Poison hemlock
Conium maculatum L.

History and Ecology in North America

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CLASSIFICATION

RANKING	SCIENTIFIC NAME	COMMON NAME
Kingdom	Plantae	Plants
Subkingdom	Tracheobionta	Vascular plants
Superdivision	Spermatophyta	Seed plants
Division	Magnoliophyta	Flowering plants
Class	Magnoliopsida	Dicotyledons
Subclass	Rosidae	
Order	Apiales	
Family	Apiaceae	Carrot family
Genus	*Conium*	
Species	*Conium maculatum* L.	Poison hemlock

HISTORY AND DISTRIBUTION

Poison hemlock is native to Europe, Asia, and northern Africa. It was introduced to North America in the 1800s as a garden plant. It has been reported in 49 states and seven Canadian provinces (**Fig. 1**).

IMPACT

Poison hemlock is highly competitive, displacing native species in natural areas and reducing pasture and crop production. It is also an alternate host for many crop pests. All parts of the plant contain alkaloids that are highly toxic to livestock and humans and are responsible for numerous deaths and birth defects. Although livestock tend to avoid grazing the fresh plant, they may ingest dried poison hemlock present in hay or silage. Symptoms of poisoning in either livestock or humans may present as a lack of muscle control, nervousness, trembling, joint knuckling, dilated pupils, and a slow or weak heart beat. Death can occur in 30 minutes to two hours, depending on the species and size of the animal. In sensitive individuals, mere physical contact with foliage or roots may result in respiratory and skin reactions.

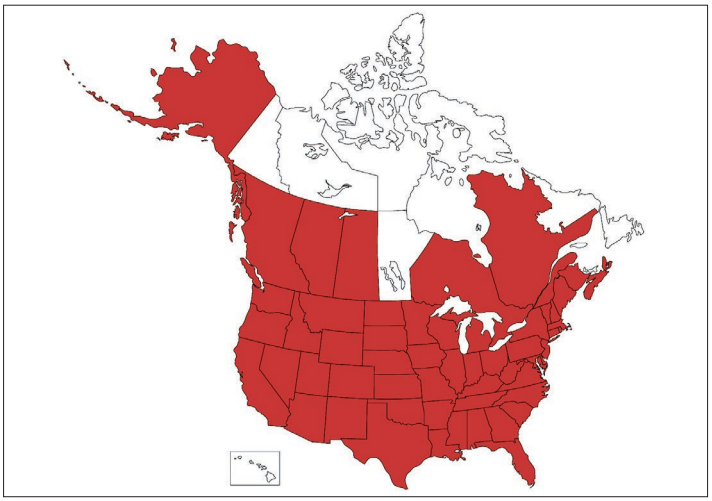


Figure 1. Poison hemlock reported distribution in North America (Credit: EDDMapS, www.eddmaps.org; USDA PLANTS Database, plants.usda.gov; both accessed 24 July 2023)

IDENTIFICATION

At a Glance

Poison hemlock (**Fig. 2**) is an herbaceous biennial (sometimes a winter annual or short-lived perennial) typically growing 3–6 ft (0.9–1.8 m) tall from a long, stout taproot. Stems are hollow with faint longitudinal ridges, light green, and covered in purple spots or splotches. Leaves are 2–3 times compound, and fern-like leaflets are glossy dark green, finely divided, and have prominent veins on their undersides. Flowers are produced in spring through summer in umbels 3 in (7½ cm) across. Each umbel is further divided into umbellets, each with approximately 15 flowers that are tiny and have five white petals. Each fruit splits into two seeds that are oval, flattened on one side, and have conspicuous wavy ribs.

Figure 2. Poison hemlock plant (Oliver S., iNaturalist.org CC BY-4.0)

Roots

Poison hemlock develops from long, stout, whitish-yellow taproots (**Fig. 3a**) that are often mistaken for wild parsnips. On average, roots may reach a depth of nearly 1 ft (30 cm) just one month after germination.

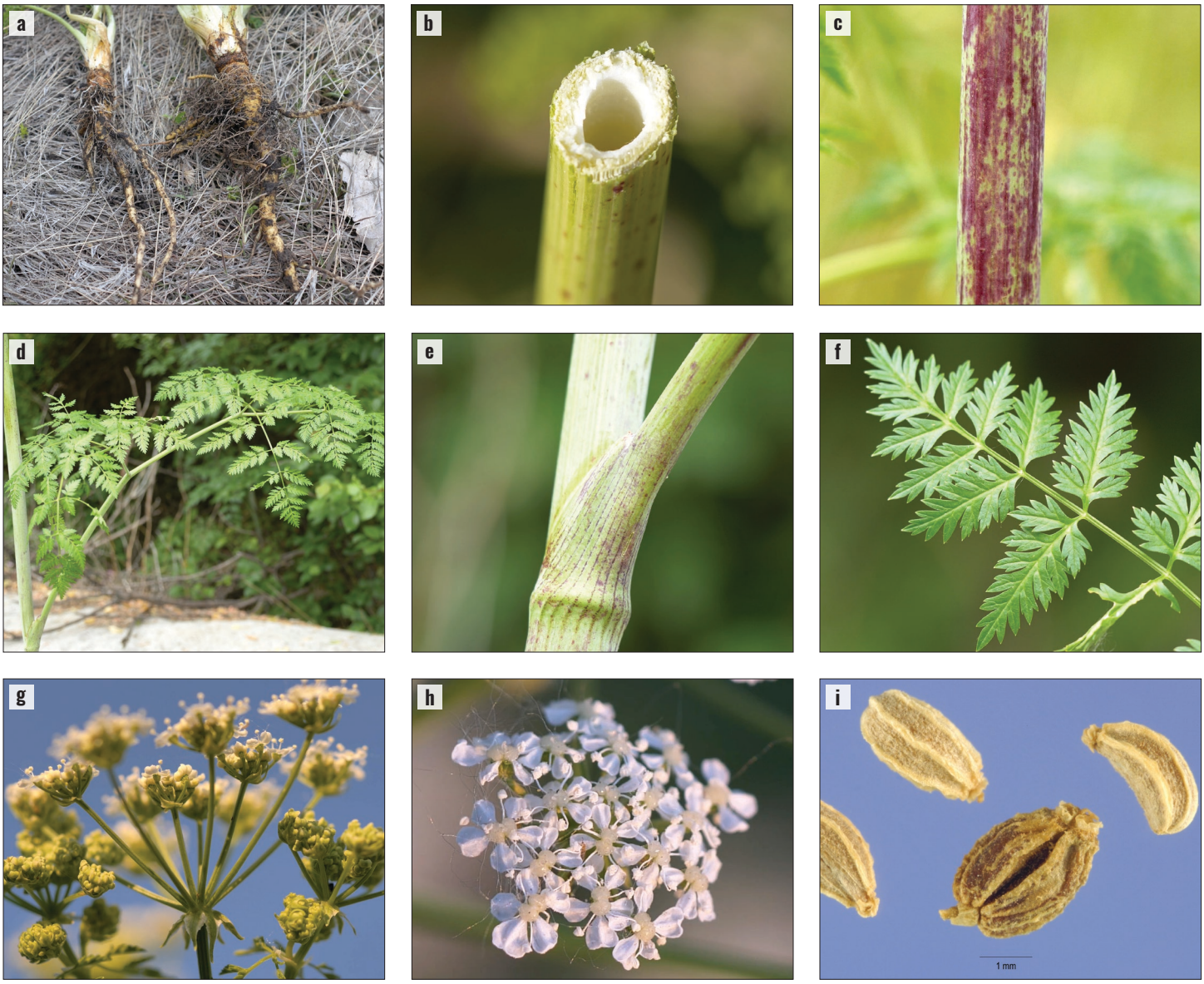


Figure 3. Poison hemlock (a) has stout, whitish-yellow taproots. Stems are (b) hollow with faint longitudinal ridges, (c) and often have purple spots or splotches. Leaves (d) are alternate, 2–3 times compound, and (e) partially sheath the stem at the point of attachment. Leaflets (f) are glossy dark green and finely toothed. Flowers are produced in (g) umbels that are further divided into umbellets. Each umbellet (h) has approximately 15 flowers, and all flowers have 5 tiny white petals. Fruits (i) each split into 2 seeds that are oval-shaped, flattened on one side, and have wavy ribs. (a–h: Travis McMahon, MIA Consulting; i: Steve Hurst, USDA NRCS PLANTS Database, Bugwood.org CC BY-3.0 US)

Stems and Leaves

Plants typically grow 3–6 ft (0.9–1.8 m) tall, though some may grow up to 9 ft (2¾ m). Stems grow singly with multiple widely-spaced branches (**Fig. 2**). Stems are hollow (**Fig. 3b**), have faint longitudinal ridges, are light green, and are covered in purple spots or splotches (**Fig. 3c**). Rosette leaves are up to 18 in (45 cm) long with obvious leaf stalks. Stem leaves are alternately arranged, and usually grow smaller farther up the stem. Leaves are 2–3 times compound, meaning each leaf is divided 2–3 times into smaller sections and leaflets (**Fig. 3d**). The base of a full true leaf is partially covered by a sheath where it attaches to the plant stem (**Fig. 3e**). Leaflets are glossy dark green, have prominent veins on their undersides, and their veins run to the tips of the leaflet teeth (**Fig. 3f**). They are opposite each other at the base and are finely toothed, giving the plant a fern-like appearance (**Fig. 3d**). Leaves and stems give off an unpleasant odor when crushed, described by some as resembling mouse urine.

Flowers

Flowers are produced at the tips of stems and branches. They occur in 3-in (7½ cm) umbels that resemble upside-down umbrellas with all flower stems arising from a single point (**Fig. 3g**). Poison hemlock flowers are compound meaning each stem of the umbel is again divided into umbellets, each with approximately 15 flowers (**Fig. 3g**). Individual flowers are tiny and have five white petals (**Fig. 3h**).

Fruits and Seeds

Each fruit splits into two single-seeded structures that are oval, flattened on one side, and have conspicuous wavy ribs (**Fig. 3i**). They are green at first but turn brown at maturity. A mature plant may produce 1,500–40,000 seeds.

ECOLOGY

Poison hemlock reproduces by seed only. Plants typically grow as biennials but may also grow as winter annuals or short-lived perennials. Seeds may germinate throughout the growing season provided the soil is sufficiently cool and moist. Some plants bolt and flower within the same calendar year. More typically, plants remain as rosettes the first year, then bolt and flower the second year. Flowering may occur from spring through summer. Most plants die after flowering and setting seed, though a small proportion overwinter and re-grow from the root crown to flower again in the following season. Seeds largely fall around the parent plant, but some may be transported by farm machinery, vehicles, agricultural produce, mud and clothing, as well as being carried by water, birds, and rodents. Some seeds may remain viable for up to six years, though most germinate within three.

HABITAT

Poison hemlock often grows at shady or moist sites. It is frequently found along roadsides, railways, field margins, and ditch banks as well as in pastures and low-lying waste areas (**Fig. 4a–f**). It also invades native plant communities in riparian woodlands and open flood plains of rivers and streams.

SIMILAR SPECIES

The combination of white umbel inflorescences, purple spots on stems, and hollow stems of poison hemlock differentiate it from unrelated species. Poison hemlock has numerous relatives in the carrot family (Apiaceae) present in North America, and many have similar features. In gardening or production settings, poison hemlock leaves can be confused with cultivated carrot (*Daucus carota* subsp. *sativus*) and parsley (*Petroselinum crispum*), so it is critical to carefully inspect foliage before consuming. In naturalized settings, the introduced weeds fool's parsley (*Aethusa cynapium*), bur chervil (*Anthriscus caucalis*), wild chervil (*A. sylvestris*), and wild carrot (*Daucus carota*) all have fern-like leaves and may be confused with poison hemlock, especially during early growth stages. At maturity, all four of these species (as well as cultivated carrot and parsley) grow smaller and lack the purple splotches on the stems. Native angelicas (*Angelica* spp.) and water hemlocks (*Cicuta* spp.) and the introduced wild parsnip (*Pastinaca sativa*) can have a very similar growth form to poison hemlock, but their leaves are not as finely divided and fern-like as poison hemlock, and many lack the purple splotches on stems. The native common cowparsnip (*Heracleum maximum*) and weedy giant hogweed (*Heracleum mantegazzianum*) often have similar blotchy purple stems, but both grow much larger than poison hemlock, have much larger leaves and flowers, and their leaves are non-ferny. Species most closely resembling poison hemlock in North America are listed in **Table 1**, along with key characteristics that can be used for differentiation.

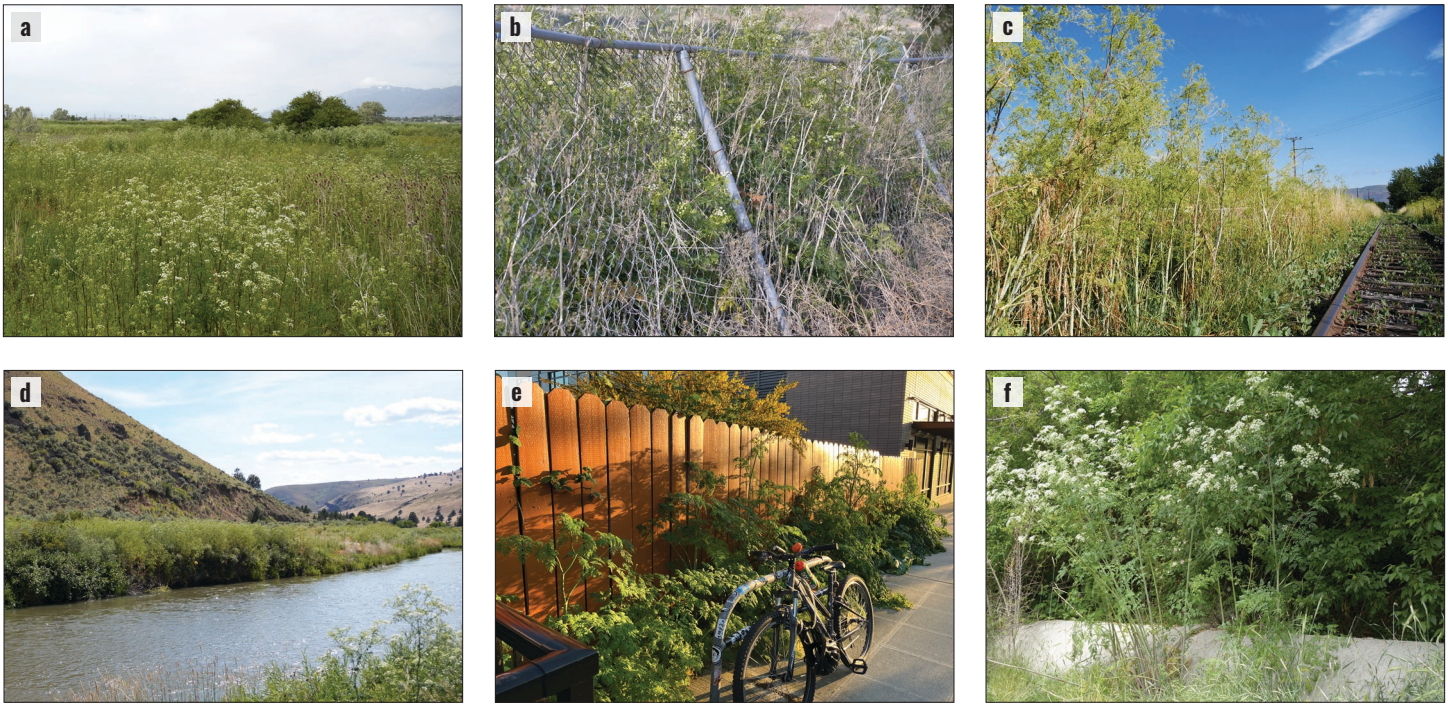


Figure 4. Poison hemlock is established in a variety of habitats but is frequently found in or along (a) moist pastures; (b) ditches and fence lines; (c) railroad tracks; (d) rivers (infestation spanning both sides); (e) urban areas; (f) shady, moist clearings (a–d,f: Travis McMahon, MIA Consulting; e: Jennifer Andreas, Washington State University Extension)

Table 1. Key traits for differentiating poison hemlock from similar species in the carrot family (Apiaceae) established in North America.

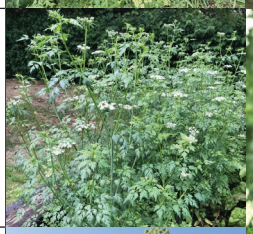
SPECIES	SIMILARITIES	DIFFERENCES	PLANT	LEAVES	FLOWERS
Cultivated carrot *Daucus carota* subsp. *sativus* Introduced biennial, but annual when cultivated	Can be a garden escapee; stout taproot; stems with longitudinal ridges; finely divided leaves; compound umbels with white flowers; ribbed seeds	Typically only cultivated; carrot odor; leaflets more deeply, finely lobed; stems solid, all green; umbel with long forked bracts; umbel closes after pollination; seeds bristly			
Parsley *Petroselinum crispum* Introduced biennial, but annual when cultivated	Can be a garden escapee; stems hollow with longitudinal ridges; finely divided leaves; compound umbels; ribbed seeds	Typically only cultivated; ≤30 in (75 cm) tall; parsley odor when crushed; stems not spotted purple; leaflets either flat or curly; flowers more yellowish			
Fool's parsley *Aethusa cynapium* Introduced annual	Habitat; fern-like appearance; stems may have few purple lines; leaf size, shape, and color; disagreeable odor when crushed; compound umbels; white flowers; ribbed seeds	≤2 ft (60 cm) tall; stems smooth, not spotted purple; umbel more flat-topped, ≤2 in (5 cm) across; umbellets with 8–12 flowers, 3 or 4 long hanging bracts; fine hairs on umbel stalks			
Purple-stemmed angelica *Angelica atropurpurea* Native perennial	Found in moist habitats; similar height; purplish stems; widely-spaced branches; compound umbels	Not found in dry habitats; leaves larger, not finely divided; leaflets sharply toothed; leaf sheath larger; umbel more ball-shaped, much larger; flowers more yellowish			
Bur chervil *Anthriscus caucalis* Introduced annual	Habitat; stems with longitudinal ridges; fern-like appearance; leaf size, shape, and color; compound umbels; white flowers	≤3.3 ft (1 m) tall; stems not spotted purple; umbel smaller; fewer and smaller umbellets with 3–7 flowers; fine hairs on lower stems, leaves, flowers; fruit covered in hooked hairs			
Wild carrot *Daucus carota* Introduced biennial	Habitat; stems with longitudinal ridges; older stems purplish; finely divided leaves; compound umbels with white flowers	Not branched; stems solid; stems and leaf stalks hairy; umbel flatter, ≤6 in (15 cm) across with long forked bracts; center flower may be red; umbel closes after pollination; seeds burred			
Spotted water hemlock *Cicuta maculata* Native biennial or perennial	Found in moist habitats; similar height; stems often purplish, with longitudinal ridges; widely-spaced branches; compound umbels; umbellets with ≤15 white flowers	Not found in dry habitats; leaves larger, not finely divided; leaflets jaggedly toothed; leaf veins extend to notches between teeth rather than teeth tips; umbel larger			
Wild parsnip *Pastinaca sativa* Introduced biennial or perennial	Habitat; size; stems with longitudinal ridges; widely-spaced branches; compound umbels	Leaves larger, not finely divided; leaflets jaggedly toothed; umbels much larger; umbellets with 12–35 yellow flowers; fruits flattened, winged			

Photo credits Table 1: cultivated carrot plants (Deldean), leaf (Евгений Баранов), flowers (Igor); parsley plant (Michael Berardozzi), flat leaves (Naomy27), curly leaves (Fynnundsascha), flowers (Andreadt08); fool's parsley plant, leaves, flowers (Jessicahigham); purple-stemmed angelica plant (Dthaase), leaf (Nate Martineau), flowers (Erik Attaway); bur chervil plant (Dylan Winkler), leaves (Sarahnwilson), flowers (Jacob Smith); wild carrot plant (Prairieflower), leaf (Lionsmane91), flowers (Ivconrad1977); spotted water hemlock plant (Dstover), leaves and flowers (Sheri); wild parsnip plant (Alexander Iosipenko,), leaves (Alexander_sh), flowers (Alinanat); all images iNaturalist.org CC BY-NC 4.0

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ACKNOWLEDGMENTS

The authors thank two anonymous reviewers for providing helpful comments on earlier versions of this publication. This fact sheet was produced by the North American Invasive Species Management Association (NAISMA) with financial support from USDA Forest Service. The layout was designed by Rachel Winston, MIA Consulting.

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SUGGESTED CITATION

Randall, C.B., J.E. Andreas, and J. Milan. 2024. Poison Hemlock (*Conium maculatum*): History and Ecology in North America. *In*: R.L. Winston, Ed. Biological Control of Weeds in North America. North American Invasive Species Management Association, Milwaukee, WI. NAISMA-BCW-2024-22-POISON HEMLOCK-P.