

California Pest Rating Proposal for

Salvia virgata Jacq., wand sage, southern meadow sage

Family: Lamiaceae

Pest Rating: B

Synonym: *Salvia campestris* M. Bieb.



Photo Credit: Hectonichus, Orto Botanico di Brera

Comment Period: 12/19/2022 through 02/02/2023

Initiating Event:

Salvia virgata has been previously assigned an A rating by the California Department of Food and Agriculture (CDFA), Plant Health and Pest Prevention Services, and is designated as a noxious weed as defined by the California Food and Agricultural Code (FAC) Section 5004 and is listed in Title 3, California Code of Regulations (CCR), Section 4500. A pest rating proposal is required to evaluate the current rating and status of the species in California.

History & Status

General Description

Salvia virgata is the correct identification of the plant on the California CCR 4500 list with the common name “meadow sage” (Averett, 2012), but it is noted that the species has often been confused with *Salvia pratensis* L., which is generally known by the common names “meadow sage” or “meadow clary” (Giblin et al, 2018; USDA/GRIN, 2022). To avoid confusion, the preferred common names for *Salvia virgata* are “wand sage” and “southern meadow sage”. The voucher specimens from the Shasta, Siskiyou, and Nevada County populations of *Salvia virgata* in the CDFA Herbarium have been

authenticated in accord with the Flora Europaea treatment of the genus (Hedge, 1972). In the Consortium of California Herbaria database (CCH, 2022) duplicates of the same collections from Siskiyou and Nevada Counties are referred to *S. virgata* in some herbaria and to *S. pratensis* in other herbaria, and should be referred to *S. virgata*. According to the Flora Europaea (Hedge, 1972), *Salvia virgata* differs from *S. pratensis* in having the corolla of the flower 11-20 mm long (versus generally 20-30 mm long in *S. pratensis*), and in having the lateral branches of the inflorescence elongated and nearly equal to the central axis in *S. virgata* (versus much shorter than the central axis or the inflorescence unbranched in *S. pratensis*).

Salvia virgata is an herbaceous perennial up to approximately 1 meter in height with simple or branched stems (Averett, 2012; Hedge, 1972). In Texas, plants of the species were observed with taproots averaging 15 cm in length (Singhurst et al., 2012). The species produces oblong to obovate basal and stem leaves approximately 5-27 cm in length, often more or less heart shaped, with an irregularly toothed margin. The leaves are dull green and sparsely covered with thickened non-glandular hairs on the upper surface and glandular and non-glandular hairs on the lower surface (DiTomaso and Healy, 2007). The inflorescence is usually composed of several long branches, with the flowers arranged in distinct whorled clusters of 4 to 6 in the axils of ovate bracts. The corollas are blue to purple or less commonly whitish in color, bilabiate, with the lower lip arched and the upper lip becoming strongly recurved at fruiting. The calyx is covered in soft wavy hairs and glandular trichomes. Each flower produces four brown one-seeded nutlet fruits, each approximately 2-3 mm in length and ovoid in shape (Averett, 2012; DiTomaso and Healy, 2007).

Worldwide Distribution

Salvia virgata is reported to be native to southeastern Europe (Balkan Peninsula, Crimea, Greece, Italy), and western and central Asia (Turkey, Iran, Iraq, Syria, Kyrgyzstan, and Turkmenistan), and in northern Pakistan on the Indian subcontinent (Hedge, 1972; USDA, GRIN, 2022). In the United States, *Salvia virgata* has been collected in California and in one county (Kerr) in Texas (Singhurst et al., 2012; EDDMapS, 2022), and in the Pacific Northwest is reported as previously present in Klickitat County, Washington, and currently occurring locally in Idaho County, Idaho (Giblin et al., 2018).

Official Control:

Salvia virgata is listed on CCR Section 4500 as a noxious weed defined by California FAC Section 5004. The Department is mandated by California FAC, Division 1, Chapter 3, Section 403 to prevent the introduction and spread of noxious weeds. *Salvia virgata* is listed as a restricted noxious weed seed in California defined by California FAC Section 52258.

California Distribution:

Salvia virgata has been collected in a limited number of localities in Siskiyou County on the Modoc Plateau in far northern California between 1941 and 1999, in the Grass Valley area of Nevada County in 1972, and in Shasta County in 2014 (CCH, 2022). A population of introduced *Salvia* collected in the Lake Arrowhead area of San Bernardino County in 1931 is listed under *S. pratensis* in the CCH (2022), but has been referred to *S. virgata* by DiTomaso and Healy (2007) and is apparently extirpated. Several of the populations of *S. virgata* in northeastern California also apparently extirpated (DiTomaso and Healy, 2007), although the 2014 collection from Shasta County is a relatively recent find.

California Interceptions:

There are no recorded interceptions of *Salvia virgata* in the CDFA Pest and Damage Record (PDR) Database.

Consequences of Introduction

1) Climate/Host Interaction: Score is Medium (2)

In its native range, *Salvia virgata* can spread in open areas like empty fields and roadsides and in all regions of Turkey (Celep et al., 2014). In California, *Salvia virgata* has been found in disturbed areas at elevations between 270-830 meters above sea level (Averett, 2012).

- Low (1) Not likely to establish in California; or likely to establish in very limited areas
- **Medium (2) may be able to establish in a larger but limited part of California**
- High (3) likely to establish a widespread distribution in California

2) Known Pest Host Range: Score is High (3)

Salvia virgata can occur wherever general ecological conditions exist that are conducive to its survival.

- Low (1) has a very limited host range
- Medium (2) has a moderate host range
- **High (3) has a wide host range**

3) Pest Dispersal Potential: Score is Medium (2)

Salvia virgata reproduces by seed. Studies in its native habitat in Turkey found that *Salvia virgata* plants produced approximately 1,500 flowers (Celep et al., 2014), potentially producing 6,000 seeds. The seed units are likely to remain near the parent plant unless moved in soil or by animal activity. The plant may have been used for ornamental planting in the past, but this has been strongly discouraged by the fact that the species is a listed noxious weed in California.

- Low (1) does not have high reproductive or dispersal potential
- **Medium (2) has either high reproductive or dispersal potential**
- High (3) has both high reproduction and dispersal potential

4) Economic Impact: Score is Medium (2)

Because of the rounded shape and resistant fruit wall of *Salvia virgata*, the seed units could be dispersed as contaminants of agricultural seed if the plant becomes established in agricultural fields in California, although this does not appear to have occurred so far. Shipments that are found infested with *Salvia virgata* are subject to rejection, treatment, reconditioning, or destruction, typically at the owner's expense.

In a 2019 study looking at phytotoxic and antifungal effects of extracts of *Salvia virgata* (menthol and hexane), the authors found that in a laboratory setting, *Salvia virgata* extracts significantly inhibited the germination of lettuce (*Lactuca sativa* L.), garden cress (*Lepidium sativum* L.), and wheat (*Triticum vulgare*) seeds, and had antifungal effects on *Fusarium oxysporum* f. sp. *radicis lycopersici* (causal agent of Fusarium wilt) and Fusarium crown and root rot of tomato, *Verticillium dahliae* (causal agent of Verticillium wilt). The authors suggest that the *Salvia virgata* plant "has the potential to demonstrate high allelopathic effect", suggesting its potential use as a natural herbicide (Bayar and Yilar, 2019).

- A. The pest could lower crop yield.**
- B. The pest could lower crop value (includes increasing crop production costs).
- C. The pest could trigger the loss of markets (includes quarantines).**
- D. The pest could negatively change normal cultural practices.
- E. The pest can vector, or is vectored, by another pestiferous organism.
- F. The organism is injurious or poisonous to agriculturally important animals.
- G. The organism can interfere with the delivery or supply of water for agricultural uses.

Economic Impact:

- Low (1) causes 0 or 1 of these impacts
- **Medium (2) causes 2 of these impacts**
- High (3) causes 3 or more of these impacts

5) Environmental Impact: Score is High (3)

- A. The pest could have a significant environmental impact such as lowering biodiversity, disrupting natural communities, or changing ecosystem processes.**
- B. The pest could directly affect threatened or endangered species.
- C. The pest could impact threatened or endangered species by disrupting critical habitats.
- D. The pest could trigger additional official or private treatment programs.**
- E. The pest significantly impacts cultural practices, home/urban gardening or ornamental plantings.

Environmental Impact:

- Low (1) causes none of the above to occur
- Medium (2) causes one of the above to occur
- **High (3) causes two or more of the above to occur**

Consequences of introduction to California for *Salvia virgata* **Medium (12)**

Low = 5-8 points

Medium = 9-12 points

High = 13-15 points

1) Post Entry Distribution and Survey Information: Score is Low (-1)

- Not established (0) Pest never detected in California or known only from incursions.
 - Low (-1) Pest has a localized distribution in California or is established in one suitable climate/host area (region).**
 - Medium (-2) Pest is widespread in California but not fully established in the endangered area, or pest established in two contiguous suitable climate/host areas.
 - High (-3) Pest has fully established in the endangered area, or pest is reported in more than two contiguous or non-contiguous suitable climate/host areas.
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7) Final Score: Medium (12-1=11)

Conclusion and Rating Justification:

The introduced weed species *S. virgata* has been subject to control efforts in California and has apparently been extirpated in several areas of the state. Because it may continue to be introduced into rangeland areas and because it is listed as a noxious weed in California, a rating of “B” is recommended.

Uncertainty

Salvia virgata has long been confused with the purple-flowered Old World ornamental species *S. pratensis*. The latter is a listed noxious weed species in Washington state and could also become naturalized in California.

References

- Averett, D. E. 2012. *Salvia virgata*. Jepson Flora Project (eds.) Jepson eFlora, https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=77028. Accessed August 15, 2022.
- Bayar, Y., and Yilar, M. 2019. The antifungal and phytotoxic effect of different plant extracts of *Salvia virgata* Jacq. *Fresenius Environmental Bulletin* 28, 4A/2019:3492-3497 <https://www.researchgate.net/journal/Fresenius-Environmental-Bulletin-1018-4619> Accessed April 20, 2022
- Calflora: Information on California plants for education, research, and conservation, with data contributed by and private institutions and individuals, including the Consortium of California Herbaria. 2022. Berkeley, California. <https://www.calflora.org/> Accessed August 15, 2022
- California Department of Food and Agriculture (CDFA), Plant Pest Diagnostics Branch, Pest and Damage Record (PDR) Database. Accessed August 15, 2022.
- Celep, F., Atalay, Z., Dikmen, F., Doğan, M., and Classen-Bockhoff, R. 2014. Flies as pollinators of melittophilous *Salvia* species (Lamiaceae). *American Journal of Botany*, 101:2148–2159. <http://www.jstor.org/stable/43826618> Accessed April 20, 2022
- Consortium of California Herbaria (CCH). 2022. Data provided by the participants of CCH. Regents of the University of California. <http://ucjeps.berkeley.edu/consortium/> Accessed August 15, 2022
- DiTomaso, J.M., and Healy, E.A. 2007. *Weeds of California and Other Western States*. University of California Agriculture and Natural Resources Publication 3488.
- Giblin, D.E., Legler, B.S., Zika, P.F., and Olmstead, R.G. (eds.). 2018. *Flora of the Pacific Northwest*, 2nd edition. University of Washington Press, Seattle.
- Hedge, I.C. 1972. *Salvia* L. Pp.188-192 in Tutin, T.G. et al., eds. *Flora Europaea*. Volume 3. Diapensiaceae to Myoporaceae. Cambridge University Press.
-

Singhurst, J.R., Sander, S., Mink, J.N., and Holmes, W.C. 2012. *Salvia virgata* (Lamiaceae) naturalized in Texas. Phytoneuron 86:1-3. <http://www.phytoneuron.net/86PhytoN-Salviavirgata.pdf> Accessed April 20, 2022

University of Georgia, Center for Invasive Species and Ecosystem Health, Early Detection and Distribution Mapping System (EDDMapS). 2022. <https://www.eddmaps.org/distribution/usstate.cfm?sub=4361> Accessed April 18, 2022.

United States Department of Agriculture (USDA), Agricultural Research Service, National Plant Germplasm System. 2022. Germplasm Resources Information Network (GRIN Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland <https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomydetail?id=70597> Accessed April 20, 2022.

Washington State Noxious Weed Control Board. 2021. State Noxious Weed List. [Class A \(wa.gov\)](#) Accessed August 15, 2022

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***Comment Period: 12/19/2022 through 02/02/2023**

***NOTE:**

You must be registered and logged in to post a comment. If you have registered and have not received the registration confirmation, please contact us at [permits\[@\]cdfa.ca.gov](mailto:permits[@]cdfa.ca.gov).

Comment Format:

- ❖ Comments should refer to the appropriate California Pest Rating Proposal Form subsection(s) being commented on, as shown below.

Example Comment:

Consequences of Introduction: 1. Climate/Host Interaction: [Your comment that relates to "Climate/Host Interaction" here.]

- ❖ Posted comments will not be able to be viewed immediately.

- ❖ Comments may not be posted if they:

Contain inappropriate language which is not germane to the pest rating proposal;

Contains defamatory, false, inaccurate, abusive, obscene, pornographic, sexually oriented, threatening, racially offensive, discriminatory or illegal material;

Violates agency regulations prohibiting sexual harassment or other forms of discrimination;

Violates agency regulations prohibiting workplace violence, including threats.

- ❖ Comments may be edited prior to posting to ensure they are entirely germane.
- ❖ Posted comments shall be those which have been approved in content and posted to the website to be viewed, not just submitted.

Pest Rating: B
