

AILANTHUS ALTISSIMA (Tree-of-Heaven)

Family: Simaroubaceae

Other Common Names: Ailanthus, Chinese sumac, Stinking sumac

Introduction and Identification

Tree-of-Heaven is deciduous with a smooth trunk and pale gray bark. Twigs are light brown and thick with large shield, heart or horseshoe shaped leaf scars; old twigs are hairless. Wood is soft and weak, harsh textured and creamy white to light brown. Alternate compound leaves range from 1 to 4 feet long and possess 11-25 leaflets that are 2 to 6 inches long. Leaflets possess 1 to 5 coarse teeth on the margins; some leaflets have smooth margins. Tree-of-Heaven can be identified from other tree species by one to several glandular teeth near the leaflet base. Small, yellow-green flowers appear near branch tips; the male flowers have a particularly obnoxious odor of rancid peanut butter. Female trees produce one seed per samara, or flat winged fruit. Large obvious fruit clusters are colored red orange on initial maturation, and turn tan with age. The samaras may remain on the trees for a time before wind dispersal. New trees develop from roots that remain after cutting or pulling.

The wood is used in some developing nations for cellulose manufacture, pulp, furniture, woodwork and cabinetry. Water extracts of plant parts are reputed to have insecticidal properties. Tree-of-Heaven had been used in homeopathy to treat cancer. The fruits are used for ophthalmic diseases from Manchuria to the Malay Peninsula. Some of the Chinese people use it for hemorrhoids. The bark is utilized to treat coughs and gastrointestinal disturbances in Korea. The leaves, bark and roots make a wash for parasitic ulcers, itch and eruptions. Some people become sleepy breathing in the pungent odor. The leaves are toxic to domesticated animals and some people may get rashes from cutting down trees.

Natural History

Tree-of-Heaven is native to central China and is escaped in Europe. Its range is Canada to Argentina in the Western Hemisphere. A Philadelphia gardener introduced the tree to America in 1784. It was used as a stock in eastern US nurseries by 1840 due to its rapid growth and ability to grow in adverse conditions. Secondly, Chinese miners introduced Tree-of-Heaven during the days of the California gold rush because of the tree's medicinal properties. Tree-of-Heaven is naturalized around the old abodes and mining settlements of California. Frequency of occurrence increases near cities of the eastern United States.

Life Cycle and Ecology

Tree-of-Heaven demonstrates sensitivity to frost in early years of development, however 6 year old trees have survived winters as cold as -27 degrees F. Dry soils are thought to be more favorable for growth than wet soils. The tree performed well in poor soils and has been used to restore acid mine areas of pHs of 4.1 or less. Tree-of-Heaven tolerates air pollution well, enduring cement dust. The tree shows modest resistance to coke and coal-tar industry wastes and the leaves assimilate large amounts of sulfur in high traffic flow regions. High levels of mercury may collect in plant tissues and the tree is somewhat endures ozone exposure resistant. Invasive root systems may damage sewers and foundations.

Tree-of-Heaven reproduces asexually and sexually. New growth emerges from root parts and stumps. Seeds ripen in large bunches from September to October; a single tree may produce as many as 325,000 seeds per year averaging 30,000 per kilogram. Seeds have dormant embryos and germination occurs on moist sand held at 41 degrees F for 60 days. Tap roots form from seedlings in less than 3 months and the tree grows fast in full sun averaging 3 feet per year for four years. Trees may grow from 40 to 100 ft tall yet have a lifespan of 50 years or less.

Management and Control

Integrated Pest Management plans are the most effective to control Tree-of-Heaven. Plant debris may be introduced to a mechanical chipper to be used as a mulch during restoration tasks. Hand labor is one manual method to remove the root system. Pull plants when they are large enough to hold before seed production. The Bradley method involves hand weeding small areas starting with the wanted stands of native plants and working towards areas of overrun by the tree. Single weed or small groups of weeds are to be eliminated from the infestation fringes. Next areas to be worked on are those with a ratio of two native plants per one weed. Work into the center of thick weed patches as the native vegetation stabilizes. The Bradley method would have good efficacy on reserves with susceptible plant populations and low budgets.

Tree-of-Heaven is often cut with loppers, clippers, axes, machetes, brush cutters and power saws; these methods remove the above ground growths. Digging out roots manually is a certain way of eliminating the tree, but this is only useful for minor infestations around other trees and shrubs. Girdling is a process of bark and cambial tissue removal, performed by ax in spring while tree-of-heaven is growing. One effective control method of woody growth control is mechanical methods useful on near level ground with and few obstacles. Tractor mounted mowers or scythes on rough or stony ground may trim back saplings, but this method is nonselective. Several cuttings must be made so that the roots utilize all food supply. A single cutting is best when the tree starts to flower. Burning by flame thrower or weed burner device spot treats and heat girdles lower stems. Continued removal of seedling tops by grazing animals prevents seed development and weakens root systems and must continue until seed banks are gone.

Introduction of exotic casual agents of disease to control Tree-of-Heaven must be researched carefully to determine if native vegetation will be imperiled by the use of

these biocontrols. Zonate leafspot (*Cristulariella pyramidalis*) causes tree defoliation in Florida. *Atteva fabricella* defoliates Tree-of-Heaven in India. Seedlings in Italy subject to cold got parasitized by *Placosphaeria* spp.

References

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