

Nonnative Invasive Plants of Pacific Coast Forests

A Field Guide for Identification



United States
Department
of Agriculture

Forest Service
Pacific Northwest Research Station
General Technical Report PNW-GTR-817
May 2011

Andrew N. Gray, Katie Barndt, and Sarah H. Reichard

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Authors

Andrew N. Gray is a research ecologist, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3200 SW Jefferson Way, Corvallis, OR 97331. **Katie Barndt** was a Ph.D. student, and **Sarah H. Reichard** is an associate professor, School of Forest Resources, University of Washington, Seattle, WA 98195. Barndt is currently an instructor at North Seattle Community College, Seattle, WA 98103.

Front cover: (upper left) Herb-robert; (upper right) spotted knapweed; (lower left) medusahead; (lower right) Himalayan blackberry.

Back cover: (upper left) Tree of heaven; (upper right) squarrose knapweed; (lower left) Dyer's woad; (lower right) Jubata grass.

Abstract

Gray, Andrew N.; Barndt, Katie; Reichard, Sarah H. 2011. Nonnative invasive plants of Pacific coast forests: a field guide for identification. Gen. Tech. Rep. PNW-GTR-817. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 91 p.

Nonnative plants affect the composition and function of natural and managed ecosystems and have large economic effects through lost or degraded land use and eradication costs. In spite of their importance, very little comprehensive information on the abundance, distribution, and impact of nonnative invasive plants is available. The objective of this study was to prioritize a list of nonnative invasive plants affecting forest lands in the Pacific coastal states of California, Oregon, and Washington, and provide enough detail in nontechnical language and photos of different stages of plant development to allow reliable identification in the field. Information was synthesized from a variety of national, regional, and state lists, assessments, and botanical guides. The final list was designed to capture species believed to be most prevalent or problematic and to be used for strategic forest inventories like the Forest Inventory and Analysis Program. Identification of the several hundred nonnative invasive species present in the region requires substantial taxonomic experience; a prioritized short list of species with practical identification tips can be a good place for novice botanists and large-scale monitoring efforts to start.

Keywords: invasive species, nonnative plants.



Yellow starthistle, *Centaurea solstitialis* L.

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Introduction

Nonnative plants affect the composition and function of natural and managed ecosystems and have large economic effects through lost or degraded land use and eradication costs (Mooney and Hobbs 2000, Pimentel et al. 2005, Vitousek et al. 1996). In response to these threats, many efforts to assess ecosystem health and sustainable management focus on the need to know how abundant invasive species are (Heinz Center 2002, Journal of Forestry 1995, National Research Council 2000). In spite of their importance, very little comprehensive information on the abundance, distribution, and impact of nonnative invasive plants is available (Blossey 1999). As a result, it is currently not possible to provide a comprehensive assessment of the abundance and impacts of nonnative invasive plants in the United States (Heinz Center 2002, National Research Council 2000).

The objective of this report is to provide a prioritized short list of the nonnative invasive plants having the greatest impact on forested lands in the Pacific coastal states of California, Oregon, and Washington. To be useful in regional resource monitoring, the list emphasizes species that are recognizable for most of the year. In addition, we hoped to provide enough detail in nontechnical language and photos to allow reliable identification of these species in the field by people without specialized

botanical training. This work was inspired by a useful lay-oriented publication of nonnative invasive plants of southern forests (Miller 2003). The list was designed to be available for use in a strategic forest inventory, such as that conducted on all forest lands in the region by the Forest Inventory and Analysis (FIA) Program of the U.S. Department of Agriculture (USDA) Forest Service Pacific Northwest Research Station. Although identification and monitoring of all nonnative invasive species in the region would be ideal, the sheer number of species—4,139 in the United States (USDA NRCS 2009) and several hundreds in any one region—requires fieldwork by experienced taxonomists (Gray and Azuma 2005). A prioritized short list of species can be a good place for novice botanists and native plant managers to start.

Methods

The first step to create a priority list of nonnative invasive plants was to compile invasive plant lists from a variety of public and private organizations in the region. Because each list was created with a specific process or set of criteria in mind (e.g., some focus on nonforest agricultural weeds), the goal of this step was to be as inclusive as possible.

Each of the states' governments maintains noxious weed lists, and these were downloaded from agency Web sites (California Department of Food and Agriculture 2008, Oregon Depart-

ment of Agriculture 2008, Washington State Noxious Weed Control Board 2008). A short list of species monitored by FIA on Pacific Southwest Region (Region 5) national forests in California was included (USDA Forest Service 2006), as well as a draft list for Pacific Northwest Region (Region 6) national forests in Oregon and Washington recommended by an invasive plants coordinator (Linda Mazzu 2008. Personal communication. Regional botanist, Region 6). Lists from multiagency invasive plant councils in California and Oregon were also included (California Invasive Plant Council 2006, Oregon Invasive Species Council 2008). A national list produced by a conservation organization was also available (Morse et al. 2004), as well as an academic publication on the worst invaders of the Pacific Northwest (Boersma et al. 2006). The lists were combined into a single list of 421 species using the nomenclature in the PLANTS database, a nationally standardized taxonomic reference (USDA NRCS 2009).

In addition, a list of nonnative plants recorded on FIA plots was compiled. There were 201 plots in Oregon and Washington measured with the national FIA vegetation indicator protocol (Schulz 2003) on a pilot basis; intensive measurements of all species were taken by experienced botanists during the summer growing season, and specimens of unknown plants were identified by Oregon State University Herbarium staff. Nonnative species recorded

according to the regional understory vegetation protocol were also included. For this protocol, crews recorded the three most abundant species per life form (tree seedlings, shrubs, forbs, and graminoids) and any additional plants found at ≥ 3 percent cover on the plot. Expertise differed among crews, and not all plants were identifiable when plots were measured (April–October), so many vegetation records were of genus or life form, particularly for forbs and graminoids. There were 48 species that were nonnative, were recorded on more than one vegetation indicator plot or more than five regional vegetation plots, and were not on any of the other invasive lists; these were added to the species list for a total of 469 species that were ranked for priority.

The species were ranked for priority by using a variety of criteria:

- **Nativity:** whether that species was entirely or partially nonnative to the United States.
- **Habitat:** likelihood that species occurred on forest land.
- **Invasiveness:** an index of the ecological impact, invasive potential, ecological amplitude, and distribution of a species.
- **Distribution:** degree to which occurrence is widespread or in many vegetation types.
- **Identifiability:** ease of identification based on phenology and growth habit.

The PLANTS database (USDA NRCS 2009) was used to determine which species were nonnative to the United States (some of the state noxious lists included native agricultural weeds), or which were listed as having both native and nonnative populations in the country. For example, common yarrow (*Achillea millefolium* L.) in the United States consists of native and introduced populations that are not distinguishable in the field, and probably have hybridized. This species is abundant in disturbed western forest lands, but it is unknown if this invasiveness is a trait common to the native genotypes or a result of the spread of the introduced genotypes (Hitchcock et al. 1969, Hurteau and Briggs 2003). Only species listed as fully nonnative were retained in the final list.

Only species that were likely to be found in forest habitats were included. Identifying species that occurred in forest habitats consisted of searching a variety of written materials for the words “forest,” “woodland,” or “riparian.” In addition, species found on the national forest lists or that met the minimum frequency on FIA plots were included as forest species. After applying the nativity and habitat criteria, 245 species were left for further ranking. Habitat points were also assigned, with codes of 4 for forest, 3 for woodland, 2 for riparian, and 1 for other.

The invasiveness ratings are focused on impacts to nonagricultural plant communities and were based on formalized criteria applied by experts (Morse et al. 2004). Additional invasiveness criteria can be used (e.g., abundance, cost of control), and we attempted to capture them in the other rating items. Conservation rankings were available in three of the lists examined. Invasiveness points were assigned to each species ranging from 5 (for species ranked “high” on any invasive list) to 1 (species ranked “low” or “insignificant” on any invasive list).

The distribution criteria were based on information provided in the lists that were examined, and distribution points were assigned to each species ranging from 5 (widespread) to 1 (limited or not present). Frequencies on FIA plots were used for species that lacked information.

Identification points were added to the spreadsheet to roughly describe the ability of a nonbotanist with modest training in identifying species. Trees and evergreen shrubs were ranked highly, deciduous shrubs lower, forbs next, forbs in the family Asteraceae lower still, and grasses lowest. Identifiability is related to the number of similar species and the length of time during the year in which the plants have diagnostic parts (e.g., flowers, fruits, or leaves).

The somewhat rough rankings of habitat, invasiveness, distribution, and identification points were added up and species grouped into four lists for experts to evaluate (readers interested in seeing the full list may contact the first author). The 25 nongraminoid species with the highest total points were placed in a preliminary “monitor” list, and 50 nongraminoid species with the next highest points and 20 graminoid species with the highest points were placed in “supplemental” lists. Experts from different regions within the three states were asked to indicate for each species whether it occurred in their region, what the priority for monitoring was, whether it should be moved to the monitor list or taken off, and why. Fourteen individuals responded with recommendations and many helpful comments, and covered the geographic range, although responses from eastern Oregon and southern California were underrepresented.

Survey responses were given points for species recommended for monitoring based on the priority they assigned: 3 = high, 2 = medium, 1 = low, 0 = no list. Because responses differed in the number of species recommended for monitoring, species scores were relativized so that the total for each respondent was 100. Scores were then summed for all responses, and by region. The species ranked in the top 40 across all regions, plus those with high scores in one or more regions, were included in the final

list. Initial regions were western Oregon and Washington, eastern Oregon and Washington, Klamath region (southwest Oregon and northwest California), and remaining portions of California. Regions were simplified into western Oregon and Washington, eastern Oregon and Washington, and California based on the overlap in species ranking in the initial regions.

The final list included 1 tree, 16 shrubs, 34 forbs, and 6 grasses, for a total of 57 species. However, the total for any one region did not exceed 45 species. In addition, many of the species were treated as “groups” of closely-related species, in which case the total number of groups per region was either 25 or 26.

Species Descriptions

The species descriptions were written to provide basic diagnostic information about stems, leaves, flowers, and fruit for each species. In addition, information on seasonality and distinguishing features from similar species is provided. Many species descriptions were adapted from DiTomaso and Healy (2007), Wisheart et al. (2008), and Miller (2003), with additional guidance from regional floras. Readers seeking greater detail and information on additional species in this region are encouraged to consult DiTomaso and Healy (2007). In addition to the descriptions, photos are provided illustrating each species and diagnostic plant parts to aid in

identification. Many photos were taken by Katie Barndt and the Institute for Applied Ecology (Corvallis, Oregon), and many others were graciously provided by other photographers (see credits). In addition, county distribution maps for each state created by the PLANTS database (USDA NRCS 2009) are provided.

Descriptions are written to minimize the use of botanical terms for ease of use, but the botanical terms are more succinct and precise and are sometimes used; many are included in parentheses after common phrases and defined in the glossary to aid in identification. Key recognition attributes are highlighted with **bold** to facilitate rapid plant identification. Nomenclature for all species follows USDA NRCS (2009). Metric units are provided in some cases where the English units are too small to appear on common rulers (e.g., 0.05 inch). We have not included control methods in this publication, as they can differ depending on the regulatory environment and management goals for an area, and can become quickly out of date with new information. Readers desiring information on controlling specific plants may refer to DiTomaso and Healy (2007), Boersma et al. (2006), Miller (2003), and resources available on the Internet (e.g., <http://www.invasive.org/>, <http://www.pnw-ipc.org/>, <http://www.cal-ipc.org/>).

Acknowledgments

Scott Sundberg and Katie Mitchell of the Oregon State University Herbarium identified plant voucher specimens. Steve Acker, Jim Belsher-Howe, Beth Brenneman, Mignonne Bivin, Robin Dobson, Chuck Fairchild, Timothy Harrington, Jennifer Hutchinson, Laurie Kurth, Robin Leshner, Terry Lillybridge, Jennifer Lippert, Linda Mazzu, Cindy McCain, Carol Ogilvie, Regina Rochefort, Catharine Thompson, Peter Warner, Andrea Williams, and Andrea Woodward provided rankings and valuable comments on the initial species list, which helped us prioritize species for the final list.

Tom Kaye and Andrea Thorpe of the Applied Ecology Institute coordinated the collection of many of the photographs used in this publication. Many other photographers freely provided their photos; each photo is identified with the name of the photographer. Joe DiTomaso, Mandy Tu, and Timothy Harrington provided helpful comments on an earlier version of this manuscript.

Tree of heaven



Katie Barndt



Katie Barndt



Katie Barndt



Katie Barndt



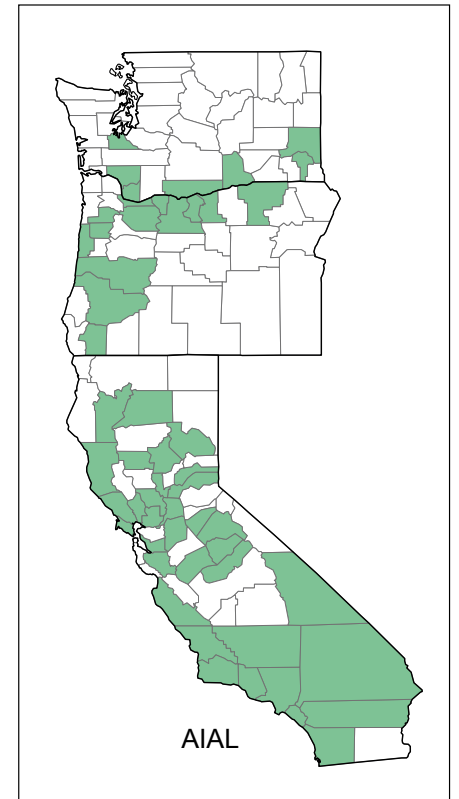
James H. Miller, USDA Forest Service, Bugwood.org



Katie Barndt



Katie Barndt



Ailanthus altissima* (P. Mill.) Swingle*AIAL**

Synonyms: *Ailanthus*, copal tree, varnish tree, Chinese sumac, *Ailanthus glandulosa* Desf., *Toxicodendron altissima* Mill.

Plant: Deciduous, fast-growing tree with a single trunk 20–60 (to 100) feet tall and up to 3 feet in diameter, **large compound leaves** and **circular glands** under lobes at base of leaflets, gray bark, and distinctive leaf scars. **Large flower clusters** of flattened winged fruit persist on female trees. The creeping roots readily sprout new stems, often producing thickets. Family: Simaroubaceae.

Stem: Young bark is smooth and light grayish brown, older bark has diamond-shaped fissures. Twigs range from green to reddish and velvety when young to light brown, smooth, and stout when old, with many light dots (lenticels). Leaf scars are heart shaped.

Leaves: Leaves are alternate, compound with leaflets on either side of a central axis (pinnate), deciduous, 1–3 feet long, with **10–41 leaflets per leaf**, and usually with a leaflet at the tip. Leaflets are not always directly opposite. Leaflet blades are lance shaped (lanceolate) to egg shaped (ovate), narrowing toward the tip, with 2–4 lobes or blunt teeth at the base; each lobe typically has a large, round, green gland on the underside. Leaflets are 2–7 inches long and 1–2 inches wide, with leaflet stalks (petioles) $\frac{1}{4}$ – $\frac{3}{4}$ inch long. Leaf margins are smooth-edged (entire) except for the lobes. The upper leaf surface is dark green with light-green veins when mature, reddish and covered with very short, velvety hairs when young; the lower leaf surface is whitish green.

Leaves smell “skunky” when crushed.

Flowers: Blooms April to June, with large clusters of flowers up to 20 inches long at branch tips. The flowers are small, about $\frac{1}{4}$ inch across, and greenish yellow, with 5 petals and 5 sepals. Male flowers have 10 stamens, and female flowers have 2–5 pistils. Male and female flowers occur on separate trees (dioecious).

Fruit and seeds: Fruit remains on trees from July to February, in large clusters (up to 12 inches across) of **flattened, twisted, winged fruit, each with a single seed**. The fruit is of uniform width throughout its length (linear), 1 inch long, $\frac{1}{2}$ inch wide, green when young, and ripening to a tan or reddish brown.

Habitat: Riparian areas, grassland, oak woodland, disturbed areas and open fields, below 5,000 feet in elevation. Trees are shade and flood tolerant.

Similar-looking plants: Other plants with large pinnately compound leaves include southern and northern California walnut (*Juglans californica* S. Watson and *J. hindsii* (Jeps.) Jeps. ex R.E. Sm., respectively), which have leaflets with finely sharp-toothed (serrated) margins without blunt teeth at the base and without glands under teeth, and fruit is a walnut; and sumacs (*Rhus* spp.), which are shrubby, have serrated leaves, lack glands under leaflets, and fruits are red, fuzzy, and fleshy with a single hard seed (drupe).

Tree of heaven

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Brooms



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Above: Scotch broom (CYSC4).

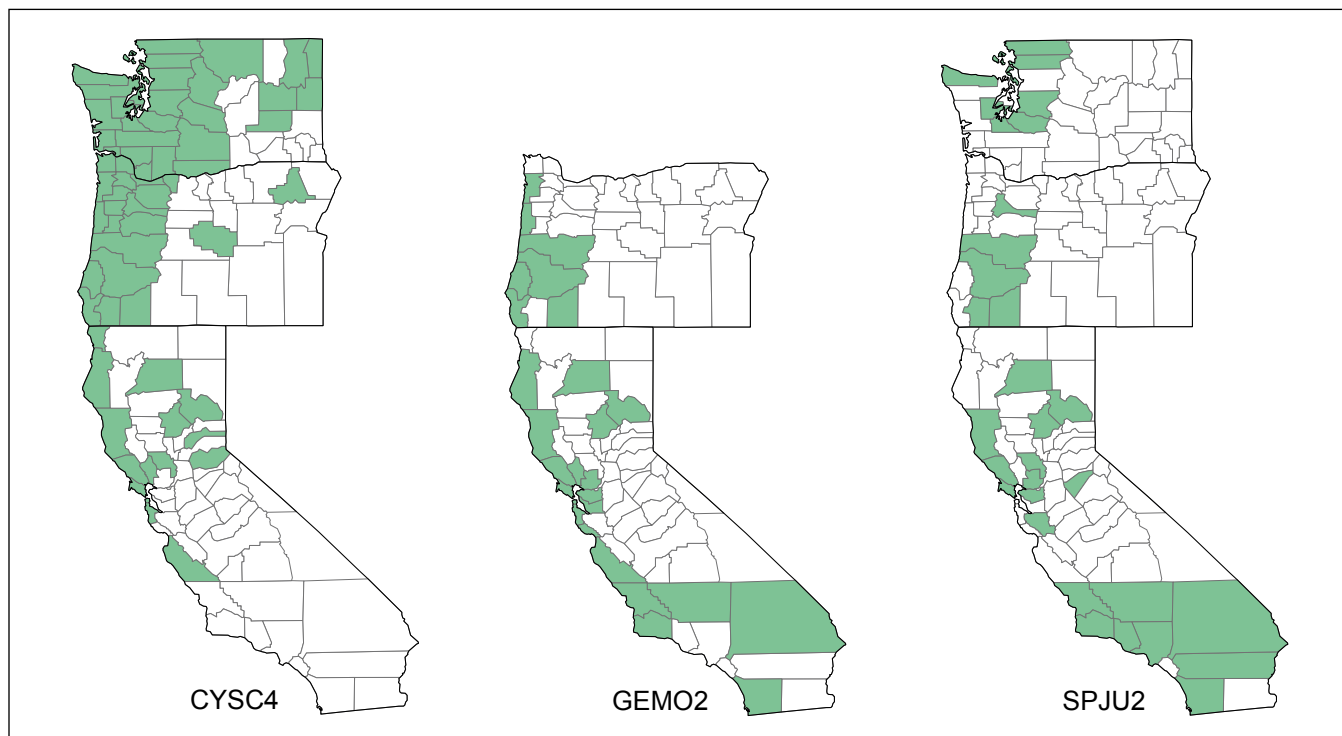
Below: French broom (GEMO2).



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Alfred Brousseau



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| 1. Scotch broom, <i>Cytisus scoparius</i> (L.) Link | CYSC4 |
| 2. French broom, <i>Genista monspessulana</i> (L.) L. Johnson | GEMO2 |
| 3. Spanish broom, <i>Spartium junceum</i> L. | SPJU2 |

Synonyms: (1) English broom, common broom, Scot's broom, *Sarothamnus scoparius* (L.) Wimm ex Koch, *Spartium scoparium* L.; (2) Cape broom, Montpellier broom, *Cytisus monspessulanus* L., *Teline monspessulana* (L.) K. Koch; (3) weaver's broom, *Genista juncea* Lam.

Plant: Large, multibranching, woody shrubs up to 10 feet tall with erect **green stems**, **yellow "pea-flowers"** and **legumes** (pods). Family: Fabaceae (pea, legume).

Stem: Stems of Scotch broom are dark green and strongly angled (approximately star shaped in cross section) with **5 ridges**, with new twigs covered in wavy hairs, becoming smooth with age, and older branches turning brown and losing ridges. Stems of French broom are round, covered in silky hairs, and have **8–10 ridges**. Stems of Spanish broom are bright green and round, and **almost smooth** with fine ridges and almost leafless.

Leaves: Leaves of Scotch and French broom are compound with 3 leaflets that are each $\frac{1}{4}$ – $\frac{3}{4}$ inch long and are nearly rectangular (oblong) to egg shaped (obovate), but are deciduous in Scotch broom and evergreen in French broom. Leaves of Spanish broom are single (simple), deciduous, narrow and uniform (linear) to lance shaped (lanceolate), and $\frac{1}{2}$ – $1\frac{1}{4}$ inches long.

Flowers: **Pea-like, usually bright yellow** (pale yellow to maroon red in Scotch broom). Scotch broom blooms primarily in March to June; flowers are $\frac{1}{2}$ –1 inch long, have smooth outer whorls (sepals), and occur single or paired in the joints where leaves attach to stems (axils). French broom blooms March to May; flowers are about $\frac{1}{2}$ inch long, have hairy sepals, and occur in head-like clusters of 4 to 19 flowers at the ends of short shoots. Spanish broom blooms April to June; flowers are $\frac{3}{4}$ –1 inch long, have smooth sepals, and occur in open clumps at the end of leafless stems.

Fruit and seeds: Seed pods are brown (sometimes black in Scotch broom) at maturity. Scotch broom pods are 1–3 inches long and flattened, with long white hairs on the seam. French broom pods are $\frac{1}{2}$ – $1\frac{1}{4}$ inches long, slightly flattened, and covered in hairs. Spanish broom pods are 1–4 inches long, slightly flattened, and covered in hairs.

Habitat: Open woodland, disturbed areas, grasslands, pasture, and rangeland. Scotch broom is found in winter-wet cooler conditions than the others.

Similar-looking plants: Gorse (*Ulex europaeus* L.) has bright yellow pea-like flowers but also has thorny stems, unlike the brooms. Portuguese broom (*Cytisus striatus* (Hill) Rothm.) is currently rare, and has a unique combination of 8–10 angled branches, flowers found singly or paired in leaf axils, and inflated pods covered with hairs.

Brooms

Below: Spanish broom (SPJU2).



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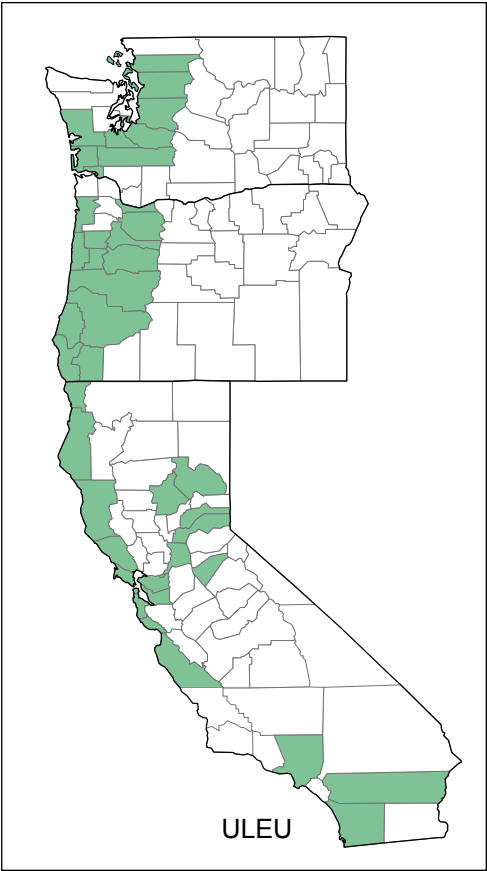
Katie Barndt

A close-up photograph of a tall, green, spiny plant stem, likely a species of cactus or succulent. The stem is covered in numerous sharp, pointed leaves or spines that radiate outwards. Small, reddish-brown flowers or buds are visible along the stem. The background is a blurred green, suggesting a natural, outdoor environment.

Katie Barndt



Forest and Kim Starr, U.S. Geological Survey, Bugwood.org



***Ulex europaeus* L. ULEU**

Synonyms: Common gorse, furze, thorn broom, whin.

Plant: Large, multibranched evergreen woody shrub up to 10 feet tall with **leaves modified into spines, yellow “pea-flowers”** and **legumes** (pods). Often forms impenetrable thickets. Family: Fabaceae (pea, legume).

Stem: Stems are highly branched and interwoven; green, strongly angled, and hairy when young; turning brown and woody as they mature. Branches end in a thorn.

Leaves: Leaves are alternate, single (simple), and evergreen. Juvenile leaves are narrow and uniform (linear) to lance shaped (lanceolate), then modified into **spines 2–7 inches long**.

Flowers: Blooms in spring (but can begin in November in warmer climates), with flowers occurring singly or in small clusters in the joints where leaves attach to stems (axils). **Flowers are like a “pea-flower,” bright yellow to orange-yellow, ½–¾ inch long.**

Fruit and seeds: The dark brown legumes (pods) are <1 inch long, covered in hairs, egg shaped (ovoid) to nearly rectangular (oblong) and slightly flattened, and with 1–6 seeds.

Habitat: Open woodland, disturbed forests, scrub, pastures and well-drained sites, including sand dunes and coastal bluffs.

Similar-looking plants: Brooms have similar flowers but do not have spiny stems and leaves.



Fred Hrusa

Gorse



Katie Burndt



Fred Hrusa



Forest and Kim Starr, U.S. Geological Survey, bugwood.org

Himalayan blackberry



Katie Barndt



Katie Barndt



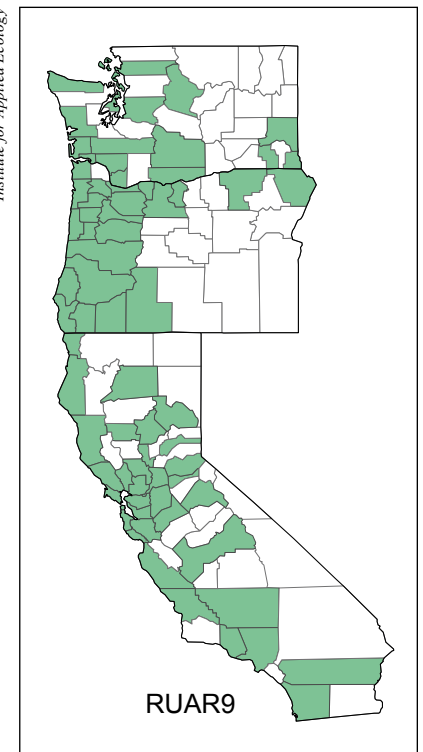
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RUAR9

***Rubus armeniacus* Focke RUAR9 (RUDI2)**

Synonyms: Himalayaberry, *Rubus discolor* (Weihe & Nees)*, *Rubus procerus* auct. non P.J. Müll. ex Genev

*Older nomenclature used in NRCS PLANTS version from 2000.

Plant: Large evergreen shrub that forms dense thickets of long, arched, thick stems (canes), up to 10 feet tall or 23 feet long. Stems are covered with prickles. Leaves are 3- to 5-parted, flowers are white to pinkish white and “roselike” (5-petaled), and the fruit is a blackberry. Family: Rosaceae (rose).

Stem: Stems are thick, up to ¾ inch diameter. First-year stems are hairy, with strong ridges and furrows, losing the hairs with age. Second-year stems bear flowers and are less strongly grooved. **Stems are covered in thick-based, straight or curved thorns (prickles), up to ½ inch long.**

Leaves: Leaves are alternate, compound, evergreen (or semievergreen). Leaves typically have **5 (7–9) leaflets on vegetative stems, 3–5 leaflets on floral stems**. Leaflets are broad with some shallow lobes, 2–4 inches long and widest above the middle, narrowing in short curves to a tip (acuminate), and with coarsely toothed margins. Upper surfaces of leaves are dark green and hairless, and lower surfaces appear whitish with dense hairs. The leaf stem (petiole) is 2–3½ inches long and has prickles.

Flowers: Flowers are arranged in a **multibranched clump (panicle), and are white or pink, up to 1 inch across**. Flowers have 5 egg shaped (obovate) petals about ½ inch long, and 5 green sepals. Stamens are abundant, in clusters of 5–20, and pistils are numerous. Flower stems (pedicels) have prickles.

Fruit and seeds: Blackberry (aggregate of drupelets). **Fruit is black, shiny and succulent at maturity**, green to red and hard when immature, up to ¾ inch long.

Habitat: Found in disturbed moist open sites, riparian areas, marshes, oak, and other open woodlands.

Similar-looking plants: Cutleaf blackberry (*R. laciniatus* Willd.) has highly dissected leaves, and lower leaf surfaces are nearly green, not white.

Whitebark raspberry (*R. leucodermis* Douglas ex Torr. & A. Gray) has first-year stems that are rounded, not grooved, leaflets that are broadest below the middle, not above, and bright white leaf undersides. Other blackberries/ raspberries have 3 leaflets or leaves have smooth margins (entire), lack prickles, or are primarily trailing plants (no canes).

Himalayan blackberry



Cutleaf blackberry



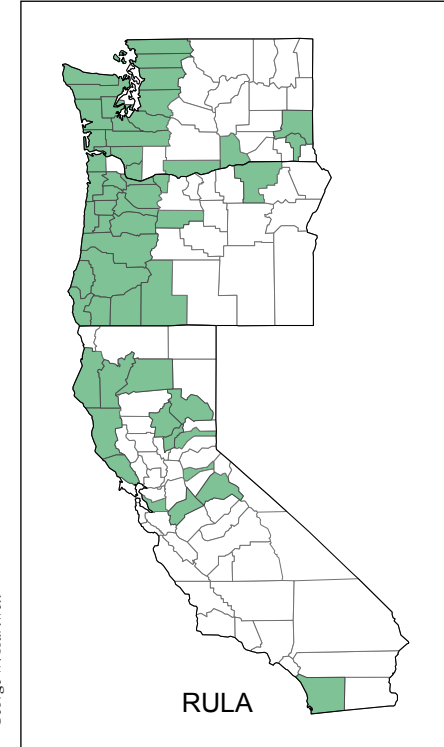
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Pat Breen, Oregon State University



George W. Hartwell



Rubus laciniatus Willd.

RULA

Synonyms: Evergreen blackberry, cut-leaved blackberry, *Rubus vulgaris* Weihe & Nees. var. *laciniatus* (Willd.) Dippel.

Plant: Woody shrub with arching branches up to 10 feet tall with 3–5-parted leaves, whose **leaflets are heavily dissected**, giving a lacy appearance. Flowers are white to pinkish white and “roselike” (5-petaled), and the fruit is a blackberry. Family: Rosaceae (rose).

Stem: Stems thick, to ½ inch diameter, often deep reddish. First-year stems with strong ridges and furrows. Stems are covered in thick-based, usually curved thorns (prickles).

Leaves: Leaves are alternate, compound, evergreen (semievergreen). **Leaves typically have 3–5 (7) leaflets, and are heavily dissected to doubly compound.** Leaflets are ¾–3 inches long, and the margins are sharply toothed. Upper leaf surfaces are green and hairless, and lower surfaces appear green with some hairs. Leaf stems (petioles) are 1–5 inches long, and the leaf central axis has a backward-curved prickle.

Flowers: Flowers are arranged in a **multibranched clump (panicle) of few to many flowers** and are white or pink. Flowers have 5 egg-shaped (obovate) petals about ¼ inch long, and 5 green sepals. Stamens are abundant, but pistils typically number fewer than 15. Flower stems (pedicels) have prickles.

Fruit and seeds: Blackberry (aggregate of drupelets). **Fruit is black, shiny and succulent at maturity**, green to red and hard when immature, to less than ¾ inch long.

Habitat: Found in disturbed moist open sites, riparian areas, marshes, oak and other open woodlands.

Similar-looking plants: Himalayan blackberry (*R. armeniacus* Willd.) does not have highly dissected leaves, and the lower leaf surface is white with small hairs. Whitebark raspberry (*R. leucodermis* Douglas ex Torr. & A. Gray) also does not have highly dissected leaves, and has first-year stems that are rounded, not grooved. Other blackberries/raspberries have 3 leaflets or leaves are smooth-margined (entire), lack prickles, or are primarily trailing plants (no canes).

Cutleaf blackberry



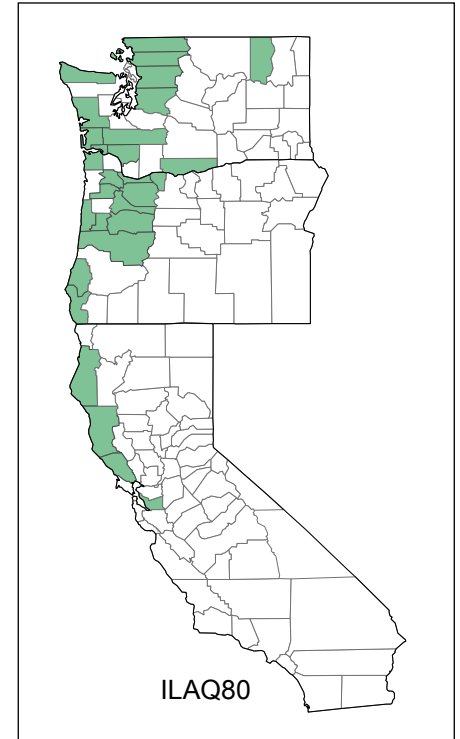
English holly



Katie Barnitt



Katie Barnitt



Katie Barnitt



Katie Barnitt



Frank Vincentz

Ilex aquifolium L.

ILAQ80

Synonyms: Christmas holly, common holly, European holly.

Plant: Large evergreen shrub or tree up to 80 feet tall, often pyramidal in shape, with **thick, shiny green leaves**, small white flowers and **red berries**. Family: Aquifoliaceae.

Stem: Plant is generally single-stemmed but can sprout into multistemmed thickets. Bark is smooth and green on young branches, turning gray with age.

Leaves: Leaves are alternate, single (simple), and evergreen. Leaf blades are egg shaped (ovate) to nearly rectangular (oblong), 1–3 inches long and $\frac{1}{4}$ – $2\frac{1}{2}$ inches wide. **Leaf margins are undulating and spiny-toothed**, but leaves can also be smooth-edged (entire) on the same plant. Spiny teeth are triangular, coarse, stiff, sharp, and usually number fewer than 20 per mature leaf. Leaf stems (petioles) are short. The upper surface of the leaf is shiny, dark green, thick and waxy, with no hairs, and the lower surface is dull green with no hairs.

Flowers: Flowers are fragrant and arranged in long branched clusters originating where the leaves attach to branches (axils), with male and female flowers on separate plants (dioecious). The flowers are small, $\frac{1}{8}$ inch across, with 4 white petals fused at the base, 4 sepals also fused at the base, and 4 stamens on male flowers.

Fruit and seeds: Fruit is round, red, and berry-like (drupe) with persistent sepals, $\frac{1}{8}$ inch across, and with 4 (2–8) hard thick-walled seeds (nutlets).

Habitat: Coastal forests, woodlands, riparian areas. Very shade tolerant.

Similar-looking plants: Hollyleaf cherry (*Prunus ilicifolia* (Nutt. ex Hook. & Arn.) D. Dietr.) occurs in woodlands and chaparral in southern California, but leaves usually have more than 20 slender, weak spines per leaf and fruits are $\frac{1}{2}$ –1 inch across and resemble commercial cherries. Individual holly leaflets resemble barberry (Oregon grape; *Mahonia* spp.) but those are usually small shrubs with compound leaves and thin, nonglossy leaflets.

Below: Hollyleaf cherry (*Prunus ilicifolia* (Nutt. ex Hook. & Arn.) D. Dietr.)



J.S. Peterson, USDA Natural Resources Conservation Service

English holly



Katie Barndt



Katie Barndt

English ivy



Andrew Gray



Katie Barndt



Katie Barndt



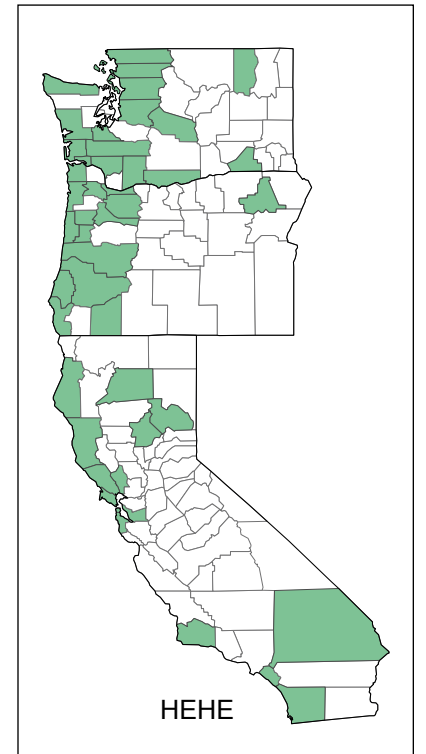
Katie Barndt



Katie Barndt



Katie Barndt

Cape ivy (*Delairea odorata* Lem.).

***Hedera helix* L. HEHE**

Note: *Hedera* species hybridize, have many cultivars, and are often misclassified. Atlantic (Irish) and Algerian ivy (*H. hibernica* (G. Kirchn.) Bean and *H. canariensis* (Willd.) Cout.) are lumped here with English ivy (most plants on the west coast are actually *H. hibernica* [Murai 1999, Zika and Alverson 2005]).

Plant: Woody, **evergreen vine** that grows in dense mounds on the ground or climbs up trees or buildings, attached with aerial rootlets, to 100 feet high. Juvenile plants have **lobed, white-veined leaves**, whereas mature plants have unlobed leaves, are erect, and bear flowers and fruit. Family: Araliaceae.

Stem: Stems are woody, with thick bases on older plants. Juvenile form has aerial rootlets that can cling to tree bark, fences, and buildings.

Leaves: Leaves are alternate, single (simple), evergreen, and thick and leathery; upper surfaces are often glossy. **Juvenile leaf blades are 3–5 lobed**, 1½–4 inches long and as wide. Lobes range from shallow to deep, with tip of lobes ranging from rounded to strongly narrowed toward the tip. Leaves are usually dark green, but can be blue green to light green, typically with light-colored veins on juvenile leaves.

Mature leaves are egg shaped (ovate) to diamond shaped with less prominent veins on the upper surface. Leaf stems (petioles) are green and as long as the leaf blades.

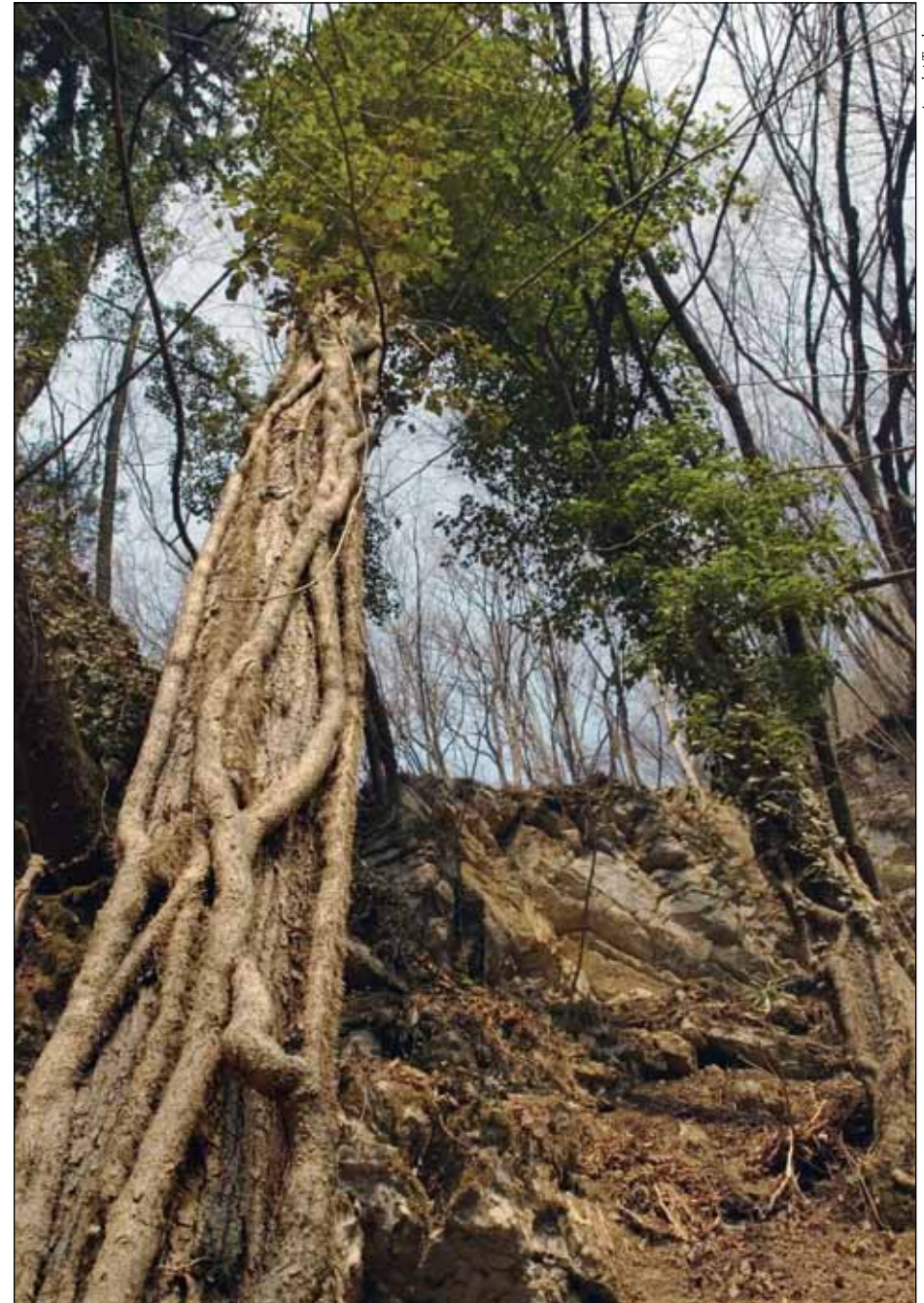
Flowers: **Plants flower in the fall and ripen in spring.** Flowers are only found on mature plants exposed to moderate or high light. Flowers are in round clusters at the ends of stems, on stalks rising from a common point (umbel). Flowers are small, 0.2–0.3 inch wide and greenish white or greenish yellow, with 5 petals, 5 sepals fused at the base, 5 stamens alternating with the petals, and a solitary, 5-lobed stigma.

Fruit and seeds: **Fruit is round and berry-like** (drupe), green when immature, and fleshy dark blue, purplish, or black when ripe. Fruit is ¼–⅓ inch wide, with 2–5 seeds.

Habitat: Forests, woodlands, riparian, and disturbed areas. Very shade tolerant.

Similar-looking plants: Cape ivy (*Delairea odorata* Lem.) occurs in coastal California and southwest Oregon. It does not have a woody base, leaves have a deep cleft in the base that give them a kidney shape, and flowers are yellow and daisylike. Grapes (*Vitis* spp.) have slender coiling structures that attach to other plants or structures (tendrils).

English ivy



Alma del Trunk

Old-man's-beard



Amadej Trnkoczy



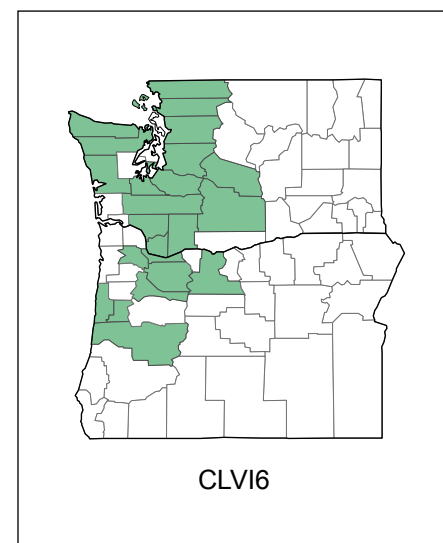
King County Noxious Weed Control Program



Katie Barnet



Katie Barnet



***Clematis vitalba* L. CLVI6**

Synonyms: Traveler's joy, virgin's bower.

Plant: Woody vine up to 40 feet long with compound leaves, clusters of small, white flowers and distinctive "hairy-looking" fruit. Family: Ranunculaceae (buttercup).

Stem: Stems are grooved, freely branching, and reddish to purplish when young, brown and woody when old.

Leaves: Leaves are opposite, compound with leaflets on either side of a central axis (pinnate), with 5–7 leaflets up to 3 inches long, and deciduous. Leaflets are heart-shaped with margins that can be smooth (entire) or have pointed (dentate) or rounded (crenate) teeth; the leaflet at the tip sometimes has 1–3 lobes. Petioles are long, and act as tendrils.

Flowers: Flowers are arranged in a branched clump (cyme) of 5–22 flowers that are attached in the joints where leaves attach to stems (axils) and at the ends of stems.

Flowers are up to 1 inch wide, with no petals, 4 creamy white sepals that are densely hairy on both sides, and about 50 stamens and 20+ pistils.

Fruit and seeds: Dry, closed fruit are reddish when mature, with long, feather-like hairs.

Habitat: Forests, riparian areas, roadsides, disturbed areas, to 500 feet elevation.

Similar-looking plants: Western white clematis (*C. ligusticifolia* Nutt.) looks very similar but is found in drier habitats, has unisexual flowers on separate plants, coarsely toothed leaves on flowering stems (not smooth), and does not tend to dominate other vegetation with dense vigorous growth.

Below: Western white clematis (*Clematis ligusticifolia* Nutt.).



Dave Powell, USDA Forest Service, Bugwood.org

Old-man's-beard



Amadej Trnkoczy



Katie Barnat

Cotoneasters

Below: Orange cotoneaster (COFR3).



Katie Barndt



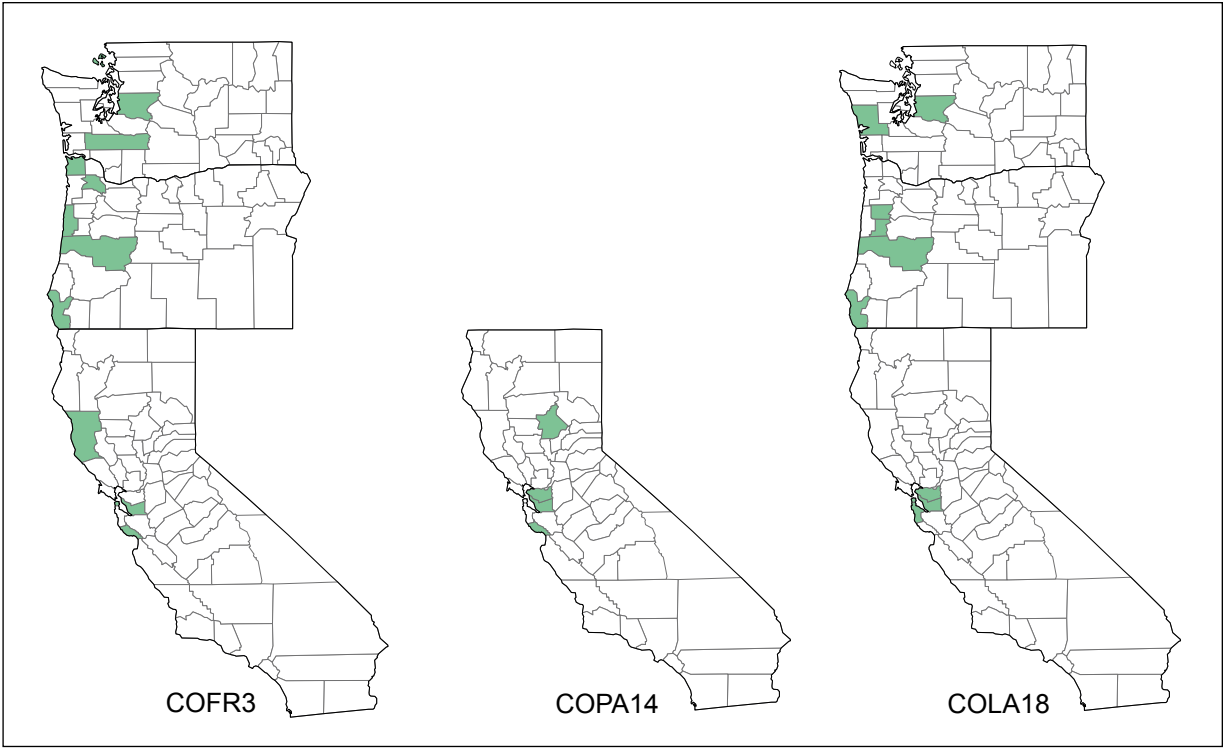
Katie Barndt



Katie Barndt



Katie Barndt



Below and right: Silverleaf cotoneaster (COPA14).



Katie Barndt



M.L. Charters

- | | | |
|---------------------------|---------------------------------------|--------|
| 1. Orange cotoneaster | <i>Cotoneaster franchetii</i> Boiss. | COFR3 |
| 2. Silverleaf cotoneaster | <i>Cotoneaster pannosus</i> Franch. | COPA14 |
| 3. Milkflower cotoneaster | <i>Cotoneaster lacteus</i> W.W. Smith | COLA18 |

Synonyms: (2) firethorn, *Cotoneaster pannosa* Franch.; (3) Parney's or rockspray cotoneaster, red custerberry, *Cotoneaster lactea* W.W.Sm., *Cotoneaster parneyi* Hort.

Plant: Evergreen shrub with many arching branches to 10 feet tall, single (simple) leaves, small white to pink "roselike" (5-petaled) flowers and orange to red berries. Family: Rosaceae (rose).

Stem: Stems are thin, dark brown, and covered with hairs when young. Branches are generally arching, and twig tips, leaf stalks, and stipules are typically densely covered with short woolly hairs.

Leaves: Leaves are alternate, single (simple), and evergreen (semievergreen), with leaf blades that are elliptic to egg shaped (ovate or obovate), with short stalks (petioles), and densely covered with hairs on the lower surface. Leaves of the orange cotoneaster are $\frac{3}{4}$ – $1\frac{1}{4}$ inches long, dark green and glossy on the upper surface. Milkflower leaves are larger, 1–2 $\frac{3}{4}$ inches long. Silverleaf leaves are $\frac{3}{4}$ – $1\frac{1}{4}$ inches long, with a dull green upper surface.

Flowers: Flowers are solitary or in a flat cluster at the ends of branches (corymb), $\frac{1}{4}$ – $\frac{1}{2}$ inch wide, with 5 petals, 5 sepals, many stamens, and 2–5 pistils. Orange cotoneaster flowers are cup shaped and pink. Milkflower flowers are white, often in large clumps, whereas silverleaf flowers are also white, but often in small tight clumps.

Fruit and seeds: Berrylike fruits are about $\frac{1}{4}$ inch wide with persistent sepals. Orange cotoneaster fruits are orange red, usually with 3 seeds. Milkflower fruits are red, have 2 seeds, and are egg shaped (ovoid), whereas silverleaf fruits are also red with 2 seeds, but are nearly spherical.

Habitat: Disturbed places, mixed evergreen forest, coastal scrub, and grassland, often near residential areas.

Similar-looking plants: Firethorns (*Pyracantha* spp.) are common ornamental shrubs with small, orange to red, berrylike fruits, but their stems have thorns; most firethorns also have leaves with finely sharp-toothed (serrate) margins.

Cotoneasters

Below: Milkflower cotoneaster (COLA18).



Katie Barndt



Katie Barndt



Katie Barndt

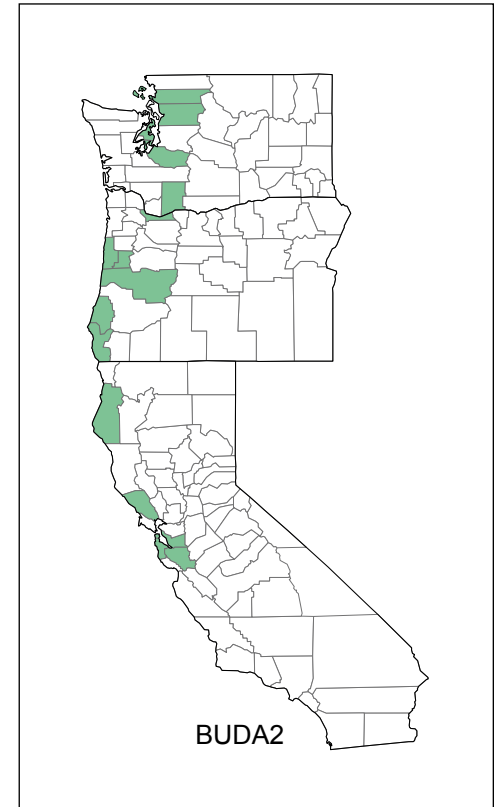
Butterfly bush



Michael Apel



Katie Barndt



Katie Barndt



Katie Barndt

***Buddleja davidii* Franch. BUDA2**

Synonyms: Orange eye butterflybush, summer lilac.

Plant: Large, arching, woody shrub 10–15 feet tall with **large lance-shaped leaves** and abundant, **large pyramidal-shaped clusters of purple flowers**. Family: Buddlejaceae (Loganiaceae).

Stem: Young stems are distinctly angled with 4–6 (8) sides, greenish to gray green, and with many small hairs. Older stems develop brown furrowed bark.

Leaves: Leaves are opposite, single (simple), deciduous or semievergreen. Leaves are lance shaped (lanceolate), 4–10 inches long and 1–3 inches wide narrowing to a pointy (acuminate) tip. Leaf margins have sharp teeth (serrate), and **upper surfaces are dark green to grayish green and leathery, while lower surfaces are grayish and covered with short hairs.**

Flowers: Flowers are grouped in **upright or nodding cylindrical or pyramidal-shaped clumps (panicle) 6–10 inches long**. Flowers are about ¼ inch long and bell shaped, 4 fused petals, 4 fused sepals, 4 stamens, and 1 style. Flower color ranges from light purple with yellow or orange at the mouth to deep purple.

Fruit and seeds: Dry fruit (capsule) is ¼–½ inch long and splits into two parts.

Habitat: Riparian areas, north coast coniferous forest, roadsides, clearcuts.

Butterfly bush

Tamarisk

Below: Saltcedar (TARA).



Steven Perkins



Steven Perkins

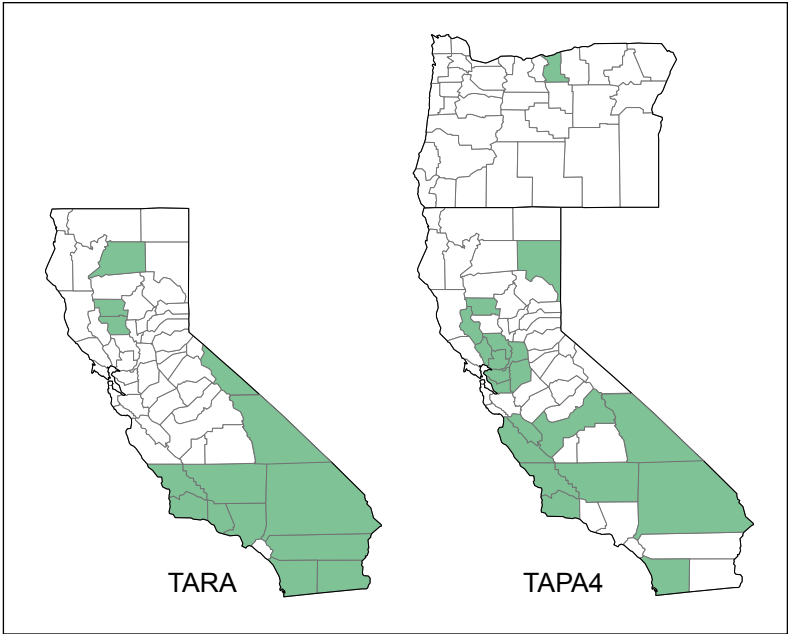
Below and right: Smallflower tamarisk (TAPA4).



Barry Rice



Joseph M. DiTomaso



1. **Saltcedar, *Tamarix ramosissima* Ledeb. TARA**
2. **Smallflower tamarisk, *Tamarix parviflora* DC. TAPA4**

Synonyms: Tamarisk, many *Tamarix* spp. names.

Plant: Large, deciduous shrubs to small trees, with many erect or arching basal branches. **Leaves are tiny and scalelike, on many branching, slender stems.** *Tamarix* species are not easily distinguishable and hybridize extensively. Saltcedar is typically < 20 (26) feet tall, whereas smallflower tamarisk is typically 12–15 feet tall. Family: Tamaricaceae.

Stem: Stems are slender, typically <1 inch in diameter, smooth and often arching, and brown to purplish in color.

Leaves: Leaves are alternate, single (simple), and deciduous, bright green, and grow overlapping and scalelike on many branching, slender stems. Leaves are lance shaped (lanceolate) with a narrow pointed tip and up to 1/8 inch long. Leaves are stalkless (sessile), and have salt-secreting glands, so salt is often visible on the leaves. Saltcedar leaves have more blue color than smallflower tamarisk.

Flowers: The tiny flowers are grouped in small narrow clusters up to 3 inches long (raceme), but the shoots bearing the flower clusters may be up to 3 feet long, producing a showy display. Saltcedar flowers have 5 pink to white petals, 5 sepals, and 5 stamens. Smallflower tamarisk flowers have 4 light to dark pink petals, 4 sepals, and 4 stamens.

Fruit and seeds: The dry fruit (capsule) is less than 0.02 inch (<0.5 mm) long, with many small seeds, and the petals can persist on fruits.

Habitat: Riparian areas, desert washes, seeps and springs, ditches, roadsides, and disturbed areas.

Similar-looking plants: Other *Tamarix* species that are less common in our region, including Athel tamarisk (*T. aphylla* (L.) Karst.), French tamarisk (*T. gallica* L.), and Chinese tamarisk (*T. chinensis* Lour.).

Tamarisk

Below: Smallflower tamarisk (TAPA4).



Joseph M. DiTomaso

Knotweeds

On this page: Japanese knotweed (POCU6).

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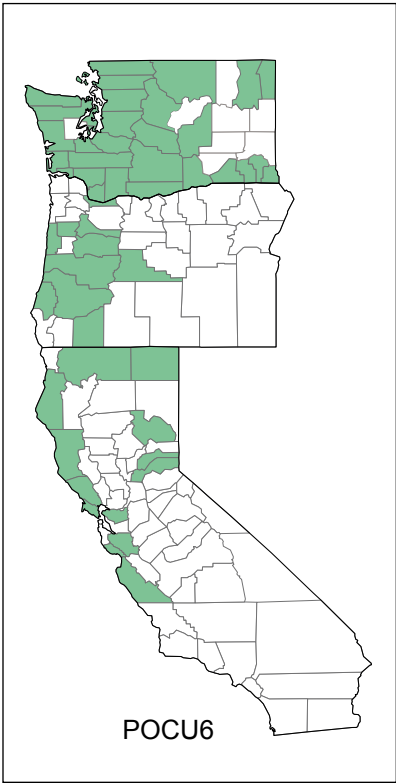
Randall G. Prostak



Louis-M Landry



Richard Old, XID Services, Inc.



1. **Japanese knotweed, *Polygonum cuspidatum*** Sieb. & Zucc. **POCU6**
2. **Himalayan knotweed, *Polygonum polystachyum***
Wallich ex Meisn. **POPO5**
3. **Giant knotweed, *Polygonum sachalinense***
F. Schmidt ex Maxim. **POSA4**
4. **Bohemian knotweed, *Polygonum x bohemicum*** (J. Chrtek &
Chrtková) Zika & Jacobson (*P. cuspidatum* x *P. sachalinense*) **POBO10**

Synonyms: (1) Japanese bamboo, Japanese arrowroot, Japanese fleecflower, Mexican bamboo, *Fallopia japonica* (Houtt.) Ronse Decr., *Reynoutria japonica* Houtt., *Pleuropterus cuspidatus* (Siebold & Zucc.) Moldenke, *Pleuropterus zuccarinii* Small; (2) cultivated knotweed, bell-shaped knotweed, *Persicaria wallichii* Greuter & Burdet, *Aconogonum polystachyum* (Wall. ex Meisn.) H. Haraldson; (3) Sakhalin knotweed, *Fallopia sachalinensis* (F. Schmidt ex Maxim.) Ronse Decr., *Reynoutria sachalinensis* (F. Schmidt ex Maxim.) Nakai; (4) Bohemian knotweed, *Fallopia x bohemicum* (Chrtek & Chrtková) J.P. Bailey.

Plant: Shrublike perennial forb, **growing in clumps with erect to somewhat arching canelike stems 6–10 (18) feet tall, with large leaves and feathery-looking flower clusters.** Family: Polygonaceae (buckwheat).

Stem: Stems are erect with few branches, grooved, hollow, **jointed and swollen at the nodes, with papery sheaths (ocrea) at the stem base and above each node** (but deciduous in mature Japanese knotweed). Stem color is green, turning to reddish brown when mature.

Leaves: Leaves are alternate, simple, and deciduous. Japanese knotweed leaves are egg shaped (ovate), **2–6 inches long and at least ⅓ as wide**, with a pointy (acuminate) tip and a round or squared-off base, with short clumps of hairs on the lower surface midvein. Himalayan leaves are lance shaped (lanceolate), **4–8 inches long and narrow**, with a squared-off or heart-shaped (cordate) base with **two lobes**, and are covered with dense hairs, especially on the lower surface. Giant knotweed leaf blades are egg shaped (ovate) to nearly rectangular (oblong), **6–14 inches long and ⅓ as wide**, with a cordate base and narrow tip, with long wavy hairs on the lower surface midvein. Bohemian knotweed leaves lower on the stem have a cordate base and are more squared off on upper leaves, with short hairs with a triangular base on the lower surface midvein.

Flowers: Flowers are small and found in **long, branched clusters (panicles) with no petals and 5 sepals**. Japanese knotweed clusters are up to 6 inches long and white to greenish white. Himalayan clusters are **8–14 inches long** and white to pinkish. Giant knotweed clusters are 1–4 inches long and greenish white to white. Bohemian knotweed flowers are in between Japanese and giant knotweeds.

Fruit and seeds: Dry fruits are egg shaped (ovoid), brown to black, smooth, and shiny, with persistent sepals.

Habitat: Riparian areas, wetlands, forest edges, roadsides, and disturbed areas.

Similar-looking plants: *Aruncus dioicus* (Walter) Fernald is a native herbaceous perennial with feathery plumes of small white flowers in the spring and summer. It has compound leaves.

Knotweeds

Below: Japanese knotweed (POCU6).



Andrew Gray

Knotweeds (continued)



Joseph M. DiTomaso

Himalayan knotweed (POPO5).



Joseph M. DiTomaso

Himalayan knotweed (POPO5).



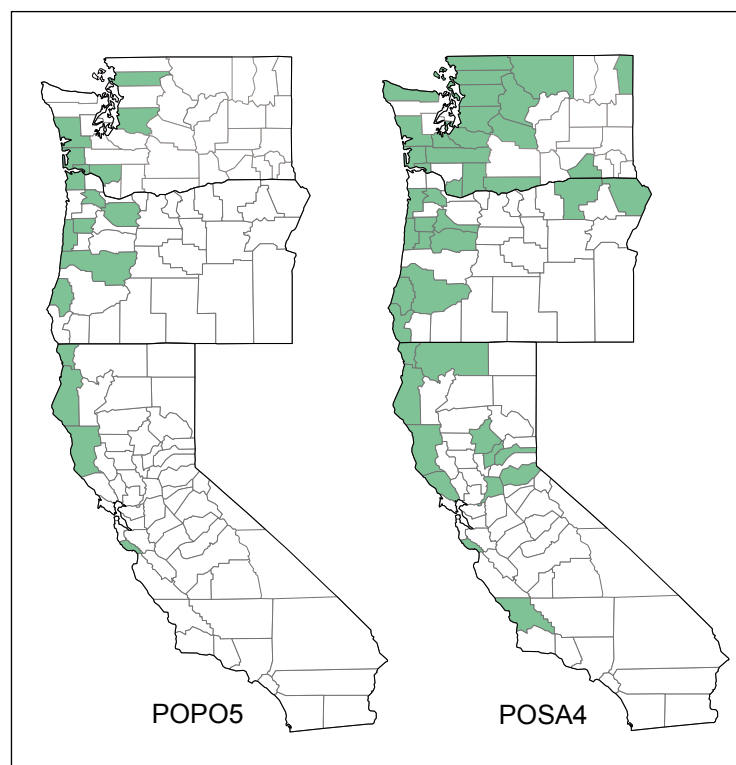
Joseph M. DiTomaso

Giant knotweed (POSA4).



Joseph M. DiTomaso

Giant knotweed (POSA4).



Composite (Asteraceae) Differentiation

The following identification tips only apply to species groups covered in this guide. Aster flowers are found in “heads,” with many tiny flowerlets grouped in a cylinder above green or brown bracts (phyllaries). The color, shape, and spininess of the bracts is often key to distinguishing species. Two types of flowerlets can be found: **disk**, which are tubular and generally in the center of the flower; and **ray**, which are generally on the outer edge of the flower with sunflower-like flat petals.

- **Knapweeds** do not have spiny leaves and have white, purple, or pink flowers that do **not** have ray flowerlets.
- **Starthistles** do not have spiny leaves and have yellow flowers that do **not** have ray flowerlets.
- **Thistles** have spiny leaves. Flowers do **not** have ray flowerlets.
- **Skeletonweed** has smooth leaves and yellow flowers that **do** have ray flowerlets, but **no** disk flowerlets.
- **Hawkweeds** have hairy leaves and yellow or orange flowers that **do** have ray flowerlets, but **no** disk flowerlets. (A native species has white flowers.)
- **Daisies** have the classic sunflower flowerhead with the small disk flowers in the center and the large-petaled ray flowers around the edge.



Spotted knapweed (CESTM).



Maltese starthistle (CEME2).



Italian thistle (CAPY2).

Carol W. Wilham



Rush skeletonweed (CHJU).

Joseph M. DiTomaso



Orange hawkweed (HIAU).

Joseph M. DiTomaso



Oxeye daisy (LEVU).

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Knapweeds

Below: Russian knapweed (ACRE3).



Fred Hrusa



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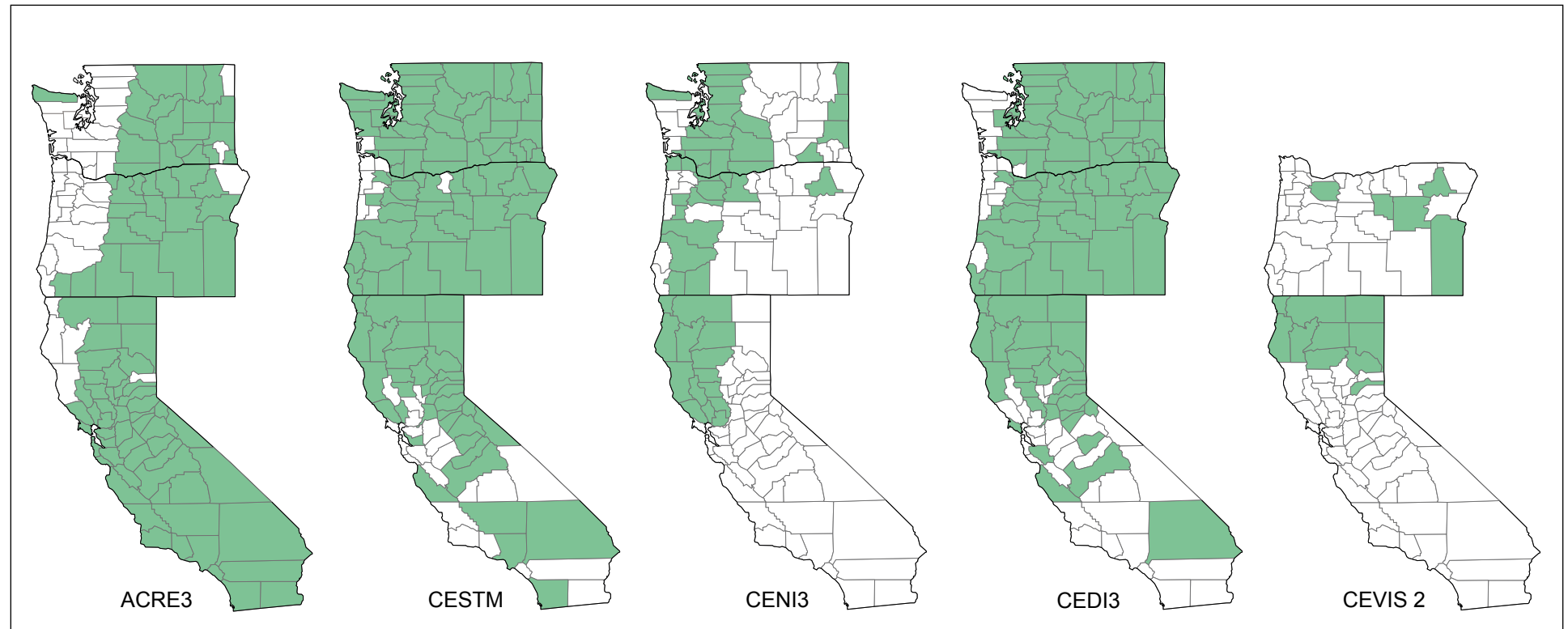
Below: Spotted knapweed (CESTM).



© Barry A. Rice/TNC



Patrick J. Alexander



1. **Russian knapweed, *Acroptilon repens* (L.) DC.** **ACRE3**
2. **Spotted knapweed, *Centaurea stoebe* L. ssp. *micranthos* (Gugler) Hayek** **CESTM (CEBI2*)**
3. **Meadow knapweed, *Centaurea nigrescens* Willd.** **CENI3 (CEDET*)**
4. **Diffuse knapweed, *Centaurea diffusa* Lam.** **CEDI3**
5. **Squarrose knapweed, *Centaurea virgata* Lam. var. *squarrosa* (Willd.) Gugler** **CEVIS2 (CETR8*)**

Synonyms: (1) Hardheads, Russian starthistle, Turkestan thistle, *C. picris* Pall ex Willd., *C. repens* L.; (2) *C. maculosa* auct. non Lam., *C. biebersteinii* DC.*; (3) *C. debeauxii* Gren. & Gord. ssp. *thuillieri* Dostal*, *C. pratensis* Thuill.; (4) white knapweed, *Acosta diffusa* (Lam.) Soják; (5) *C. triumphatii* auct. non All.*, *C. squarrosa* Willd.

*Older nomenclature used in NRCS PLANTS version from 2000.

Plant: Herbaceous annuals or perennials with **clusters of white, pink, or purple flower heads**, starting out as basal rosettes until erect branched flowering stems develop in late spring or summer, growing up to 4 feet tall. Family: Asteraceae (aster, composite).

Stems and leaves: Leaves of rosettes and lower stems are deeply lobed (pinnate). Stem leaves are alternate and do not extend down the stem as wings.

Russian: Lower leaves deeply lobed and **2–4 inches long**, upper leaves entire or toothed. Stems are leafy and mostly covered with cobwebby gray hairs.

Spotted: Multistemmed from the crown, lower leaves are lobed and 4–8 inches long, upper leaves are mostly lobed.

Meadow: Multistemmed from the crown.

Diffuse: Lower leaves are lobed and 4–8 inches long, upper leaves are smooth margined (entire).

Squarrose: Lower lobed leaves are 4–8 inches long, upper leaves are smooth margined (entire), narrow and uniform (linear) or very reduced (bractlike), mostly lacking at flowering.

(continued on page 35)

Knapweeds

Below: Spotted knapweed (CESTM).



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Knapweeds (continued)

Below: Meadow knapweed (CENI3).



Bogdan

Below: Diffuse knapweed (CEDI3).



Steve Dewey



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Below: Squarrose knapweed (CEVIS2).



Fred Hrusa



Steve Dewey, Utah State University, Bugwood.org

Flowers: The knapweeds have composite heads of small disk flowerlets and are **primarily distinguished by the color and shape of the bracts (phyllaries) on the flower heads**. Old flower stems can persist after senescence, aiding in identification.

Russian: Bracts are oval shaped, green at the base, and with papery margins.

Spotted: Bracts are green at the base and black at the tips with comblike points on the margins.

Meadow: Bracts are shiny gold to brown and fringed, without spines at the tip.

Diffuse: Bracts are pale green and straw colored with comblike points on the margins and a spine at the tip up to 0.1 inch (3 mm) long.

Squarrose: Bracts are pale green to straw colored with a spine at the tip usually curved away from the head and downward.

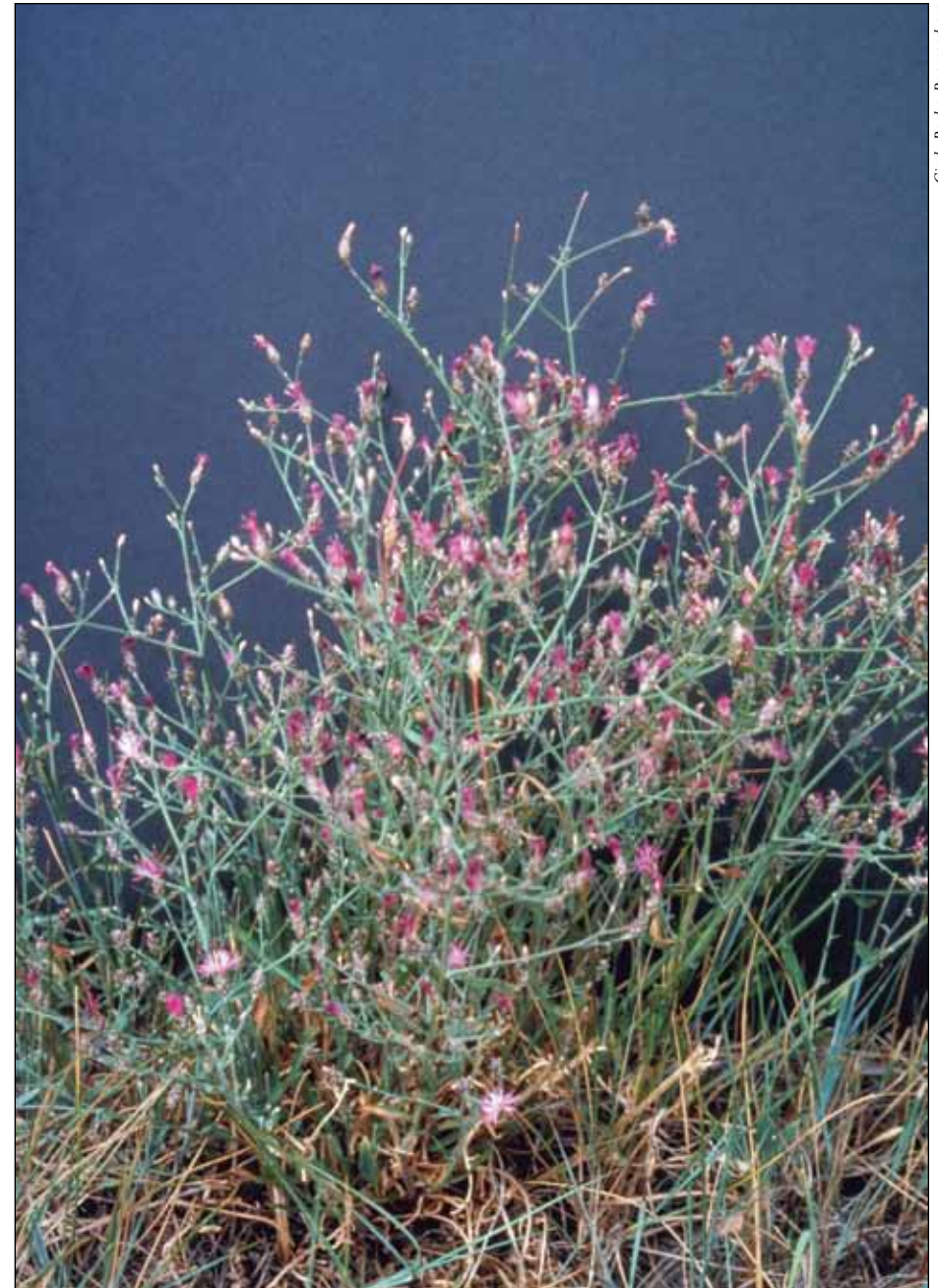
Fruit and seeds: Seeds are nearly rectangular (oblong), 0.1–0.15 inch (3–4 mm), tapered to a rounded base with a notch on one side.

Habitat: Open forests, roadsides, rangeland, grassland, and disturbed areas.

Similar-looking plants: There are several much less common knapweeds in California. Knapweeds are distinguished from thistles by not having spiny leaves, and from starthistles by not having spiny yellow flowers.

Knapweeds (continued)

Below: Squarrose knapweed (CEVIS2).



Cindy Roche, Bugwood.org

Starthistles

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Jordan Zylstra



Jordan Zylstra



Thomas Stoughton



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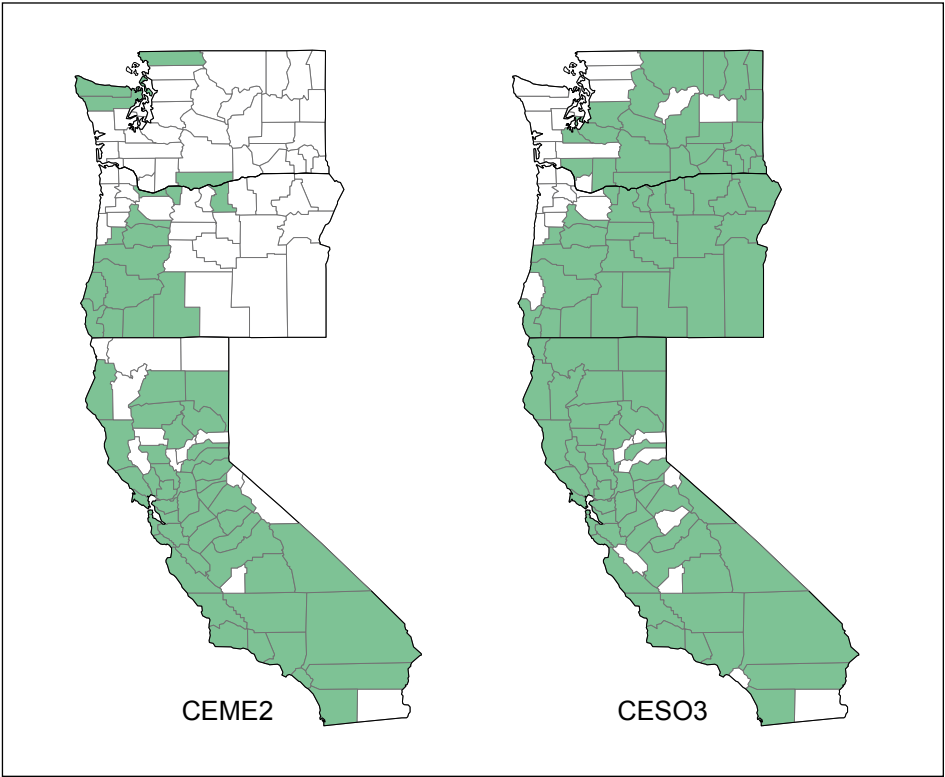
Above and right: Maltese starthistle (CEME2).

Above: Yellow starthistle (CESO3).

Below: Yellow starthistle (CESO3).



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1. **Maltese starthistle, *Centaurea melitensis* L.** CEME2
2. **Yellow starthistle, *Centaurea solstitialis* L.** CESO3

Synonyms: (1) Tocalote, Malta starthistle, Napa thistle; (2) golden starthistle, yellow cockspur, St. Barnaby's thistle, *Leucantha solstitialis* L.

Plant: Simple to bushy herbaceous winter annuals, with **spiny yellow-flowered heads** and wiry stems, growing up to 3 feet tall. Family: Asteraceae (aster, composite).

Stems and leaves: Stems are rigid, single in small plants to openly branched from near the base in large plants. Bases of leaves extend down the stems in long ridges ("wings"). Leaves are alternate, leaf margins are smooth, toothed, or wavy, and stems and leaves are covered in wooly hairs. Basal rosette leaves typically wither by flowering time.

Maltese: Leaves are often grayish green, mostly straight and narrow to nearly rectangular (oblong).

Yellow: Leaves are grayish green to bluish green, and lower stem leaves are sometimes deeply lobed.

Flowers: The starthistles have composite heads of small disk flowerlets. Heads are round to oval, spiny, and single on the ends of stems, although vigorous plants may develop flower heads in the joints where branches connect to stems. The bracts on the flower heads (phyllaries) have a long central spine and 2 or more pairs of short lateral spines. Old flower stems can persist after senescence, aiding in identification.

Maltese: Flowers from April to July. The central spine of the main bracts is $\frac{1}{4}$ – $\frac{1}{2}$ inch long, slender, and often purple to brown tinged. Lateral spines are usually in 3–4 pairs, the upper pair near the middle of the central spine. Central spine stays on after senescence.

Yellow: Flowers from June to December. The central spine of the main bracts is $\frac{1}{2}$ –1 inch long, stout, and yellowish to straw colored throughout. Lateral spines are typically in 2–3 pairs at the base of the central spine. Central spine falls off after senescence.

Fruit and seeds: Seeds are barrel-shaped, 0.1–0.15 inches, slightly flattened with a notch on one side of the base.

Habitat: Open disturbed sites, open woodland, grassland, rangeland, pastures, and roadsides.

Similar-looking plants: There are several less common starthistles in California, including purple (*Centaurea calcitrapa* L.) and Iberian (*C. iberica* Trevir. ex Spreng.), which have purple flower heads.

Starthistles

Below: Yellow starthistle (CESO3).



Thistles

Below and right: Canada thistle (CIAR4).



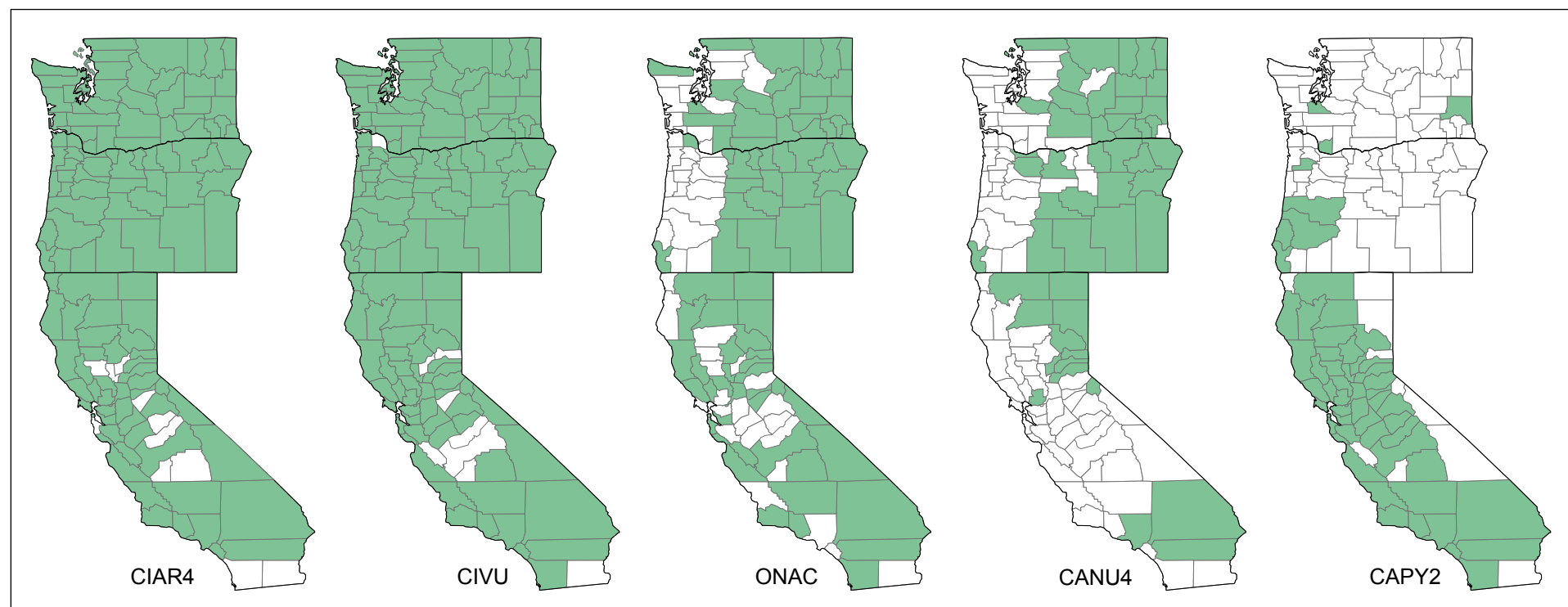
Katie Barnidi



Steve Dewey, Utah State University, Bigwood.org



Katie Barnidi



1. **Canada thistle, *Cirsium arvense* (L.) Scop. CIAR4**
2. **Bull thistle, *Cirsium vulgare* (Savi) Ten. CIVU**
3. **Scotch thistle, *Onopordum acanthium* L. ONAC**
4. **Musk thistle, *Carduus nutans* L. CANU4**
5. **Italian thistle, *Carduus pycnocephalus* L. CAPY2**

Synonyms: (1) Corn thistle, creeping thistle, *Breia arvensis* (L.) Less., *Carduus arvensis* (L.) Robson, *Cirsium incanum* (S.G. Gmel.) Fisch. ex M. Bieb.; (2) bank thistle, bird thistle, common thistle, spear thistle, *Ascalea lanceolata* (L.) Hill, *Carduus lanceolatus* L., *Carduus vulgaris* Savi; (3) cotton thistle, downy thistle, jackass thistle, winged thistle; (4) giant plumeless thistle, nodding thistle, plumeless thistle, *Carduus leiophyllus* Petrovič; (5) compact-headed thistle, shore thistle, slender thistle.

Plant: Erect herbs with **prickly foliage** and flower heads of purple, pink, or white disc flowerlets, 1–7 feet tall. For most species, leaf bases extend nearly all the way down stems between leaves (decurent) as spiny “wings.” Family: Asteraceae (aster, composite).

Stems and leaves:

Canada: Creeping roots (rhizomes) often result in dense clumps of stems. Stems are slender, mostly hairless and leafy, with **small inconspicuous “wings.”** Leaves are nearly rectangular (oblong) to lance shaped (lanceolate), 2–8 inches long, with mostly hairless upper surfaces and **margins that are mostly smooth to shallow lobed** and toothed, with main leaf prickles about 0.1–¼ inch long.

Bull: Stems are usually solitary and branched, loosely covered with white cob-webby hairs, sometimes glandular, and with conspicuous spiny “wings.” Basal rosette leaves are 4–15 inches long, moderate to deeply lobed and toothed, with main prickles mostly ¼–½ inch long. Stem leaves are smaller, more deeply lobed, and spinier than rosette leaves. **Leaves have prickly hairs above** and cottony surfaces below.

Scotch: Stems are branched, **5–10 feet tall**, with conspicuous spiny “wings” along the entire length of the stems. Basal rosette and stem leaves are alternate, 4–20 inches long, and very spiny, with toothed or shallow-lobed margins. Leaves are covered with wooly, pale grey hairs.

Musk: Stems are branched near the top, with narrow spiny “wings” along the entire stem. Leaves are lobed, hairless to sparsely hairy, with lower leaves 4–15 inches long.

Italian: Stems branched near the top, with spiny “wings” up to ¼ inch wide along most of the stem, often interrupted near the flower heads. Leaves lobed and mostly covered with woolly hairs, 4–6 inches long.

(continued on page 41)

Thistles

Below: Bull thistle (CIVU).



Sieve Dewey, Utah State University, Bugwood.org



Sieve Dewey, Utah State University, Bugwood.org



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Thistles (continued)

Below: Scotch thistle (ONAC).



Gary A. Monroe



Louis-M. Landry



Gary A. Monroe

Below: Musk thistle (CANU4).



Louis-M. Landry



© Steven J. Baskauf/TNC



Thomas Stoughton

Below: Italian thistle (CAPY2).



Carol W. Witham



Alfred Brousseau

Flowers:

Canada: Blooms June to October with clusters of small flower heads, with the green bract part of the head (involucre) $\frac{1}{4}$ –1 inch in diameter and $\frac{1}{2}$ –1 inch long, the **bracts without spines** (flimsy spines about 0.04 inch (1 mm) long can be found on close inspection). Flowerlets are pink, purple, or white, and plants are unisexual, with male flowers generally $<\frac{1}{2}$ inch long and female flowers generally $>\frac{1}{2}$ inch long.

Bull: Blooms June to October with large flower heads, with the green bract part of the head (involucre) $\frac{3}{4}$ –1 $\frac{1}{2}$ inches in diameter and 1–1 $\frac{1}{2}$ inches long, the **bracts with spines** up to $\frac{1}{4}$ inch long. Each head has at least 1 bractlike leaf just below. Flowerlets are purple (rarely white), mostly 1–1 $\frac{1}{2}$ inches long.

Scotch: Blooms July to September with large, mostly solitary flower heads, but found in clusters of 2–7 too, the **bracts with spines up to $\frac{1}{4}$ inch long and covered with short hairs** and a few cobwebby hairs. Flowerlets are white or purple, about 1 inch long.

Musk: Blooms June to September, with large heads $\frac{3}{4}$ –2 $\frac{1}{2}$ inches diameter, single on each stem and usually nodding at the end of about 1 inch long stalks. **Bracts are wide and spine tipped**; flowerlets are purple, $\frac{3}{4}$ –1 inch long.

Italian: Blooms May to July, with heads $\frac{1}{2}$ – $\frac{3}{4}$ inch diameter, stalkless or nearly so and usually with 2–5 in a clump. **Bracts are narrow and spine tipped**, with persistent patches of wooly hairs at the bases; flowerlets are pink to purple, about $\frac{1}{2}$ inch long.

Fruit and seeds: Seeds are oval to elliptic, $<\frac{1}{4}$ inch long, attached to feathery tan to white (pink to reddish for scotch) bristles that catch the wind.

Habitat: Open disturbed sites, recently logged forest, open woodland, rangeland, pastures, and roadsides; not tolerant of shade. Scotch thistle is often found in sites with high soil moisture.

Similar-looking plants: There are many native thistles that generally do not dominate sites (e.g., not weedy). Unlike other weedy composites, thistles have spiny leaves.

Thistles (continued)

Below: Italian thistle (CAPY2).



Rush skeletonweed



Fred Hrusa



Joseph M. DiTomaso



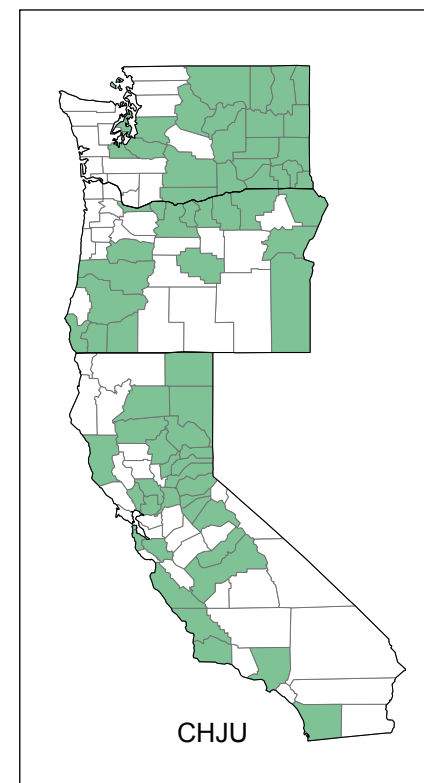
Joseph M. DiTomaso



Joseph M. DiTomaso



Fred Hrusa



Chondrilla juncea* L.*CHJU**

Synonyms: Devil's-grass, hogbite, naked weed, skeleton weed.

Plant: Herbaceous perennial with **rigid, wiry flower stems** to 3 feet tall and **milky sap**. Plants grow as basal rosettes until flowering stems develop. Family: Asteraceae (aster, composite).

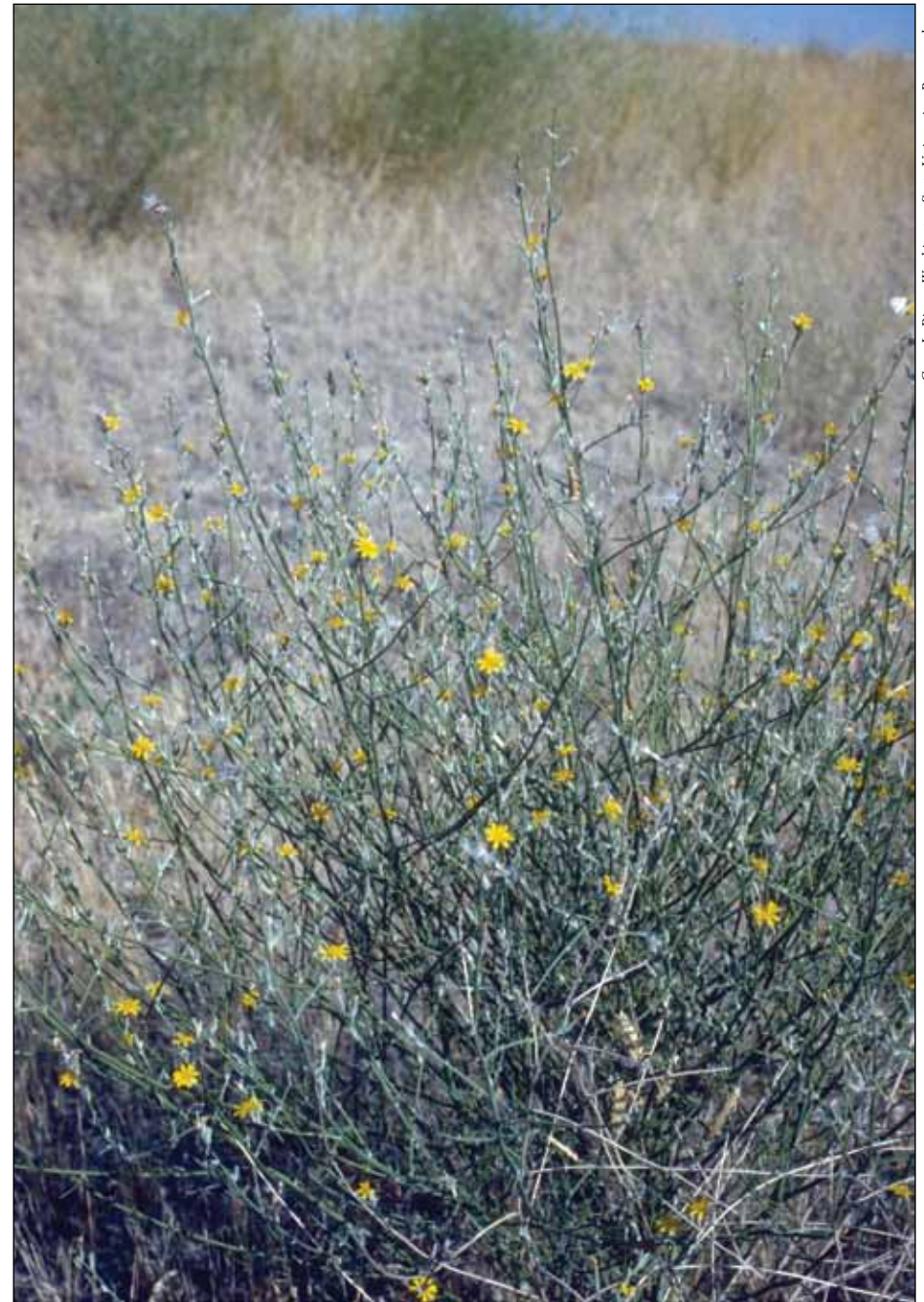
Stems and leaves: Rosette leaves are lance shaped (oblanceolate) and shallowly lobed, with lobes opposite each other and pointing backward, looking a lot like dandelion or chicory, and withering as flowering stems develop. Stems are nearly leafless and highly branched, with **the lowest 4–6 inches covered in coarse, bristly, downward-pointing hairs**. When present, stem leaves are bractlike and resemble small rosette leaves. **Rigid stems with downward-pointing hairs persist long after flowering**, with reddish leaves and clusters of old flower heads.

Flowers: Blooms May until first frost, with small ($\frac{3}{4}$ inch wide) 5–15 petaled **bright yellow flowers** in leaf joints on stems (axils) or at tips. Petals are strap-like, about $\frac{1}{2}$ inch long, with 5 lobes at the tip.

Fruit and seeds: Seeds about 0.15 inch (3 to 4 mm) long, and tapered at both ends, and attached to feathery pappus of fine white bristles.

Habitat: Disturbed roadsides, open forest, rangeland, and pasture. Grows best on dry sandy or gravelly soils.

Similar-looking plants: Rosette leaves are similar to dandelion (*Taraxacum officinale* F.H. Wigg) in having hairless leaves with paired lobes pointed backward and milky sap. Dandelion differs by having unbranched flower stems that are slightly succulent, leafless, and hollow, and generally occurring in lawns and gardens. In contrast to both, basal rosette leaves of chicory (*Cichorium intybus* L.) have lobes that point outward or forward, are not always opposite, and basal leaves usually have a few rough, coarse hairs. Skeletonweed leaves are also often reddish, unlike dandelion or chicory.

Rush skeletonweed

Hawkweeds

On this page: Orange hawkweed (HIAU).

FORBS



Michael Shephard, USDA Forest Service, Bugwood.org



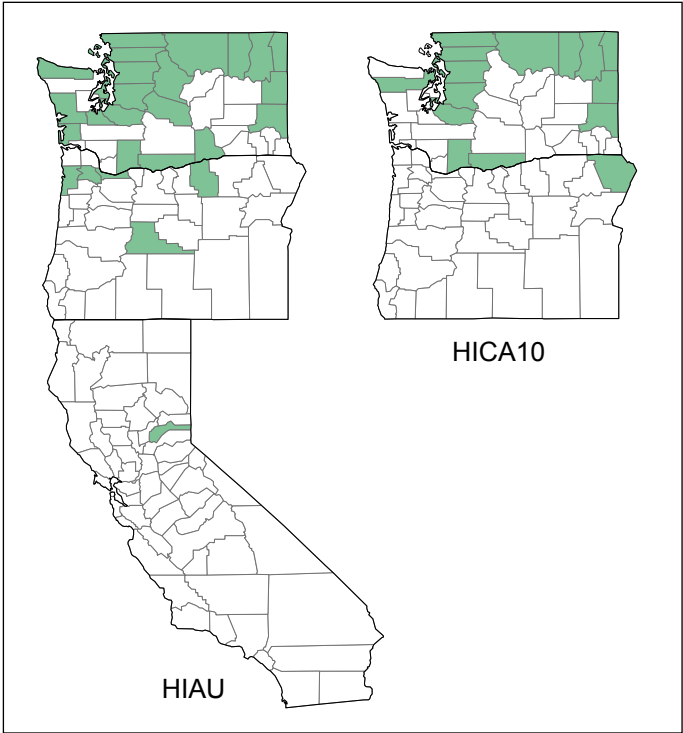
Montana Statewide Noxious Weed Awareness and Education Archive



Joseph M. DiTomaso



Joseph M. DiTomaso



1. Orange hawkweed, *Hieracium aurantiacum* L. HIAU
2. Yellow hawkweed, *Hieracium caespitosum* Dumort. HICA10

Synonyms: (1) Devil's paintbrush, orange paintbrush, red daisy, *Pilosella aurantiaca* (L.) F.W. Schullz & Sch. Bip.; (2) meadow hawkweed, *Hieracium pratense* Tausch.

Plant: Herbaceous perennial with basal rosette and flowering stems to 2 feet tall, **covered in long hairs, with orange-red dandelion-like flowers and milky sap** in all plant parts. Family: Asteraceae (aster, composite).

Stems and leaves: Basal rosette leaves are nearly rectangular-elliptical (oblong-elliptic) to lance shaped (lanceolate), 1–8 inches long and usually $> \frac{1}{2}$ inch wide, with smooth or slightly toothed margins. Upper and lower leaf surfaces are densely covered with long, soft, spreading hairs. Flowering stalks are usually leafless and covered with black, glandular hairs. Above-ground runners (stolons) spread from established plants and root at the tips, creating dense mats of plants. Stems do not persist after senescence.

Flowers: Blooms June–September with a cluster of a few to several flower heads at the end of stalks.

Orange: Heads consist of **orange-red flowers** with straplike petals with 5 lobes at the tip (ligulate) that turn purplish when dry. Flower-head bracts (phyllaries) are covered with glandular and black hairs.

Yellow: Heads consist of **yellow flowers** with straplike petals with 5 lobes at the tip (ligulate).

Fruit and seeds: Seeds are about 0.05 inch (1.5–2 mm) long, cylindrical, ribbed lengthwise, dark, and attached to feathery pappus of fine white bristles.

Habitat: Disturbed roadsides, open forest, rangeland, and pasture.

Similar-looking plants: There are several invasive nonnative hawkweeds in addition to several common natives; all of the nonnative species can spread with aboveground runners (are stoloniferous), whereas the natives do not. Common natives encountered in forested environments include the white, slender, and Scouler's hawkweeds (*Hieracium albiflorum* Hook., *H. gracile* Hook., and *H. scouleri* Hook., respectively). In addition to the lack of stolons, white hawkweed has white flowers (slender and Scouler's are yellow), slender hawkweed leaves are mostly hairless, and Scouler's hawkweed has leafy stems (Wilson 2006).

Hawkweeds



Michael Shephard, USDA Forest Service, Bugwood.org

Above: Orange hawkweed (HIAU).

Below: Yellow hawkweed (HICA10).



Richard Old, XID Services, Inc., Bugwood.org



Tom Heutte, USDA Forest Service, Bugwood.org



Joseph M. DiTomaso

Oxeye daisy



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Patrick J. Alexander



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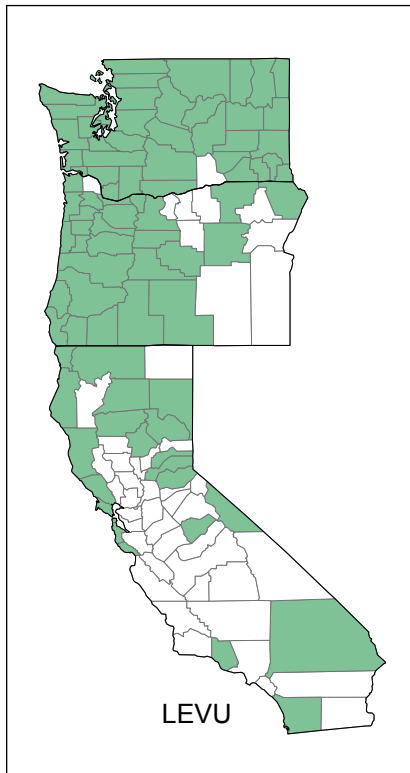
Leucanthemum vulgare* Lam.*LEVU**

Synonyms: Butter daisy, field daisy, golden flower, moon daisy, white daisy, *Chrysanthemum leucanthemum* L., *Leucanthemum leucanthemum* (L.) Rydb.

Plant: Herbaceous perennial with basal rosette leaves and flowering stem 1–3 feet tall, with **white daisy flowerheads** (small disk flowers in the center and large-petaled ray flowers around the edge) and creeping roots that result in dense clumps of plants. Family: Asteraceae (aster, composite).

Stems and leaves: Rosette leaves are hairless, lance shaped (oblanceolate) and irregularly lobed, **with lobes about half the width from edge to midvein, and coarsely toothed leaf margins**, with teeth usually rounded. Rosette and leaves on lower stems are up to 6 inches long and taper to a stalk that is about half the leaf length. Upper stem leaves are stalkless, nearly rectangular (oblong), and usually <2 inches long at mid-stem.

Flowers: Blooms May to August with **yellow centers 1–2 inches wide surrounded by 20–30 white petals ½–1 inch long (1–3 inches total width). Flowerheads occur singly on the end of a long stalk.**



Fruit and seeds: Seeds are lance shaped (lanceolate), curved, about 0.1 inch (1.5 to 2.5 mm) long, dark brown, and ribbed lengthwise, with **no feathery pappus of fine white bristles.**

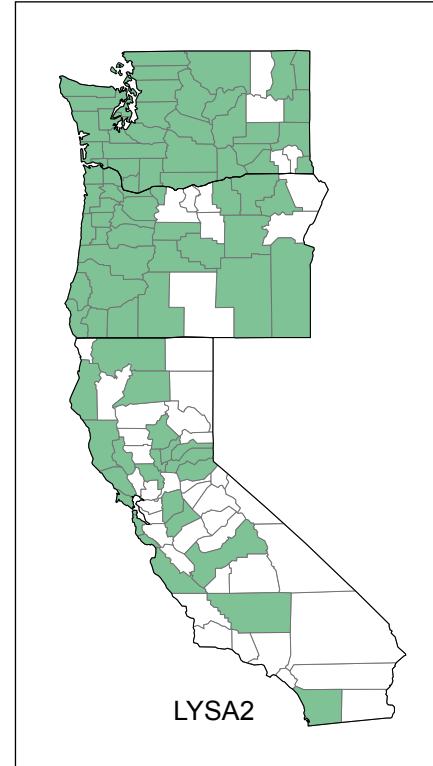
Habitat: Disturbed roadsides, pastures, grassland, coastal scrub, and open forests. Often does well on moist clay soils.

Similar-looking plants: Max chrysanthemum (*Leucanthemum maximum* (Raymond) DC.) is an uncommon nonnative perennial with larger white daisylike flower heads 3–4 inches in diameter and regularly toothed leaves.

Oxeye daisy

Steven J. Baskin

Ohio State University Weed Lab Archives, Bugwood. org



Lythrum salicaria* L.*LYSA2**

Synonyms: Bouquet-violet, purple lythrum.

Plant: Herbaceous bushy perennial with stiff four-sided stems and showy, **pinkish purple flower spikes growing 6–10 feet tall**. Family: Lythraceae.

Stems and leaves: Stems are simple or branched, **square or 5-angled in cross section**, covered in short hairs. Leaves are mostly opposite or whorled (upper sometimes alternate), lance shaped, 2–6 inches. Leaf bases are round or slightly heart shaped, with no stalk connecting to stems (sessile). Leaf margins are smooth. Senescing foliage often turns red. The dead, brown, opposite-branched stems often persist through winter and may retain a few seed capsules.

Flowers: Flowers from June to September. **Small magenta flowers with 5–7 petals** are produced on tall clusters of flower spikes (consisting of stalkless flowers on an unbranched long axis). Petals are $\frac{1}{8}$ – $\frac{1}{2}$ inch (8–14 mm) long with slightly wavy margins. Stamens number around 12.

Fruit and seeds: Dry fruit (capsules) are nearly rectangular (oblong) to egg shaped (ovoid), about 0.2 inch long, with numerous flattened seeds 0.02–0.04 inch (0.5–1 mm) long.

Habitat: Moist or marshy areas and disturbed sites. Tolerates some shade.

Similar-looking plants: California loosestrife (*Lythrum californicum* Torr. & A. Gray) is a native that grows to 2 feet tall, and has hairless stems, and petals mostly $<\frac{1}{8}$ inch (4 to 8 mm) long. Rose spirea (*Spiraea douglasii* Hook.) is a native shrub with round stems and toothed leaf tips, with tiny, light pink flowers in dense clumps at the top of the plant. Fireweed (*Chamerion angustifolium* (L.) Holub) has round stems, longer leaves with a distinct midvein, and 4-petaled flowers on stalks that split open when dry to release fluffy white seeds.

Below: Rose spirea (*Spiraea douglasii* Hook.).



Lindsay Koepke, Natural Resources Conservation Service

Below: Fireweed (*Chamerion angustifolium* (L.) Holub).



Joy Viola, Northeastern University, Bugwood.org

Purple loosestrife

Barry Rice, sarrencia.com, Bugwood.org

Dalmatian toadflax



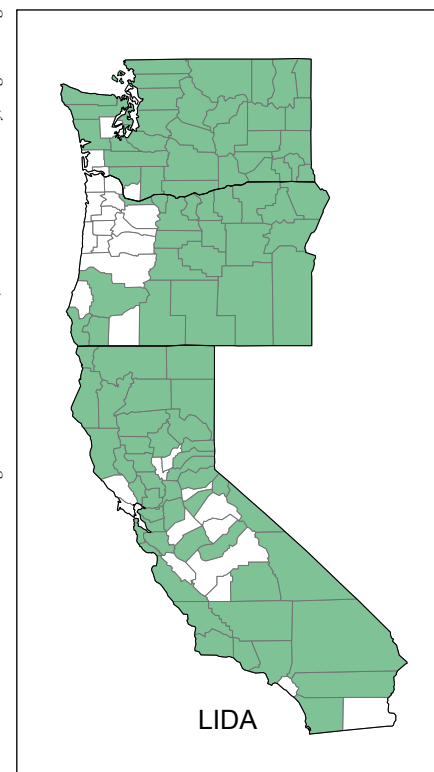
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K. George Beck & James Sebastian, Colorado State University, Bugwood. org



K. George Beck & James Sebastian, Colorado State University, Bugwood. org

***Linaria dalmatica* (L.) P. Mill** **LIDA**

Synonyms: Broad-leaved toadflax, wild snapdragon, *Linaria genistifolia* (L.) Mill. ssp. *dalmatica* (L.) Maire & Petitm.

Plant: Erect herbaceous perennial up to 4 feet tall, with **showy yellow snapdragon-like flowers** (tubular base with a flared upper lip and a bent-downward lower lip). Family: Scrophulariaceae (figwort).

Stems and leaves: Solitary stems, often branched near the top, arise from creeping rootstock. Stem and leaves have a waxy coating. **Leaves are heart shaped, clasp the stem at their bases**, and are stiff and point upwards. Leaves are usually bluish green and **covered with a whitish bloom**.

Flowers: Blooms May to September with showy, snapdragon-like bright yellow flowers that are two-lipped and 5-lobed, with a long downward-pointing spur. Throat and lower lip are hairy, with white or orange hairs. Flowers are 1–2 inches long including the spur. Flowers in bud are often purplish at the tip.

Fruit and seeds: Dry fruit (capsules) are round, 0.1–0.33 inch long and 2-chambered, opening by irregular slits at the end to release numerous black to dark brown pyramid-like tiny (0.05 inch; 1.2 mm long) seeds.

Habitat: Disturbed open sites, fields, pastures, rangeland, forest clearings, and roadsides; grows best in cool, semiarid climates and coarse soils.

Similar-looking plants: Yellow toadflax (*Linaria vulgaris* Mill.) has softer, narrow and uniform (linear) leaves and flowers <1½ inches long, and is rarely found in forest habitats. Other ornamental toadflaxes have escaped cultivation, but have red or purple flowers.

Below: Yellow toadflax.



Michael Shephard, USDA Forest Service, Bugwood.org

Dalmatian toadflax



Utah State University Archive, Utah State University, Bugwood.org

Leafy spurge



Joseph M. DiTomaso



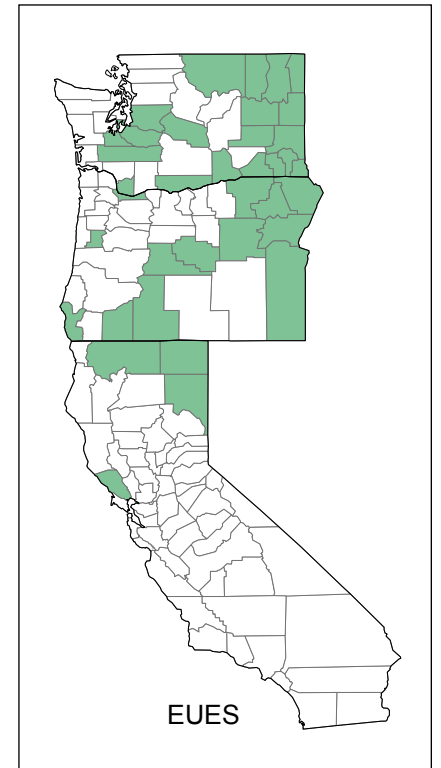
© John M. Randall/The Nature Conservancy



Steve Schoenig



Fred Hrusa



Euphorbia esula* L.*EUES**

Synonyms: Faitours-grass, wolf's milk, *Euphorbia virgata* Waldst. & Kit. non Desf., *E. discolor* Ledeb., *E. gmelinii* Steud.

Plant: Erect perennials up to 3 feet tall, with **milky white sap**, mostly alternate leaves, and **distinctive yellow green bracts at the base of the flower**. Plants form large clumps from deep, creeping roots. Family: Euphorbiaceae (spurge).

Stems and leaves: Stems are often somewhat woody at the base. Leaves lack stalks (petioles), are narrow and uniform (linear) to narrowly lance shaped (oblongate), and are 1–3 inches long and usually ½ inch wide. Leaf margins are smooth and usually hairless. Yellow-green bracts under the flowers are opposite, heart-shaped, and shorter and broader than the leaves. Shoots die back with the onset of the cold season, and leaves often turn reddish just before dropping.

Flowers: Blooms June to September. What appears to be one flower is a clump of small male and female flowers (cyathium, unique to the spurge family) above the large bracts.

Fruit and seeds: Dry fruit (capsules) are round, 0.1–0.2 inches long, and 3-chambered, with 1 seed per chamber. Seeds are oval to oblong, with a yellowish small appendage (caruncle) near the end of attachment.

Habitat: Disturbed open sites, fields, pastures, rangeland, and riparian areas.

Similar-looking plants: Yellow toadflax (*Linaria vulgaris* Mill.) looks similar in the vegetative stage prior to blooming, but the juice in the stems of all toadflaxes is clear whereas leafy spurge stems contain a milky latex when broken.

Below: Yellow toadflax.

Leafy spurge

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Steve Dewey, Utah State University, Bugwood.org

Houndstongue

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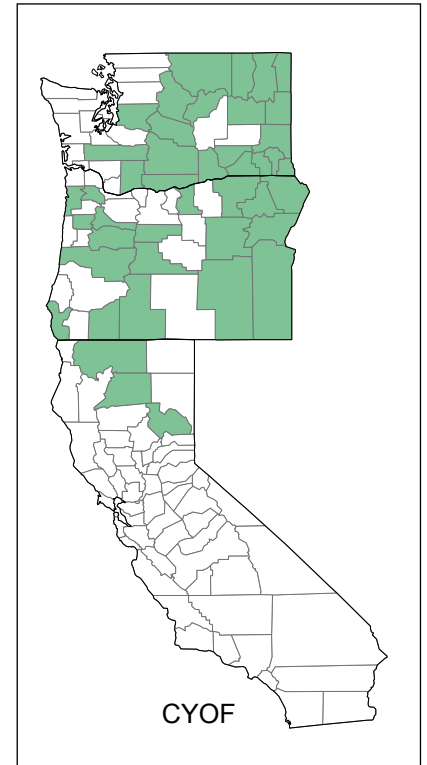
David Fenwick



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***Cynoglossum officinale* L. CYOF**

Synonyms: Beggar's-lice, dog's tongue, gypsflower, woolmat.

Plant: Herbaceous biennial, **forming rosettes the first year and flowering stalks the second year up to 4 feet tall**, with clusters of reddish purple flowers. Family: Boraginaceae (borage).

Stems and leaves: Leaves are alternate, **moderately to densely covered with long, soft, white hairs**, lance shaped (oblanceolate) to narrowly elliptic, 2–8 inches long and 1–2 inches wide (shape resembles a hound's tongue). Lower leaf bases taper to a stalk 1–5 inches long. Upper leaves are smaller than lower leaves and lack stalks (sessile). Old dead stems with fruits can persist through winter or longer.

Flowers: Blooms May to August, with dark reddish, 5-petaled, small flowers 0.15–0.33 inch long and about ¼ inch wide, in clumps at the end of drooping stems. Petals are just slightly longer than the sepals. Leaves usually slightly **overlap the base of the flower clumps**. Flower stalks (pedicels) are short, <½ inch long.

Fruit and seeds: Fruits consist of 4 oval, about ⅓-inch-long nutlets **covered with short prickles tipped with downward-pointing barbs**, on a pyramid-shaped fleshy base (receptacle) with a persistent tube from the pistil (style) attached to the center of the receptacle.

Habitat: Disturbed open sites, often moist areas, roadsides, pastures, rangeland, and open woodland and forests.

Similar-looking plants: Pacific houndstongue (*Cynoglossum grande* Douglas ex Lehm.) and western houndstongue (*C. occidentale* A. Gray) are distinguished by having leaves that do not overlap the base of the flower groups, bluish flowers with petals conspicuously longer than sepals, and nutlets with a rounded upper surface. These native perennials are also not weedy.

Below: Pacific houndstongue.



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Houndstongue



Mary Ellen (Mel) Harte, Bugwood. org

Perennial pepperweed



Steve Schoenig



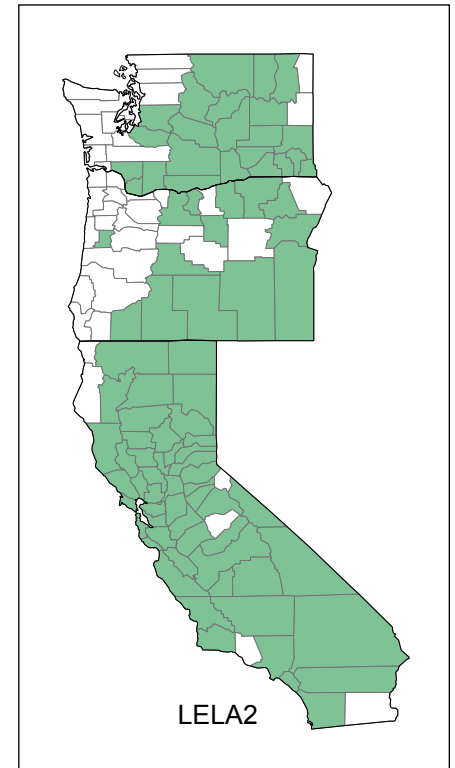
Jennifer Forman



Fried Hrusa



Bonnie Milton, National Park Service, Bugwood.org



***Lepidium latifolium* L. LELA2**

Synonyms: Broadleaf pepperweed, perennial peppergrass, tall whitetop, giant whiteweed, *Cardaria latifolia* (L.) Spach.

Plant: Herbaceous perennial 1-6 feet tall, with hairless foliage, rounded to pyramidal clumps of small white flowers. **Dense stands can form from an extensive creeping root system.** Family: Brassicaceae (mustard).

Stems and leaves: Lower stem can be almost woody, and stems are branched. Leaves are alternate, lance shaped (lanceolate) to elliptic, and green to grey green in color. Basal leaves are larger than stem leaves, to 12 inches long and 3 inches wide, on a stalk 1-6 inches long, and with sharp-toothed (serrate) margins. Stem leaves are smaller than basal leaves, stalkless or nearly so, with a tapered base and smooth or slightly serrate margins. Pale brown dead stems may persist for several years.

Flowers: Blooms May to September, with a **distinctive odor**. **Dense clumps of very small white flowers** form at the ends of stems in a pyramidal or rounded-top shape. Flowers have **4 spoon-shaped petals about 0.05 inch long**, 4 oval sepals sometimes covered with long simple hairs, and 6 stamens (4 long and 2 short).

Fruit and seeds: Dry fruit pods (silicles) are **2-chambered, round to oval, slightly flattened, without a notch at the end**, about 0.1 inch long, usually sparsely to moderately covered with long, simple hairs, and on stalks that are much longer than pods. Each chamber has 1 flattened, elliptical, slightly hairy reddish brown seed. Seeds fall from pods throughout the winter.

Habitat: Grows in roadsides, wet meadows, riparian areas, sand dunes, and irrigated pastures.

Similar-looking plants: Hoary cress (*Cardaria draba* (L.) Desv.), lens-podded whitetop (*C. chalapensis* (L.) Hand.-Maz.), hairy whitetop (*C. pubescens* (C.A. Mey.) Jarmol.), field pepperweed (*Lepidium campestre* (L.) W.T. Aiton), and clasping pepperweed (*Lepidium perfoliatum* L.) all grow only to about 20 inches tall, have stem leaves with bases that are lobed and clasp the stem, and foliage that is at least sparsely hairy. In addition, *Cardaria* usually have inflated pods greater than 0.075 inch (2 mm) long. Field and clasping pepperweeds do not grow in dense colonies.

Perennial pepperweed



Hoary cress and hairy whitetop

On this page: Hoary cress (CADR).

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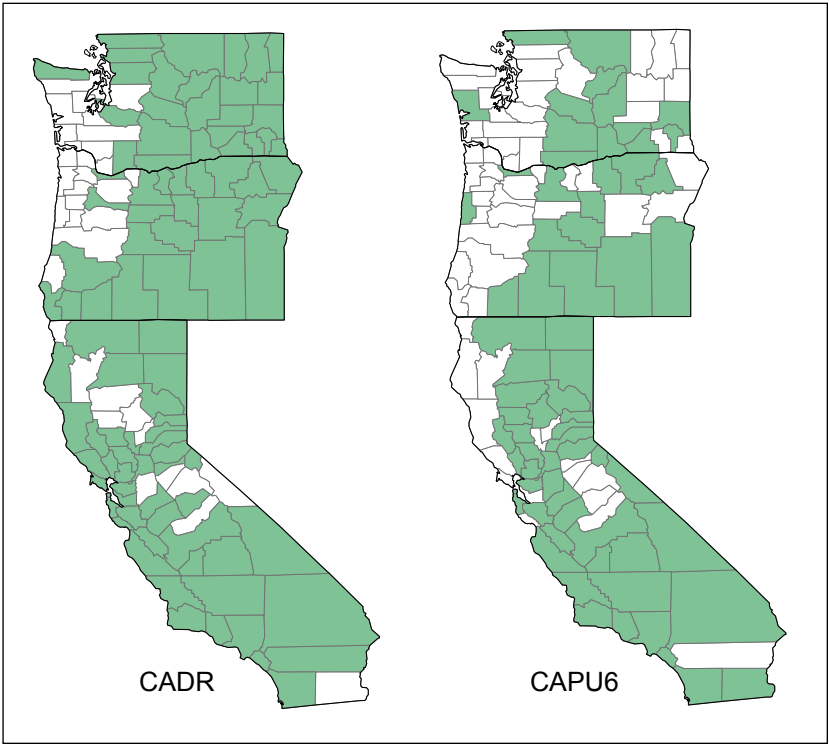
Joseph M. DiTomaso



Joseph M. DiTomaso



Joseph M. DiTomaso



1. **Hoary cress, *Cardaria draba* (L.) Desv.** CADR
 2. **Hairy whitetop, *Cardaria pubescens* (C.Meyer) Jarmol.** CAPU6

Synonyms: (1) Heart-podded hoary cress, peppergrass, pepperweed whitetop, perennial peppergrass, short whitetop, whitetop, *Lepidium draba* L.; (2) ball cress, hoary cress, *Hymenophysa pubescens* C.A. Mey.

Plant: Herbaceous perennials to 16 (20) inches tall, with **flat-topped** to rounded clumps of small white flowers, and **small disk- to heart-shaped pods**. Clonal colonies usually develop from the creeping roots. Family: Brassicaceae (mustard).

Stems and leaves: Stems are sparsely to densely covered with short, simple hairs. Leaves are alternate, grey green, and highly variable in shape, either egg shaped (obovate), lance shaped (lanceolate), nearly rectangular (oblong), or elliptic. Leaf margins can be irregularly toothed or smooth. Leaves are sparsely to densely covered with short, simple white hairs, particularly on the undersides. Basal leaves have short stalks (petioles), and upper leaves are stalkless (sessile), with lobed bases clasping the stem.

Hoary cress: Leaves are up to 3½ inches long and 2¼ inches wide, sometimes smaller, sparse to densely hairy, and leaf base lobes are often rounded pointy (acute).

Hairy whitetop: Leaves are up to 3 inches long and ¾ inch wide, usually much smaller, densely hairy, and leaf base lobes are often pointy (acute).

Flowers: Flowers are **fragrant**. Dense clumps of very small, 4-petaled, white flowers form at the ends of stems in a rounded to nearly flat-topped shape. Flowers have 6 stamens (4 long and 2 short).

Hoary cress blooms March to July and flowers have petals about 0.15 inch (3–4 mm) long and **hairless** sepals.

Hairy whitetop blooms April to October and flowers have petals about 0.1 inch (2–3.5 mm) long and sepals covered with short simple hairs.

Fruit and seeds: Dry fruit pods (silicles) are 2-chambered, variable, **inflated**, with **a persistent style about 0.05 inch (1–2 mm) long at the end**. Each chamber usually has 1–2 seeds that are oval, slightly flattened, reddish-brown, <0.1 inch (1.5–2 mm) long and about 0.05 inch (1–1.5 mm) wide.

Hoary cress pods are **upside-down heart shaped to broadly egg shaped (ovoid), constricted in the middle and often 2-lobed**, 0.1–0.15 inch (2.5–3.5 mm) long, 0.1–0.2 inch (3–5 mm) wide, and hairless.

Hairy whitetop pods are strongly inflated, spherical to egg shaped (ovoid or obovate), **not constricted in the middle nor 2-lobed**, are 0.15–0.2 inch (3–4.5 mm) long, 0.1–0.2 inch (2.5–4.5 mm) wide, and covered with short hairs.

Habitat: Grows in disturbed open sites, roadsides, ditches, pastures, and orchards.

Similar-looking plants: Unlike *Cardaria* species, perennial pepperweed (*Lepidium latifolium* L.) has hairless leaves, stalkless stem leaves that are tapered at the base, and smaller pods (about 0.1 inch or 2 mm long) that are flattened, not inflated, and that have a stigma less than 1 mm long at the end. Perennial pepperweed is also usually >20 inches tall.

Hoary cress and hairy whitetop

On this page: Hairy whitetop (CAPU6).



Joseph M. DiTomaso



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Joseph M. DiTomaso

Dyer's woad

FORBS



Luigi Rignanese



Luigi Rignanese



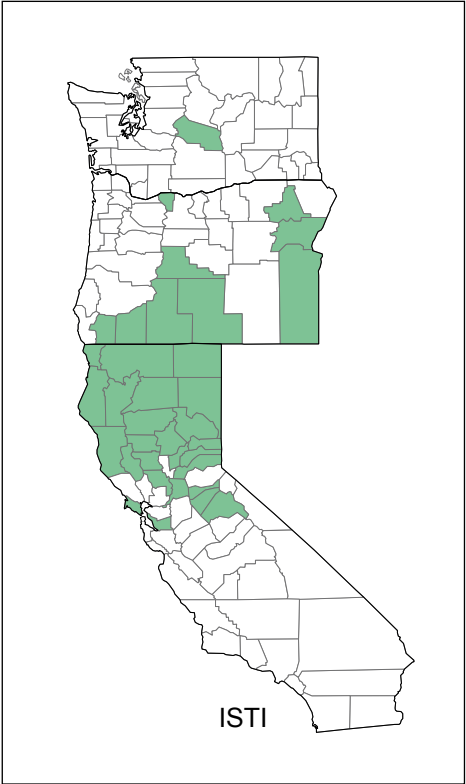
Alfred Brousseau



Antonie Van Den Bos, <http://www.botanypictures.com>



Luigi Rignanese



Isatis tinctoria L.

ISTI

Synonyms: Marlahan mustard.

Plant: Herbaceous biennial to 4 feet tall, with **bright yellow flowers and distinctive dark, hanging fruit**. Grows as basal rosette until flower stems develop. Family: Brassicaceae (mustard).

Stems and leaves: Leaves are usually bluish **with a distinct pale midvein**, and covered with a white powdery bloom (glaucous). Rosette leaves are lance shaped (oblanceolate) to elliptic, 1–7 inches long, $\frac{1}{2}$ – $1\frac{1}{2}$ inches wide, with a base that gradually tapers to a stalk $\frac{1}{2}$ to $\frac{3}{4}$ the length of the leaf. Leaf margins are slightly toothed to wavy. Upper stem leaves are alternate, stalkless, with lobed bases clasping the stem.

Flowers: Blooms April to June with **bright yellow** 4-petaled flowers in clumps that are flat topped or umbrella shaped. Petals are spoon shaped about 0.15 inch (3–4 mm) long, yellow sepals are shorter than petals and separate to the base, and there are 6 stamens (4 long and 2 short).

Fruit and seeds: Fruits are hanging, **black to purplish black, flattened, nearly rectangular (oblong) to lance shaped (oblanceolate)**, 0.3–0.7 inch (8–18 mm) long, ridged lengthwise at the center of each side, and gradually tapered to a slender stalk. Each fruit has 1 seed that is oblong, grooved into 2 unequal halves, yellowish brown, and about 0.15 inch (3–4 mm) long.

Habitat: Grows in forest, disturbed open sites, roadsides, pastures, and rangeland, often in dry rocky or sandy soils.

Similar-looking plants: Dyer's woad is distinguished from all other plants in the mustard family by its unique fruits.

Dyer's woad



Antonie Van Den Bos, <http://www.botanypictures.com>

Garlic mustard



Tom Heutte, USDA Forest Service, Bugwood.org



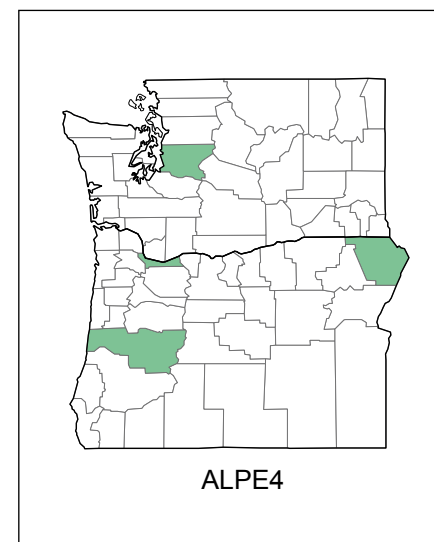
Steven J. Baskalyf



Amadej Trnkoczy



Amadej Trnkoczy



Alliaria petiolata (Bieb.) Cavara & Grande**ALPE4**

Synonyms: *Alliaria*, flixweed, *Alliaria alliaria* (L.) Britton, *A. officinalis* Andr. ex M. Bieb., *Erysimum alliaria* L., *Sisymbrium alliaria* (L.) Scop.

Plant: Herbaceous biennial with first-year basal rosette remaining green over winter, producing 1–2 stems 2–4 feet tall, with white flowers. Crushed leaves and stems **smell like garlic in early spring**. Roots typically have a characteristic s-shaped bend. Family: Brassicaceae (mustard).

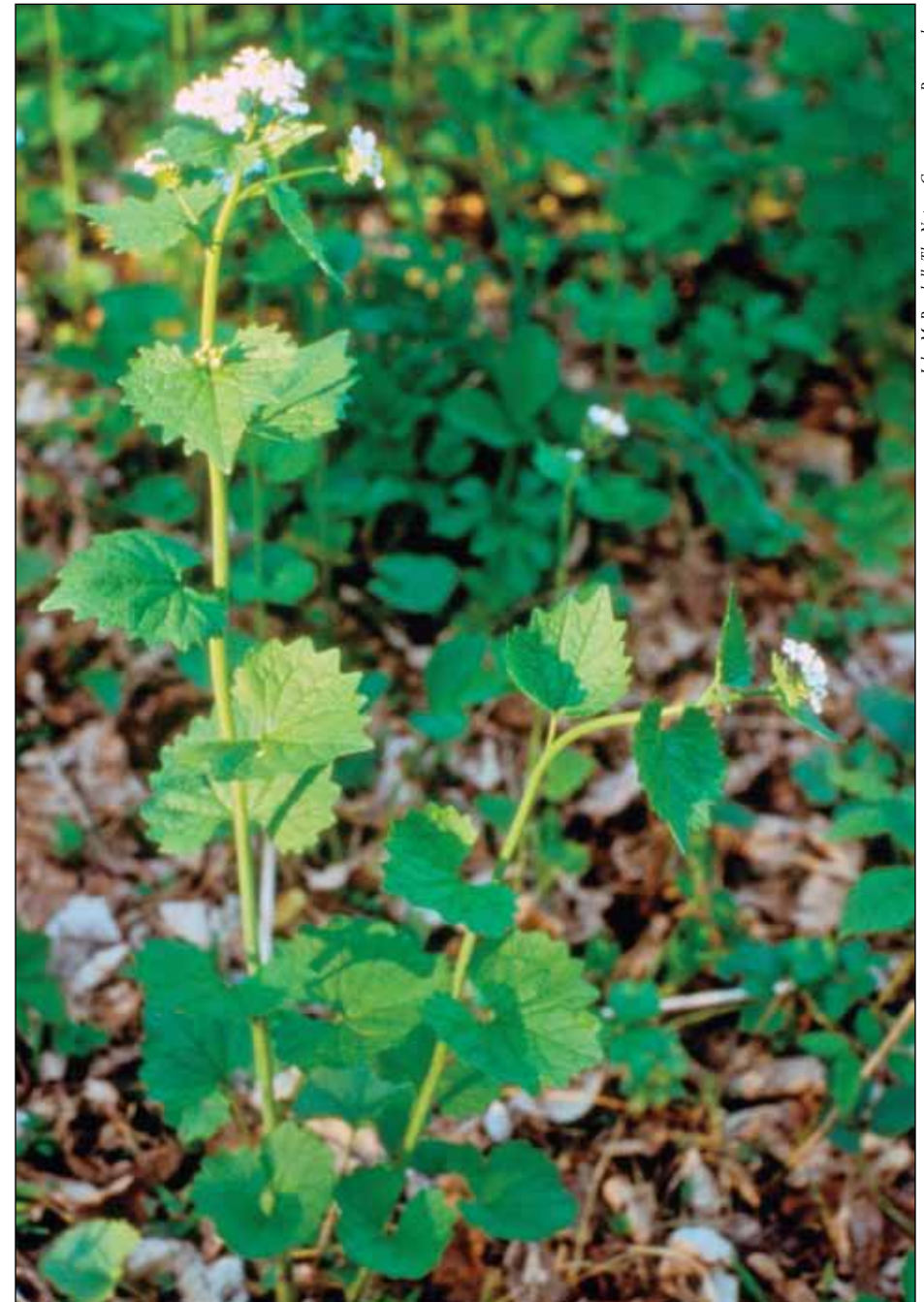
Stems and leaves: First-year rosettes consist of 3–4 dark green, kidney-shaped leaves with scalloped edge margins only 2–4 inches off the ground. Flowering stems are light green, slightly ridged, **hairless above** and hairy below. Stem leaves are alternate, stalked, triangular to heart shaped and coarsely toothed, 1–3½ inches long and 1–4 inches wide.

Flowers: Blooms April to May with **white 4-petaled flowers** in small tight clusters at the ends of the stalks.

Fruit and seeds: **Dry fruit pods are 4 sided**, erect to ascending, and thin, 1–5 inches long and 0.05 inch (1.5 mm) wide. Pods initially look like green stem branches alternately whorled along the stalk, and ripen to tan and papery, exploding to fling tiny black seeds arranged in rows.

Habitat: Grows in forest understories, forest edges, shaded roadsides, riparian areas, flood plains, and trails. Shade tolerant.

Similar-looking plants: Native saxifrage species (*Tellima grandiflora* (Pursh) Douglas ex Lindl. and *Tolmiea menziesii* (Pursh) Torr. & A. Gray can be distinguished by the long hairs on their leaf stems and their green to pink flowers.

Garlic mustard

Common St. Johnswort

FORBS



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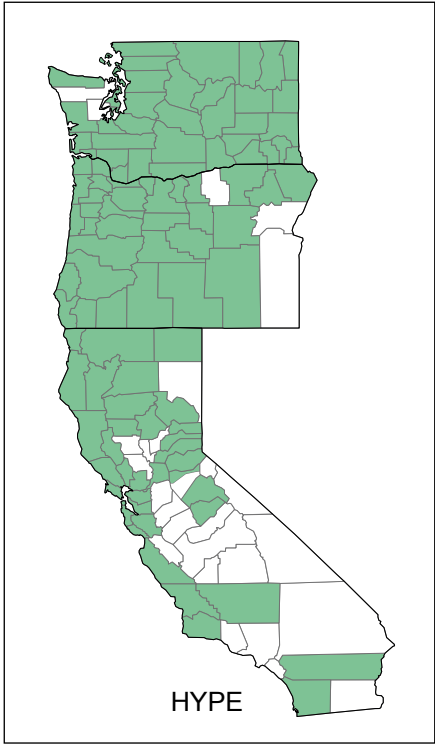
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Norman E. Rees, USDA Agricultural Research Service, Bugwood.org



Hypericum perforatum L.

HYPE

Synonyms: St. Johnswort, St. John's wort, Klamath weed.

Plant: Herbaceous perennial to 4 feet tall, with **leaves covered with transparent dots** and bright yellow 5-petaled flowers. Family: Clusiaceae (St. Johnswort).

Stems and leaves: Stems are highly branched near the top, slightly 2-ridged, hairless, often reddish and woody at the base. Leaves are opposite, stalkless, oblong, <1 inch long, covered in transparent dots visible when a leaf is held up to the light, and with rolled-under margin.

Flowers: Blooms June to September, with bright yellow flowers about $\frac{3}{4}$ inch in diameter in clumps at the tips of stems. Flowers are 5-petaled, with **scattered black dots along the margins of the petals, numerous yellow stamens**, and 3 styles. First-year plants usually do not flower.

Fruit and seeds: Dry fruit (capsules) are oval, 3-chambered, and about $\frac{1}{4}$ inch (5–10 mm) long, with 3 persistent styles and shiny black to brown densely pitted seeds.

Habitat: Disturbed roadsides, pastures, and rangeland. Tolerates light shade (e.g., open forest roads).

Similar-looking plants: Native St. Johnswort species (e.g., *H. anagalloides* Cham. & Schltld. and *H. scouleri* Hook) occur in similar habitats but have at least one of the following characteristics: prostrate habit with matted aboveground runners (stolons), narrow and uniform (linear) to lance-shaped (lanceolate) leaves with pointy (acute) tips and often folded along the midvein, or 3-lobed capsules.

Common St. Johnswort



Sulfur cinquefoil



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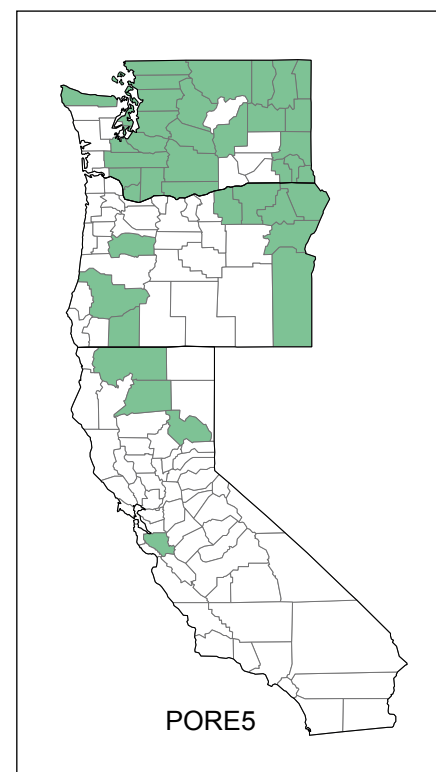
Jennifer Anderson



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Potentilla recta* L.*PORE5**

Synonyms: Roughfruit cinquefoil, sulphur five-fingers.

Plant: Herbaceous perennial 1 to 3 feet tall, with **palmate compound leaves** (i.e., originating from a central point) and pale yellow 5-petaled flowers. Family: Rosaceae (rose).

Stems and leaves: One or more leafy stems rise from the woody root crown, with stems and leaves covered with stiff hairs. Leaves are palmately compound with 5 to 7 toothed leaflets; the **narrow teeth are half or slightly less than the width from edge to midvein**. The central leaflet ranges 1–6 inches long.

Flowers: Blooms May to July with 5-petaled flowers $\frac{1}{2}$ –1 inch in diameter arranged in open, branched groups. **Petals are pale yellow and heart shaped** and sepals are about as long as the petals. Each flower has 25–30 stamens and often more than 50 pistils.

Fruit and seeds: Numerous seeds are produced per flower, egg shaped (obovate), slightly flattened, about 0.05 inch (1–1.5 mm) long, dark brown with pale netlike reticulate veins.

Habitat: Open forests, roadsides, pastures, and rangeland.

Similar-looking plants: There are numerous native nonweedy cinquefoils in our region of which slender cinquefoil (*Potentilla gracilis* Douglas ex Hook.) is most similar. However, unlike sulfur cinquefoil, slender cinquefoil rarely forms dense patches and has white woolly hair on the undersides of the leaves. Rough cinquefoil (*Potentilla norvegica* L.) is another nonnative cinquefoil often associated with cultivated land that has compound leaves with 3 leaflets.

Below: Slender cinquefoil (*Potentilla gracilis* Douglas ex Hook.).



Mary Ellen (Mc) Harie, Bugwood.org

Sulfur cinquefoil

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Herb-robert



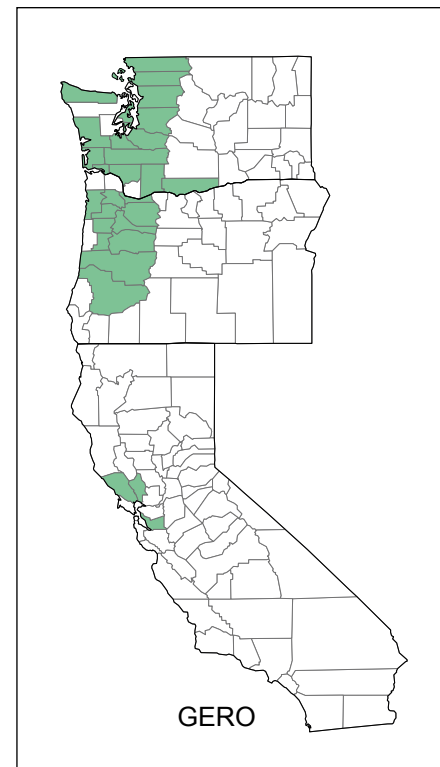
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Katie Berndt



Geranium robertianum* L.*GERO****Herb-robert**

Synonyms: Robert's geranium.

Plant: Herbaceous annual or biennial to 2 feet tall, with dissected leaves, **sticky, often red stems, small pink 5-petaled flowers, and a strong odor when crushed.** Family: Geraniaceae (geranium).

Stems and leaves: Stems are often dark red and covered in white hairs that are glandular and feel sticky or oily. Leaves are dissected and appear to be compound with 3-5 lobed leaflets, and are light or dark green in color, turning reddish in the fall. Stems and leaves have a strong odor when crushed.

Flowers: Blooms April to September with 5-petaled flowers in all shades of pink to purple (sometimes white), the petals are about ½ long (7–14 mm) and often have dark stripes, and the pollen is orange.

Fruit and seeds: Fruits are hairy and often have a long, straight, pointed beak.

Habitat: Forests, woodlands, roadsides, and riparian areas. Prefers shady areas.

Similar-looking plants: Shining geranium (*Geranium lucidum* L.) is a nonnative annual currently found in the northern Willamette Valley, Skagit County in Washington, and the San Francisco Bay area. Leaves differ from herb-robert in being shiny and lobed, not dissected. Dovefoot geranium (*G. molle* L.) is another nonnative in our region with simple lobed leaves with rounded teeth. Bleeding heart (*Dicentra formosa* (Haw.) Walp.) is a native with highly dissected, soft, hairless leaves that end in narrow oblong segments.



Below: Shining geranium (*Geranium lucidum* L.).



Below: Dovefoot geranium (*Geranium molle* L.).



Policeman's helmet



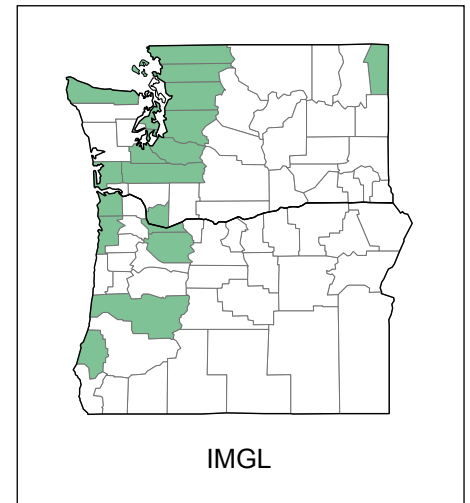
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Amadej Trnkoczy



John Wright



Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

***Impatiens glandulifera* Royle IMGL**

Synonyms: Ornamental jewelweed, *Impatiens roylei* Walp.

Plant: Herbaceous annual that grows 3 to 10 feet tall, with simple leaves, and **white to pink or purple flowers shaped like a British policeman's helmet** (fused tube with showy upper and lower lips at the opening). Family: Balsaminaceae (balsam).

Stems and leaves: Stems are straight and easily broken, with a purplish tinge. Stems and leaves are smooth and hairless. Leaves are opposite or whorled, and oblong to egg shaped, with serrated edges.

Flowers: Blooms in midsummer with white to pink or purple flowers with 5 petals, 5 fused stamens, and 2 sepals, and shaped like a British policeman's helmet.

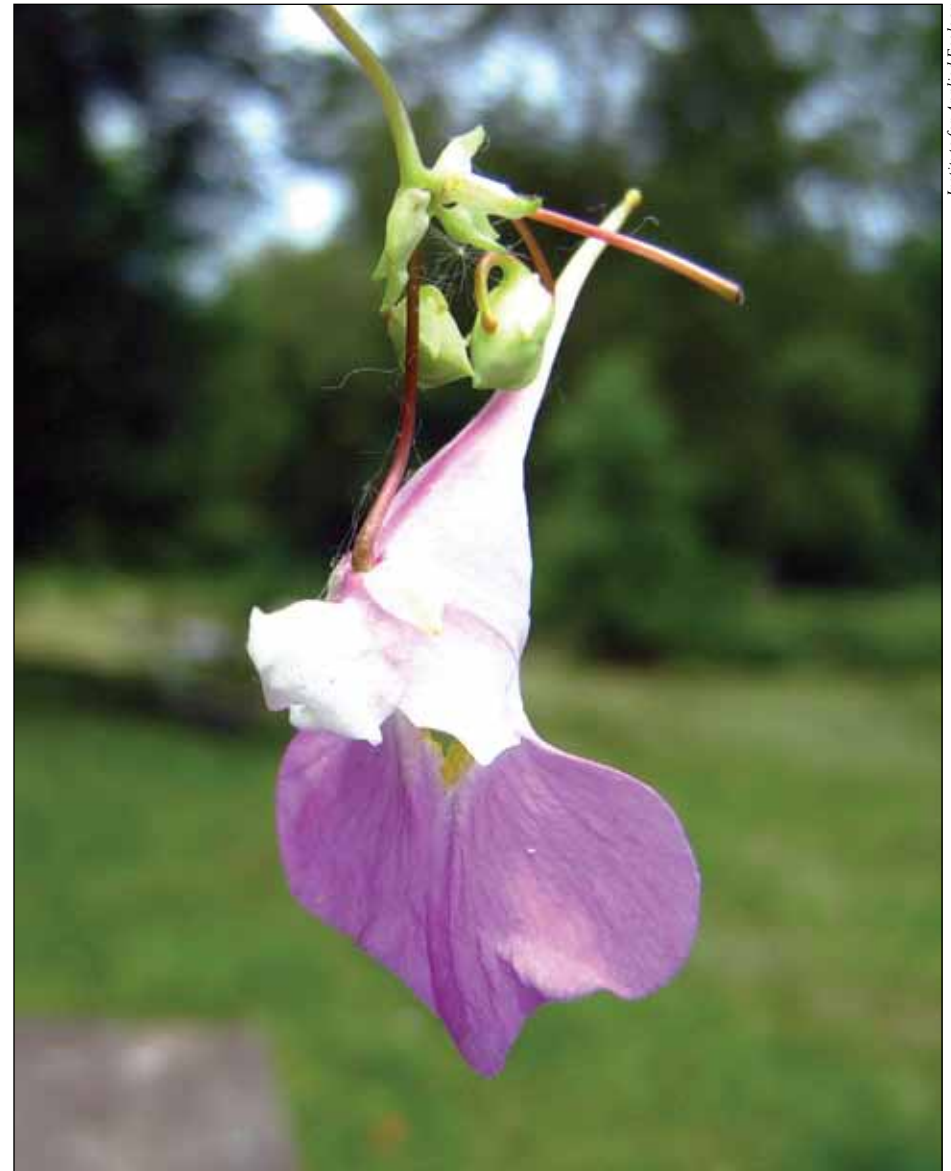
Fruit and seeds: (No information).

Habitat: Moist forests, roadsides, and riparian areas. Tolerates shade.



Jan Samanek, State Phytosanitary Administration, Bugwood.org

Policeman's helmet



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Medusahead



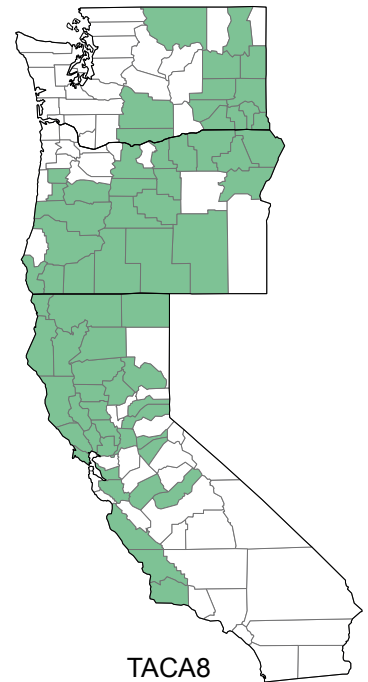
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Fred Hrusa



Fred Hrusa



***Taeniatherum caput-medusae* (L.) Nevski TACA8**

Synonyms: Medusahead rye, *Elymus caput-medusae* L., *Taeniatherum asperum* auct. non (Simonkai) Nevski, *Taeniatherum crinitum* (Schreb.) Nevski var. *caput-medusae* (L.) Wipff, many others (taxonomy unsettled).

Plant: Annual grass 6 to 24 inches tall forming dense stands, with **spikes of long-awned spikelets** that often droop over horizontally when mature. Matures later than most other annual grasses and appears yellowish-green from a distance after other annual grasses have turned brown. Family: Poaceae (grass).

Stems and leaves: Stems are slender and round in cross section. Ligules are membranous (not fringed in hairs) and 0.08–0.2 inch (0.3–0.8 mm) long, auricles are present, and sheaths are open. Leaves are about 1/16 inch (1–3 mm) wide, 4–12 inches long, smooth to softly hairy, and somewhat rolled.

Flowers and fruit: Spikelets grouped in a densely crowded bristly spike 1–4 inches long, with bristles (awns) $>\frac{3}{4}$ inch long. Spikelets are $\frac{3}{4}$ –1½ inches long and flattened laterally. Old spikes remain intact long after the plant turns brown.

Habitat: Disturbed sites, rangeland, woodland, and chaparral.

Similar-looking plants: *Hordeum* and *Elymus* species are distinguished from medusahead by their 5-veined lemmas (medusahead lemmas are 3-veined) and main spike axes that typically break apart in fruit.



Fred Hrusa

Medusahead



John M. Randall, The Nature Conservancy, Bugwood.org

Cheatgrass



Joseph M. DiTomaso



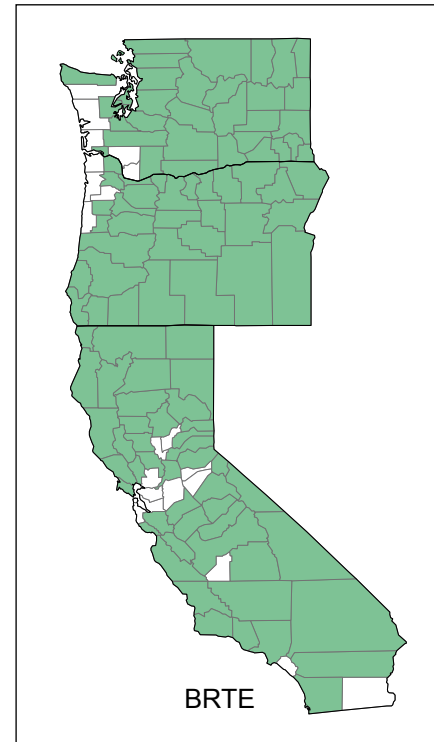
K. George Beck & James Sebastian, Colorado State University, Bugwood.org



Joseph M. DiTomaso



Joseph M. DiTomaso



Bromus tectorum* L.*BRTE**

Synonyms: Downy brome, chess, cheat, drooping brome, junegrass, Mormon oats, *Schedonorus tectorum* (L.) Fries, *Anisantha tectorum* (L.) Nevski, *Zerna tectorum* (L.) Panz., and others.

Plant: Annual grass 5–16 inches tall, maturing earlier than most other plants in spring, with **sharp florets** and **straight awns**. Family: Poaceae (grass).

Stems and leaves: Stems are round in cross section. Sheaths are closed (fused) for at least one-half the length and often hairy with a few long hairs, ligules are membranous and about 1/16 inch (1.5–3 mm) long with minutely jagged tips, and auricles are absent. Leaves are about ¼ inch (1–6 mm) wide and hairy with a few long hairs at the base. Plants fade to a dingy tan after death and may be identified by their drooping habit and may remain intact for up to 3 years in desert areas.

Flowers and fruit: Spikelets grouped in a **loose, open clump often drooping to one side** 3–9 inches long, with the longest flower branches having 4–8 spikelets. Spikelets are slightly flattened. The bases of the florets are sharp, and lemmas are awned from the tip between 2 teeth, with the awns ⅓–¾ inch (8–18 mm) long.

Habitat: Open disturbed areas, roadsides, woodland, open forest, and rangeland.

Similar-looking plants: Other annual *Bromus* species with sharp floret bases and straight awns including ripgut brome (*B. diandrus* Roth), red brome (*B. rubens* L.), and poverty brome (*B. sterilis* L.); ripgut is the only one that may have most or all flower branches that droop, but the awns are much longer than cheatgrass, being >1 inch long.

Cheatgrass

K. George Beck & James Sebastian, Colorado State University, Bugwood.org

Slender false brome



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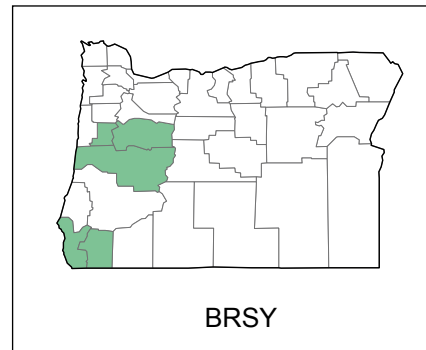
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BRSY

Brachypodium sylvaticum (Huds.) Beauv.

BRSY

Synonyms: Perennial false brome, *Festuca sylvatica* Huds.

Plant: Perennial bunchgrass growing in clumps 20 to 28 inches tall, with **broad yellow green leaves with hairs along the edges**. Family: Poaceae (grass).

Stems and leaves: Sheaths are open to the base, ligules are membranous and ciliate-hairy at the tip, and auricles are absent. Leaves are broad, flat, yellow green with hairs along the edges.

Flowers and fruit: Spikelets are not stalked, and spikes droop conspicuously.

Habitat: Roadsides, forest, and rangeland. Grows in deeply shaded and full light environments.

Similar-looking plants: Columbia brome (*Bromus vulgaris* (Hook.) Shear) is very similar but has spikelets that are stalked.



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Slender false brome



Robert Soreng, USDA-NRCS PLANTS Database

Jubata grass



Joseph M. DiTomaso



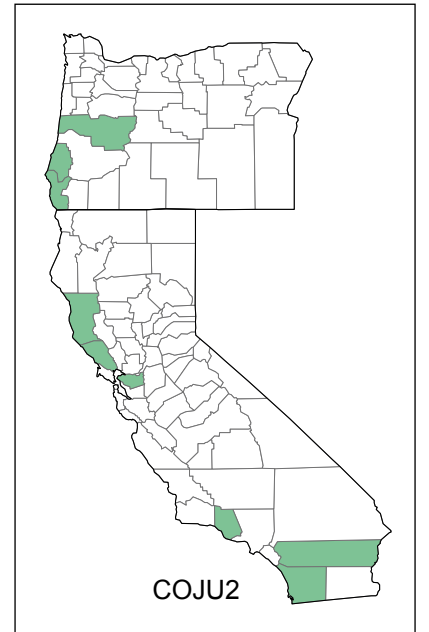
Joseph M. DiTomaso



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Joseph M. DiTomaso



Cortaderia jubata* (Lem.) Stapf*COJU2**

Synonyms: Andean pampasgrass, cortaderia, selloana pampas grass, *Cortaderia atacamensis* (Phil.) Pilg., *Gynerium jubatum*, *Gynerium quila* Nees var. *pygmaeum* Nees.

Plant: Large, densely tufted perennials 6–20 feet tall with long basal leaves and tall, showy, plumelike flowers. Family: Poaceae (grass).

Stems and leaves: Plants grow in large clumps with leaves $> \frac{1}{2}$ inch wide, with **sharp serrated margins**. Sheaths are open hairy, ligules are a ring of dense hairs about 0.1 inch (2–3 mm) long, and auricles are absent.

Flowers and fruit: Blooms late summer to early fall, in large plumes 1–3 feet long, purple tinged to tan colored. Plumes from the previous year remain standing for about a year. Flower plumes are $\frac{1}{4}$ to $\frac{1}{5}$ the length of the plant and elevated above the leaves.

Habitat: Disturbed areas, dunes, roadsides, road cuts, and logged forests, particularly in areas with summer fog or ocean influence.

Similar-looking plants: Pampas grass (*Cortaderia selloana* (Schult. & Schult. f.) Asch. & Graebn.) is a nonnative that grows in similar environments, but unlike jubata grass the sheaths are hairless or sparsely hairy and the flower plumes are $\frac{1}{2}$ – $\frac{1}{4}$ the length of the plant.

Below: Pampas grass (*Cortaderia selloana* (Schult. & Schult. f.) Asch. & Graebn.)



Joy Viola, Northeastern University, Bugwood.org

Jubata grass

John M. Randall, The Nature Conservancy, Bugwood.org

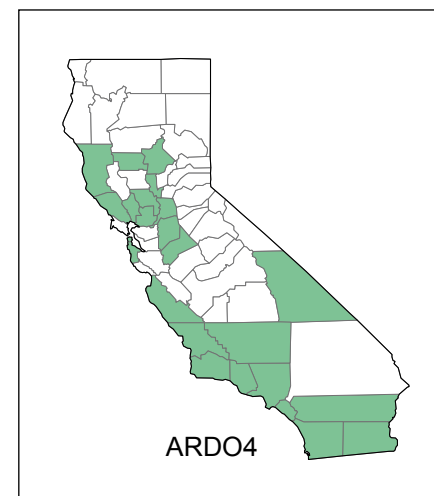
Giant reed



David Graber



BonTerra Consulting



Luigi Rignamese



Luigi Rignamese



Larry Altam, USDA-NRCS PLANTS Database

Arundo donax* L.*ARDO4**

Synonyms: Bamboo reed, elephant grass, reed cane, reed grass, Spanish reed, giant cane, wild cane, *Arundo glauca* M. Bieb., *Arundo latifolia* Salisb., *Arundo sativa* Lam., *Donax arundinaceus* P. Beauv., *Arundo versicolor* Mill.

Plant: Large bamboolike plant in large clumps or hedges, 6–25 feet tall, with thick, well-developed creeping roots (rhizomes). Family: Poaceae (grass).

Stems and leaves: Canes are semiwoody, $\frac{1}{2}$ – $1\frac{1}{2}$ inches thick, hollow between nodes, and mostly hairless. Canes erect, semiwoody, inflexible, about $\frac{1}{2}$ – $1\frac{1}{2}$ inch thick, with long, hollow internodes. Sheaths are open, but tightly clasp the stem, ligules are membranous and fringed but only about 0.05 inch (1–2 mm) long, and the base of the leaves and auricles are yellowish with long hairs and **clasp the stem**. Leaves are flat, 1–3 feet long and 1–3 inches wide, with margins that are rough to the touch (scabrous), and grow alternately and on opposite sides of the stem in the same plane. Dead canes lose their leaves and become grayish and brittle.

Flowers and fruit: Blooms early spring to late fall in dense plumes 1–2 feet long, either open with ascending branches or closed with erect branches, and silvery cream colored to purplish or brown.

Habitat: Riparian areas, flood plains, and wet dunes.

Similar-looking plants: Common reed (*Phragmites australis* (Cav.) Trin. ex Steud.) is a smaller, widespread native that grows up to 13 feet tall. Unlike giant reed, it has blade bases and auricles that narrow gradually, stems $<\frac{1}{2}$ inch diameter, and ligules that consist of a membrane less than 0.05 inch (1 mm) long with hairs about 0.05 inch (1 mm) long.

Giant reed

Amadej Trnkoczy

Bulbous bluegrass



Joseph M. DiTomaso



Joseph M. DiTomaso



Joseph M. DiTomaso



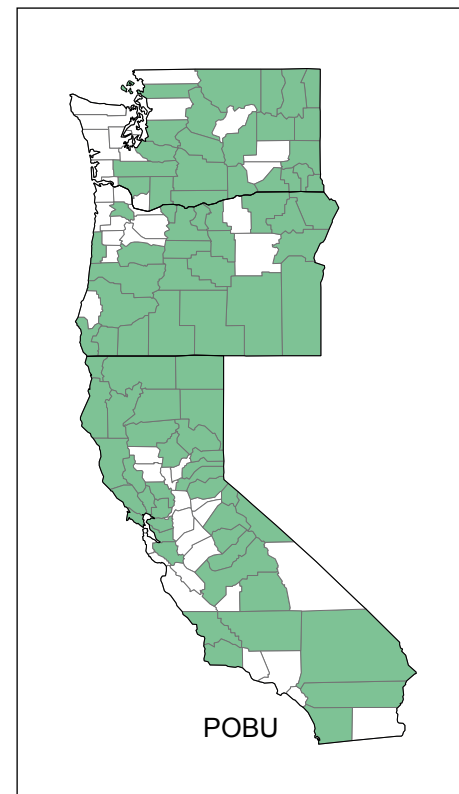
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Joseph M. DiTomaso



Poa bulbosa L.

POBU

Synonyms: Winter bluegrass.

Plant: Cool season perennial grass in dense clumps <2 feet tall, with **bulbous-based stems** and dense flower clusters of **leafy bulblets**. Clumps enlarge around the edges from new bulbous-based stems. Family: Poaceae (grass).

Stems and leaves: Stems are thickened and **bulblike at the base**, and sometimes purplish near the base. Sheaths are open almost to the base and hairless, ligules are membranous and about 0.1 inch (2–4 mm) long, and auricles are not present. Leaves are ridged in the center, flat, and thin, usually <4 inches long and about 0.05 inch (1–2.5 mm) wide.

Flowers and fruit: Blooms in spring to early summer in 1–4 inches branched flower clusters, **with spikelet flowers often developing into leafy bulblets**. Spikelets usually have 4-6 bulblets that are about 0.1 inch (2 mm) long and dark purple.

Habitat: Woodlands, roadsides, pastures, and grassland.

Similar-looking plants: Not readily confused with other weedy grasses.



Richard Old. XTD Services, Inc., Bugwood.org

Bulbous bluegrass



Sheri Hagwood, USDA-NRCS PLANTS Database

Glossary

This glossary is composed of selected terms and drawings reproduced with permission from DiTomaso and Healy (2007). Figures 1 through 12 illustrate the features used to distinguish species.

acuminate—Leaf tip that tapers to a point; the sides are concave and tip is extended (fig. 2).

acute—Leaf tip that tapers to a point but is less tapering than acuminate; the angle of the sides is less than 90° (fig. 2).

alternate—Attachment of leaves to the stem in which one leaf is attached to each stem node (fig. 6).

annual—Plant whose life cycle is completed within a single year.

auricle—An ear-shaped appendage usually associated with the collar region of grasses (fig. 11) or the sheath of some submerged aquatic plants.

awn—A slender bristle attached to a tissue; usually refers to grass florets, primarily lemmas and glumes.

axil—The junction between the stem and the upper leaf base.

biennial—Herbaceous plant whose life cycle is completed within 2 years. In the first year, plants germinate and typically exist as basal rosettes. In the second year, plants bolt, flower, and die.

bipinnate—Twice pinnate; leaves that are branched twice with leaflets on the second branch (fig. 5).

bract—A very reduced leaflike structure, usually associated with the base of a flower or inflorescence.

bulbil (also called bulbel)—Small daughter bulbs that arise from the primary bulb.

calyx—Sepals collectively.

capsule—A dry fruit structure that opens by means of slits, lids, pores, or teeth to release its seeds.

caruncle—A spongy outgrowth of the seed coat. Can be a source of food for insects.

composite—A member of the Asteraceae (sunflower family); flower structure arranged in dense heads (fig. 10).

compound leaf—A leaf with two or more leaflets (fig. 5).

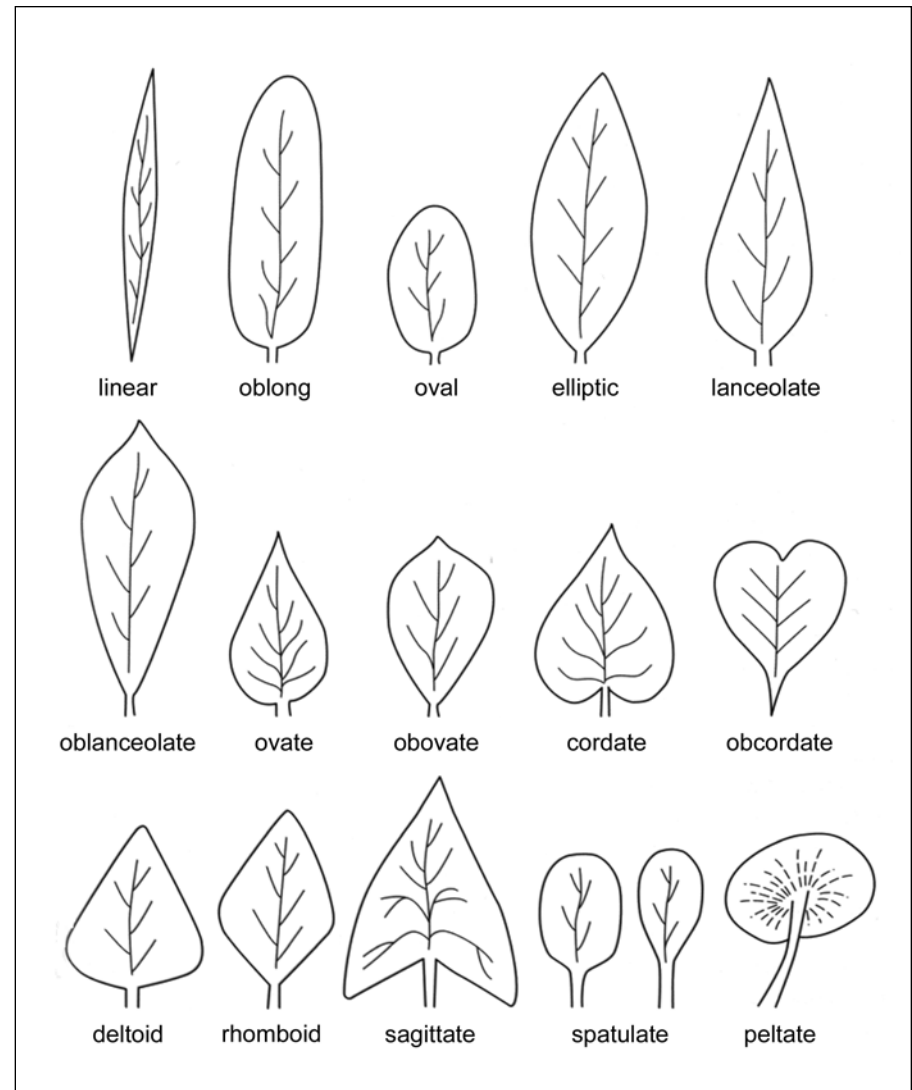


Figure 1—Leaf shapes.

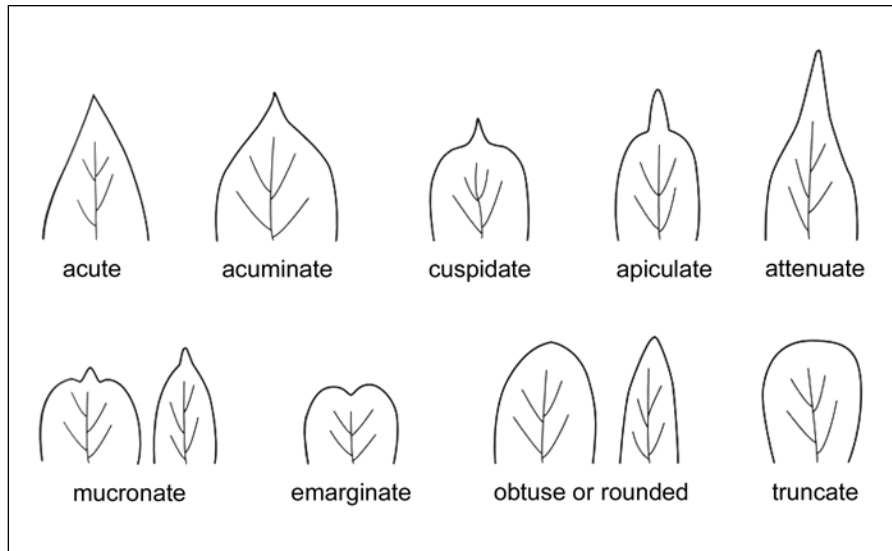


Figure 2—Leaf tips.

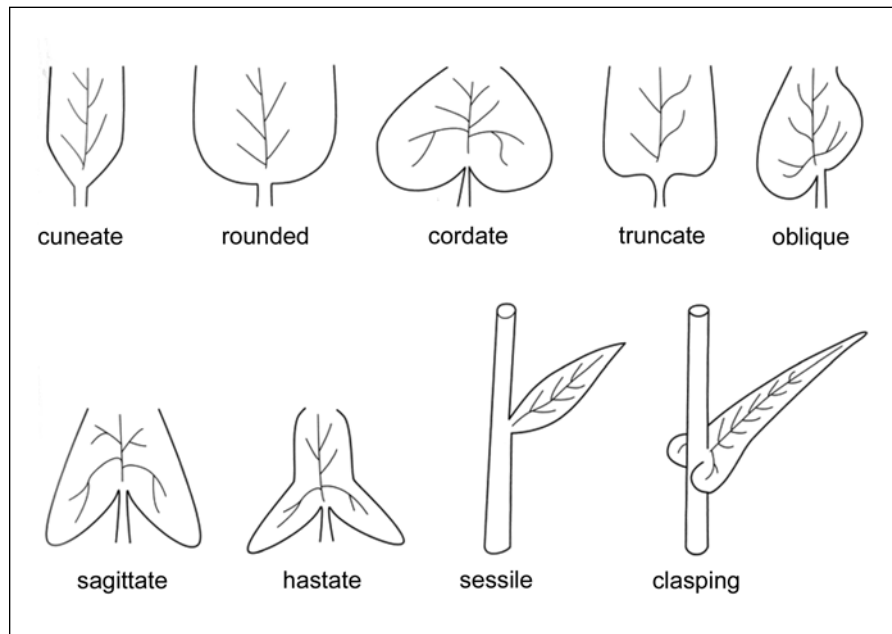


Figure 3—Leaf bases.

corolla—All the petals of a flower, collectively.

corymb—A flat-topped or rounded inflorescence that is unbranched or branched (compound corymb) with pedicels of varying lengths (fig. 8).

crenate—Leaf margin with shallow, rounded teeth (fig. 4).

cyathium—Inflorescence in members of the genus *Euphorbia*. Characterized by a pistillate flower and several staminate flowers within a cuplike involucre. The entire structure mimics a perfect flower.

cyme—A flat-topped or convex inflorescence type in which the flowers bloom from the center outward (fig. 8).

deciduous—Falling off, usually in reference to flower parts or leaves that fall off in the fall.

decurrent—Base of the leaf that extends down and is fused to the stem.

dentate—With spreading, pointed teeth.

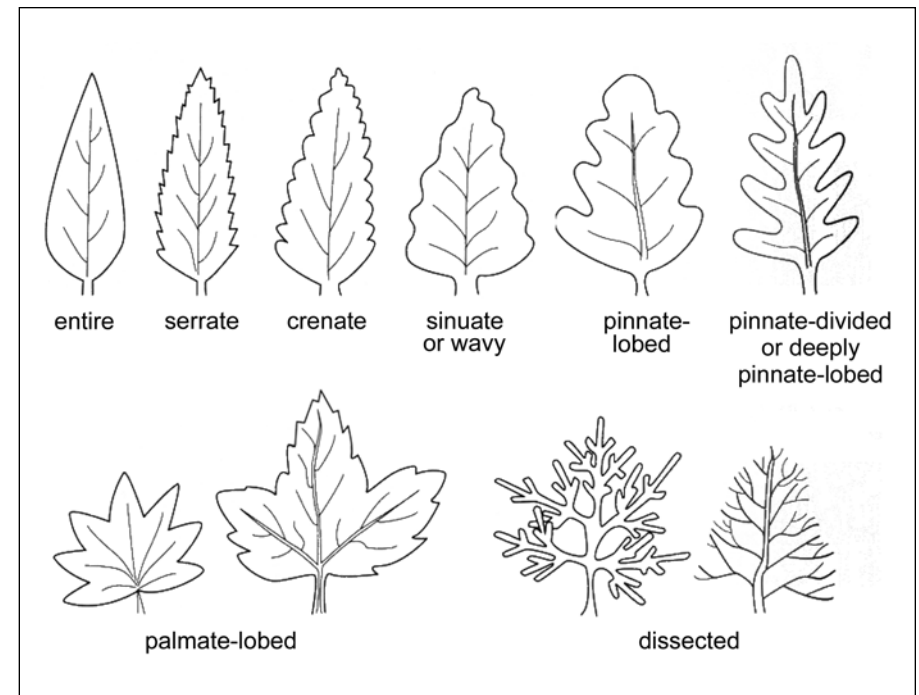


Figure 4—Leaf margins.

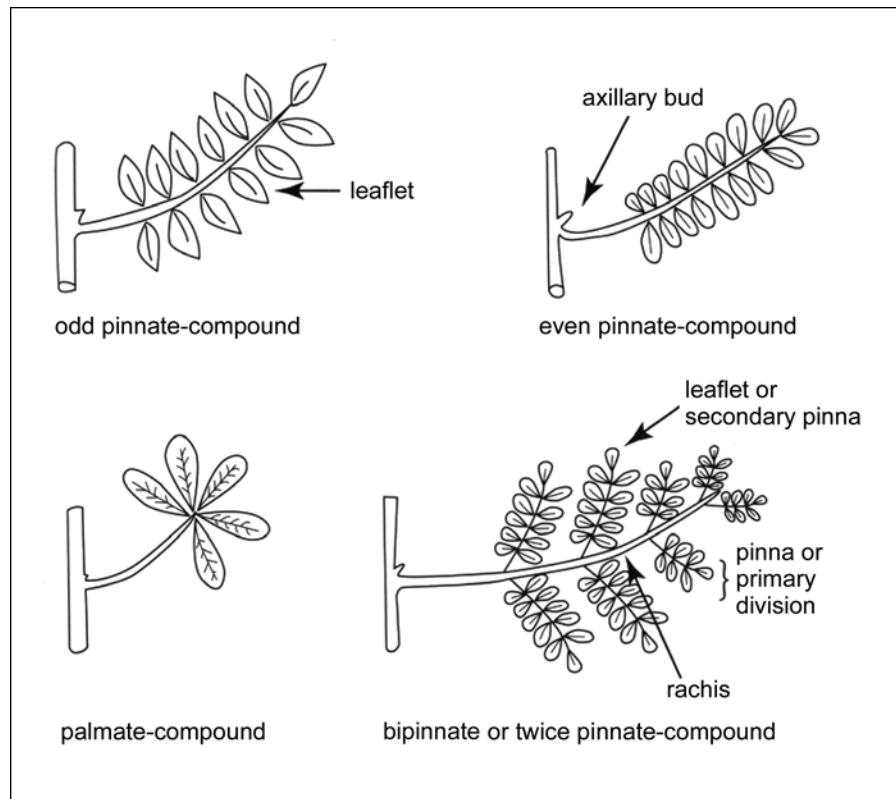


Figure 5—Compound leaves.

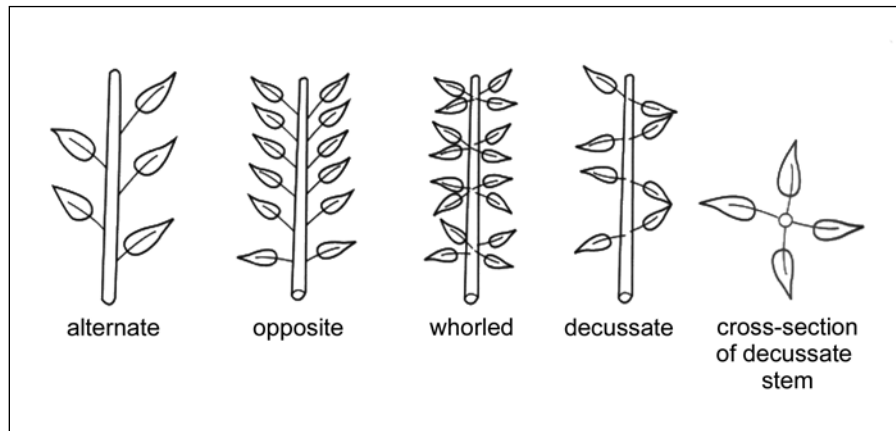


Figure 6—Leaf arrangement.

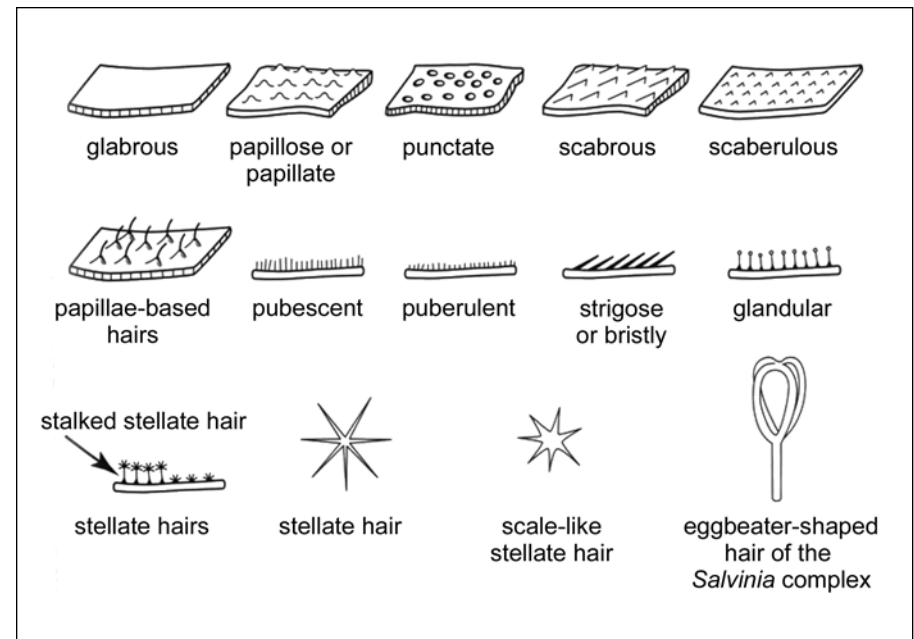


Figure 7—Leaf surface and hair types.

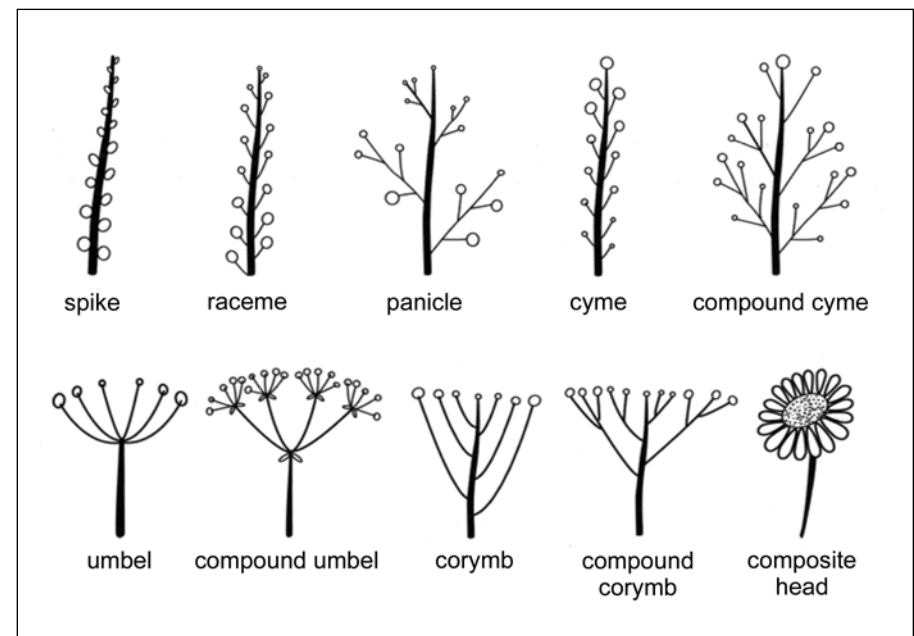


Figure 8—Inflorescence types (larger circles indicate older flowers).

dioecious—Having male and female flowers on separate plants.

disk flower—Tubular flowers associated with the flower heads of many species in the Asteraceae (sunflower family) (fig. 10).

dissected—Leaves irregularly, sharply, or deeply cut but not compound (fig. 4).

drupe—A fleshy fruit that contains a single seed in a stony endocarp.

drupelet—A small drupe; usually refers to a cluster of drupelets that form a fruiting structure.

elliptic—Football-shaped; a flattened circle more than twice as long as wide (fig. 1).

endocarp—Inner layer of the walls of the ovary (pericarp).

entire—The smooth margin (lacking teeth) of a leaf (fig. 4).

evergreen—Having leaves that remain green on plant year-round; not deciduous.

floret—Usually, the flower (lemma and palea) of a grass (fig. 12). The combination of florets and glumes is a spikelet. Also used to describe small flowers in the Asteraceae (sunflower family).

fusiform—Having a spindle shape, wide in the middle and tapering toward the ends.

glaucous—A whitish or bluish green color owing to the deposition of waxes.

glume—Sterile bract or bracts (2) at the base of a grass spikelet (fig. 12).

indehiscent—Fruit that does not open to release seeds when mature.

inflorescence—Collected cluster or arrangement of flowers on a plant (fig. 8).

involucre—Group of bracts together beneath a flower or flower cluster.

lanceolate—Leaf shape that is narrow, widest in the middle, and tapering at both ends (fig. 1). Much longer than wide; narrower than fusiform.

leaflet—A subunit of a compound leaf (fig. 5).

lemma—Larger outer bract of a grass floret (fig. 12).

lenticel—A structure on the bark of woody plants that allows the exchange of gases.

ligulate flower—Flower type in the Asteraceae (sunflower family). Bilateral, fertile flower with long straplike corolla that is five-lobed. Only occurs when all flowers in a head are ligulate (fig. 10).

ligule—In grasses, the membranous projection at the inner junction of the blade and sheath (fig. 11).

linear—Long, narrow, and of uniform width (fig. 1).

membranous—Thin, soft, and transparent or translucent.

nutlet—A small nut that consists of a dry, thick-walled indehiscent structure with a single seed.

oblanceolate—Much longer than wide, and tapering at both ends. Similar to lanceolate but widest above the middle (fig. 1).

oblong—Much longer than wide; sides parallel and more or less rectangular (fig. 1).

obovate or obovoid—Widest at or above the middle and tapering at the base; egg shaped (fig. 1).

ocrea—A papery sheath that encloses the stem at the nodes and is formed from the fusion of two stipules. Typical of many members of the Polygonaceae (smartweed family).

ovary—Ovule-bearing portion of a pistil; develops into the fruit (figs. 9 and 12).

ovate or ovoid—Widest at or below the middle and tapering at the apex; egg shaped (fig. 1).

palea—Inner bract of a grass floret that is usually partially or totally enclosed by the lemma (fig. 12).

palmate—Branches, lobes, leaflets, or veins arising from a common point; similar to the palm of a hand (figs. 4 and 5).

panicle—Inflorescence branched more than once with flowers attached at the terminal end of the branchlets; branches can be short and give the inflorescence a spikelike appearance (fig. 8).

pappus—Modified calyx of the flower of species in the Asteraceae (sunflower family) that can take the form of bristles, feathery structures, scales, awns, or a low crown; typically facilitate wind or animal dispersal (fig. 10).

pedicel—Stalk of an individual flower (fig. 9).

peduncle—Stalk of a flower cluster, inflorescence, or flower head.

pericarp—Outer wall of the ovary.

petal—Individual part of the corolla, usually colored (fig. 9).

petiole—Stalk of a leaf; the area of the leaf below the blade.

phyllary—One of many bracts subtending the flower head of species in the Asteraceae (sunflower family). Collectively called an involucre (fig. 10).

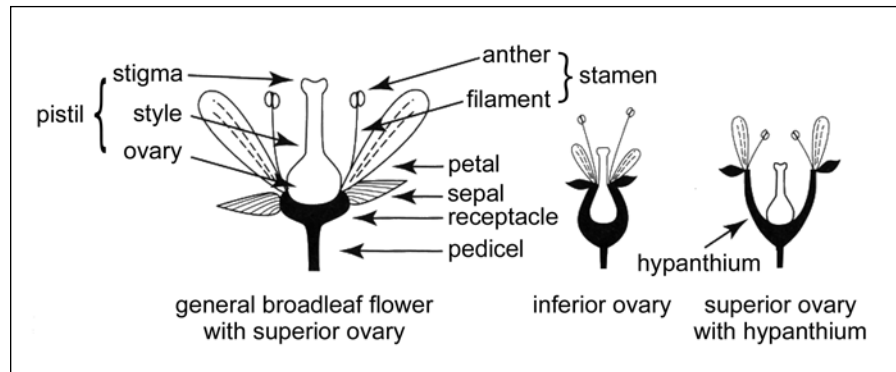


Figure 9—General broadleaf flower structures.

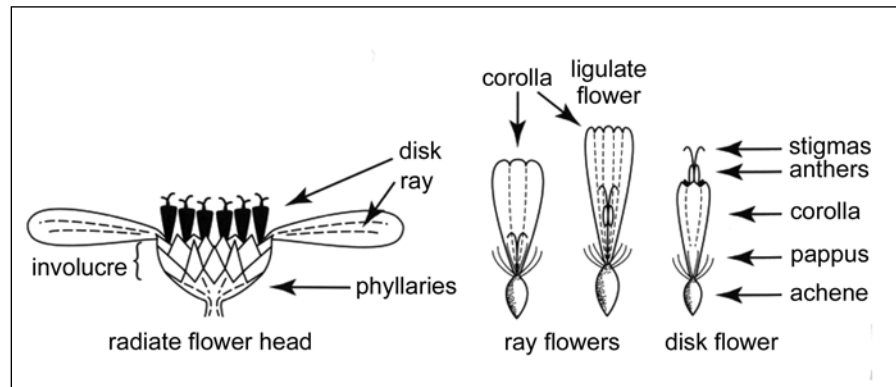


Figure 10—Composite head and flower structures.

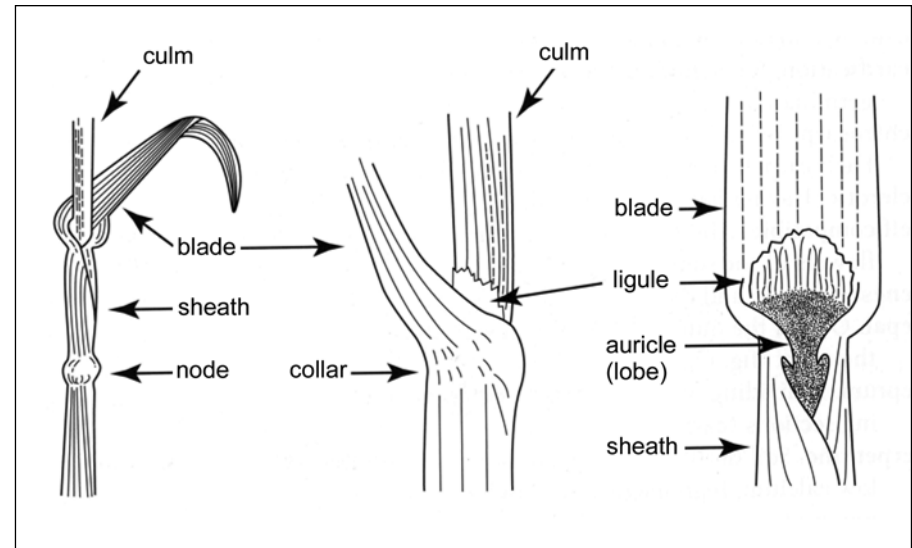


Figure 11—Grass stem structures.

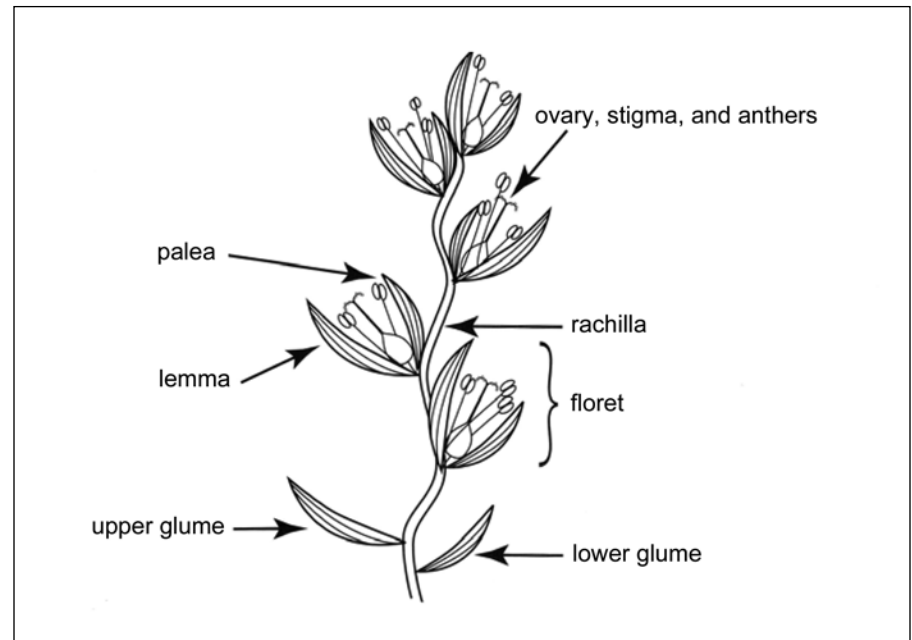


Figure 12—General grass spikelet.

pinnate—Leaflets arranged on either side of a common axis (figs. 4 and 5).

pistil—Female structure of a flower; includes stigma, style, and ovary (fig. 9).

pod—Fruit of species in the Fabaceae (pea or bean family).

prickle—Sharp-pointed structure on a plant that usually originates as an outgrowth of the epidermis (e.g., hairs or rose thorns).

raceme—Elongated inflorescence with stalked flowers arising along the unbranched central axis (fig. 8).

rachilla—A small secondary axis to a rachis. Usually refers to the axis of a grass spikelet (fig. 12).

rachis—Central or main axis of an inflorescence or pinnately compound leaf (fig. 5).

ray flower—Flower type in the Asteraceae (sunflower family). Bilateral sterile or female flower with long straplike corolla that has up to three lobes. Associated with flower heads that also contain disk flowers (fig. 10).

receptacle—Tissue of the inflorescence where the flower parts arise, as in species in the Asteraceae (sunflower family), Ranunculaceae (buttercup family), Rosaceae (rose family), and others (fig. 9).

rosette—Cluster of leaves arising from a very short stem at the surface of the soil; lacking an erect stem.

rhizomes—a horizontal underground stem that contains nodes and reduced scaly leaves.

scabrous—Rough to the touch owing to the presence of short, stiff hairs (fig. 7).

sepal—One of the outer whorls of a flower, usually green; collectively known as the calyx (fig. 9).

serrate—Having sharp teeth directed forward, as in the teeth on a leaf margin (fig. 4).

sessile—Lacking a petiole at the base of a leaf, or lacking a pedicel at the base of a flower (fig. 3).

sheath—Generally, the base of a leaf that surrounds the stem. Nearly always present in grasses (fig. 11) but can be present on other monocots (e.g., cattails, sedges) and dicots (e.g., Apiaceae [carrot family], Polygonaceae [knotweed family]).

silicle—Fruit type of many members of the Brassicaceae (mustard family). Characterized by being no more than twice as long as wide. Consists of two cells with a thin central septum. Seeds are released as the two halves of the fruit split, leaving the remaining septum.

simple—Not compound; single, undivided, and unbranched.

spike—An inflorescence with sessile flowers attached along an unbranched elongated rachis (fig. 8).

spikelet—Inflorescence of a grass or sedge that consists of glumes at the base and one or more sterile or fertile florets attached along an unbranched rachilla (fig. 12).

stamen—The male tissue of a flower that consists of filaments attached to anthers, which contain the pollen (fig. 9).

stigma—Upper region of the pistil that receives the pollen (figs. 9, 10, and 12).

stipule—Appendage at the base of the petiole or leaf; usually in pairs, sometimes thin and inconspicuous, other times leaflike.

stolon—Aboveground trailing shoot; roots form at the nodes.

style—Elongated structure above the ovary and below the stigma of the female portion of the flower (fig. 9).

tendrils—Slender coiling structure that assists plants in climbing and supporting stems on other plants or structures. Usually found in the axil or tips of leaves.

umbel—Flower cluster in which the stalks or pedicels arise from a common point. Referred to as compound umbel when stalks of each cluster (peduncle) arise from a common point (fig. 8).

Metric Equivalents

English units		Metric units
1 inch (in)	=	25.4 millimeters (mm)
1 inch (in)	=	2.54 centimeters (cm)
1 foot (ft)	=	0.3048 meter (m)

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