Forest Health

Invasive Plant Hit List: Paulownia

by Jeff Stringer

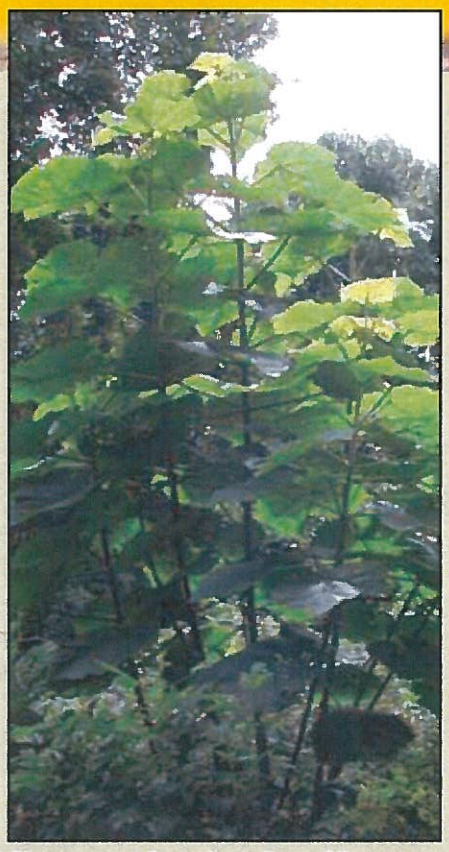

Photo courtesy: Pennsylvania Dept. of Conservation and Natural Resources, www.forestryimages.org

Paulownia is a genus that is composed of a number of species, all relatively similar in appearance. They are all native to China, produce abundant seed, and grow rapidly. While all of the Paulownia species will grow in the United States, *Paulownia tomentosa*, often referred to as Paulownia, royal Paulownia, princess or empress tree, became established in Kentucky in the 1800s and has naturalized throughout the Commonwealth.

Paulownia tomentosa was prized as a flowering ornamental in Europe where it was named after a Russian princess (thus, the root of the name) and brought to the east coast of North America as an ornamental. There are also references to the fluffy seed being used as packing material for goods from China and the seed being inadvertently released in the Ohio River valley.

Species and varieties of the genus Paulownia are still being sold as ornamentals in the United States because of the showy flowers. The highly prized timber of *Paulownia tomentosa* still commands interest. Unfortunately, some of the traits that facilitate its use as an ornamental, such as profuse flowering (and thus seeding), the ability to tolerate a wide range of site conditions, and its propensity to grow quickly, also make it problematic for invasion into native ecosystems. While this genus and *Paulownia tomentosa* in particular, can easily invade disturbed sites such as roadways, abandoned urban sites, surface-mined lands, it can also invade disturbed areas in forests very similar to tree-of-heaven, another Asian invasive tree species. While most Paulownia species have the ability to invade, because *Paulownia tomentosa* has been on the continent the longest and has had time to establish in natural settings it is listed as a nonnative invasive plant by the USDA and by many states.

Paulownia seed pods often remain on the tree and contain hundreds of small seeds. A single tree can produce millions of seeds contributing to its aggressive invasive nature.

Photo courtesy: Jeff Stringer

Identification

The species can easily reach 80 feet in height and over 48 inches in diameter. The bark is gray-brown, smooth when young and later turning rough. Leaves are very large, broadly oval to heart-shaped, and are similar to native catalpa, but, unlike catalpa, they originate on opposite sides of a branch. The leaves are noticeably hairy on the lower surfaces. In the spring, there will be a conspicuous amount of upright clusters of showy, pale violet, and sometimes fragrant flowers. The flowers mature into a dry brown capsule (often referred to as pods) with four compartments that contain several thousand tiny winged seeds. The pods mature in fall, opening to disperse seed but hang onto the tree throughout winter (a key to identification). The wood is pale and very lightweight, and the branches and main stem have a large open pith.

Removal

In most woodlands, *Paulownia tomentosa* occurs scattered or occasionally in small groups. Small Paulownia trees can be pulled from the ground. Lateral roots, if left in the ground, will not send up root suckers as is common with tree-of-heaven or some native species such as black locust. If pulling, make sure all of the root collar is removed as it will sprout prolifically if any part of it is left in the

When hand-pulling small Paulownia seedlings ensure the entire root collar is removed.

Photo courtesy: David J. Moorhead, www.forestryimages.org

ground. The most preferred method of removal is with the use of herbicides. Three techniques are commonly used for individual tree removal including foliar spray for small trees and cut stump and hack and squirt for larger trees. Table 1 shows the herbicides that can be used for control and how and when they can be applied.

Small Trees (less than head high)
Foliar Spray: mid-June to mid-September. Use recommended rates of herbicides that are labeled for killing trees or shrubs using a foliar application (e.g., glyphosate at dilute solutions of 1 to 2% active ingredient, wetting leaf surfaces until runoff). Backpack sprayers with cone nozzles are commonly used for this application.

Large Trees
Cut Stump Treatment: all year except mid-February through April. Cut the tree, and spray any of the listed herbicides at or near full strength or as the label specifies for cut stump treatment. Weaker foliar solutions should not be used. Typically, herbicides are applied with a backpack sprayer or handheld spray bottle. The stumps should be treated when they are fresh (within a couple of hours of cutting). Waiting will reduce herbicide effectiveness for many herbicides. On trees less than 10 inches in diameter, spray the entire stump. On larger trees, treat the outside three inches of the stump. If you cut the tree and do not spray the herbicide when the stump is fresh, you can soak the stump with Garlon 4 (see label instructions for full basal application). There is no credible information indicating that pouring herbicides into the open pith of a stump is effective and is it not recommended.

Photo courtesy: Chris Evans, River to River CWMA www.forestryimages.org

The bark of Paulownia is a gray-brown with irregular shallow fissures. Paulownia with its smooth thin bark can easily be treated with a basal bark application.

Hack and Squirt: all year except mid-February to April. All herbicides listed can be used. Use a hatchet to cut slits around the stem through the bark into the wood (see label directions for spacing of slits). Using a handheld spray bottle, spray strong concentrations of herbicide (see label) directly into each slit. You may see on labels a reference to tree injection or the use of a "Hypo-Hatchet." These techniques are similar to the hack and squirt.

Watch to see that treated trees die over the course of a growing season. Re-apply if necessary the next year. Check your woods for new seedlings, especially after a disturbance occurs, and foliar spray or pull up any newly established seedlings. If you have any questions, contact your local professional forester.

Table 1. List of some commonly used herbicides for Paulownia control.[1]

Active Ingredient	Common Brands	Treatment	Cautions
glyphosate	Roundup, Accord, and others[2]	foliar, cut stump (fresh), hack and squirt	Make sure that you read and follow label directions. Mix and apply the chemical in the proper manner and at the recommended times. Protect your eyes during mixing and application (where necessary) and check label for personal protective equipment and other precautions.
triclopyr – amine	Garlon 3a	foliar, cut stump (fresh), hack and squirt	
triclopyr – ester	Garlon 4	basal bark, cut stump (fresh and dry)	
picloram/2,4-D	Pathway	foliar, cut stump (fresh), hack and squirt	
imazapyr	Arsenal	foliar, cut stump (fresh), hack and squirt	

[1] Other herbicide brands can be used for Paulownia control. The herbicides listed are those that have widespread and traditional use.
[2] There are currently a large number of brand names for glyphosate herbicides. Many are for use in fields or fencerows. A few such as Accord are labeled for use inside a forest (see Kentucky Woodland Magazine 1(1) for more information on glyphosate herbicides.

Drawing courtesy: USDA PLANTS Database, USDA NRCS PLANTS Database, www.forestryimages.org

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