Tree-of-heaven (Ailanthus altissima)

Description

- Tree-of-heaven is commonly known as 'ailanthus'.
- Refer to the DCNR Invasive Plants page, and the Tree-of-heaven factsheet.
- Fast growing, weak-wooded, clonal (root suckering) tree.
- Dioecious – male and female flowers on separate plants.
- Individual stems are typically short-lived, but they can reach heights of 80 ft.
- Grows in dense clones where ailanthus stems can occupy all layers, from understory to canopy.
- Native to East Asia, imported as an ornamental and urban street tree in the late-1700's.
- Grows almost anywhere, from sidewalk cracks or spoil in full sun to fertile, partially-shaded alluvial soils along rivers and streams.

Management Keys

Due to its size and vigor, and extensive spreading root system, ailanthus can be difficult to control. As long as you are willing to invest the up-front effort and treat at the proper time, it can be successfully suppressed.

Be Persistent

There are two phases of invasive species management – control and maintenance. The control phase for ailanthus takes two seasons, and would ideally include two applications the first season and a rigorous follow-up treatment the second year.

After your control efforts have nearly eliminated the ailanthus, you need to periodically monitor the sites and treat any signs of new growth to prevent re-infestation.

Target the Roots – Timing is Key

To control ailanthus, you have to injure the root system. This is most effectively done with systemic herbicides, when the plant canopy is exporting sugars to the roots for growth and storage.

Systemic herbicides are most effective when applied later in the growing season (Figure 1). For ailanthus, we recommend waiting until July 1 to initiate treatment. This is when the foliage is sending sugars produced through photosynthesis back to the roots. Systemic herbicides are moved in the same direction through the plant as the sugars.

Applications made too early in the season do not translocate effectively to the roots, and only injure the aboveground growth.

Mechanical Operations

Cutting ailanthus is often necessary to remove potentially hazardous stems, but it is not useful as a control measure. In situations where you want to remove ailanthus stems, it is better to cut *after* herbicide treatment has taken effect.

Herbicide Applications

Ailanthus can be effectively treated with foliage or stem treatments. Tall, dense growth is best treated with a high volume ('spray to wet') application, while smaller stems can be treated with a low volume foliar or stem treatment approach.

Effective stem treatment methods include basal bark and 'hack and squirt'. Basal bark treatments use a concentrated mixture of herbicide in oil, applied to the complete circumference of the lower 12 to 18 inches of the stem. The 'hack and squirt' method uses concentrated herbicide solution applied to cuts spaced horizontally around the circumference of the stem. It is critical to have small intact spaces between cuts so the applied herbicide can translocate to the roots. If you completely girdle the stem, the herbicide can only move up in the stem, and you will not injure the roots or the stem below the girdle.

Dense, or extensive infestations should be treated initially with a foliar application. This will eliminate the small, dense growth. The 'clean-up' application can be stem treatment, or foliar, depending on the size of the remaining stems. Large, tall plants are easier to treat with stem treatment, while smaller stems are easier to treat with a foliar application.

Recommended Herbicides

There are many herbicides available that are very effective against ailanthus, but we recommend using *glyphosate* or *triclopyr.* They are both effective, have no or little soil activity, and are available as aquatic-labeled products. For foliar applications, we recommend mixing them together (Table 1). Either herbicide can be used

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for hack-and-squirt treatments, and *triclopyr* is also available in oil-soluble formulations for basal bark applications. There are two water-soluble formulations of *triclopyr*, 'Garlon 3A' and 'Vastlan'. 'Vastlan' is a new formulation, and is more concentrated (4 lb vs. 3 lb *triclopyr* /gallon) and less volatile, but has the same labeled uses as the more familiar 'Garlon 3A'.

What about Stump Treatment?

If you need to cut down ailanthus for immediate safety reasons, by all means do so and treat the stump. However, cutting the stems and treating the stumps does not provide effective control of the roots. When you remove the top, there is little downward flow of sugars to the roots. Stump treatment of ailanthus will keep the stump free of sprouts, but it will not prevent root suckering.

If you want to cut ailanthus, treat it first, and then wait until the dormant season to cut it. You should cut it before the next growing season because standing-dead ailanthus decays quickly. If you leave it stand too long, you may be faced with considerable hazard while trying to remove the ailanthus.

Figure 1. The management calendar for ailanthus emphasizes late-season treatment to maximize injury to the roots.

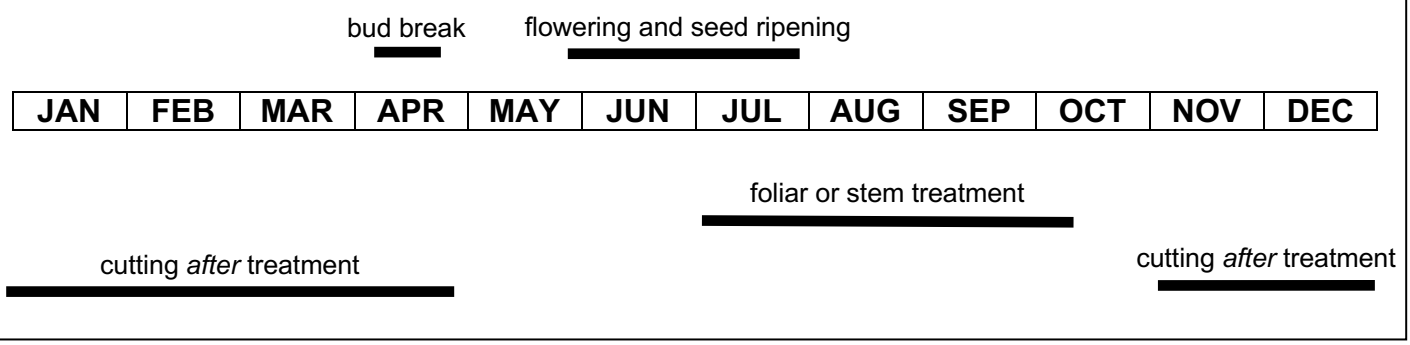

Table 1. Prescriptions for controlling ailanthus stress proper timing of operations to maximize injury to the roots. Improper timing will result in treatments that provide 'topkill' (shoot injury) but little net effect. Product names reflect the current PA State Herbicide Contract.

Treatment and Timing	Treatment	Product Rate	Comments
Foliar Application July 1 to fall color	'Aquaneat plus either 'Garlon 3A' or 'Vastlan'	3 qts/acre plus 2 qts/acre or 1.5 qts/acre	The combination of *glyphosate* and *triclopyr* provides a broad-spectrum treatment that is effective against ailanthus and other woody species that should be targeted as well during the operation. This is a non-selective mixture, but it has little soil activity, poses low risk to non-target organisms, and both products have aquatic labeling. A surfactant (e.g. 'CWC 90') needs to be added. If the *glyphosate* product 'Glyphomate 41' is used instead (4.3 qts/acre), no additional surfactant is needed.
Basal Bark July 1 to fall color	'Pathfinder II'	ready-to-use	'Pathfinder II' is an oil-based formulation of *triclopyr* that can be used for basal bark applications. Treat stems up to 6-in diameter by wetting the entire circumference of the lower 12 to 18 inches, without runoff. You can apply a shorter band to small stems. This technique is laborious, and is best suited for treating small infestations or as a follow-up to surviving stems after a foliar application. If stems are significantly larger than 6-in diameter, use hack and squirt.
Hack and Squirt July 1 to fall color	'Aquaneat' or 'Garlon 3A' or 'Vastlan'	Use either product undiluted or 1:1 with water	Hack-and-squirt is applying a concentrated herbicide mixture to fresh cuts spaced horizontally around the circumference of the stem. Leaving a small, intact space between cuts is critical becauseif you completely girdle the stem, the herbicide cannot translocate to the roots. A simple guideline for number of cutson small stems is 'inches in diameter plus one'. For stems greater than 12-inch diameter, make as many cuts as you can without girdling the stem. This is a laborious treatment best suited for low stem numbers, and stems at least 1-inch in diameter. Treat immediately after cutting, filling the cut with herbicide mixture using a squirt bottle.