Exotic Biennials

Description

- Refer to the DCNR Invasive Plants pages under 'Herbs'- (http://www.dcnr.state.pa.us/forestry/plants/invasiveplants/index.htm), for information on seven biennial species, including garlic mustard (*Alliaria petiolata*), chervil (*Anthriscus sylvestris*), musk thistle (*Carduus nutans*), bull thistle (*Cirsium vulgare*), poison hemlock (*Conium maculatum*), dame's rocket (*Hesperis matronalis*). wild parsnip (*Pastinaca sativa*)
- Other problem biennials include common teasel (*Dipsacus fullonum*), plumeless thistle (*Carduus acanthoides*), and common burdock (*Arctium minus*).
- Biennial life span is two growing seasons. They germinate, and grow vegetatively as a rosette in year one, overwinter, then 'bolt' and flower, produce seed, and die in year two.
- They aren't just weedy - poison hemlock is deadly toxic to humans and livestock, and wild parsnip sap causes sunlight-induced blisters in sensitive individuals.
- Bull and musk thistles are Noxious Weed in PA.

Management Keys

There are a number of exotic biennials, and they vary somewhat in their flowering times and response to certain herbicides. These guidelines offer techniques and timings that should be effective against any biennial species you need to manage.

Long Term Goals

Biennials reproduce only by seed, and there is variability between species in how long their seed persists in the soil. The primary objective is to treat biennials early in their life cycle as selectively as practical, which increases the window of opportunity for desirable species to fill in, dominate the site, and limit the reinfestation by biennials. What complicates this is that many biennials can germinate throughout the growing season – eliminating one growth flush may just invite another. Leave as much desirable vegetation in place as practical.

Mechanical Control Methods

Biennials are taprooted, and unlike certain perennials, they generally do not regenerate from root fragments. Mechanical operations that completely remove shoot tissue will prevent regrowth.

Garlic mustard (*Alliaria petiolata*) is an example of a biennial that can be hand-pulled. When the plants bolt and are preparing to flower in the early spring, they are relatively easy to pull. This is one species that volunteers can effectively control. Each plant flowers over a period of weeks, and there will be variability of flower timing within a stand. Therefore, it is best to bag and remove the pulled plants from the site, as even early pulling episodes probably include plants that have viable seed.

For other species you can control isolated plants by shearing the root below the soil surface and removing the shoot and top of the root. This is labor intensive, and would only be suitable where plant numbers are low and the soil is moist or friable enough to penetrate with a shovel.

Controlling Biennials with Herbicides

Although biennials arise from seed, we don't rely on premergence herbicides as a control method. This is partly because we are typically devoting attention to the overwintered rosettes in the spring, rather than the next generation. Another factor that works against preemergent herbicide applications being a primary tool is the length of the germination window for many biennials. They are opportunistic species that can germinate throughout the growing season, whenever conditions are suitable.

Postemergence applications are the primary tool to control most biennial species. It is best to treat the rosette stage, as they are easier to selectively target with a spray application than taller, bolted plants. The window to treat rosettes is almost a year long. You can treat rosettes as soon as you recognize them after germination, and because they do not go dormant, you can treat even through the winter months as long as the temperature of the plant crown is above freezing.

pennsylvania
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
www.dcnr.state.pa.us

This work was sponsored by the Pennsylvania Department of Conservation and Natural Resources, Bureau of State Parks (PA DCNR).

A selective mix useful for treating biennials is *triclopyr* ('Triclopyr 3') plus *2,4-D* ('DMA 4 IVM'). This combination does not injure grasses, or most grass-like plants (sedges, rushes, etc.), and both ingredients have aquatic labeling. Therefore, you can preserve desirable grasses, and work near water with a mix that poses less risk to non-target organisms. This mix is useful for most broadleaved plants, but will be weak against a lot of woody species.

If you are going to target other species while treating biennials, use *glyphosate* ('Rodeo') plus *triclopyr* ('Triclopyr 3'). This mixture will be effective against almost any species you encounter, whether grass, forb, or woody. The application rate described in Table 1 is higher than needed to control biennial rosettes. To retain the ability to control difficult species and apply an appropriate dose to less resilient targets, make your mix more dilute than normal. For example, instead of a carrier volume of 20 gallons/acre, mix in 40 gallons/acre, but apply the same as you would for the 20 gallon/acre mix. Then, you are applying a half-rate to the biennials, and when you encounter a more difficult species, apply the mix heavier to increase the dosage. In this manner, you can use one mix, treat many species, and dose each only as needed.

Figure 1. The management calendar for biennials emphasizes treatment before seed set. The rosette stage represents a year-long window for herbicide treatment. The table shows extended ranges because it addresses many species.

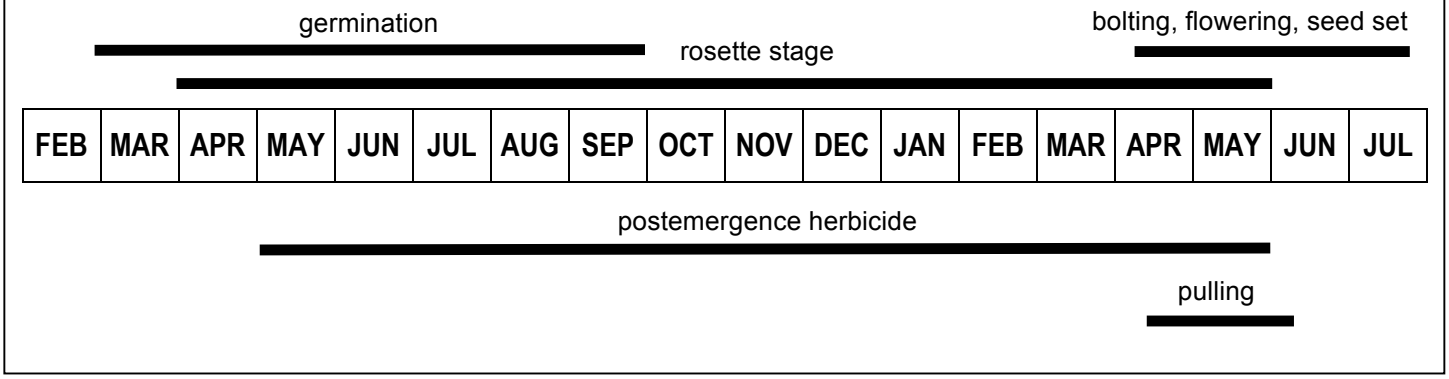

Table 1. Prescriptions for controlling invasive biennials emphasizes treatment before seed set, and when using herbicides, treat reproductive growth in the second season when it is easier to treat the low growing rosettes.

Timing	Treatment	Product Rate	Comments
Year 2: April to June	pulling	n/a	Garllc mustard is unique in that it pulls easily. Pull bolted plants from the pre-bloom to pre-seed shatter stage. Plants should be bagged and destroyed. This is a useful activity for volunteers.
Before seed set	root shearing	n/a	Most biennials have a distinct taproot. Individual plants can be controlled by cutting the root below the crown with a sharp digging tool and pulling the top.
Rosette stage	*Selective Postemergence* 'Triclopyr 3' plus 'DMA 4 IVM'	43 oz/ac plus 68 oz/acre	Postemergence applications of *triclopyr* ('Triclopyr 3') plus *2,4-D* ('DMA 4 IVM') are useful when targets plants are growing among desirable grasses or other grass-like plants. This is a broad spectrum combination that is aquatic-labeled and has little soil activity. This mix would be effective against most herbaceous species. Use an aquatic-labeled surfactant such as 'Alligare 90'. If you plan on treating woody vegetation as well during the operation, the 'Rodeo' plus 'Triclopyr 3' combination described below would be a better choice.
Rosette stage	*Non-selective Postemergence:* 'Rodeo' plus 'Triclopyr 3'	96 oz/ac + 64 oz/ac	This is a non-selective combination that would be effective when there is no advantage to using the selective mixture described above, or when you are also treating invasive grasses or woody species. An additional benefit is this mix will effectively control most any species you encounter during the operation. *Glyphosate* ('Rodeo') has been shown to be effective even in the dormant season, as long as the temperatures are above freezing. Use an aquatic-labeled surfactant such as 'Alligare 90'.