California Pest Rating Profile for

***Misopates orontium* (L.) Raf., lesser snapdragon, linear-leaved snapdragon, weasel's-snout**

Family: Plantaginaceae

Pest Rating: C

Synonyms: *Antirrhinum orontium* L.

Comment Period: 03/15/2021 through 04/29/2021

Initiating Event:

Misopates orontium has been assigned a Q rating by the CDFA Botany Laboratory and requires a pest rating proposal.

History & Status:

Background: *Misopates orontium* is an annual herb with thin, glandular, simple to branched stems up to 0.7 meters high and an extensive fibrous root system. The leaves are sessile to very short-petiolate, opposite near the base of the stem and alternate toward the top of the plant, entire, linear to narrowly lanceolate or oblanceolate, 1-5.5 cm long, glandular-hairy, and have a prominent midrib (Freeman, 2019; Webb, 1972). The flowers are borne on short pedicels (0.5 to 2.5 mm long) in prominently glandular-hairy bracteate terminal racemes. The flowers are bilaterally symmetrical, with a pale green, deeply incised calyx with narrowly linear unequal lobes that exceed the corolla tube. The bilabiate, pink to purple corolla is 10-15 mm in length, and has a pouched corolla tube with its opening closed by the palate of the lower lip (snapdragon flower shape). The fruit is an ovoid to obliquely ovoid glandular-pubescent capsule approximately 8-10 mm in length, and contains up to 200-250 seeds at maturity (Freeman, 2019; Webb, 1972). The seeds are brown and minutely papillate, 0.9-1.2 mm long, and flattened, with the abaxial face keeled and narrowly winged and the adaxial face with a broad, sinuate marginal ridge and central depression (Freeman, 2019). Thompson (1988) notes that the plant grows rapidly and begins to flower late in the season after many other herbaceous species have already flowered. In California the species is reported to bloom from March to June (Wetherwax and Thompson, 2012).

Worldwide Distribution: *Misopates orontium* is native to southern Europe, Macaronesia (Cape Verde, Canary Islands, and Madeira), northern and eastern Africa, and western Asia. It has become naturalized in North America (U.S. and Canada), South America (Argentina, Bolivia, Ecuador), central and northern Europe, Japan, Australia, New Zealand, and South Africa (Freeman, 2019; Webb, 1972). In the western U.S., it has been reported from sporadic localities in Alaska, California, Oregon, Washington, Utah, Idaho and on several Hawaiian islands (USDA/NRCS, 2020). In the eastern U.S., it has been found in sporadic localities in Florida, Illinois, Kentucky, Virginia, Michigan, Ohio, Pennsylvania, New York, New Jersey, Connecticut, and Maine (Freeman, 2019; USDA/NRCS, 2020). In Canada it has been been recorded in a limited area of western British Colombia and in the provinces of Ontario, and Quebec.

Official Control: *Misopates orontium* is not under official control elsewhere in the United States, and is not a listed noxious weed seed in the United States (USDA/AMS, 2020; USDA/NRCS, 2020). It is not listed as a harmful organism for other countries in the USDA/PCIT database (2020).

California Distribution: In vouchered records from the Consortium of California Herbaria (CCH, 2020) *Misopates orontium* has been reported from several localities in San Luis Obispo County and sporadic localities in Los Angeles, Monterey, San Mateo, Sacramento, and Lake counties, with the earliest non-cultivated collections made in 1996 near Watsonville in Monterey County and in 1998 near Paso Robles in San Luis Obispo County. Additional individual localities in Alameda, Marin and San Francisco counties in the San Francisco Bay Area are shown in the Calflora database (CalFlora, 2020). The editorial analysis for the Jepson Manual (2nd edition) suggested that the species occurs in California as a transient introduction (waif) or escape from cultivation and had not naturalized in the state (Jepson Flora Project, 2011).

California Interceptions: A single plant of *Misopates orontium* was collected as a weed in a potted plant of maple in a nursery setting in Contra Costa County, submitted to CDFA Plant Pest Diagnostics Branch for identification in 2009 (CDFA PDR database, 2020). The record does not provide origin information, and the plant of *Misopates* was noted as a waif in the PDR entry.

Consequences of Introduction

1) **Climate/Host Interaction:** Score is **Medium (2)**
Misopates orontium is a Mediterranean species that can tolerate moist and dry soils, full and partial sun. It is found at elevations below 1200 meters (4000 feet). In the western U.S., it has been collected on gravel roadsides, highway road cuts, railyards, vacant urban lots, dry gravel bars, burned, low elevation woodlands, and experimental gardens, but has achieved only a very sporadic distribution (USDA/NRCS, 2020). Entries in CalFlora database (2020) suggest this species is an escaped cultivar that has naturalized occasionally in the wild.

Evaluate if the pest would have suitable hosts and climate to establish in California.
- 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)**
Misopates orontium can occur wherever 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)**

Misopates orontium reproduces only by seed. Seeds are small (approximately 1 mm long), produced in large numbers (approximately 200-250 per fruit), and are released through pores in the dry fruit capsules by wind or other physical disturbance. There are no reports of internal or external transport of seed by animals (Thompson, 1988). Seeds are flattened, with a longitudinal rib and an unevenly notched margin. Thompson (1988) speculates that the longitudinal rib may aid in water transport of the seed. The seeds may potentially be spread as contaminants of commercial seed lots, as evidenced by an individual collection in the CDFA Seed Herbarium in bluegrass seed from elsewhere in the United States,

but no intercepts of *Misopates* as a seed contaminant have been recorded for California in the CDFA PDR database. Field notes associated with two collections from Washington State indicate the species was found interspersed with other herbaceous species on a roadside and may have been included in a seed mixture used for erosion control (CPNWH, 2019).

Evaluate the natural and artificial dispersal potential of the pest.

- 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 **Low (1)**.

Misopates orontium is a host of *Peronospora antirrhini,* a causal organism of snapdragon downy mildew (Yarwood, 1947). The disease can infect cultivated snapdragon seedlings (*Antirrhinum majus*) and cause severe stunting, leaf curling, and leaf lesions, resulting in crop loss, decreased crop value, and increased production costs for the snapdragon cut flower industry. Economic impacts include the destruction of infected seedlings, treatment, and reinspection of remaining plants (Byrne et al., 2005).

The value of the California cut snapdragon market was just over $12,000 in 2019 (USDA/NASS, 2019).

Evaluate the economic impact of the pest to California using the criteria below.

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 **Medium (2)**

Misopates orontium is a host for *Peronsopora antirrhini*, which causes downey mildew infection in horticultural varieties of snapdragons in commercial or residential settings.

Environmental Impact:

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 *Misopates orontium:* Medium (10)

Low = 5-8 points
Medium = 9-12 points
High = 13-15 points

6) **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.

7) **Final Score: Medium 9 (10-1=9)**

Conclusion and Rating Justification:

Misopates orontium appears to persist only sporadically in disturbed habitats in California and thus appears to represent only a limited risk to agriculture or the environment in the state. A C-rating is recommended.

Uncertainty:

This species may be distributed through seed mixtures as well as possibly being cultivated as an ornamental for its attractive snapdragon-shaped flowers, but the extent of these uses is unclear.

References:

Byrne, J. M., Hausbeck, M. K., and Sconyers, L. E. 2005. Influence of environment on atmospheric concentrations of *Peronospora antirrhini* sporangia in field-grown snapdragon. Plant Disease. 89: 1060-1066.

CalFlora, 2019. Information in California plants for education, research and conservation with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria. Accessed: December 11, 2020. https://www.calflora.org/

CDFA Pest and Damage Record (PDR) Database. 2019. *Antirrhinum orontium, Misopates orontium*. Plant Health and Pest Prevention Services. CA Department of Food and Agriculture. Accessed December 11, 2020. http://phpps.cdfa.ca.gov/user/frmLogon2.asp

Consortium of Pacific Northwest Herbaria Specimen Database (CPNWH). 2019. http://www.pnwherbaria.org. Accessed October 5, 2019.

Freeman, C. C. 2019. *Misopates* Rafinesque. Pp. 36-37 in Flora of North America Editorial Committee (eds.). Flora of North America North of Mexico. Volume 17, Magnoliophyta: Tetrachondraceae to Orobanchaceae. Oxford University Press, New York and Oxford.

Jepson Flora Project. 2011. Jepson Interchange for California Floristics. https://ucjeps.berkeley.edu/cgi-bin/get_cpn.pl?33836&expand=1 Accessed December 14, 2020.

Thompson, D. 1988. Systematics of *Antirrhinum* (Scrophulariaceae) in the New World. Systematic Botany Monographs 22: 1-142.

United States Department of Agriculture (USDA), National Agricultural Statistics Services (NASS). 2018. Floriculture Crops, 2018 Summary.

United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), PLANTS Database. https://plants.usda.gov/core/profile?symbol=MIOR Accessed December 11, 2020.

United States Department of Agriculture (USDA), Agricultural Research Service, National Plant Germplasm System. 2019. Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx Accessed December 11, 2020.

United States Department of Agriculture (USDA), Phytosanitary Certificate Issuance and Tracking System (PCIT), Phytosanitary Export Database (2020). https://pcit.aphis.usda.gov/PExD/faces/ViewHarmfulOrgs.jsp Accessed December 14, 2020.

Webb, D. A. 1972. *Misopates* Rafin. P. 24 in T. G. Tutin et al. (eds.). Flora Europaea. Volume 3. Cambridge University Press, Cambridge, United Kingdom.

Wetherwax, M., and Thompson, D. 2012. *Antirrhinum orontium*, in Jepson Flora Project (eds.) *Jepson eFlora* http://ucjeps.berkeley.edu/eflora/ Accessed December 11, 2020.

Yarwood, C. 1947. Snapdragon downy mildew. *Hilgardia* 17(6): 239-250.

Author Contact: Courtney.Albrecht@cdfa.ca.gov

Responsible Party: Robert Price, Primary State Botanist; California Department of Food & Agriculture; Seed Laboratory and Herbarium; 3294 Meadowview Road, Sacramento, CA 95832; (916) 738-6700; permits[@]cdfa.ca.gov.

***Comment Period:** **03/15/2021 through 04/29/2021**

***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.

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: C