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Description

Wild carrot, also known as Queen Anne's lace, has finely divided leaves like those of cultivated carrots. The leaves, petioles and flower stems may be densely hairy or have no hair. The leaves on the stem are arranged alternately. Flowering wild carrot may grow 4 feet tall. At the end of the stem is a primary umbel (seedhead) made up of numerous individual white flowers and possibly a purple flower in the center. Plants also may have many secondary umbels produced at any node on the stem below the primary umbel. Each flower on the umbel produces two seeds. After seed set, the umbel closes upward. Once the seeds have turned brown, they are mature. The roots of wild carrot are typically white. The characteristic odor of carrot is present when any part of the plant is crushed.

The Life Cycle of Wild Carrot

Wild carrot is a biennial weed. The life cycle of a biennial weed requires two years to complete. During the first year, the plant will emerge and grow as a rosette, producing only leaves. During the second year, a stem will emerge and the plant will flower and set seed. The emergence of the flower stem is called bolting. Once a biennial plant has set seed, it will die and no longer be a problem, though many seeds were produced that may germinate and form new plants in the future. Biennial weeds are characterized as having large diameter taproots to store the food needed to begin growth after winter and to produce a flower stem. Biennial weeds usually reproduce by seed only and not by vegetative structures such as rhizomes or perennial roots. Wild carrot typically overwinters in the rosette stage.

Biology of Wild Carrot

The appearance of individual wild carrot plants within a population and their response to herbicides are highly variable. Wild carrot may not always act as a biennial weed. Plants may complete their life cycle in one to three or more years, depending on the habitat in which the plants are growing. Seedlings of wild carrot may emerge as early as April and continue to emerge until mid-October, if favorable conditions exist. Seeds require large amounts of water to initiate germination. Most seeds germinate within two years of dispersal, but they may persist in the soil for up to seven years. Wild carrot may begin to produce leaves after the winter as early as March with favorable weather conditions. Root size determines if a plant will flower and set seed in the first or the second year following emergence or later. For the majority of plants in the population to survive the winter, the root crown diameter must be

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at least 1/8 inch. For the majority of plants in the population to begin flowering, the root crown diameter must be at least 1/2 inch. Wild carrot may begin to bolt as early as the beginning of June and flower as early as the end of June. Flowering will continue through August for these early plants, but other plants in the population may flower until the first frost. If plants are cut after flowering begins, they may produce a new bolt from below the cut, but flowering and seed set will be delayed and seed production greatly reduced. Cross-fertilization by many insect species is the major method of fertilization, but self-fertilization may occur. If a seed has reached maximum size at the time of a frost and is still green, then the seed may still be viable because of a process called after-ripening.

Habitat of Wild Carrot

Wild carrot is usually found in undisturbed habitats such as continuous no-tillage crop production, roadsides and railways, fencerows, fallow fields, waterways, ditches, pastures, hay fields, lawns and around buildings. Wild carrot usually becomes a problem in continuous no-tillage by encroaching from the field borders.

Methods of Control

Wild carrot control falls into three categories: cultural, such as crop rotation; mechanical, such as tillage or mowing; and chemical, using herbicides. Control of wild carrot may require a combination of these methods. The biology of wild carrot is a critical consideration in preventing or controlling wild carrot infestations. The ultimate goal of controlling wild carrot, regardless of the method, should be to prevent seed production, because seeds are the only means of reproduction and are short-lived in the soil. Environmental implications should be considered when choosing a method of control.

Cultural Control

Crop rotation in combination with other methods is the best strategy for control of wild carrot. Including fall-planted cereals such as wheat into a crop rotation can be very helpful in reducing wild carrot infestations. Wheat will prevent or greatly reduce wild carrot seed production because wheat harvest occurs when wild carrot plants are flowering but before seed production has occurred. This reduction in seed production will reduce the number of overwintered plants in the field two years later.

Mechanical Control

Tillage effectively and consistently controls wild carrot. The entire field can be tilled or tillage can be limited to the perimeter of the field as a preventive control measure. Mowing wheat stubble to 4 inches in late August will cut off any new flowering wild carrot and stop seed production. This practice also reduces seed production by other weeds, and herbicide applications in early October can be made with no barrier to spray coverage. Mowing rather than applying herbicides for control of wild carrot in non- crop areas, such as roadsides and fencerows, will help prevent development of herbicide resistance. To control wild carrot in non-crop areas or pastures, mow as close to the ground as possible when 75 percent of the population has begun flowering.

Chemical Control

Wild carrot may be controlled by herbicides at three stages of growth: overwintered plants with early preplant, preemergence or postemergence herbicide applications; established plants with fall herbicide applications; and seedlings with preemergence or postemergence herbicide applications. Overwintered and established plants are generally more difficult to control than seedlings.

Herbicide Resistance. Growers using herbicides to control wild carrot should follow a resistance management approach. Do not apply the same herbicide or herbicides with the same mode of action for more than two consecutive applications. Over half of wild carrot populations tested in the Midwest had at least one plant that was resistant to 2,4-D. This indicates that resistance of wild carrot to 2,4-D is widespread throughout the Midwest. The resistance to 2,4-D is likely a result of multiple applications of 2,4-D to roadsides over the years. Resistance may also occur at high frequencies in the natural population. The widespread occurrence of 2,4-D-resistant plants indicates that 2,4-D will control wild carrot at some sites and will be ineffective at others. In fields where 2,4-D is effective, the continued use of 2,4-D will lead to a resistance problem in as few as two or three years. Therefore, the use of 2,4-D for wild carrot control is discouraged.

Chemical Control of Overwintered Wild Carrot

The herbicides listed in the tables below represent the most effective herbicides for control of overwintered wild carrot in field trials conducted in Michigan in 1993 and 1994.

SOYBEANS

Herbicide	Rate	Timing	Effectiveness
Canopy + Lexone/Sencor + COC[1,4]	4.0 oz/A + 2.0 oz/A + 1%	PRE	Fair
Lorox Plus + COC[1,4]	14.0 oz/A + 1%	PRE	Fair
Classic + NIS[2,3,4]	0.67 oz/A + 1/4%	POST	Fair-Good
Pursuit + 28% N + NIS[4]	1/4 pt/A + 4% + 1/4%	POST	Poor-Fair

[1]Do not use Canopy or Lorox Plus if soil pH is greater than 6.8.
[2]Do not use Classic if soil pH is greater than 7.0.
[3]Increasing Classic to 0.75 oz/A + NIS may improve wild carrot control.
[4]COC = crop oil concentrate; NIS = non-ionic surfactant.

STS SOYBEANS

Herbicide	Rate	Timing	Effectiveness
Classic + COC[1,2,5]	0.75 oz/A + 1%	POST	Good
Synchrony STS + 28%N + COC[1,4,5]	0.85 oz/A[3]+ 2 qt/A + 1%	POST	Fair-Good

[1]Do not use Classic or Synchrony STS if soil pH is greater than 7.0.
[2]Apply this rate of Classic plus COC on STS soybeans only.
[3]One 3.4 oz soluble pack of Synchrony STS will treat 4 acres.
[4] Apply Synchrony STS to STS soybeans only
[5] COC = crop oil concentrate.

CORN

Herbicide	Rate	Timing	Effectiveness
Atrazine + COC[1,2]	1.5 lb ai/A + 1%	PRE	Poor-Fair
Atrazine + COC[1,2]	2.0 lb ai/A + 1%	POST	Good-Excellent
Beacon + 28% N + COC[2]	0.76 oz/A + 4% + 1%	POST	Good
Accent + 28% N + COC[2]	0.67 oz/A + 4% + 1%	POST	Fair-Good
Permit + NIS[2]	0.67 oz/A + 1/4%	POST	Fair-Good

[1]Do not apply more than 2½ lb ai/A of atrazine within a single growing season.
[2]COC = crop oil concentrate; NIS = non-ionic surfactant.

BURNDOWN

Herbicide	Rate	Timing	Effectiveness
Roundup + AMS + NIS[2]	1.0 qt/A + 17 lb/100 gal + 1/2 %	EPP	Poor-Excellent[1]
Roundup + AMS + NIS[2]	1.0 qt/A + 17 lb/100 gal + 1/2 %	PRE	Poor

[1]Control will be greater when application is made during the first warm period in spring following green-up.
[2]AMS = ammonium sulfate; NIS = non-ionic surfactant.

Chemical Control of Established Wild Carrot in Fall[1]

The herbicide listed in the table below represents the most effective chemical control option for established wild carrot based on a field trial conducted in 1993.

Herbicide	Rate	Timing	Effectiveness
Roundup + AMS + NIS[3]	1.0 qt/A + 17 lb/100 gal + 1/2%	Fall[2]	Fair-Good
Roundup + AMS + NIS[3]	2.0 qt/A + 17 lb/100 gal +1/2%	Fall[2]	Good

[1]The best opportunity for fall application of herbicides is in wheat stubble.
[2]Treatments should be applied in late September or early October. Light frosts which do not cause visible injury to the wild carrot will not reduce effectiveness of herbicide treatments. Apply when daytime high temperature is at least 60°F.
[3]AMS = ammonium sulfate; NIS = non-ionic surfactant.

Chemical Control of Seedling Wild Carrot

Based on greenhouse studies, the following herbicides should provide control of seedling wild carrot when used at typical application rates:

Preemergence	Postemergence
Bladex	Basagran
Canopy[1] + Lexone/Sencor	Bladex 90% DF
Harness	Permit
Lorox Plus[1]	Stinger
Surpass	

[1]Do not use Canopy or Lorox Plus if soil pH is greater than 6.8.

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