Biology and Management of Knotweeds in Oregon:

A Guide for Gardeners and Small-Acreage Landowners

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Robert Emanuel, Andrew Hulting, and Rebecca Koepke-Hill

Woody knotweeds were introduced from Asia to North America as garden ornamentals during the 19th and 20th centuries. They have become established outside of cultivation in at least 41 states and most Canadian provinces. Because of their invasiveness, woody knotweeds are listed as noxious weeds throughout most of the United States.

There are four closely related species of woody knotweeds: Japanese (*Polygonum cuspidatum*), giant (*Polygonum sachalinense*), Bohemian (*Polygonum ×bohemicum*), and Himalayan (*Polygonum polystachyum*). These species are known by many other common names including fleece flower and Japanese, Mexican, or false bamboo.

Identification and Biology

Woody knotweeds have hollow stems (referred to as canes) that frequently grow in a zigzag pattern. Each joint in the stem is swollen and covered with a thin membrane (figure 1). Stems are red early in the growing season and mature to a brown color later in the fall. Open sprays (i.e., plume-like clusters or panicles) of showy, white flowers emerge during late summer and fall where each leaf meets the stem.

Young plants may be confused with oriental lady's thumb (*Polygonum caespitosum*), but oriental lady's thumb has tight clusters of pink flowers and often a dark green spot on the upper surface of the leaf.

Figure 1. Woody knotweed canes have swollen joints.

Japanese knotweed (figures 1 and 2) can grow to 10 feet tall and has oval-shaped, sharply tipped leaves and white flowers.

Giant knotweed (figure 3) is taller than Japanese knotweed. Leaves can be up to 2.5 feet long, and flowers are greenish-white.

Bohemian knotweed (figures 4 and 5) is a hybrid of Japanese knotweed and giant knotweed and has characteristics of both parents.

Himalayan knotweed (figure 6) grows to 6 feet tall. Stems and flowers are similar to those of other knotweed species, though flowers are occasionally pink. Leaves are a thin triangle between 4 and 8 inches long.

Robert Emanuel, water resources and community development specialist, Oregon Sea Grant Extension, Tillamook and Clatsop counties; Andrew Hulting, Extension weed management specialist, Department of Crop and Soil Science; Rebecca Koepke-Hill, faculty research assistant, Department of Crop and Soil Science; all of Oregon State University.

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Figure 2. Japanese knotweed.

Figure 3. Giant knotweed.

Figure 4. Bohemian knotweed.

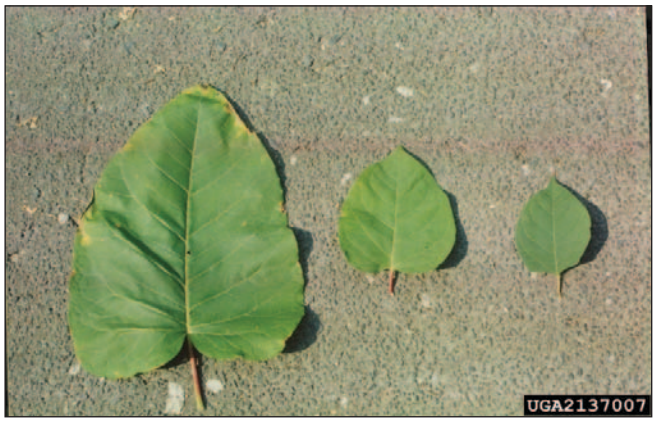

Figure 5. (left to right) Leaves of giant knotweed, Bohemian knotweed, and Japanese knotweed.

Figure 6. Himalayan knotweed.

Ecological Impact

Where they are native, woody knotweeds generally do not spread aggressively or form overwhelming populations. This is not the case in areas where they have been introduced. For example, although Japanese knotweed colonizes barren slopes in eastern Asia, the plants eventually die back and allow other plants to establish. In North America, however, woody knotweeds can quickly become serious invaders of open land, pastures, riparian areas, rights of way, and forest edges (figures 7 and 8). They even grow on and near the margins of ocean beaches in Oregon.

Where they have been introduced in North America, woody knotweeds form extensive, dense thickets of canes that exclude native plants and animals, suppress regrowth of competing vegetation, and change the cycling of nutrients through food webs in waterways. In a garden, they will quickly outcompete most neighboring plants. Knotweed infestations also pose a problem for real estate sales because they suppress property values.

Figure 7. Giant knotweed infestation.

Figure 8. Knotweed infestation.

Strong canes grow quickly from large rhizomes and can puncture asphalt, concrete, and brick in an effort to reach sunlight. The extensive roots can persist for many years underground, making control a potentially long and expensive venture for property owners and land managers. Soil, mulch, or other media that has had knotweed growing in it could be contaminated with rhizomes and root fragments and must be treated with great care. In the United Kingdom, knotweed-infested soil is considered a hazardous material.

Management

Because woody knotweeds reproduce readily from very small pieces of roots and stems, mechanical control is virtually impossible. **We do not recommend cutting, pulling, or mowing because these practices only encourage denser new growth**, but there are some common best management practices for dealing with green material from knotweed:

- Do not allow cut canes, or any part of a cut cane, to come into contact with water or soil.
- If you cut canes, allow them to air dry completely before disposing of them in the garbage. Dry canes on a surface where they will not come into contact with soil or water, such as on concrete or a tarp.
- Do not compost canes, roots, or other plant material or dispose of this material in a brush pile or with your yard waste.
- Do not mow or weed-trim knotweed; this encourages stem growth and spreads plant pieces to new areas.
- Do not dig or pull roots; this encourages knotweed to spread and increases the size of knotweed infestations.
- Do not disturb any soil where knotweed has been actively growing (even if treated with herbicides), and monitor for regrowth for at least two seasons. If regrowth occurs, re-treatment will be necessary.
- Because roots of large infestations may be connected, cooperate with neighboring property owners to control large infestations that cross property lines.

Chemical Control

Biological control agents are currently being tested for host specificity and are not yet ready to be released into Oregon. At this time, chemical control is often the only effective way to control knotweed. A study by Rudenko and Hulting (2010) at Oregon State University showed that glyphosate (Roundup, Rodeo, and other trade names) or imazapyr (Habitat, Stalker, or Arsenal AC) applied alone to foliage provided more than 80% control of Japanese knotweed 1 year after treatment (figures 9 and 10). A tank mixture of these two products applied together resulted in similar levels of control and provided better control than a tank mixture of imazapyr plus aminopyralid (Milestone). Triclopyr (Garlon and other trade names) plus 2,4-D, which are often sold together as the common herbicide premix Crossbow, provided little lasting control of Japanese knotweed over the duration of the study. In terms of knotweed control and cost, glyphosate applied alone is often the most effective treatment that gardeners and landowners can use.

Table 1 shows herbicides and application rates that have been documented to provide partial to full control of knotweed. To completely control large knotweed infestations, apply herbicides over multiple growing seasons and actively monitor the results. Read herbicide labels carefully, and apply only according to label directions. Wear proper protective equipment when applying herbicides or any pesticide product.

Figure 9. Japanese knotweed 1 year after treatment with glyphosate.

Figure 10. Japanese knotweed with no herbicide treatment.

Table 1. Quick guide to chemical control methods for knotweed.

Trade name	Active ingredient	Active ingredient per acre	Amount of product per acre	Registered for use near water?
Roundup Pro	Glyphosate	3.75 lb/A	160 oz/A	No
Rodeo	Glyphosate	3.75 lb/A	120 oz/A	Yes
Arsenal AC	Imazapyr	1.08 lb/A	34.6 oz/A	No
Stalker	Imazapyr	1.08 lb/A	69.1 oz/A	No
Habitat	Imazapyr	1.08 lb/A	69.1 oz/A	Yes
Arsenal AC + Rodeo	Imazapyr + Glyphosate	1.08 lb/A + 3.75 lb/A	34.6 oz/A + 120 oz/A	No
Arsenal AC + Milestone	Imazapyr + Aminopyralid	1.08 lb/A + 0.11 lb/A	34.6 oz/A + 7 oz/A	No

The best time to spray knotweed is in the fall from August to October prior to a killing frost and complete leaf drop. Apply herbicides to as much of the mature growth as possible, including all leaves and canes. Leaves should be mostly green at the time of application but may have some yellowing. Many herbicides are not registered for use near water, so take care to use an appropriate product at each application site.

It is important to be patient after the first season of treatment. Allow any regrowth of canes to reach maturity before re-treating in following seasons. Specifically, re-treat plants during or after flowering and before leaf drop.

References

Rudenko, M., and A.G. Hulting. 2010. Integration of chemical control with restoration techniques for management of *Fallopia japonica* populations. *Management of Biological Invasions* 1:37–49.

Use pesticides safely!

- Wear protective clothing and safety devices as recommended on the label. Bathe or shower after each use.
- Read the pesticide label—even if you've used the pesticide before. Follow closely the instructions on the label (and any other directions you have).
- Be cautious when you apply pesticides. Know your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

For More Information

Parkinson, H., and J. Mangold. 2010. *Biology, Ecology and Management of the Knotweed Complex (Polygonum spp.)*. EB0196. Bozeman, MT: Montana State University Extension.

Prather, T.S., T.W. Miller, and S.S. Robins. 2009. *Knotweed Shrubs: Identification, Biology and Management*. PNW 610. Moscow, ID: University of Idaho Extension.

Rudenko, M. 2010. Integrating restoration and ecologically based weed management practices for invasive knotweed control. Master's thesis, Oregon State University, Corvallis.

Urgenson, L., S. Reichard, and C. Halpern. 2009. Community and ecosystem consequences of giant knotweed (*Polygonum sachalinense*) invasion into riparian forests of western Washington, USA. *Biological Conservation* 142:1536–1541.

King County, Washington, fact sheet on Japanese knotweed: *http://www.kingcounty.gov/environment/animalsAndPlants/noxious-weeds/weed-identification/invasive-knotweeds/japanese-knotweed.aspx*

Invasipedia: *http://wiki.bugwood.org/Invasipedia*

Plant Conservation Alliance Alien Plant Working Group: *http://www.nps.gov/plants/alien/fact/faja1.htm*

Japanese Knotweed Alliance (detailed information on biological control for Japanese knotweed): *http://www.cabi.org/japaneseknotweedalliance/*

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