of the chemicals and chemical compounds, the ones we could not locate in the chemical and biological indexes. Since they are not found in the indexes or the journals, this means the scientist will have to do this research himself, which is burdensome and expensive, unless we do it for him.

Mr. WHITTEN. If you do it for him, what will you do? Will you go back to the basic papers?

Mr. MOHRHARDT. We will have two—actually more than two—sources of information. We will have the journals we at present have in the library but which are not indexed in depth. We are listing them in the bibliography but are not indexing them in depth.

There are also many journals—we estimate 700 or 800—that we do not have that cover this field of pesticides.

Mr. WHITTEN. Because of the residue problem primarily and because of the public interest in books and news releases, and so on, everybody is turning to these new and different types of control.

HISTORY OF RESEARCH ON PEST CONTROL

Dr. Shaw, how long have you been in this area of research involving beneficial insects, biological controls, the sterilization approach, and so on? How long have you been working with those various types and kinds?

Dr. SHAW. With the predators we have been in it 50 years or more.

Mr. WHITTEN. So this is not new so far as your attention is concerned, but rather is an enlargement of your efforts?

Dr. SHAW. In the area of predators and diseases and things of that

kind it is, but in the case of sterilization and attractants I would say this has been in the last 6 or 7 years.

Mr. WHITTEN. But did you not first start dealing with it in about 1946?

Dr. SHAW. It has been dealt with but no substantial progress in it has been made until the last 5 or 6 years.

Mr. HORAN. Mr. Chairman, will you yield?

Of course we had the attractants that were developed in the twenties or earlier—not as a control measure but as a way of determining when the brood was coming on and when you could most effectively apply your sprays.

Dr. SHAW. We did the same thing in the development of the gypsy moth attractants from gypsy moths but more recently we have learned how to synthesize it.

Mr. WHITTEN. You do have records of all the work of the Department itself?

Mr. MOHRHARDT. Yes.

Mr. WHITTEN. And you have that indexed, to use your words, in depth, do you not?

Mr. MOHRHARDT. Not in as great depth as we should. For example, we have limited ourselves to three index items per article because of the limitation of staff. We should be doing as much as six or eight index items per article. If there are more than three insects we do not list them all, we just say "insects." This is a handicap to the scientist.

Mr. WHITTEN. You might proceed.

Mr. MOHRHARDT. This is another example of what we would try to do. This chart (No. 3) shows that in the phosphorous compounds there were 104 listed in 1963. We checked in the bibliography of agriculture and find only 34 there. This shows a serious deficiency.

In building up this service we would use all the resources in the other libraries in Washington including the National Library of Medicine, the Library of Congress, and so on before we would decide to acquire new materials.

We propose to make a pesticide index—shown in charts 4A and 4B—that would come out twice a month and list all the articles from any part of the world that might be of interest to the scientists. I have photocopies of this I could leave with the committee.

Mr. WHITTEN. We will be glad to have it.

Mr. MOHRHARDT. I think this indicates very specifically what we would be doing that we are not doing now in the pesticide area.

Mr. WHITTEN. I am sure this committee has as much interest in this pesticide matter as anybody. But you are pointing out a weakness in the Department of Agriculture in your particular area because of your inability to index over three where you would like to have six. Is that right?

Mr. MOHRHARDT. Yes. I am trying not to do it too obviously.

Mr. WHITTEN. I do not think you were so obvious, I might say.

Mr. MOHRHARDT. Then in addition to the standard index service that would be provided to them on a continuing basis there is need for specialized bibliographies. When a man starts a research project he wants to know first of all what research if any has been conducted in the field. So in addition to the index we would support each project on a continuing basis with a special research bibliography. This chart (No. 5) shows the first bibliographies that we would do.

(Chart No. 5 follows:)

CHART 5

PRIORITY SPECIAL BIBLIOGRAPHIES

TYPICAL BIBLIOGRAPHIES IN THE FIELD OF BIOLOGICAL CONTROL OF INSECTS

1. *Insect control by disease dispersal. (INCLUDES BACTERIA, ENTOMOGENOUS FUNGI, ETC.)*
2. *Control of insects by sterilization. (GAMMA RAYS, X-RAYS, CHEMOSTERILITANTS)*
3. *Predator control of insects. (PARASITES, BIRDS, SPIDERS, ETC.)*
4. *Cultural control methods. (VIGOROUS PLANTS, CROP ROTATIONS, CLEAN CULTURE, EARLY MATURING VARIETIES, TILLAGE, SANITATION)*
5. *Control of insects by breeding insect-resistant crops, i.e., genetic and varietal resistance. (IDEAL SOLUTION)*
6. *Baits, traps attractants for insect control.*

Mr. WHITTEN. You have six points on that chart. I would like for you to supply for the committee the list of articles that you presently have in connection with that, within reason, and how far back the text may go, and the highlights.

Mr. MOHRHARDT. I will be delighted to send it over.

As soon as we issue the index or the bibliographies they are immediately available not only to the scientists in Washington, but to any scientist in the country, in all the land grant research programs or wherever they might be.

Mr. WHITTEN. Thank you.

Mr. WHITTEN. Mr. Natcher.

INCREASES PROVIDED IN HOUSE VERSION OF REGULAR BILL

Mr. NATCHER. As you gentlemen from the Department know, in the past several years the chairman of our subcommittee, Mr. Whitten, has continually expressed his support and stressed the importance of additional research for insecticides and pesticides.

The budget submitted for fiscal year 1965 did not, of course, carry the necessary recommendations, according to the way we felt on this committee, concerning this matter. We increased the amount in the bill and, Mr. Murphy, you are well acquainted with the report that accompanied our bill, which contains a very detailed recommendation concerning this part of the work. This appears on pages 32 and 33 of the report.

Under this amendment, as submitted, there would be \$29 million of new funds; is that correct?

Dr. BRADY. That is correct.

Mr. NATCHER. You are making no provision for transfer from section 32 for any of this money?

Dr. BRADY. No.

Mr. MURPHY. It would be none of this money.

Mr. NATCHER. This would be new funds.

What consideration, if any, did you give to the recommendations that we made when we reported the bill and passed it in the House concerning this type of research?

Dr. BRADY. We were very pleased that the House had taken upon themselves, so to speak, to add additional funds for this kind of research. You put a special section in your report dealing with it, in effect, encouraging the Department to move in the direction we are now moving. We did make plans, as indicated earlier, for the quarter of a million for the coordination of our program with the other two agencies. And preliminary plans, of course, for the use of the funds allocated for the control of insects and pesticide work.

Because of the fact the Senate had not acted on your recommendations in the House bill, we have been unable to plan in detail how these funds would be used.

Mr. NATCHER. Dr. Brady, assuming the committee would go along in part or in whole with the request that is now pending before the committee what, if any, change would we have in the bill as passed by the House and that portion which is provided for on page 33 of the report? Do you have the report before you, Dr. Brady?

Dr. BRADY. Yes, I do have.

Mr. NATCHER. What change are you making, if any?

Dr. BRADY. The Department responded officially to the Senate on the use of these various funds, and I think it would be best if Mr. Grant would comment on specific items that the Department commented favorably on.

Mr. GRANT. Mr. Natcher, insofar as the items listed on page 33 are concerned, the Department, in its letter to the Senate, asked that the first item of \$1.5 million for research on health-related problems of tobacco be retained in the bill as passed by the House; and that the \$1.5 million for research on insects and pests also be retained. We requested that the amounts for staffing of new laboratories be increased to \$1.5 million as proposed in the budget, rather than \$1.2 million as passed by the House. The budget estimate was for an increase under the research appropriation; the Department's recommendation to the Senate was to leave it under section 32, as in the House bill.

With regard to the next two items—\$9,400,000 for research in reductions in cost of production, and \$9,400,000 for research on expanded use of agricultural commodities—the Department recommended that they be deleted on the basis they were not in the budget.

In connection with the next item for strengthening research in foot-and-mouth disease at Plum Island, N.Y., we requested that the amount be increased to \$500,000 as requested in the budget.

The Department also recommended that the item related to facilities at Beltsville be increased to \$1,394,300; that the amount for replacement of the facilities at Fort Collins be increased to \$1 million, the amount of the budget; and that the amount included by the House, \$450,000, for the peanut research facility in Georgia be retained as included in the House bill.

Mr. NATCHER. Mr. Grant, the part that confuses me is the fact that you would ask the Bureau of the Budget to delete \$18,800,000 and now come back before the committee and ask for \$29 million of new funds. I just don't understand it. Is it because the Department failed to make the necessary recommendations and since, under the leadership of our chairman, Mr. Whitten, who has worked diligently to see that this research increased and that the necessary funds be appropriated, initiated the program instead of the Department?

Mr. MURPHY. The \$18,800,000 is what is referred to?

Mr. NATCHER. The items Mr. Grant just testified about.

Mr. MURPHY. Now, those items were for different purposes than the \$29 million we are now talking about, sir.

Mr. NATCHER. Mr. Murphy, why was the \$18,800,000 reduction request made of the Bureau of the Budget? Would you like to add to Mr. Grant's statements, Mr. Murphy?

Mr. MURPHY. Yes; I would like to comment a little further on what you just inquired about.

It is true, I think, that research on pesticides will have some collateral effects on reductions in the cost of production and perhaps also on the use of agricultural commodities, but certainly the central purpose and focus of the research will be different. While I am no scientist, I think the difference is sufficiently great so that you would say that this was for a different purpose than the \$29 million that is now requested.

REPORT OF PRESIDENT'S SCIENCE ADVISORY COMMITTEE

Mr. NATCHER. According to the document presented to the committee, there is a statement from the Director of the Bureau of the Budget to the effect that the Secretary of Agriculture, with the President's Science Advisory Committee, has made certain reports concerning pesticides. Can you give the committee any idea as to what the President's Advisory Committee has to say about this particular matter?

Dr. BRADY. Would you like me to comment on this?

Mr. NATCHER. We would be glad to hear from you.

Dr. BRADY. The President's Committee made a report on this whole matter of pesticides in our total environment. They made certain specific recommendations to various agencies of the Government, including the Department of Agriculture, and many of the things that we are doing, that you have encouraged us to do, are not in response to, but in accord with this present Science Advisory Committee report. I say not in response to, because we were already moving in this direction.

I might say that we recognize that the program that we have presented to you is one whose value will be dependent on its continuity and this is one of the reasons this was injected as part of the regular budget, rather than as coming from section 32.

REDUCTION PROPOSED IN ARS FUNDS YET ADDITIONAL FUNDS REQUESTED

Mr. NATCHER. Dr. Brady, at the time Mr. Whitten presented this bill to the House, that part of the bill concerning the \$1,500,000 set forth on page 33 of our report, for additional research, and for the development and testing of insecticides and materials used in agricultural production, was well received by the Members of the House. They felt that our chairman was correct and that the subcommittee was correct, and that the full Committee on Appropriations was correct, in making this recommendation.

As I have said to you, I have served on this committee for 10 years, and I know that our chairman for a period of 5 years or longer has continued to stress the importance of more research in this field.

Now, since our subcommittee took the action that it did, and between that time and the time of this amendment, what consideration have you given, from the standpoint of the different parts of the program, as set forth in the amendment?

It states that it emphasizes research to seek new and nontoxic ways of controlling insects. This proposal for the money would provide a foundation for a long-range program covering the whole field of contaminants associated with production, processing, and marketing of agricultural products. And then this further shows that the proposal would include funds for planning and construction of critically needed research facilities.

When was this study made? Was it after the House passed our bill?

Dr. BRADY. I think the facts will show that the various agencies that are before you today have been cognizant of the need for a greatly expanded research effort. I think the facts will show they have presented cases in previous years for expansions of the same

order of magnitude. I would imagine that some of the impetus for action, at this time, came about as a result of news releases and other facts brought to light in relation to the fish kill in the Mississippi.

Mr. NATCHER. In addition to fish, we know about cranberries, and other matters that have taken place during the past 5 or 6 years. That is the reason for taking the action that we did.

Now, I am confused about \$29 million of new funds, at this time. Why not go along and proceed in an orderly fashion. As our chairman has pointed out, you do not have the necessary authority, at this time, for personnel. What study have you given as to the location of these new facilities that you talk about, Dr. Brady? Has this been in the last 3 or 4 days, or the last 2 or 3 weeks?

Dr. BRADY. No, sir. Here, again, I think the facts will show that the agencies concerned have been considering these facilities, and, in earlier recommendations, at least to the Department, and to the Bureau of the Budget, have requested funds to do essentially the things that are requested in this \$29 million program.

I think we are, so to speak, with our backs against the wall. I think the chairman and other members of this committee have called our attention to this, because of our relationships with, not only the other agencies in Government, but with the public as a whole, with respect to pesticides.

Mr. WHITTEN. If you haven't been guilty of any failures—and I haven't seen any place that you have—if you have the perfect answer to everything, what good would it do you, if you can't get the the other agencies and departments to cooperate with you?

I appreciate my colleague bringing this matter up. This committee comes in and provides \$18.8 million, and we provide for extra emphasis in research on insecticides, pesticides, and so forth. Then the Department goes to the other body and asks to have it cut out. Now, you have the nerve to come back here and ask us to go along with it, where you provide for 50 States and 6 agencies, and provide for 8 new laboratories. Now, does that not leave you in pretty bad shape with this committee?

Mr. MURPHY. Mr. Chairman, I will say again, the \$29 million requested here is for a different type of research.

Mr. WHITTEN. Mr. Secretary, I have known in my years here where the Department asked the Congress to change the use of money without asking them to eliminate the money. In fact, that has happened every year since I have been chairman of this subcommittee. So it would not have been unusual for you to have asked the other body to let you shift the emphasis, or to shift the use. But to ask them to eliminate it, while at the same time you are going before the Bureau of the Budget and asking for this \$29 million, that is something else.

Mr. NATCHER. What about that, Mr. Murphy?

Mr. MURPHY. Well, I don't have in mind in detail the specific sequence of events, here, but my recollection is that the budget estimate for increased pesticides research has been in the process of development for a good many months—I think I might say for years—and I don't remember just when this report was filed, but my recollection is that this request for increased appropriations for the pesticides research was actually transmitted to the Bureau of the Budget before the report of this committee on the current appropriation bill, and the request

was pending there, and has been under consideration in the Bureau of the Budget since that time.

Mr. NATCHER. Dr. Shaw, you have been around probably as long as any other member of the Department who is before the committee, at this time.

I would like to know when the last request was made by the Department—if you know—to delete funds that were placed in a bill by this committee. Can you give us some idea as to that? I have been on this committee 10 years and if my memory serves me correctly, Dr. Shaw, that has never taken place since I have been a member of the committee.

Dr. SHAW. You are probably right, as far as my recommendations to the Department are concerned, but I am not sure on the other point, whether the Department recommended some deletions or not.

Mr. NATCHER. Mr. Murphy, coming back to you, again, I am still confused in my mind as to why this action took place, when the committee has tried to handle this problem as it should be handled and proceeded in the right direction.

What position does it put us in when we go back to the House, now, and make certain recommendations concerning the amendments that are now before the committee?

Mr. MURPHY. Mr. Natcher, it is always a very painful process to ask anyone not to give you money that they are willing to give you. I have difficulty with that concept whenever the problem arises. However, the President does have a very difficult problem in planning the Federal budget. There are certain customs and ground rules that are laid down in the executive branch of the Government, and we follow them.

One of the problems that we have when the House passes an appropriation bill is the action that we recommend or request from the Senate on the changes that are made in the budget by the House of Representatives. In the process of preparing these recommendations each year, I think each year we have requested some money be deleted by the Senate that was put in by the House of Representatives. All I can say is, this is an established part of the budget process, and this is the process that we follow.

Mr. Chairman, I think I may have some dates here before me that are pertinent to this subject.

The request for this pesticides research was transmitted to the Bureau of the Budget on May 4, 1964. The report of your committee was on May 8, 1964.

Mr. WHITTEN. The minute you found you already had the money, it would appear you would communicate with the Bureau of the Budget and say, "Forget about \$18.8 million of it; we already have that through the House." Did anybody think of that in the Department?

Mr. MURPHY. Not in connection with this pesticides research, Mr. Chairman. At least, as far as I am aware. At least, I didn't think of it. I can't say what other people in the Department might have thought of it. I can't say what other people in the Department think, but I think, about this \$18 million, in terms of cost of production research, and in terms of the utilization research, not in terms of insecticide research.

Mr. WHITTEN. Isn't there an item in there for pesticides research?

Dr. SHAW. No, Mr. Chairman.

Mr. NATCHER. Mr. Chairman, that is all I have.

Mr. WHITTEN. Mr. Addabbo.

SHIFTS IN RESEARCH PROGRAM AND PERSONNEL

Mr. ADDABBO. In Document 85 you emphasize research in new and nontoxic ways of controlling insects. Can we presume, at this time, in the research that has been going on, that the research relative to certain insects and pests, has been conducted with the use of pesticides and insecticides?

Dr. BRADY. A great deal of it has, yes. They have been very valuable tools.

Mr. ADDABBO. Because of this report and attendant emergency, wouldn't it be possible to take personnel away from testing with pesticides and turn them over to this new research, without the use of pesticides?

Dr. BRADY. We have already made shifts of this nature in each of the agencies that are here, and we think at as rapid a rate as it is possible, to make these shifts. But this program would enable us to initiate a greatly stepped up program in this area.

I would like to point out that we have emphasized and that this committee has emphasized the importance of controlling the pests. Up to now, the best means we have is through the use of pesticides. Your wife and my wife have had cockroaches in the kitchen. We don't like to have mosquitoes bother us when we go out in the backyard. Right now our cheapest and only effective way of controlling these pests has been through the use of these insecticides.

We feel, also, that pests are developing resistance to some of these insecticides, and we must maintain control, as a holding proposition, until we can shift over to biological means of controlling pests.

Dr. SHAW. On the chemicals themselves, one of our problems, as Mr. Whitten referred to a while ago, is that while there has been no evidence that the pesticides properly used cause health troubles, we have had knowledge that there are residues in very minute amounts of those chemicals on our foods and other products. We can't show that they won't sometime cause somebody some trouble, but we can develop alternate chemicals as well as biological controls that will not leave any residues. In other words, chemicals that will decay in a short period of time, rather than lasting for several years, as do some of the chemicals we now have.

JUSTIFICATION FOR NEW FACILITIES

Mr. ADDABBO. In view of all this, and the fact that we have an emergency, how can we justify building new facilities, which will not be ready for two and a half years? Couldn't we use this money better right now, by going into the various colleges and having them conduct these research programs, immediately, rather than wait two and a half years to build new facilities?

Dr. BRADY. Only a large laboratory would take this long. In terms of the buildings to be constructed at experiment stations, we would expect that these facilities, many of them, would be in operation

within a year. The smaller laboratories that have been requested for construction through the Department of Agriculture, probably 18 months. So you are really not dealing with two and a half years.

I think the intent here, however, was to make long-range plans, not to simply come in with something that was a crash program that might not be properly carried out.

This kind of research is expensive. It takes a long time. We want to control the pests, to protect the life of man and wildlife, and associated animals, at the same time. But this is going to take us a long time. It is not going to be done in 1 or 2 years, and that is the reason we are trying to plan with a broad enough base over a period of 5 and 10 years. We can begin to move more toward the biological and really safer means of controlling these pests.

Mr. ADDABBO. According to this the cost will be over \$10 million, just for facilities, and \$5 million each year thereafter, just for the staffing and work in these laboratories.

Dr. BRADY. Yes.

Dr. SHAW. While we have an emergency now, and considerable need for stepping this up, it is going to get worse before it gets better. This problem is not going to be solved this year or next year. It is a number of years away in its solution. I am sure it will be worse next year than it is this year, in terms of our problems.

Dr. BRADY. We already have evidence from various places, reports coming in, indicating we are going to have more of the same kind of difficulties we have already had reported.

Mr. ADDABBO. Then would it not have been much cheaper to utilize facilities in colleges presently conducting these programs and giving them additional grants, if that be the case, rather than going into new facilities, creating personnel problems, et cetera?

Dr. BRADY. I think the facts will show a fairly high proportion of the operating budget will be going to land grant universities and other institutions, through contracts. I don't recall the exact proportion, but if my memory serves me correctly, it will be at least 50 percent of the operational funds, which will be used for participation by other than in-house agencies of the department during the early stages.

We feel that our plan makes it possible for us to use the manpower resources throughout the country that are capable of carrying on this kind of research. It makes use of every agency that can contribute to it. By this I mean each agency that in some way, over a period of time, can help to get us out of this difficulty.

Dr. BYERLY. May I supplement Dr. Brady's comment?

There are \$5,555,000 going directly to the colleges and experiment stations. Dr. Shaw tells me that about 40 percent of the operating funds of ARS will also go by contract to this group. I assume some of this may also, in the Forest Service, go out to institutions, but I am not sure of that. I am told it is \$500,000. This means roughly a total of \$11 million of the operating research funds which we have will go to these places.

May I emphasize what Dr. Brady has said with regard to the \$3.242 million for formula distribution under Public Law 88-74, to provide such things as greenhouses, insectories, other small structures, to augment their present facilities for doing it. The manpower is there. We know that the capacity for doing this work is there, from

the application for new proposals that we have had from these places. But if it saturates their facilities, they do need some new facilities. So I think from the standpoint of concentration in long-term larger facilities, that both are needed.

Mr. ADDABBO. Your new facilities, I believe, in one or two instances, were at different locations than where the work is presently being performed, is that correct?

Dr. SHAW. At College Station, Tex., where we are going to expand the basic work, we will continue the work we have going at the one location at Kerrville for the applied research. At the laboratory in Gainesville, Fla., we have not had anywhere a concentration in this field. We have had some work at a number of locations, but we wanted to really go to town on this one and have a new laboratory.

COORDINATION OF PROPOSED RESEARCH

Mr. ADDABBO. In preparing the statement in conjunction with this document, it seems to me you have possible duplications.

On page 9, under "Marketing," paragraph (c), you have \$200,000 for research on nonpesticidal methods and work on feed and fiber after harvest.

On page 11, under "Marketing research," you have \$350,000 increase for research on biology, et cetera, nutrition of stores.

On page 13, an increase of \$550,000 for research developing pesticides, and residue in harvested commodities.

Under "Consumer research," you have \$600,000 for research on effective pesticides in the current food supply. They all seem to be closely connected items.

Dr. SHAW. We had four main heads for the research. On biological controls, the marketing group on the stored products, is in on that one, as well as the people on the production side of research. We have another one on basic research of studying the nature of the insects, their physiology and so on. The group in the marketing field, participate in it, along with the production research group.

Then on the less persistent pesticides, both groups on the stored-products insects and farm insects were in on it.

On the nutrition item that you mentioned, they would not be involved in that one. This is for study of the effect of the pesticides on the cooking and eating quality, and on the nutritive content of the foods.

Mr. ADDABBO. Is all this work coordinated?

Dr. SHAW. Yes, sir, all these activities you are mentioning are in the Agricultural Research Service.

INCREASE FOR PESTICIDE REGISTRATION ACTIVITIES

Mr. ADDABBO. Under the original appropriation of \$1.5 million given for insecticides and pesticides, you were given additional money, and now you are seeking \$180,000 for coordination between your Department and HEW and Interior.

Dr. SHAW. The \$180,000 that is requested here is part of the Agricultural Research Service, where we have the work on the registration of pesticides. It is for work in cooperation with the other two Departments. Under the agreement we have reached on coordination, we

have to send them, on a weekly basis, all of the new things that are being registered, for comment from the Fish and Wildlife Service, the Food and Drug Administration, and the Public Health Service, on any questions they may have on these. When they raise questions, we have got to respond by giving them all of the material furnished by the registrant, and this is going to involve a whale of a lot of work on this exchange of information and coordination problem—this is a day-to-day operating problem we are going to have, and we have asked for the \$180,000.

My understanding of the \$250,000, is that it was to be used by the Secretary's Office in dealing with the Secretary's Offices of the other two Departments, on this overall problem.

Mr. ADDABBO. Do you have two funds, the Secretary of one Department dealing with the Secretary of the other Department, and the one Department dealing with the other Department?

Dr. SHAW. This \$180,000 that you speak of is an operating program in our Pesticides Regulation Division with the Food and Drug Administration. We are to furnish them everything on registration; they are to furnish us everything on setting tolerances. The listings are on a weekly basis.

Mr. ADDABBO. For what purposes does the Secretary use this \$250,000 allotted to his office?

Dr. BRADY. In one case you are dealing with an operational, day-by-day, handling of routine requests that come in, to be sure that each of the other departments is informed on what is going on.

As we have interpreted it, in talking to our chairman, the \$250,000 is to assure not just operations, but across-the-board coordination, at the Secretary's level, at the heads of agencies level, and out in the field. I believe the statement is in here, that we plan to make studies and to come back to Congress with any modifications in our current regulations or even laws, which may be necessary in dealing with this. So this has an identifiable, specific purpose, whereas the \$180,000 is operational, day-by-day, funds to be used in keeping our registration group and Food and Drug Administration and Public Health Service completely informed on the activities of the others.

COST OF RESEARCH, DEPARTMENTWIDE

Mr. ADDABBO. Could you give me a figure of the total passed by the House being spent for all research?

Dr. BRADY. Pesticides?

Mr. ADDABBO. No, for all research by the Agricultural Department.

Mr. GRANT. You want the amount for items in this bill? The budget included \$196,915,000 for all research in the Department. Of that, \$29,944,000 was for the Forest Service. The amount for items in this bill was \$166,971,000. This is for research by agencies of the Department and for payments to the State experiment stations.

The House added to that about \$7.6 million. This estimate, if you build it on top of the House action, would provide another \$23 million for research, exclusive of the Forest Service.

Mr. ADDABBO. The total then is close to \$198 million being spent for all types of research, outside of the Forest Service.

No further questions, Mr. Chairman.

Mr. WHITTEN. Mr. HORAN.

Mr. HORAN. I want to say that I have listened to this with a great deal of interest because in the field of research nothing can take place without teamwork and you are dealing with a breed of men that is not always easy to get them to work together. I got fouled up in this pear decline matter myself because I happened to know something about the work that had been done, and I was very anxious to see the maximum of teamwork, but we had an awful lot of differences of opinion among Congressmen and among land grant experiment stations, and all the while one Federal operator by the name of Dr. Badger had the answers and he had not spent any great fortune in the research up to that time so far as I know. And of course we had every philosophy of how to attack a proposition. Some wanted to do it with money and some wanted to do it through other processes.

REDUCTION PROPOSED IN ARS FUNDS YET ADDITIONAL FUNDS REQUESTED

But I would like to go back to the question Mr. Natcher was asking before lunch. I was confused about just where we are. The House has acted on the appropriation bill but it is not law yet. We do not know what the Senate will do with it. We increased your funds, or thought we did. However, they are not available to you.

There was some discussion that you were going to delete the additional monies we put in there from section 32 and that you were basing your whole line of operations on the supplemental request.

Dr. SHAW. The original budget had \$1.5 million for pesticides and the House transferred that to section 32 but kept the whole \$1.5 million in and we asked the Senate to keep that same \$1.5 million in section 32. In these two \$9.4 million items it is true the Department did ask the Senate to delete them, the one on cost of production research and the other on utilization research. The cost of production research could have contributed materially to this pesticide problem in small part, but those amounts were recommended for deletion. As was explained this morning, our request for this \$29 million went over to the Bureau of the Budget before the House acted on the bill, but it was not acted on by the Bureau of the Budget until just recently.

Mr. HORAN. Apparently consideration by the Bureau of the Budget was just about the same day we marked up the bill.

Dr. SHAW. We sent our request to the Bureau of the Budget on May 4 and your bill was reported on May 8.

Mr. HORAN. Yes; but we marked it up before then. So where are we?

Dr. SHAW. In terms of the House report, you mentioned a number of specific items you felt research should be done on with the \$9.4 million item. Some of them had a relation to the pesticide problem but many of them did not have any relation to it. So that certainly we feel that all of this \$29 million is necessary and, for my part, I could go along with the House that a lot of these other problems you mention need research in addition.

Mr. HORAN. Mr. Chairman, I have not yet got it clear in my mind where we are. They have this supplemental request here. What disposition do we make of what we did?

Mr. WHITTEN. I was interested in developing this too. Actually, this is a Senate document—so our action on the House side is dependent on action by the Senate. The Senate might go along with the \$18.8 million as well as this item, or it might reject both so far as anyone can tell.

I was interested in the Department coming before us and making a good case on the pesticide situation as a basis for Congress taking action to strengthen the program. So we are having these hearings for our own information, because the Senate will act on it before we will.

Mr. HORAN. Does this supplemental take the place of the House action or is it in addition to it?

Dr. SHAW. It is in addition to the \$1.5 million the House transferred.

Mr. WHITTEN. I keep calling this a supplemental. It is an amendment to the budget.

Mr. HORAN. I suppose we can do whatever we wish with this. There is a small item of the program we are trying to develop that has to be given some consideration and I presume you are doing things along that line to get this new approach underway?

Dr. SHAW. We have been moving as best we could with the moneys we had in this direction and in the last 5 years we have moved in ARS from 66 percent of our program on chemicals to about 66 percent on biological and newer approaches to the problem, but we still need to have it expanded beyond that.

COORDINATION OF RESEARCH EFFORTS

Mr. HORAN. In a coordinated approach attempting to solve any research problem before you, who is in command?

Dr. SHAW. For the Department of Agriculture, Dr. Brady is.

Dr. BRADY. We have attempted, Mr. Horan, in this particular case—for example. The point has been raised that this program includes support for several agencies. What we have tried to do is to develop a total coordinated approach to the whole program. A total program in which not only the Federal agencies but the State agencies would cooperate to try to get out of the difficulties we are in. It is not directed by me. We are setting up a committee with representatives from each agency to see if we cannot bring about maximum fitting together of these various agencies. We have had several meetings on it and this group of scientists will be working together as we move forward. So insofar as we can with the tremendous problems we have, we hope to develop a coordinated program, under the leadership, you might say, of the scientists in the Department of Agriculture.

Mr. HORAN. You know, I have been reading MacArthur's memoirs and they had two naval fleets in one of the battles to take Japan. One was commanded by Halsey and the other was commanded from Washington, D.C., and it was a mess. We are doing a lot of talking about a coordinated program and I believe in it. Some of our poultry diseases have been solved by coordination between your experiment stations, a very happy circumstance, by men in a position to know which experiment station was more able than the others in one field, so they were all brought together and it was very happily solved and I am all for it. In this research now we are dealing with a lot of

Federal money which is supposed to be the responsibility of this subcommittee, not only what we appropriate directly to you, but we also are approaching \$100 million annual outlay for State experiment stations, if you figure everything in, and that is Federal money. Then there is a tremendous amount of things being done by the private corporations and chemical companies. How much is that?

Dr. SHAW. In the chemical fields, it is probably in the order of \$40 or \$50 million.

Mr. HORAN. And of course they are not in it for their health.

Dr. SHAW. No, and they are not likely to spend much of their resources on such things as biological control because it will not give them a return on their investment.

Mr. HORAN. No, that is probably basic research that will obviously have to be done by the Federal Government.

Dr. Brady, just how broad is your authority to coordinate in this field?

Dr. BRADY. Well, within the Department of Agriculture there are certain of the agencies that report directly to the Office of the Director of Science and Education, which office I hold. These are Agricultural Research Service, Cooperative State Research Service, Extension Service, and National Agricultural Library. There is a definite opportunity for coordination among these agencies. Other agencies of the Department also have research responsibilities such as Economic Research Service and the Forest Service. There is opportunity for coordination of research among these agencies and with those reporting directly to me. So while I do not have direct control over these other research agencies, the Secretary of Agriculture has given me the responsibility for coordination of research in the Department. The Forest Service participation in this program on pesticides illustrates the coordinated approach to planning.

In addition to this, in the Department Dr. Byerly and his group and I are working with the State stations to get them to name representatives to meet several times a year to discuss steps that can be taken to bring about even closer coordination than is now going on between the Department and the State programs. I think that coordination is going on between scientists—I have been in the field and I know they are working together. We want to encourage and give every opportunity we can to coordination. I am very optimistic of our chances of bringing our manpower and resources both at the Federal and State levels to bear on this program.

Mr. HORAN. In this statement it says:

In order to implement the total research, educational and regulatory phases of this program, it is necessary to call upon the services of six agencies of the Department: The Agricultural Research Service—

And I assume there the line of command is fairly clear. The second is the Cooperative State Research Service. How do you go about calling on that, because the line of command there is not very clear.

Dr. BRADY. The line of command is somewhat less clear because you do have, as Dr. Byerly said this morning, separate State experiment stations to deal with. However, I think this pesticide program provides greater control, actually, than we have had in the past. Each of the facilities that would be constructed under the appropriation we

have asked for would have to have the approval of the Secretary of Agriculture. This means before these are constructed, even a greenhouse would have to be approved by the Secretary or his designee.

We also have certain parts of the operating budget that would be handled through grants that likewise will be controlled, and then there is the regional project control. I should not use the word "control," because we really coordinate rather than control. There are means to coordinate programs with in-house capability.

Mr. HORAN. The next is the Cooperative Extension Service. That is under the Secretary?

Dr. BRADY. This is true but the Federal Extension Service, to whom the Secretary has delegated program responsibility does report to me.

Mr. HORAN. Next is the Economic Research Service.

Dr. BRADY. The Economic Research Service does not report directly to me. However, members of their staff working specifically on research projects come within my area of responsibility insofar as coordination with other research is concerned. We work together as a team.

Mr. HORAN. The Forest Service?

Dr. BRADY. The same way with them. They have met from the beginning to help work out the program and are attempting to coordinate even in the field to be certain that there is a maximum of cooperation and a minimum of overlap.

Mr. HORAN. The National Agricultural Library, you just deposit what we find out, do you not?

Mr. MOHRHARDT. And make it available.

INTERDEPARTMENTAL COORDINATION

Mr. HORAN. That is the Department of Agriculture. How do we get along with HEW?

Dr. BRADY. It is through a mechanism that was initiated really following the confidence shown in the Department by this committee in providing, hopefully, \$250,000. People were named within our agency and within the HEW. Contact people for press releases, for policy matters of concern to the two Secretaries, with particular emphasis, of course, on matters involving pesticides. We have people working together also, on tobacco, and on mold found in food products. We mentioned this morning other activities where we have working teams to lessen the possibility of conflicts in terms of interest or what might appear to be conflicts.

Mr. HORAN. Of course, as far as funds are concerned you know, mostly from HEW, your experiment stations quite often get a good share of their operating capital by transfer from HEW, as high as \$20 million a year.

Dr. BRADY. This is correct.

Mr. HORAN. Nobody seems to know much about that.

Dr. BRADY. Well, this will give us, Mr. Horan, the opportunity to not only make records of our own but to be certain that these programs are coordinated with our own.

I would like to make this point. In presenting this program to the Bureau of the Budget we invited representatives from Interior and HEW to sit in on the budget hearings to be certain the kind of things

Agriculture is presenting here are clearly Agriculture's responsibility and not HEW's or Interior's. The examiners that sat with us agreed that our proposals were within Agriculture's area of responsibility and were not things that the Department of Interior and HEW would do with their funds. So our proposed program package is directly related to Agriculture's responsibility and if we do not do it it will not get done.

Mr. HORAN. I am all for controlling the pests any way we can do it, but I do know that money is being spent that the Department of Agriculture does not know anything about. Charlie Grant does not have control over the \$20 million. We have to go to each individual station.

Dr. BRADY. In the case of the National Institutes grants are made—

Mr. HORAN. There again they are not made through the departments.

Dr. BRADY. This is correct.

Mr. HORAN. HEW makes those direct to the individuals, as I understand it.

Dr. BRADY. Our grants are to be made to the institution with whom we are dealing to support the work of given individuals. This is correct and is one reason why we feel so strongly about this particular program. We feel HEW, AEC, the National Science Foundation, are actually attracting some of the best brains we have in the State experiment stations and even though the work they are doing is very good, it represents a real loss to agricultural research. We are hoping by means of this scheme that we can keep the best agricultural scientists at the universities working on matters of concern to agriculture.

Since this is Dr. Byerly's service, he may want to comment.

Dr. BYERLY. Coordination of these funds at each of these experiment stations is the primary task of the director of the experiment station and, by and large, they do it very well to get an effective program of research. Research is oriented to HEW, it is oriented to the Department of the Interior, it is oriented to Agriculture, and it is the responsibility of the director of that station to coordinate these efforts. At the instigation of this committee we have sought that information and it is provided to us freely so that I think we know what money is going to these stations and for what purposes.

The suggestion of Dr. Brady is correct that we want equal access to the best brains and we have included funds that can put into research all these good people at the stations but we make them more directly to the individual. We are sure it is part of the program, recognizing the coordination function of the director himself.

One other small aside: We are included in the planning item of HEW, so we have a liaison member of their Advisory Council on Environmental Health, so we are in on the planning side.

Mr. HORAN. Well, you talk about a coordinated program but nobody tells me who will do this coordinating.

Dr. BRADY. Well, I think coordination—

Mr. HORAN. Osmosis, is that the way you will do it?

Dr. BRADY. No. You have to have coordination at various levels. I have indicated to you in terms of program planning and development how coordination is already taking place. We had to have

coordination to fit this program together. We will bring about coordination with the experiment stations through active committees. This will be primarily at the planning level to be certain that if we tell you there will be \$1 million spent on biological control it will be so spent. We will know in a year's time that the funds were spent for this purpose.

Then there is the coordination responsibility of the experiment station director. He has not only his own people but frequently there will be U.S. Department of Agriculture personnel on the campus or in the State. We will take steps to see to it that there is a necessary coordination among agencies working at various levels of government.

I think the most important level of all is that of the working scientists—to see that they put their brains and talents together. I think we have as good a mechanism as you could ask for within the operational procedures under which we have to work.

Dr. BYERLY. May I add one comment to the gentlemen of the committee. I am flattered to be invited to be present on August 18 at the dedication of a new laboratory costing \$1.3 million of the State of Washington appropriated funds that will house about 50 scientists. There have been these 50 scientists in temporary wooden structures for years. About half of them are U.S. Department of Agriculture scientists and the other half are State scientists. They are working together and in this case the State of Washington is providing the facility to house them. There are other examples of this.

Mr. HORAN. I am for it. This transfer of funds from HEW, the total of the transfer of funds that go to these State experiment stations is in the neighborhood of \$20 million, but they do not report to anybody except to the other subcommittee up here and they probably do not know about these transfers. It may be the best money we spent, I suspect it is, and I am not being critical of the men who are doing the work, that is not the point; but I do know that when we talk about a coordinated approach to any problem we have got to have coordination and we ought to have a coordinator.

FEDERAL COORDINATION OF RESEARCH

Dr. BYERLY. If I may make a remark off the record, Mr. Chairman. (Discussion off the record.)

Dr. BRADY. Yes. I did not take this above the level of the Department of Agriculture.

I discussed this matter with you up to the level of the Secretary's Office in the Department of Agriculture. There is likewise a coordinating group, the Federal Council for Science and Technology, with representatives from the offices of the various secretaries, or heads of agencies involved in science from throughout the whole Government. HEW, Department of Commerce, Department of Defense, National Science Foundation, NASA, all are represented on this Council. I can give you an example of the coordination that we are attempting there in our water resources research. There is a subcommittee supported by a working group over here in the Department. The Council subcommittee includes representatives from the various agencies that are concerned with water resources research. They have organized their work with the same broad framework. They get together

and discuss their budget requests. We have a meeting coming up between HEW and Agriculture to explore our common interests in pollution control and the pollution of waters that might result from agricultural operations.

We are getting together and will try to see if we cannot jointly plan a program encompassing our mutual interests and respective responsibilities. You see, we are carrying this on at the interdepartmental level and unless we set up a "czar" that is the boss of all agriculture-related research, without reference to the departmental structure, it seems to me this arrangement is about as effective as we can possibly get.

Mr. HORAN. When you have a meeting, what rules of order do you proceed under? Does somebody hold a gavel?

Dr. BRADY. Yes. There is the Director of the Office of Science and Technology in the Office of the President. He serves as Chairman of the Federal Council for Science and Technology. In line with a preplanned agenda we consider reports from the various work groups and, as appropriate, attempt to develop a policy position. We consider various problems where there is a difference in opinion among the departments as to how things should be handled and to arrive at a mutual understanding. I will say that the Office of Science and Technology gave us some very helpful suggestions in connection with the planning of this pesticide program. I think they have given us confidence in the program and their vote of confidence in the approach that we are using in bringing the resources of all appropriate agencies to bear on this problem of pesticides in our total environment.

Mr. HORAN. I am still not satisfied. We have not even got to Interior yet. You have your public lands, you have your Indian forest service, all capable of making quite a contribution here. Who is it that pulls all these things together? You keep talking about "We do get together and we discuss this," et cetera.

Dr. BRADY. Let's take the pesticides problem as an illustration. We do have a special work group—the Pest Control Review Committee, which has been given the responsibility of reviewing and to bring about coordination in the pest control and research programs of the Department of Agriculture, Interior, HEW, and the Department of Defense. All of these agencies are represented on the Committee. Now, there are some limitations in terms of legal requirements. This group could not force HEW to modify their program contrary to the requirements of law. However, they can use their influence, in matters of an administrative or regulatory nature. They could call the attention of the Office of Science and Technology, that "here is a group out of line, not playing ball with the rest of them." If I could go off the record for a moment—

(Discussion off the record.)

Mr. HORAN. Could we have that statement on the record?

It will be a capstone.

Dr. BRADY. The Director of the Office of Science and Technology is charged by statute with coordinating R. & D. effort throughout the Federal Government and the mechanism by means of which this coordination is brought about is what I have been trying to explain.

The situation, I think, that we are faced with here is that you have interest from many areas in this pesticide problem. We do not want

to throw the baby out with the bathwash—so to speak—by saying, “We are going to force this part of the program to come over here and be under the direct control of the man that is in charge of pesticides.”

Perhaps someone will turn up primarily interested in water, but because of unanticipated developments find himself deeply involved in pesticide research and the interrelationships involved. This is the kind of a very complex situation that we are trying to solve.

Mr. WHITTEN. Will the gentleman yield to me?

Mr. HORAN. I am about through.

Mr. WHITTEN. At this point I just want to cite two illustrations, and my colleagues on the committee have heard these many times, and I think perhaps many of you in the Department have, too. The first thing that you have in something like that is to have a listing somewhere of what each department already has. On another subcommittee, on Defense, I happened to be down at Eglin Field, Fla., where we had such a building, that was as big as three football fields. I remember the description they gave us. I asked why they didn't use that. The Department was unaware that the Air Force had it. Whoever was in charge at that time said he would be glad to postpone it and look and see. When they went to the Air Force they said, “Sure, you can use the one at Eglin Field, but why don't you use the one across the river at Fort Belvoir.”

Another illustration of the same kind, years ago the Navy asked for a lot of money to put up new airfields. We asked why they did not use the Army airfields, abandon their field, and they said they had abandoned it. It developed they did not call them abandoned as long as they had caretakers. They were listed as vacated and not abandoned. The point of all this is the Assistant Secretary of the Army said they had to go to the field to find out what they did have. They did not have any central place in the services at that time. This was some years ago—and all that is I am sure remedied now. In fact, I have heard testimony to that effect. If the Science Committee is going to coordinate this thing, the first thing they should do is list all facilities that all branches of Government now have and start from there. Do you know whether that has been done, Doctor?

Dr. BRADY. I do not know about the total facilities, but facilities for given programs have been pulled together and records made of the facilities that are available.

Mr. HORAN. That is about the size of it. We may appear to be critical, but we do not mean it that way, Dr. Brady, not at all, but here we are launching a coordinated program. We use that word loosely, I guess. It is to help alleviate the pesticide threat. We are going to use any number of deposits of talent and we have lots of them. There are some in private business who make contributions, I am sure.

Inadvertently, I assume, they come up with some basic research as a byproduct probably of specific research. It is good, Mr. Chairman, to have all of the talent inventoried and know their capabilities. It is also wise to have all of the physical facilities inventoried and geographically located and their capabilities also listed by talent and by facilities. That is what we are interested in.

Dr. SHAW. Mr. Horan, a lot of this is done as Dr. Brady says at lower levels in his office or mine. Take, for example, on the problems connected with one insect, the boll weevil. We have our laboratory at Mississippi State College. We have Dr. Davage down there, who is in charge. He is our principal man in charge of boll weevil research. He does get together all the people in the States along with the folks from the Federal Government and discuss the whole program and they plan their program ahead together. This is going on repeatedly in various other fields.

Mr. HORAN. I will end here. I have taken a lot longer than I intended to. I saw this pear decline thing come along and all the prima donnas, including me, I guess, got in the act. There was almost a total breakdown of coordination.

That is all, Mr. Chairman.

PERSONNEL NEEDS

Mr. WHITTEN. Briefly, then, there are two points I would like to emphasize:

One, this is an amendment to the budget, as I pointed out earlier, which means the Department and the Bureau of the Budget has taken credit for reductions made by the House of Representatives, and to continue to show a minus you are taking those cuts and applying them to the increased funds recommended here.

I also note that this additional request will provide for 682 man-years. In addition to that there would be 100 State employees in the Extension Service making a total additional number for the Department of some 782 people above your present manpower ceilings. This creates a real problem which I think will be of real interest to this committee as well as our counterpart on the other side before we finally act on this matter. There is no need to give you the money if you cannot have the manpower.

I would like for you to insert in the record at this point the man-years and amounts of funds involved in the work covered by your request involved here from 1965 through 1968.

(The information requested follows:)

AGRICULTURAL RESEARCH SERVICE

Funds and man-years requested in S. Doc. 85 for additional pesticide research, fiscal year 1965, and projections of this program through fiscal year 1968, including requirements for staffing and operating the proposed new facilities

[Dollars in thousands]

	Fiscal year 1965		Fiscal year 1966		Fiscal year 1967		Fiscal year 1968 ¹	
	S. Doc. 85	Man-years	Estimate	Man-years	Estimate	Man-years	Estimate	Man-years
RESEARCH								
Program:								
In-house.....	\$7,088	362	\$9,595	634.4	\$9,595	668.9	\$14,140	769.9
Contracts and grants.....	5,112		2,605		2,605		2,605	
Total, program.....	12,200	362	12,200	634.4	12,200	668.9	16,745	769.9
Facilities:								
Plans and specifications.....	758							
Construction:								
Facility for livestock insects and toxicological and pathological effects of pesticides on livestock, College Station, Tex.....			2,990					
Plant diseases, nematodes, and insects, Beltsville, Md.....			3,887					
Insect attractants and basic research laboratory, Gainesville, Fla.....			1,840					
Stored products insects laboratory, Savannah, Ga.....	800							
Total, facilities.....	1,558		8,717					
Total, research.....	13,758	362	20,917	634.4	12,200	668.9	16,745	769.9
PLANT AND ANIMAL DISEASE AND PEST CONTROL								
Program: In-house.....	600	36	600	36.0	600	36.0	925	46.0
Facilities:								
Plans and specifications.....	100							
Construction: Laboratory facilities for expanded registration and enforcement activities under the Federal Insecticide, Fungicide, and Rodenticide Act, Beltsville, Md.....			1,150					
Total, plant and animal disease and pest control.....	700	36	1,750	36.0	600	36.0	925	46.0
Grand total, salaries and expenses.....	14,458	398	22,667	670.4	12,800	704.9	17,670	815.9

¹ The 1968 program includes an additional \$4,870,000 (research, \$4,545,000; plant disease and pest control, \$325,000) for staffing the new laboratories proposed in S. Doc. 85.

COOPERATIVE STATE RESEARCH SERVICE

Funds and man-years requested in S. Doc. 85 for additional pesticide research, fiscal year 1965, and projections of this program through fiscal year 1968, including requirements for staffing and operating the proposed new facilities

[In thousands of dollars]

	Fiscal year 1965		Fiscal year 1966		Fiscal year 1967		Fiscal year 1968	
	S. Doc. 85	Man-years	Estimate	Man-years	Estimate	Man-years	Estimate	Man-years
Research:								
Program:								
In-house.....								
Contracts and grants.....	5,550	5	8,000	5	8,000	5	8,000	5
Total, program.....	5,550	5	8,000	5	8,000	5	8,000	5
Facilities: For grants for facilities under the act approved July 22, 1963 (77 Stat. 90) (to be distributed to States according to formula).....	3,242		4,758					
Total, research.....	8,792	5	12,758	5	8,000	5	8,000	5

EXTENSION SERVICE

Funds and man-years requested in S. Doc. 85 for additional pesticide activities in fiscal year 1965 and projections of this program through fiscal year 1968

	Increase, 1965		1966 estimated	Man-years	1967 estimated	Man-years	1968 estimated	Man-years
	S. Doc. 85	Man-years						
Cooperative extension work, payments and expenses:								
Payments to States.....	\$2,100,000		\$3,850,000		\$4,600,000		\$5,500,000	
Retirement and employees' compensation costs for extension agents.....	100,000		150,000		200,000		250,000	
Federal Extension Service.....	100,000	6	200,000	12	200,000	12	250,000	15
Total.....	2,300,000	6	4,200,000	12	5,000,000	12	6,000,000	15

ECONOMIC RESEARCH SERVICE

Funds and man-years requested in S. Doc. 85 for additional pesticide research, fiscal year 1965, and projections of this program through fiscal year 1968, including requirements for staffing and operating the proposed new facilities

[In thousands of dollars]

	Fiscal year 1965		Fiscal year 1966		Fiscal year 1967		Fiscal year 1968	
	S. Doc. 85	Man-years	Estimate	Man-years	Estimate	Man-years	Estimate	Man-years
Research:								
Program:								
In-house.....	150	14	330	23	330	23	330	23
Contracts and grants.....	350		420		420		420	
Total, program.....	500	14	750	23	750	23	750	23
Facilities.....								
Total, research.....	500	14	750	23	750	23	750	23

NATIONAL AGRICULTURAL LIBRARY

Funds and man-years requested in S. Doc. 85 for additional pesticide research, fiscal year 1965, and projections of this program through fiscal year 1968, including requirements for staffing and operating the proposed new facilities

[In thousands of dollars]

	Fiscal year 1965		Fiscal year 1966		Fiscal year 1967		Fiscal year 1968	
	S. Doc. 85	Man-years	Estimate	Man-years	Estimate	Man-years	Estimate	Man-years
Research:								
Program:								
In-house.....	200	13	200	13	310	21	310	21
Contracts and grants.....								
Total, program.....	200	13	200	13	310	21	310	21
Facilities.....								
Total, research.....	200	13	200	13	310	21	310	21

FOREST SERVICE

Funds and man-years requested in S. Doc. 85 for additional pesticide research fiscal year 1965, and projections of this program through fiscal year 1968, including requirements for staffing and operating the proposed new facilities

[In thousands of dollars]

	Fiscal year 1965		Fiscal year 1966		Fiscal year 1967		Fiscal year 1968	
	S. Doc. 85	Man-years	Estimate	Man-years	Estimate	Man-years	Estimate	Man-years
RESEARCH								
Program:								
In-house.....	\$1,350	80.0	\$1,700	88.0	\$1,840	94.0	\$1,840	94.0
Grants.....	500		300		250		250	
Total, program.....	1,850	80.0	2,000	88.0	2,090	94.0	2,090	94.0
Facilities: Construction:								
Berkeley, Calif.....	50							
New Haven, Conn.....	850							
Total, facilities.....	900							
Total, research.....	2,750	80.0	2,000	88.0	2,090	94.0	2,090	94.0
Total.....	29,000	516.0	42,575	811.4	28,950	859.9	34,820	973.9

CSRS GRANTS FOR BASIC RESEARCH

MR. WHITTEN. Also, what will be your basis for distribution of funds requested for the Experiment Station Service and Extension Service?

We heretofore have recognized that funds you do not request under the formula are proposed because you want latitude in handling it. Doubtless some are better qualified for research work in some areas than certain other stations, but in a general way how do you expect to approach this?

DR. BRADY. Dr. Byerly can give you the breakdown of the \$5.5 million.

DR. BYERLY. I assume you are speaking of the \$2 million basic research funds.

Mr. WHITTEN. Yes.

Dr. BYERLY. We have compiled a list of persons known to be competent in the areas appropriate—pesticides, insects, and others.

Mr. WHITTEN. Would you supply the committee with a copy of that?

Dr. BYERLY. Yes.

Mr. WHITTEN. I do not think we will put it in the record at this point.

DEVELOPMENT OF NEW PEST CONTROLS

There is one question that I might ask here. All these new and exotic approaches to an old problem are fine and this committee has taken lots of satisfaction in Dr. Knipling's experiments with the sterilization of the screw-worm fly. We claimed our part of the credit in many programs that have worked throughout the years. Mr. Horan and I have served on this committee 15 or 18 years. We are proud of all that progress. We are proud in turn in other committees of some of the newer programs—the missile program, et cetera.

We have learned many times these things are very slow to show up. I tell my old story about the mules disappearing before we got rid of research on the swamp fever of mules. The point is—are you continuing your efforts to make existing methods safer in the handling of chemicals and are you continuing your research on how to break down more rapidly some of these residues? What is your story as to what your present program is along that line and what your future program will be?

Dr. SHAW. We are doing work in every one of these fields that we are asking increases for and to the full extent of our resources we are directing our attention at these new approaches.

I believe I mentioned earlier that right now about a third of our program is on the chemical side of pest control and two-thirds on the other side.

Mr. WHITTEN. You might break that phase of it down. I think you have gone into the other in some detail. Detail for the record the existing work that you are doing in those areas.

Dr. SHAW. On the chemical side, our problem really is with these pesticides, mainly the chlorinated hydrocarbons which persist for several years; if they are applied to the soil or crops they remain there for a good long while.

Now, as you stated this morning, no one has yet found that these chemicals, when used in accordance with the way they are recommended, have caused anybody any harm, but we do have the evidence that they are accumulating in our environment and none of us can say that they won't some day cause harm. That is where we are in extreme difficulty, so what we are aiming to do is to get chemicals that will be as effective against the insects, but will break down much more rapidly and won't affect nearly as many insects as the ones we have now.

You will remember when we first came out with DDT it practically worked on any insect and it killed the bees and all the beneficial insects as well as the harmful ones. We are trying to get chemicals that will be aimed at the specific ones we are trying to control.

Mr. HORAN. Could I ask one question?

Mr. WHITTEN. Surely.

Mr. HORAN. Why did it take us from 1872 until 1940 to put DDT to work?

Mr. WHITTEN. The librarian just had it indexed under three different subjects.

Dr. SHAW. We did not know it had insecticidal properties. It was developed as a chemical. It was in the literature. We did not know it had insecticidal properties.

Mr. BRADY. There are probably some more chemicals in the literature right now we don't know about, but 5 years from now may turn out to be useful.

GENERAL STATEMENT OF DIRECTOR OF SCIENCE AND EDUCATION

Mr. Whitten, I would like to offer for the record a statement I have prepared to support this estimate.

Mr. WHITTEN. It will be placed in the record at this point.
(The statement is as follows:)

STATEMENT OF NYLE C. BRADY, DIRECTOR OF SCIENCE AND EDUCATION, U.S. DEPARTMENT OF AGRICULTURE

Mr. Chairman and members of the committee, we face a pesticide dilemma. We cannot live without them. And we're finding it more and more difficult to live with them. On the one hand these chemicals are giving us greater protection from pests than we've ever known. On the other hand, they have created a problem of environmental contamination that is growing in intensity.

Organic pesticides have proliferated during the two decades since the advent of DDT. Today, there are more than 57,000 different formulations registered by the Department under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act.

These pesticides serve to make our farmers the most efficient in the world; they protect the quality and wholesomeness of farm products and they help maintain this quality through marketing channels and into retail stores.

They are our chief weapons in fighting alien pests newly established in this country. They help protect the beauty and timber potential of our forests. Pesticides provide the only effective means for controlling most epidemic insect losses to our forests.

Pesticides are equally important tools of public health officials in their continuing fight against pest-borne diseases. In fact, they have become the everyday tools of most all of us.

At the same time, the problems inherent in the use of pesticides must be recognized. These problems of persistence and environmental contamination were spelled out in the report of the President's Science Advisory Committee more than a year ago, and since, have been reemphasized by such occurrences as the Mississippi River fish kill.

The Department has been long aware of these growing difficulties, and within its available resources has endeavored to devise new ways of fighting pests, without the attendant hazards of pesticides. Our research has been redirected with greater emphasis in such areas as biological control, insect sterilization, attractants, and repellents.

We have worked closely with other Federal agencies and with State and local authorities in carrying out effective pest control programs, keeping uppermost considerations of safety for man, animals, fish, and wildlife.

These efforts have helped. They have reduced our dependence on pesticides in some instances; in others, they have reduced hazards to a minimum. But more importantly, they have pointed the way to the ultimate solution of the pesticide problem.

An intensified program of research, education, and regulation, I am convinced, is the answer, and I am here today to support an amendment to the Department's budget for an increase of \$29 million for such a stepped-up program. Of this requested increase, \$5.8 million would be for construction and the planning of new and expanded facilities.

The proposed program involves a coordinated and concentrated attack by Federal and State agencies on the problem of potentially hazardous pesticides in our environment. In President Johnson's words—"it looks toward the reduc-

tion and eventual elimination of the need for using hazardous chemicals in agricultural production and processing." Every project approved under this program will contribute to this goal.

President Johnson made it clear in his transmittal of this budget amendment to the Congress that he expects the Department of Agriculture to intensify its own pest control research efforts, and to work with scientists in the State agricultural experiment stations and other institutions in an expanded and cooperative research and educational program. If the additional funds are appropriated we expect to carry out the President's wishes.

In order to implement the total research, educational, and regulatory phases of this program, it is necessary to call upon the services of six agencies of the Department: the Agricultural Research Service, the Cooperative State Research Service, the Cooperative Extension Service, the Economic Research Service, the Forest Service, and the National Agricultural Library. With your permission, Mr. Chairman, I would like at this time to introduce into the record the justification proposals of these agencies, and then move ahead to discuss the major items on an overall Department basis. I would like to provide you with a table that shows a breakdown of the budget request on a program basis.

TABLE I.—Proposed 1965 budget amendment for research on pesticide residues, summary by program

[In thousands of dollars]

Program	1965 budget estimate	1965 budget amend- ment	1965 revised total
RESEARCH AND EDUCATION			
1. Research on control of plant pests and diseases and animal parasites by biological, nonchemical, and sterility methods, or by use of attractants, repellents, etc., including study of safety to humans and animals of controls developed; and plant genetic and breeding research to develop resistant varieties to obviate or reduce the need for any chemical of other controls...	8,205	+9,190	17,395
2. Basic research on biology, ecology, physiology, pathology, metabolism, and nutrition of insects, plants, and animals to develop safe means of control of plant pests and diseases and animal parasites.	17,437	+3,330	20,767
3. Research on more specific, less persistent conventional pesticides, improved methods of application, and development of detection methods of determining residues in processing and marketing of agricultural commodities.	8,728	+3,815	12,543
4. Research on toxicological and pathological effects of pesticides and other agricultural chemicals in livestock, and on fate and effects of such residues in soils and in crop and farmstead water supplies; and on effects of trace levels of pesticides occurring in our current food and feed supplies.	1,271	+3,265	4,536
5. Economic research on comparative farm costs and returns and collection of basic data on current practices, costs, and methods of controlling insects, involving use of toxic chemicals in major agricultural areas of the Nation; and effects of restrictions on the use of toxic chemicals in agricultural production.		+500	500
6. Intensified extension educational program on use of pesticides and residue problems, for dissemination to the general public including producers of agricultural commodities.	2,000	+2,300	4,300
7. Specialized library reference services to scientists on new research and other information on problems related to pesticide residues.		+200	200
Total, research program.....	37,641	+22,600	60,241
Construction and planning of research facilities.....		+5,700	5,700
Total, research and education.....	37,641	+28,300	65,941
PLANT AND ANIMAL DISEASE AND PEST CONTROL			
Plant pest control and pesticide regulation activities: Evaluation of pest control programs with special reference to environmental impact associated with control and eradication procedures, and initiation of monitoring pesticides in agriculture; coordination and strengthening of registration and enforcement activities.....	2,438	+600	3,038
Planting of facilities.....		+100	100
Total plant and animal disease and pest control.....	2,438	+700	3,138
Grand total.....	40,079	+29,000	69,079

The first major research category, for which we would allocate \$9,190,000, concerns research on the control of plant pests and diseases and animal parasites by biological and other highly selective, nonchemical techniques.

Under this item, let me first discuss insect research, beginning with the need for increased studies of parasites, predators, and diseases. The Department pioneered the concept of importing beneficial insects to control established pests in this country and has, through the years, made scores of successful importations that have contributed to the control of many of our major agricultural pests. We can greatly benefit by expanding our work in this proved area.

We know less, but are even more hopeful, concerning the ultimate value of diseases as a means of insect control. Mass produced bacteria, viruses and other disease-causing organisms can be used on a large scale like insecticides. Promising pathogens are already under investigation for such major pests as the corn earworm (which is also the bollworm on cotton), the cabbage looper, tobacco hornworm and budworm, the boll weevil, citrus red mite, and forest insects such as the spruce budworm and hemlock looper.

The same can be said for the sterilization method of insect control, which has had such a spectacular success against the screw-worm in Southeastern United States and in Texas, New Mexico, and the States to the north and east. Our research indicates that this method may be similarly effective against other major pests, including the boll weevil, pink bollworm, and various fruit flies.

Nonchemical methods of controlling insects include the use of light traps and other mechanical equipment to collect and destroy insects. It includes the use of sound and electromagnetic energy against stored grain insects, and such traditional cultural practices as cultivation and sanitation. For example, light trap research against the tobacco hornworm has shown that these traps not only have survey value but can effectively reduce insect populations. An amplified recording of the call of a female mosquito attracted hordes of males. Here again, these are promising ways of insect control—only cursorily examined to date—that can supplement or perhaps replace pesticides.

Attractants show great promise as substitutes for or supplements to pesticides, where residues are a problem. An example is the highly specific bait developed by USDA for use against the imported fire ant. This bait, requiring the addition of only a minute amount of insecticide for effective control, has replaced heavier dosages of a residual-type pesticide in the Federal-States campaign against this pest in the South.

Our scientists have also isolated, determined the chemical structure, and this year are field testing gyplure, the sex attractant produced by the female gypsy moth. Other Department scientists have discovered two distinct substances in the cotton plant, one of which attracts the boll weevil, another which encourages it to eat.

Research is also showing these nonchemical methods of pest control effective against those plant diseases, nematodes, weeds, and animal parasites which up to now have been controlled only by the use of pesticides. As we come to understand the microbiological populations of our soils, for example, there is a possibility that we can adjust our systems of cropping and soil management to suppress disease-causing soil organisms.

Nematodes or eelworms, which are another major agricultural pest now controlled almost exclusively with pesticides, are subject to attack by fungi, viruses, and other biological control agents.

Weeds, causing an estimated \$5 billion in losses to agriculture each year, present a particularly difficult problem since pesticides have proved to be the most effective and lowest cost control agents in many cases. Still, in a few notable instances, research has demonstrated that weeds can be controlled by biological means. The beetle that rid Pacific Northwest rangelands of the Klamath weed is an example. Other, more recently introduced insects that prey on weeds, give further hope for this method of control. In addition, there is promise for methods that are not much more than scientific concepts at this point—techniques that induce all weed seeds to germinate at the same time so that they can be destroyed in one operation; and techniques that inhibit weed seed production, or prevent pollen development by unwanted plants.

Let us also consider the fact that almost two-thirds of the internal parasites of livestock still remain uncontrolled, costing us an estimated billion dollars a year. Principal means of control is through use of chemicals. Expanded research in this area would be aimed at developing biological methods of control. The potential for vaccines against internal parasites is practically untapped. For example, research on the irradiation of lungworm larva has attenuated them

to the point where they actually produce calf immunity to lungworm disease. This approach alone offers great promise for other parasite diseases.

The other portion of this requested increase would be to expand the Department's research effort on genetic and varietal resistance of plants to insects, diseases, and nematodes.

New emphasis will be placed on breeding for resistance to diseases and insects that have been controlled so far by chemicals. This is a long-range, but an almost ideal, solution. Past successes on a relatively limited basis indicate greater gains to come from this research.

Disease resistance has already been obtained in many crops where pesticides were once used. Sugarbeets have been bred to resist curly top; lima beans, to downy mildew; potatoes, to late blight and leafroll; cantaloup, to powdery mildew; lettuce, to downy mildew; pecans, to scab; peaches, to bacterial spot; and white pines to blister rust.

Other research has similarly proved the method in developing plants resistant to insects. Alfalfa resistant to the spotted aphid is an example. Others are inbred lines of corn resistant to the European corn borer, and yellow pines resistant to the reproduction weevil.

But research in this area is not nearly adequate. New pests and new races of old diseases continue to provide new threats to American agriculture. We need to develop sugarbeets that are resistant to virus yellows; cucumbers resistant to the cucumber beetle; grasses, to the spittle bug; and pears, to fire-blight and powdery mildew. Similarly, we need to develop resistance to many diseases and insects that are common to sugarcane, as well as fruits, vegetables, forages, and oilseed crops. These diseases and insects are being held in check by chemical pesticides.

Those, then are the major areas of nonchemical pest control research that we would pursue with the requested budget increase.

A second major research area to which we would allocate \$3,330,000 is that of basic research on the pests we are to control. In other words we need to know more about these pests if we hope to control them.

We need to expand our basic research into the biology, taxonomy, ecology, physiology, pathology, metabolism, and nutrition of these unwanted insects, plants, and animals. For instance, we will be able to apply more specific and selective controls to our insect problems when we better understand such considerations as their seasonal occurrence, abundance, and their nutritional requirements. This sort of knowledge is essential if we are to successfully use the sterilization technique, or, for that matter, any biological control against insect pests.

In the case of certain plant diseases, we can eliminate or reduce the repeated use of fungicides—now commonplace in the production of many vital crops—by learning how to accurately forecast the probability and occurrence of diseases. Such forecasts, of course, require basic knowledge of initiation, spread, and severity of such diseases.

Our research progress against late blight, a serious disease of potatoes and tomatoes, is an example. Before we were able to forecast the timing and severity of late blight outbreaks, farmers normally applied as many as nine fungicidal treatments. Now, four spray applications are the rule.

When such exotic pests as witchweed, the soybean cyst nematode, and corn stunt disease strike, we find ourselves seriously handicapped by our lack of knowledge of them. Basic research offers the way of filling this gap.

Basic research is also needed to truly understand the pesticides we use. How are they broken down? What are their metabolic products? What is the relationship between an animal's intake of certain pesticides and their appearance in its body tissues? Even more to the point of many current arguments against pesticides; What are their longtime effects on the production and growth of livestock?

We would use \$3,815,000 of the increase for a third major area of research—more specific and less persistent conventional pesticides, and for improved equipment for pesticide application.

We foresee a continuing need for effective insecticides of the conventional type for the foreseeable future in order to produce the foods, feeds, and fibers needed by man. The problem is to find materials which are toxic only to specific insects, and which are nonpersistent. We must be sure that the insecticides developed can be safely used. This safety factor includes the assurance that the materials will not affect handlers or leave objectionable residues on food and feed products or in soil and water, or be harmful to pollinating insects and to fish and wildlife.

There will be a continuing need for fungicides and nematocides of the conventional type, as well as materials effective against bacteria and viruses. Many of such new products are being developed by industry. Before these chemicals can be recommended for use, it is necessary to develop information to assure their safe use.

Herbicide usage has mushroomed in recent years until today an estimated 85 million acres are treated annually. The development of improved and safer herbicides depends on a broader understanding of such elements as the entry, movement, persistence, and final fate of the materials in and on plants. We need more basic research to identify and analyze the degradation products resulting from the reactions of herbicides in their various environments.

We also need more basic research on growth regulators, which are being widely used today to control the growth of plants and plant parts. They are used to thin fruit trees, to delay fruit drop, to prevent sprouting of potatoes and onions in storage, and to prevent suckers from developing on tobacco plants. These chemicals must be carefully studied so that we can develop substitutes for any that leave harmful residues.

Expanded research on the improvement of pesticide application equipment is needed to achieve greater effectiveness in the use of pesticides while reducing the application rates required. Compounds are often applied in excessive rates because of such inefficiencies as drift, uneven coverage, or nonspecific distribution.

In another area, we would use \$3,265,000 for research on the effects of such materials as pesticides and feed additives on livestock and the fate of pesticides in soil, water, plants, and animals. This expansion of research is essential at this time because of current problems connected with residues in the Nation's food supplies.

The proposed increase would provide for research to give us precise information about the insecticides now approved, and about the promising new ones, as they might affect feeds with residues. We need to determine the effects on the health of livestock of the various chemicals now being used externally as insecticides. The increase in funds would also provide for research on herbicides and other chemicals which could possibly cause livestock poisoning.

The use of growth stimulants for livestock has greatly increased in recent years. Hormones and antibiotics have stimulated growth and provided increased yields of meat, milk, and eggs. These materials have resulted in more efficient use of feeds. There is urgent need for additional funds to develop new products of this type that leave no question as to safety. Studies would be expanded to determine the levels of practical use of such products that will avoid accumulation of residues in body tissues and in milk and eggs.

This research would also include studies on herd management practices that could markedly reduce occurrence of mastitis in dairy herds, thus decreasing the use of antibiotics and other medicinals for the treatment of this disease.

This part of the increase also includes funds for research on the fate and the effects of pesticide residues in soils, and in crops and water supplies. Little is known about the fate of pesticides applied to crops concerning their interaction, persistence, and adverse effects in different kinds of soils. It is essential that research be undertaken to determine the changes that take place when various insecticides, herbicides, and nematocides are added to soil. The influence of the accumulation of residues on the vital processes that the soil micro-organisms perform and whether they alter the interrelationships between soil micro-organisms need investigating.

We do not know nearly enough about the movement of pesticides and other contaminants into the water supplies of streams, farm ponds, reservoirs, and wells that furnish water for livestock and household use.

This part of the increase also provides for research in the effects of pesticides on the nutritive value of our current food supply. For some 15 years, our scientists in human nutrition have cooperated with other departmental scientists in evaluating the qualities of foods grown or stored with exposure to various pesticides. The need is now urgent to extend the methods of evaluating the cooking and eating quality and nutrient content of foods treated with pesticides, particularly foods with affinity or high uptake capacity for pesticides. In addition to knowing nutrient content, it is important to know whether the availability of any nutrients in the foods is affected, and whether the overall food value has been altered in any way that would either lower or improve the nutritional quality of our current food supply.

A proposed increase of \$500,000 would cover the costs of research on the economics of pesticide use.

The acceptance and use of new chemical pesticides or alternate methods for controlling pests depends mainly on relative costs and results, as measured by the efficiency of production. Little information is now available upon which to evaluate the economic considerations of alternative ways to control pests.

The proposed research would include a periodic national survey of farms to obtain basic data on extent and frequency of use and results obtained by farmers from use of agricultural chemicals, particularly those toxic to man. Other studies will deal with the costs and returns associated with alternate methods of plant pest control in major producing areas, with benefits and costs of controlling pesticide pollution of water. Also planned is a continuing appraisal of the implications with respect to the supply of agricultural products and to incomes of farmers associated with elimination or restriction in use of a chemical pesticide or with alternative methods of control of agricultural pests, and their effects on prices of farm products and on costs of food and fibers to consumers.

A greatly expanded program is needed to educate people to use pesticides with the utmost care. This means the producers; home gardeners; householders; processors, distributors, and retailers of food products; clerks and salesmen who advise customers; and local agencies that conduct spraying programs.

It is not enough to conduct research on pest control and the use of chemicals. The knowledge from research must be understood and applied. Users must constantly be kept up to date on new chemicals and recommendations for their use and changing regulations in order to avoid severe economic losses and possible danger to health.

Specialized area agents will be needed to work with producers to be sure they understand how and when to use various chemicals as well as other means of controlling pests * * * and that they are aware of their public responsibilities as they use agricultural chemicals.

Cooperative State extension services will be encouraged to set up special pest control short courses or schools for farmers, commercial spray operators, and personnel in the pesticide industry. Likewise, special educational programs will be developed for homemakers who use pesticides extensively in their lawns, gardens, and households.

The proposed increase of \$2,300,000 for this educational work would also cover hiring additional extension agents in the 50 States and Puerto Rico. Funds would also be used to strengthen the National Federal Extension Service leadership and to improve coordination of the State-Federal educational effort on safe use of pesticides.

The additional funds amounting to \$200,000 for the National Agricultural Library would be used to establish and maintain a pesticides information center to support research on pesticide projects.

Rapid access to information about current and past studies is basic to effective research on pesticides. To provide this the library must promptly identify and acquire worldwide publications in the scientific fields basic to pesticide research. More detailed indexing and more rapid notification as well as increased lending and reference services are necessary for research and regulatory workers concerning publications in their fields.

The pesticides information center would provide biweekly notification to scientists of new information concerning pesticides in its broadest aspects, specialized literature searches, and other bibliographic services essential to the support of research programs. Information available at land-grant institutions and experiment stations as well as in other Government libraries would be utilized, including the Library of Congress, National Library of Medicine, Department of the Interior, and the Department of Health, Education, and Welfare.

An increase in funds of \$420,000 would be used to evaluate pest control programs, with special reference to the impact on environment and the necessary field activities to monitor the use of pesticides in agriculture. The President's Science Advisory Committee in its report on "Use of Pesticides" made the following recommendation:

"Provide, as part of the operation budget of Federal control and eradication programs, funds to evaluate the efficiency of the programs and their effects on nontarget organisms in the environment. Results of these studies should be published promptly."

The proposed increase of funds would implement the specific plans we have made to follow this recommendation. These activities would include the establishment of a specialized unit to direct the acquisition and processing of basic information on the impact of control and eradication programs. We would

evaluate current and alternate pest control programs and recommend modifications that would increase effectiveness and reduce residues. We would also contract for the services of qualified teams of trained entomologists, wildlife specialists, and chemists as may be needed to extend monitoring services to the general agricultural uses of pesticides.

We are requesting an increase in funds of \$180,000 to implement additional operational activities under the interagency agreement with the Departments of Health, Education, and Welfare, and Interior relating to pesticide registration.

Our three Departments have developed formal procedures for interdepartmental coordination of activities relating both to the registration of pesticides and the setting of tolerances for pesticide residues. This coordination will require close working relationships between the agencies involved, and markedly increase our workload.

It is vitally important for the Department of Agriculture to take all necessary steps to provide agricultural producers with the necessary assurances that use of pesticide chemicals will not result in a loss of markets. To avoid recurrences of incidents such as the problem with cranberries that arose several years ago, greater coordination is needed between Federal agencies administering requirements affecting the use of the pesticides. In order to provide this expanded coordination, the existing pesticides regulation staff—already hard pressed to keep up with the workload—must be expanded.

We are badly in need of additional facilities for research in order to develop more effective means of avoiding pesticide residues, and are requesting additional funds for this purpose.

TABLE 2.—*Facility support for the pest control research and education program (Budget amendment for fiscal 1965)*

<i>Item</i>	<i>1965 Amount</i>
1. Planning money for the following facilities :	
(a) Livestock Insects and Toxicological and Pathological Effects of Pesticides on Livestock, College Station, Tex., (ARS, \$3,250,000)-----	\$260, 000
(b) Research Laboratory for the Control of Plant Diseases, Nematodes, and Insects, Beltsville, Md. (ARS, \$4,225,000)-----	338, 000
(c) Insect Attractants and Basic Research Laboratory, Gainesville, Fla. (ARS, \$2,000,000)-----	160, 000
(d) Laboratory for Plant and Animal Disease and Pest Control Investigation (ARS, \$1,250,000)-----	100, 000
Subtotal, planning-----	858, 000
2. Construction of the following facilities :	
(a) Stored Products Insects Laboratory, Savannah, Ga-----	800, 000
(b) Facility at Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.-----	50, 000
(c) Northeastern Forest Experiment Station Laboratory, New Haven, Conn-----	850, 000
Subtotal, construction-----	1, 700, 000
3. Construction of facilities at State experiment stations-----	3, 242, 000
4. Grand total-----	5, 800, 000

We are requesting an increase of \$5,800,000 for the planning and construction of new facilities. This includes an increase of \$858,000 to cover the cost of planning three research and control laboratories. (The total construction costs of these laboratories will be \$10,725,000.) It also includes \$1,700,000 for the construction of three smaller laboratories and \$3,242,000 for the construction of facilities at State experiment stations.

The funds for planning and constructing facilities will be used for the following specific items :

An increase of \$260,000 is requested to plan research facilities on livestock insects and toxicological and pathological effects of pesticides on livestock. Our present facilities are meager and makeshift, and wholly inadequate for the re-

search that is needed. Our plan is to build a new facility at College Station, Tex., the total cost of which will be \$3,250,000.

We hope to develop greatly improved methods of protecting livestock from insects, especially cattle from attack by biting flies. And we expect to concentrate on the development of new types of chemicals and nonchemical methods that will not leave harmful residues in milk, meat, eggs, and other animal products.

The toxic effects of chemicals on livestock and livestock products will be studied, as well as any other effects that chemicals may have. Investigations will include chemical, pathological, and physiological and other changes that take place in livestock as a result of controlling pests.

A supplemental sum of \$338,000 has been requested to plant facilities at Beltsville, Md., to study methods of controlling plant diseases, nematodes, and insects, and for research on safer methods for controlling stored products insects. (The total cost of this facility will be \$4,225,000.)

The additional facilities will enable us to develop new and improved methods of reducing plant diseases and plant nematodes through basic studies on fungicides, nematocides, bactericides, and viricides and the host-plant relationships. We hope to develop nontoxic pesticides and biological forms of control, lower the concentrations of currently used pesticides, and study chemical and related biological research on various materials that may lead to more effective insect control.

We are asking for an increase of \$160,000 to plan a \$2 million Insect Attractants and Basic Biology Laboratory at Gainesville, Fla. There is great need for adequate facilities for studies of insect attractants. They are highly specific and avoid or minimize pesticide residues on foods or feeds, and present no hazards to wildlife and beneficial insects. We believe that further research could result in developing highly desirable methods for detecting and controlling many insects. Promising work is already underway to develop such attractants for the gypsy moth, American cockroach, and other important pests.

The basic biological research at Gainesville would emphasize work on the biology, ecology, physiology, and nutrition of stored-product insects. It would also include research on insecticides and relationship to the development of resistance to insecticides by stored-product insects.

An additional sum of \$100,000 has been requested for the planning of facilities which would provide for the expanded registration and enforcement activities under the Federal Insecticide, Fungicide, and Rodenticide Act. The increased regulatory activities require laboratory analyses and greenhouses and field evaluation relating to chemistry, bacteriology, plant biology, pharmacology, and entomology. The facilities would be located at Beltsville, Md., on federally owned land, and would provide a net total of 23,000 square feet of laboratory-office space and 15,000 square feet of headhouse-greenhouse space. (The estimated total cost of these facilities is \$1,250,000.) These facilities would be constructed in conjunction with the research facilities at Beltsville, which I have just discussed. It is believed a single building would provide for more effective work, as well as result in savings of construction funds and future operating costs.

Additional funds have been requested for facilities to provide for more research on forest protection.

We have asked for \$50,000 for laboratory facilities at Berkeley, Calif., that would enable us to conduct studies on more selective and less persistent chemicals for use in suppressing outbreaks of highly destructive forest insects. Studies would be accelerated on the modes of action of different chemicals both on and in insects and their tree hosts. New and less hazardous chemicals will be formulated and their effectiveness will be tested in pilot applications. Although laboratory space is available, the increase would provide special facilities for the storage, mixing, and test applications of chemical formulations.

We have also requested an additional \$850,000 to provide laboratory facilities at New Haven, Conn., on the insects and diseases of forest trees of the Northeast—facilities, by the way, that were recently destroyed by fire. The proposed laboratory is needed to house research now underway and additional investigations to speed progress on biological control of important forest pests in New England and adjacent States. The possibilities of reducing or preventing much of the damage caused by the gypsy moth and other serious insect pests will be studied. Research will be speeded up on insect parasites, predators, and disease pathogens. The research will also include studies of sterilization techniques and development of more vigorous strains of insect enemies.

An appropriation of \$800,000 has been requested for construction of facilities at Savannah, Ga., to permit expanded research on insect control in agricultural products in marketing channels. Research here would be conducted on non-pesticidal methods for controlling stored insect pests, development of simple and rapid methods for detecting residues in harvested commodities, development of more specific and less persistent pesticidal treatments, and of nontoxic moth-proofing treatments.

We are requesting \$3.242 million for facilities grants under authority of Public Law 88-74. This act, strongly supported by the State agricultural experiment stations, provides for formula distribution of matching grants for the construction of research facilities so that the funds requested will be at least matched by non-Federal funds. These funds when matched by State moneys will be used to construct facilities costing nearly \$6.5 million.

Every one of the State agricultural experiment stations has competence in one or more areas of research on the problems of protecting our crops, livestock, and rural communities against insects and other pests, with minimum contamination of the environment with chemicals. Every State agricultural experiment station must be responsible for and responsive to the special research needs of each State for research on these problems. And every State can expand its research in this area to meet these needs. Needed expansion will be greatly enhanced by the facilities grant funds requested. They will be used mostly for the construction of greenhouses, insectaries, small shelters for experimental animals, controlled environment units, and modifications of existing laboratories and other structures to adapt them for use in research on protection against pests.

Public Law 88-74 requires that each State proposal for use of facility grant funds must be approved by the Secretary, thus providing complete assurance against wasteful duplication among the State agricultural experiment stations or duplication of USDA facilities. A long period of effective regional and inter-regional research cooperation among States and with the U.S. Department of Agriculture on pest control and pesticide problems represents a successful history of coordination and prevention of duplication in this field. This kind of research effort will continue in an expanded program.

And now finally, may I introduce into the record a table showing the specific budget increases of each of the six Department agencies concerned.

TABLE 3.—*Summary of program and construction items, by agency, for the pest control research and education (budget amendment for fiscal 1965)*

[In thousands of dollars]

Agency	1964 base	1965 budget estimate	1965 budget amendment				Grand total
			Program	Facilities		Total	
				Construction	Planning ¹		
Research and education:							
Agricultural Research Service ²	21, 881	24, 194	12, 200	800	758	13, 758	37, 952
Forest Service.....	3, 835	4, 186	1, 850	900		2, 750	6, 936
Economic Research Service.....			500			500	500
Cooperative State Research Service.....	6, 995	7, 261	5, 550	3, 242		8, 792	16, 053
Federal Extension Service.....	2, 000	2, 000	2, 300			2, 300	4, 300
National Agricultural Library.....			200			200	200
Total, research and education.....	34, 711	37, 641	22, 600	4, 942	758	28, 300	65, 941
Disease and pest control: Agricultural Research Service.....	1, 604	2, 438	600		100	700	3, 138
Grand total.....	36, 315	40, 079	23, 200	4, 942	858	29 000	69, 079

¹ This includes funds for planning research facilities valued at \$10,725,000.

² Includes research in marketing.

Mr. Chairman and gentlemen, thank you. This completes my statement. My colleagues who are here and I will be glad to respond to any questions you may have.

Mr. WHITEN. This will conclude our hearing on this item. Thank you very much, gentlemen.

AGRICULTURAL RESEARCH SERVICE

BOLL WEEVIL CONTROL, AND SCREW-WORM ERADICATION

WITNESSES

DR. B. T. SHAW, ADMINISTRATOR, AGRICULTURAL RESEARCH SERVICE

DR. R. J. ANDERSON, DEPUTY ADMINISTRATOR, REGULATORY AND CONTROL, AGRICULTURAL RESEARCH SERVICE

E. D. BURGESS, DIRECTOR, PLANT PEST CONTROL DIVISION, AGRICULTURAL RESEARCH SERVICE

DR. F. J. MULHERN, DIRECTOR, ANIMAL DISEASE ERADICATION DIVISION, AGRICULTURAL RESEARCH SERVICE

EDMUND STEPHENS, DIRECTOR, PROGRAM EXAMINATION AND BUDGET DEVELOPMENT DIVISION, AGRICULTURAL RESEARCH SERVICE

CHARLES L. GRANT, DIRECTOR OF FINANCE AND BUDGET OFFICER, DEPARTMENT OF AGRICULTURE

Mr. WHITTEN. We will turn now to the next items before us, Senate Document No. 82, and Senate Document No. 83. We will consider these two together.

We might have at this point the justifications as well as the documents included in the record for the items under the Agricultural Research Service.

(The justifications and documents follow:)

[S. Doc. 82, 88th Cong., 2d sess.]

AMENDMENTS TO THE BUDGET FOR THE DEPARTMENT OF AGRICULTURE

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., June 23, 1964.

THE PRESIDENT,
The White House.

SIR: I have the honor to submit herewith for your consideration amendments to the request for appropriations transmitted in the budget for 1965 for the Department of Agriculture, as follows:

"AGRICULTURAL RESEARCH SERVICE

"Budget appendix page	Heading	Request pending	Proposed amendments	Revised request
85	Salaries and expenses, plant and animal disease and pest control.....	\$67,905,000	+\$1,000,000	\$68,905,000
88	Salaries and expenses (special foreign currency program).....	5,000,000	-1,000,000	4,000,000."

The proposed amendment for plant and animal disease and pest control would provide 50 percent of the total costs of controlling the boll weevil outbreak on the Texas high plains. The infestation is moving westward through the weevil-free high plains area and has now reached a level of economic significance. Prompt action by the producers, the State, and the Federal Government working cooperatively will not only protect this area but will prevent the spread of the insect into cotton-growing areas in Arizona, California, and New Mexico.

I recommend that the foregoing amendments to the budget be transmitted to the Congress.

Respectfully yours,

KERMIT GORDON,
Director of the Bureau of the Budget.

[S. Doc. 82]

AGRICULTURAL RESEARCH SERVICE

1965 budget amendment

Page in budget appendix	Heading	Revised budget estimates, fiscal year 1965	Revised estimate	Increase
85	Salaries and expenses:			
	Research.....	¹ \$98,615,000	¹ \$98,615,000	
	Plant and animal disease and pest control.....	² 67,905,000	68,905,000	+\$1,000,000
	Meat inspection.....	30,837,000	30,837,000	

¹ Excludes reappropriation of \$1,000,000 under "Special fund."² Budget estimate, as revised by H. Doc. 240 and S. Doc. 83.

PURPOSE AND NEED FOR BUDGET AMENDMENT

On the eastern border of the High Plains area of Texas the spread of boll weevil infestation has reached damaging proportions. If allowed to continue, the buildup in weevil population would soon spread throughout the valuable cotton acreage of the Texas High Plains which alone produces about 15 percent of the American cotton crop at a value of about \$400 million, and to the highly productive cotton areas of Arizona, California, and New Mexico. This area is presently free of boll weevils, the most destructive cotton insect pest in the United States. Arizona, California, New Mexico, and west Texas produce in total about 40 percent of the Nation's cotton crop which has an estimated value of almost \$1 billion.

In order to stop the spread, a 3-year cooperative treatment program is needed on approximately 175,000 acres of the eastern border of the Texas High Plains. In field trials, insecticide treatments in the fall of the year when the boll weevil is entering diapause (hibernation) have proved effective in practically eliminating boll weevils. Based on this success it is believed that at the end of 3 years the boll weevil population in this area, known as the Cap Rock, would be reduced to such low levels that danger of spread would be reduced to a minimum. Any spot outbreaks which would occur from time to time could be readily treated. An expanse of uncultivated ranch land provides natural advantages against reinfestation except for such spot infestations. Area cotton producers are preparing an agreement to provide for placing funds annually for a 3-year period for half of the cost in trust for the Department to use in planning and conducting program operations.

A boll weevil control program is now being conducted to prevent the northward and westward spread of infestations from Mexico and from the El Paso area. Late season insecticide treatments in the area between Presidio and El Paso and in Sonora, Mexico, just south of Nogales, Ariz., have proved highly effective in stemming the encroachment of boll weevils into Arizona, California, New Mexico, and west Texas. These operations have been financed by releases from the contingency fund for emergency measures against diseases and pests.

Justification for budget amendment, fiscal year 1965 for "Salaries and expenses, ARS, plant and animal disease and pest control"

Project	Revised budget estimate, fiscal year 1965	Revised estimate	Increase
Plant and animal disease and pest control.....	\$67,905,000	\$68,905,000	+\$1,000,000

Need for increase

The boll weevil is the most destructive cotton insect pest in the United States and severely limits cotton production in generally infested areas. It infests most of the cotton producing areas of the Southeast where the climate is warm and humid. The highly productive cotton areas of west Texas, New Mexico, Arizona, and California are presently free from boll weevils. The latter areas produce about 40 percent of the Nation's cotton crop with an estimated value of almost \$1 billion. The threat of boll weevils invading this valuable cotton acreage through westward spread has reached serious proportions. In the High Plains area of Texas known as the Caprock, the boll weevil has shown evidence of becoming established in irrigated cotton areas. This area alone produces about 15 percent of the American cotton crop with an annual value estimated at about \$400 million.

The boll weevil infestation in the High Plains area has only recently reached a level of economic significance. The infestation in the Cap Rock is now so widespread that the pest will gradually infest all the valuable cotton acreage in west Texas if allowed to spread. From this area, it could readily spread farther westward into New Mexico, Arizona, and California.

At the present time, the area requiring insecticide treatment involves approximately 175,000 acres along the eastern border of the Texas High Plains. Field trials have demonstrated that fall insecticide treatments at the time the weevil is entering diapause (hibernation) are very effective in practically eliminating boll weevil infestations. Field surveys would be conducted throughout the entire area where treatments are made to delimit the infestation, as well as to determine the efficiency of the treatments. The fall treatments would have to be repeated over a 3-year period. It is expected that an organized and concerted suppression program would reduce the present boll weevil infestation on the Caprock to such a low level that danger of spread would be minimal. An expanse of uncultivated ranch land would provide natural advantages against reinfestations. At the conclusion of the 3-year program, it should be possible to eliminate small or spotty outbreaks as they occur.

The total program is estimated to cost \$2 million annually over a 3-year period. Because of the potential damage to valuable cotton acreage, cotton producers in west Texas are making necessary arrangements to provide 50 percent of the cooperative program costs. An agreement is near completion under which the West Texas Cotton Growers Association will provide up to \$1 million each year of the program for the Department's use in planning and conducting the required treatment operations.

A boll weevil control program is now being conducted to prevent the northward and westward spread of infestations from Mexico and from the El Paso area. Late season insecticide treatments in the area between Presidio and El Paso and in Sonora, Mexico, just south of Nogales, Ariz., have proved highly effective in stemming the encroachment of boll weevils into Arizona, California, New Mexico, and west Texas. These operations have been financed by releases from the contingency fund for emergency measures against diseases and pests.

Plan of work

The area requiring insecticide treatment will involve approximately 175,000 acres on the eastern border of the High Plains of Texas. The first treatments will be applied around September 15 and three or more applications will be made at 10- to 14-day intervals until the first killing frost.

Surveys will be made throughout the entire area where treatments are scheduled, beginning about August 1, for the purpose of delimiting the infestations. Surveys will also be made during the course of the program to determine the efficacy of the treatment.

The insecticides will be applied by aircraft under contract with private operators. The contractors will furnish labor and equipment for mixing, loading, and servicing the planes. A methods improvement program will be conducted in conjunction with the regular control program for field testing other chemical formulations and application rates.

Program and financing

	Latest estimate, 1965	Revised estimate	Increase
Program by activities:			
1. Research:			
(a) Farm research.....	\$66,671,300	\$66,671,300	-----
(b) Utilization research and development.....	25,452,600	25,452,600	-----
(c) Nutrition and consumer use research.....	3,096,800	3,096,800	-----
(d) Construction of facilities.....	2,896,500	2,896,500	-----
(e) Contingencies.....	1,000,000	1,000,000	-----
Total, research.....	99,117,200	99,117,200	-----
2. Plant and animal disease and pest control:			
(a) Plant disease and pest control.....	26,068,600	27,068,600	\$1,000,000
(b) Animal disease and pest control.....	39,522,800	39,522,800	-----
(c) Pesticides regulation.....	2,313,600	2,313,600	-----
Total, plant and animal disease and pest control.....	67,905,000	68,905,000	1,000,000
3. Meat inspection.....			
	30,837,000	30,837,000	-----
Total program costs ¹	197,859,200	198,859,200	1,000,000
Change in selected resources ²	-502,200	-502,200	-----
Total obligations.....	197,357,000	198,357,000	1,000,000
Financing: New obligational authority (appropriation).....	197,357,000	198,357,000	1,000,000

¹ Includes capital outlay as follows: Latest estimate \$12,025,000; revised estimate, \$12,092,000.

² Selected resources as of June 30, are as follows:

	Latest estimate, 1965	Revised estimate
Stores.....	\$581,000	\$581,000
Unpaid undelivered orders.....	13,237,000	13,237,000
Advances.....	735,000	735,000
Total selected resources.....	14,553,000	14,553,000

Object classification

	Latest estimate, 1965	Revised estimate	Increase
AGRICULTURAL RESEARCH SERVICE			
11 Personnel compensation:			
Permanent positions.....	\$123,663,900	\$123,740,000	\$76,100
Positions other than permanent.....	4,596,200	4,619,700	23,500
Other personnel compensation.....	1,670,600	1,671,000	400
Total personnel compensation.....	129,930,700	130,030,700	100,000
12 Personnel benefits.....	9,895,500	9,902,500	7,000
21 Travel and transportation of persons.....	5,639,700	5,676,700	37,000
22 Transportation of things.....	1,078,600	1,078,600	-----
23 Rent, communications, and utilities.....	3,544,500	3,550,500	6,000
24 Printing and reproduction.....	1,055,400	1,055,400	-----
25 Other services.....	12,622,500	13,147,500	525,000
Services of other agencies.....	7,280,100	7,280,100	-----
26 Supplies and materials.....	13,058,200	13,338,200	280,000
31 Equipment.....	7,715,000	7,760,000	45,000
32 Lands and structures.....	1,296,000	1,296,000	-----
41 Grants, subsidies, and contributions:			
Grants for research.....	372,000	372,000	-----
Payment to Mexican-United States Commission for the Prevention of Foot-and-Mouth Disease.....	24,000	24,000	-----
42 Insurance claims and indemnities: Indemnities:			
Tuberculosis.....	300,000	300,000	-----
Brucellosis.....	1,400,000	1,400,000	-----
Scrapie of sheep.....	250,000	250,000	-----
Hog cholera.....	600,000	600,000	-----
Subtotal.....	196,062,200	197,062,200	1,000,000
Deduct quarters and subsistence charges.....	98,000	98,000	-----
Total, Agricultural Research Service.....	195,964,200	196,964,200	1,000,000
ALLOCATION TO GENERAL SERVICES ADMINISTRATION			
25 Other services.....	117,100	117,100	-----
32 Lands and structures.....	1,275,700	1,275,700	-----
Total, General Services Administration.....	1,392,800	1,392,800	-----
Total obligations.....	197,357,000	198,357,000	1,000,000

Personnel summary

	Latest estimate, 1965	Revised estimate	Increase
Total number of permanent positions.....	18,457	18,469	12
Full-time equivalent of other positions.....	1,086	1,091	5
Average number of employees.....	18,003	18,019	16
Employees in permanent positions, end of year.....	17,334	17,346	12
Employees in other positions, end of year.....	1,992	2,002	10

[S. Doc. 82]

AGRICULTURAL RESEARCH SERVICE

1965 budget amendment

Page in Budget appendix		Budget estimates, fiscal year 1965	Revised estimate	Decrease
88	Salaries and expenses (special foreign currency program).....	\$5,000,000	\$4,000,000	-\$1,000,000

PURPOSE AND NEED FOR BUDGET AMENDMENT

A decrease of \$1 million for the research program under Public Law 480, is proposed as follows:

Project	Budget estimates 1965	Revised estimate	Decrease
Sec. 104(a), Market development research.....	\$2,000,000	\$2,000,000	-----
Sec. 104(k), Agricultural and forestry research.....	3,000,000	2,000,000	-\$1,000,000
Total, special foreign currency program.....	5,000,000	4,000,000	-1,000,000

This modifies the Department's recommendations in the letter of May 27, 1964, to the chairman of the Senate Agricultural Appropriations Subcommittee, wherein the restoration of the \$5 million budget estimate for the Public Law 480 research program for 1965 was proposed. It now appears that \$4 million will be sufficient to carry out the program plans for fiscal year 1965.

SALARIES AND EXPENSES (SPECIAL FOREIGN CURRENCY PROGRAM)

Program and financing

	Original estimate, 1965	Revised estimate, 1965	Decrease
Program by activities:			
1. Market development research (sec. 104(a)).....	\$5,200,000	\$5,200,000	-----
2. Agricultural and forestry research (sec. 104(k)).....	5,570,000	5,370,000	-\$200,000
3. Translation of scientific publications (sec. 104(k)).....	30,000	30,000	-----
Total program costs, funded ¹	10,800,000	10,600,000	-200,000
Change in selected resources ²	-800,000	-1,600,000	-800,000
Total obligations.....	10,000,000	9,000,000	-1,000,000
Financing: Unobligated balance brought forward.....	-5,000,000	-5,000,000	-----
New obligational authority (appropriation).....	5,000,000	4,000,000	-1,000,000

¹ Includes capital outlay as follows: Original estimate, \$17,000; revised estimate, \$17,000.

² Selected resources as of June 30 are as follows: Unpaid undelivered orders, original estimate, 1965, \$25,237,000; revised estimate, \$24,437,000.

Object classification

	Original estimate, 1965	Revised estimate, 1965	Decrease
11 Personnel compensation:			
Permanent positions.....	\$59,600	\$59,600	-----
Positions other than permanent.....	1,100	1,100	-----
Other personnel compensation.....	8,300	8,300	-----
Total personnel compensation.....	69,000	69,000	-----
12 Personnel benefits.....	14,300	14,300	-----
21 Travel and transportation of persons.....	105,000	105,000	-----
22 Transportation of things.....	15,000	15,000	-----
23 Rent, communications, and utilities.....	4,000	4,000	-----
25 Other services.....	35,000	35,000	-----
Services of other agencies.....	50,000	50,000	-----
26 Supplies and materials.....	15,700	15,700	-----
31 Equipment.....	17,000	17,000	-----
41 Grants, subsidies, and contributions.....	9,675,000	8,675,000	-\$1,000,000
Total obligations.....	10,000,000	9,000,000	-1,000,000

Personnel summary

	Original estimate, 1965	Revised estimate, 1965	Decrease
Total number of permanent positions.....	17	17	-----
Full-time equivalent of other positions.....	1	1	-----
Average number of all employees.....	18	18	-----
Employees in permanent positions, end of year.....	17	17	-----
Employees in other positions, end of year.....	1	1	-----

[S. Doc. 83, 88th Cong., 2d sess.]

AN AMENDMENT TO THE BUDGET AND A PROPOSED SUPPLEMENTAL APPROPRIATION FOR THE DEPARTMENT OF AGRICULTURE

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., June 18, 1964.THE PRESIDENT,
The White House.

SIR: I have the honor to submit herewith for your consideration an amendment to the request for appropriations transmitted in the budget for 1965 in the amount of \$2,250,000 and a proposed supplemental appropriation for 1964 in the amount of \$10 million, both for the Department of Agriculture as follows:

DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
SALARIES AND EXPENSES

Budget appendix page	Heading	Request pending	Proposed amendments	Revised request
85	Salaries and expenses, Plant and animal disease and pest control..... (Delete the paragraph under this heading and insert in lieu thereof the following): Plant and animal disease and pest control: For operations and measures, not otherwise provided for, to control and eradicate pests and plant and animal diseases and for carrying out assigned inspection, quarantine, and regulatory activities, as authorized by law, including expenses pursuant to the Act of February 28, 1947, as amended (21 U.S.C. 114b-c), [\$64,449,000] \$67,905,000, of which \$1,500,000 shall be apportioned for use pursuant to section 3679 of the Revised Statutes, as amended, for the control of outbreaks of insects and plant diseases to the extent necessary to meet emergency conditions: <i>Provided</i> , That no funds shall be used to formulate or administer a brucellosis eradication program for the current fiscal year that does not require minimum matching by any State of at least 40 per centum: <i>Provided further</i> , That no funds shall be available for carrying out [the] a screwworm eradication program that does not require minimum matching by State or local sources of at least 50 per centum of the expenses of production, irradiation, and release of the screwworm flies, <i>except that when eradication from any area has been completed the matching requirement shall apply only to expenses of releasing sterile screwworm flies outside the barrier zone in cases of reinfestation and may be met by providing inspection or other services or funds: Provided further</i> , That, in addition, in emergencies which threaten the livestock or poultry industries of the country, the Secretary may transfer from other appropriations or funds available to the agencies or corporations of the Department such sums as he may deem necessary, to be available only in such emergencies for the arrest and eradication of foot-and-mouth disease, rinderpest, contagious pleuropneumonia, or other contagious or infectious diseases of animals, or European fowl pest and similar diseases in poultry, and for expenses in accordance with the Act of February 28, 1947, as amended, and any unexpended balances of funds transferred under this head in the next preceding fiscal year shall be merged with such transferred amounts;	\$65,655,000	+\$2,250,000	\$67,905,000

The southwestern screw-worm eradication program has (a) eliminated screw-worms from overwintering areas in Texas and New Mexico and areas in States north and east of this eradication area; and (b) has demonstrated that an artificial barrier zone of sterile screw-worm flies along the Mexico-United States border can be effectively maintained to prevent the establishment of self-perpetuating screw-worm populations in screw-worm-free areas of the United States.

It had been estimated that the eradication program and study of the feasibility of maintaining a barrier zone to prevent reinfestations from Mexico would require a 3-year period. However, the screw-worm has been eradicated in a shorter period and it has been determined that a barrier now can be established which will keep Texas and New Mexico and States to the north and east free.

This proposed amendment together with the \$2.8 million in the 1965 budget request will provide for the maintenance of an international protective barrier. Since most of this barrier is located in Mexico, that Government has pledged its cooperation and as the benefits will be for the United States the cost will be borne by the Federal Government.

This amendment is in addition to the amendment transmitted to the Congress on March 9, 1964, House Document No. 240.

I recommend that the foregoing proposals be transmitted to the Congress:

Respectfully yours,

KERMIT GORDON,
Director of the Bureau of the Budget.

AGRICULTURAL RESEARCH SERVICE

1965 budget amendment

Page in budget appendix	Heading	Budget estimate, 1965, as revised by House Document 240	Revised estimate	Increase
85	Salaries and expenses:			
	Research.....	¹ \$98, 615, 000	¹ \$98, 615, 000	
	Plant and animal disease and pest control.....	65, 655, 000	67, 905, 000	+\$2, 250, 000
	Meat inspection.....	30, 837, 000	30, 837, 000	
	Proposed language changes follow (new language italicized and deleted matter in brackets):			
	* * * <i>Provided further</i> , That no funds shall be available for carrying out [the] a screwworm eradication program that does not require minimum matching by State or local sources of at least 50 per centum of the expenses of production, irradiation, and release of the screwworm flies, except that when eradication from any area has been completed the matching requirement shall apply only to expenses of releasing sterile screwworm flies outside the barrier zone in cases of reinfestation and may be met by providing inspection or other services or funds: * * *.			

¹ Excludes reappropriation of \$1,000,000 under "Special fund".

EXPLANATION OF LANGUAGE

The first change would delete the article "the" referring to the Southwest screw-worm eradication program which was confined to New Mexico, Texas, Oklahoma, Louisiana, and Arkansas.

The second change provides for altering the matching proviso for a cooperative screw-worm eradication program when eradication from any area has been completed. Program operations then require (a) maintenance of an artificial barrier zone of sterile screw-worm flies to protect areas of the United States freed of native screw-worms from reinfestation from Mexico and (b) spot eradication of reinfestations in screw-worm-freed areas behind the barrier zone. The new language provides for matching the expenses of screw-worm release only in the case of spot eradication operations. Protective barrier zone operations are now required along the Mexico-United States international boundary to protect Texas, New Mexico, and States north and east.

PURPOSE AND NEED FOR BUDGET AMENDMENT

The southwestern screw-worm eradication program has (a) eliminated screw-worms from the overwintering areas in Texas and New Mexico and areas in States north and east of this eradication area; and (b) has demonstrated that an artificial barrier zone of sterile screw-worm flies along the Mexico-United States border can be effectively maintained to prevent the establishment of self-perpetuating native screw-worm populations in screw-worm-freed areas of Texas, New Mexico, and States north and east.

The maintenance of the barrier zone will require the release of sterile screw-worm flies up to 200 miles deep into the Republic of Mexico. As the screw-worm can readily migrate across the international boundary, an integral part of the barrier zone will extend into the United States in order to prevent screw-worm reinfestations from Mexico in the States of Texas, New Mexico, and areas to the north and east. The operation of the barrier zone along the Mexican-United States border to protect screw-worm-freed areas of Texas, New Mexico, and States north and east is a Federal responsibility and requires additional Federal funds.

The exact dimensions of the barrier will vary from season to season and under different climatic conditions. Most of the field operations would be carried out in the Republic of Mexico. It is expected that State and local

agencies will meet the requirement to match the costs of releasing sterile screw-worm flies, as needed, to eliminate reinfestations as they may occur in the United States which require a sterile fly drop and which are outside the limits of the barrier zone operation.

The State of Texas and livestock producers in Texas, New Mexico, Arkansas, Louisiana, and Oklahoma provided substantial funds during the trial eradication program. It is expected that full cooperation would be forthcoming in the case of spot infestations outside the barrier zone. The instances requiring matching of costs can be readily identified as the dimensions of the artificial barrier zone within the United States will be known at any given time.

Justification for budget amendment, fiscal year 1965, for "Salaries and expenses, Agricultural Research Service, plant and animal disease and pest control"

Project	Budget estimate, fiscal year 1965, as revised by H. Doc. 240	Revised estimate	Increase
Plant and animal disease and pest control.....	\$65,655,000	\$67,905,000	+\$2,250,000

Need for increase

An increase of \$2,250,000 is needed to maintain an artificial barrier zone along the border between Mexico and Texas and New Mexico to prevent the reestablishment of self-perpetuating screw-worm population in States freed of screw-worms. The maintenance of such an international barrier is considered to be a Federal responsibility. Program operations will be conducted primarily within the Republic of Mexico, with the consent of the Mexican Government. The increase would also provide for eradication of isolated and sporadic outbreaks outside the zone from time to time.

Cooperative activities were inaugurated in February 1962 as a 3-year trial eradication program to eliminate screw-worm flies in Arkansas, Louisiana, Oklahoma, Texas, and New Mexico. Concurrently, activities were conducted to determine the requirements and the economic feasibility for establishing and maintaining an artificial barrier zone of sterile screw-worm flies along the Mexican-United States border that would prevent screw-worms from Mexico from entering screw-worm-free areas of Texas, New Mexico, and States north and east. The southwestern screw-worm eradication program has (a) eliminated screw-worms from overwintering areas in Texas and New Mexico and areas in States north and east of this eradication area; and (b) has demonstrated that an artificial barrier zone of sterile screw-worm flies can be effectively maintained to prevent the establishment of self-perpetuating screw-worm populations in the screw-worm-free areas of Texas, New Mexico, and States north and east. The eradication program and study of the feasibility of maintaining a barrier zone to prevent reinfestations from Mexico were estimated to require a 3-year period. However, the screw-worm has been eradicated in a shorter period.

Prior to initiating screw-worm activities in the Southwest in February 1962, the costs of screw-worm infestations to livestock producers in the Southwest had been estimated from \$25 to \$100 million annually, with additional losses to wild game. In addition to protecting the Southwest, the international barrier zone of sterile screw-worm flies will provide protection against screw-worm reinfestations in the Southeastern States where annual losses were estimated at \$10 to \$25 million annually prior to eradication in that region. The artificial barrier zone is expected to protect livestock producers against losses such as occurred before screw-worms were eradicated in the Southeast and the Southwest.

1964 program.—Cooperative program operations which have demonstrated that an artificial barrier zone of sterile screw-worm flies can be effectively maintained along the Mexican-United States border to prevent screw-worms migrating

from Mexico from becoming permanently reestablished in the overwintering areas of New Mexico and Texas are estimated to cost \$5,300,000 in fiscal year 1964.

In addition, State and local personnel have provided field detection surveys to locate promptly any possible screw-worm infested animals. This includes efforts throughout the Southwest to have livestock producers maintain a constant vigilance over their animals and to report promptly any evidence of screw-worms. State personnel have provided the necessary supervision in the treatment of infested animals including precautionary treatment of exposed animals. These activities provide vital support in efforts to prevent the reestablishment of native screw-worm infestations.

Current status.—From January 1 to May 30, 1964, there were 71 confirmed cases of screw-worm in the Southwest compared to 1,170 cases in the same period of 1963. The cases this year have been confined largely to southern Texas, the screw-worms having entered the United States from Mexico. In the week June 14-20, 1964, there were no confirmed cases of screw-worm infestations in the Southwest.

1965 program operations.—The proposed increase would provide Federal funds totaling \$5 million in fiscal year 1965 for maintaining the barrier zone to protect Texas, New Mexico, and States north and east against permanent screw-worm reinfestation. State and local sources would provide whatever additional funds may be needed to maintain the current level of program operations especially to wipe out isolated infestations which occur requiring the release of sterile screw-worm flies. In addition, cooperators would continue to provide for field inspections and other services at a level at least as high as during the past year.

It is expected that the geographic dimensions of the barrier zone will vary according to seasons of the year, climatic conditions during the year, and information derived from field survey operations concerning native screw-worm fly populations in northern Mexico. Likewise, the numbers of sterile flies released will vary during the year with larger numbers required during the warm weather as the native flies attempt to migrate northward from Mexico.

Maintenance of the barrier zone will involve release of sterile screw-worm flies up to 200 miles deep into Mexico, the distance depending on terrain, climatic conditions, and field survey information in northern Mexico. The northern limits of the barrier will extend across the border into New Mexico and Texas as the screw-worm can readily migrate across the international border. Thus, an integral part of the barrier zone will require the release of sterile screw-worm flies within the United States. The distance factor will vary between cold and warm weather months.

Plan of work

The proposed increase would provide a total of \$5 million for maintenance of an artificial barrier of sterile screw-worm flies along the Mexico-United States border, primarily within Mexico. It would provide the personnel, supplies, materials, utilities, and equipment needed to produce during the year a weekly average of 119 million sterile screw-worm flies to be released over an estimated 130,000 square miles needed to be included in the barrier zone. International and interstate inspection activities would be continued in support of the artificial barrier operations. As spot reinfestations occur from time to time because of reintroduction of the screw-worm fly from Mexico, steps would be taken to eradicate them promptly. Cooperation of affected States is expected in these eradication activities. Cooperators would be required to provide inspection and other services to match the cost of any release of sterile screw-worm flies outside the barrier zone at the time of the reinfestation. It is expected that total Federal and State outlays in fiscal year 1965 will be about the same as in 1964.

SALARIES AND EXPENSES

Program and financing

	Budget estimate, 1965, as revised by H. Doc 240	Revised estimate, 1965	Increase
Program by activities:			
1. Research:			
(a) Farm research.....	\$66,671,300	\$66,671,300	-----
(b) Utilization research and development.....	25,452,600	25,452,600	-----
(c) Nutrition and consumer use research.....	3,096,800	3,096,800	-----
(d) Construction of facilities.....	2,896,500	2,896,500	-----
(e) Contingencies.....	1,000,000	1,000,000	-----
Total, research.....	99,117,200	99,117,200	-----
2. Plant and animal disease and pest control:			
(a) Plant disease and pest control.....	26,068,600	26,068,600	-----
(b) Animal disease and pest control.....	37,272,800	39,522,800	+\$2,250,000
(c) Pesticides regulation.....	2,313,600	2,313,600	-----
Total, plant and animal disease and pest control.....	65,655,000	67,905,000	+2,250,000
3. Meat inspection.....			
	30,837,000	30,837,000	-----
Total program costs ¹	195,609,200	197,859,200	+2,250,000
Change in selected resources ²	-502,200	-502,200	-----
Total obligations.....	195,107,000	197,357,000	+2,250,000
Financing: New obligational authority (appropriation).....	195,107,000	197,357,000	+2,250,000

¹ Includes capital outlay as follows: Latest estimate, \$12,000,000; revised estimate \$12,025,000.

² Selected resources as of June 30 are as follows:

	Budget estimate, 1965, as revised by H. Doc. 240	Revised estimate, 1965
Stores.....	\$581,000	\$581,000
Unpaid, undelivered orders.....	13,237,000	13,237,000
Advances.....	735,000	735,000
Total selected resources.....	14,553,000	14,553,000

Object classification

	Budget estimate, 1965, as revised by H. Doc. 240	Revised estimate, 1965	Increase
AGRICULTURAL RESEARCH SERVICE			
11 Personnel compensation:			
Permanent positions.....	\$122,813,900	\$123,663,900	\$850,000
Positions other than permanent.....	4,596,200	4,596,200	-----
Other personnel compensation.....	1,645,600	1,670,600	25,000
Total personnel compensation.....	129,055,700	129,930,700	875,000
12 Personnel benefits.....	9,855,500	9,895,500	40,000
21 Travel and transportation of persons.....	5,604,700	5,639,700	35,000
22 Transportation of things.....	1,069,600	1,078,600	9,000
23 Rent, communications, and utilities.....	3,519,500	3,544,500	25,000
24 Printing and reproduction.....	1,050,400	1,055,400	5,000
25 Other services.....	12,195,500	12,622,500	427,000
Services of other agencies.....	7,280,100	7,280,100	-----
26 Supplies and materials.....	12,249,200	13,058,200	809,000
31 Equipment.....	7,690,000	7,715,000	25,000
32 Lands and structures.....	1,296,000	1,296,000	-----
41 Grants, subsidies, and contributions:			
Grants for research.....	372,000	372,000	-----
Payment to Mexican-United States Commission for the Prevention of Foot-and-Mouth Disease.....	24,000	24,000	-----
42 Insurance claims and indemnities:			
Indemnities:			
Tuberculosis.....	300,000	300,000	-----
Brucellosis.....	1,400,000	1,400,000	-----
Scrapie of sheep.....	250,000	250,000	-----
Hog cholera.....	600,000	600,000	-----
Subtotal.....	193,812,200	196,062,200	+2,250,000
Deduct quarters and subsistence charges.....	98,000	98,000	-----
Total, Agricultural Research Service.....	193,714,200	195,964,200	+2,250,000
ALLOCATION TO GENERAL SERVICES ADMINISTRATION			
25 Other services.....	117,100	117,100	-----
32 Lands and structures.....	1,275,700	1,275,700	-----
Total, General Services Administration.....	1,392,800	1,392,800	-----
Total obligations.....	195,107,000	197,357,000	+2,250,000

Personnel summary

	Budget estimate, 1965, as revised by H. Doc. 240	Revised estimate, 1965	Increase
Total number of permanent positions.....	18,190	18,457	+267
Full-time equivalent of other positions.....	1,086	1,086	-----
Average number of employees.....	17,768	18,003	+235
Employees in permanent positions, end of year.....	17,067	17,334	+267
Employees in other positions, end of year.....	1,992	1,992	-----

Mr. WHITEN. I note the presence of our chairman of the Committee on Appropriations. We are glad to have Mr. Mahon with us. These items concerning agriculture have been of prime interest to him through the years. It has been our pleasure on this subcommittee, long before he became chairman of the full committee, to cooperate with him and discuss with him the many problems of agriculture.

Mr. Chairman, we are glad to have you here. You might wish to have them present their general statement first. Then we will be glad for you to ask any questions you might like.

The CHAIRMAN (Mr. Mahon). Just go ahead, thank you.

GENERAL STATEMENT

Dr. SHAW. I have a short general statement, Mr. Chairman.

We appreciate this opportunity to discuss with the committee the following 1965 budget amendments for work of the Agricultural Research Service recently submitted by the President:

- | | |
|--|--------------|
| 1. (a) Boll weevil in High Plains area of Texas..... | +\$1,000,000 |
| (b) Special foreign currency programs..... | -1,000,000 |

Mr. WHITEN. Don't you think we should put two minuses there? Our committee already cut that out once, did we not?

Dr. SHAW. You committee reduced the total estimate we had of \$5 million. You cut it all out. The Department made a request to the Senate to have \$4 million of it restored and not the \$1 million offsetting this \$1 million.

The second item: Southwest screw-worm program, +\$2,250,000.

BOLL WEEVIL IN HIGH PLAINS OF TEXAS

On the eastern border of the High Plains area of Texas, the spread of boll weevil infestations presents a serious threat to valuable cotton acreage now free of the boll weevil. If allowed to continue, the natural buildup in weevil population would soon spread through the Texas High Plains which alone produces annually about 15 percent of the Nation's cotton crop valued at approximately \$400 million. Further, a widespread boll weevil infestation in the High Plains of Texas could soon spread to highly productive cotton acreage in Arizona, California, and New Mexico. These States and west Texas produce about 40 percent of Nation's cotton crop which has an estimated value of almost \$1 billion.

In field trials, insecticide treatments in the fall of the year when the weevil is entering hibernation (diapause) have proved highly effective in practically eliminating boll weevils especially in areas which are not immediately exposed to reinfestations. This has been demonstrated in fall treatment operations in the Presidio-El Paso area along the Mexican-United States border to prevent the northward spread of weevil infestations from Mexico.

At the present time, the infested area on the High Plains is limited to an area known as the Caprock. While the infested area is still isolated, we believe an organized and concentrated suppression program will reduce boll weevil populations to such minimal levels that local growers would have to contend with only small or spotty outbreaks as they occur. These could be eliminated readily and the area

maintained relatively free because an expanse of uncultivated ranch land provides natural advantages against widespread boll weevil reinfestations.

I would like to show you a map I have here which shows the area we are talking about. This in the solid red is the area where we expect to make the treatments. This area is free of the boll weevil and all the area west is free of it. Here to the east is where we have rangelands without cotton production so if we can knock it out here, we think, then, we can relatively easily keep it out. If we let it go it will cover all of this area and certainly increase the chances of spreading on west through the other part of the United States that is also free of the boll weevil.

It is expected that the fall treatment program would be repeated over a 3-year period on approximately 175,000 acres. Field surveys would be conducted throughout the treatment area to delimit the infestation, as well as to determine the efficiency of the treatments.

The total program is estimated to cost \$2 million annually for the 3-year period. An agreement is near completion under which the West Texas Cotton Growers Association will provide \$1 million each year—half of the costs. These matching funds would be made available for the Department's use in planning and conducting the required treatment operations.

We have a letter from the plains cotton growers that they have now an agreement from the bank to advance them the money to put up their share before they start making their collections, which they are going to do on a per bale basis as the cotton is harvested, so that we have their and the bank's assurances that they will put up their half of the money to start with.

SPECIAL FOREIGN CURRENCY PROGRAM

It is proposed to offset the Department's estimate of \$1 million for the cooperative boll weevil program by a decrease of \$1 million in the budget estimate of \$5 million for the research program under Public Law 480. These funds are under "Salaries and expenses (special foreign currency program)" and the decrease would be applied to section 104(k) research. The House bill has eliminated the proposed budget estimate of \$5 million but the Department recommends restoration of the item to the Senate with a revised amount of \$4 million for this program.

SOUTHWEST SCREW-WORM PROGRAM

The southwestern screw-worm eradication program was undertaken in February 1962 to accomplish two things. First, to eliminate native screw-worm populations from overwintering areas in Texas and New Mexico and States to the north and east, and, second, to determine the requirements and feasibility for establishing and maintaining an artificial barrier zone of sterile screw-worm flies that would prevent screw-worms from Mexico from becoming permanently reestablished in screw-worm-freed areas of Texas, New Mexico, and States to the north and east. At the start, it was anticipated that a 3-year trial program would be required.

It pleases me to report that after about 2½ years native screw-worm populations have been eliminated from Texas, New Mexico, and in States to the north and east; and program operations have demonstrated that the maintenance of an artificial barrier zone of sterile screw-worm flies can effectively prevent the reestablishment of self-perpetuating native screw-worm populations within areas of this country which have been freed of this livestock pest.

Before proceeding any further, Mr. Chairman, I must mention the substantial financial support provided during the trial eradication program by the State of Texas and the Southwest Animal Health Research Foundation, an organization of livestock producers in the Southwest. Also, cooperation has been provided by the States of Arkansas, Arizona, Louisiana, Oklahoma, and New Mexico and the Republic of Mexico. As was true in the southeastern eradication program, the success of this program would not have been possible without the full and active cooperation of State and local groups.

The need now is to maintain the artificial barrier along the Mexican-United States border to prevent screw-worms from Mexico from entering screw-worm-freed areas of Texas and New Mexico as well as areas north and east. This is a Federal responsibility. In addition, it is to be expected that there will be small sporadic infestations occurring from time to time which must be eradicated on a cooperative basis. The estimate of \$2,250,000 before you would provide for the financing needed in 1965 in addition to the \$2,750,000 in the 1965 House bill. Most of the total estimate of \$5 million would be required to maintain the barrier zone.

BARRIER ZONE OPERATIONS IN REPUBLIC OF MEXICO

These barrier zone operations will be conducted principally within the Republic of Mexico along the international boundary. However, an integral part of the barrier will have to extend into the United States as the screw-worm can readily migrate across the border and become permanently reestablished. The exact geographic dimensions of the barrier zone will vary according to seasons of the year; climatic conditions during the year; and data derived from field survey operations concerning the intensity of native screw-worm populations in northern Mexico.

One single factor has added significantly to costs of maintaining the barrier zone over our 1962 estimates. Prior to the southwestern eradication program, research data and field experience indicated that the screw-worm fly could migrate about 5 miles a day or about 70 miles during the average lifespan of 2 weeks. From this, it was projected originally that a barrier zone should be established up to 100 miles wide. In the Southwest, it has been demonstrated that the screw-worm fly can migrate at least 180 miles. This requires a much wider barrier zone than anticipated—up to 200 miles wide. There is need for vast quantities of sterile screw-worm flies released over the larger area.

MATCHING COSTS OF OUTBREAKS OUTSIDE THE BARRIER ZONE

It can be expected that isolated and sporadic screw-worm cases in animals will occur outside the barrier zone. The budget amendment includes revised appropriation language requiring State or local sources to match the costs of releasing the sterile screw-worm flies required to eliminate such spotted outbreaks.

State and local personnel will continue to conduct field detection surveys necessary to locate promptly any possible screw-worm-infested animals. This includes efforts throughout the Southwest to have live-stock producers maintain a constant vigilance over their animals and report immediately any evidence of screw-worms. State personnel will supervise needed treatment of infested animals including precautionary treatment of exposed animals. These activities provide vital support in efforts to prevent the reestablishment of native screw-worm infestations.

EFFECTS OF SOUTHWESTERN PROGRAM ON SCREW-WORM-FREE SOUTHEASTERN STATES

Because of the southwestern screw-worm program, there were no cases of screw-worms east of the Mississippi River during calendar year 1963—the first time in 30 years. Further, only a single screw-worm case occurred in the Southeast in 1962.

From January 1 to May 30, 1964, there were 71 confirmed screw-worm cases in the Southwest, compared to 1,170 cases in the same period of 1963. The cases this year are confined largely to southern Texas where the screw-worms have migrated from Mexico. In the week June 14–20, 1964, there were no confirmed cases of screw-worm infestations in the Southwest.

Thus, the success of the southwestern program has virtually eliminated the danger of screw-worms entering the Southeastern States.

The maintenance of the barrier zone in the Southwest will afford greater protection to the screw-worm-free States of the Southeast than was possible before the barrier zone was in operation.

Because of this favorable situation, the line of inspection stations along the Mississippi River will not be maintained in fiscal year 1965. During 1963, there were no screw-worm-infested animals intercepted at the inspection stations maintained along the Mississippi River. I wish to emphasize, Mr. Chairman, that we are concerned that the present screw-worm-free status of the Southeastern States is not jeopardized. As an added precaution, we plan to continue the leasing arrangements now in existence for inspection stations in order that the line could be immediately reactivated should the need arise. We are confident this will not be necessary if the proposed increased funds of \$2,250,000 is approved.

Mr. Chairman, this completes my statement. My associates and I will try to answer any questions that you may have.

BOLL WEEVIL CONTROL

The CHAIRMAN. I would say, Mr. Chairman, that my State is, of course, very much interested in this screw-worm program and the program has been, of course, as you know, unbelievably successful. I

have been intimately associated with this boll weevil problem of which you spoke. I am much concerned and I have, of course, been in touch with you, Dr. Shaw.

Dr. SHAW. Yes.

The CHAIRMAN. When did you get the budget estimate?

Dr. SHAW. We sent it to the Bureau of the Budget on June 11 and they transmitted it on June 24.

The CHAIRMAN. To the Congress?

Dr. SHAW. Yes.

The CHAIRMAN. I think that, having just come from this area, where I conferred with cotton farmers who are interested in this program, it might be of some interest to the committee to say that we are already having our problems with the boll weevil in the eastern area, of which you have spoken. Am I correct, Dr. Shaw, in this, that the purpose of this proposed program is to destroy the boll weevil just prior to the time that he would go into hibernation and this hibernation stage is called the diapause phase, is that correct?

Dr. SHAW. That is correct, sir.

The CHAIRMAN. I think it is important for the committee to know that the individual farmer who has boll weevils will continue to have to fight his boll weevils in the same way he has heretofore. I believe that is correct, Dr. Shaw?

Dr. SHAW. Yes; we expect to, by taking this fall application before they go into hibernation, to knock out most all of them, but there will be a few left. We hope that within a 3-year period we can knock this down to such a low level that there will only be a spot here and there and the farmers, with our cooperation, can keep it under control.

The CHAIRMAN. My point here is that under this program the Government would not go in and tell the farmer that he would be absolved of any responsibility for fighting the weevil on his individual farm. If he does not get out and fight the weevil in June, July, and August, where the weevil is prevalent, then he makes no cotton crop.

Dr. SHAW. Yes.

The CHAIRMAN. This is at his own expense and the Government does not participate in the weevil program at that phase; am I correct?

Dr. SHAW. That is correct. We only come in here in the fall of each of these 3 years in which we intend to knock out as many as possible of all those that are left but as you say, if any of them that were there have been causing trouble to the farmer, unless he has been treating them—

The CHAIRMAN. In other words, if he should wait until the Government moves in in September or October, he would have already lost his crop if he is in an area of heavy infestation.

As I understand the program, the farmer himself would have to make his traditional fight against the boll weevil, if he has the boll weevil.

Dr. SHAW. Yes.

The CHAIRMAN. I think this ought to be understood by the committee. I would like for you to understand this: That this area would have had the boll weevil problem many years ago, except it is high. My hometown of Lubbock, the center of this area, is over 3,000 feet and the winters are much more severe and the weevil has apparently not been acclimated to this type of winter. However, since he is over-

wintering on the Eastern Plains fringe of this High Plains area the people are much disturbed. The program is for all of the farmers, some of whom never saw a boll weevil or had one on their farm; they will be contributing to this campaign; not that they are immediately threatened with the boll weevil, but ultimately will be infested if this movement forward is not stopped.

Dr. SHAW. That is right.

The CHAIRMAN. Is that correct?

Dr. SHAW. Yes, all of them are going to put up the 50 cents per bale on all of their cotton—even those that do not have any boll weevil now at all.

The CHAIRMAN. Most of them do not have the boll weevil who will be participating in this program?

Dr. SHAW. Yes.

The CHAIRMAN. It is just a long-range, stopgap measure.

Is it your opinion this program will work?

Dr. SHAW. I am quite confident it will. All of our advisers, and we had our best entomologists, both in research and control, and from the States, who have gone over this carefully and they are of the opinion we can knock it out.

Mr. WHITTEN. Mr. Chairman, if you will yield, I am interested in that showing. I think the records of our earlier hearings show the interest of our chairman even though there was no budget estimate. He did call the attention of this subcommittee to the interest that his local people had and to their efforts to raise the funds to do for themselves. You know, it always impresses us on each of our subcommittees, when the local people are willing to put up their part. This is the first time I fully realized personally that this work was to be done at the end of the year in an effort to have a minimum of work to do and a maximum of benefit the following year.

Coming from an area where the boll weevil has been rampant since about 1912, I certainly can see the tremendous benefit and the great need, if at all possible, to keep it from spreading in the area where my chairman happens to reside.

However, there are certain other effects in my section. The boll weevil has made some average lawyers out of folks who might have made pretty good farmers.

I don't know. It is not always one-sided, I do think it makes it quite clear what the situation is.

I will merely ask at this point, of what does this treatment that you have in mind consist?

Mr. BURGESS. This would be a multiple application of insecticides over the area involved last year, approximately 175,000 acres. The chemical hasn't been chosen, as yet. It lies between two major candidates, either methylparathion or guthion, and I understand the technical committee of the Plains Cotton Growers is meeting on Wednesday in Lubbock, Tex., together with research and pest control officials of the Agricultural Research Service to discuss this very problem.

We calculate at the moment this treatment will begin on the 15th of September and be applied weekly until frost. The current expectations are that it will be probably a repetitive treatment, four times, at about weekly intervals.

Mr. WHITTEN. In our own section, we find most all insects have become toughened to any particular treatment, and periodically you have to switch from one to the other.

In this 3-year effort, do you contemplate analyzing at the end of each year to see whether you will continue with the same one the following year?

Mr. BURGESS. We plan to continually take a look at it. As a matter of fact, we have already undertaken a little exploratory work in the Rio Grande Valley of Texas, using low-dosage low-volume malathion. This chemical doesn't have some of the difficulties that the two previously mentioned might have, as far as actual residues are concerned, and a waiting period before being able to go back to work in the field.

At this point we are not prepared to say we can switch to malathion, but certainly it may be in the picture.

Mr. WHITTEN. I was just trying to get for the record that you are going to ride herd on this. That it is an experimental thing which you will watch from day to day, and month to month?

Mr. BURGESS. Yes, sir.

Mr. WHITTEN. Keep the committee advised of the degree of success that you do have.

Mr. BURGESS. We will be very happy to.

Mr. WHITTEN. Since this is a 1-year approach, perhaps we should make it clear, if the committee goes along, that we would be obligated to pass judgment on it each year as it came up, and we would appropriate on a 1-year basis. One year would not necessarily mean a commitment for 3 years. I know you folks are familiar with that, as are others. That statement doesn't mean we would be opposed for future years, if there is a good progress sheet.

You will complete 1 year's work and the next year would be another year's work, and so forth.

SCREW-WORM ERADICATION

Now, with regard to this screw-worm, next to the watershed program, I guess this committee claims about as much credit for that development as anyone else. But you know, Dr. Shaw, you came before us here once before, and you have to discharge your responsibilities. You are here as spokesman for the Department. There have been times where I thought you were a spokesman discharging your duty much more than from the heart than on other occasions.

One was the proposed change in the quarantine regulation 37, where the Department proposed to send U.S. agricultural employees to foreign countries to help them produce plants so they, in turn, could bring them back over here in competition with our own plants. I am glad to see the Secretary hasn't gone along with that proposal as yet, and I trust that he will not.

This committee, I may say, initiated this screw-worm program in this area. I believe we did it without budget requests. I know if we had budget requests it was because we pressed for it.

If we accept as a Federal responsibility, going 200 miles into Mexico and getting rid of the screw-worm so that the Mexicans can produce more cattle, which, in turn, can come into this country without any limitation, wouldn't we be in the same line of business? Now, you

don't stop at the Rio Grande. You go on over into Mexico and you get rid of the screw-worm over there. If I understand the present regulations, live cattle can come into this country. Aren't you creating for our own cattlemen a competitive situation, by making available more cattle over there for export over here?

Dr. SHAW. The cattle can come in anyway. What we do now is dip them, to be sure the screw-worms will be killed.

Mr. WHITTEN. You dip the cattle now, and you would just be improving the net income and possibly reducing the price of Mexican cattle. If you get rid of the screw-worm in Mexico, you have either improved the cattle or you have reduced losses, either way you take it.

Do you know of any place else where we, under any circumstances, go into another country and try to control the local problems because it might spread over here?

Dr. SHAW. We are doing, in essence, this, on the citrus black fly, now.

Mr. WHITTEN. Are we releasing flies in Mexico?

Dr. ANDERSON. On the citrus black fly we are not releasing flies in Mexico, but we are cooperating with the Mexican Ministry of Agriculture in control programs in the northern part of Mexico.

CONTRIBUTION OF MEXICAN GOVERNMENT

Mr. WHITTEN. That is what I am coming to. How much effort has been made to get the Mexican Government to go along on a similar program, here, where it is a joint program?

Dr. ANDERSON. The Mexican Department of Agriculture is cooperating on the present program now.

Mr. WHITTEN. They are cooperating, but with how much money are they cooperating?

Dr. ANDERSON. Very little in actual money. They have assigned personnel to the project and the Mexican cattlemen themselves, are contributing their time and effort in carrying out daily inspection of their cattle to report any cases of screw-worm they may find. This is an essential part of the cooperative effort. Without this cooperation from the Mexicans we wouldn't be able to carry out the program.

Mr. WHITTEN. I realize that. But you know, this committee has been around here a good many years. I know something about the cooperation between this Government and the Mexican Government. Sometimes it reminds me of the rabbit and the horse stew. One rabbit and one horse.

What do they put out in cash, now, and what will they put out under the new proposal? Supply the committee with any correspondence you have had with the Mexican Government as to whether they will carry their fair share of the load.

(Information subsequently supplied follows:)

In the fall of 1962 a representative of ARS met with the Subsecretary of Agriculture of Mexico regarding the screw-worm eradication activities on the Mexico-United States border. This meeting was followed by an exchange of letters about the program and Mexico's participation. It was then agreed that Mexico would provide the services of six inspectors. Since that time they have also authorized the use of the Mexico franking privilege in connection with this

program. It is estimated that Mexico's participation is costing them about \$11,000 a year. Copies of the letters follow:

SEPTEMBER 11, 1962.

Dr. OSCAR VALDEZ ORNELAS,
Subsecretary for Livestock,
Ministry of Agriculture,
Mexico City, D.F., Mexico.

DEAR DR. ORNELAS: I refer to Dr. R. S. Sharman's recent trip to Mexico for the purpose of conferring with you and your staff regarding screw-worm eradication activities along the Mexico-United States border. Some recapitulation, at this point, of the discussions held may be helpful in considering the plans and the requirements for screw-worm eradication in the United States, and perhaps, depending upon the desires of you and your countrymen, in certain areas of Mexico.

Screw-worm eradication in the Southeastern United States turned out to be a relatively fast and uncomplicated undertaking, even though the cost was somewhat in excess of \$10 million. Observing the many advantages accruing to the livestock industry in the Southeast as a result of the program, livestock owners in Texas and adjacent States have expressed a keen desire to initiate screw-worm eradication activities in their area. These livestock owners have contributed almost \$2 million from their pockets in recent months for the purpose of matching Federal funds for such a program. As a result, screw-worm eradication was initiated in the area on February 14 of this year and sterile flies are currently being released over about 60,000 square miles in southern Texas and New Mexico. Within a few more weeks we hope to reach maximum fly production at the sterile fly production headquarters near Mission, Tex.—a figure somewhere between 50 and 75 million flies weekly.

It is the aim of the program to eliminate screw-worms from Texas, New Mexico, Oklahoma, Arkansas, and Louisiana, and to establish the safeguards necessary to prevent screw-worms from reentering this area. Animals crossing from Mexico into Texas and New Mexico are inspected and treated for screw-worms at the international border, and within a few weeks animals moving east from regions west of the New Mexico-Arizona State line will also be inspected and treated for screw-worms before entering the eradication area. Once eradication is achieved, sterile flies will be continually released along the Río Grande, and, depending upon the need, along the Arizona-New Mexico State line. It is hoped that this artificial barrier of sterile flies will prevent wild screw-worms from flying into the eradication area from infested regions of Arizona and Mexico and thereby causing reinfestations.

Our technical people believe that the efficacy of an artificial barrier would be enhanced by the release of flies in areas of Mexico immediately along the international boundary. Such releases, of course, would be expected to virtually eliminate screw-worms in the portions so treated and provide relief from screw-worms to livestock owners with animals in that particular area. Normal drift of sterile flies south of the treated area might provide relief, to a lesser extent, in regions farther south. We believe it would be mutually helpful if a permanent screw-worm detection operation were established along the Mexican side of the border for the purpose of determining (a) when screw-worms have been eradicated in the treated area, (b) the recurrence of outbreaks in or near the treated area, and (c) the effect sterile fly release has on eliminating outbreaks that crop up within or near the treated area. We would be pleased, then, to have you consider this a request for conducting joint screw-worm eradication activities in Mexico, and we hope the details outlined in this correspondence will serve as a basis for initiating such activities.

We are currently contacting other agencies in an effort to locate U.S. Government surplus planes and to recruit qualified pilots in order that release of sterile flies may be begun as early as it is feasible to do so in Mexico provided your reply indicates that sterile fly release and other supporting activities brought to your attention are acceptable to you and your Government. Our aircraft specialist at the Mission fly production headquarters has forwarded data to Dr. Williams on the one plane now in our possession which is of a suitable type for conducting sterile fly release in Mexico. Due to nonuse for a rather lengthy period, this plane has deteriorated mechanically and we are now having it thoroughly examined to determine if it can be restored to satisfactory mechanical condition at an early date. Due to this, it appears unlikely that we will be prepared to release

flies in Mexico during September, but we will keep Dr. Williams advised of our progress in obtaining planes and pilots for use in Mexico and of a tentative release date as soon as possible.

It is proposed that U.S. Department of Agriculture pilots flying in Mexico would be provided with U.S. passports, and that they would be based at sterile fly distribution centers on the U.S. side along the international border from which they would fly daily into Mexico to release their cargo. So as not to burden customs and immigration authorities of both countries with unnecessary daily work, it is suggested that these pilots be assigned certain geographic areas by Mexican aviation authorities in which to fly, and that they file advance flight plans in compliance with Mexican law, maintain radio communication with Mexican authorities when flying over Mexico, and that the U.S. Department of Agriculture forbid these pilots to land in Mexico except under emergency circumstances. In the latter case, they would be expected to report as quickly as possible to the nearest Mexican authority for the purpose of clarifying their status in the country and, immediately thereafter, to advise the U.S. Embassy in Mexico City by phone of the condition of the emergency.

It is proposed that sterile flies be released at the initial rate of 200 to 400 sterile flies per square mile per week in parts of the border areas of Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas. If surveys in Mexico indicate high populations in some areas, it may be necessary to increase the number of sterile flies released in those areas. A strip 50 miles wide running from Matamoros to Nuevo Laredo would be the initial target for fly drop this fall, and, depending upon weather conditions, a strip 25 miles wide from Nuevo Laredo to Agua Prieta would be treated at the same rate. Certain riverbeds and canyons extending further south would also be treated with sterile flies in keeping with the findings of survey teams regarding the overwintering habits of screw-worms in these areas. Since such an "artificial barrier" has never been attempted before, we are quite uncertain as to its width and the number of flies that need be released to make it effective; therefore, adjustments of the composition of the barrier will most likely be necessary before a satisfactory one is developed. This may entail the release of sterile flies further south into Mexico.

In order to prepare for such an eventuality, it appears essential that accurate and continuing screw-worm surveys be made in a strip at least 100 miles wide adjacent to the border between Matamoros and Agua Prieta. The only dependable means we have been able to develop for obtaining timely, accurate, and detailed information about the incidence and abundance of screw-worms in a given area has as its basis the continuing education of livestock owners regarding the need to report information concerning screw-worms regularly in a systematic manner and, above all, to submit specimens they collect from animal wounds for identification at a central laboratory. A great deal of this educational work can be conducted through existing organizations such as cattlemen's associations, veterinary associations, universities, local officials, and newspapers, television, and radio. For explaining survey needs at the field level, we have found it necessary to employ livestock inspectors to call personally on representatives of the groups mentioned above for the purpose of showing films and slides, distributing specimen kits and information bulletins, and to keep these groups advised of progress that is being made. Within the survey area mentioned, we believe four teams of inspectors with one team of supervisors will be able to initiate and continue a satisfactory survey, provided they are supported by a good information program at the Mexico City level consisting of periodic releases of press stories, television tapes, letters to local officials, and other material designed to both explain the program and emphasize the need for cooperation from livestock owners.

We are prepared to provide a minimum of four U.S. livestock inspectors and one supervisory employee with vehicles for border survey work in Mexico in anticipation that an equal number of Mexican citizens or employees might be similarly assigned for the purpose of forming five teams to carry out the survey. If expenses for salaries and travel of the Mexican inspectors could be provided through your office, the cost of U.S. inspectors' salaries and travel could be borne by a U.S. agency. We judge from past experience that such a survey will stimulate the submission by livestock owners of great quantities of larval specimens for identification—perhaps several thousand vials per week, as we are currently finding in Texas alone. We are prepared to continue the identification procedures currently being conducted by Mexican and United States technicians at Palo Alto to expedite analysis of the screw-worm situation on a daily basis in the areas

where sterile flies are being dropped, or need be dropped, in Mexico. Our research entomologists are keenly interested in studies of the physical characteristics of field specimens of screw-worms, and it would be extremely helpful if the field specimens submitted to Palo Alto might be forwarded to an appropriate laboratory in the United States for further study in lieu of being discarded. Those who have done research on screw-worms for many years in the United States are anxious to determine whether there are mutations or significant physical differences in screw-worms farther south that would require further research and possible alterations of the strain in the fly colony now being used so that sterile flies would be more effective under Mexican conditions. It is possible that natural mutations have occurred that would make this necessary.

It would be expected that the survey teams would file joint weekly reports to the Mexico City offices, and the U.S. employees would be requested as well to send a copy of the report to the person in charge of fly distribution at the mission plant so that advance planning can be carried out in regard to any changes in fly release that the survey reports indicate are necessary. It is believed advisable to prepare a form for use by those doing specimen identification in the laboratory at Palo Alto so that a daily report of the findings in the laboratory may be promptly available to scientists of both governments for study and planning purposes.

We also think the idea proposed by Dr. Fernandez de Castro of enlisting the aid of aftosa vigilante committees all over Mexico to determine more about screw-worm incidence and abundance in the Republic is a splendid suggestion. The sterile fly technique is so relatively new that such information may make it possible, through changes in approach, to achieve much more in the future in the way of screw-worm eradication or control in both countries with the same or lesser resources.

We would ask Dr. Donald Williams to be responsible for working with whom ever you might designate on your staff to correlate and supervise all joint screw-worm activities that may be undertaken. In this capacity Dr. Williams would be serving directly as a representative of the U.S. Department of Agriculture as distinguished from his responsibilities as a member of the joint Mexican-United States Commission for the Prevention of Foot-and-Mouth Disease.

We are sending Dr. Donald Williams and Mrs. Ana Gomez copies of this letter to keep them abreast of developments. Should you feel the need for rapid clarification on any point, please contact one of them and they may utilize our teletype for obtaining a prompt reply from us. We will also welcome any suggestions you may care to offer.

Dr. R. S. Sharman advises us of the very pleasant and helpful interviews he was privileged to have with you during his stay in Mexico. We appreciate your kind and thoughtful cooperation in these matters of mutual interest.

Sincerely yours,

M. R. CLARKSON,
Acting Administrator.

SUBSECRETARY FOR LIVESTOCK,
Mexico, D.F., October 8, 1962.

Sr. Dr. M. R. CLARKSON,
*Acting Administrator,
Agricultural Research Service,
Washington, D.C.:*

In answer to your attentive letter of September 11, 1962, relative to the campaign against the screw-worm, you are advised that this Subsecretariat accepts the workplan discussed in these offices with Dr. E. Sharman, who was sent down for this purpose by Agricultural Research Service. In connection with this, we have requested, and successfully so, that the regional cattlemen's associations of Sonora, Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas provide one inspector from Sonora, two from Chihuahua, one from Coahuila, and two from Tamaulipas.

These inspectors, whose names have been asked for, and who have instructions to join with American inspectors in the northern part of the country on a date that we shall designate, and preferably in Ciudad Reynosa, Tamps., will be placed at our disposition for visiting the plant at Mission, Tex., before beginning work.

I wish to inform you that we had, on a previous date, already contacted the secretaries of State who might have an interest, even though remote, with the

campaign, which we consider has begun, particularly regarding the flight of planes over Mexican territory, the release from the air of sterile flies, the operation of pilots over Mexican territory, as well as personnel and vehicles operating on land.

We are optimistic, along with you, over having success in the eradication of the screw-worm in this first territorial swathe, and we base this assertion on the manifestation of cooperation and friendly feeling that the cattlemen have demonstrated for the campaign.

It pleases me to communicate to you, through this letter, assurances of my esteem and regard to you and your associates.

M. V. OSCAR VALDES ORNELAS.

U.S. DEPARTMENT OF AGRICULTURE,
AGRICULTURAL RESEARCH SERVICE,
Washington, D.C., October 18, 1962.

DR. OSCAR VALDES ORNELAS,
Subsecretary of Agriculture for Livestock, Secretariat of Agriculture and Livestock, Mexico, D.F., Mexico.

DEAR DR. ORNELAS: Thank you for your informative letter of October 8 concerning the screw-worm program. We are pleased with the actions you have taken and the opportunities thus provided for cooperative effort in this important matter.

We appreciate especially the courtesies you have extended to Dr. Sharman and Dr. Williams in this regard.

With every good wish for continued success in your important work.

Sincerely yours,

M. R. CLARKSON,
Associate Administrator.

Dr. ANDERSON. First of all, the screw-worm is not as much of a major problem to the Mexican cattlemen as it is the cattlemen of this country. First, because their method of animal husbandry is such that they observe their cattle more closely and can detect them if they should become infected. And, too, there are large areas of Mexico, because of climatic and geographical conditions, where the screw-worm doesn't exist as it does in the United States. So they wouldn't have the real interest of eradication as would the cattlemen of the United States.

Besides assigning personnel to the project, I would say the Mexican cooperators are contributing in the neighborhood now of probably \$5,000 in cash. That is besides the value of the contribution of the cattlemen, besides the dollar value of the Mexican Government personnel engaged in other work that are now assisting in this project.

NECESSITY FOR PROGRAM

Mr. WHITTEN. Now, I believe you have gotten rid of the screw-worms, haven't you?

Dr. ANDERSON. Yes, sir.

Mr. WHITTEN. That means you have gotten rid of the flies, doesn't it?

Dr. ANDERSON. Yes, sir.

Mr. WHITTEN. If you have gotten rid of the flies and you release all these male flies, don't you have to put that country back in the fly business for sterile male flies to be of any benefit whatever? If you have no female flies now, and if you released millions on millions of sterilized male flies, aren't you just actually spinning your wheels?

Dr. ANDERSON. No, we have screw-worm cases in the barrier zone

where we are releasing them. We have no screw-worms in the area that has been freed.

Mr. WHITTEN. Doctor, this committee went along with \$250,000 unmatched, so that you could spotcheck and keep up with anything that was happening, so that you would have money to go anytime anybody called you. I am not too familiar with the Texas range country. I have been over it. I have been to Mexico. I have been down to Mexico City, and I was down there three or four times in earlier years.

But now, when you don't have any in the United States—the flies are gone—it would be a waste of effort to release sterile male flies, because there are no female flies. Then if you go into Mexico with the situation that you describe, it strikes me that you are spending a whole lot of money, on the chance that something could happen. It would be more economical to spotcheck in the United States through your county agents, work through your ranchers, and if something does happen, get busy again. I just can't see this program at all.

Dr. ANDERSON. Unless you maintain the barrier, Mr. Chairman, these flies will just move back in the next day. They are in Mexico in large numbers.

Mr. WHITTEN. Did you end this program, the one we have been carrying on?

Dr. ANDERSON. It is still underway.

Mr. WHITTEN. On a matched basis?

Dr. ANDERSON. It is still underway, and the barrier is being maintained at this time.

Mr. WHITTEN. Do you mean you are doing this work, now? Who approved it?

Dr. ANDERSON. We are maintaining a barrier with Federal and matching cooperator funds. We are not carrying on at the level provided for in this proposal, with Federal funds.

Mr. WHITTEN. Were those funds appropriated by the Congress on a no-year basis?

Dr. ANDERSON. The funds we are using are at the same level as used last year. We are operating under the continuing resolution passed by the Congress, with the State of Texas and the Southwest Animal Health Foundation contributing on a matching basis as required under the 1964 appropriation act.

Mr. WHITTEN. So while this committee went along with the \$2.5 million, we removed a quarter of a million from the matching requirement for 1965. So what you are recommending here is that the Federal Government pay the local share, as well?

Dr. ANDERSON. Yes.

Mr. WHITTEN. I believe you also testified in your statement that the problem doesn't exist, now?

Dr. ANDERSON. Self-perpetuating screw-worm populations have been eradicated from Texas, New Mexico, and States north and east. Screw-worms do exist from the border, south. We have taken advantage of the Mexico-United States border to stop cattle moving into the United States for treatment. The barrier extends more than 200 miles into Mexico at some points extending across the border in some areas, depending on geographic, climatic, and other factors having an effect on maintaining an effective barrier.

NUMBER OF SCREW-WORM CASES

Mr. WHITTEN. How many cattle that come in from Mexico do you find suffering from screw-worm? Do you have the records for the last 6 months? Could you supply that to the committee?

Dr. ANDERSON. Yes, sir; except at this point, I don't recall having intercepted any cases at the border.

Mr. WHITTEN. Show us any cases intercepted before they got to the border.

Dr. ANDERSON. We can show you the cases reported in Mexico, and the cases reported this year in the United States, as compared with the previous years. We would be glad to provide that information.

Mr. WHITTEN. Do that for the record, if you would.

(The information follows:)

Southwest screw-worm eradication—Number of identified screw-worm cases

	State of Texas			United States-Mexico border ¹		
	1962	1963	1964	1962	1963	1964
January.....	(?)	128	0	1	1	0
February.....	1,112	6	0	5	0	0
March.....	331	64	7	8	1	0
April.....	2,633	386	29	7	1	0
May.....	6,308	447	36	6	0	0
June.....	8,300	435	15	2	2	0
July.....	10,267	274	37	0	0	0
August.....	5,088	104	-----	6	0	-----
September.....	3,967	593	-----	3	0	-----
October.....	8,702	1,662	-----	22	0	-----
November.....	2,710	752	-----	33	3	-----
December.....	1,091	32	-----	32	0	-----
Total.....	50,509	4,883	494	125	8	0

¹ The majority of the livestock offered for entry originate in the barrier zone where the number of screw-worm cases have been materially reduced through the release of sterile flies. Without a barrier zone south of the border the number of screw-worm-infested animals would be greater, and the screw-worm population would build up in the area immediately adjacent to the border exposing the screw-worm-free areas of the United States to migration from Mexico.

² Program initiated Feb. 14, 1962.

³ As of July 20, 1964.

⁴ Eradicated by treatment of animals involved and hot-spot sterile screw-worm fly release.

COST SHARING AND THE ADVISABILITY OF OPERATING PROGRAM IN MEXICO

Mr. WHITTEN. Also, I would like for you to supply for the record the programs where we require matching in the Department of Agriculture. I guess I should direct that to you, Dr. Brady. This whole thing here, as I see it, has two aspects: (1) Are you going into a foreign country in an attempt to prevent problems and clear up that country, because of what it might do to your own country, and (2) are we going to upset this matching procedure?

We have just been discussing requiring the cottongrowers in Texas to put up their half, with regard to the boll weevil. I don't recall a single instance where the Congress hasn't tried to require the Department to get matching funds.

There is the illustration of the foot-and-mouth disease, but I think the damages and dangers from that so far exceed the problem that you have here as to make that an exceptional case.

Dr. SHAW. A parallel case on this is the cattle fever tick. We cooperated with all the States from Florida on west through Texas, in eradicating the cattle fever tick from the United States, and then when it was eradicated from the United States, the U.S. Government has paid the full cost in keeping it from coming from Mexico.

Mr. WHITTEN. You mean just on the border?

Dr. SHAW. Yes.

Mr. WHITTEN. But you don't go into Mexico and attempt to get rid of all the ticks in Mexico?

Dr. SHAW. No.

Mr. WHITTEN. I know you have to have the cooperation of Mexico. It is a sovereign nation and as such we don't even have the liberty of free movement.

Dr. SHAW. The thing about this border zone, Mr. Chairman, is that we have to have a 200-mile-wide border to keep them from coming through. Now, we can accomplish the thing much easier by having most of it in Mexico, rather than the United States, plus the fact we will have a lot fewer cases in the United States with the border zone in Mexico than if we try to maintain it in the United States.

Mr. WHITTEN. I might buy that, but when you get on your side of the table, you can justify spending money mighty easy. You would think on our side of the table we could agree mighty easily. However, this is the first time you have succeeded in getting rid of the screw-worm. That being true, you don't exactly know what the future will hold. Your guess could be better than mine, perhaps, but at least there is a period where we might bide our time with patience and see how rapidly it might come back. It might be that you would be pleasantly surprised.

Dr. SHAW. If we stopped that barrier zone, Mr. Chairman, we would have screw-worms all over Texas yet this season.

Mr. WHITTEN. When you say barrier zone, you mean just releasing the flies?

Dr. SHAW. Yes, in a 200-mile-wide zone, where we release the sterile flies.

Dr. BRADY. This requires conducting operations outside of your border, in order to keep the pest out of your own country.

Mr. WHITTEN. I want to see the official correspondence you have had with the Mexican Government carrying out the directive in the report of this committee, which called on you to explore what the Mexican Government might be willing to do.

(A list of cooperatively financed disease and pest control and eradication programs follow:)

Agricultural Research Service.—List of cooperative plant and animal disease and pest control programs in which there is cost sharing:

Plant pests:

Insect pests:

- Cereal leaf beetle.
- Citrus blackfly and Mexican fruitfly.
- European chafer.
- Grasshopper and Mormon cricket.
- Gypsy moth.
- Imported fire ant.
- Japanese beetle.
- Khapra beetle.
- Mediterranean fruitfly.
- Pink bollworm and boll weevil.
- Southern green stinkbug in Hawaii.
- Sweetpotato weevil.
- White-fringed beetle.

Nematodes:

- Burrowing nematode.
- Golden nematode.
- Soybean cyst nematode.

Plant diseases:

- Hoja blanca.
- Barberry eradication.
- Phony peach and peach mosaic.
- Witchweed.

Animal diseases:

- Eradicating brucellosis and tuberculosis.
- Eradicating scabies.
- Eradicating cattle ticks.
- Eradicating screw-worm.
- Eradicating hog cholera.
- Diagnosis, control, and eradication of miscellaneous diseases.

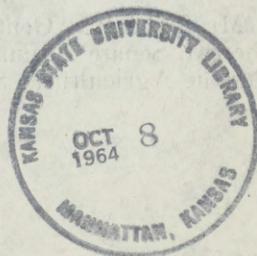
Forest service.—List of forest insect and disease projects on which Federal-State-private cooperative financing was accomplished in 1964.

Forest insects:

- Spruce budworm.
- Pine tussock moth.
- European pine shoot moth.
- Southern pine beetle.
- Black turpentine beetle.
- Black Hills beetle.
- Western pine beetle.
- Mountain pine beetle.
- Jeffrey pine beetle.
- Fir engraver beetle.
- Flatheaded borer.
- Balsam woolly aphid.
- White pine weevil.

Forest diseases:

- White pine blister rust.
- Oak wilt.



SURVEYS AND EVALUATION

Federal-State cooperative cost-sharing agreements on forest insect and disease surveys and evaluations have been executed in 12 States and 5 more agreements are imminent in 1964.

SCREW-WORM PROGRAM IN MEXICO

The Mexican Government's participation in the screw-worm program is currently estimated at an equivalent of about \$11,000 per annum. While the Department has not had any recent correspondence with the Mexican Government, informal contacts have been made. It appears that the present screw-worm program, which is designed to protect the United States from reintroduction of the screw-worm, does not offer sufficient protection to the Mexican livestock industry to prompt the Government to increase its contribution by any substantial amount. However, since May 7 the Department, in cooperation with the Agency for International Development, has undertaken a review of the feasibility and advisability of planning a screw-worm eradication program which could offer adequate protection not only to the United States but to portions of Mexico as well. Among the considerations involved in the planning of such a program are its economic impact on Mexico, the state of biological and ecological knowledge on the screw-worm fly in Mexico, technical feasibility and the viewpoint of the Mexican Government. The executive branch is not yet in a position to undertake negotiations with Mexico on the planning of such a program.

MONDAY, JULY 20, 1964.

AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE

EMERGENCY CONSERVATION MEASURES AND CROPLAND CONVERSION PROGRAM

WITNESSES

EDWIN A. JAENKE, ASSOCIATE ADMINISTRATOR, AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE

CHARLES M. COX, ASSISTANT DEPUTY ADMINISTRATOR, STATE AND COUNTY OPERATIONS, AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE

H. LAWRENCE MANWARING, DEPUTY DIRECTOR, CONSERVATION AND LAND USE POLICY STAFF, AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE

ROBERT P. BEACH, DEPUTY ADMINISTRATOR, MANAGEMENT, AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE

CHARLES L. GRANT, DIRECTOR OF FINANCE AND BUDGET OFFICER, DEPARTMENT OF AGRICULTURE

Mr. WHITTEN. Gentlemen, we will be glad to have the portion of the two Senate documents included in the record at this point covering the Agricultural Stabilization and Conservation Service.

(The information follows:)

[S. Doc. 82, 88th Cong., 2d sess.]

AMENDMENTS TO THE BUDGET FOR THE DEPARTMENT OF
AGRICULTURE

AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE

Budget appendix page	Heading	Request pending	Proposed amendment	Revised request
125	Emergency conservation measures..... (Immediately preceding the Program and Financing schedule, insert the following): <i>For emergency conservation measures, to be used for the same purposes and subject to the same conditions as funds appropriated under this head in the Third Supplemental Appropriation Act, 1957, to remain available until expended, \$1,000,000, with which shall be merged the unexpended balances of funds heretofore appropriated for emergency conservation measures.</i>		+\$4,000,000	\$4,000,000
124	Conservation reserve program.....	198,000,000	-4,000,000	194,000,000

The proposed amendment for emergency conservation measures will provide funds for use by the Department of Agriculture in providing cost-sharing assistance to farmers and ranchers in the event natural disasters cause serious damage to farmlands and rangelands. It is anticipated that substantially all funds currently available will be committed by June 30, 1964, resulting in practically no funds being available in fiscal year 1965 to meet emergencies which are likely to occur in various sections of the country.

I recommend that the foregoing amendments to the budget be transmitted to the Congress.

Respectfully yours,

KERMIT GORDON,
Director of the Bureau of the Budget.

[S. Doc. 83, 88th Cong., 2d sess.]

AN AMENDMENT TO THE BUDGET AND A PROPOSED SUPPLEMENT
APPROPRIATION FOR THE DEPARTMENT OF AGRICULTURE

AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE

[Land-Use Adjustment Program] Cropland Conversion Program
(Liquidation of Contract Authorization)

For necessary expenses to promote the conservation and economic use of land pursuant to the provisions of section 16(e) of the Soil Conservation and Domestic Allotment Act (16 U.S.C. 590h, 590p), as amended [by the Act of September 27, 1962 (76 Stat. 606)], \$10,000,000, to remain available until expended.

This program provides for long-range agreements with farm and ranch owners and operators to make changes in their cropping systems and land uses so as to convert excess cropland to other uses. The proposed supplemental appropriation is to liquidate obligations under contracts entered into with producers during calendar year 1964.

The amounts requested herein, when added to amounts previously requested, will not raise total requests above the totals proposed in the 1965 budget.

I recommend that the foregoing proposals be transmitted to the Congress.

Respectfully yours,

KERMIT GORDON,
Director of the Bureau of the Budget.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE

[S. Doc. 82]

1965 budget amendment

Budget page	Heading	Original estimate	Revised estimate	Increase
125	Emergency conservation measures (Immediately preceding the Program and Financing schedule, insert the following): <i>For emergency conservation measures to be used for the same purposes and subject to the same conditions as funds appropriated under this head in the Third Supplemental Appropriation Act, 1957, to remain available until expended, \$4,000,000, with which shall be merged the unexpended balances of funds heretofore appropriated for emergency conservation measures.</i>		\$4,000,000	\$4,000,000

EXPLANATION OF LANGUAGE

The proposed language would appropriate \$4 million under the head "Emergency conservation measures" in the regular appropriation act for the Department of Agriculture for emergency cost-sharing assistance to farmers who carry out approved measures to repair excessive damage to farmland caused by natural disasters. The appropriation would be merged with the unexpended balance, if any, of prior appropriations made for this purpose and would remain available until expended.

PURPOSE AND NEED FOR BUDGET AMENDMENT

The Senate Committee report on the deficiency appropriation bill, 1964, includes the following statement:

"* * * The committee further recommends that future estimates for appropriations for emergency cost-sharing practices authorized under this head be made a part of the regular submission in connection with the annual appropriation bill for Agriculture."

It is anticipated that substantially all funds currently available will be committed by June 30, 1964. Recoveries, if any, from allocations for recent disasters, will not be made until the latter part of fiscal year 1965. Therefore, no funds will be available to meet future emergencies which are likely to occur in other parts of the country in the fall of 1964 and in early spring of 1965.

Based upon the experience of the last 4 years (1960-63), it will be necessary to make commitments long before the Congress has an opportunity to consider and act upon estimates for fiscal year 1966. Therefore, a budget amendment is being submitted at this time so that the Department will be in position to authorize assistance in those areas where, due to natural disasters, additional public assistance is required to help farmers protect or rehabilitate their farmlands.

Justification for budget amendment, fiscal year 1965, for "Emergency conservation measures"

Project	Budget estimates, 1965	Amendment to budget estimates, 1965	Revised estimates, 1965
Emergency cost-sharing assistance to farmers.....		\$4,000,000	\$4,000,000

In the past, funds have been included in supplemental appropriation requests as emergencies arose and when pending and anticipated requests for emergency cost-sharing assistance exceeded available funds. The Senate committee report on the deficiency appropriation bill, 1964, recommends that estimates for appropriations for emergency cost-sharing assistance be made a part

of the regular submission of the budget estimates for the Department. A budget amendment is being submitted at this time since it is anticipated that substantially all funds currently available will be committed during fiscal year 1964 to cover current needs. Recoveries of any amounts now allocated for recent disasters would not be made until too late to provide funds for emergencies which are likely to occur in other parts of the country in the fall of 1964 or early spring of 1965. Based on past experience requests for emergency cost-sharing are more numerous in the fall and early spring. It is felt that as a matter of forward planning, funds should be available to deal promptly with new conservation problems resulting from natural disasters.

In order to have standby capacity to provide emergency cost-sharing assistance promptly, it is proposed to include in the annual estimates an amount which would provide a beginning balance equal to the annual average cost, based upon the most recent 4 years.

Beginning in 1957, under the criteria set forth in Public Law 85-58, the Congress has provided special funds for sharing the cost of emergency conservation measures to deal with cases of severe damage to farm and rangelands resulting from natural disasters, such as floods, hurricanes, drought, windstorms, tornados, and freeze. Funds are allocated for use only in those counties designated by the Secretary of Agriculture as disaster counties where new conservation problems have been created which (1) if not treated, will impair or endanger the land, (2) materially affect the productive capacity of the land, (3) represent damage which is unusual in character and, except for wind erosion, is not the type which would recur frequently in the same area, and (4) will be so costly to rehabilitate that Federal assistance is or will be required to return the land to productive agricultural use.

The regular agricultural conservation program is used to the fullest extent possible to provide assistance for emergency conservation work. However, when natural disasters create new conservation problems, the concentration of damage in an area is generally so great that regular program distribution is not adequate to meet emergency needs. In most instances the authorizations under the regular program are already committed when disasters occur. Allocations for emergency cost-sharing assistance are based upon a county-by-county survey of the need for assistance and represent the assistance, over and above that available under the regular agricultural conservation program, which is needed to help farmers meet new conservation problems created by natural disasters.

There is no way to accurately estimate probable needs for emergency conservation assistance for any given period since it is impossible to forecast disasters in advance of their occurrence or the extent of damage which might result. Within available funds, it is necessary to allocate the estimated amount of cost-sharing needed to repair excessive damage to farm and rangelands so that each farmer would have an opportunity to avail himself of Federal cost-sharing assistance. This necessarily involves an amount in excess of expenditures.

It is therefore proposed that the estimated requirements be based upon the most recent 4-year average initial allocations. This amount would be reduced by recoveries of prior allocations.

In accordance with the above, the fiscal 1965 estimate is derived as follows:

Initial allocations:

Fiscal year 1960.....	\$730,000
Fiscal year 1961.....	4,703,000
Fiscal year 1962.....	8,516,154
Fiscal year 1963.....	6,754,186
Total.....	<u>20,703,340</u>
1. 4-year average initial allocation.....	5,175,835
2. Less estimated recoveries by July 1, 1965.....	<u>1,175,835</u>
Total estimated requirements.....	4,000,000

The amount included in this estimate would enable the Department to authorize assistance during fiscal year 1965 in those areas where, due to natural disasters, additional public assistance is needed to help farmers protect and rehabilitate their farmlands. In the event a major disaster occurs, however, it would be necessary to submit a request for supplemental funds.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE

Cropland conversion program

[S. Doc. 83]

Appropriation to date.....	\$11,350,000
Obligations to May 31, 1964.....	11,350,000
Expenditures to May 31, 1964.....	11,327,979
Request (for agreements entered into through Dec. 31, 1964).....	10,000,000

PROPOSED LANGUAGE

“[Land-Use Adjustment Program] *Cropland Conversion Program (Liquidation of Contract Authorization)*”

“For necessary expenses to promote the conservation and economic use of land pursuant to the provisions of section 16(e) of the Soil Conservation and Domestic Allotment Act (16 U.S.C. 590h, 590p), as amended [by the Act of September 27, 1962 (76 Stat. 606)], \$10,000,000, to remain available until expended.”

EXPLANATION OF LANGUAGE

The proposed language would appropriate \$10 million for adjustment, cost sharing, and technical assistance under the cropland conversion program.

PURPOSE AND NEED FOR SUPPLEMENTAL FUNDS

The proposed increase in the appropriation would provide funds to continue the cropland conversion program as authorized under section 16(e) (7) of the Soil Conservation and Domestic Allotment Act, as amended. There is an immediate need to continue the program within the presently authorized level of expenditure pending final legislative action in regard to an increased annual limitation. Acreage now is being used for producing row crops and small grains in excess of our national requirements. Therefore, it is necessary to encourage the conversion of excess cropland to other uses. Such uses include conversion to grass, trees, recreational facilities, or wildlife habitat. The funds requested are needed now so that agreements can be negotiated for conversion to take effect at the earliest practicable date.

AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE

Justification for supplemental estimate, fiscal year 1964, for cropland conversion program

Project	Appropriation to date, 1964	Supplemental estimate, 1964	Total, 1964
Adjustment payments, cost sharing, and technical assistance.....	\$5,350,000	\$10,000,000	\$15,350,000
Conservation reserve contract extension—rental and practice payments.....	6,000,000	-----	6,000,000
Total.....	11,350,000	10,000,000	21,350,000

The proposed supplemental would provide funds for making payments, and for furnishing materials and services and other assistance under the cropland and conversion program.

Section 101, title I, of the Food and Agriculture Act of 1962, approved September 27, 1962, Public Law 87-703, authorizes the Secretary of Agriculture to enter into agreements with respect to eligible land to an extent that would not require payments in excess of \$10 million in any calendar year for the purpose of promoting the conservation and economic use of the land. In addition, the act authorized a 1-year extension of conservation reserve contracts that were

due to expire on December 31, 1962, to the extent of \$15 million. Such agreements require payments, the furnishing of materials and services, and other assistance.

The major objectives of this program are (1) to reduce the acreage of land now being used to produce crops that are not needed to supply our food and feed requirements, and (2) to assist family farms to convert such land to more needed uses.

The Department's "Land and Water Resources—A Policy Guide" shows that by 1980 a net reduction of 51 million acres should be made in our cropland in order to help bring crop production in line with requirements and to provide for other needed uses of our agricultural lands. Under the cropland conversion program, agreements are offered to farm and ranch owners and operators providing for changes in cropping systems and land uses and for practices and measures needed to conserve and develop soil, water, forest, wildlife, and recreation resources. Agreements under the program would be for up to 10 years, depending upon the type of land being converted and the type of project to which conversion is being made.

Adjustment and cost-share payments made to farmers are not "income" payments, but rather are designed to provide limited assistance in shifting cropland to alternate uses. The farmer is expected to earn his income from the land by using it for purposes other than crop production. The amount of assistance to farmers is based on such factors as land productivity, type of conversion, use to which land is converted, changes in operating costs, and the conservation measures needed by the land in its new use.

The increase of \$10 million is set forth as follows:

	Fiscal year 1963	Fiscal year 1964	Total
1963 programs:			
Conservation reserve contract extensions—rental and practice payments.....	\$150,000	\$6,000,000	\$6,150,000
Cropland Conversion Program—adjustment, cost-sharing and technical assistance.....	1,850,000	5,350,000	7,200,000
Total.....	2,000,000	11,350,000	13,350,000
1964 program: Cropland conversion program, adjustment, cost-sharing and technical assistance.....		10,000,000	10,000,000
Total appropriation or estimate.....	2,000,000	21,350,000	-----

¹ Supplemental proposed under existing legislation.

CROPLAND CONVERSION PROGRAM (LIQUIDATION OF CONTRACT AUTHORIZATION)

Program and financing

[In thousands of dollars]

	Presently available, 1964	Revised estimate	Increase, 1964
Program by activities: Adjustment, cost-sharing, and technical assistance (costs, obligations) (object class 41).....	9,354	19,354	+10,000
Financing:			
Unfunded balance of contract authorization brought forward.....	-11,350	-11,350	-----
Repayment of advance from Commodity Credit Corporation.....	1,996	1,996	-----
Unfunded balance of contract authorization transferred to proposed for separate transmittal.....	10,000	-----	-10,000
New obligatory authority (contract authorization) (permanent).....	10,000	10,000	-----

Status of unfunded contract authorization

[In thousands of dollars]

	Presently available, 1964	Revised estimate	Increase, 1964
Unfunded balance brought forward.....	11,350	11,350	
Contract authorization (permanent).....	10,000	10,000	
Unfunded balance transferred to proposed for separate transmittal.....	-10,000		+10,000
Appropriation to liquidate contract authorization.....	11,350	21,350	+10,000

EMERGENCY CONSERVATION MEASURES

Mr. WHITTEN. We will first take up the \$4 million item. Is that another case where you took our reduction and claimed credit for it in your request for an increase?

Mr. JAENKE. The emergency conservation portion is a \$4 million request to carry out what we can foresee as the needs for conservation measures under this program in the year ahead.

Mr. WHITTEN. This is an emergency program and it is operated on a revolving basis, is that correct?

Mr. JAENKE. That is correct, sir.

Mr. WHITTEN. Supply for the record in detail the uses that have been made for the last 4 or 5 years, the location, and the special measures you have used.

Mr. JAENKE. We will be happy to.

(The information follows.)

Emergency conservation measures

	Number of counties	Current allocation	Type of disaster
1960 program:			
Indiana.....	1	\$10,648	Flood.
Kansas.....	3	10,914	Tornado.
Missouri.....	8	139,664	Flood.
Oklahoma.....	9	50,183	Do.
South Dakota.....	4	6,374	Do.
Texas.....	4	74,832	Do.
Total, 1960 program.....	29	292,615	
1961 program:			
Arizona.....	3	12,486	Drought.
Arkansas.....	6	87,207	Flood.
Hawaii.....	1	5,921	Do.
Idaho.....	23	1,703,456	Drought.
Kentucky.....	19	494,304	Flood.
Mississippi.....	1	7,024	Do.
Montana.....	26	343,744	Drought.
Nevada.....	3	9,039	Flood.
North Dakota.....	53	3,617,479	Drought.
Oregon.....	8	367,004	Drought and flood.
Puerto Rico.....	1	43,951	Flood.
South Dakota.....	14	398,426	Drought.
Texas.....	13	500,198	Flood.
Utah.....	29	1,060,864	Drought.
Wyoming.....	10	268,349	Do.
Total, 1961 program.....	210	8,919,452	

	Number of counties	Current allocation	Type of disaster
1962 program:			
Alaska.....	1	61,584	Wind erosion.
Delaware.....	3	28,087	Flood.
Idaho.....	11	402,608	Do.
Kentucky.....	19	546,161	Do.
Louisiana.....	3	16,196	Do.
Nebraska.....	4	38,039	Do.
Nevada.....	3	73,000	Do.
New Jersey.....	3	65,850	Do.
Oregon.....	3	63,566	Do.
South Dakota.....	2	6,275	Do.
Texas.....	6	717,952	Do.
Utah.....	2	57,519	Do.
Wyoming.....	2	21,633	Do.
Total, 1962 program.....	62	2,098,470	
1963 program:			
Arizona.....	2	\$205,000	Do.
California.....	1	59,000	Do.
Georgia.....	3	43,000	Do.
Kentucky.....	11	250,000	Do.
Nevada.....	1	7,500	Earthquake.
Nevada.....	5	187,836	Flood.
Oregon.....	15	2,671,319	Windstorm.
Oregon.....	5	325,398	Flood.
Tennessee.....	4	42,000	Do.
Utah.....	8	256,771	Drought.
Washington.....	5	230,000	Windstorm.
Washington.....	1	8,000	Flood.
Wyoming.....	3	201,551	Do.
Total, 1963 program.....	64	4,487,375	
1964 program:			
Alabama.....	40	590,000	Drought.
Alaska.....	1	43,200	Earthquake.
Arizona.....	3	110,000	Drought.
Arkansas.....	20	670,000	Do.
Florida.....	5	80,000	Flood.
Georgia.....	4	92,000	Do.
Indiana.....	24	600,000	Do.
Kentucky.....	39	840,000	Do.
Kentucky.....	33	560,000	Drought.
Missouri.....	14	990,000	Flood.
Missouri.....	63	950,000	Drought.
Montana.....	9	500,000	Flood.
North Carolina.....	35	420,000	Drought.
Ohio.....	9	317,000	Flood.
Ohio.....	37	372,000	Drought.
Oklahoma.....	29	580,000	Do.
Oregon.....	11	590,000	Windstorm.
Pennsylvania.....	5	70,000	Flood.
South Carolina.....	1	8,000	Drought.
Tennessee.....	4	33,000	Flood.
Tennessee.....	25	660,000	Drought.
Virginia.....	64	575,000	Do.
Washington.....	3	115,000	Windstorm.
Washington.....	1	12,000	Flood.
West Virginia.....	2	30,000	Do.
West Virginia.....	23	300,000	Drought.
Wyoming.....	3	100,000	Flood.
Total, 1964 program.....	507	10,207,200	

Practices for which cost-sharing assistance is provided under the emergency conservation measures program include:

Flood:

- Removal of flood-deposited debris from farmlands.
- Smoothing gullies and field washouts.
- Restoration of pond levees, sod waterways, drainage ditches, and irrigation systems.
- Stabilizing streambanks.
- Releveling or reshaping land damaged by floodwaters, which before the flood, had been leveled or shaped, for more efficient use of irrigation water and to prevent erosion.
- Establishing protective vegetative cover on seriously eroded areas.

Drought:

- Development of wells, springs, and ponds for livestock water.
- Reorganization of irrigation systems, including other measures to conserve the limited supply of water available for irrigation.
- Restoration of permanent vegetative cover destroyed or seriously damaged on areas which would be subject to serious erosion unless vegetative cover is reestablished.
- Tillage operations to prevent or control wind erosion.

Windstorm:

- Removal of debris from stream channels, waterways, and ditches.
- Removal of debris from cropland or pastures.
- Removal of debris from orchards.
- Removal of debris from farm woodland.

Earthquake:

- Removal of debris deposited by seismic waves caused by earthquake.
- Land smoothing and reestablishment of vegetative cover on cropland damaged by fissures resulting from the earthquake.
- Reestablishment of vegetative cover damaged by scour or deposits of sedimentation by seismic waves.
- Reconstruction of permanent fences destroyed or impaired by seismic waves.

Tornado: Clearing trees and other tornado debris from stream channels.

Mr. WHITTEN. Is it true that this money will not be used unless something occurs in the nature of an emergency, requiring special measures?

Mr. JAENKE. This is right, and the special type of situations where there would be no opportunity for the individual to be helped otherwise.

Mr. WHITTEN. How is this handled? Once the money is appropriated, how would this money be made available, and on what terms and conditions? In other words, what type of application, who would have to approve it, and what would be the steps it would go through, prior to being approved?

Mr. JAENKE. We have a procedure established for this which requires a county disaster committee, which is made up of the representatives of the various agencies of the Government—FHA, ASCS, Extension, et cetera, at the county level. This disaster committee meets and makes its recommendations to the State disaster committee, which is set up equivalent to the county level, the various agencies represented there from Extension on down. This group makes a recommendation to the Department of Agriculture. The Governor of the State must also make a recommendation. If these recommendations are found to be valid ones, and there is need for this, then and only then do we begin making the funds available to that particular State. They are then allocated to the individual farmer to use for the practice that is necessary on his lands. In the case of floods, it might be the filling in of potholes that have been washed out when

a levee broke, or it might be to establish permanent cover in the case of serious drought.

Mr. WHITTEN. In the last deficiency bill that passed the House, you had an appropriation for this of \$4 million. What has happened to that?

Mr. JAENKE. We had the \$4 million made available in the deficiency bill. As of the 30th of June 1963, we had \$3.8 million, approximately, available. We then had the \$4 million made available in June of this year. We had some recoveries of nonused funds that had been allocated of around \$2.5 million giving us a net of around \$10.3 million. Of this, the allocations to date have been \$10.1 million, leaving \$196,000 available for the program for the remainder of the year. In addition, Oklahoma has come in with unused funds of \$150,000, and we have allocated and approved for West Virginia, \$300,000, so our final current balance is around \$46,000.

Mr. WHITTEN. This continuing resolution under which you are operating, does that cover these revolving fund-type programs that you have?

Mr. JAENKE. No, sir.

CROPLAND CONVERSION PROGRAM

Mr. WHITTEN. Turning briefly to the other item that you have of \$10 million for the cropland conversion program, what is the basis for that request?

Mr. JAENKE. This is a request to carry out the cropland conversion program during the calendar year of 1964. If these funds are made available, we will be able to go out and to enter into contracts with producers to convert some of their cropland into permanent noncrop-land uses; grasslands, recreation projects, et cetera.

Mr. WHITTEN. Could we have for the record the pertinent provisions of the basic law covering this? Do you have authority to in fact enter into contracts without the money and pay later? Or do you have to have the money in advance of contracting?

Mr. BEACH. There is basic authority in the law, but we have been admonished by the Senate committee not to use it, but to have the money in hand before we commit the new program. There is a provision in the basic legislation to utilize the services, facilities, and authorities of CCC, but no disbursements can be made by CCC unless funds have been appropriated for this purpose.

Mr. WHITTEN. Could we have for the record how much of this money you have spent in what States, and what you have gotten for it?

Mr. JAENKE. Yes, sir. We have that information and can provide it for the record.

(The information follows:)

Table 1 shows the total funds obligated in connection with the 2,802 agreements entered into under this program. This tabulation also shows the average duration of the agreements, cropland converted to grassland, woodland, wildlife uses, and recreation uses.

Table 2 shows, by States, the amounts of the obligations paid out through May 31, 1964.

TABLE 1.—*Cropland conversion program, selected program data, 1963 program*

	General pilot projects	Pilot recreation projects	Totals (net)	
Test counties	41	95	128	
States involved	13	33	37	
Number of agreements (farms)	2,695	130	2,802	
Average acreage converted per agreement			46	
Average years under agreement			6.14	
Total CCP cost:				
Amount			\$7,098,180	
Average per acre			\$54.96	
Average per acre per year			\$8.95	
Average per agreement			\$2,533	
Average per agreement per year			\$413	
Portion of adjustment payments in lump sum, \$3,631,253 (percent)			81	
Portion of adjustment payments to be made on annual basis, \$849,313 (percent)			19	
	Acres	Percent	Cost	Average per acre
Cropland converted (adjustment payments):				
Grassland	114,592	88.7	\$3,988,741	\$34.81
Woodland	5,986	4.6	194,184	32.44
Wildlife uses	256	.2	10,024	39.16
Recreation uses	8,323	6.5	287,617	34.56
Total	129,157	100.0	4,480,566	34.69
Cropland converted (cost shares):				
Grassland	114,592		1,676,606	14.63
Woodland	5,986		211,835	35.39
Wildlife uses	256		14,105	55.10
Recreation uses	8,323		486,187	58.41
Total	129,157		2,388,733	18.49
Forestry incentive payments:				
Amount			28,838	
Average per acre ¹	\$0.22			
Technical assistance cost (to CCP):				
Amount			200,043	
Average per acre	\$1.55			
Total			7,098,180	

¹ Based on total converted acreage, 129,157 acres, not the acreage on which actually earned.

CROPLAND CONVERSION PROGRAM (CCP)

TABLE 2.—Cumulative payments from inception through May 31, 1964

State	Adjustment payments	Practice payments	Technical services payments	Forestry incentive payments	Total payments	Total refunds and collections
Arkansas	\$23,387.20	\$4,496.41	\$2,417.32		\$30,300.93	\$10,494.84
California	20,337.60	796.45			21,134.05	
Colorado			1,236.00		1,236.00	
Connecticut	5,112.60	2,587.80	816.34		8,516.74	
Florida	300.00		1,632.00		1,932.00	
Georgia	254,436.96	92,143.95	6,739.59		353,320.50	670.65
Idaho	318,415.58	30,449.38	5,503.03		354,367.99	393.20
Illinois	2,981.80	7,734.45	1,440.59		12,156.84	
Indiana	355.00	40.00	4,758.59		5,153.59	
Iowa	212,426.00	37,082.25	4,423.92		253,932.17	1,449.70
Kansas	272,702.00	66,011.04	8,907.10		347,620.14	293.14
Kentucky	6,692.12	178.12	519.59		7,389.83	2,774.23
Louisiana	12,051.10	3,907.25	1,966.25		17,924.60	
Maine	812,427.85	103,152.86	9,471.91	\$3,054.00	928,106.62	2,889.04
Massachusetts	7,558.20	1,609.51	860.85		10,028.56	
Michigan	7,415.70	7,443.57	1,274.89		16,134.16	
Minnesota	296,814.20	124,412.04	6,567.54		427,793.78	2,272.83
Mississippi	299,220.24	100,556.30	6,228.26	429.00	406,433.80	3,437.33
Missouri	144,206.04	34,592.70	7,115.00	585.68	186,499.42	592.96
Montana	236.64	428.55	453.05		1,118.24	
Nebraska	3,609.00	9,562.92	1,349.49		14,521.41	
New Hampshire	14,088.38	610.75	1,580.80	7.50	16,287.43	628.96
New York	8,770.50	7,539.34	2,059.53		18,369.37	
North Carolina	364,765.46	132,983.48	13,026.18	508.40	511,283.52	2,479.65
North Dakota	446,379.77	133,334.99	4,477.31		584,192.07	1,259.38
Ohio	4,199.60	3,265.00	4,082.63		11,547.23	
Oklahoma	24,416.10	3,671.92	1,991.22		30,079.24	3,214.60
Oregon			101.23		101.23	
Pennsylvania	69,399.07	26,056.08	8,066.14		103,521.29	3,675.90
South Carolina	601.20	346.88	1,063.34		2,011.42	176.04
South Dakota	4,300.20	7,611.14	768.99		12,680.33	
Tennessee	14,614.30	18,607.89	3,996.45		37,218.64	
Texas	4,185.00	6,771.30	700.00		11,656.30	
Utah	213,577.43	46,303.23	5,537.62		265,418.28	1,887.74
Vermont	3,004.20		984.67		3,988.87	186.00
Virginia	17,115.55	1,948.28	2,475.65		21,539.48	
Washington	4,142.10	713.66	4,384.49		9,240.25	
Wisconsin	102,620.48	31,890.98	10,496.41	8,881.20	153,889.07	3,189.42
Wyoming	5,410.80		190.26		5,601.06	
Total	4,002,275.97	1,048,840.47	139,664.23	13,465.78	5,204,246.45	41,965.61

CRITICISM OF PROGRAM

Mr. WHITTEN. What have you done about the points raised by the committee's investigations which shows that in some cases you hadn't even made sure the man had title to the land? What efforts had you made to make sure the land was in production? Can he get paid if the man says "I have never used this for this purpose, but I am thinking about it"?

Mr. JAENKE. No. The land must have been in production. We have prepared comments on the approximately six points raised in the investigative reports. We believe we have taken the necessary steps to correct any recurrence of some of these cases that showed up in your investigative report. This was a pilot program, and we hope to find any—

Mr. WHITTEN. Could we have supplied for the record at this point the steps that have been taken and what the present status is?

Mr. JAENKE. We will be happy to supply that.
(The information follows.)

RESPONSE TO CRITICISM OF CROPLAND CONVERSION PROGRAM STATED IN
APPROPRIATION HEARINGS, HOUSE SUBCOMMITTEE

1. *No limit was placed on the amount of cost-sharing assistance in meeting the conservation needs of a particular project or area*

All cost-sharing assistance was limited to not more than 80 percent of the cost of the practice; usually it was only 50 percent. We imposed no top on the total extent of the practices for which cost sharing could be used in meeting the conservation problem. Experience was needed on how extensive an offer was needed in order to induce participation. Also we needed experience on how extensively we might encounter needs for practices in order to judge whether limits were necessary. As a result of the experience in the pilot program, we expect to establish in future programs, a maximum limit per acre for conservation cost sharing. This limitation will be set low enough to eliminate inordinately expensive conservation problem areas from the program unless the farmer is willing to bear all of the costs above those encountered in usual situations. Our intent will be to achieve the maximum conversion with available funds rather than to solve the most severe conservation problems. This rule will leave to the farmer a choice as to whether he shifts land to grass, trees, or recreation while at the same time protecting the program against excessive costs regardless of which alternative use the farmer makes of the land. Also, it is proposed to adopt arrangements for future programs which will prevent the total obligation under an agreement from being in excess of the average value of comparable cropland in the locality even though we only found two instances under the 1963 cropland conversion program where total payments to the farmer exceeds the value of the designated cropland.

2. *Determination of eligibility of landowner and of land*

In some cases the investigators found no documentation of the determination that the landowner was eligible and that the land was eligible to participate in the program.

Ownership of land for a specified period is a condition of eligibility. In the pilot program, ASC committees were dealing with a relative few farmers, usually well known to the committee, its employees and those of the Soil Conservation Service. These people fully discussed the program with the farmer and some of them visited his farm. Therefore, it was not necessary to require the filing of documentary proof of the required period of ownership of the land. Each participating farmer certified that he met the eligibility requirements of the program. No cases of violation of the required ownership period were reported by the investigators. Under an expanded program, we would of course, require documentary proof of ownership if ASCS representatives did not have personal knowledge of the man's eligibility.

To be eligible for the higher adjustment payment, the land must have been in a row crop or small grain during one of the last 3 years or in certain program uses. Records developed from participation by the farm in other ASCS programs often established whether or not the land had been so used. Farmers were required to certify as to the eligibility of the land. A determination as to the past use of the land not only was made but the determination was verified by an inspection of the land either before signing the contract or during the first year of the contract. Often the specific crop uses which made the land eligible were recorded field by field. This will be required for future programs. No cases of improper determination of land eligibility were reported by the investigators.

Lump-sum payments

Lump-sum adjustment payments were provided in the 1963 pilot program for the purpose of making maximum assistance available to the producers at the time it was most needed in making the conversion from one use to another. Experience has borne out that this was particularly effective in connection with all types of diversion including the shifting into recreation enterprises as well as the utilization of land shifted into grass. It should be pointed out that a producer has a choice of taking the adjustment payment in five equal annual installments in lieu of lump-sum payment. It is planned to continue this provision for future programs. It is also pointed out that the owner of the designated land is required to sign the agreement in all cases and is responsible for compliance thereunder. Therefore, the owner is responsible and liable for any refunds of payments required.

4. *Cost-share payments for measures on other than designated cropland acres*

In many instances, especially in connection with the development of recreation projects, it is essential to the success of a project to carry out land treatment measures on other than designated cropland. This was recognized by the Congress as expressed in paragraph (e) (1) of section 101 of the Soil Conservation and Domestic Allotment Act which authorized this program. It is believed the proposed limitations to be placed on cost-share payments plus the limitation placed on the total obligations for a project, as expressed in item 1 above, will provide adequate protection to avoid excessive cost in connection with land treatment measures carried out on noncropland. It is also pointed out that the designated cropland must be maintained in a conservation use for the period of agreement even though we may spend some cost-shares on other than designated land.

5. *Recreation project considerations*

During the 1963 trial period all applications for recreation projects were jointly scrutinized by representatives of the Forest Service, SCS, and ASCS for practicability and cost. Likewise, the national RAD Board's recommendations were sought with respect to approval of a project in a given county. A \$200 maximum per acre figure was used as a guide for arriving at the amount to be approved for each project. This maximum figure included all conversion payments, cost-shares and technical service costs for each project. In some instances a higher limitation appeared to be justified and was granted. In most cases this result was due to adjustments between the actual measured acreage designated as compared to the estimated acreage used when the project was approved or an increase in cost-shares or technical service costs required to complete the project as compared to estimated costs for these items at time of project approval.

SCS is reimbursed for all technical service rendered. In many instances, especially in connection with recreational projects involving the development of water recreation activities, these costs represent a substantial part of the total cost of the project and are difficult to accurately predetermine. Also the technical service charges reported by the investigators include service charges made for projects in the counties which did not result in a CCP agreement and, therefore, in some cases the average per acre figure reported does not represent a true obligation for the specific project.

The Macon County, N.C., project has been canceled by the producer because of the substantial reduction in the acreage actually designated as compared with his intended diversion at time of project approval. This reduction in acreage reduced the project maximum authorization to \$1,400. Also, the producer was unable to obtain needed financing.

The project authorizations for Chelan and Island Counties, Wash., were approved at the present level because of the following circumstances:

(a) Agreements were erroneously approved, due to misunderstanding, permitting the designation of substantially less acres than the producer intended to divert at time the project was approved.

(b) On the basis of this erroneous agreement, the producers proceeded to establish the practices required to make the diversion and made commitments to complete the work. In view of this, the producers, representatives of the SCS and ASCS conferred on the situation and arrived at some adjustments in total costs, however, because of the fact that commitments had been made to the producers on signed and approved agreements and some payments made thereunder and the outstanding nature of the project authority was granted to honor the agreement at the higher limitations.

The Harrison County, Ind., project reflects a high per acre obligation due to including technical service charges which were made on other projects in Indiana which did not result in CCP agreements.

Cost-share payments for developing horseshoe, badminton, basketball, and tennis courts in connection with recreation projects were limited to earth-moving for necessary drainage and leveling. These types of recreation facilities are often essential to the success of an income-producing recreational project, especially a project designed to attract all members of a family to the farmers facility. The elements for which cost sharing was authorized are those associated with conservation of soil and water. The cost was not shared for such facilities as benches, backstops, playing equipment, or hard surfacing.

Cost sharing in connection with the development of golf courses was limited to establishing vegetable cover (land preparation, seed, and necessary minerals)

for fairways. No cost sharing was authorized for the establishment of greens, traps, or other necessary elements. The establishment of grass on fairways requires considerably more effort, seed, and materials per acre than an ordinary pasture seeding. For example, at 50 percent of the cost, the cost-share payment per acre for establishing grass cover for a golf course in a midwestern county might be \$24 per acre, whereas the average cost share for establishing grass under the ACP in the Midwest would be about \$12 per acre.

For future programs, county committees will be required to consult with persons and groups most qualified in the area to determine the need for additional recreational facilities of the type being considered. It is believed this was done in connection with most recreation projects being developed under the 1963 program. This, of course, will involve some consideration of the financial success of the project but this is a judgment which in the final analysis must rest with the applicant.

6. *Public use of recreation projects*

It is our belief that public use of recreation conversions is implicit in the regulations and if a participant refuses to make the project available to "other than his own family" USDA is empowered to institute action for recovery of adjustments and cost-share payments. State and county operating officials are being instructed to initiate action of this nature whenever a situation comes to their attention where the use of a recreation facility is being limited to his own family. Steps will be taken to ascertain that this provision is brought to the attention of all future applicants.

MR. WHITTEN. What efforts, if any, do you make to see that in the handling of these programs it cannot be misused by the local county managers? Most of them, I am sure, are very fine citizens, but still it might not be in the interest of public policy for a man on behalf of the Government to contract with himself as a landowner. What is the present situation?

MR. COX. Congressman Whitten, under our current instructions, we do not permit a county office manager, or a county committeeman who himself is involved in one of these contracts, to participate in any decision with respect to the contract, to vote in any matter affecting his own contractual relationship.

MR. WHITTEN. In other words, he can't be the signer on behalf of the Government?

MR. COX. That is right.

NEED FOR ADDITIONAL FUNDS

MR. WHITTEN. Don't you think this program should remain in abeyance for 12 months, in line with your regular bill, as against having this supplemental increased request, at this time? Where is the pressure for additional money? How many requests have you had; from what States?

MR. JAENKE. We had a great number of requests, when a number of farmers were made aware that there was no program coming in here for 1964, and when we have not been able to give them any indication of what they could do under this program. We had a number of inquiries coming from the Congress, as well as the ones coming from our own people out in the country.

We would hope that we could continue at the minimum of this \$10 million level here for 1964, and give this program another opportunity to operate, and see whether or not we are able to accomplish the goals; namely, to take land which had been devoted to production of crops for which we have no immediate need, and devoting that land to other uses, whether it be recreation, whether it be grassland, conservation uses, or what they may be.

Mr. WHITTEN. I wish, Mr. Jaenke, that you would provide for the committee, the history of this program to date, showing the total number of signers, the amount of money paid out by the States, the purpose, and whether it is recreation, or putting it in grass.

Mr. JAENKE. We would be happy to do this.

(NOTE.—The information referred to appears in Mr. Jaenke's prepared statement beginning on p. 207.)

Mr. WHITTEN. Gentlemen, I believe that concludes our hearings. I wish to thank you for your appearance. This is somewhat unusual in that these documents have been presented to the Senate. But our committee will have to deal with the Senate action in conference in case they include any of it. Of course, if they should exclude it, it won't be in conference.

However, I felt the committee should be advised directly by the Department.

Thank you, gentlemen, for your appearances.

GENERAL STATEMENT OF ASSOCIATE ADMINISTRATOR, ASCS

Your prepared statement, Mr. Jaenke, may appear in the record at this point.

(The statement follows:)

STATEMENT OF EDWIN A. JAENKE, ASSOCIATE ADMINISTRATOR, AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. Chairman, I am here today to discuss the supplemental estimate for the 1964 cropland conversion program and the need for a budget amendment in 1965 in connection with the emergency conservation measures. First, I will discuss the cropland conversion program estimate of \$10 million. Until such time as pending legislation is acted upon to increase the current \$10 million limitation on calendar year expenditures to \$50 million, there is an urgent need to continue the cropland conversion program at the presently authorized level. This supplemental estimate for the calendar year 1964 program will provide continuity in operations, and is consistent with plans underlying the 1965 budget, which includes \$10 million for the calendar year 1965 program. I would like to offer for the record three statements which give expenditures from appropriations from inception of the program through estimated fiscal year 1969; appropriations through estimated fiscal year 1965; and payments required by calendar years under the existing legislation.

More acreage continues to be used for producing row crops and small grains than necessary for our national requirements. There is a need for more land in grass, trees, public recreational facilities, or wildlife habitat, than now is being used for those purposes. The cropland conversion program provides a means for helping farmers shift to these other needed uses some of their cropland which now is being used to produce crops. It helps people stay on the farm and earn income from farming. It helps the farmer find a better use for his land and therefore the changes he makes in the use of his land are more likely to be permanent changes. It provides the public with needed conservation of agricultural resources and facilities for recreation.

Funds are needed now so that long-term agreements can be negotiated for conversion to take effect as soon as practicable.

Under this program, agreements are offered to farm and ranch owners and operators providing for changes in cropping systems and land uses and for practices and measures needed to conserve and develop soil, water, forest, wildlife, and public recreation resources. Agreements with farmers are for periods of either 5 or 10 years, depending upon the type of land being converted and the type of project to which conversion is being made.

Adjustment and cost-share payments are made to farmers not as income payments, but rather to provide limited assistance in shifting cropland to alternate income-producing uses. The farmer is expected to earn his income from the land by using it for purposes other than crop production. In other words, the

cropland conversion program will move land into more needed uses which will produce income for the farmer while at the same time conserving soil and water resources and providing public use benefits. The amount of assistance to farmers is based on such factors as land productivity, type of conversion, use to which the land is being converted, changes in operating costs, and the conservation measures needed by the land in its new use.

The supplemental will provide funds for adjustment, cost-sharing, and technical assistance payments on agreements to be entered into under this program, as authorized under existing legislation which we interpret to mean that the Secretary may sign agreements in excess of \$10 million in a calendar year, so long as the total payments required for a calendar year under all outstanding agreements do not exceed \$10 million.

Participation and financing for agreements beginning in 1963 calendar year

During the calendar year 1963, 2,802 agreements covering 129,157 acres, requiring payments of \$7,098,180 were signed with farmers to take effect that year. In accordance with the basic act, these agreements were signed in advance of a specific appropriation therefor. On February 11, 1963, a 1963 supplemental estimate of \$6 million was submitted to the Congress to cover estimated expenditures in the fiscal year 1963. The remaining funds needed to complete payments under the agreements were requested as a part of the fiscal year 1964 appropriation. The Congress appropriated \$2 million as a fiscal year 1963 supplemental, of which \$1,850,000 was for that purpose. The remaining funds needed (\$5,350,000) were provided by the Congress in the fiscal year 1964 appropriation act, on December 30, 1963. In the meantime, and in accordance with the law, CCC funds were used to make initial payments.

The delayed and uncertain financing of the program contributed to the failure to obtain agreements requiring the full \$10 million authorized. In view of this, the Department concluded that the Congress should specify in appropriation acts the size of any future commitments and provide necessary funds for meeting them before the Department entered into any additional agreements.

Fiscal year 1964 budget estimate

The fiscal year 1964 budget estimate submitted in January 1963, included funds for entering into additional agreements under the cropland conversion program to begin with the 1964 calendar year. However, no funds were included in the fiscal year 1964 appropriation act for such agreements, but as stated above, funds were included to complete payments on agreements entered into in the 1963 calendar year.

The Senate committee report on the fiscal year 1964 appropriation bill stated: "The Committee understands that legislation is pending (S. 1588) in regard to the current limitation of \$10 million annually on the pilot land use adjustment program. The proposed legislation would include a provision that beginning with the 1964 program [calendar year]¹ the size of the annual program limitation would be specified in advance in the annual appropriation act. The committee will consider the program authorization for 1964 after the pending legislation is enacted."

Budget estimate for 1965 program

The fiscal year 1965 budget estimate, submitted in January 1964, included \$10 million to finance additional agreements under the cropland conversion program. The House bill reduced this amount to \$7.2 million, the same amount as was appropriated for the agreements entered into in the 1963 calendar year. Restoration of the \$2.8 million reduction has been requested by the Department in order to carry out the cropland conversion program at the level authorized by the Congress in section 101 of the Food and Agriculture Act of 1962. The 1965 budget also included a forecast of a 1964 supplemental request of an additional \$10 million based on existing legislation and \$33 million based on enactment of legislation to expand the program.

Supplemental estimate for \$10 million for 1964 program (S. Doc. 83)

Since no final action on legislation to expand the program had been taken by the Congress as of March 1964 and the outlook for action was not favorable, a supplemental estimate of \$10 million was transmitted to the Congress on June 24, 1964. This action is consistent with the 1965 budget and the funds would be obligated in the fiscal year 1965.

¹ Bracketed material added.

The total of \$20 million involved in the estimates for the 1964 and 1965 programs would be handled so that the long-term agreements (5 to 10 years) entered into therewith would not require payments (including payments scheduled to be made in calendar year 1964 under agreements entered into in the 1963 calendar year) in excess of \$10 million in any one calendar year.

Now, for the emergency conservation measures estimate—historically, additional funds have not been included in the regular budget submission since it is impossible to forecast disasters and it is difficult to estimate probable needs for emergencies in advance of their occurrence. Recent disasters have practically exhausted all available funds, thus making it necessary to request additional funds at this time.

For several years, beginning in 1957 under the criteria stated in Public Law 85-58, the Congress has provided special funds for sharing the cost of emergency conservation measures needed to deal with cases of sever damage to farmlands by natural disasters such as floods, storms, and drought. Funds are allocated for use in counties designated by the Secretary upon a finding that a natural disaster has occurred and as a result new conservation problems have been created which (1) if not treated, will impair or endanger the land; (2) materially affect the productive capacity of the land; (3) represent damage which is unusual in character and, except for wind erosion, is not the type which would recur frequently in the same area; and (4) will be so costly to rehabilitate that Federal assistance is or will be required to return the land to productive agricultural use.

These funds are in addition to regular appropriations for the agricultural conservation program. As in the past, it is proposed that emergency funds be used to supplement the regular ACP funds—most of which are already committed to other areas and farmers—to deal with these additional intense conservation problems arising from unforeseeable natural disasters.

The ACP emergency conservation assistance has provided urgently needed assistance to farmers each year since 1952—the first year this emergency type of assistance was authorized by the Congress. Since that time several such special authorizations have been provided by the Congress. A need for funds to assist farmers in carrying out emergency conservation measures to deal with severe damage caused by natural disasters such as floods, hurricanes, and drought has arisen in 36 States during this period.

Some examples are the severe dust storms in the Great Plains area in 1954, 1955, and 1956 where this program provided invaluable assistance in applying emergency measures to prevent or eliminate disastrous wind erosion. This program also was used to provide emergency assistance to farm damaged by severe floods in many areas, especially in the Midwest where the Missouri, Platte, Wabash, and numerous tributaries have damaged lands from 1952 to 1960. Severe windstorms in the Northwest in 1963 also required the use of emergency funds.

In the New England area, severe hurricane damage was experienced about 10 years ago and emergency ACP assistance was needed in Connecticut and Massachusetts to help farmers rehabilitate their damaged farmlands. About \$250,000 of emergency ACP funds were used in these two States. Funds also were used in 1957-59 in Louisiana and Texas due to hurricanes in that area.

At the present time emergency funds are being used in the following States to combat conservation problems caused by severe drought or flood; Alabama, Arizona, Arkansas, Florida, Georgia, Indiana, Kentucky, Missouri, Montana, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia. Almost all available funds have been allocated to meet present emergencies.

We are requesting an additional \$4 million in 1965 to provide standby capacity to meet emergencies which may occur this fall or early next spring. Requests for assistance are more numerous in the fall and early spring. This budget amendment is consistent with the Senate report on the 1964 deficiency appropriation bill which indicated that funds should be included in the budget for this program, rather than being requested piecemeal in supplemental estimates.

CROPLAND CONVERSION PROGRAM

EXPENDITURES

After enactment, appropriations are advanced in full to the Commodity Credit Corporation and are therefore technically expended at that point. The following table illustrates the actual timing of estimated payments and other assistance under the program.

Expenditures from appropriations from inception through fiscal year 1969 (estimated)

Program	Fiscal year 1963	Fiscal year 1964	Fiscal year 1965	Fiscal year 1965	Fiscal year 1967	Fiscal year 1968	Fiscal year 1969	Total
Adjustment, cost sharing, and technical assistance: Conserva- tion reserve contract extensions.....	\$13,061	\$5,786,246	\$80,693					\$5,890,000
Cropland conversion:								
1963 program.....	1,850,000	3,450,000	1,458,456	\$169,862	\$169,862			7,098,180
1964 program (S. Doc. 83).....			9,280,000	240,000	240,000	\$240,000		10,000,000
1965 program.....			6,760,000	2,520,000	240,000	240,000	\$240,000	10,000,000
Total estimated expenditures.....	1,863,061	19,236,246	17,589,149	2,929,862	649,862	480,000	240,000	2 32,988,180

¹ Pursuant to sec. 101(4)(e)(7) of the Food and Agriculture Act of 1962, \$1,995,585 of Commodity Credit Corporation funds were used to make payments through June 30, 1963. These funds were repaid from the fiscal year 1964 appropriation.

² Estimated expenditures through fiscal year 1969 are less than the appropriations made. To the extent that expenditures are less when final payments are made, such balances will be available to reduce future appropriation requests.

Appropriations from inception through fiscal year 1965 (estimated)

Program	Fiscal year 1963	Fiscal year 1964, appropriated	Pending supplemental, S. Doc. 83	Fiscal year 1965 budget	Total program
Adjustment, cost sharing, and technical assistance: Conservation reserve contract extensions-----	\$150,000	\$6,000,000	-----	-----	\$6,150,000
Cropland conversion:					
1963 program-----	1,850,000	5,350,000	-----	-----	7,200,000
1964 program-----	-----	-----	\$10,000,000	-----	10,000,000
1965 program-----	-----	-----	-----	\$10,000,000	10,000,000
Total appropriation-----	2,000,000	11,350,000	10,000,000	10,000,000	33,350,000

NOTE.—Pursuant to sec. 101(4)(e)(7) of the Food and Agriculture Act of 1962, \$1,995,585 of CCC funds were used to make payments through June 30, 1963. These funds were repaid from the fiscal year 1964 appropriation.

Payments required by calendar years under \$10,000,000 limitation

[Thousands of dollars]

	Calendar year							Total
	1963	1964	1965	1966	1967	1968	1969	
Agreements entered into:								
Calendar year 1963-----	\$6,400	\$200	\$200	\$200	\$200	-----	-----	\$7,200
Calendar year 1964-----	-----	9,800	8,520	480	480	\$480	\$240	120,000
Total-----	6,400	10,000	8,720	680	680	480	240	27,200

¹ Supplemental for 1964 program, \$10,000,000; fiscal year 1965 budget estimate for 1965 program, \$10,000,000; total commitment authority, \$20,000,000.

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

RESEARCH REPORT

NO. 1234

BY

J. D. JONES

DEPARTMENT OF PHYSICS

UNIVERSITY OF CHICAGO

CHICAGO, ILLINOIS

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