

Poison Hemlock: Options For Control

Poison Hemlock, *Conium maculatum L.*, a Class-C noxious weed, was first introduced from Europe as an ornamental in the 1880s. It is found in most states, including Washington. In Lincoln County, look for it along river drainages, roadsides, open fields and natural areas in Reardan, Edwall, Lords Valley, Odessa, Almira and Wilbur. It is common along Crab Creek, Wilson Creek and Goose

Creek. Poison Hemlock is a member of the Apiaceae family which also includes carrots, celery, parsley, anise, dill, caraway and coriander. It is an erect biennial, or sometimes perennial, which generally grows 4 to 6 feet in height, but sometimes as tall as 10 feet. In its first year of growth, the plants form a basal rosette of leaves. Erect stems and flowers are produced in the second year. It is acutely toxic to people and animals. Unrelated to the native evergreen hemlock tree, Poison Hemlock can be *deadly!* There are reports that some 35 head of cattle died on a ranch near Crab Creek during the winter of 2005-06, since it was possibly mixed in with bales of hay.



Poison Hemlock leaves are fern-like, similar to carrots or parsley.



In its first year, Poison Hemlock produces a large rosette.



Stems are hollow, mottled with purple spots and lack hairs.



The fruits are small, grayish-brown with two seeds in each.

Creek. Poison Hemlock is a member of the Apiaceae family which also includes carrots, celery, parsley, anise, dill, caraway and coriander. It is

Identifying Poison Hemlock

- Leaves of Poison Hemlock are shiny-green, very fine, fern-like, pinnately-divided three or four times, and leaflets are segmented, 1/8 to 1/4-inch long.
- Poison Hemlock has smooth, hollow stalks with purple blotches and no hairs on its stems.
- It is an erect biennial, but sometimes a perennial. In its first year, the plant forms a rosette of leaves close to the ground.
- Erect stems and flowers are produced in the second year, generally 4 to 6 feet in height, but sometimes as tall as 10 feet.
- It produces many white flower clusters in umbels, with an umbrella-shaped appearance.
- The individual flowers are tiny and five petaled.
- Poison Hemlock has a bad, musty smell that reminds some people of mice.
- Poison Hemlock is spread by seeds. It starts growing early in the spring, producing flowers in late spring. It will often have regrowth in the fall with more green shoots.
- Poison Hemlock occurs on the borders of pastures and cropland, gradually invading perennial crops like alfalfa. It tolerates poorly-drained soils and frequents stream and ditch banks.
- In contrast, wild carrot usually has one red flower in the center of the flower top and is usually 3 feet tall or less. Wild carrot produces flowers later in summer.
- Queen Anne's Lace smells like carrot greens, grows 2 to 4 feet tall, and has hair on its stems.



Poison Hemlock blooms look like Queen Anne's Lace.



Purple is common on lower stems.



Flower umbels, mostly flat on top



Both poisonous: Western Water-hemlock, a native plant, on left, and Poison Hemlock on the right.

Poison Hemlock's Toxicity

- All parts of the plant are highly toxic to humans and animals when eaten.
- Cases of human poisoning are generally associated with children using the hollow stems as flutes, or adults confusing Poison Hemlock for parsley, parsnip, or anise.
- Livestock poisonings are more common.
- Animals tend to avoid Poison Hemlock when other forage is available, but it is among the first green plants to emerge.
- The concentration of poisonous y-coniceine is also at its greatest in the spring.
- Regrowth of newly-germinated Poison Hemlock may be the last green forage available in the fall.



Poison Hemlock is often seen along streams and creek beds.

How Poisonous Is The Hemlock?

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- Ingestion of **Poison Hemlock** in the Fall may coincide with a critical time for gestation, causing birth defects in new-born livestock.
- Fetal deformity (**crooked calf disease**) is caused when pregnant cattle, pigs and goats consume toxins from **Poison Hemlock** during a specific interval in the gestation period.
- Toxins in **Poison Hemlock** can harm the developing fetus in pregnant animals, and affect the flavor and safety used for human consumption.
- Winter poisonings are common when harvested hay is fed to cattle, and **Poison Hemlock** is mixed in with the feed.
- A small degree of toxicity is lost upon drying. Boiling does not destroy the toxins.
- The seeds, leaves, roots and stems of **Poison Hemlock** are all poisonous. As the plant matures, the toxicity increases.
- The highest concentration of poisonous alkaloids is in the seeds. The roots are the least toxic and become toxic only later in the year.
- Environmental factors such as soil moisture, soil type, temperature and the season of growth can alter the plant's toxicity.
- Of domesticated animals, **cattle, goats and horses** are the most sensitive. A **lethal dose** in horses and cattle is as low as **0.25 to 0.5%** (fresh plant weight) of the animal's weight. A **lethal dose** for a horse is **4-5 pounds** of leaves; **cattle** may be poisoned with **1-2 pounds**, and **sheep** with a **half-pound or less**.
- **Symptoms of poisoning** include nervousness, trembling, knuckling at the fetlock joints, ataxia, dilation of the pupils, a weak and slow heartbeat, coma, respiratory paralysis and eventually death. Symptoms can occur within **30 to 40 minutes** in horses, and **1.5 to 2 hours** in cows and sheep.



Socrates, a fourth-century-B.C. Greek philosopher and teacher of **Plato**, is the most famous victim of **Poison Hemlock** poisoning. In **399 B.C.**, **Socrates** was accused of "impiety" and of "neglect of the Gods" and sentenced to death. In the painting above, the "**Death of Socrates**," by **Jacques-Louis David** (1748 - 1825), **Socrates** holds up his finger making another point as he continues to teach and pontificate while a disciple hands him a cup of hemlock. **Socrates** could have escaped out the hatch below his foot, but he felt duty-bound to follow the law, no matter what the cost.

- Large doses act as a depressant and cause a neuro-muscular block, as well as lowering blood pressure and heart rate.
- **Western Waterhemlock** is a **perennial, native plant** with erect stems. It grows to **7 feet tall**. Stems are smooth, purple-striped and hollow. A **yellow liquid** exudes from cut stems and roots. Leaves are toothed, and white flowers bloom in the late spring and early summer in umbrella-like clusters. It grows primarily along stream banks and irrigation canals, but it likes pastures or untilled areas. When this weed grows at the side of a pond or pool of water, it will poison the water. **Animals that drink the water may also be poisoned**. Since the weed is native to **Lincoln County**, control is not mandated by the weed board.



The stems of **Poison Hemlock** are hollow, but they cannot be safely used for homemade flutes.

Biology and Ecology of Poison Hemlock

- **Poison Hemlock** usually behaves as a **biennial that reproduces solely by seed**.
- Most seeds drop **close to the parent plant**. While some seeds may be spread by water, birds or rodents, it does not have a well-developed mechanism for long-distance seed dispersal.
- **Seeds are dispersed over a considerable time period**, beginning in **September** and ending in **late February**.
- About **85 percent** of seeds mature by **mid-July**, prior to dispersal, and these seeds germinate almost immediately.
- **Seeds dispersed in late-fall** give rise to seedlings in late-winter or the following fall.
- **Seeds dispersed in late-winter** germinate in the spring, fall or following year.



Poison Hemlock can be 10 feet tall. It is best to take control measures before it gets this tall.



It is wise to wear gloves when handling Poison Hemlock.



Purple speckles on the stem of Poison Hemlock are distinctive.



Seed pods on Poison Hemlock and later dried seeds

Manual Control of Hemlock

- When controlling Poison Hemlock, avoid skin contact with the plant.
- Wear gloves and long sleeves when pulling.
- Wash your hands thoroughly after handling the plant.
- Plants can be dug up or cut back, and removed manually.
- Do not compost the flowers as they can easily go to seed.

Mechanical & Cultural Control

- If done several times a season, plants can be mowed or cut back with a weed-eater, but before plants flower and they produce seed. A single mowing will not control it.
- Plowing or repeated cultivations are more effective when followed by mulching and replanting the area with desirable vegetation.
- Good competitive vegetation helps prevent infestation, but does not stop it entirely.

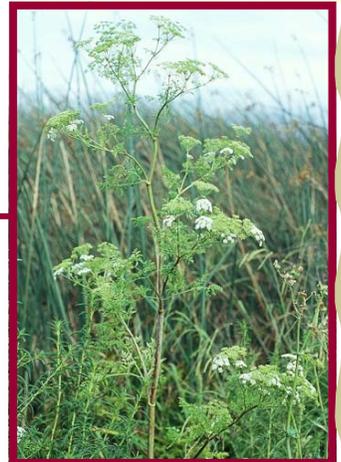
Chemical Control of Hemlock

- The application of 2, 4-D, Milestone or Weedmaster is effective if sprayed in the spring. 2, 4-D and Milestone can typically be applied to the edge of a creek or lake, but check the label instructions for specific details.
- Applying herbicide to freshly-cut plant stumps greatly improves the uptake of herbicide into the plant. Pour the herbicide down the hollow stalks.
- The addition of a surfactant will increase the effectiveness of the herbicide.
- Read the label instructions before applying any herbicides.
- Apply the herbicide to the entire leaf and stem surface of actively-growing plants.
- Do not cut the stems after applying the herbicide since this will prevent the plant from absorbing the herbicide into its roots.

Biological Control of Hemlock

- The Poison Hemlock Moth (*Agopterix alstromeriana*) is very effective in controlling Poison Hemlock.
- The larvae of this moth defoliates Poison Hemlock, reducing a healthy plant to just sticks and twigs.
- The Poison Hemlock moth has no known food source besides Poison Hemlock. The noxious weed is its sole host.
- The larvae live in conspicuous leaf rolls, and feed on the foliage, buds and flowers in spring and early summer.

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Poison Hemlock often likes to keep "its feet" damp.



Distinctive stems and leaves



Poison Hemlock in bloom is pretty, but dangerous.



The Hemlock moth can change a healthy plant into a stalk with no leaves or vegetation.



The Hemlock moth larvae start a leaf roll in the second photo.

How Effective Are Bio-Controls?



Larvae of Poison Hemlock Moth



Adult Hemlock Moth

- The larvae of the Hemlock Moths cause severe injury to Poison Hemlock.
- Plants are completely defoliated by several hundred larvae on each plant.
- Population densities can reach high levels, with up to 40 caterpillars per stem.



Seed pod

- Larval destruction of the inflorescences may prevent seed production.
- The damage by the larvae is equivalent to what can be done by the best herbicides.
- The Poison Hemlock Moth is one of the best bio-controls available.



Adult Hemlock Moth

Biology of *Agonopterix alstroemeriana*



Adult Hemlock Moth

- **Origin:** Morocco, Europe
- **First Releases in USA:** By accident in New York in 1973
- **First Seen in Washington:** 1985
- **Generations:** One per year.
- **Over-wintering Stage:** Adult moths over-winter in a state of temperature-induced quiescence among soil debris or in sheltered sites, such as under the bark of trees or in firewood piles.
- **Spring Activity:** Adult activity resumes in mid- to late-April at a time when **Poison Hemlock** resumes its growth.
- **Life Pattern:** The moth is **nocturnal**, resting during the day among vegetation or in ground litter.
- **Eggs:** Females deposit an average of 201 eggs over a **three-week period**. The oval, slightly flattened, pale-yellow eggs are affixed to the underside of leaves during late April and May.
- **First-Stage Larvae:** Upon hatching, the first-stage larvae chew irregularly-shaped holes through the leaf's upper epidermal and underlying mesophyll tissues.
- **Second- to Fifth-Stage Larvae:** The larvae reside beneath a flimsy blanket of silk strand which horizontally span the midrib. They then fasten the edges of a leaflet together with silk and reside in

these tight tubular shelters called "leaf rolls" while feeding on adjacent leaflets. The larval stages last about 24 days.

- **Destructive Stage:** Many larvae can co-exist on one leaf. **Feeding injury is severe**, and both non-flowering and flowering plants are frequently **totally defoliated by several hundred larvae per plant**.
- **Site of Attack:** Larvae also web together and consume flower buds, flowers and developing seeds, before moving on to the epidermis and mesophyll of stems and leaf petioles.
- **Pupal Stage:** Mature larvae then enter the soil to a depth of 1.0 to 3.0 cm. and spin silken cocoons adorned externally with soil particles and debris. They **pupate** for about 15 days.
- **Adult Stage:** Adults emerge during **June and July**, and disperse to other areas during late summer and early fall to find over-wintering sites.
- **Redistribution:** The moth can be collected in large numbers where it is established. While adults can be collected with a sweep net, it is far easier to clip off heavily-infested leaves, stems and inflorescences to re-distribute the material among unattacked **Poison Hemlock**.



Damage to Poison Hemlock by larvae of the hemlock moth



Adult Hemlock Moth



Early damage on Poison Hemlock



Leaf rolls on leaves



Damage by larvae



Dead Hemlock stalks