

## Invasive Plant Information Sheet

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# Tree of Heaven *Ailanthus altissima* Quassia Family (Simaroubaceae)

**Ecological Impact:** Tree of Heaven grows rapidly and is a prolific seed producer. Individual trees can produce up to 325,000 seeds per year. Seeds are wind-dispersed and seedlings rapidly establish by producing a well-developed tap root in less than three months. Once established, Tree of Heaven outcompetes with native vegetation for sunlight and space. It quickly takes over an area and produces a dense thicket. Trees produce a toxin in the bark and leaves. As leaves accumulate in the soil, the toxin inhibits the growth of other species. Furthermore, the root system is capable of damaging sewers and foundations.

**Control Methods:** Tree of Heaven is very difficult to remove once established. The most effective control methods are to prevent establishment by annually monitoring for and removing seedlings and to treat saplings and larger trees with herbicides.

**Mechanical Control:** Seedlings should be hand pulled after a rain when the soil is loose. Be sure to remove the entire plant including all roots, since new plants can sprout from root fragments. Root sprouts resemble seedlings, but are attached to a lateral root and are nearly impossible to pull up. Saplings and larger plants can be cut using brush cutters, loppers and clippers, axes, or power saws. Trees can also be girdled. Initially, cutting is counter-productive as it will promote large numbers of stump sprouts and root suckers. However, cutting will prevent seed production and, if done repeatedly, will ultimately exhaust food reserves. If continued for several years, cutting will eventually kill the plants. The initial cut should be made in early summer when root reserves are lowest. If only a single cut can be made, the best time is when the tree begins to flower. At this stage, the food supply in the roots is nearly exhausted and seeds have not yet been produced. After cutting, stems should be treated with herbicide to prevent sprouting from root crowns. Mature trees can be girdled with an ordinary axe in the spring when trees are actively growing. Manually cut away bark and cambial tissue in a 2-3 cm wide ring around the trunk. To prevent sprouting, treat girdle cuts with herbicide.

**Chemical Control:** Herbicides can be applied broad scale as a foliar spray, or to select individuals as injection, cut stump, or basal bark treatments. Foliar sprays are highly effective, but should be used only where contact with nearby native vegetation can be prevented. Injection treatment inhibits or prevents sprouting and suckering if done at the right time of year. Cut stump treatment is best in areas where trees are to be removed. Basal bark treatment is one of the easiest methods and does not require cutting.

**1) Foliar Spray:** Spray plants with a systemic herbicide like glyphosate (e.g., Roundup™ or Rodeo™) when in full leaf. The leaves absorb the herbicide and transport it to the root system. If plants are in or near wetlands, only Rodeo™ should be used. For backpack sprayers, use a 2% solution of glyphosate and water. Another systemic herbicide known to be effective is triclopyr (Garlon 3ATM, Garlon 4TM), which is specific for broadleaf and woody plants and will not kill grasses. When using triclopyr, a small amount (0.5%, or as per label) of non-ionic surfactant should be mixed in to help the spray spread over and penetrate the leaves. For backpack sprayers, use a 1.5% solution of a 4 lb./gallon triclopyr product (Garlon 4TM) or a 2% solution of a 3 lb./gallon triclopyr product (Garlon 3ATM).

**2) Injection Treatment:** This treatment is most effective if done during the summer. Control of root suckers decreases in the fall and is poor during winter and spring months. Using a hand axe, make downward-angled cuts into the sapwood around the tree trunk. Make one cut for each inch

of diameter, plus one extra (e.g., for a 10 inch diameter tree, make 11 cuts). Space the cuts so that 1-2 inches of uncut living tissue remains between them. A continuous line cut may cause the tree to react by producing basal sprouts or root suckers. Apply 1-2 mls of full strength water-soluble triclopyr (Garlon 3ATM) into each cut so that the bottom of the cut is covered, but not running over. A trigger spray bottle works well as an applicator. Apply 1-2 sprays per cut. This method is relatively easy for one person to do, but working with a partner is recommended in case of accident. Follow-up with a foliar spray the next year to control basal sprouts and root suckers.

**3) Cut Stump Treatment:** This method is most effective if done in late spring or early summer. In early spring, sap flowing to the surface of the cut can rinse off the herbicide. In the fall, control of root suckers decreases. Treatment during dormancy may prevent stump sprouts, but will not inhibit root suckers. To ensure uptake of the herbicide before the plant seals off the cut, apply immediately after cutting, within 5-15 minutes. Use full strength water-soluble triclopyr (Garlon 3ATM) to treat the outer 1/3 of the stump. Apply with a sponge or paint brush or spray with a spray bottle or backpack sprayer. Follow-up with a foliar spray the next year to control stump sprouts and root suckers.

**4) Basal Bark Treatment:** This method is generally used for trees that are less than 6 inches in diameter. Best results occur during late winter/early spring when plants near the base of the tree are dormant. Summer treatments are effective as long as nearby vegetation is not a hindrance and low concentrations of herbicide can be used. Fall to mid-winter (October-January) treatments have shown poor results. The base of the tree must be free of snow, ice, or water on the bark from recent rainfall. Mix up a 20% (10% in summer) solution of oil-soluble triclopyr (Garlon 4TM) in 80% oil (mineral oil, special vegetable oils, kerosene, diesel, or fuel oil). To help the herbicide penetrate the bark, a pine oil based additive (e.g., Cide-Kick IITM) can be used at the rate of 10%. Another option is to use a pre-mixed, ready-to-use triclopyr product designed for basal bark treatment (e.g., Pathfinder IITM). Using a handheld or backpack sprayer, apply the mixture in a 12-inch wide band around the base of the trunk, making sure to not miss any areas. Follow-up with a foliar spray if basal sprouts or root suckers appear.

**Biological Control:** Currently, there are no biological control methods. Several fungal pathogens isolated from dead and dying trees are being examined as potential control agents.

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