Weed Alert! New Invasive Weeds in California

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Abstract

The Jepson Manual and errata, which were published in 1993, listed a total of 1,025 non-native species as established in California. Since that time reports in various publications indicate that a total of at least 33 additional non-native species are established in the state. Several of these newly reported species are known to be invasive in other areas of the world where they are already established and others show potential to be highly invasive in California's natural areas. The recently reported species include *Catalpa bignonioides, Coincya monensis, Cynanchum louiseae, Ehrharta longiflora, Gleditsia triacanthos, Helichrysum petiolare, Maytenus boaria, Retama monosperma* and *Sapium sebiferum.*

A few of these reports stated that efforts to contain or, if possible, eradicate the species had already begun. Early detection and swift action to eradicate or prevent further spread of new invaders is the most effective and efficient weed control strategy available and is emphasized in the recently released National Weed Strategy and other state Weed Control Strategies. The California Exotic Pest Plant Council newsletter, CaIEPPC News, provides one forum for reporting non-native species that have just been detected becoming established in California or appearing in a new area of the state. CaIEPPC may also have a role to play in promoting effective means of containing or eradicating new invasive species.

Introduction

Preventing invasions by new plant species and quickly detecting invasions that do occur so they can be eradicated or contained before they spread, are the most effective and efficient weed control strategies available. The California Department of Food and Agriculture has long recognized this and the state's Noxious Weed List gives highest priority to pest species that are either not yet established in the state or whose populations are not yet widespread. The state's native species will likewise be better protected if new invaders are detected quickly and word of their discovery is spread to managers and others who can take action to prevent the invaders from spreading. Although there are already at least 1025 non-native plant species established in California according to the Jepson Manual (Hickman 1993) and errata (Wilken 1993), more continue to arrive and become established here. If they are allowed to spread, some could impact native species and communities as severely as yellow starthistle or tamarisk. Preventing or stopping just one new invasive weed would be of even greater conservation benefit in the long run than far more costly and difficult efforts to control an already widespread, damaging pest.

Fortunately, when botanists and other naturalists find species not previously found in an area they often report them in the literature. Unfortunately, reports to regional botanical journals or in herbarium records often go unnoticed by natural area managers for long periods. Sometimes a non-native species is only recognized as a troublesome invader decades after it was first detected in the area when containing it would have been relatively easy. In order to remedy this situation, it is vital that reports of newly detected non-native species be made more easily available to natural area managers. To this end, I searched for published reports and herbarium records of non-native species growing wild in California that had not bee n reported in the Jepson Manual.

I found reports of 33 new non-native plant species established in the state. Most appeared following publication of the Jepson Manual (Table 1a). After a brief search of the University of California Davis Herbaria (DAV) and the California Department of Food and Agriculture Herbarium (CDA) I found specimens of 2 more new species not reported in the Jepson Manual or elsewhere in the literature (Table 1b). In addition, 9 more

species were reported as 'possibly established' in California (Table 1c). Several of the newly reported species are known to be invasive in other areas they have invaded and some others also show potential to be highly invasive and troublesome in California. The recently reported species include *Catalpa bignonioides, Coincya monensis, Cynanchum louiseae, Erharta longiflora, Gleditsia triacanthos, Helichrysum petiolare, Maytenus boaria, Retama monosperma* and *Sapium sebiferum.*

In a few cases, the reports stated that efforts to contain or, if possible, eradicate the species had already begun. More detailed information on some of these species which I believe have potential to become natural area invaders is presented in the next section. Look for updates on new non-native species in CaIEPPC News, the Noteworthy Collections section of the journal Madroño, and The Nature Conservancy's Weedson-the-Web Homepage (http://tncweeds.ucdavis.edu).

Newly Reported Species with Potential to Become Invasive

Catalpa bignonioides is a deciduous tree with large, heart-shaped opposite leaves native to the southeastern U.S. It is a member of the family Bignoniaceae with showy clusters of large (4 cm wide by 7 cm long), white, trumpet-shaped flowers. Yellow stripes and brown-purple spots mark the inside of the floral tube. The flowers yield bean-shaped capsules up to 30 cm long that give rise to the species common name, cigar-bean. The capsules contain many flat seeds encircled by a papery wing. *Catalpa bignonioides* is commonly used as an ornamental tree in California and elsewhere. It was first reported growing outside cultivation in California in San Diego County by Beauchamp (1986). The trees are also common on levees in the Sacramento-San Joaquin Delta where it may have begun to escape.

Coincya monensis is an herbaceous member of the mustard family (Brassicaceae) native to Europe. The species was first detected in California by Jim Belsher, a botany graduate student at Humboldt State University, in February 1997 (Pickart 1997). He found a population of 2,000 to 3,000 individuals growing on fill in a pasture adjacent to the Manila Dunes in Humboldt County. The species is invasive in Pennsylvania and other eastern states (Naczi & Tliieret 1996) so all individuals that could be found were pulled in April 1997 (Miller and Pickart pers. comm. 1997). The fact that the species was present in California was first reported in the literature by Pickart (1997) in the CaIEPPC News.

Cynanchum louiseae is an herb or weak climber native to Europe in the milkweed family (Asclepiadaceae). *Cynanchum nigrum* and *Vincetoxicum nigrum* are synonyms for this species and its common name is black swallowwort (Gleason and Cronquist 1991, Kartesz 1994). This species and the closely related *Cvnanchum rossicum* are common forest understory invaders in the northeastern U.S. where they form extremely dense stands that appear to exclude native herbs (Sheeley and Raynal 1996). They are particularly troublesome on rich calcareous soils. *C. louiseae* was first reported in California from the Riverside Botanic Garden by Sanders (1996) in the journal Madroño.

Ehrharta longiflora is an annual grass in the family Poaceae native to western South Africa. Its stems are generally erect but spread widely at maturity. The inflorescence is a particle with pubescent branches and pedicels. The spikelets have short membranous glumes 2.5 to 4.5 mm, long, enclosing two sterile florets and a single fertile floret. The leaves have flat blades up to 20 cm long and 1 cm wide. The ligule is membranous and toothed and the auricles are purple. The species was first reported in California from sites near Torrey Pines State Preserve in San Diego County by Claire Brey (1996). She first collected it from a site south of the Preserve in 1992 but reported that it had spread throughout the Preserve and was crowding out some native forbs by 1996.

Gleditsia triacanthos is a tree in the pea family (Fabaceae) native to the eastern and central U.S. Information about the species original range is vague but it is believed native to the area bounded by western Pennsylvania, southeastern Minnesota, northwestern Texas and the Florida panhandle. Commonly called honey locusts, the trees have straight trunks with arching to spreading branches and reach heights of 12 to 25 m. The leaves are pinnately or bipinnately compound with 18 to 28 leaflets. The flowers are small and greenish with 3-5 sepals, 3-5 petals and exerted anthers. They appear in dense racemes in April and May and yield a broad, flat fruit up to 40 cm long containing many seeds. Honey locust is commonly planted as an ornamental in

California and elsewhere and has escaped from cultivation and become weedy east of the Appalachian Mountains. It was first reported in California in Orange County by Roberts (1989). Barry Meyers-Rice and I found five saplings 20 to 150 cm tall growing in primary Valley oak riparian forest at the Cosumnes River Preserve in southern Sacramento County during the spring of 1997 (Randall and Meyers-Rice in press). We believe it has potential to become a serious pest in California's riparian forests, particularly in the Central Valley.

The saplings we found did not have thorns and may be of the thornless form *(G. triacanthos* f. *inermis)* that is occasionally encountered in natural populations and has been embraced by the nursery trade for use as an ornamental and shade tree. Cultivated specimens are usually of this form. Most wild trees have conspicuous, simple or 3-branched thorns on their branches.

Helichrysum petiolare is a low shrub native to coastal South Africa in the Inulae (everlasting) tribe of the composite family (Asteraceae). It has aromatic leaves about the size and shape of nickels or dimes (Sigg 1997). They are so densely matted with hair that the plants look white, somewhat like a native sage *(Salvia* spp.). It has many small, clustered flowerheads which resemble those of native cudweeds and everlastings *(Gnaphalium* spp.). The plants are attractive and have been sold in specialty nurseries at least since the 1960s. It was first reported escaping cultivation in California from a small but expanding infestation on the western slopes of Mount Tamalpais, just inland from Stinson Beach, Marin County by Howell (1970). Smith and Wheeler (1992) reported another population on Highway 1 north of Gualala in Mendocino County. *Helichrysum petiolare* was not included in the Jepson Manual, but Sigg's 1997 article in CaIEPPC News brought renewed attention to the species. By this time the Mount Tamalpais population had spread to cover several acres, with scattered outliers, and there was another infestation roughly two miles southeast in Tennessee Valley on the Marin peninsula. It can apparently invade otherwise healthy *Baccharis-Artemisia* dominated communities and may be able to move into other shrubland and grassland community types along the state's northern and central coast (Sigg 1997).

Maytenus boaria is an evergreen tree native to Chile and Argentina in the family Celastraceae. Commonly called the mayten tree, it is used as an ornamental and was reported was escaping from cultivation by Jacobsen (1996) in his book North American Landscape Trees. This report is confirmed by observations of mayten trees establishing outside cultivation in Davis, California (Rejmánek, pers. comm. 1997). In cultivation the mayten tree reaches heights of 10-16 meters (30-50 feet). It has long pendulous branches somewhat like a weeping willow and lanceolate leaves that are also somewhat willow-like. The flowers and fruits are inconspicuous.

Retama monosperma is a shrub native to the Mediterranean region of Europe in the pea family (Fabaceae). *Genista monospertna* is a synonym for this species. It is sold as an ornamental and commonly known as Bridal Veil Broom for its attractive displays of small, fragrant, sweetpea-type flowers with purple sepals and. white petals (description from Bailey Hortorium Staff 1976). The fruits are broad pods with 1 to 2 seeds. The branches are nearly leafless, green and grooved lengthwise. *Retama monosperma* was first reported as established in the wild at Fallbrook Naval Weapons Station in San Diego County by Edie Jacobsen (Pers. comm. 1994, 1996; Rejmánek and Randall 1994; the 1994 paper incorrectly reported the location of the infestation). Edie and her crew have been working diligently to eradicate the population on the base and to prevent it from spreading to adjacent areas and beyond.

Sapium sebiferum is a deciduous tree native to China in the spurge family (Euphorbiaceae). Commonly called Chinese tallow, the species has been cultivated for seed oil in China for centuries (Bruce et al. 1997). It was introduced to North America in the late 1700s for production of a vegetable tallow from its fruits and seeds (Hunt 1947). The U.S. Department of Agriculture later promoted it to support local soap industries, particularly around Houston, Texas (Jamieson and McKinney 1938). When growing wild it often produces multiple trunks. It has attractive leaves that look something like those of the quaking aspen (*Populus tremuloides)* with a smooth (untoothed) edge. The leaves turn yellow and red in the autumn before dropping, giving it added value as an ornamental. The small, yellowish flowers are borne in drooping spikes in mid-summer. The fruits are 3-lobed, grayish-white and look somewhat like popcorn when ripe, giving rise to another of its common names, popcorn tree.

Sapium sebiferum is a severe pest in swamps and bottomland forests along the Gulf coastal plain from Texas to Florida and the Atlantic coastal plain at least as far north as the Carolinas (Jubinsky 1995, Bruce et al.

1997). Along the Gulf Coast, particularly in Texas and Louisiana, it forms large single-species stands along bayous and canals. Large stands can alter species composition, community structure and ecosystem processes in natural areas (Bruce et al. 1997). Studies in Texas found that leaf litter from Chinese tallow alters rates of nutrient cycling and thereby promotes populations of the non-native isopod *Annadillium vulgare* and depresses populations of native invertebrates (Cameron and LaPoint 1978, Cameron and Spencer 1989). It is commonly used as an ornamental plant in the Central Valley and ecologists familiar with it from the Gulf Coast like Marcel Rejmánek (pers. comm. 1996) predicted that it could become a problem in California in and around the Sacramento-San Joaquin Delta. I first learned it was establishing outside cultivation in California from Deborah Bishop (pers. comm. 1997) who had encountered it in a tributary of the American River east of Sacramento while conducting plant surveys. In June 1998, Barry Meyers-Rice, Ramona Robison and I located several trees growing wild along the American River Parkway in Sacramento, confirming its establishment in California. There are apparently well over 100 trees along the river already and the species could easily spread downstream and into the Delta if unchecked.

Species Recently Reported in New Regions of the State

Many non-native species are established in one part of the state but continue to expand their ranges to other regions of California and western North America. For example, *Pistacia atlantica* Desf., a semi-evergreen or deciduous tree in the poison-oak family (Anacardiaceae), was reported as established in the Sacramento Valley in the Jepson Manual but more recently was reported in the incipient stage of invasion in southern California by Sanders (1996). Commonly known as the Mount Atlas pistache, the species is native to the Mediterranean region and widely used as an ornamental in California. It reaches 3-9 meters in height and its leaves are pinnately compound with a winged leaf axis (rachis) and 7-11 lanceolate leaflets (description from Hickman 1993, Jacobsen 1996 and Sunset Books 1979). The species has male and female flowers on separate trees (dioecious), the flowers appear in a fairly conspicuous panicle, but the individual flowers are small with bract-like petals and sepals. The fruits are dark blue or purple and 6-8 mm long when ripe.

Conclusions

Non-native species continue to establish and be detected in California. With the recent upsurge in interest and concern about invasive non-native species there seems to be more attention given to locating new species and reporting these finds in the literature. Between giving this talk in October 1997 and writing it down in June 1998, I have learned of several more new non-native species in California. Some were reported in the most recent issues of Madroño, others noted in recently published county floras (e.g. Samson et al. 1996) have come to my attention, and concerned botanists and conservationists have informed me of at least 3 more new species growing wild in the Sacramento area alone. Many, perhaps most, of these new species may not become pests of the environment or agriculture but some almost surely will. Once they have arrived, the best defense we have is to quickly detect them and take swift action to contain or eradicate the species with potential to become pests.

References

Anonymous. 1988. Harmel, Peganum harmala. California Plant Pest and Disease Report 7:22-23.

Bailey Hortorium Staff. 1976. Hortus Third. McMillan Publishing. Co., Inc. New York.

Beauchamp, M. 1986. A flora of San Diego County, California. Sweetwater River Press, National City, CA.

Brey, C. 1996. What? Another *Ehrharta? Oh*, No!! CaIEPPC News 4(2):5-6.

Bruce, K.A., G.N. Cameron, PA. Harcombe and G. Jubinsky. 1997. Introduction, impact on native habitats, and management of a woody invader, the Chinese Tallow Tree *Sapium sebiferion* (L.) Roxb. Natural Areas Journal 17(3):255-260.

Cameron, G.N. and TW. LaPoint. 1978. Effects of tannins on the decomposition of Chinese tallow leaves by terrestrial and aquatic invertebrates. Oecologia 32:349-366.

Cameron, G.N. and S.R. Spencer. 1989. Rapid leaf decay and nutrient release in a Chinese tallow forest. Oecologia 80:222-228.

De Nevers, G. 1985. Pepperwood flora. California Academy of Sciences, San Francisco.

Fischer, B.B., B. Crampton, H. Seney and A.L. Smith. 1985. Texas millet-Panicum texanum Buckl. in Growers weed identification handbook. Publication 4030, Division of Agricultural Sciences, University of California, Berkeley.

Gleason, H.A. and A. Cronquist. 199 1. Manual of vascular plants of northeastern United States and adjacent Canada, 2 ed. New York Botanical Garden, Bronx, New York.
Hickman, J.C. (ed.). 1993. The Jepson Manual: higher plants of California. University of California Press, Berkeley.
Howell, J.T. 1970. Marin Flora: manual of the vascular plants and ferns of Marin County, California. 2nd edition with supplement. University of California Press, Berkeley.
Hunt, K.W. 1947. Ile Charleston woody flora. American Midland Naturalist 37:670-756.
Jacobsen, A.L. 1996. North American Landscape Trees. Ten Speed Press, Berkeley, California
Jamieson. G.S. and R.S. McKinney. 1938. Stillingia oil. Oil and Soap 15:295-296.
Jubinsky, G. 1995. Chinese tallow (Sapium *sebiferwn).* Florida Department of Environmental Protection, Bureau of Aquatic Plant Management. TSS-93-03 updated April 1995. Tallahassee, Florida.
Junak, S., T. Ayers, R. Scott, D. Wilken and D. Young. 1995. A flora of Santa Cruz Island. Santa Barbara Botanic Garden & California Native Plant Society, Santa Barbara & Sacramento.
Kartesz, J.T 1994. A synonornized checklist of the vascular flora of the United States, Canada and Greenland, 2nd edition. Volume I-Checklist. Timber PressPortland, Oregon.
Keeley, J.E. 1992. Noteworthy collections-California. Madrofio 39:157.
McClintock, E., R Reeberg and W. Knight. 1990. A flora of the San Bruno Mountains. California Native Plant Society, Sacramento.
Munz, P.A. 1969. California miscellany-VII. El Aliso 7:65-7 1.
Munz, P.A. 1974. A flora of southern California. University of California Press.
O'Brien, M. 1995. A new invasive? Fremontia 23(2):33.
Pickart, A. 1997. A new invasive mustard in California. CaIEPPC News 5(4):6.
Preston, R.E. 1997. *Dittrichia graveolens* (Asteraceae), new to the California weed flora. Madrofio 44(2):200-203.
Randall, J.M. and B.A. Meyers-Rice. In press. Noteworthy collections-California. Madrofio.
Rejmdnek, M. and J.M. Randall. 1994. Invasive alien plants in California: 1993 summary and comparison with other areas in North America. Madroho 41(3):161-177.
Roberts, F.M., Jr. 1989. A checklist of the vascular plants of Orange County, California. Museum of Systematic Biology, University of California, Irvine.
Ross, T.S. 1994. *Galenia pubescens* (Aizoaceae), new to the North American flora. Madrofio 41(4):226-228.
Ross, T.S. and S. Boyd. 1996. Noteworthy collections-California. Madrofio 43(3):432-436.
Sanders, A.C. 1996. Noteworthy collections- California. Madrofio 43(4):524-532.
Sanders, A.C. and S. Boyd. 1996. Noteworthy collectionsCalifornia. Madrofio 43(4):523-524.
Sheeley, S.E. and D.J. Raynal. 1996. The distribution and status of species of *Vincetoxicum* in eastern North America. Bulletin of the Torrey Botanical Club 123(2):148-156.
Sigg, J. 1997. Everlasting sleeper. CaIEPPC News 5(l):8.
Simpson, M.G., S.C. McMillan, B.L. Stone, J. Gibson, and J.P. Rebman. 1996. Checklist of the vascular plants of San Diego County, 2nd edition. San Diego State University Herbarium Press, San Diego.
Smith, G.L. and C.R. Wheeler. 1992. A flora of the vascular plants of Mendocino County. University of San Francisco, San Francisco, California.
Spicher, D. and M. Josselyn. 1985. *Spartina* (Graminae) in northem California: distribution and taxonomic notes. Madrofio 32:158-167.
Sunset Books Editors. 1979. Sunset New Western Garden Book. fourth edition. Lane Publishing Co. Menlo Park, California.
Wilken, D.H. 1993. Balsaminaceae. The Jepson Globe 5(l):2.

Table 1. Non-native species reported as established or possibly established in California that were not included in the Jepson Manual (Hickman 1993).

a. Reported in the literature.

	Species	Family	Reference
1.	*Achrachne racemosa* (Roem. & Schult.) Ohwi	Poaceae	Sanders 1996
2.	*Amaranthus rudis* Sauer	Amaranthaceae	Munz 1969
3.	*Atriplex muelleri* Benth.	Chenopodiaceae	Sanders 1996
4.	*Brassicafruticulosa* Cyrillo	Brassicaceae	Sanders and Boyd 1996
5.	*Catalpa bignonioides* Walter	Bignoniaceae	Beauchamp 1986
6.	*Ceratonia siliqua* L.	Fabaceae	Sanders 1996
7.	*Chloris truncata* R. Br.	Poaceae	Sanders 1996
8.	*Coincya monensis* (L.) Greuter & Burdet	Brassicaceae	Pickart 1997
9.	*Coronilla valentina* L.	Fabaceae	Ross and Boyd 1996
10.	*Cvnanchwn louiseae* Kartesz &Gandhi	Asclepiadaceae	Sanders 1996
11.	*Dittrichia graveolens* (L.) W. Greuter	Asteraceae	Preston 1997
12.	*Ehrharta longiflora* E.J. Smith	Poaceae	Brey 1996
13.	*Fatoua villosa* (Thunb.) Nakai	Moraceae	Sanders 1996
14.	*Galenia pubescens* (Ecklon Zeyher) Druce	Aizoaceae	Ross 1994
15.	*Geranium rotundifolium* L.	Geraniaceae	Ross and Boyd 1996
16.	*Gleditsia triacanthos* L.	Fabaceae	Randall & Meyers-Rice in press
17.	*Helichrysum petiolare* Hiliard & B.L. Bunt	Asteraceae	Howell 1969; Sigg 1997
18.	*Lasiospermum bipinnatum* (Thunb.) Druce	Asteraceae	Ross and Boyd 1996
19.	*Afatricaria globifera* (Thunb.) Fenzl. in Harv. & Sond.	Asteraceae	Sanders 1996
20.	*Maytenus boaria* Mol.	Celastraceae	Jacobsen 1996
21.	*Nerium oleander* L.	Apocynaceae	Keeley 1992
22.	*Panicum maximum* Jacq.	Poaceae	Sanders 1996
23.	*Panicum texanum* Buckl.	Poaceae	Fischer et al. 1985
24.	*Peganum harmala* L.	Zygophyllaceae	Anonymous 1988
25.	*Pinus halapensis* Miller	Pinaceae	McClintock et al. 1990
26.	*Pinus pinea* L.	Pinaceae	Junak et al. 1995
27.	*Retama monosperma* (L.) Boiss.	Fabaceae	Rejmanek & Randall 1994
28.	*Schinus polygamus* (Cav.) Cabr.	Anacardiaceae	Sanders 1996
29.	*Scrophularia peregrina* L.	Scrophulariaceae	Ross and Boyd 1996
30.	*Senna obtusifolia* (L.) Irwin & Barneby	Fabaceae	Sanders 1996
31.	*Solanum mauritianum* Scop.	Solanaceae	Sanders 1996
32.	*Spartina anglica* C.E. Hubbard	Poaceae	Spicher and Josselyn 1985
33.	*Verbascum olympicwn* Boiss.	Scrophulariaceae	de Nevers. 1985

b. Deposited at Herbaria

1.	*Sapium sebiferum* (L.) Roxburgh	Euphorbiaceae	Davis Herbaria
2.	*Sida spinosa* L.	Malvaceae	Davis Herbaria

c. **Reported possibly established or persistant,**

1.	*Cassia artemisioides* Gaud.-Beaup. ex DC	Fabaceae	Roberts 1989
2.	*Cutandia memphitica* (Spreng.) Richt.	Poaceae	Munz 1974
3.	*Cyperus papyrus* L.	Cyperaceae	Beauchamp 1986, Roberts 1989
4.	*Dichondra repens* Forst. & Forst.	Convolvulaceae	Munz 1974, Roberts 1989
5.	*Dodonaea viscosa* Jacq.	Sapindaceae	Roberts 1989
6.	*Dolichos lignosus* Pers.	Fabaceae	Beauchamp 1986
7.	*Ficus microcarpa* L.	Moraceae	O'Brien 1995
8.	*Ficus pseudocarica* Miq.	Moraceae	Munz 1974
9.	*Ficus rubiginosa* Desf. v. *australis*	Moraceae	O'Brien 1995