Wild parsnip

Pastinaca sativa L.

Wild parsnip is closely related to carrot and parsley and was introduced to the US by early colonists as a food source. It was in cultivation in Virginia by 1609. The plant has been in Michigan since at least 1838. Its edible root becomes sweeter after winter frost and was used as a sweetener in Europe historically before cane sugar was introduced. The escaped form is less palatable. Wild parsnip is common throughout the northern US and Canada and thrives in a wide variety of soils and moisture conditions. It spreads primarily in disturbed areas, where it can form dense stands. It does not compete well in established grasslands but can invade along the edge, in degraded patches and also in prairie restorations.

The sap from wild parsnip stems and leaves contains furanocoumarin, a photosensitive chemical that can cause photodermatitis. After exposure to ultraviolet radiation from sunlight the affected skin may redden or blister like a severe sunburn within 48 hours, and the affected areas may remain discolored for two years. The effect is enhanced when skin is moistened by humidity or perspiration. Livestock and poultry are also vulnerable when sap contacts bare skin.


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Identification

Habit:

Wild parsnip is an herbaceous biennial or monocarpic perennial—it dies after it fruits. Initially, it produces a basal rosette, and once it has stored enough energy, it sends up a flowering shoot. This may take two years or longer. It can reach 1.5 m (5 ft) in height and has a long, thick taproot.

Leaves:

Wild parsnip has pinnately compound leaves with coarse, irregular teeth. Stem leaves are alternate, and the leaf base encircles the stem. Lower stem leaves are sometimes doubly pinnate and leaves decrease in size and lobing towards the top.

Stems:

Wild parsnip's stems are upright, thick and grooved, with sparse hairs. They are hollow between the nodes and may branch at the upper nodes.

Flowers:

Wild parsnip has numerous, tiny, yellow flowers with five miniscule petals. They are arranged in terminal compound umbels—large flat clusters composed of smaller clusters—that can reach 15 cm (6 in) in width.

Fruits/Seeds:

The yellowish seeds are large, oval and flat on one side, with ridges on the other. They can remain viable in the seed bank for up to four years.


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Habitat: Wild parsnip occurs in sunny, open habitats including roadsides, pastures and fields, disturbed natural areas, prairies and fens. Although it prefers moist, alkaline sites, it tolerates a range of soil and moisture conditions.

Caution!

The sap of wild parsnip contains chemicals that interact with sunlight and skin moisture causing burning and discoloration of the skin. Exposed skin is most vulnerable when plants are flowering; however, leaves, stems and fruits all contain these chemicals.

Similar species

The coarsely pinnately compound basal leaves and yellow flowers of wild parsnip distinguish it from other similar plants. Both cow parsnip (*Heracleum maculatum*) and giant hogweed (*H. mentagazianum*) have white flowers instead of yellow and much larger, divided leaves with fewer leaflets.

Cow parsnip

Giant hogweed

Golden alexanders (*Zizia aurea*) and prairie golden alexanders (*Zizia aptera*) have yellow flowers like wild parsnip, but golden alexanders have twice-divided leaves and prairie golden alexanders have simple, basal leaves. They are both shorter plants than wild parsnip.

Golden alexanders

Prairie golden alexanders

Reproduction/dispersal

Wild parsnip is a monocarpic perennial with a deep taproot. Seeds germinate predominately in the spring, and develop into basal rosettes that persist one or more years until producing a flowering stalk. Stalks have alternate leaves and can reach 5 feet in height. Flowering usually occurs in the second or third year, from June to the middle of July or longer, dependent upon site conditions. Pollinators have not been documented, but ants are suspected to be among them. Seeds mature in late fall after which the plant dies. Seeds are viable about three weeks after maturation and are reported to remain viable for at least four years. Seeds disperse in September and November, moving about 3 meters on average.

Best survey period

Detection of wild parsnip is easiest when it is in flower, as the large, flat-topped, yellow umbels are conspicuous on their irregular, long stalks. Up close, it can be distinguished at other times by the long, pinnately divided leaves with many coarsely toothed leaflets.

Planning a control program

Resources for invasive species control invariably fall short of the actual need, so it is important to prioritize sites for treatment and plan carefully. Assessing the scope of the problem is a critical first step:

- Map known populations.
- Identify the leading edges and outliers.
- Is the species widely dispersed throughout the region, or is it just beginning to appear?
- How is the species behaving in your area? Is it spreading rapidly?
- Identify potential dispersal pathways and monitor them; is the population along a pathway or stream?
- Does it lie in the path of road-mowing crews that might spread it further? Are there construction sites in the area where it might be introduced in fill dirt?
- Does it occur in high-quality habitat or on important recreational, hunting or fishing lands?

Given this information, develop a strategy for control:

1. Prioritize high value sites where treatment success can be achieved.
2. Prevent further spread by monitoring the leading edges and outliers.
3. Choose appropriate control methods, given site conditions and available resources.
4. Determine whether any permits are required (e.g., herbicide application in wetlands, prescribed burning).
5. Eradicate smaller, satellite populations.
6. Treat larger, core infestations.
7. Monitor to ensure desired results are being achieved; adapt management to improve success.

Documenting occurrences

In order to track the spread of an invasive species on a landscape scale, it is important to report populations where they occur. The Midwest Invasive Species information Network (MISIN) has an easy-to-use interactive online mapping system. MISIN I-phone and android phone apps are also available. Links to MISIN and its phone apps are provided in the "Online Resources" section. Herbaria also provide a valuable and authoritative record of plant distribution. The University of Michigan Herbarium's database can be searched online for county records of occurrence, for example. When wild parsnip is first encountered in a county where it has not been documented previously, specimens should be submitted to the Herbarium to document its presence. Check the "Online Resources" section for links to both of these resources.

Control

Wild parsnip is relatively easy to control, but extreme caution is necessary to ensure that plant sap does not get on one's skin or eyes as it can cause severe blistering and burning. Gloves and other protective clothing should always be worn when working with this species. The primary goals for control are to prevent seed production, deplete the seed bank and prevent the arrival of new seeds from nearby populations.

Using a variety of techniques including manual, mechanical and/or chemical control is usually most efficient and effective and should be tailored to the specific conditions of the site. It is critical to monitor treatment sites for multiple years, perhaps indefinitely, to ensure depletion of the existing seed bank and to prevent replenishment of the seed bank from other sources.

Hand pulling

Protective clothing, including gloves and eyewear should always be used because plant sap can cause serious blistering and irritation.

Hand pulling over repeated years can be an effective control technique for small populations, as long as soil conditions allow for the removal of the tap root. If the root is not removed, it can re-sprout. Pulling should occur before seeds have ripened or it will facilitate dispersal. Diligent, repeated monitoring and treatment to ensure depletion of the seed bank is required.

Soil disturbance by hand pulling can also stimulate germination. Deliberate stimulation in this way may expedite depletion of the seed bank, thereby speeding up long-term control. However, follow-up treatment of seedlings must be planned for at least four years and should be conducted each year before new seeds are produced.

Where removal of the tap-root is difficult, or when there are safety concerns, root slicing (see below) can provide an effective alternative.

If flowers are present on pulled plants, they should be bagged and taken to a landfill or dried and then burned or buried deep into the ground.

Hand pulling usually is not practical in large, well established populations but may be useful as follow-up to other control methods such as prescribed burning or herbicide application.

Root slicing

Slicing through the entire taproot with a sharp shovel or spade over repeated years can be effective for small populations. It is easier for wild parsnip than for garlic mustard or spotted knapweed because of the larger roots and taller stature of the plant. It can be useful in sites where roots are not easily extracted by hand pulling. Slicing should be made 1-2" below the surface, and the plant and attached root should be disposed of similarly to hand-pulled plants.

Root slicing is often preferred over hand pulling as there is less risk of skin exposure to the sap, but protective clothing and eyewear should still be used.

Root slicing is usually not practical in large, well established populations but may be useful as a follow-up to other control methods such as prescribed burning or herbicide application.

Mowing

Mowing over repeated years can be an effective control technique in sites where mowing does not harm other, desirable plants to the detriment of management goals. It does not kill the plant, but it reduces seed production. Mowing should occur after the emergence of flower heads, but before seeds enlarge. If mowing occurs too late, seeds will be dispersed.

Plants may re-sprout and still flower, but viable seed is rarely produced. Four to five years of mowing before new seeds are produced usually provides adequate control; however, this is dependent upon how well-established the population is and the site conditions. Follow-up monitoring for at least four years is required to ensure depletion of the seed bank. Any

new seeds that are produced after mowing is initiated will increase the length of time that mowing will be required.

Mowing prior to July 15 may kill or displace ground nesting birds and this should be considered during planning.

Clipping

For small populations, clipping off the flower or seed heads with scissors or clippers can reduce seed recruitment. Protective clothing and eyewear should be used. Clipped plants should be burned or bagged and disposed of in a landfill. Clipping must be continued until the seed bank is exhausted.

Grazing

A variety of animals will graze on wild parsnip, providing some control; however, too much parsnip grazing can result in injury from the sap reacting with the sun to cause burning. To prevent this, it is important to maintain ample amounts of other forage species where grazing occurs.

Chemical control

Chemical controls are typically used for large wild parsnip infestations where hand pulling or root slicing alone is impractical. It is often employed in conjunction with follow-up spot treatment of rosettes and seedlings by hand pulling, root slicing, targeted chemical application or burning with a hand-held propane torch.

Factors that should be considered when selecting an herbicide for use on a particular site include proximity to water or wetlands, presence or absence of desirable native vegetation, potential for erosion and the effectiveness of the herbicide under consideration on wild parsnip.

General considerations

Anyone applying herbicides as part of their employment must become a certified pesticide applicator. In addition, certification is required for the use of some herbicides under any circumstances. The exam is administered by the Michigan Department of Agriculture and Rural Development and a link to their website is included in the "Online Resources" section.

A permit from the Michigan Department of Environmental Quality is usually required to apply herbicide where standing water is present—in wetlands, along streams, rivers or lakes, or over open water. A permit is also required for herbicide use below the ordinary high water mark along the Great Lakes or Lake St. Clair shoreline, whether or not standing water is present. A link to their website is included in the "Online Resources" section.

A number of adjuvants or additives may be used with herbicides to improve their performance including mixing agents, surfactants, penetrating oils and dyes. Some are included in premixed products while others must be added. Adjuvants do not work with all products; consult the product label to determine which adjuvants may be used with a specific herbicide formulation.

Dyes are useful in keeping track of which plants have been treated, as well as detecting spills on clothing or equipment. Some premixed herbicides include dyes. Clothing dyes such as Rit® can be added to water soluble herbicides, while other products require oil-based dyes. Consult the product label for specific instructions.

Crop Data Management Systems, Inc. (CDMS) maintains a database of agro-chemicals that includes herbicide labels for specific products. Herbicide labels contain information on application methods and rates, specific weather conditions, equipment types, nozzles, etc., to provide the desired coverage and minimize the potential for volatilization or drift. They also contain critical information about the potential for damage to valuable non-target species. A link to the CDMS website is included in the "Online Resources" section.

Read the entire pesticide label before use. Follow all directions on the label.

Herbicide specifics

Glyphosate (e.g., Roundup Pro®, Rodeo®, Accord®) can provide effective control of wild parsnip. It should be applied as a foliar spray in the spring and fall to rosettes when native plants are dormant or senesced. It can also be applied to bolting and flowering plants but should be done well before seeds ripen. Fall treatment will not control seedlings that emerge in the spring, and dry conditions may inhibit translocation of herbicide to roots.

Glyphosate should be used with a vegetable oil-based, multi-purpose adjuvant (e.g. SprayTech® Oil) on upland sites or a wetland-approved, non-ionic surfactant (e.g., Cygnet Plus®) in wetlands. Only aquatic formulations should be used in wetlands or when contact with surface waters is anticipated. Glyphosate is not selective and will kill desirable non-target species through overspray and drift, in some

cases leading to increased erosion on site. Glyphosate works best at temperatures above 50 degrees.

Do not apply glyphosate during a drought, as plants will not translocate chemicals effectively.

Several other herbicides or herbicide combinations are highly effective for controlling wild parsnip in some settings; however, they all persist in the soil for months, require manure management and/or have the potential to contaminate ground or surface water. They are not currently recommended for wide-scale use until further data regarding their efficacy and risk in natural settings is obtained.

Foliar application

The product label for the specific herbicide being used provides essential information on coverage - how much of the foliage should be treated and how wet it should be. Herbicide labels also contain information on specific weather conditions, application modes, equipment types, nozzles, etc., to provide the desired coverage and minimize the potential for volatilization or drift.

The herbicide applicator is responsible for managing drift and damage to non-target vegetation. Wind speeds between 3 and 10 miles per hour are best for foliar herbicide spraying. At higher wind speeds, herbicide may be blown onto adjacent vegetation or water bodies.

At lower wind speeds, temperature inversions can occur, restricting vertical air movement. Under these conditions, small suspended droplets of herbicide can persist in a concentrated cloud and be blown off-target by variable gusts of wind. Ground fog indicates the presence of a temperature inversion, but if no fog is present, smoke movement on the ground can also reveal inversions. Smoke that layers and remains trapped in a cloud at a low level indicates an inversion, while smoke that rises and dissipates indicates good air mixing.

In hot, dry weather, herbicide can evaporate rapidly. Setting equipment to produce large droplets can help compensate for this. In general, follow all directions on the label of the specific herbicide being used, in order to prevent damage to non-target vegetation or water bodies.

Prescribed fire

General considerations

Permits are usually required before a prescribed fire. The Michigan Department of Natural Resources (DNR) is responsible for issuing burn permits in the Upper Peninsula and Northern Lower Peninsula unless a municipality wishes to do so. Municipalities located in the Southern Lower Peninsula issue burn permits under authority of the state law. A link to the DNR local fire contacts web page is included in the "Online Resources" section. In the Southern Lower Peninsula, contact the local fire marshall for permits and more information. In many situations, insurance is required before a permit is issued, to cover the cost of damages if the fire should escape.

Before initiating a program of prescribed fire, a written burn plan establishing the criteria necessary for starting, controlling, and extinguishing a burn is required. The burn plan includes details such as specific weather conditions, locations of fire control lines, ignition pattern, equipment and personnel needed, contingency plans, and important phone numbers. The burn plan is essentially the prescription for how to conduct the burn safely while accomplishing the management objectives.

Fire specifics

Spring burning can be useful in fire-adapted communities, but prescribed burning alone does not provide effective control of wild parsnip and is not recommended. Fire will control seedlings if there is adequate fuel; however, its impact to rosettes and older plants is variable, depending upon fire intensity. Established plants quickly re-sprout after fire and seed germination is stimulated. This increases parsnip's ability to compete with other desirable species.

Burning is often used in conjunction with follow-up spot treatment because the rosettes green-up quickly and are easier to see for targeted treatment. Follow-up spot treatment can be conducted by hand pulling, root slicing, herbicides or burning with a hand-held propane torch.

Prescribed burning should be implemented to meet specified management goals in accordance with specific site conditions. Fire may pose a risk to desirable plants; however, it may benefit other fire-adapted species such as prairie grasses, resulting in improved competition with parsnip. This should be considered during planning.

Hand-held propane torch

Freshly emerged seedlings can be killed with a handheld propane torch, but this should be done when conditions are not too dry, to minimize risk of

unintentional fire. As the first-year plants develop taproots, this method becomes less effective.

Interseeding

Native seeding may improve wild parsnip control efforts by increasing competition of desirable plants with parsnip seedlings. Assessment of the native seed bank prior to control efforts will help determine whether this is needed.

Manipulation of the canopy

Wild parsnip can colonize forested areas where the canopy is disturbed and there is increased light penetration. It can be advantageous to manage these openings by restoring the canopy quickly.

Biological control

To date, no effective biological control agents have been identified for wild parsnip. The native parsnip webworm feeds on it; however, the plant and webworm appear to have coevolved a relationship in which neither one has a selective advantage.

Integrated control:

Integrated control first requires an understanding of the site management goals, the biology of wild parsnip and the environment in which it is growing to select a combination of actions that collectively reduces its impact. Total site eradication may not be necessary to reach overall landowner objectives.

Using a combination of control methods usually provides better control than any single treatment alone. Herbicide, grazing or prescribed fire treatments are often followed up with spot treatment by hand pulling, herbicides or burning with a hand-held propane torch. Treatment will need to be continued until the seed bank is exhausted.

Disposal of plant parts

When plants are pulled or root-sliced, they should be disposed of in a manner that will ensure that their roots will dry out completely. If flowers or seed is present, plants should be burned or bagged and placed in a landfill. Where this is not possible, any resulting seedlings will require monitoring and control.

Although landscape waste cannot generally be disposed of in landfills, Michigan law permits the disposal of invasive species plant parts. See the "Online Resources" section for a link to the relevant legislation.

Online resources:

CDMS - herbicide labels
http://www.cdms.net/LabelsMsds/LMDefault.aspx?t=v

Invasive.org
http://www.invasive.org/

Michigan Department of Agriculture and Rural Development—Pesticide Certification
http://www.michigan.gov/pestexam

Michigan Department of Environmental Quality—Aquatic Nuisance Control
http://www.michigan.gov/anc

Michigan Department of Natural Resources—Local DNR Fire Manager contact list
http://www.michigan.gov/dnr/0,4570,7-153-30301_30505_44539-159248--,00.html

Michigan Invasive Species Coalition:
http://www.michiganinvasives.org/

Michigan Invasive Species Program:
http://www.michigan.gov/invasives

Michigan's Invasive Species Legislation
Natural Resources and Environmental Protection Act 451 of 1994, Section 324.4130
http://legislature.mi.gov/doc.aspx?mcl-324-41301

Michigan Legislation—landscape waste, disposal of invasive species plant parts
Natural Resources and Environmental Protection Act 451 of 1994, Section 324.11521, 2 (d)

Midwest Invasive Species Information System:
https://www.misin.msu.edu/

MIPN Invasive Species Control Database
https://mipncontroldatabase.wisc.edu/

MISIN Mapping Phone Apps:
http://www.misin.msu.edu/apps/

http://legislature.mi.gov/doc.aspx?mcl-324-11521

The Nature Conservancy's Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas
http://www.invasive.org/gist/handbook.html

University of Michigan Herbarium - Michigan Flora Online
http://michiganflora.net/

Quick reference – Wild Parsnip

This chart has been provided as a convenience to summarize the pros and cons of each herbicide and to present details on adjuvants, concentrations, etc., that do not fit into the discussion in the preceding sections. Although every attempt has been made to ensure accuracy, the product labels for the listed herbicides are the ultimate authority for their usage. Where there are conflicts, always follow the label directions. Techniques are listed in order of general preference by MDNR Wildlife Division staff but not all are suitable for wetlands or sensitive sites. Site conditions vary—choose a method that is best suited to conditions on the site being treated.

Anyone using herbicides in the course of their employment is required to be a certified pesticide applicator. Treatment in wetlands or over open water requires a permit from the Michigan Department of Environmental Quality.

These chemicals are available in a variety of formulations and concentrations. Concentration is listed below as a percentage of the active ingredient (AI) to facilitate use of different products/brands. Always follow all directions on the product label including mixing instructions, timing, rate, leaf coverage and the use of personal protective equipment.

	Herbicide	% A.I.	Adjuvant	Timing	Pros	Cons
Foliar Spray	Glyphosate (i.e., Roundup®, Rodeo®, Accord®)	1-3%	Some products already contain a surfactant - if not, add one (e.g., Cygnet Plus®, NuFilm IR®).	Target rosettes in late fall or in spring, prior to emergence of natives. Fallen leaves can decrease effectiveness. Best at temperatures above 50 degrees.	Some products approved for use in wetlands.	**Non-selective!** Use only when few or no natives are present.
Note: Wear protective eye cover when working with this species.						