Weed of Interest: Tree of Heaven

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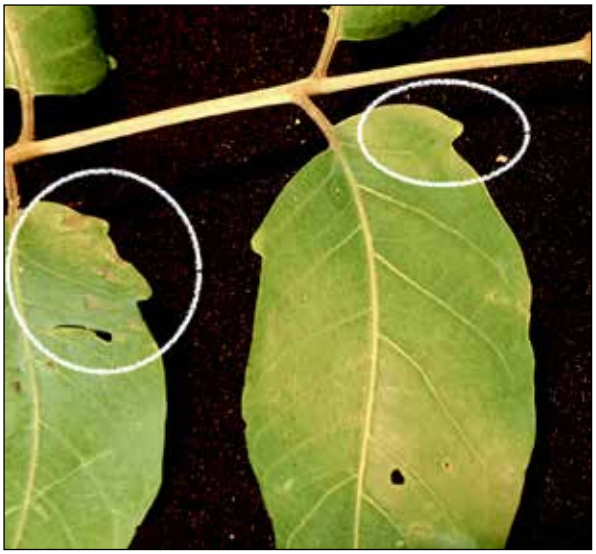
Tree of Heaven (*Ailanthus altissima)* has a long history of introduction in North America. The general public was largely made aware of it in 1943 by Betty Smith in her acclaimed novel, *A Tree Grows in Brooklyn*. The tree was celebrated for its tenacity and ability to take root where no other plants could grow. Brought to eastern North America as an ornamental species from East Asia by way of England in the 1700s, it was later introduced again on the West Coast in the 1800s by Chinese immigrants who brought it for its herbal and medicinal uses. The name is derived from an Indonesian language and reflects its revered status in parts of Asia as a tree of the gods or the heavens. It has a well-earned reputation for growing in urban waste areas and vacant lots as well as invading natural areas, especially those near roadways, train tracks or other transportation pathways. It is both reviled in areas where it has been introduced and revered in parts of its native range. Tree of Heaven has gathered a few nicknames over the years such as: Trash Tree, Tree from Hell, Stink Tree or, in its native range, God's Tree and Tree Reaching the Sky.

The Stink Tree moniker refers to the male flowers that grow separately from the female-flowered trees, and emit a powerfully unpleasant odor that has been described as 'burnt peanut butter'. It is this odor and its aggressively invasive behavior that in the early 20th Century turned public opinion against Tree of Heaven as a desirable street tree. A papery sheath (samara) surrounds a single seed and becomes twisted as it ages and drops from the tree. The twisted samara allows it to catch the wind and float far from the parent tree. It is not alone though; it has been estimated that a single tree over the course of its lifetime can produce more than 50 million seeds with viability in the range of 60-70 percent. That combination of extremely high production of germinable seeds makes for a huge potential for invasiveness. If this were its only invasive quality, it would be bad enough. But there are more! Both the seedling trees and the sprouts arising from roots can grow from 1.3 to 6 feet in the first year. By the second year they can reach as high as 9 feet! This rate of growth earns it a place in the record books as it as one of the fastest growing woody species in North

Tree of Heaven seedling. Photo by A. Senesac



Tree of Heaven leaflets with one or two notches at the base. Photo by A. Senesac

Tree of Heaven colony-mature trees and young root suckers. Photo by A. Senesac

Tree of Heaven samaras containing a single Tree of Heaven seed. The twist allows for wind dispersal. Photo by A. Senesac

America! Additionally, an allelopathic (anti-germination) compound, ailanthone (a triterpene), has been identified in the bark, roots and, to a lesser extent, the foliage of Tree of Heaven. This compound has several toxic properties and it is unclear how the tree uses it in its defense, although it has strong allelopathic and anti-insect-feeding properties. It is thought that the leaching of this compound to adjacent soil helps prevent other trees from establishing. It probably is also responsible for the fact that very few insects feed on Tree of Heaven. An exception to this is the spotted lanternfly (*Lycorma delicatula*). This new pest, a plant hopper, originating from East Asia uses *Ailanthus altissima* as a preferred and possible obligate host to complete its life cycle. Since this dreaded new insect pest has not yet appeared in large numbers in New York, removing as many Ailanthus trees as possible may decrease the likelihood of its spread. At least that is the hope. The spotted lanternfly has many other plant species that can act as a host to part of its life cycle, so it is not a guarantee that the absence of Tree of Heaven means the absence of spotted lanternfly.

Management Considerations:

There are some unique aspects of Tree of Heaven management that should be considered. It is one of the few tree species where cutting the stems can actually make the problem worse. The act of cutting the stem stimulates the lateral surface roots to send up more shoots. There are EPA-registered systemic herbicides that can be applied to the foliage before cutting or to the fresh cuts right after to prevent the re-sprouting. Unless the entire root system is physically removed, herbicide treatment is generally viewed as necessary to manage the vigorous resprouting. In recent years it was noticed in some Mid-Atlantic states that some stands of Tree of Heaven were being sickened and killed by a naturally occurring native fungus: *Verticillium nonalfalfae*. This systemic wilt can act very quickly once it is introduced into the vascular system of the tree. Symptoms of foliar wilt and necrosis can occur within four weeks of inoculation. Concerted efforts in Ohio and Pennsylvania are underway to obtain a Minor-Use Registration of a product containing this *Verticillium* isolate. Once registered by the EPA, the isolate, which is specific for *Ailanthus*, is fairly easy and inexpensive to produce and may provide an effective biological control of this invasive species. Although deer have been observed to consume the bark of small or immature trees, it doesn't appear to damage the trees enough kill large stands.

Is there anything good about it? Although no one is growing it on purpose for forestry purposes, it is occurring in great enough numbers to be considered for harvesting in infested commercial woodlots. The center of the tree has a weak corky pith and this limits its use for lumber, but it can be a useful source of pulp, biofuel/charcoal or fire wood. However, harvesting *Ailanthus* can complicate its management because just cutting the trunks is only one step in controlling it. Systemic herbicides need to be applied either before or after cutting to manage the root suckers that almost immediately start to grow. ●