

Hort 5051

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Romanzoffia californica

Taxonomy:

Romanzoffia californica Greene is an herbaceous perennial native to the western coast of the United States and is commonly known as California Mistmaiden. The species was previously categorized under the synonym *Romanzoffia suksdorfii*⁴. The genus *Romanzoffia* originally resided in the Hydrophyllaceae family, although it was later moved to the family Boraginaceae².



Romanzoffia californica. © 2010 Aaron Schusteff¹

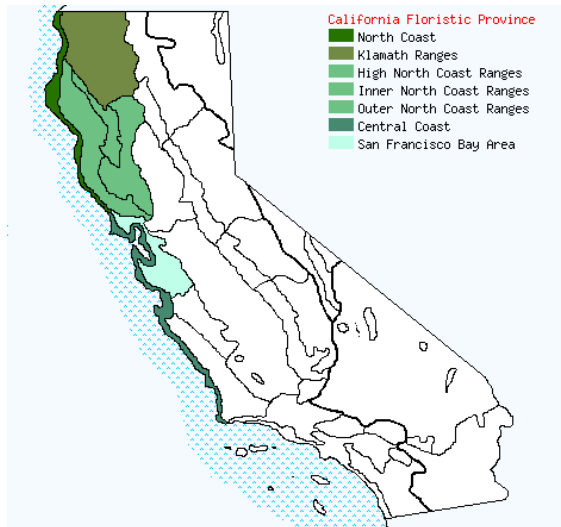
Geographic Distribution:

R. californica is endemic to southern Oregon and parts of California, specifically northwestern California, the northern part of the Central Coast, and the San Francisco Bay area, in the United States (North America)². The species is primarily found from 37-43°N latitude at elevations under 800 meters. The coastal areas that *R. californica* calls home generally have a Mediterranean climate and often feature moist, cool, and foggy conditions with rainy winters and dry summers. Invasiveness is unlikely due to the species' preferred habitat, however, a definitive claim on invasiveness cannot be determined since the species has been rarely cultivated outside of its native range.

Native Habitat:

R. californica can be found growing on ocean bluffs, along road banks, in mountain forests, on wet cliffs, and in other moist, rocky areas². Winter rains fuel early spring growth for

this and other species, with dry summers meaning little moisture and thus sparse growth during the warmer months of the year. It is likely that *R. californica* grows in the spring and dies back or goes dormant during the summer when conditions are dry. Underground tubers allow the



plant to store up nutrients for quick growth when moisture becomes available. The plant community in this region consists mainly of small herbaceous plants, woody shrubs, and coastal trees ranging from small pines to massive sequoias and redwoods.

Taxonomic Description:

R. californica (Hook.) Nutt.
California range. Image courtesy Jepson Flora²

perennial, appearing glabrous or slightly hairy and reaching a maximum 30-45cm in height^{1,2,3}.

The species has a tuberous root system consisting of clusters of hairy brown tubers that are oval in shape, from which the plant regenerates each spring^{2,3}. The leaves are simple and basal, with long petioles, rounded shallow lobes, and are sometimes toothed^{1,2,3}. The leaves are somewhat thick and succulent, and can range from 8-45mm across on a mature plant. The flowers are 5-12mm across, either bell or funnel-shaped, and arranged in a loose cyme^{1,2,3}. They are white with a yellow center, bisexual, and grow on long peduncles that rise above the leaves. Multiple inflorescences will appear on each plant. Once fertilized, the ovaries develop into a small oblong or ovoid fruit². The exact bloom time for this species is unknown, but it is surmised that it likely blooms in the spring after winter rains. Uses by indigenous people of *R. californica* are unknown, as are any other uses for the plant other than as an ornamental.

Cultivars on the Market:

There are currently no cultivars of *R. californica* available for purchase. Wild seed has been collected and is available via online order³.

Propagation Methods:

R. californica is generally seed propagated, but there is no known reason why vegetative propagation would not be feasible. The species regenerates from a cluster of tubers each spring, and these tubers would likely be usable for cloning of a desired genotype³.



R. californica flower ©2002 Bart and Susan Eisenberg¹

This experiment focused on seed propagation, specifically looking for methods of effective germination. A packet of approximately 130 *R. californica* seeds was received in week 5. On February 20th of week 8, the seeds were divided into two treatments, one that would undergo cold stratification in order to mimic the species' natural habitat and one that would not. 56 seeds were sown in a 288 plug tray using moistened LC8 Sunshine Mix, covered in a light layer of vermiculite, and put in the cooler at 4°C to undergo cold stratification. Another 56 seeds were sown in a 288 plug tray using moistened LC8 Sunshine Mix, covered in a light layer of vermiculite and put directly into the 369B-2 mist house. The mist house was maintained at a constant 21°C day/night temperature with zero DIF. Lighting was a constant 16 hours at 150 μmol of light. The mist nozzles activated every 10 minutes for a duration of 7 seconds.

The seeds in the cooler were monitored on a weekly basis and sprayed lightly with a mist bottle whenever they began to dry out. The seeds in the mist house were also monitored on a weekly basis to check for signs of germination. On March 24th of week 13 it was observed that 2 of the *R. californica* seedlings had germinated in the cooler, although they had etiolated and died

by the time they were noticed. The seeds were then moved to the same mist house as the other treatment after having undergone 4.5 weeks of cold stratification.

A week later, on March 31st of week 14, it was observed that 4 of the cold stratified seeds had germinated while none of the non-cold stratified seeds had yet shown any signs of germinating. These were the only 4 seeds that ever germinated during the experiment, other than the 2 that germinated and subsequently died in the cooler. On April 14th of week 16 it was noted that true leaves had formed on the 4 seedlings. All 4 seedlings were transplanted into 606 containers on April 18th of week 16 using the same LC8 Sunshine Mix that was used to plant the seeds. These 4 seedlings were then placed in greenhouse 369B-5. Here they were exposed to a constant day/night temperature of 21°C with zero DIF. A 2-3 hour temperature dip to 10°C took place every morning at sunrise. Lighting was provided for 16 hours at 150 µmol. The plants were watered daily and fertilized with 125ppm N CLF 15-5-15 Cal-Mag. They were monitored three times a week for signs of growth as well as pests and disease.

By week 18 the 4 plants were still quite small, measuring at most 2-3cm in height with a few small true leaves. Growth appears to be slow but steady, and no pest or disease problems were observed during the course of the experiment.

Overall this experiment was a success in that some *R. californica* plants were produced. However, only 6 out of 56 of the cold stratified seeds germinated, giving a 10.7% germination rate, which isn't altogether surprising from a non-cultivated species. It is quite possible that conditions in the cooler were colder than these seeds would experience in their native habitat, which may help explain the poor germination rate. Also, it should again be noted that 2 of those seedlings died



Seedlings. ©2014 Jacob R Deaver

shortly after germination, likely due to lack of light and cold temperatures in the cooler. None of the non-cold stratified seeds germinated, showing that cold stratification is likely a germination requirement for *R. californica*. While the four plants that were produced thus far have been slow to mature, it is hoped that they will continue to grow and will eventually flower. It is quite likely that *R. californica* is a short day plant and therefore will not flower in current greenhouse conditions, although it is possible that this species is day neutral. Bloom time, the average number of flowers per plant, and the number of seeds per flower are currently unknown, and this data would be very useful for future cultivation of this species.

Treatment	Number of Seeds Planted	Number of Seeds Germinated	Percent Germination	Leafing Data
Cold Stratified	56	6	10.7%	Cotyledons emerged week 14; true leaves emerged week 16
Not Cold Stratified	56	0	0.0%	N/A

Table 1: Experimental Data

Product Specifications:

R. californica is already a rather small species. An ideal phenotype would be small in stature and quite floriferous, with numerous small white flowers.

Market Niche:

R. californica would hold great appeal for collectors of rare plants and those who enjoy smaller, “dainty” flowers. The common name “California Mistmaiden” holds great marketing potential. Catalogs, tags, and signage could show off the mature, flowering plant and declare “This beautiful little maiden would look great in a fairy garden or terrarium!” The ability of the plant to flower year-round in the right conditions is unknown. The predicted spring bloom time and small white flowers give this plant a lot of sales potential during the Easter holiday. It

should also be noted that this species grows in full or part shade, and consumers are always looking for new shade-tolerant plants².

While *R. californica* is currently not familiar to growers or consumers, its unique appearance has the potential to catch on quickly and ensures that it has little direct competition. The crop is initially limited by poor germination as well as the need for a cool season growth period – a long, mild spring that doesn't exist in many parts of the United States, including Minnesota. Also, being hardy in USDA zones 8 and 9 could limit the sales potential of this plant in both colder and warmer climates⁴. However, these issues could possibly be ironed out through breeding, and the species may hold potential as an annual or even a houseplant in climates where it will not overwinter or have the right spring conditions in which to thrive. It will take some time to iron out the kinks and ramp up production, but with some enthusiasm from breeders, producers, and retailers, cultivars of *R. californica* could be available on the market in 5-7 years.

Anticipated Cultural Requirements:

R. californica is hardy in USDA zones 8 and 9⁴. The species requires cool, moist soil conditions in the spring, but drought and heat during the summer months are tolerated as the plants may die back or go dormant during that time². Given the species' native habitat and spring growing time, it is surmised that ideal growing temperatures would fall between 10-18°C. 10 hours of 150 µmol high-quality light should be adequate for this (likely) short-day species. A fertilizer similar to the one applied in the greenhouse (125ppm N CLF 15-5-15 Cal-Mag) should be appropriate. Given that the species naturally grows in rocky areas that are nutrient-poor, frequent feedings should not be necessary. Growing guides found online indicate the need for a

light, well-draining soil mixture^{2,3}. Producers should sow in 288 plug trays, then transplant the seedlings to 606 and finally 4" containers for sale at retail.

As this is a relatively short-statured crop, the use of plant growth regulators is not necessary, especially given the slow rate at which the plants grew during the aforementioned experiment. No disease or pest problems were observed during the experiment, so susceptibility to pathogens is unknown. Treatment with insecticides or fungicides should only be conducted if problems are observed during production.

Production Schedule:

Seeds may be stored in a seed vault after harvest, although duration of viability is unknown. Seeds should be sown during week 4 in 288 plug trays using a mix similar to LC8 Sunshine, covered with a light layer of vermiculite, moistened, and placed in a cooler at 7°C. After 4 weeks, the plug trays should be removed and placed in a mist house with conditions similar to those used in the experiment. It should take 1 week for seeds to germinate, after which they can be moved to a capillary mat in a greenhouse similar to 369B-5 where they will be watered and fertilized with 50 ppm N CaNO₃ using a hose-on proportioner.

It should take an additional 2 weeks for true leaves to appear. At this point seedlings can be transplanted into 606 containers and moved off of the capillary mat to another bench in the same greenhouse, where they will be given the 125ppm N CLF 15-5-15 Cal-Mag every other week to avoid overfeeding this species that typically grows in less nutrient-rich environments. No PGRs will be used, and fungicides and insecticides will only be used if problems appear or have occurred in the past. Once the plants have filled out the 606 containers they can be transplanted into their final 4" pots. It is estimated that it will take 5-6 weeks from the time of the first transplanting until the plants have reached maturity and flower. This schedule takes a

total of 12-13 weeks from sow to flower, and with flower timing only being an estimate it is not yet known if this timing would be successful. However, it is desired that this schedule would allow plants to be ready for Easter sale in week 16. Of course the start time could be moved forward or back depending on how early or late Easter is in a given year. It is quite likely that this schedule could be streamlined significantly if tuberous cuttings were used instead of seed.

Genetic Improvement:

There are several aspects of *R. californica* that should be improved via breeding to increase this crop's appeal to producers, growers, retailers, and consumers. Speeding up germination time and increasing the rate of germination would make the crop more viable for consumers. Germination may currently take up to several months, so this should be the highest initial priority for breeders³. Breeding for a longer growth period as well as increased drought tolerance would increase the appeal of *R. californica* to growers, retailers, and consumers.

Overall this is a great crop with a lot of potential for the market in the years to come!

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