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Invasive Plants of California's Wildland

Conium maculatum

Scientific name *Conium maculatum*

Common name poison hemlock, carrot fern, poison parsley, spotted hemlock

Synonymous scientific names none known

Closely related California natives 0

Closely related California non-natives: 0

Listed CalEPPC List B, CDFA nl

By: Jennifer Drewitz

Distribution



HOW DO I RECOGNIZE IT?

Distinctive features:

Poison hemlock (*Conium maculatum*) is a member of the carrot family. It is usually a biennial, with first-year plants producing ground-level rosettes. During the second year plants grow from two to ten feet tall with a stem that is ribbed, hollow, and has purplish streaks or splotches (Pitcher 1986). Small, white flowers grow in many umbrella-shaped clusters, each supported by a stalk. Leaves have a somewhat fern-like appearance and are finely pinnately divided. When crushed, they have a rank odor (Pitcher 1986).

Description:

Apiaceae. Biennial. Stems: hollow, ribbed with purple spots. Leaves: opposite, ovate, tapered, serrate, and finely pinnately divided. Inflorescence: umbels terminal and lateral. There are 4-6 bracts, brown in color, and 5-6 bractlets present. Pedicels abundant. Flower: petals white or yellowish, usually wide with narrow tips. Ray flowers number 10-20, 0.6-2 in (1.5-5cm). Fruit: 0.08-0.12 in (2-3mm) wide, ovate with



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distinctively wavy ribs
(Hickman 1993).

WHERE WOULD I FIND IT?

Poison hemlock has spread throughout California in areas below 5,000 feet (1,500 m) elevation, excluding the Great Basin and Desert provinces (Pitcher 1986, Hickman 1993). It is commonly found in dense patches along roadsides and fields. It also thrives in meadows and pastures and is occasionally found in riparian forests and flood plains (Goeden and Ricker 1982). It does best in disturbed areas where soil is moist with some shade. Poison hemlock is also able to form stands in dry, open areas (Parsons 1992).

WHERE DID IT COME FROM AND HOW IS IT SPREAD?

Poison hemlock is native to Europe, North Africa, and Asia (Pitcher 1986). It was brought to the United States as a garden plant sometime in the 1800s and sold as a "winter fern" (Goeden and Ricker 1982, Parish 1920). The earliest poison hemlock collections were made in 1893 and 1897 in Berkeley and Truckee, respectively (Parish 1920). Poison hemlock has spread throughout the United States, Canada, Australia, New Zealand, and South America (Parsons 1992, Holm et al. 1979).

Poison hemlock reproduces only by seed, which is dispersed by water, mud, wind, animal fur, human clothing, boots, and machinery (Pitcher 1986, GGNRA 1989). It has no means of vegetative reproduction.

WHAT PROBLEMS DOES IT CAUSE?

Poison hemlock can spread quickly after the rainy season in areas that have been cleared or disturbed. Once established, it is highly competitive and prevents establishment of native plants by overshadowing (Serpa 1989). In agricultural areas it interferes with crops and production of feed for livestock (Jeffery and Robinson 1990). Poison hemlock is best known for its toxicity to vertebrates, causing death primarily by respiratory paralysis after ingestion. The alkaloids in poison hemlock depress the central nervous system. Symptoms include nausea, vomiting, convulsions, loss of muscle power, dilation of pupils, slowing of heartbeat, and eventual death from respiratory failure (Parsons 1992). In livestock, symptoms appear immediately after ingestion, and death occurs within two to three hours. The recommended treatment is the same as that for nicotine poisoning: tannic acid followed by a purgative (Parsons 1992).

Poison hemlock is toxic to livestock, wildlife, and humans. Cattle, sheep, horses, pigs, goats, and fowl are all susceptible to its toxicity. Poisoning occurs in horses when they eat a quantity approximately equal to 0.25 percent body weight and in cows, 0.5 percent body weight (Kingsbury, 1964). Poisonings are usually not caused by direct foraging of poison hemlock, but by consumption when it is mixed in stock feed (Parsons and Cuthbertson 1992).

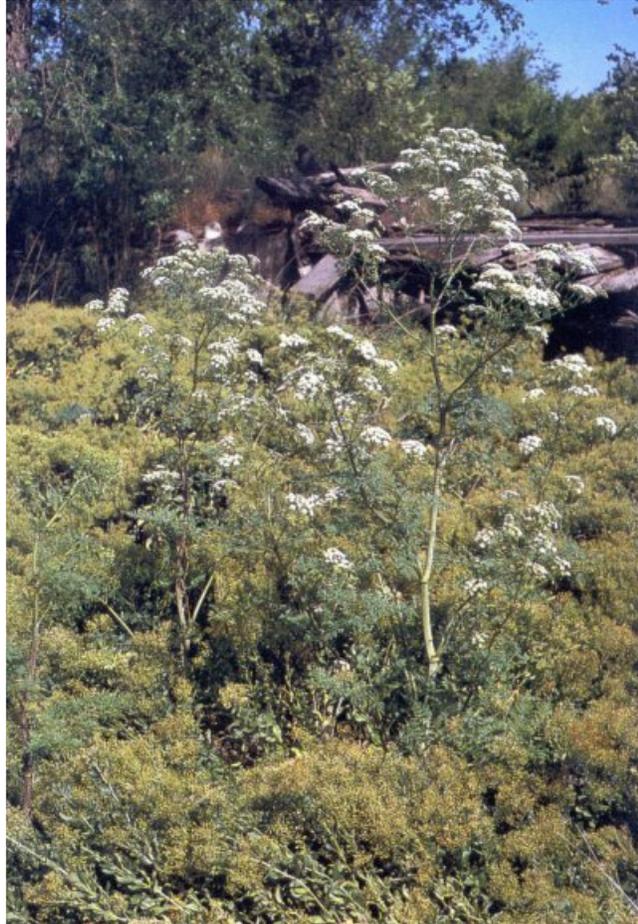
Wildlife is also susceptible to the toxic effects of poison hemlock. Ten percent of an elk population on Grizzly Island, California, died from ingesting poison hemlock in 1985 (Parsons and Cuthbertson 1992).

Field experiments have not established any allelopathic effects of poison hemlock (Serpa 1989).

Ancient Greeks used poison hemlock to carry out judicial executions, including the execution of Socrates (Parsons and Cuthbertson 1992). Most human poisonings occur when the leaves are eaten by people confusing them with edible seeds used as spices, or when children use the hollow stems as flutes (Kingsbury 1964). Seeds and young leaves are the most toxic parts of the plant. It is recommended that gloves be worn when handling the plant, as some people develop dermatitis, and that inhalation of particles be minimized (Parsons and Cuthbertson 1992). Children should be monitored when in areas containing poison hemlock.

HOW DOES IT GROW AND REPRODUCE?

Reproductive plant parts develop in mid-April, usually one year after germination (Amme 1988). In summer, once plants have set seed, they dry up and die leaving tall stalks to shade out other plants. The seed of poison hemlock is fully developed by mid-June. Plants disperse about 90 percent of their seed in September through December, with the remainder dispersed by late February (Baskin and Baskin 1990). This lengthy dispersal period allows poison hemlock to produce new seedlings continuously for several months (Baskin and Baskin 1990).



Poison hemlock has a large range of conditions in which it can germinate. It can germinate at temperatures greater than 9.4 C and lower than 33.8 C. It can germinate in darkness as well as in light. About 85 percent of seed produced is able to germinate as soon as it leaves the parent plant (Baskin and Baskin 1990). The remainder is dormant and requires certain environmental conditions (thought to be summer drying) in order to germinate (Baskin and Baskin 1990).

(click on photos to view larger image)



This ensures that some seed will remain in the seedbank until the following growing season. Seed can remain viable in the soil for up to three years (Baskin and Baskin 1990). It germinates most readily in soil, but can also germinate in sand. The combination of long seed dispersal period, seed dormancy, and non-specific germination requirements enable poison hemlock seedlings to emerge in almost

every month of the year (Roberts 1979). Germination takes place in all months of the year except April, May, and July, with late winter and early spring being the periods of greatest germination (Roberts 1979). Most vegetative growth occurs in winter months, with plants developing a deep taproot that is sometimes branched (Pitcher 1986).

Physical control:

Manual methods: Hand pulling of poison hemlock is effective, especially prior to seed set, and easiest when the soil is wet (Parsons 1992). Because of the biennial nature of the plant, the entire root system does not need to be removed (Pitcher 1986).

Mechanical methods: Spring mowing has proven effective in killing mature plants, yet regrowth may occur and new seedlings may continue to establish (Amme 1988). A second mow in late summer is recommended to eliminate remaining or subsequent growth (GGNRA 1989). Because poison hemlock seed has been shown to germinate up to three years after dispersal, a third year of mowing may be necessary (Baskin and Baskin 1993).

Prescribed burning: Joseph DiTomaso, with the University of California, Davis, Weed Science Group, states that burning is probably not a good control option. In areas where poison hemlock is the dominant vegetation (usually moist environments), sufficient dried material would not be available to provide adequate fuel to control poison hemlock before fruit maturation. This method has yet to be tried on poison hemlock.

Biological control:

Insects and fungi: Although biocontrol is being examined, at this time there is no USDA approved biocontrol agent for use on poison hemlock in California. Goeden and Ricker (1982) found few insects attacking poison hemlock in California. Those that were found feeding on poison hemlock were unspecialized and polyphagous species (Goeden and Ricker 1982). In 1994 Berenbaum and Harrison published a paper noting a native European oecophorid caterpillar, *Agonopterix alstroemeriana*, was infesting poison hemlock in northeastern and western parts of the United States (Berenbaum and Harrison 1994). According to Berenbaum and Passoa (1983), "*C. maculatum* appears to be the sole host of *A. alstroemeriana*." It is not known how *A. alstroemeriana* was introduced into the United States, but this defoliating moth is now described as a biological control agent providing good to excellent control when present in a medium to heavy infestation in the Pacific Northwest (William et al. 1996).

Chemical control:

Effective post-emergent herbicides include 2,4 D ester, 2,4 D amine, and glyphosate plus surfactant, all to be applied in late spring. 2,4 D has been effective when sprayed at 1.0 lb ai/acre (1.1 kg/ha) and mixed with a wetting agent (Jeffrey and Robinson 1990). Glyphosate at a rate of 1.0 lb/acre (1.1 kg/ha) plus surfactant (as Roundup®) has also proved effective in killing poison hemlock, especially in the rosette stage (Amme 1988, Jeffery and Robinson 1990). Glyphosate plus surfactant (as Roundup®) at a rate of 1.0 lb/acre (1.1 kg/ha) has also proved effective in killing poison hemlock, especially in the rosette stage (Amme 1988, Jeffery and Robinson 1990).

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