

A Bibliography of

**ORGANIC ACIDS
IN HIGHER PLANTS**

Agricultural Handbook No. 164

Agricultural Research Service

UNITED STATES DEPARTMENT OF AGRICULTURE

CONTENTS

	Page
Occurrence of organic acids in higher plants	2
Literature cited	51

A BIBLIOGRAPHY OF ORGANIC ACIDS IN HIGHER PLANTS¹

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Scientific interest in the organic acids of higher plants has prompted a search of the literature and tabulation of these acids and their occurrence.

Nonvolatile, non-nitrogen-containing, carboxylic acids whose structure is generally accepted (44, 267, 483)² are included. Fatty acids, long-chain polymers—such as pectins—and compounds which contain a sugar group as part of the molecule are excluded. Thus, carboxylic saponinins are included but saponins are not. The acids reported are those that are found in the free state or as salts, not as esters.

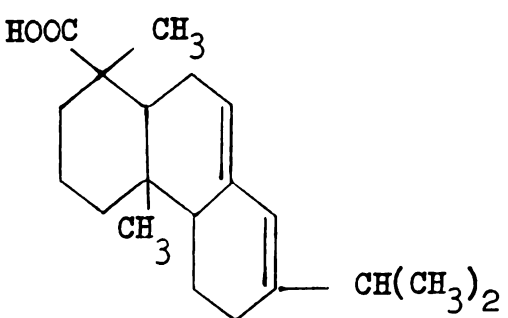
Plants are listed by family and by genus and species. The family names are those given by Willis (789), and, when possible, the names of the genus and species follow this system. Where the name disagrees with that in established usage by the Department of Agriculture the latter name is given in parentheses following the original name. Where the name is apparently misspelled, doubtful, or not known by the Department a query(?) has been inserted following the original name. Only spermatophyta are included.

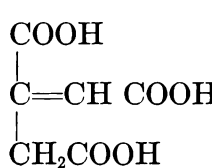
Titles of articles and books published in other languages have been translated into English. In those cases in which the report could not be verified by consulting the original paper or an abstract, a secondary reference is substituted.

¹ This review covers all publications through 1954 and a limited number published in 1955 and 1956.

² Italic numbers in parentheses refer to Literature Cited, p. 51.

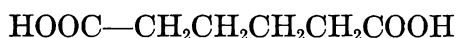
OCCURRENCE OF ORGANIC ACIDS IN HIGHER PLANTS

Family	Genus and species	Source	Reference
Abietic Acid			
			
Pinaceae	-----	Colophony	(37, 113, 162, 169)
	<i>Pinus abies</i> (<i>Picea abies</i>)	Resin	(48, 419)
	<i>P. larix</i> (<i>Larix decidua</i>)	-----	(419)
	<i>P. palustris</i>	Resin	(35, 258, 339)

Aconitic Acid			
			
Chenopodiaceae	<i>Beta vulgaris</i>	{ Juice	(392, 395)
		{ Unripe beet	(705)
Compositae	<i>Achillea millefolium</i>	-----	(285)
	<i>Helianthus annuus</i>	-----	(58)
	<i>Avena sativa</i>	-----	(474)
	<i>Hordeum vulgare</i>	{ Etiolated shoot.	(168)
Gramineae	<i>Saccharum officinarum</i>	{ Seedling	(314, 474)
		{ Juice	(36; 50; 411; 603; 604; 605; 694; 699; 703; 704, ref. 162; 784; 811; 817)
	<i>Secale cereale</i>	{ -----	(474)
		{ Seedling	(668)

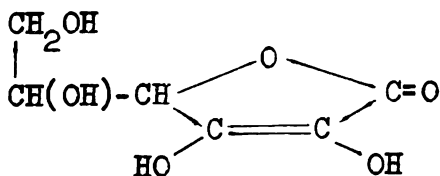
Family	Genus and species	Source	Reference
Aconitic Acid—Continued			
Gramineae-----	<i>Sorghum vulgare</i> -----	Scale from evaporation pans.	(414, 744) (507)
		Juice-----	(745, 786, 787)
	<i>Triticum</i> sp.-----	Sprout-----	(473) (667)
	<i>T. sativum</i> (<i>T. aestivum</i>)--	Seedling-----	(668)
Leguminosae-----	<i>Zea mays</i> -----	Sprouting seed	(668)
	<i>Phaseolus coccineus</i> -----		(58)
	<i>Aconitum</i> spp-----		(54; 58; 108; 160, p. 567, ref. 3; 497)
	<i>A. columbianum</i> -----		(49)
Ranunculaceae---	<i>A. heterophyllum</i> -----	Root-----	(322) (769)
	<i>A. napellus</i> -----		(50)
	<i>A. septentrionale</i> -----	Tuber and root	(316)
	<i>A. vernalis</i> (<i>Adonis ver-</i> <i>nalis</i>).-----	Leaf-----	(497) (388)
	<i>Delphinium barbeyi</i> -----		(49)
	<i>D. bicolor</i> -----		(49)
	<i>D. consolida</i> -----	Leaf sap-----	(781)
	<i>D. cucullatum</i> -----		(49)
	<i>D. geyeri</i> -----		(49)
	<i>D. glaucescens</i> -----		(49)
Solanaceae-----	<i>D. nelsonii</i> -----		(49)
	<i>Solanum lycopersicum</i> (<i>Lycopersicon escu-</i> <i>lentum</i>).-----	Fruit-----	(109)
		Root, leaf, and ripe fruit.	(116)
Umbelliferae-----	<i>Angelica archangelica</i> ----	Root-----	(690)

Adipic Acid



Chenopodiaceae--	<i>Beta vulgaris</i> -----	(396, 742)
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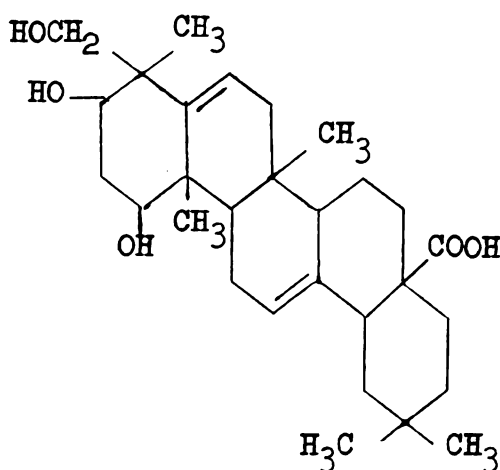
Ascorbic Acid



Since its structure was elucidated by Svirbely and Szent-Györgyi in 1932 (691, 692), ascorbic acid has been reported in almost every plant in which its presence has been investigated.

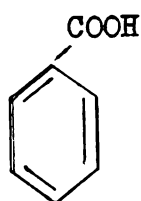
Family	Genus and species	Source	Reference
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Basic Acid



Sapotaceae	<i>Achras sapota</i>	Seed	(276)
	<i>Bassia butyracea</i> (<i>Madhuca butyracea</i>).	do	(276, 277)
	<i>B. latifolia</i> (<i>M. latifolia</i>).	do	(276, 277)
	<i>B. longifolia</i> (<i>M. longifolia</i>).	do	(276)
	<i>B. parkii</i>	do	(276, 277)
	<i>Dumoria heckelii</i>	do	(276)
	<i>Mimusops djave</i> (<i>Bailonella toxisperma</i>).	do	(276)
	<i>M. elengi</i>	do	(276)
	<i>M. hexandra</i>	do	(276)
	<i>Payena lucida</i>	do	(276)

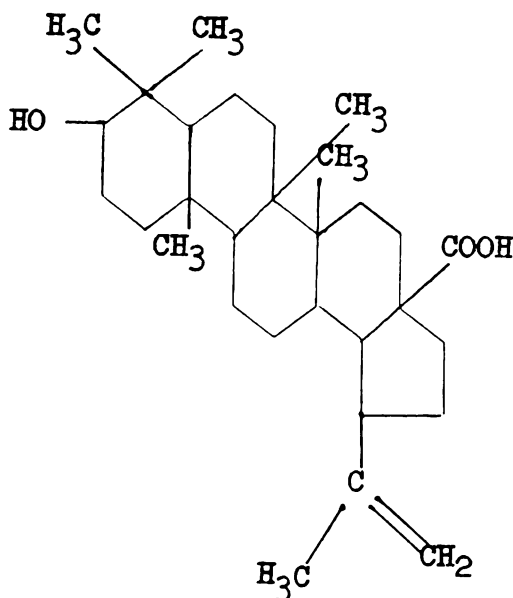
Benzoic Acid



Compositae	<i>Dahlia</i> sp.		(511)
Droseraceae	<i>Drosera rotundifolia</i>		(796)
Empetraceae	<i>Empetrum nigrum</i>	Leaf	(306)
Ericaceae	<i>Vaccinium macrocarpum</i>	Berry	(239, 434, 467)
	<i>V. oxycoccus</i>	do	(239, 415, 477, 599)
	<i>V. vitis-idaea</i>	do	(51, 239, 328, 382, 403, 477)
Gramineae	<i>Bambusa arundinacea</i>	Young shoot	(218)

Family	Genus and species	Source	Reference
Benzoic Acid—Continued			
Leguminosae.....	<i>Daviesia latifolia</i>	Leaf and stem.....	(555)
	<i>Myroxylon pereirae</i>	Balsam.....	(361)
	<i>M. toluiferum</i>	do.....	(110, 146)
Lentibulariaceae..	<i>Pinguicula vulgaris</i>	Leaf.....	(405)
Lilaceae.....	<i>Dracera draco</i>	Resin.....	(715a)
	<i>Gloriosa superba</i>	Tuber.....	(123)
Magnoliaceae.....	<i>Illicium anisatum</i>	Fruit and seed.....	(498)
Myrtaceae.....	<i>Psidium</i> spp.....	.....	(515)
Papaveraceae.....	<i>Papaver somniferum</i>.....	.....	(635)
Pinaceae.....	<i>Agathis australis</i>.....	.....	(457)
Rosaceae.....	<i>Prunus serotina</i>	{Bark.....	(550)
		{Leaf.....	(551)
Rubiaceae.....	<i>Coffea</i> sp.....	.....	(410, 516)
Rutaceae.....	<i>Casimiroa edulis</i>	Seed.....	(549)
Scrophulariaceae..	<i>Digitalis purpurea</i>.....	.....	(331)
Styracaceae.....	<i>Styrax</i> sp.....	.....	(372; 718, p. 507, fn. 4.)
	<i>S. benzoin</i>	Resin.....	(715a)

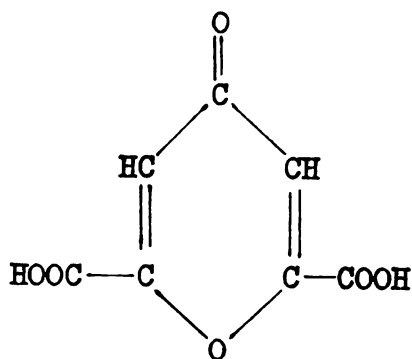
Betulinic Acid



Apocynaceae.....	<i>Alyxia buxifolia</i>	Bark.....	(21)
Cornaceae.....	<i>Cornus florida</i>.....	.....	(606)
Gentianaceae.....	<i>Menyanthes trifoliata</i>	Rhizome.....	(671)
Loranthaceae.....	<i>Nuytsia floribunda</i>	Leaves, stems, and bark.....	(21)
Myrtaceae.....	{ <i>Melaleuca</i> (6 spp.).....	Bark.....	(21)
	{ <i>Syncarpia laurifolia</i>	do.....	(579)
Platanaceae.....	<i>Platanus acerifolia</i>	do.....	(100)
Punicaceae.....	<i>Punica granatum</i>	Leaves and bark.....	(98)
Rhamnaceae.....	<i>Ziziphus vulgaris</i>	Seeds and bark.....	(333)

Family	Genus and species	Source	Reference
Caffeic Acid			
$\begin{array}{c} \text{CH}=\text{CHCOOH} \\ | \\ \text{C}_6\text{H}_3(\text{OH})_2 \end{array}$			
Aquifoliaceae	{ <i>Ilex aquifolium</i> -----	Leaf-----	(678)
	{ <i>I. paraguayensis</i> -----	do-----	(678)
Compositae	{ <i>Anthemis nobilis</i> -----	Flower-----	(547)
	{ <i>Taraxacum officinale</i> -----	Root-----	(546)
Labiatae	<i>Melissa</i> sp-----	Leaf-----	(272)
Pinaceae	<i>Larix europaea</i> (<i>L. de-</i> <i>cidua</i> .)-----	Resin-----	(37)
Ranunculaceae	{ <i>Aconitum septentrionale</i> ----	-----	(315)
	{ <i>Clematis vitalba</i> -----	Flowering branch.-----	(730)
Rosaceae	<i>Crataegus oxyacantha</i> ----	Leaf, fruit, and flower.-----	(187)
Rubiaceae	{ <i>Cinchona cuprea</i> -----	Bark-----	(349)
	{ <i>Coffea</i> spp-----	{ Bean-----	(187)
		{ Leaf-----	(678)
Scrophulariaceae	{ <i>Digitalis purpurea</i> -----	-----	(88, 331)
	{ <i>Scrophularia nodosa</i> -----	Root-----	(317)
Solanaceae	<i>Solanum tuberosum</i> -----	-----	(323)
Umbelliferae	{ <i>Angelica archangelica</i> -----	-----	(690)
	{ <i>Conium maculatum</i> -----	-----	(288)

Chelidonic Acid



Amarylidaceae	-----	-----	(684)
	<i>Agave</i> sp-----	Leaf-----	(581)
	<i>A. falcata</i> -----	Anther and peri- anth.-----	(582)
	<i>Amaryllis crispa</i> (<i>Hessea</i> <i>crispa</i>).-----	Leaf, perianth, and anther.-----	(582)

Family	Genus and species	Source	Reference
Chelidonic Acia—Continued			
	<i>Androstemma junceum</i> (<i>Conostylis androstemma</i>).	Leaf, perianth, and anther.	(582)
	<i>Anigozanthos humilis</i> -----	Leaf-----	(582)
	<i>A. preissii</i> -----	Anther-----	(582)
	<i>Anoiganthus breviflorus</i> ..	Pericarp-----	(582)
	<i>Blancoa canescens</i> -----	Leaf and peri- anth.	(582)
	<i>Brunsvigia angustifolia</i> ..	Leaf and flower..	(582)
	<i>B. josephinea</i> (<i>B. gigan- tea</i>).	Pericarp, leaf, perianth, and anther.	(582)
	<i>B. uitenhagensis</i> -----	Flower-----	(582)
	<i>Buphane ciliaris</i> -----	Leaf, perianth, and anther.	(582)
	<i>Carpolyza spiralis</i> -----	Leaf, perianth, and bulb.	(575)
	<i>Conostylis</i> (12 spp.)-----	-----	(582)
	<i>Crinum capense</i> (<i>C. longi- folium</i>).	Leaf, perianth, and pedicel.	(582)
	<i>C. kirkii</i> -----	-----do-----	(582)
	<i>C. purpurascens</i> -----	Leaf, perianth, and anther.	(582)
	<i>Cummingia tenella</i> (<i>Con- anthera campanulata</i>).	Perianth-----	(582)
	<i>Galanthus nivalis</i> -----	Leaf, pedicel, anther, and perianth.	(582)
	<i>G. plicatus</i> -----	Leaf, perianth, pedicel, and bulb.	(582)
Amarylidaceae---	<i>Hessea maximiliani</i> -----	Flower-----	(582)
	<i>Hippeastrum mandoni</i> ---	Leaf, perianth, anther, and pedicel.	(582)
	<i>Hypoxis juncea</i> -----	Flower-----	(582)
	<i>H. minuta</i> -----	Flower and leaf..	(582)
	<i>H. probata</i> -----	Perianth-----	(582)
	<i>H. serrata</i> -----	Perianth, leaf, and anther.	(582)
	<i>H. villosa</i> -----	Leaf, and peri- anth.	(582)
	<i>Ixiolirion montanum</i> ---	Perianth, leaf, and flower.	(582)
	<i>Lanaria plumosa</i> -----	Leaf and peri- anth.	(582)
	<i>Leucojum</i> (5 spp.)-----	-----	(582)
	<i>Lophiola americana</i> -----	Leaf and flower..	(582)
	<i>Lycoris aurea</i> -----	Perianth, anther, pedicel, and pericarp.	(582)
	<i>Narcissus</i> (14 spp.)-----	-----	(582)
	<i>Panoratiwm canariense</i> ---	Leaf and anther..	(582)
	<i>Sternbergia colchiciflora</i> ---	Leaf, perianth, anther, and seed.	(582)
	<i>S. lutea</i> -----	Leaf, perianth, and anther.	(582)
	<i>Tribonanthus uniflora</i> ---	Perianth-----	(582)
	<i>Zephyranthes rosea</i> -----	Perianth, leaf, and anther.	(582)
Berberidaceae---	<i>Berberis vulgaris</i> -----	-----	(370)

Family	Genus and species	Source	Reference
Chelidonic Acid—Continued			
Campanulaceae	<i>Centropogon</i> (6 spp.)	-----	(582)
	<i>Downingia pulchella</i>	-----	(582)
	<i>Isotoma</i> (5 spp.)	-----	(582)
	<i>Laurentia</i> (4 spp.)	-----	(582)
	<i>Lobelia</i> (25 spp.)	-----	(582)
	<i>L. cardinalis</i>	-----	(370)
Cannaceae	<i>L. inflato</i>	{ Fruit	(370)
	<i>L. syphilitica</i>		(581)
	<i>Siphocampylus</i> (9 spp.)	-----	(370)
	<i>Canna</i> spp.	Root	(582)
Dioscoreaceae	<i>Discorea balcanica</i>	Leaf, flower, and pericarp.	(581)
	<i>D. deltoidea</i>	Leaf and flower.	(582)
	<i>D. humifusa</i>	Seed and pericarp.	(582)
Haemodoraceae	<i>Dilatris corymbosa</i>	Flower and leaf.	(582)
	<i>Lichenolia tinctoria</i>	-----do-----	(582)
	<i>Wachendorfia paniculata</i>	Flower, leaf, and pericarp.	(582)
	<i>W. thyrsiflora</i>	Anther	(582)
Hippocastanaceae	<i>Aesculus flava</i>	Perianth and leaf.	(582)
	<i>A. hippocastanum</i>	-----	(581)
	<i>Acanthocarpus preissii</i>	Pericarp and leaf.	(582)
	<i>Allium cirrhosum</i>	Leaf	(582)
	<i>A. flavescens</i>	-----do-----	(582)
	<i>A. obliquum</i>	-----do-----	(582)
	<i>A. tenuissimum</i>	Leaf and flower.	(582)
	<i>Aloe minima</i>	Leaf	(582)
	<i>Androcymbium</i> (3 spp.)	-----	(582)
	<i>Anguillaria dioica</i>	-----do-----	(582)
Liliaceae	<i>A. tenella</i>	-----do-----	(582)
	<i>Anticlea sibiricus</i> (<i>Zigadenus sibiricus</i>)	Leaf, bulb, and filament.	(582)
	<i>A. sparagus</i> (11 spp.)	-----	(582)
	<i>A. officinalis</i>	-----	(580)
	<i>A^sphodelus clavatus</i>	-----	(582)
	<i>A. damascena</i>	-----	(582)
	<i>B^ellevalia dubia</i> (<i>Hya-</i> <i>cinthus dubius</i>)	Flower	(582)
	<i>Boemetra columellaris</i> (?)	Filament, leaf, and perianth.	(582)
	<i>Borya septentrionalis</i>	Leaf	(582)
	<i>Brodiaea</i> (3 spp.)	-----	(582)
	<i>Bulbine alooides</i>	Flower	(582)
	<i>Bulbocodium ruthenicum</i>	Leaf	(582)
	<i>B. versicolor</i>	-----do-----	(582)
	<i>Chlorophytum bowkeri</i>	Flower	(582)
	<i>C. parviflorum</i>	Pedicel	(582)
	<i>Colchicum</i> (12 spp.)	-----	(582)
	<i>C. autumnale</i>	-----	(370)
	<i>Convallaria majalis</i>	{ Leaf, anther, and perianth.	(370)
	<i>Cordylina banksii</i>		(582)
	<i>C. pumilio</i>	Flower	(582)
	<i>Dasyllirion graminifolium</i>	Leaf	(582)
		Flower	(582)

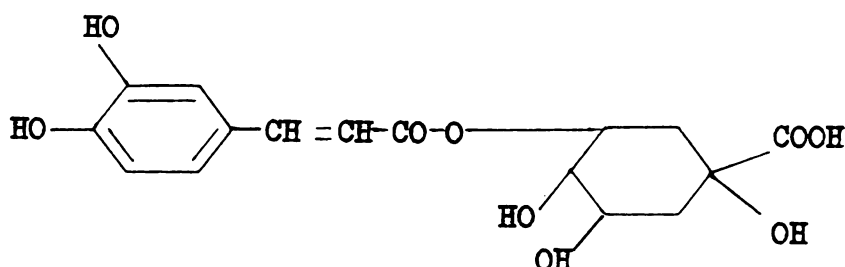
Family	Genus and species	Source	Reference
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Chelidonic Acid—Continued

	<i>Dasypogon bromeliifolius</i> ..	Flower	(582)
	<i>Dichopogon humilis</i>	do	(582)
	<i>Dracaena angustifolia</i> ..	Leaf	(582)
	<i>D. elliptica</i>	Flower	(582)
	<i>Eremurus himalaicus</i> ..	Leaf	(582)
	<i>Gloriosa superba</i> .....	.....	(370, 399)
	<i>Hookera hyacintha</i>	Flower	(582)
	<i>H. minor</i>	do	(582)
	<i>Hyacinthus leucophaeus</i> ..	do	(582)
	<i>Iphigenia diuterik</i> (?) ..	Leaf	(582)
	<i>I. indica</i>	do	(582)
	<i>Johnsonia lupulina</i> ..	do	(582)
	<i>Kniphofia</i> (4 spp.) .....	.....	(582)
	<i>Lachenalia montigena</i> ..	Leaf	(582)
	<i>L. picta</i>	Leaf and flower.	(582)
	<i>Liriope graminifolia</i>	Leaf	(582)
	<i>Melonthium tenue</i>	Leaf, perianth, and seed.	(582)
	<i>M. virginicum</i> (<i>M.</i> <i>comosum</i>) ..	Leaf and flower.	(582)
	<i>Merendera</i> (5 spp.) .....	.....	(582)
	<i>Muscari botryoides</i>	Flower	(582)
	<i>M. calandrinianum</i>	Flower and leaf ..	(582)
	<i>Nartheceium scardicum</i> ..	Flower	(582)
	<i>Ophiopogon bockianus</i> ..	Leaf	(582)
	<i>O. japonicus</i>	do	(582)
	<i>Ornithogalum arabicum</i> ..	Anther	(582)
	<i>O. fimbriatum</i>	Leaf and peri- anth.	(582)
Liliaceae	<i>O. narbonense</i>	Flower	(582)
	<i>O. oligophyllum</i>	Pedicel	(582)
	<i>Ornithoglossum glaucum</i> ..	Leaf and flower ..	(582)
	<i>Paradisea liliastrum</i>	Leaf	(582)
	<i>Paris bockiana</i>	Leaf and peri- anth.	(582)
	<i>Polygonatum</i> (4 spp.)	do	(582)
	<i>Reineckea carnea</i>	Leaf and pedi- cel.	(582)
	<i>Rhipogonum album</i>	Pedicel	(582)
	<i>R. scandens</i>	Leaf and pedi- cel.	(582)
	<i>Ruscus hypoglossum</i>	Flower	(582)
	<i>Sabadilla officinarum</i> (<i>Schoenocaulon offi- cinale</i>) ..	.....	(684)
	<i>Sandersonia aurantiaca</i> ..	Leaf and peri- anth.	(582)
	<i>Schoenocaulon officinale</i> ..	.....	(370)
	<i>Scilla obtusifolia</i>	Leaf and flower ..	(582)
	<i>S. pratensis</i>	Flower	(582)
	<i>S. verna</i>	Leaf	(582)
	<i>Smilax</i> (6 spp.) .....	.....	(582)
	<i>Sugerokia orientalis</i> (<i>Helo- niopsis orientalis</i>) ..	Leaf, flower, and anther.	(582)
	<i>Tofieldia</i> (4 spp.) .....	.....	(582)
	<i>Trichopetalum stellatum</i> (<i>Bottionea thysantoides</i>) ..	Flower	(582)
	<i>Trillium</i> (9 spp.) .....	.....	(582)
	<i>Tupistra viridiflora</i>	Leaf	(582)
	<i>Urginea maritima</i> .....	.....	(370)
	<i>Uvularia sessilifolia</i>	Leaf and flower ..	(582)

Family	Genus and species	Source	Reference
Chelidonic Acid—Continued			
Liliaceae-----	<i>Veratrum</i> (7 spp.)-----	-----	(582)
	<i>V. album</i> -----	-----	(370, 637, 684)
	<i>V. viride</i> -----	-----	(370)
	<i>Wurmbea</i> (4 spp.)-----	-----	(582)
	<i>Xerotes elongata</i> -----	Flower-----	(582)
	<i>X. pauciflora</i> -----	do-----	(582)
	<i>X. sauveolens</i> -----	do-----	(582)
	<i>Yucca brevifolia</i> -----	Perianth and pedicel.	(582)
Papaveraceae----	<i>Zygadenus</i> (5 spp.)-----	-----	(582)
	<i>Chelidonium majus</i> -----	-----	(254, 300, 370, 383, 387, 636, 684, 820)
	<i>Stylophorum diphyllum</i> ..	Leaf-----	(560)
		Leaf, perianth, and pedicel.	(582)
Rhamnaceae-----	<i>Stylophorum diphyllum</i> ..	Leaf, perianth, and anther.	(582, 632)
	<i>Paliurus aculeatus</i> -----	Pedicel-----	(582)
	<i>Rhamnella franguloides</i> ..	Leaf-----	(582)
	<i>Rhamnus</i> (21 spp.)-----	-----	(582)
	<i>R. cathartica</i> -----	Fruit-----	(581)
	<i>Sageretia minutifolia</i> -----	Leaf-----	(582)
Rubiaceae-----	<i>Zizyphus lotus</i> -----	do-----	(582)
	<i>Uragoga ipecacuanha</i> (Cephaelis ipecacuanha).-----	-----	(370)
Thymelaeaceae----	<i>Daphne</i> (9 spp.)-----	-----	(582)
	<i>D. gnidium</i> -----	Fruit-----	(581)
	<i>Gnidia</i> (9 spp.)-----	-----	(582)
	<i>Passerina</i> (5 spp.)-----	-----	(582)
	<i>Pimelea flava</i> -----	Leaf-----	(582)
	<i>Stellera chamaejasme</i> -----	Leaf and flower.	(582)
	<i>Thymelaea</i> (4 spp.)-----	-----	(582)
	<i>Wikstroemia</i> (3 spp.)-----	-----	(582)

Chlorogenic Acid



Acanthaceae-----	<i>Barleria cristata</i> -----	-----	(228)
	<i>Eranthemum macrophyllum</i> .	-----	(228)
	<i>Graptobilanthes hortense</i> (Graptophyllum hortense).	-----	(228)
	<i>Strobilanthes lupinus</i> -----	-----	(228)
	<i>Thunbergia laurifolia</i> -----	-----	(228)

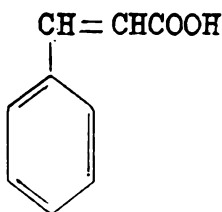
Family	Genus and species	Source	Reference
Chlorogenic Acid—Continued			
Apocynaceae-----	{ <i>Allamanda hendersonii</i> -----	-----	(228)
	{ <i>Alstonia scholaris</i> -----	-----	(228)
	{ <i>Kopsia flavida</i> -----	-----	(228, 231)
Aquifoliaceae-----	{ <i>Ilex aquifolium</i> -----	Leaf, stem, and root.	(118)
	{ <i>I. salicifolia</i> -----	-----	(228)
Araliaceae-----	{ <i>Aralia maculata</i> -----	-----	(228)
	{ <i>Hedera helix</i> -----	-----	(249)
	{ <i>Heptapleurum</i> sp-----	-----	(228)
	{ <i>Paratropia</i> sp-----	-----	(228)
	{ <i>Trevesia sundaica</i> -----	-----	(228)
Asclepiadaceae---	{ <i>Hoya bandanensis</i> -----	-----	(228)
Bignoniaceae-----	{ <i>Crescentia cuneifolia</i> -----	-----	(228)
	{ (<i>C. cujele</i>).-----	-----	-----
	{ <i>Kigelia pinnata</i> -----	-----	(228)
	{ <i>Spathodea campanulata</i> -----	-----	(228)
Boraginaceae-----	{ <i>Cordia suaveolens</i> -----	-----	(228)
	{ <i>Ehretia buxifolia</i> -----	-----	(228)
Cannaceae-----	{ <i>Canna indica</i> -----	-----	(228)
Caprifoliaceae----	{ <i>Lonicera</i> sp-----	-----	(228)
	{ <i>Sambucus javanica</i> -----	-----	(228)
	{ <i>S. nigra</i> -----	Flower-----	(118)
Chenopodiaceae---	{ <i>Suaeda dodoneifolia</i> (?)-----	-----	(228)
	{ 95 genera-----	-----	(540)
	{ <i>Achillea millefolium</i> -----	Flower-----	(118)
	{ <i>Anacyclus pyrethrum</i> -----	do-----	(118)
	{ <i>Arnica montana</i> -----	do-----	(118)
	{ <i>Centaurea jacea</i> -----	Leaf-----	(118)
	{ <i>Cichorium intybus</i> -----	do-----	(118)
	{ <i>Clibadium asperum</i> -----	-----	(228)
	{ <i>C. surinamense</i> -----	-----	(228)
	{ <i>Dahlia variabilis</i> (<i>D. pin-</i> <i>nata</i>).-----	-----	(539)
	{ <i>Eupatorium javanicum</i> -----	-----	(228)
	{ <i>E. pallescens</i> -----	-----	(228)
	{ <i>Gymnanthemum grande</i> -----	-----	(228)
	{ <i>Helianthus</i> sp-----	Seed-----	(230)
Compositae-----	{ <i>H. annuus</i> -----	do-----	(224, 229, 364, 494)
	{ <i>H. doronicoides</i> -----	Leaf-----	(118)
	{ <i>H. tuberosus</i> -----	-----	(536, 538, 539)
	{ <i>Lactuca sativa</i> -----	-----	(538)
	{ <i>Lappa major</i> (<i>Arctium</i> <i>majus</i>).-----	Leaf-----	(118)
	{ <i>Pluchea indica</i> -----	-----	(228)
	{ <i>P. odorata</i> -----	-----	(228)
	{ <i>Silybum marianum</i> -----	-----	(536)
	{ <i>Stiffia chrysantha</i> -----	-----	(228)
	{ <i>Tagetes erecta</i> -----	-----	(228)
	{ <i>Taraxacum gymnanthum</i> -----	-----	(539)
	{ <i>Tithonia diversifolia</i> -----	-----	(228)
	{ <i>Vernonia</i> sp-----	-----	(228)
	{ <i>Argyrea kurzei</i> -----	-----	(228)
	{ <i>Erycibe tomentosa</i> -----	-----	(228)
Convolvulaceae---	{ <i>Ipomoea batatas</i> -----	{ Root-----	(228, 538)
	{ <i>Lepistemon flavescens</i> -----	-----	(610)
	{ <i>Merremia dissecta</i> -----	-----	(228)
	{ <i>Porana paniculata</i> -----	-----	(228)

Family	Genus and species	Source	Reference
Chlorogenic Acid—Continued			
Cornaceae	<i>Mastixia cuspidata</i>	-----	(228)
Cucurbitaceae	<i>Coccinia cordifolia</i>	-----	(228)
	<i>Trichosanthes</i> sp.	-----	(228)
Dipsacaceae	<i>Dipsacus sylvestris</i>	-----	(118)
Ericaceae	<i>Vaccinium lucidum</i>	-----	(228)
Erythroxylaceae	<i>Erythroxylon coca</i>	-----	(228)
	<i>E. novogranatense</i>	-----	(228)
Eucommiaceae	<i>Eucommia</i> sp.	Leaf	(247)
	<i>Aeschynanthus longiflora</i>	-----	(228)
	<i>Agalmyla staminea</i>	-----	(228)
	<i>Cyrtandra bicolor</i>	-----	(228)
Gesneriaceae	<i>Episcia pulchella</i>	-----	(228)
	<i>Gloxinia caulescens</i>	-----	(228)
	<i>Sinningia</i> sp.	-----	(228)
	<i>Gnetum ovalifolium</i>	-----	(228)
Gnetaceae	<i>Gnetum ovalifolium</i>	-----	(228)
Goodeniaceae	<i>Scaevola sericea</i>	-----	(228)
	Mixed herbage	-----	(299)
	<i>Bambusa</i> sp.	-----	(228)
Gramineae	<i>Oryza sativa</i>	-----	(228)
	<i>Paspalum vaginatum</i>	-----	(228)
	<i>Phragmites</i> sp.	-----	(228)
	<i>Saccharum officinarum</i>	-----	(228)
	<i>Ballota foetida</i>	Leaf	(118)
	<i>Calamintha officinalis</i>	-----	(118)
Labiatae	<i>Mentha javanica</i>	-----	(228)
	<i>M. rotundifolia</i>	-----	(118)
	<i>Salvia coccinea</i>	-----	(228)
	<i>S. pratensis</i>	-----	(118)
	<i>Stachys lanata</i>	-----	(118)
Liliaceae	<i>Convallaria majalis</i>	Leaf	(118)
	<i>Crateriphytum molucanum</i>	-----	(228)
Loganiaceae	<i>Strychnos</i> sp.	Seed	(230)
	<i>S. nux-vomica</i>	Seed	(228)
	<i>S. nux-vomica</i>	Seed	(725)
Magnoliaceae	<i>Michelia fuscata</i>	-----	(228)
Malvaceae	<i>Gossypium</i> sp.	-----	(495)
Martyniaceae	<i>Martynia diandra</i>	-----	(228)
Moraceae	<i>Castilla elastica</i>	Latex	(232)
	<i>Ficus elastica</i>	do	(232)
Oleaceae	<i>Jasminum nudiflorum</i>	Leaf and flower	(118)
	<i>Orobanche epithymum</i>	Stem	(118)
	<i>O. rapum</i>	Stem, flower, and under-ground parts.	(118)
Orbanchaceae	<i>Phelipaea lutea</i>	-----	(118)
Pandanaceae	<i>Freycinetia strobilacea</i>	-----	(228)
Pedaliaceae	<i>Sesamum orientale</i>	-----	(228)
	<i>Aconitum septentrionale</i>	-----	(315)
Ranunculaceae	<i>Clematis paniculata</i>	-----	(228)
	<i>C. vitalba</i>	Leaf	(118)
	<i>Ranunculus bulbosus</i>	do	(118)
	<i>Crataegus oxyacantha</i>	Fruit, leaf, and flower.	(187)
	<i>Prunus domestica</i>	Fruit	(147)
Rosaceae	<i>Pyrus communis</i>	do	(94, 779)
	<i>P. communis</i>	Leaf	(779)
	<i>P. communis</i>	Fruit	(94, 296, 460, 779)
	<i>P. malus (Malus sylvestris)</i>	Juice	(530, 531)
	<i>P. malus (Malus sylvestris)</i>	Leaf	(788)

Family	Genus and species	Source	Reference
Chlorogenic Acid—Continued			
Rubiaceae	<i>Adina cordifolia</i>	-----	(228)
	<i>Coelospermum corymbosum</i>	-----	(228)
	<i>Coffea</i> sp.....	Bean.....	(187, 230, 240, 286)
	<i>C. arabica</i>	-----	(228, 593)
	<i>C. bengalensis</i>	-----	(228)
	<i>C. liberica</i>	-----	(227, 228, 231)
	<i>Exostemma longiflorum</i>	-----	(228)
	<i>Hymenodictyon</i> sp.....	-----	(228)
	<i>Mussaenda officinalis</i>	-----	(228)
	<i>Nauclea fagifolia</i>	-----	(228)
Saxifragaceae	<i>Oxyanthus hirsutus</i>	-----	(228)
	<i>Palicourea gardenioides</i>	-----	(228)
	<i>Timonius compressicaulis</i>	-----	(228)
Scrophulariaceae	<i>Hydrangea mutabilis</i>	-----	(228)
	<i>Capraria biflora</i>	-----	(228)
	<i>Torenia</i> sp.....	-----	(228)
	<i>Veronica alpina</i>	Whole plant.....	(118)
	<i>V. chamaedrys</i>	do.....	(118)
Solanaceae	<i>V. officinalis</i>	do.....	(118)
	<i>V. traversii</i>	Root, stem, and leaf.....	(118)
	<i>Atropa belladonna</i>	Leaf.....	(537)
	<i>Brunfelsia americana</i>	do.....	(537)
	<i>Capsicum annuum</i>	do.....	(537)
	(<i>C. frutescens</i>). <i>C. grossum</i>	do.....	(537)
	(<i>C. frutescens</i>). <i>C. violaceum</i>	do.....	(537)
	<i>Cestrum aurantiacum</i>	do.....	(537)
	<i>C. elegans</i>	do.....	(537)
	<i>Datura arborea</i>	do.....	(537)
Solanaceae	<i>D. stramonium</i>	do.....	(537)
	<i>Hyoscyamus albus</i>	do.....	(537)
	<i>H. aureus</i>	do.....	(537)
	<i>H. pusillus</i>	do.....	(537)
	<i>H. reticulatus</i>	do.....	(537)
	<i>Mandragora officinarum</i>	do.....	(537)
	<i>Nicotiana</i> sp.....	-----	(348)
	<i>Petunia nyctaginiiflora</i>	Leaf.....	(537)
	<i>Physalis alkekengi</i>	do.....	(118)
	<i>P. angulata</i>	do.....	(537)
Solanaceae	<i>P. peruviana</i>	do.....	(537)
	<i>Physochlaina orientalis</i>	do.....	(537)
	<i>Scopolia carniolica</i>	do.....	(537)
	<i>Solanum</i> (16 spp).....	do.....	(537)
	<i>S. lycopersicum</i> (<i>Lycopersicon esculentum</i>). <i>S. tuberosum</i>	-----	(321, 323, 539)
	<i>Withania frutescens</i>	-----	(537)
	<i>W. somnifera</i>	-----	(537)
Theaceae	<i>Thea sinensis</i>	Leaf.....	(602)
Tiliaceae	<i>Corchorus olitorius</i>	-----	(228)
Umbelliferae	<i>Angelica archangelica</i>	Root.....	(690)
	<i>Apium graveolens</i>	-----	(539)
	<i>Eryngium pandanifolium</i>	-----	(228)
Urticaceae	<i>Hydrocotyle</i> sp.....	-----	(228)
	<i>Thapsia garganica</i>	-----	(539)
Verbenaceae	<i>Boehmeria nivea</i>	-----	(228)
Verbenaceae	<i>Verbena officinalis</i>	Leaf.....	(118)

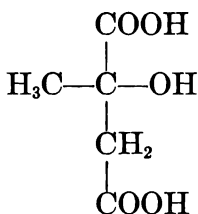
Family	Genus and species	Source	Reference
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Cinnamic Acid



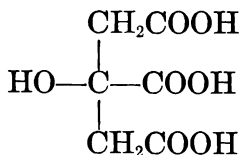
Compositae.....	<i>Parthenium argentatum</i> ..	Aqueous extract of root, rubber, resin, and leaf.	(78, 764)
Ericaceae.....	<i>Enkianthus japonicus</i> ...	Leaf.....	(166)
Globulariaceae...	<i>Globularia</i> spp.....	.....	(264)
	<i>G. alypum</i>	Stalk and leaf..	(265)
	<i>G. vulgaris</i>	do.....	(265, 743)
Hamamelidaceae...	<i>Liquidambar</i> sp.....	Resin.....	(293, 305)
	<i>L. orientalis</i>	do.....	(718)
	<i>L. styraciflua</i>	do.....	(304, 717)
Lauraceae.....	<i>Cinnamomum</i> sp.....	Leaf.....	(365)
	<i>Myroxylon pereirae</i>	Balsam.....	(212, 268, 356, 361)
Leguminosae.....	<i>M. toluiferum</i> (<i>M. balsamum</i>).	do.....	(110, 117, 146, 212)
Myrtaceae.....	<i>Eugenia jambolana</i>	Seed.....	(545)
Scrophulariaceae...	<i>Scrophularia nodosa</i>	Root.....	(317)
Styracaceae.....	<i>Styrax liquidus</i> (?).....	Resin.....	(658)

Citramalic Acid



Rosaceae.....	<i>Pyrus malus</i>	Peel.....	(297, 298)
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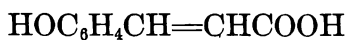
Citric Acid



Citric acid was first found by Scheele (626, 627) in lemons. Franzen and Helwert (199) have made a critical review of the literature on occurrence of citric acid, and it appears to be ubiquitous in higher plants.

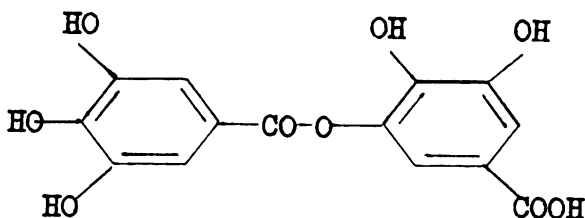
Family	Genus and species	Source	Reference
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Coumaric Acid



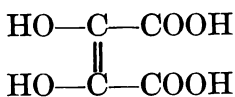
Bignoniaceae	{ <i>Catalpa bignonioides</i>	Leaf	(462)
	{ <i>C. ovata</i>	Leaf and bark	(282)
	{ <i>Daviesia latifolia</i>	Leaf and stem	(555)
Leguminosae	{ <i>Melilotus alba</i>	{ Vegetative part.	(99)
	{ <i>M. officinalis</i>	{ Root	(616)
	{ <i>Trifolium pratense</i>	{ Vegetative part.	(99)
	{ <i>Trifolium pratense</i>	Flower	(553)
Papaveraceae	<i>Papaver somniferum</i> .....	.....	(635)
Pinaceae	<i>Pinus</i> sp.	Resin	(37)
Rosaceae	<i>Prunus serotina</i>	Bark	(550)

Digallic Acid



Theaceae	<i>Thea sinensis</i>	Leaf	(601, 602)
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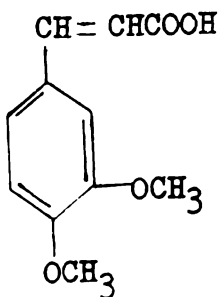
Dihydroxymaleic Acid



Papaveraceae	<i>Glaucium luteum</i>	Pressed juice	(634)
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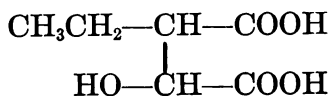
Family	Genus and species	Source	Reference
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3,4-Dimethoxycinnamic Acid



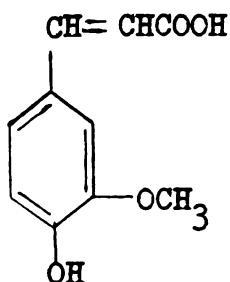
Scrophylariaceae	<i>Veronica virginica</i> -----	Rhizome and root.	(552)
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Ethylmalic Acid



Euphorbiaceae---	<i>Euphorbia biglandulosa</i> --	Latex-----	(342)
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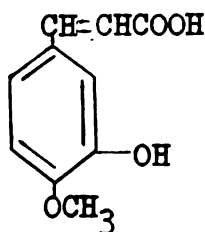
Ferulic Acid



Bignoniaceae-----	<i>Catalpa ovata</i> -----	Bark-----	(282)
Pinaceae-----	<i>Larix europaea</i> (L. <i>decidua</i>).	Resin-----	(37)
Umbelliferae-----	<i>Ferula assafoetida</i> -----	Resin of roots and rhizomes.	(638)

Family	Genus and species	Source	Reference
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Isoferulic Acid



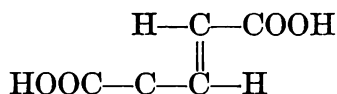
Bignoniaceae.....	<i>Catalpa ovata</i>	Root bark.....	(282)
Ranunculaceae...	<i>Cimicifuga racemosa</i>	Rhizome.....	(188)

Fluoracetic Acid



Dichapetalaceae..	<i>Dichapetalum cymosum</i> ..		(425)
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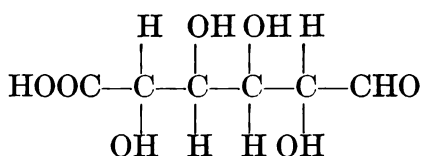
Fumaric Acid



Aceraceae.....	<i>Acer saccharum</i>	{ Sirup.....	(468)
		{ Sugar sand.....	(469)
		{ Sap and sirup..	(542)
Asclepiadaceae...	<i>Asclepias syriaca</i>	Root.....	(427)
Chenopodiaceae..	<i>Beta vulgaris</i>	Diffusion juice..	(501, 673)
Compositae.....	<i>Helianthus annuus</i>		(58)
Cruciferae.....	<i>Bunias orientalis</i>	Stem, leaf, and flowering top.	(316)
Eucommiaceae...	<i>Eucommia ulmoides</i>	Leaf.....	(246)
Euphorbiaceae...	{ <i>Cluytia similis</i>	Leaf and stem..	(729)
	{ <i>Ricinus communis</i>	Germinating bean.	(145)
		{ Leaf.....	(114)
	{ <i>Hordeum vulgare</i>	{ Etiolated shoot..	(168)
		{ Seedling.....	(314)
Gramineae.....	{ <i>Oryza sativa</i>	{ Grain.....	(256)
	{ <i>Saccharum officinarum</i> ...	{ Leaf.....	(809)
	{ <i>Sorghum</i> sp.....	{ Juice.....	(603, 604, 605)
		{ Sirup.....	(416)

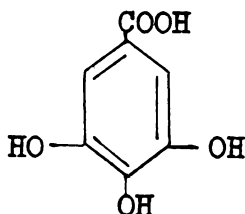
Family	Genus and species	Source	Reference
Fumaric Acid—Continued			
Labiatae	<i>Salvia officinalis</i>	Leaf	(96)
Leguminosae	<i>Daviesia latifolia</i>	Leaf and stem	(555)
	<i>Phaseolus coccineus</i>		(58)
	<i>P. mungo</i>		(129)
	<i>Corydalis bulbosa</i>		(781)
	<i>Fumaria officinalis</i>	Sap	(138, 140, 713, 790)
Papaveraceae	<i>Glaucium flavium</i>	Leaf	(486)
	<i>G. luteum</i>		(560, 561, 634)
	<i>Papaver somniferum</i>		(635)
Solanaceae	<i>Nicotiana</i> sp.		(653, 748, 749)
Umbelliferae	<i>Daucus carota</i>	Root tissue	(105, 106, 409)
	<i>Myrrhis odorata</i>	Leaf	(308, 486)

Galacturonic Acid



Rosaceae	<i>Fragaria vesca</i>	Juice	(447, 448)
	<i>Prunus persica</i>	do	(18)
		Fruit	(19)
	<i>Pyrus communis</i>	Fruit	(19, 29)
	<i>P. malus</i> (<i>Malus sylvestris</i>).	Juice	(530)

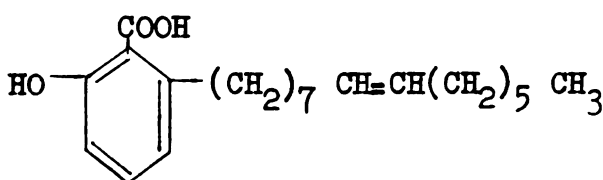
Gallic Acid



Anacardiaceae	<i>Rhus coriaria</i>	Stalk	(386, 677)
	<i>R. glabra</i>	Fruit	(618)
	<i>R. semialata</i>	do	(734)
Celastraceae	<i>Celastrus scandens</i>	do	(776)
Commelinaceae	<i>Commelina agraria</i>		(594)
Cornaceae	<i>Cornus florida</i>	Flower and bract.	(619)
	<i>C. sericea</i>	Fruit pulp	(679)

Family	Genus and species	Source	Reference
Gallic Acid—Continued			
Ericaceae.....	{ <i>Arctostaphylos uvaursi</i>	-----	(607)
	{ <i>Epigaea repens</i>	-----	(502)
Euphorbiaceae....	<i>Phyllanthus distichus</i>	Root bark.....	(136)
	{ <i>Quercus aegilops</i>	Acorn.....	(677)
Fagaceae.....	{ <i>Q. pedunculata</i> (<i>Q. robur</i>).....	Wood.....	(442)
	{ <i>Geranium onoei</i>	-----	(301)
Geraniaceae.....	{ <i>G. pratense</i>	-----	(91)
	{ <i>G. zonale</i>	-----	(93)
Lauraceae.....	<i>Persea gratissima</i>	Fruit kernel.....	(514, 515)
	(<i>P. americana</i>).....		
Leguminosae.....	<i>Pithecellobium saman</i>	Bark.....	(307)
	(<i>Samanea saman</i>).....		
Loganiaceae.....	<i>Gelsemium sempervirens</i>	Root.....	(289)
Musaceae.....	<i>Musa paradisiaca</i>	Sap.....	(263)
Myrtaceae.....	<i>Psidium</i> spp.....	-----	(515)
Nymphaeaceae....	<i>Brasenia schreberi</i>	-----	(461)
Oleaceae.....	<i>Olea europea</i>	Leaf.....	(115)
	{ <i>Rheum austriacum</i>	Root.....	(273)
Polygonaceae.....	{ <i>R. rhaponticum</i>	do.....	(273)
Punicaceae.....	<i>Punica granatum</i>	Root bark.....	(772, p. 641, note 1)
Rubiaceae.....	<i>Coffea</i> sp.....	-----	(529)
Sapotaceae.....	<i>Mimusops</i> sp.....	-----	(515)
Scrophulariaceae..	{ <i>Digitalis</i> sp.....	-----	(88, p. 776)
	{ <i>D. purpurea</i>	-----	(88, p. 776)
Simarubaceae.....	<i>Quassia simaruba</i>	Root bark.....	(772, p. 641, note 1)
Solanaceae.....	<i>Nicotiana tobacum</i>	Leaf.....	(772, p. 1112, note 2)
Theaceae.....	<i>Thea sinensis</i>	-----	(369, 601, 602)

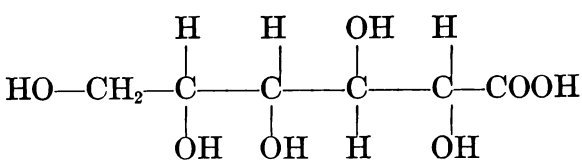
Ginkgolic Acid



Ginkgoaceae.....	<i>Ginkgo biloba</i>	Fruit.....	(334)
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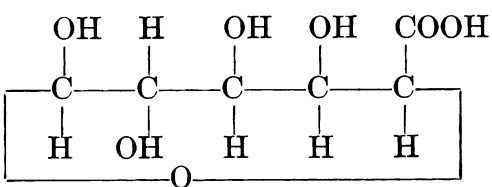
Family	Genus and species	Source	Reference
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Gluconic Acid



Chenopodiaceae..	<i>Beta vulgaris</i>	Crust on juice preheater.	(402)
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Glucuronic Acid



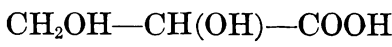
Compositae.....	<i>Taraxacum officinale</i>	Young leaf.....	(504)
Cucurbitaceae.....	<i>Cucurbita pepo</i>	Seed.....	(504)
Gramineae.....	<i>Hordeum vulgare</i>	Germinating seed.	(504)
Leguminosae.....	<i>Musa</i> sp.....	Shoot.....	(621)
	<i>Phaseolus</i> or <i>Vicia</i>	Germinating seed and etiolated leaf.	(504)

Glutaric Acid



Chenopodiaceae..	<i>Beta vulgaris</i>	Beet.....	(395, 396, 742)
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Glyceric Acid

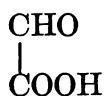


Chenopodiaceae..	<i>Beta vulgaris</i>	Diffusion juice..	(673)
Gramineae.....	<i>Hordeum vulgare</i>	{.....	(56)
Leguminosae.....	<i>Glycine</i> sp.....	Leaf.....	(57, 114)
Solanaceae.....	<i>Nicotiana tabacum</i>	Leaf.....	(24)
		.....	(687)

Family	Genus and species	Source	Reference
Glycolic Acid			
$\text{HO}-\text{CH}_2-\text{COOH}$			
Caprifoliaceae	<i>Sambucus nigra</i>	Leaf	(34)
Caryophyllaceae	<i>Herniaria glabra</i>	do	(34)
Chenopodiaceae	<i>Beta vulgaris</i>	Beet juice	(396, 501, 672, 673)
Combretaceae	<i>Combretum micranthum</i>	Leaf	(34)
Compositae	<i>Cynara scolymus</i>	do	(34)
	<i>Solidago virga-aurea</i>	Flowering twig	(34)
Dichapetalaceae	<i>Dichapetalum cymosum</i>		(425)
Ericaceae	<i>Arbutus unedo</i>	Leaf	(34)
	<i>Erica multiflora</i>	Flowering twig	(34)
Euphorbiaceae	<i>Ricinus communis</i>		(65, 145)
	<i>Agropyron repens</i>	Root and rhizome.	(34)
	<i>Avena sativa</i>	Seedling	(291)
Gramineae	<i>Hordeum vulgare</i>	Leaf	(56, 57)
		Etiolated shoot	(114, 687)
		Seedling	(168)
	<i>Saccharum officinarum</i>	Juice	(291)
Labiateae	<i>Zea mays</i>	Stigmata	(559, 603, 604, 605, 654, 686)
	<i>Lavandula vera</i>	Flowering twig	(34)
	<i>Orthosiphon stamineus</i>	Leaf	(34)
	<i>Rosmarinus</i> spp	Flowering twig	(34)
	<i>Lupinus albus</i>	Seedling	(34)
Leguminosae	<i>Medicago sativa</i>	Sap	(291)
	<i>Pisum sativum</i>	Seedling	(185)
	<i>Asparagus</i> spp	Root and rhizome.	(291)
Liliaceae	<i>Ruscus aculeatus</i>	do	(34)
Pinaceae	<i>Juniperus communis</i>	Berry	(34)
	<i>Prunus cerasus</i>	Peduncle	(34)
Rosaceae	<i>Pyrus communis</i>	Juice	(592)
	<i>P. malus</i> (<i>Malus sylvestris</i>).	do	(700)
	<i>Nicotiana tabacum</i>	Leaf	(686)
Solanaceae	<i>Physalis alkekengi</i>	Berry	(687)
	<i>Solanum lycopersicum</i> (<i>Lycopersicon esculentum</i>).	Leaf	(34)
	<i>Apium graveolons</i>	Root and rhizome.	(686, 687)
Umbelliferae	<i>Eryngium campestre</i>	do	(34)
	<i>Foeniculum vulgare</i>	do	(34)
	<i>Petroselinum sativum</i> (<i>P. crispum</i>).	do	(34)
Urticaceae	<i>Parietaria</i> spp	Leaf	(34)
	<i>Ampelopsis hederacea</i> (<i>Parthenocissus quinquefolia</i>).	do	(235)
Vitaceae	<i>Vitis vinifera</i>	Unripe fruit	(101, 183, 184)
		Fruit	(280)

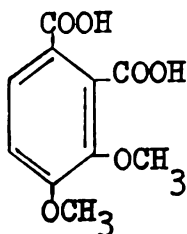
Family	Genus and species	Source	Reference
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Glyoxalic Acid



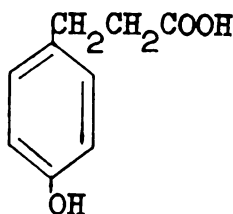
Chenopodiaceae	<i>Beta vulgaris</i>		(396)
Cornaceae	<i>Cornus mas</i>	Fruit	(631)
Ericaceae	<i>Vaccinium oxycoccos</i>		(682)
Gramineae	<i>Saccharum officinarum</i>	Juice	(784)
Labiatae	<i>Mentha piperita</i>	Leaf	(709, 711)
Leguminosae	<i>Arachis hypogaea</i>	Seedling	(195, 196)
Liliaceae	<i>Tulipa gesneriana</i>		(709, 710)
Polygonaceae	<i>Rheum officinale</i>		(102)
Rosaceae	<i>Prunus domestica</i>	Unripe fruit	(102)
	<i>Pyrus malus</i> (<i>Malus sylvestris</i>).	{ do	(102)
		{ Fruit	(298)
Saxifragaceae	<i>Ribes</i> sp.	Unripe fruit	(102)
	<i>R. grossularia</i>	{ do	(102)
Solanaceae	<i>Solanum tuberosum</i>	Tuber	(711)
Umbelliferae	<i>Daucus carota</i>	{ Leaf and root	(709)
		{ Root	(711)
Vitaceae	<i>Vitis vinifera</i>		(102, 103, 248, 280)
		{ Juice	(647)

Hemipinic Acid



Papaveraceae	<i>Papaver somniferum</i>		(635)
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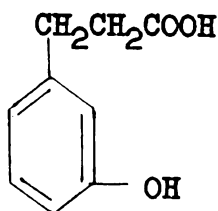
Hydrocaffeic Acid



Chenopodiaceae	<i>Beta vulgaris</i>	Leaf	(397)
Solanaceae	<i>Solanum tuberosum</i>	Tuber	(587)
Vitaceae	<i>Ampelopsis hederacea</i> (<i>Parthenocissus quinquefolia</i>).		(587)

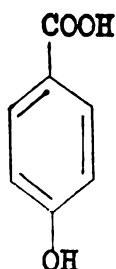
Family	Genus and species	Source	Reference
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Hydrocoumaric Acid



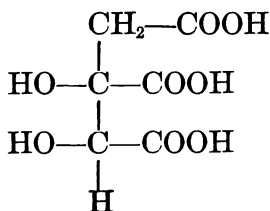
Leguminosae.....	<i>Melilotus officinalis</i>		(822)
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p-Hydroxybenzoic Acid



Bignoniaceae.....	{ <i>Bignonia catalpa</i>	Unripe fruit.....	(534)
	{ <i>Catalpa ovata</i>	Leaf.....	(462)
Papaveraceae.....	<i>Papaver somniferum</i>		(635)

Hydroxycitric Acid



Chenopodiaceae..	<i>Beta vulgaris</i>	Juice.....	(395)
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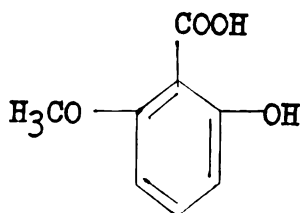
alpha-Hydroxyglutaric Acid



Chenopodiaceae..	<i>Beta vulgaris</i>	Sap.....	(394)
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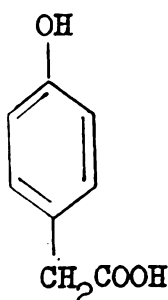
Family	Genus and species	Source	Reference
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2-Hydroxy-6-Methoxybenzoic Acid



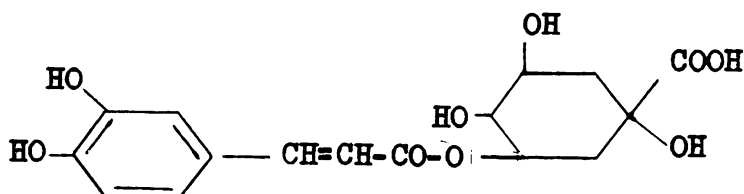
Liliaceae.....	<i>Gloriosa superba</i>	Tuber.....	(123)
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p-Hydroxyphenylacetic Acid



Compositae.....	<i>Taraxacum officinale</i>	Root.....	(546)
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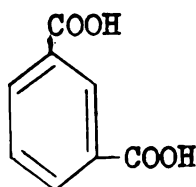
Isochlorogenic Acid



Rosaceae.....	<i>Pyrus communis</i>	{ Leaf and shoot..	(94)
Rubiaceae.....	<i>Coffea</i> sp.....	{ Leaf.....	(788)
		.....	(41)

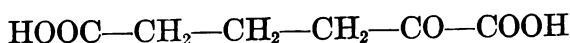
Family	Genus and species	Source	Reference
Isocitric Acid			
$\begin{array}{c} \text{CH(OH)—COOH} \\ | \\ \text{CH—COOH} \\ | \\ \text{CH}_2\text{—COOH} \end{array}$			
Anonaceae-----	<i>Anona muricata</i> -----	-----	(479)
	<i>Bryophyllum</i> sp-----	Leaf-----	(80, 505, 572)
		do-----	(109, 362, 563,
	<i>B. calycinum</i> -----	-----	564, 566, 568,
		-----	686, 687, 738,
		-----	747).
Crassulaceae-----	<i>Escheveria</i> sp-----	Leaf and stem--	(567)
	<i>E. secunda</i> -----	Leaf-----	(362)
	<i>Sedum acre</i> -----	-----	(484, 485)
	<i>S. maximum</i> -----	-----	(485)
	<i>S. praealtum</i> -----	-----	(485)
	<i>Sempervivum tectorum</i> -----	-----	(803)
		-----	(485)
Gramineae-----	<i>Hordeum vulgare</i> -----	-----	(56)
		Leaf-----	(57, 589)
Lecythidaceae-----	<i>Couropita guianensis</i> -----	Fruit-----	(476)
Leguminosae-----	<i>Pisum sativum</i> -----	Ungerminated seeds.	(424)
	<i>Pyrus malus</i> (<i>Molus sylvestris</i>).-----	Fruit-----	(105, 106)
Rosaceae-----	<i>Rubus fruticosus</i> -----	do-----	(127, 465, 470)
		-----	(331)
Scrophulariaceae-----	<i>Digitalis purpurea</i> -----	Leaf-----	(362)
		-----	(686)
	<i>Nicotiana tabacum</i> -----	Leaf-----	(687)
Solanaceae-----	<i>Solanum lycopersicum</i> (<i>Lycopersicon esculentum</i>).-----	Leaf-----	(686, 687)
	<i>S. tuberosum</i> -----	Juice of tuber--	(126)
Umbelliferae-----	<i>Daucus carota</i> -----	-----	(105, 106)

Isophthalic Acid



Iridaceae-----	<i>Iris versicolor</i> -----	Rhizome-----	(554)
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alpha-Ketoadipic Acid



Leguminosae-----	<i>Pisum sativum</i> -----	Germinating seed.	(753)
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Family	Genus and species	Source	Reference
alpha-Ketoglutaric Acid			
$\text{HOOC}-\text{CH}_2-\text{CH}_2-\text{CO}-\text{COOH}$			
Euphorbiaceae	<i>Ricinis communis</i>	Germinating seed.	(145)
Gramineae	<i>Hordeum vulgare</i>	Etiolated shoot.	(168)
Labiatae	<i>Mentha piperita</i>	Leaf	(709, 711)
Leguminosae	<i>Arachis hyggogaea</i>	Seedling	(196, 196)
	<i>Pisum sativum</i>	Young plant	(757, 759)
	<i>Trifolium pratense</i>		(756, 757)
Liliaceae	<i>Tulipa gesneriana</i>		(709, 710)
Rosaceae	<i>Pyrus malus</i> (<i>Malus sylvestris</i>).	Fruit	(298)
Solanaceae	<i>Solanum tuberosum</i>	Tuber	(38, 711)
Umbelliferae	<i>Daucus carota</i>	{ Root and leaf	(709)
		{ Root	(711)

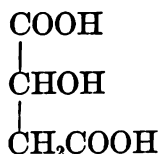
Lactic Acid



Amaryllidaceae	<i>Agave sisalana</i>	Leaf	(414, 640, 641)
Bromeliaceae	<i>Ananas sativas</i> (<i>A. comosus</i>).		(515)
Chenopodiaceae	<i>Beta vulgaris</i>	{ Juice	(438)
		{ Root	(672, 673)
		{ Root and leaf	(680, 681)
Compositae	<i>Helionthus annuus</i>		(742)
	<i>Lactuca</i> sp.		(58)
	<i>L. sativa</i>		(515)
Crassulaceae	<i>Bryophyllum calycinum</i>	{ Leaf	(640)
		{ Leaf	(641)
Cruciferae	<i>Brassica oleracea</i>	Fresh and fermented kale.	(801)
Cucurbitaceae	<i>Cucumis sativus</i>	Cabbage leaf	(42)
Ericaceae	<i>Vaccinium myrtillus</i>		(641)
Euphorbiaceae	<i>Ricinis communis</i>		(680)
		Germinating seed.	(325)
		Seedling	(137)
Fagaceae	{ <i>Castanea vesca</i> (<i>C. sativa</i>) <i>Fagus sylvatica</i>	Seedling and leaf.	(145, 294)
			(640)
		Fruit	(641)
Gentianaceae	<i>Erythraea centaurium</i>	Nut	(148)
Gramineae	<i>Bambusa</i> sp.		(327)
	<i>Hordeum distichum</i>	Shoot	(253)
	<i>H. sativum</i>	Germinating seed.	(621)
	<i>H. vulgare</i>		(681)
	<i>Oryzo</i> spp.	Etiolated shoot.	(793)
	<i>Secale cereale</i>	Leaf	(168)
	<i>Triticum sativum</i> (<i>T. aestivum</i>).		(809)
	<i>T. vulgare</i>	do	(668)
	<i>Zea mays</i>	do	(668)
		Germinating seed.	(681)
		do	(640, 641, 793)

Family	Genus and species	Source	Reference
Lactic Acid—Continued			
Leguminosae	<i>Glycine</i> sp.-----	-----	(327)
	<i>Lupinus</i> sp.-----	Seed-----	(456)
	<i>L. luteus</i> -----	Germinating seed.	(681)
	<i>Phaseolus coccineus</i> -----	-----	(58)
	<i>P. vulgaris</i> -----	Seedling-----	(641)
	<i>Pisum sativum</i> -----	Germinating seed.	(640, 641, 681)
	<i>Tamarindus indica</i> -----	-----	(3, 325)
	<i>Vicia faba</i> -----	{ Leaf and sprout. Germinating seed.	(640, 641) (681)
	<i>Gossypium</i> sp.-----	Seed-----	(327)
	<i>Myrica rubra</i> -----	Fruit-----	(354)
Myrsinaceae	<i>Maesa picta</i> -----	Seed-----	(22)
Papaveraceae	<i>Glaucium luteum</i> -----	Pressed juice-----	(634)
	<i>Papaver somniferum</i> -----	"Poppy straw"-----	(635)
Polygonaceae	<i>Rheum</i> sp.-----	Leaf-----	(640)
	<i>R. hybridum</i> -----	Tuber-----	(641)
	<i>Eriobotrya japonica</i> -----	Milky juice-----	(128, p. 93, ftn. 12)
Rosaceae	<i>Fragaria</i> sp.-----	Juice of fruit-----	(281)
	<i>Prunus avium</i> -----	-----	(197)
	<i>P. cerasus</i> -----	Juice of fruit-----	(437)
	<i>Pyrus communis</i> -----	{ do----- Juice and fruit.	(437) (592)
	<i>P. malus</i> (<i>Malus sylvestris</i>).-----	{ Fruit----- Juice of fruit-----	(200, 281) (436, 437, 702)
	<i>Rubus</i> sp.-----	Leaf-----	(640)
	<i>R. fruticosus</i> -----	do-----	(203, 204, 641)
	<i>R. idaeus</i> -----	do-----	(210, 211, 642)
	<i>Citrus decumana</i> (<i>C. grandis</i>).-----	Juice of fruit-----	(281)
Salicaceae	<i>Salix</i> sp.-----	Bark-----	(151)
Scrophulariaceae	<i>Digitalis purpurea</i> -----	-----	(331)
	<i>Euphrasia officinalis</i> -----	-----	(172)
	<i>Veronica officinalis</i> -----	-----	(171)
Solanaceae	<i>Solanum dulcamara</i> -----	Peduncle-----	(800)
	<i>S. lycopersicum</i> (<i>Lycopersicon esculentum</i>).-----	{ Fruit----- Juice of fruit-----	(109, 116, 737) (595)
	<i>S. tuberosum</i> -----	Tuber-----	(39, 40, 640, 641, 680, 681, 778, 793)
	<i>Theobroma cacao</i> -----	Seed-----	(453)
Umbelliferae	<i>Daucus carota</i> -----	{ Root----- Juice-----	(640) (641, 681)
Vitaceae	<i>Vitis vinifera</i> -----	{ Juice----- Sap-----	(437) (799)

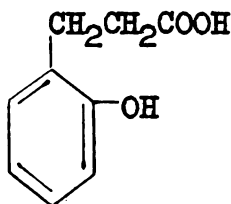
Malic Acid



Malic acid was discovered by Scheele (623), who reported its presence in a number of plants. Franzen and Keyssner (204) have made a critical review of the literature on its occurrence, but it appears to be ubiquitous in higher plants.

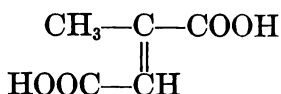
Family	Genus and species	Source	Reference
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Melilotic Acid



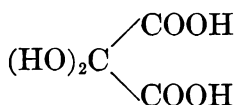
Leguminosae-----	{ <i>Melilotus alba</i> -----	Vegetative part-----	(99)
	{ <i>M. officinalis</i> -----	do-----	(99, 822)
Solanaceae-----	<i>Nicotiana tabacum</i> -----	Leaf-----	(772, p. 1112, note 2)

Mesaconic Acid



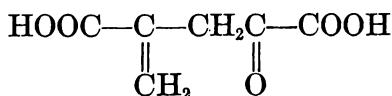
Bignoniaceae-----	<i>Crescentia</i> sp.-----	Curare-----	(330)
Cruciferae-----	<i>Brassica oleracea</i> -----	Leaf-----	(111, 112)
Gramineae-----	<i>Saccharum officinarum</i> ---	Juice-----	(603, 604, 605)

Mesoxalic Acid



Leguminosae-----	<i>Medicago sativa</i> -----	-----	(185)
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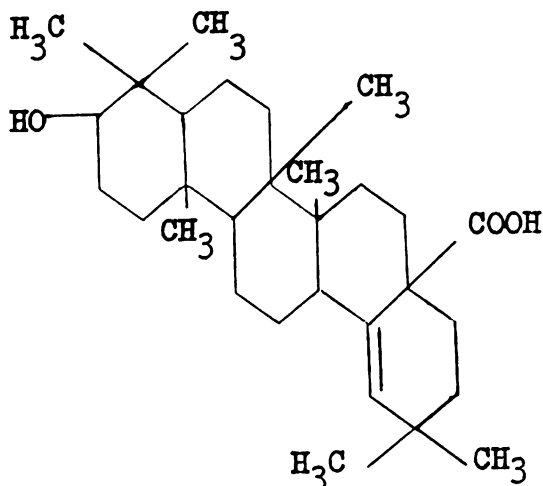
gamma-Methylene-alpha-Ketoglutaric Acid



Leguminosae-----	<i>Arachis hypogaea</i> -----	Seedling-----	(195, 196)
Liliaceae-----	<i>Tulipa gesneriana</i> -----	-----	(709, 710)

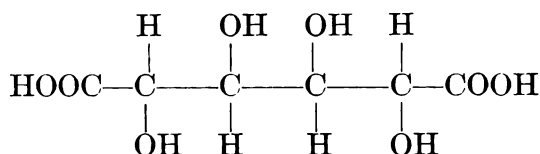
Family	Genus and species	Source	Reference
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Morolic Acid



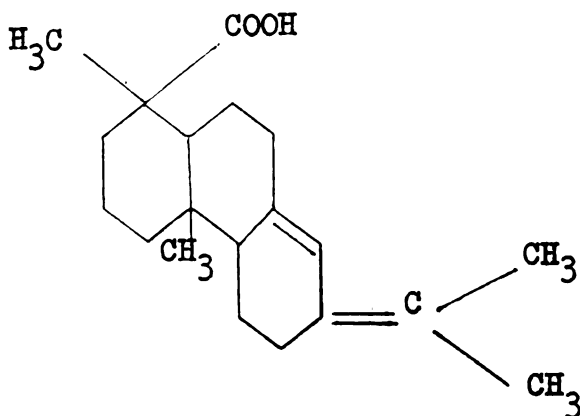
Ericaceae.....	<i>Agauria salicifolia</i>		(158)
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Mucic Acid



Chenopodiaceae..	<i>Beta vulgaris</i>	Diffusion juice..	(672)
Elaeocarpaceae---	<i>Elaeocarpus serratus</i>	Fruit pulp.....	(870)
Rosaceae.....	{ <i>Prunus persica</i>	Ripe fruit.....	(19)
	{ <i>Pyrus communis</i>	do.....	(19)

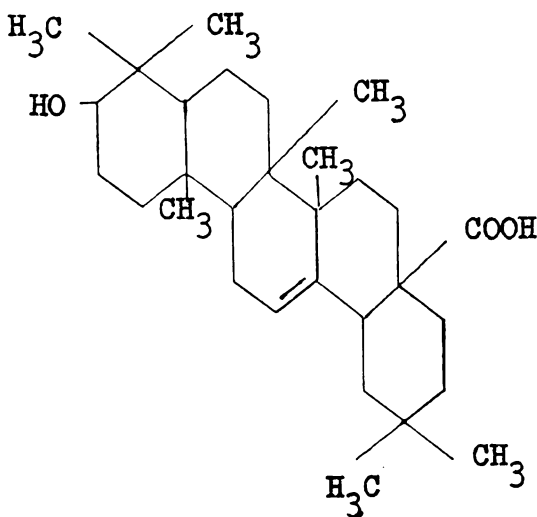
Neoabietic Acid



Pinaceae.....	{ <i>Pinus palustris</i>	Oleoresin.....	(258)
	{ <i>P. sylvestris</i>	Oleoresin and wood resin.	(259)

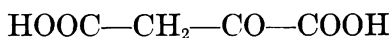
Family	Genus and species	Source	Reference
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Oleanolic Acid



Apocynaceae.....	<i>Alyxia buxifolia</i>	Bark.....	(21)
Ericaceae.....	<i>Vaccinium myrtillus</i>		(583)
Euphorbiaceae.....	<i>Petalostigma sericeum</i>.....	.....	(21)
Labiatae.....	{ <i>Salvia officinalis</i>.....	.....	(97)
	{ <i>Thymus vulgaris</i>.....	.....	(609)
Loranthaceae.....	<i>Viscum album</i>	Leaf.....	(795)
Myrtaceae.....	<i>Psidium guajava</i>	do.....	(27)
Oleaceae.....	<i>Olea europea</i>	do.....	(252)
Rosaceae.....	{ <i>Crataegus oxyacantha</i>	do.....	(60)
	{ <i>Eriobotrya japonica</i>	do.....	(26)
	{ <i>Anthocercis intricata</i>	Bark.....	(21)
Solanaceae.....	<i>A. littorea</i>	do.....	(21)
	<i>A. odgersii</i>	do.....	(21)
Vitaceae.....	<i>Vitis labrusca</i>	Pomace.....	(432)

Oxalacetic Acid



Gramineae.....	{ <i>Hordeum vulgare</i>.....	.....	(756)
	{ <i>Phleum pratense</i>.....	.....	(756)
Labiatae.....	<i>Mentha piperita</i>.....	.....	(709, 711)
	{ <i>Canvalia ensiformis</i>.....	.....	(756)
	{ <i>Pisum sativum</i>.....	.....	(755, 756, 757,
Leguminosae.....			758, 759)
	<i>Trifolius pratense</i>	Young leaf.....	(754, 755,
			756, 757)
Liliaceae.....	<i>Tulipa gesneriana</i>.....	.....	(709, 710)
Rosaceae.....	<i>Pyrus malus</i> (<i>Malus</i>	Fruit.....	(298)
	<i>sylvestris</i>).		
Solanaceae.....	<i>Solanum tuberosum</i>	Tuber.....	(711)
Umbelliferae.....	<i>Daucus carota</i>	{Root and leaf..	(709)
		{Root.....	(711)

Family	Genus and species	Source	Reference
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Oxalic Acid



[Reviews and surveys of the occurrence of oxalic acid include those of Andrews and Viser (17), Esbach (475, p. 1909), Kohman (350, 351), Meyen (443, p. 122), Miller, Ross, and Lewis (446), Molisch (450), Pat-schovsky (508), Schimper (630), and Treviranus (123, p. 66, note 6)]

Aceraceae	{ <i>Acer platanoides</i> ----- <i>A. saccharum</i> -----	Root ----- Sap and sugar sand.	(359) (768)
Aizoaceae	{ <i>Mesembryanthemum</i> sp. -- <i>M. acinaciforme</i> ----- <i>M. crystallinum</i> -----	----- ----- { Leaf and flower.	(509) (2) (16, 63) (62)
Amarantaceae	{ ----- <i>Alternanthera sessilis</i> ----- <i>Amaranthus</i> sp. ----- <i>A. aquatica</i> (?) ----- <i>A. caudatus</i> ----- <i>A. gangeticus</i> ----- <i>A. polygonoides</i> -----	----- ----- ----- ----- { Leaf and flower. ----- ----- -----	(509) (292) (236) (622) (62) (63) (292) (292)
Amaryllidaceae	<i>Agave americana</i> -----	Leaf -----	(815)
Anacardiaceae	<i>Mangifera indica</i> -----	-----	(86)
Araceae	{ <i>Acorus calamus</i> ----- <i>Arum italicum</i> -----	----- Berry -----	(810) (343)
Aristolochiaceae	<i>Asarum</i> sp. -----	-----	(509)
Balsaminaceae	{ <i>Impatiens parviflora</i> ----- <i>I. sultani</i> ----- <i>Begonia</i> sp. ----- <i>B. evansiana</i> ----- <i>B. rex</i> ----- <i>B. semperflorens</i> -----	----- ----- ----- ----- ----- -----	(455) (455) (220) (650, 651, 652) (760) (125, 611, 732)
Berberidaceae	<i>Berberis vulgaris</i> -----	Fruit -----	(343)
Betulaceae	{ <i>Alnus</i> sp. ----- <i>Betula</i> sp. ----- <i>Ostrya vulgaris</i> -----	Leaf ----- ----- -----	(771) (359) (359)
Bombacaceae	<i>Adansonia digitata</i> -----	Fruit -----	(5)
Bromeliaceae	<i>Bromelia pinguin</i> -----	do -----	(28)
Cactaceae	{ <i>Cereus peruvianus</i> ----- <i>Opuntia</i> sp. ----- <i>O. vulgaris</i> -----	----- ----- Stem -----	(509) (728) (478) (343)
Caprifoliaceae	{ <i>Sambucus nigra</i> ----- <i>Symphoricarpos</i> sp. ----- <i>Dianthus babatus</i> ----- <i>D. carthusianorum</i> ----- <i>Lychnis coronaria</i> ----- <i>L. dioica</i> ----- <i>L. flos-jovis</i> ----- <i>L. githago</i> (<i>Agrostemma</i> <i>githago</i>). -----	Young leaf ----- Leaf ----- ----- Leaf and stem ----- ----- ----- ----- -----	(47) (771) (492) (12) (74) (12, 74, 91) (74) (12)
Caryophyllaceae	{ <i>Saponaria</i> sp. ----- <i>S. officinalis</i> ----- <i>Spergula arvensis</i> ----- <i>Stellaria media</i> ----- <i>Tunica saxifraga</i> -----	----- ----- ----- ----- -----	(478) (12) (74) (455, 492) (12)
Celastraceae	{ <i>Celastrus obscurus</i> ----- <i>Euonymus japonicus</i> -----	Leaf ----- -----	(154) (2)

Family	Genus and species	Source	Reference
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Oxalic Acid—Continued

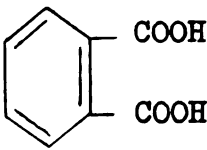
Chenopodiaceae	<i>Atriplex</i> sp.		(446) (509)
		Juice	(492, 509, 533, 622)
		Root and leaf	(396, 444, 501, 672, 673)
	<i>Beta vulgaris</i>	Leaf	(413, 742)
			(33, 454, 615, 624)
		Swiss chard, mangold, and beet leaf.	(625)
		Seed	(149, 685)
		Root	(23, 226, 236, 773)
	<i>Chenopodium</i> sp.		(509)
	<i>C. quinoa</i>	Leaf and flower	(62, 63)
	<i>Halogeton glomeratus</i>		(191, 290)
	<i>Spinacia oleracea</i>	Leaf	(23, 90, 381, 475, 509, 533)
Commelinaceae	<i>Callisia repens</i>		(46, 69, 150, 236, 492, 615, 782, 910)
	<i>Tradescantia</i> sp.		(455)
	<i>T. fluminensis</i>		(509)
	<i>T. selloi</i>	Leaf	(53, 777)
	<i>T. virginica</i>	do	(630)
Compositae	<i>Cichorium endivia</i>		(343)
	<i>Helianthus tuberosus</i>		(23)
	<i>Kleinia articulata</i>		(226)
	<i>Lactuca</i> spp.		(312)
	<i>L. sativa</i>		(515)
Convolvulaceae	<i>Ipomoea aquatica</i>		(475, 633, 782)
Cornaceae	<i>Cornus sericea</i>	Fruit pulp	(292)
			(679)
Crassulaceae	<i>Bryophyllum calycinum</i>	Leaf	(109, 563, 568, 573, 686, 687, 738)
		Leaf and stem	(567)
	<i>B. crenatum</i>	Leaf	(80, 343)
	<i>Echeveria glauca</i>	do	(343)
	<i>Sedum azureum</i>		(16)
	<i>S. fabaria</i>	Leaf	(343)
	<i>Sempervivum glaucum</i>	do	(52)
	<i>S. tectorum</i>	do	(343)
Cruciferae			(509)
	<i>Brassica oleracea</i>		(23, 475)
	<i>B. pekinensis</i>		(810)
	<i>Bunias orientalis</i>	Stem, leaf, and flowering top.	(316)
Cucurbitaceae	<i>Cucumis melo</i>		(23, 533)
	<i>Cucurbita pepo</i>		(782)
Dipsacaceae	<i>Succisa pratensis</i>		(492)
Ericaceae	<i>Vaccinium myrtillus</i>		(23, 325)
Euphorbiaceae	<i>Aleurites cordata</i>	Leaf	(221)
	<i>Euphorbia</i> sp.		(509)
	<i>Mercurialis annuelle</i>		(130)
	<i>M. perennis</i>		(492)
	<i>Phyllanthus emblica</i>		(326)
Fagaceae	<i>Ricinus communis</i>		(65)
	<i>Fagus sylvatica</i>		(95, 492, 646)
	<i>Quercus pedunculata</i>		(442)

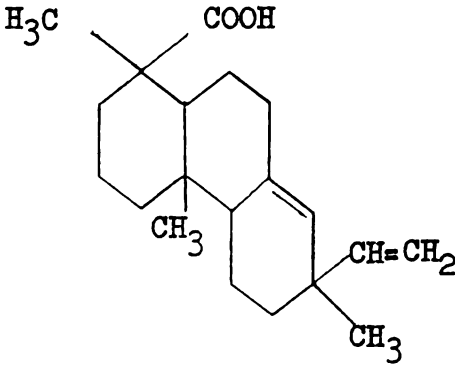
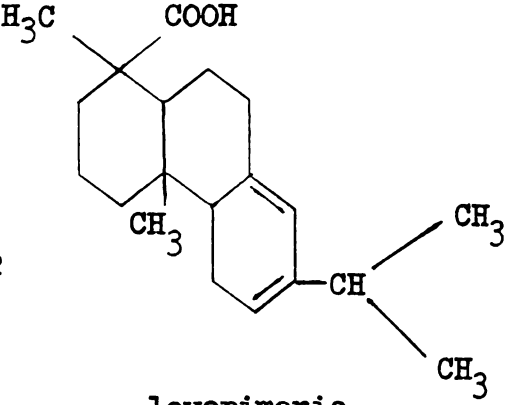
Family	Genus and species	Source	Reference
Oxalic Acid—Continued			
Gesneraceae	<i>Aeschynanthus</i> sp.	-----	(509)
Globulariaceae	<i>Globularia</i> spp.	-----	(264)
		-----	(509)
	<i>Avena sativa</i>	Seedling	(291, 474, 524)
	<i>Bambusa</i> sp.	Shoot	(621)
	<i>Hordeum vulgare</i>	{ Leaf	(47, 687)
		{ Seedling	(291, 314, 474, 686)
	<i>Lolium perenne</i>	-----	(420)
	<i>Oplismenus imbecillis</i> (<i>O. undulatifolius</i>).	-----	(53)
Gramineae	<i>Oryza</i> spp.	Leaf	(809)
	<i>Phyllostachys mitis</i>	Sprout	(695)
	<i>Poa pratensis</i>	-----	(533)
	<i>Saccharum officinarum</i>	Juice	(85; 512; 603; 604; 605; 699; 704, ref. 162; 811)
	<i>Secale cereale</i>	-----	(474)
	<i>Sorghum</i> sp.	Juice	(416)
	<i>S. vulgare</i>	{ Leaf	(786, 787)
			(802)
	<i>Triticum</i> sp.	-----	(473)
	<i>T. aestivum</i>	-----	(533)
	<i>Zea mays</i>	-----	(53, 761)
Hippocastanaceae	<i>Aesculus hippocastanum</i>	Young leaf	(47)
Hydrocharitaceae	<i>Elodea canadensis</i>	-----	(459)
	<i>E. densa</i>	-----	(459)
Juglandaceae	<i>Juglans regia</i>	Bark	(353)
Labiatae		-----	(509)
	<i>Acacia</i> spp.	Bark	(675)
	<i>Acacia cambagei</i>	Bark and wood	(674, 675)
	<i>Arachis hypogaea</i>	Kernel	(585)
	<i>Cassia</i> sp.	Leaf	(763)
	<i>Cicer arietinum</i>	{ Secretion from hairs.	(449)
		{ Fruit	(818)
	<i>Glycine soja</i> (<i>G. max</i>)	-----	(533)
Leguminosae	<i>Lupinus albus</i>	Seedling	(291)
	<i>L. luteus</i>	Seed	(600)
	<i>Medicago sativa</i>	-----	(533)
	<i>Mimosa spegazzinii</i>	-----	(455)
	<i>Phaseolus limensis</i> (<i>P. lunatus</i>).	-----	(533)
	<i>Pisum sativum</i>	Seedling	(291, 533, 782)
	<i>Tamarindus indica</i>	{ Mature leaf	(202, 325, 326)
			(237)
	<i>Vicia</i> sp.	-----	(318, 336)
	<i>Vicia faba</i>	-----	(23)
		-----	(509)
	<i>Agapanthus umbellatus</i>	Leaf	(343)
	<i>Allium cepa</i>	-----	(8; 77, p. 165, ref. 4; 360, 732)
Liliaceae	<i>Asparagus officinalis</i>	-----	(23)
	<i>Erythronium denscanis</i>	Bulb	(153)
	<i>Hyacinthus orientalis</i>	do	(75)
	<i>Smilacina bifolia</i> (?)	Fruit	(163)
	<i>S. racemosa</i>	do	(163)
Loranthaceae	<i>Viscum</i> sp.	-----	(509)
Malvaceae	<i>Gossypium</i> sp.	-----	(180, 181, 182, 412)

Family	Genus and species	Source	Reference
Oxalic Acid—Continued			
Melastomaceae	<i>Memecylon tinctorium</i>	-----	(155)
Menispermaceae	<i>Jateorhiza columba</i>	-----	(724)
Moraceae	<i>Cannabis</i> sp.	-----	(130)
	<i>Ficus carica</i>	-----	(236)
Musaceae	<i>Musa sapientum</i> (<i>M. paradisiaca sapientum</i>).	Overripe fruit	(482)
Myricaceae	<i>Myrica rubra</i>	Fruit	(354)
Myristicaceae	<i>Myristica surinamensis</i>	Seed	(715)
Myrtaceae	<i>Eucalyptus</i> (12 spp.)	Bark	(665)
	<i>Psidium guajava</i>	Leaf	(10)
Nyctaginaceae	<i>Mirabilis</i> sp.	Flower and fruit	(535)
Nymphaeaceae	<i>Nymphaea alba</i>	Rhizome	(244)
	<i>N. lutea</i>	do	(244)
Orchidaceae	<i>Vanilla planifolia</i>	-----	(509)
	<i>Averrhoa carambola</i>	Fruit	(767)
		Juice	(120)
Oxalidaceae	<i>Oxalis</i> sp.	-----	(385)
	<i>O. acetosella</i>	Leaf	(472)
	<i>O. corniculata</i>	-----	(220, 236, 509)
	<i>O. stricta</i>	-----	(343, 429)
	<i>O. violacea</i>	-----	(237)
Papaveraceae	<i>Fumaria officinalis</i>	-----	(63)
Pedaliaceae	<i>Sesamum indicum</i>	Seedcoat	(515)
	<i>Phytolacca</i> sp.	Seed	(509)
Phytolaccaceae	<i>P. dioica</i>	Shoot, bark, and pith.	(262)
		-----	(509)
Pinaceae	<i>Pinus abies</i> (<i>Picea abies</i>)	Sap	(2)
	<i>P. cembra</i>	Seedling	(608)
	<i>P. excelsa</i> (<i>Picea abies</i>)	Needle	(324, 646)
Piperaceae	<i>Peperomia</i> sp.	-----	(644)
	<i>Emex</i> sp.	-----	(492, 813)
	<i>Fagopyrum esculentum</i>	Leaf and stem	(509)
	<i>Oxyria</i> sp.	-----	(53, 533)
	<i>Polygonum</i> sp.	-----	(577)
	<i>Rheum</i> sp.	-----	(509)
	<i>R. crispum</i> (?)	Leaf	(23, 104, 236, 381, 509, 750, 782)
		Stem	(676)
		Leaf and rhizome	(499)
	<i>R. hybridum</i>	Leaf	(9)
		-----	(565, 576, 687, 760)
		Stem and rhizome.	(612, 613)
Polygonaceae	<i>R. leucorrhizum</i>	Stem	(499)
	<i>R. mepalense</i>	do	(499)
	<i>R. nutans</i>	do	(499)
	<i>R. officinale</i>	Leaf	(102, 760)
	<i>R. palmatum</i>	Stem	(499)
	<i>R. "Paragon"</i>	do	(499)
	<i>R. rhaponticum</i>	do	(375)
	<i>R. undulatum</i>	Petiole	(343)
	<i>Rumex</i> sp.	-----	(220, 236, 509)
		Leaf	(45)
	<i>R. acetosa</i>	Seed and root	(63)
		-----	(23, p. 99, ftn. 2; 61; 515)
	<i>R. obtusifolius</i>	Root	(359)

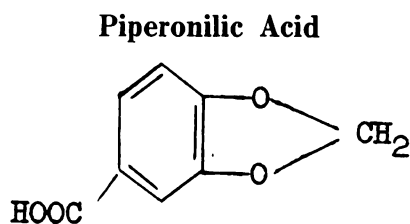
Family	Genus and species	Source	Reference
Oxalic Acid—Continued			
Polypodiaceae	<i>Lonchitis</i> sp.	-----	(509)
Portulacaceae	<i>Portulaca</i> sp.	-----	(236, 509)
	<i>Talinum speciosum</i>	-----	(292)
Primulaceae	-----	-----	(509)
	<i>Primula elatior</i>	-----	(492)
Punicaceae	<i>Punica granatum</i>	{ Bark	(326)
	-----		(478)
Pyrolaceae	<i>Monotropa</i> sp.	-----	(509)
Ranunculaceae	<i>Anemone</i> sp.	-----	(509)
	<i>A. nemorosa</i>	-----	(732)
Rhamnaceae	<i>Rhamnus lycioides</i>	Leaf	(77, p. 165, ref. 4)
	<i>Zizyphus jujuba</i>	-----	(326)
	<i>Crataegus</i> sp.	Leaf	(771)
	<i>C. oxyacantha</i>	do	(47)
	<i>Fragaria</i> sp.	{ Fruit	(6)
	-----		(23, 782)
	<i>Mespilus germanica</i>	Overripe fruit	(482)
	<i>Prunus armeniaca</i>	Dried fruit	(464)
	<i>P. avium</i>	Fruit	(197)
	<i>P. cerasus</i>	do	(23, 337)
Rosaceae	<i>P. domestica</i>	do	(23, 104)
	<i>P. persica</i>	do	(23)
	-----	do	(23)
	<i>Pyrus communis</i>	{ Overripe fruit	(482)
	-----		(23, 200, 298, 726)
	<i>P. malus</i> (<i>Malus sylvestris</i>).	Fruit	(478)
	<i>Quillaja</i> sp.	-----	(23, 782)
	<i>Rubus</i> sp.	Fruit	(205)
	<i>R. fruticosus</i>	{ Leaf	(465)
	-----		(732)
Rubiaceae	<i>R. idaeus</i>	-----	(284, 586)
	<i>Cinchona</i> spp.	Bark	(46)
	<i>Coffea</i> sp.	Seed	(270)
	<i>C. arabica</i>	Fruit capsule	(292)
	<i>Dentella asiatica</i>	-----	(343)
	<i>Galium lucidum</i>	Leaf	(23, 482, 782)
	-----	Fruit	(660)
	<i>Citrus aurantium</i>	Leaf	(659)
	-----	Peel	(326, 439)
	<i>C. decumana</i> (<i>C. grandis</i>)	Fruit	(659)
Rutaceae	-----	Peel	(23, 326, 482, 782)
	<i>C. limon</i>	{ Fruit	(659)
	-----		(77, p. 165, ref. 4)
	<i>C. medica</i>	Petiole	(326)
	-----	Fruit	(482)
Santalaceae	<i>C. nobilis</i> (<i>C. reticulata</i>)	-----	(309)
Saxifragaceae	<i>Santalum album</i>	-----	(23, 104, 782)
	<i>Ribes grossularia</i>	-----	(198)
Simarubaceae	<i>R. rubrum</i>	-----	(358)
	<i>R. sanguineum</i>	-----	(772, p. 641 note 1)
	<i>Quassia amara</i>	Root bark	

Family	Genus and species	Source	Reference
Oxalic Acid—Continued			
Solanaceae	<i>Capsicum annuum</i> (<i>C. frutescens</i>).		(130) (23, 63, 236)
	<i>Datura</i> sp.		(509)
	<i>D. stramonium</i>		(455)
	<i>Nicotiana</i> sp.	Leaf	(30, 493, 505, 569, 574, 575, 662, 748, 749, 805)
	<i>N. tabacum</i>	Leaf	(32, 686, 707, 708, 751) (455; 687; 772, p. 1112, note 2)
	<i>Solanum</i> sp.		(509)
	<i>S. lycopersicum</i> (<i>Lycopersicon esculentum</i>).	Fruit	(4, 63, 122, 533, 686, 810) (7, 23, 104, 351, 381, 782)
	<i>S. tuberosum</i>	Unripe fruit	(83, 84)
		Tuber	(23, p. 99, ftn. 2; 126; 303; 426; 455; 562; 656; 782)
	<i>Sterculia plantanifolia</i> (<i>Firmiana simplex</i>).		(8)
Sterculiaceae	<i>Theobroma cacao</i>		(23, 236, 452, 453, 782)
Theaceae			(236, 292, 785)
Umbelliferae	<i>Angelica archangelica</i>	Root	(509) (690)
	<i>Anethum graveolens</i>	Leaf	(782)
	<i>Apium graveolens</i>		(23)
	<i>Pastinaca sativa</i>		(782)
	<i>Petroselinum sativum</i> (<i>P. crispum</i>).		(782)
Valerianaceae	<i>Valeriana officinalis</i>		(91)
	<i>Valerianella</i> sp.		(509)
	<i>Ampelopsis</i> sp.		(509)
	<i>A. quinquefolia</i> (<i>Parthenocissus quinquefolia</i>).	Fruit	(557)
Vitaceae		do	(23, 184, 186, 276)
	<i>Vitis vinifera</i>	Leaf and fruit	(278, 280) (343)
		Leaf and shoot	(479)
		Sap	(480, 804)
		Vines	(481)
Zingiberaceae	<i>Hedychium</i> sp.	Leaf	(77, p. 165, ref. 4)
Zygophyllaceae	<i>Guaiaacum</i> sp.	Phloem	(77, p. 165, ref. 4)

Family	Genus and species	Source	Reference
Phthalic Acid			
			
Papaveraceae	<i>Papaver somniferum</i>	-----	(635)

Pimaric Acid			
 d-pimaric  levopimaric			

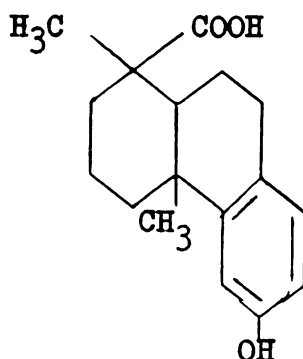
Pinaceae	<i>Picea vulgaris</i> (<i>P. abies</i>)	Resin	(67)
	<i>P. excelsa</i> (<i>P. abies</i>)	do	(260, 345, 346)
	<i>Pinus</i> (5 spp.)	Oleoresin	(260)
	<i>P. maritima</i>	Resin	(157, 378)
	<i>P. palustris</i>	Oleoresin	(35, 257)
		Resin	(357)
		Turpentine gum.	(503)
	<i>P. pinaster</i>	-----	(159)
	<i>P. sylvestris</i>	-----	(259, 274)



Rubiaceae	<i>Palicourea densiflora</i>	Bark	(318)
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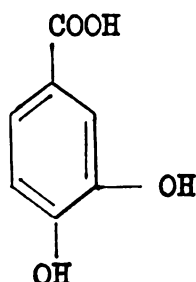
Family	Genus and species	Source	Reference
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Podocarpic Acid



Pinaceae.....	<i>Dacrydium cupressinum</i>	-----	(161, 649)
	<i>Podocarpus cupressina</i>	-----	(500, 649)
	<i>P. dacrydioides</i>	-----	(161, 649)

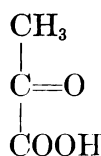
Protocatechuic Acid



Bignoniaceae.....	<i>Crescentia</i> sp.....	Crude curare....	(330, 783)
Globulariaceae....	<i>Globularia alypum</i>	-----	(743)
Liliaceae.....	<i>Allium cepa</i>	Skin.....	(20, 389, 390, 762)
Magnoliaceae.....	<i>Illicium anisatum</i>	Fruit and seed..	(498)
	<i>I. religiosum</i>	Fruit.....	(121, 164, 165)
	<i>I. verum</i>	Capsule.....	(76)
Saxifragaceae....	<i>Hydrangea thunbergii</i> (<i>H. serrata</i>)..	Leaf.....	(698)
Vitaceae.....	<i>Vitis vinifera</i>	do.....	(73)

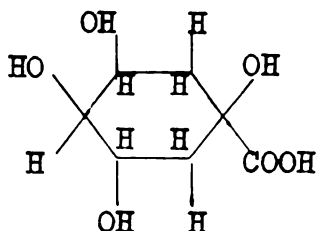
Family	Genus and species	Source	Reference
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Pyruvic Acid



Chenopodiaceae	<i>Spinacia oleracea</i>	Leaf	(31)
Euphorbiaceae	<i>Ricinus communis</i>	Germinating seed.	(145)
Gramineae	<i>Hordeum vulgare</i>	{ Seedling	(57) (314)
Labiatae	<i>Mentha piperita</i>	Leaf	(709, 711)
Leguminosae	<i>Arachis hypogaea</i>	Seedling	(195, 196)
	<i>Pisum sativum</i>	Leaf	(31)
		Seedling	(759)
	<i>Trifolium pratense</i>		(757) (757)
Liliaceae	<i>Allium cepa</i>	{ Juice	(55) (451)
	<i>Tulipa gesneriana</i>		(709, 710)
Rosaceae	<i>Pyrus malus</i> (<i>Malus sylvestris</i>).	Fruit	(298)
Solanaceae	<i>Solanum tuberosum</i>	Tuber	(38, 711)
Umbelliferae	<i>Daucus carota</i>	{ Leaf and root	(709)
		{ Root	(711)

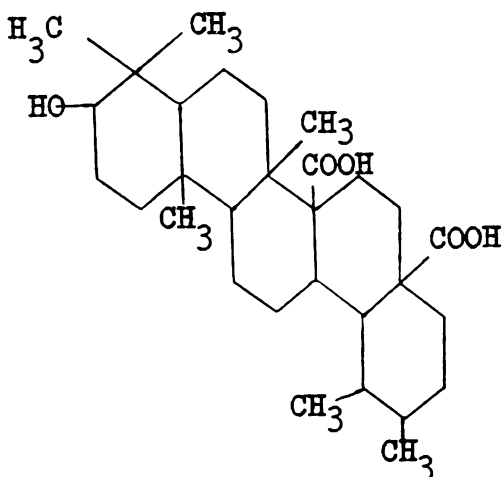
Quinic Acid



Compositae	<i>Taraxacum officinale</i>		(404)
Ericaceae	<i>Vaccinium arctostaphylos</i>	Leaf	(670) (325)
	<i>V. myrtillus</i>	{ Young leaf	(341)
		{ Foliage	(321)
	<i>V. oxycoccus</i>	Fruit	(352, 379)
	<i>V. vitis-idaea</i>	Leaf	(328)
Gramineae	Mixed herbage	Hay	(403, 404) (299)
Leguminosae	<i>Tamarindus indica</i>	Fruit	(325)
Magnoliaceae	<i>Illicium verum</i>	Capsule	(76)
Pinaceae	<i>Cedrus libani</i>	Needle	(701)
	<i>Larix europaea</i> (<i>L. decidua</i>).	do	(701)
	<i>Picea excelsa</i> (<i>P. abies</i>)	{ Young shoot	(340) (341)
Ranunculaceae	<i>Aconitum septentrionale</i>		(315)

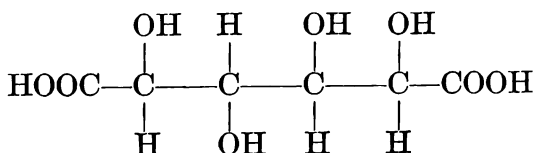
Family	Genus and species	Source	Reference
Quinic Acid—Continued			
Rosaceae	<i>Prunus domestica</i>	Ripe fruit	(147)
		Fruit	(352)
	<i>P. persica</i>	Fruit	(18, 133)
	<i>Pyrus communis</i>	Juice	(592)
		Fruit	(733)
Rubiaceae	<i>P. malus</i> (<i>Malus sylvestris</i>)	Fruit	(295, 298)
		Juice	(530, 531, 700)
	<i>Cinchona</i> sp.		(284, 287, 521, 522, 586, 741)
	<i>C. cordifolia</i>		(522)
	<i>Coffea</i> sp.	Fruit	(823)
Solanaceae	<i>Gallium mollugo</i>		(490)
	<i>Nicotiana tabacum</i>	Leaf	(772, p. 1112, note 2)
Umbelliferae	<i>Angelica archangelica</i>	Root	(690)
Vitaceae	<i>Vitis vinifera</i>	Fruit	(352)

Quinovic Acid



Rosaceae	<i>Potentilla</i>	Root	(539)
Rubiaceae	<i>Cinchona</i> spp.		(284, 586, 614)
Zygophyllaceae	<i>Zygophyllum coccineum</i>		(669)

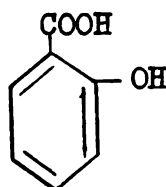
Saccharic Acid



Moraceae	<i>Ficus elastica</i>	Latex	(232)
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Family	Genus and species	Source	Reference
Saccharinic Acid			
$\text{CH}_2\text{OH}-\text{CHOH}-\text{CHOH}-\text{C}(\text{CH}_3)(\text{OH})-\text{COOH}$			
Bromeliaceae.....	<i>Ananas sativas</i> (A. comosus).	Fruit.....	(79)

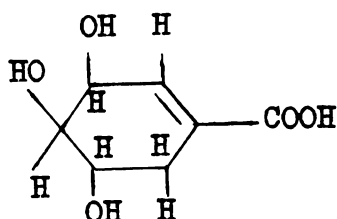
Salicylic Acid



Compositae.....	<i>Calendula officinalis</i>.....	.....	(143)
	<i>Matricaria chamomilla</i>	Flower head.....	(548)
Euphorbiaceae.....	<i>Cluytia similis</i>	Stem and leaf.....	(729)
Iridaceae.....	<i>Iris versicolor</i>	Rhizome.....	(554)
Leguminosae.....	<i>Daviesia latifolia</i>	Leaf and stem.....	(555)
	<i>Glycyrrhiza glabra</i>	Root.....	(142)
	<i>Trifolium pratense</i>	Flower.....	(535)
	<i>Aloe</i> sp.....	.....	(731)
Liliaceae.....	<i>Gloriosa superba</i>	Tuber.....	(123)
	<i>Hyacinthus</i> sp.....	.....	(241)
	<i>Tulipa</i> sp.....	.....	(241)
	<i>Yucca</i> sp.....	.....	(241)
Moraceae.....	<i>Morus</i> sp.....	Fruit.....	(142)
Pittosporaceae.....	<i>Pittosporum undulatum</i>	do.....	(556)
Polygalaceae.....	<i>Polygala</i> sp.....	Root.....	(639)
Ranunculaceae.....	<i>Cimicifuga racemosa</i>	Rhizome.....	(188)
Resedaceae.....	<i>Reseda odorata</i>.....	.....	(421)
		Calyx and pedicel.....	(435)
	<i>Fragaria</i> sp.....	Fruit.....	(543, 544, 712, 735)
		Fruit pulp and juice.....	(639)
		Juice.....	(791)
	<i>Prunus armenica</i>	Fruit.....	(712)
	<i>P. avium</i>	do.....	(143)
Rosaceae.....		do.....	(142, 143, 243, 712)
	<i>P. cerasus</i>	Juice.....	(311)
	<i>P. domestica</i>	Fruit.....	(712)
	<i>P. persica</i>	do.....	(712)
	<i>Rubus fruticosus</i>	do.....	(712)
	<i>R. idaeus</i>	do.....	(243, 712, 735)
		Juice.....	(266, 791)
	<i>R. occidentalis</i>	Fruit.....	(712)
	<i>Spiraea ulmaria</i> (Fili-pendula ulmaria).	Flower.....	(421, 422)
Rubiaceae.....	<i>Uragoga ipecacuanha</i> (Cephaelis ipecacuanha).	Root.....	(421)
Rutaceae.....	<i>Barosma</i> sp.....	.....	(770)
	<i>Casimiroa edulis</i>	Seed.....	(549)
Saxifragaceae.....	<i>Ribes</i> sp.....	Fruit.....	(712)

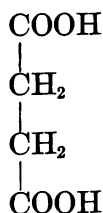
Family	Genus and species	Source	Reference
Salicylic Acid—Continued			
Solaneaceae-----	<i>Solanum lycopersicum</i> (<i>Lycopersicon esculentum</i> .)	-----	(194, 519)
Violaceae-----	{ <i>Viola</i> (6 spp.)-----	-----	(143)
	{ <i>V. syrtica</i> -----	Leaf, stem, and rhizome.	(423)
	{ <i>V. tricolor</i> -----	{ Flower, leaf, stem, and root.	(242)
Vitaceae-----	{ <i>Vitis labrusca</i> -----	Leaf, stem, and rhizome.	(423)
	{ <i>V. vinifera</i> -----	Fruit-----	(243)
		do-----	(435)

Shikimic Acid



Ginkgoaceae-----	<i>Ginkgo biloba</i> -----	Leaf-----	(261, 808)
Gramineae-----	<i>Lolium perenne</i> -----	-----	(596)
Magnoliaceae-----	{ <i>Illicium anisatum</i> -----	-----	(498)
	{ <i>I. religiosum</i> -----	{ Fruit-----	(121, 164)
		{ Carpel-----	(165)
	{ <i>I. verum</i> -----	{ Carpel-----	(76, 213)
Pinaceae-----	25 spp-----	-----	(655)
Taxaceae-----	4 spp-----	-----	(261)
		-----	(261)

Succinic Acid



Franzen and Ostertag (208) have made a critical review of the literature on the occurrence of succinic acid.]

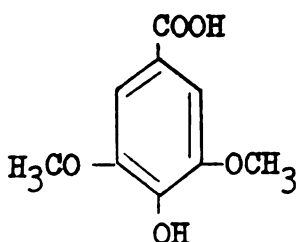
Aceraceae-----	<i>Acer saccharum</i> -----	{ Sirup-----	(468, 542)
		{ Sugar sand-----	(469)
Amaryllidaceae---	<i>Narcissus poeticus</i> -----	Leaf and root--	(762)
Begoniaceae-----	<i>Begonia semperflorens</i> ---	-----	(611, 732)
Betulaceae-----	<i>Corylus</i> sp-----	Nut-----	(144)
Bigononiaceae---	<i>Crescentia</i> sp-----	{ -----	(72)
		{ Crude curare---	(330)

Family	Genus and species	Source	Reference
Succinic Acid—Continued			
Bombacaceae	<i>Adansonia digitata</i>	Fruit	(5)
Celastraceae	<i>Goupia tomentosa</i>	Wood	(156)
Chenopodiaceae	<i>Beta vulgaris</i>	Juice	(396, 501, 672, 673)
		Top and root	(571)
	<i>Spinacia oleracea</i>	Leaf and root	(742)
		Leaf	(377)
	<i>Artemisia absinthium</i>	Leaf	(706)
Compositae	<i>Helianthus annuus</i>		(819)
	<i>Lactuca</i> spp.		(58)
	<i>L. sativa</i>		(515)
	<i>L. virosa</i>		(347, 732)
	<i>Taraxacum officinale</i>		(347)
	<i>Bryophyllum</i> sp.	Leaf	(404)
Crassulaceae	<i>B. calycinum</i>	Leaf	(570, 571)
		Detached leaf	(109, 563, 687)
	<i>Echeveria secunda</i>		(738)
		Leaf	(686)
	<i>Sedum acre</i>	Leaf	(207)
Cruciferae	<i>Sempervivum glaucum</i>	do	(484)
	<i>Brassica oleracea</i>	Leaf and bud	(484)
	<i>Bunias orientalis</i>	Stem, leaf, and flowering top.	(52)
			(475)
Ericaceae	<i>Vaccinium myrtillus</i>	Fruit	(316)
Euphorbiaceae	<i>Ricinus communis</i>	Whole plant	(325)
Fagaceae	<i>Fagus sylvatica</i>	Sap	(583)
	<i>Quercus</i> sp.	Nut	(65, 145)
			(646)
	<i>Avena sativa</i>		(144)
	<i>Bambusa</i> sp.		(299)
	<i>Dactylis glomerata</i>		(291)
	<i>Hordeum vulgare</i>	Leaf	(70)
		Etiolated shoot	(134)
		Seedling	(114, 687)
			(168)
Gramineae	<i>Lolium perenne</i>		(291, 686)
	<i>Oryza</i> spp.		(314, 739)
	<i>O. sativa</i>		(134)
	<i>Phleum pratense</i>		(809)
	<i>Saccharum officinarum</i>	Juice	(256)
			(134)
	<i>Triticum</i> sp.		(68, ref. 57; 603; 604; 605; 704, ref. 162; 794; 811)
Juglandaceae	<i>Zea mays</i>	Leaf	(739)
Lauraceae	<i>Juglans regia</i>	Nut	(43, 571)
Leguminosae	<i>Persea gratissima</i> (<i>P. americana</i>)	Kernel	(144)
	<i>Lupinus albus</i>	Seedling	(514)
Loganiaceae	<i>Phaseolus coccineus</i>		(291)
	<i>Pisum sativum</i>	Seedling	(58)
	<i>Tamarindus indica</i>		(291)
Malvaceae	<i>Strychnos toxifera</i>		(202, 325)
Moraceae	<i>Gossypium</i> sp.		(70, 71)
	<i>Morus</i> sp.		(181)
	<i>M. alba</i>	Bark exudate	(806)
Musaceae	<i>M. indica</i>	Leaf	(225)
	<i>Musa basjoo</i>	Juice	(326)
	<i>M. sapientum</i>	Fruit	(623)
			(193)

Family	Genus and species	Source	Reference
Succinic Acid—Continued			
Papaveraceae	<i>Chelidonium majus</i> -----	-----	(636)
	<i>Eschscholtzia</i> sp-----	-----	(766)
	<i>Glaucium luteum</i> -----	Juice-----	(634)
	<i>Papaver somniferum</i> -----	-----	(766)
Pinaceae	-----	Turpentine-----	(380)
	<i>Abies pectinata</i> -----	{ do-----	(113)
	(<i>A. alba</i>).-----	{ Resin-----	(722)
	<i>Agathis australis</i> -----	Resin-----	(457)
	<i>A. dammara</i> -----	do-----	(719)
	<i>Larix decidua</i> -----	do-----	(723)
	<i>Picea vulgaris</i> (<i>P. abies</i>)-----	do-----	(720)
	<i>Pinus</i> sp-----	Sap-----	(646)
	<i>P. sylvestris</i> -----	Resin-----	(721)
Polygonaceae	<i>Fagopyrum esculentum</i> -----	{-----	(144)
	-----	{ Leaf and stem-----	(571)
	<i>Rheum hybridum</i> -----	{ Rhizome and stem-----	(612)
	-----	{ Leaf-----	(687)
Proteaceae	<i>R. officinale</i> -----	Petiole-----	(102)
	<i>R. rhaponticum</i> -----	Leaf and petiole-----	(571)
	<i>R. undulatum</i> -----	Petiole-----	(343)
	<i>Orites excelsa</i> -----	Wood-----	(664)
Ranunculaceae	<i>Anemone nemorosa</i> -----	Leaf-----	(400)
Rosaceae	-----	-----	(732)
	<i>Fragaria</i> sp-----	Fruit-----	(6)
	<i>Prunus avium</i> -----	do-----	(197)
	<i>P. cerasus</i> -----	{ Juice-----	(319)
	-----	{ Fruit-----	(337)
	<i>P. communis</i> -----	Fruit pulp-----	(320)
	<i>P. persica</i> -----	Fruit-----	(18)
	<i>Pyrus aucuparia</i> (<i>Sorbus aucuparia</i>).-----	{ do-----	(206)
	-----	-----	(401)
	<i>P. communis</i> -----	{ Juice-----	(592)
	-----	{ Fruit-----	(733)
	<i>P. malus</i> (<i>Malus sylvestris</i>).-----	{ Fruit-----	(43, 105, 106)
	-----	-----	(200)
	-----	{ Juice-----	(530, 702)
Rutaceae	<i>Rubus fruticosus</i> -----	{ Leaf-----	(205)
	-----	{ Fruit-----	(465)
	<i>R. idaeus</i> -----	Leaf-----	(211, 319, 732)
	<i>Citrus limon</i> -----	Fruit-----	(326)
Santalaceae	<i>Santalum album</i> -----	-----	(309)
Sapotaceae	<i>Mimusops</i> sp-----	-----	(515)
Saxifragaceae	<i>Ribes rubrum</i> -----	-----	(198)
Scrophulariaceae	<i>Digitalis purpurea</i> -----	-----	(87, 331)
Solanaceae	<i>Atropa belladonna</i> -----	-----	(366)
	-----	-----	(43, 571, 653, 686)
	<i>Nicotiana</i> sp-----	Leaf-----	(570, 748, 749)
	<i>N. tabacum</i> -----	Leaf-----	(687, 751)
	-----	{ Fruit-----	(7, 736, 737)
	<i>Solanum lycopersicum</i> (<i>Lycopersicon esculentum</i>).-----	{ Overripe fruit-----	(82, 83, 84)
	-----	{ Leaf and stalk-----	(571)
Umbelliferae	<i>S. tuberosum</i> -----	Leaf-----	(686, 687)
	-----	Tuber-----	(814)
	<i>Angelica archangelica</i> -----	Root-----	(690)
Vitaceae	<i>Daucus carota</i> -----	do-----	(105, 106, 409)
	-----	{ Leaf-----	(73)
	-----	{ Unripe fruit-----	(101)
	<i>Vitis vinifera</i> -----	{ Fruit-----	(102, 343)
	-----	{ Sap and fruit-----	(280)
	-----	{ Sap-----	(481, 804)

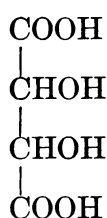
Family	Genus and species	Source	Reference
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Syringic Acid



Gramineae-----	<i>Saccharum officinarum</i>	{ Juice-----	(605)
		{ Crude molasses_	(696)

Tartaric Acid



[Franzen and Helwert (801) have made a critical review of literature on the occurrence of tartaric acid]

Aceraceae-----	<i>Acer saccharum</i> -----	{ Sugar sand----	(398, 666)
		{ Sirup-----	(469)
Amaryllidaceae---	<i>Agave americana</i> -----	Leaf sap-----	(107)
	{ <i>Mangifera indica</i> -----	-----	(86)
	{ <i>Rhus coriaria</i> -----	-----	(152)
Anacardiaceae---	{ <i>R. semialata</i> -----	-----	(734)
	{ <i>Spondias purpurea</i> -----	-----	(558)
Araliaceae-----	<i>Aralia hispida</i> -----	Fruit-----	(222)
Asclepiadaceae---	<i>Asclepias syriaca</i> -----	Milky sap-----	(643)
	{ <i>Berberis integerrima</i> -----	Fruit-----	(343)
Berberidaceae---	{ <i>Caulophyllum thalic-</i>	Fruit pulp-----	(679)
	<i>troides.</i>		
Betulaceae-----	<i>Betula alba</i> -----	Sap-----	(217)
	{ <i>Adansonia</i> sp-----	{ Fruit-----	(445)
Bombacaceae---	{ <i>A. digitata</i> -----	{ Fruit pulp-----	(523, p. 779)
	{ <i>Ananas sativas</i> (A.	Fruit-----	(5)
Bromeliaceae---	<i>comosus).</i>	----do-----	(79, 515)
	{ <i>Diervilla florida</i> -----	Fruit-----	(135)
	{ <i>Lonicera xylosteum</i> -----	----do-----	(170)
	{ <i>Sambucus callicarpa</i> -----	----do-----	(124)
	{ <i>S. ebulus</i> -----	{ ----do-----	(174)
		{ Root-----	(175)
Caprifoliaceae---	{ <i>S. nigra</i> -----	Fruit-----	(173)
	{ <i>Symphoricarpos</i>	----do-----	(663)
	<i>racemosus</i> (<i>S. albus</i>).		
	<i>Viburnum lantana</i> -----		(178)
	<i>V. nudum</i> -----		(406)
Caricaceae-----	<i>Carica papaya</i> -----	Fruit-----	(513)
	{ <i>Celastrus obscurus</i> -----	Leaf-----	(154)
Celastraceae---	{ <i>C. scandens</i> -----	Fruit-----	(776)
	{ <i>Euonymus atropurpureus</i>	Root bark-----	(463)
	<i>E. europaeus</i> -----	Seed kernel----	(245)

Family	Genus and species	Source	Reference
Tartaric Acid—Continued			
Chenopodiaceae	<i>Beta vulgaris</i> -----	{ Root-----	(226, 396)
	<i>Chenopodium ambrosioides</i> -----	{ Root and leaf--	(742)
Commelinaceae	<i>Tradescantia purpurea</i> -----	Stem sap-----	(201, p. 297)
	<i>T. zebrina</i> (<i>Zebrina pendula</i>).-----	do-----	(219)
Compositae	<i>Rellis perennis</i> -----	-----	(179)
	<i>Helianthus tuberosus</i> -----	Tuber-----	(92, 226)
	<i>Matricaria chamomilla</i> -----	Flower-----	(269)
Cornaceae	<i>Cornus paniculatum</i> -----	Fruit-----	(648)
	(<i>C. racemosus</i>).-----	-----	-----
Cruciferae	<i>C. sericea</i> -----	do-----	(679)
	<i>Capella bursapastoris</i> -----	-----	(131)
Elaegnaceae	<i>Hippophae rhamnoides</i> -----	Fruit-----	(797)
Elaeocarpaceae	<i>Elaeocarpus serratus</i> -----	do-----	(807)
Ericaceae	<i>Vaccinium</i> sp-----	Leaf-----	(328)
	<i>V. corymbosum</i> -----	Fruit-----	(257)
	<i>V. vitisidaea</i> -----	{ Leaf-----	(491)
Eucommiaceae	<i>Eucommia ulmoides</i> -----	{ Fruit-----	(792)
	<i>Euphorbia cyparissias</i> -----	Leaf-----	(246)
Euphorbiaceae	<i>E. platyphylla</i> -----	Milky sap-----	(774)
	<i>Phyllanthus emblica</i> -----	do-----	(775)
	<i>Ricinus communis</i> -----	-----	(326)
Fagaceae	<i>Quercus pedunculata</i> -----	Wood-----	(65)
Geraniaceae	(<i>Q. robur</i>).-----	-----	(442)
	<i>Geranium zonale</i> -----	-----	(93)
Gramineae	<i>Rambusa</i> sp-----	Shoot-----	(621)
	<i>Saccharum officinarum</i> -----	Juice-----	(811)
Guttiferae	<i>Sorghum vulgare</i> -----	-----	(416, 786, 787)
	<i>Garcinia gambogia</i> -----	Fruit rind-----	(367)
Hydnoraceae	<i>Prosopanche burmeisteri</i> -----	-----	(816)
Labiateae	<i>Glechoma hederacea</i> -----	-----	(176)
	<i>Orthosiphon stamineus</i> -----	-----	(338)
Lauraceae	<i>Persea gratissima</i> -----	Fruit pulp-----	(514, 515)
	(<i>P. americana</i>).-----	-----	-----
Leguminosae	<i>Astragalus</i> sp-----	Twig-----	(408)
	<i>Rauhinia reticulata</i> -----	Fruit and leaf--	(578)
	<i>Cassia</i> sp-----	Leaf-----	(716, 763)
	<i>C. acutifolia</i> -----	do-----	(376)
	-----	Fruit pulp-----	(81, 590, 688, 746)
	-----	-----	(3; 192; 201, ref. 28; 202; 233; 740)
Liliaceae	<i>Tamarindus indica</i> -----	Leaf-----	(237)
	-----	Mesocarp-----	(271)
	-----	Green and ripe fruit.	(310, 558)
	-----	Fruit-----	(326, 693)
	<i>Clintonia borealis</i> -----	Fruit-----	(661)
	<i>Erythronium denscanis</i> -----	Bulb-----	(153)
Magnoliaceae	<i>Smilacina bifolia</i> (?)-----	Fruit-----	(163)
	<i>S. racemosa</i> -----	do-----	(163)
Moraceae	<i>Schizandra chinensis</i> -----	do-----	(525)
Myrtaceae	<i>Morus indica</i> -----	Leaf-----	(326)
	<i>Eugenia australis</i> -----	-----	(407)
Musaceae	<i>Psidium guajava</i> -----	-----	(620)
	<i>Musa sapientum</i> -----	Fruit-----	(193)
Orchidaceae	<i>Vanilla planifolia</i> -----	do-----	(384)
Oxalidaceae	<i>Oxalis corniculata</i> -----	Leaf-----	(237)

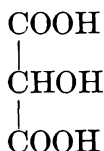
Family	Genus and species	Source	Reference
Tartaric Acid—Continued			
Papaveraceae	<i>Adlumia cirrhosa</i> (<i>A. fungosa</i>).	Root	(633)
	<i>Chelidonium majus</i>	Leaf	(560)
	<i>Fumaria officinalis</i>	Sap	(201, p 295)
	<i>Papaver somniferum</i>	Capsule	(141)
Pinaceae	<i>Pinus sylvestris</i>	Pollen	(363)
Piperaceae	<i>Piper nigrum</i>		(520)
Polygonaceae	<i>Polygonum Reynoutria</i>	Stem	(697)
Ranunculaceae	<i>Aconitum napellus</i>		(588)
Rosaceae	<i>Crataegus</i> sp.	Fruit	(433)
	<i>Cydonia vulgaris</i>	do	(119, 693, 714)
	<i>Eriobotrya japonica</i>	do	(368)
	<i>Fragaria</i> sp.		(119, 458, 714)
	<i>Prunus armeniaca</i>	Fruit	(119, 487, 489, 693)
	<i>P. avium</i>		(714)
	<i>P. cerasus</i>	Fruit	(119)
	<i>P. domestica</i>	do	(119, 458, 487, 488, 489, 714)
	<i>P. persica</i>	do	(487, 488, 489, 714)
	<i>P. spinosa</i>		(488, 629)
	<i>Pyrus arbutifolia</i>	Fruit	(642)
	<i>P. aucuparia</i> (<i>Sorbus aucuparia</i>).		(584)
	<i>P. malus</i> (<i>Malus sylvestris</i>).	Fruit	(386a, 401)
	<i>Rubus</i> sp.	Juice	(487, 489)
	<i>R. idaeus</i>	Juice	(693)
Rubiaceae	<i>Coffea</i> sp.		(132)
Rutaceae	<i>Citrus decumana</i> (<i>C. reticulata</i>).	Fruit	(458)
Santalaceae	<i>Cusparia trifoliata</i>		(332)
Sapindaceae	<i>Leptomeria acida</i>	Fruit	(119, 335)
Sapotaceae	<i>Sapindus saponaria</i>		(516)
	<i>Achras sapota</i>		(439)
	<i>Bassia latifolia</i>		(201, ref. 1)
Saxifragaceae	<i>Sideroxylon crassipedicellatum</i> .	Fruit	(591)
	<i>Ribes</i> sp.		(233)
	<i>R. grossularia</i>		(517)
	<i>R. nigrum</i>		(344)
Scrophulariaceae	<i>R. rubrum</i>		(517)
	<i>Antirrhinum majus</i>		(458)
	<i>Digitalis grandiflora</i>		(792)
	<i>Euphrasia officinalis</i>		(119)
	<i>Linaria cymbalaria</i>		(209, 792)
	<i>Scrophularia nodosa</i>		(765)
Solanaceae	<i>Veronica officinalis</i>		(765)
	<i>Cyphomandra calycina</i>		(171)
	<i>Physalis peruviana</i>	Fruit	(518)
	<i>Solanum dulcamara</i>	do	(373)
Sterculiaceae	<i>S. lycopersicum</i> (<i>Lycopersicon esculentum</i>).	Fruit	(15, 776)
	<i>S. tuberosum</i>	Tuber	(4)
Tiliaceae	<i>Theobroma cacao</i>	Berry	(7, 177, 343, 693)
Urticaceae	<i>Tilia vulgaris</i>		(167)
	<i>Parietaria officinalis</i>		(89)
			(201, ref. 29)
			(283)

Family	Genus and species	Source	Reference
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Tartaric Acid—Continued

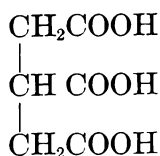
Vitaceae-----	<i>Ampelopsis hederacea</i>	-----	(186)
	(<i>Parthenocissus</i>	-----	(234)
	<i>quinquefolia</i>).	Leaf-----	(235)
	<i>Parthenocissus quinque-</i>	Leaf-----	(532)
	<i>folia</i> .	-----	
	<i>Vitis</i> sp-----	{-----	(11)
		Leaf-----	(505)
	<i>V. hederaceae</i> (<i>Partheno-</i>	-----	(798)
	<i>cissus quinquefolia</i>).	-----	
	<i>V. labrusca</i> -----	{Juice-----	(413, 629)
		Fruit-----	(466)
	<i>V. sylvestris</i> -----	Fruit-----	(598)
		-----	(13, 64, 216,
		Fruit-----	280, 302, 480)
		-----	(14, 190, 297,
		-----	326, 487,
		-----	541, 693)
		Leaf-----	(73, 343, 527,
		-----	645)
	<i>V. vinifera</i> -----	{Juice-----	(139, 214, 223,
		-----	255, 355,
		-----	528, 647)
		Sap-----	(374, 799, 804)
		Vine-----	(215, 278)
		Unripe fruit--	(417, 496, 526)
		Young shoot	(479)
		and leaf.	

Tartronic Acid



Gramineae-----	-----	-----	(597)
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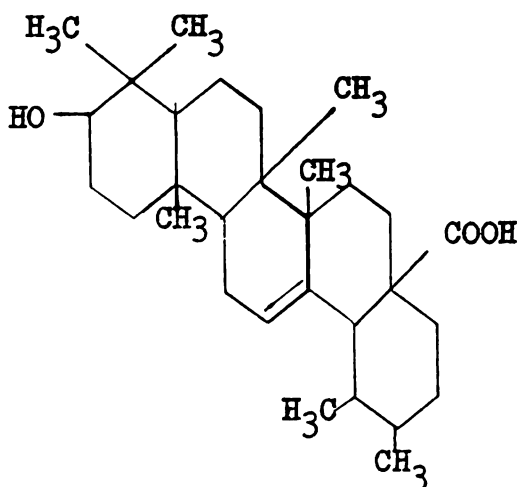
Tricarballic Acid



Aceraceae-----	<i>Acer saccharum</i> -----	Sugar sand----	(398, 469)
		{Evaporated	(391, 402)
		juice.	
Chenopodiaceae..	<i>Beta vulgaris</i> -----	{Root-----	(392, 705)
		Juice-----	(395)
		Root and leaf--	(742)
Gramineae-----	<i>Hordeum vulgare</i> -----	Whole plant---	(474)

Family	Genus and species	Source	Reference
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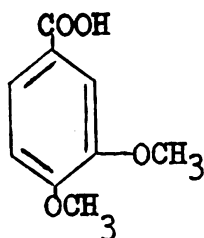
Ursolic Acid



Apocynaceae	<i>Allamanda cathartica</i>	Leaf	(26)
	<i>Ilex aquifolium</i>		(189)
Aquifoliaceae	<i>I. latifolia</i>	Cuticle	(329)
	<i>I. paraguariensis</i>	Leaf	(440)
Cornaceae	<i>Cornus florida</i>	Flower and bract	(619)
	<i>Arctostaphylos uva-ursi</i>	Leaf	(617)
	<i>Enkianthus quinqueflorus</i>		(25)
	<i>Erica arborea</i>		(189)
	<i>E. carnea</i>		(189)
	<i>E. mediterranea</i>		(189)
	<i>Kalmia angustifolia</i>		(313)
Ericaceae	<i>Leucothoe keiskei</i>	Leaf	(657)
	<i>Rhododendron</i> (6 spp.)		(25)
	<i>R. pulchrum</i>	Leaf	(26)
	<i>R. simsii</i>	do	(26)
	<i>Vaccinium macrocarpon</i>	Pomace	(430)
	<i>V. myrtillus</i>		(189, 583)
	<i>V. oxycoccus</i>	Fruit pulp	(371)
	<i>V. vitis-idaea</i>		(189)
Labiatae	<i>Salvia officinalis</i>		(97)
	<i>Thymus vulgaris</i>		(609)
Myrtaceae	<i>Psidium guajava</i>	Leaf	(27)
Punicaceae	<i>Punica granatum</i>	Peel and leaf	(98)
Pyrolaceae	<i>Pyrola minor</i>		(189)
	<i>P. umbellata</i>		(189)
	<i>Crataegus oxyacantha</i>		(59)
	<i>Eriobotrya japonica</i>		(26)
	<i>Prunus avium</i>	Cuticle	(431)
	<i>P. serotina</i>		(251)
Rosaceae		Leaf	(617)
	<i>Pyrus communis</i>	Fruit skin	(428)
		Fruit	(250)
	<i>P. malus</i> (<i>Malus sylvestris</i>)	Fruit skin	(275, 617)
		Fruit cuticle	(429)
Solanaceae	<i>Anthocercis intricata</i>		(21)
	<i>A. littorea</i>		(21)
	<i>A. odgersii</i>		(21)
Verbenaceae	<i>Verbena stricta</i>		(506)

Family	Genus and species	Source	Reference
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Veratric Acid



Liliaceae----- *Sabadilla officinalis*----- Seed----- (441)

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