



## Tree-of-heaven (*Ailanthus altissima*)

### Description

- Tree-of-heaven is commonly known as 'ailanthus'.
- Refer to the DCNR Invasive Exotic Plant Tutorial ailanthus page ([http://www.dcnr.state.pa.us/forestry/invasivetutorial/tree\\_of\\_heaven.htm](http://www.dcnr.state.pa.us/forestry/invasivetutorial/tree_of_heaven.htm)).
- Fast growing, weak-wooded, clonal (root suckering) tree.
- Dioecious – male and female flowers on separate plants.
- Individual stems are relatively short-lived, but they can reach heights of 80 ft.
- Grows in dense clones where ailanthus stems 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, 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 follow a few key guidelines, it can be successfully suppressed.

#### Target the Roots

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.

#### Timing is Key

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 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 to the roots, and only injure the aboveground growth.

### Management Approach

You need a program to manage ailanthus, not occasional bursts of activity. Ailanthus management falls into two phases – control and maintenance. The control phase will require two growing seasons, and the maintenance phase will be ongoing.

Anticipate three treatments during the control phase, and at least biennial treatments during the maintenance phase. If you are successful during the control phase, very little effort is required during the maintenance phase to prevent reinfestation.

#### Mechanical Operations

Cutting ailanthus is often necessary to remove potentially hazardous stems, but it is not usually useful as a control measure. You should only cut ailanthus if you are planning on treating the resulting resprouts. In situations where you want to remove ailanthus stems, it is better to cut *after* you have treated with herbicides.

#### 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 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 spaced cuts around the perimeter of the stem. It is critical that the stem cuts are spaced 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. The 'clean-up' application can be stem treatment, or foliar, depending on the size of the remaining stems. Large, tall stems 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* and *triclopyr*. For foliar applications, we recommend a mixture of these herbicides (Table 1). Either herbicide can be used for hack-and-squirt treatments, and *triclopyr* is available in oil soluble formulations for basal bark applications.

## 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 no more 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 down. 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.

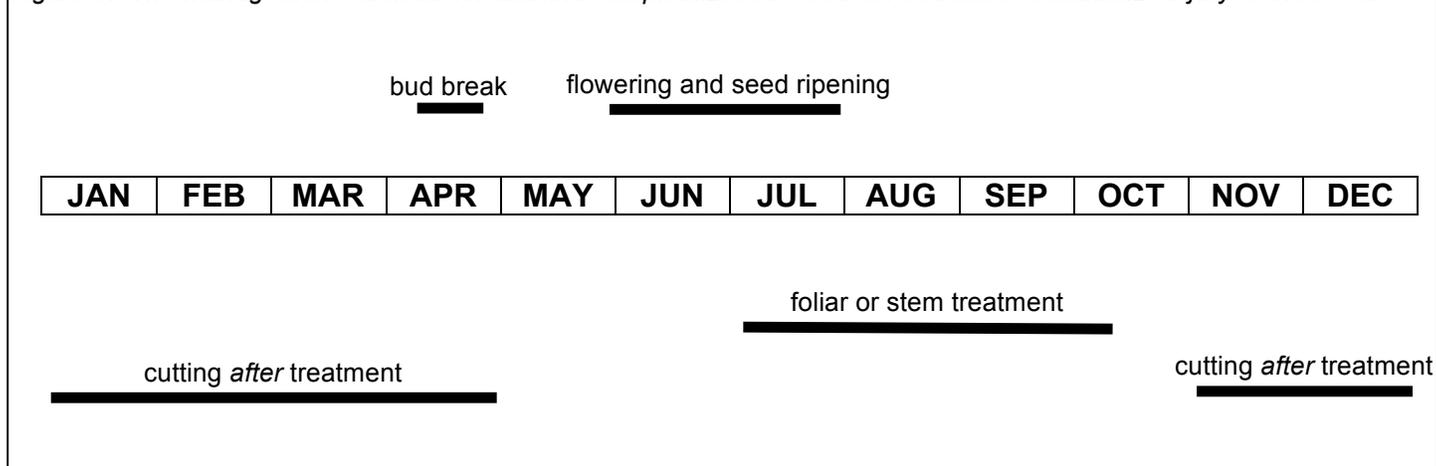


Table 1. Prescriptions for controlling ailanthus stress proper timing of operations to maximize injury to the roots. Improper timing will result in treatments that provide 'topkill' (shoot injury) but little net effect.

timing	treatment	product rate	comments
July 1 to fall color	foliar application of 'Aquaneat' plus 'Garlon 3A'	3 qts/acre  plus 1 qt/acre	The combination of <i>glyphosate</i> and <i>triclopyr</i> provides a broad-spectrum treatment that is effective against ailanthus and other woody species that should be targeted as well during the application. 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 needs to be added. If the <i>glyphosate</i> product 'Glyphomate 41' is used instead (4.25 qts/acre), no additional surfactant is needed.
July 1 to fall color	basal bark application 'Pathfinder II'	ready-to-use	'Pathfinder II' is an oil-based formulation of <i>triclopyr</i> that can be used for basal stem applications. Treat the entire circumference of the lower 12 to 18 inches to wet the stem without runoff. This technique is laborious, and is best suited for treating small infestations or as a follow-up to a foliar application.
July 1 to fall color	hack-and-squirt 'Aquaneat' or 'Glyphomate 41' or 'Garlon 3A'	undiluted or 1:1 with water	These are water-based formulations useful for hack-and-squirt treatments. It is essential to space the cuts so there is intact bark between the cuts. If you completely girdle the stem, the herbicide cannot translocate to the roots. A simple guideline for number of cuts is 'inches in diameter plus one'. 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.

### This publication is available in alternative media on request.

The Pennsylvania State University is committed to the policy that all persons shall have equal access to programs, facilities, admission, and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by University policy or by state or federal authorities. It is the policy of the University to maintain an academic and work environment free of discrimination, including harassment. The Pennsylvania State University prohibits discrimination and harassment against any person because of age, ancestry, color, disability or handicap, national origin, race, religious creed, sex, sexual orientation, gender identity, or veteran status. Discrimination or harassment against faculty, staff, or students will not be tolerated at The Pennsylvania State University. Direct all inquiries regarding the nondiscrimination policy to the Affirmative Action Director, The Pennsylvania State University, 328 Boucke Building, University Park, PA 16802-5901; Tel 814-865-4700/V, 814-863-1150/TTY.