

Controlling Knotweed

(*Polygonum cuspidatum*, *P. sachalinense*, *P. polystachyum* and hybrids)

Although produced by and the responsibility of The Nature Conservancy, this document grew from a workshop co-sponsored by Metro, The City of Portland Parks, Natural Resources Division, The Society for Ecological Restoration, Northwest Chapter and The Nature Conservancy held in February 2002. As well as extensive literature review, the data and field experience of many individuals went into the development of this document. Funding for the production of this guide and the research that supported it was provided by: the Bureau of Land Management, For the Sake of the Salmon, the Northwest Service Academy, the Oregon Department of Agriculture, the Oregon Watershed Enhancement Board and the United States Fish and Wildlife Service. The Oregon Department of Agriculture provided friendly review. Thank you all.

Knotweed Description

Japanese, giant and Himalayan knotweed are members of the buckwheat family (Polygonaceae) from Asia with hollow (not true for the Himalayan species), upright, bamboo like stems growing to 1 to 5 meters (3 to 16 feet) (photographs 1 and 2).



Photo 1. Knotweed infested stream bank



Photo 2. Knotweed canes

The large, smooth-edged leaves range from an elongate triangle (Himalayan knotweed), through heart shaped (Japanese knotweed) to huge, "elephant ear" type leaves (photograph 3). Hybrids blur these distinctions.

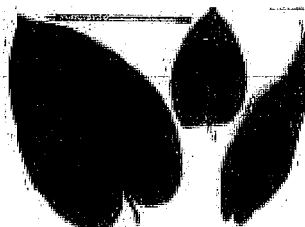


Photo 3. Knotweed leaves, 3 types

The stems are often reddish or red-speckled (photograph 2). Young shoots look similar to red asparagus (see photograph 12). The small white or greenish flowers form in July and August and grow in dense clusters from the leaf joints (photograph 4). Although it dies back to the ground after hard frosts, the stems may persist through the winter as bare, reddish brown stalks (photograph 5).

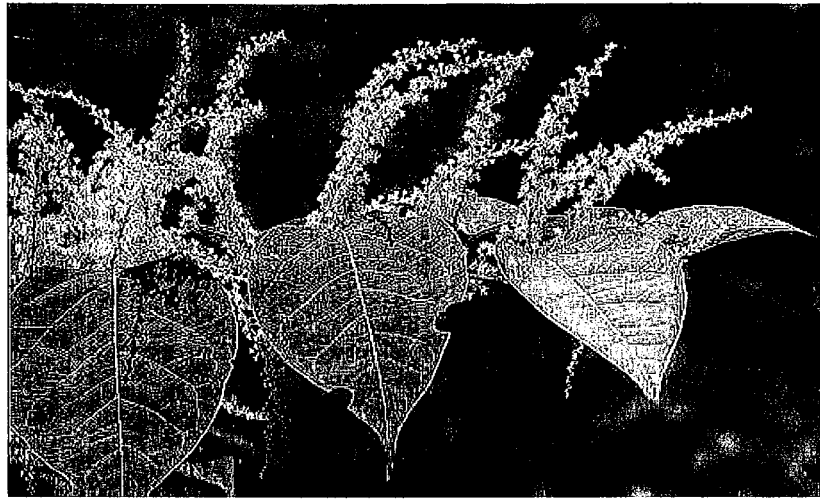


Photo 4. Flowering knotweed branch



Photo 5. Dead and persistent knotweed canes

Prostrate knotweed, a common weed in the Polygonaceae family, is not addressed in this document. References to “knotweed” pertain exclusively to Japanese, giant or Himalayan knotweed or their hybrids, unless otherwise noted.

Common names include:

elephant ear bamboo,
Mexican bamboo,
and fleecflower.

Scientific names include:

Japanese knotweed (*Polygonum cuspidatum*, *Fallopia japonica*, *Reynoutria japonica*)

giant knotweed (*P. sachalinense*)

Himalayan knotweed (*P. polystachyum*)

Japanese and giant knotweed hybrid (*P. X Bohemicum*)

Control Summary

So you have knotweed and want to be rid of it? Good. It is possible, but not usually easy, especially at a landscape scale. Because of knotweed's incredibly extensive root system and sprouting ability, landscape level control must be thought of within the context of a program. Even on a patch by patch basis, successful eradication is likely to take more than one year, let alone one treatment in most cases. Finally, although there are potentially successful mechanical or manual control options for small patches, landscape level projects and large sites will almost certainly require integrating herbicide use into a control strategy.

Although this document does not address it, a successful landscape level program will almost certainly involve outreach to private landowners and the broader community, as well as volunteer recruitment and coordination. You may need an outreach program to reach landowners that may have knotweed on their property. You almost certainly will need to educate those property owners and others so that they fully realize the threat knotweed poses. Fully understanding the devastating effects that knotweed can have on waterways and riparian ecological systems can only help motivate people to act.

You may also want to work with volunteers and other organizations in your community to expand your ability to physically get the work done. Helping to create and protect free flowing waterways and noxious weed-free embankments provides the rewards that can inspire citizens to participate more fully in natural resource restoration projects.

Note: The Nature Conservancy has produced some outreach materials that are available to other projects at little or no cost. These include an informational brochure, an outreach poster and "I found knotweed" postcards. The Conservancy can also provide more detailed control and project structure advice.

Basic Knotweed Ecology

In the Pacific Northwest (PNW), at low elevation, knotweed typically starts growth in April, earlier in warm areas, and as late as June at higher elevations. Even at low elevation, stems from deeply buried roots may emerge as late as July or August. Knotweed grows extremely fast during the spring. Giant knotweed can reach 15 feet (4.5 meters) by June (photo-graph 6). The slightly shorter Japanese knotweed reaches "only" 10 feet (3 meters) or so. The "dwarf" Himalayan variety is shorter still, typically reaching 4-6 feet (1.5 - 2 meters).

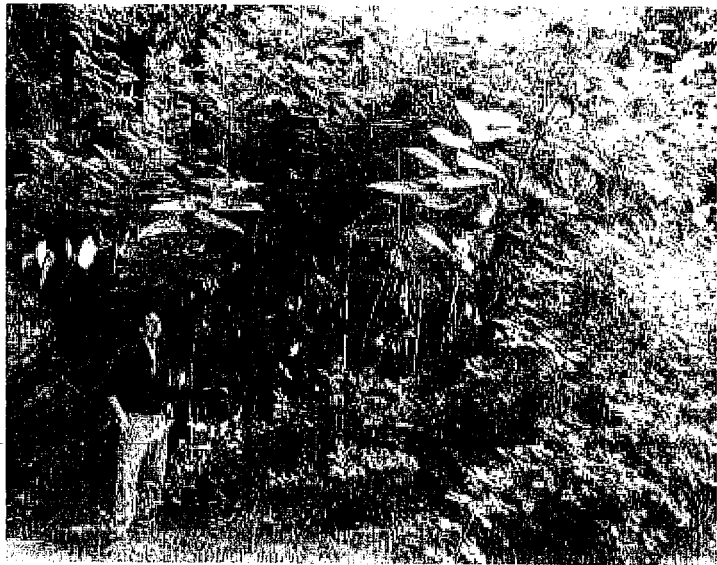


Photo 6. Giant knotweed patch



Photo 7. Tangled mass of knotweed rhizomes growing within an eroding river bank. Despite knotweed's large rhizome mass, it provides poor erosion control.



Photo 8. Close-up view of rhizomes with machete in background for comparison. Note small shoot growing "in the air."

Knotweed is a creeping perennial. It dies back to the ground with the first hard frost, and returns each spring from the same root system. The term "creeping" refers to the extensive network of rhizomes (roots that can sprout) spreading at least 23 feet (7 meters), and possibly as far as 65 feet (20 meters) from the parent plant and penetrating at least 7 feet (2 meters) into the soil (photographs 7 and 8).

Knotweed can spread rapidly due to its ability to reproduce vegetatively. Root and stem fragments, as small as 1/2" (1 cm) can form new plant colonies (photograph 9). Seasonal high water events and floods sweep plants into rivers and creeks, then fragment and disperse knotweed plant parts throughout the floodplains and cobble bars. The fast growing knotweed then takes advantage of the freshly disturbed soil to become established. Because it grows faster than most other plant species (including native species and most other weeds) it quickly outgrows and suppresses or kills them.

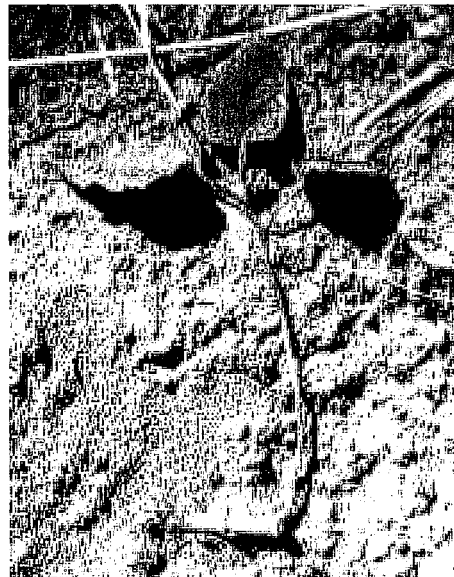


Photo 9. Root fragment sprout.



Photo 10. Stem cut by beaver, rooted in cobble at nodes.

Roadside ditches, irrigation canals, and other water drainage systems can be colonized the same way. Cut or broken stems and roots will sprout if left on moist soil or put directly into water, or if moved by beavers (or earth moving equipment) (photograph 10). Stem or root fragments can also be spread in contaminated fill material.

Although pure strains of Japanese, giant or Himalayan knotweed are not thought to produce fertile seed in the United States, the hybrid varieties (including the recently described hybrid of giant and Japanese knotweed — *Polygonum X bohemicum*) are able to produce fertile seeds. According to knowledgeable observers, unfortunately, many of the patches in the Pacific Northwest appear to be hybrids of Japanese and giant knotweed. The Nature Conservancy (TNC) has successfully germinated knotweed seeds in a laboratory setting and seedlings have been confirmed in at least one setting on the Sandy River during spring 2002. Should extensive sexual reproduction be confirmed in the field it would certainly alter the strategy for landscape level control projects.

Knotweed resprouts vigorously following cutting, mowing, digging and some herbicide treatments, especially early in the growing season, until at least August. Such treatments apparently stimulate the production of shoots from latent buds dispersed on the root crown or rhizomes (photograph 12).

Based on these ecological features, TNC's more than three years of field experience and extensive literature and "regional expert" review, the following suggestions are provided to help eradicate this fearsome noxious weed threat to our watersheds. Although the advice is designed for the Pacific Northwest, it should be generally useful everywhere.

Mechanical or Manual Control

Variations: Cutting, mowing, pulling, digging, covering

The goal of mechanical control is to remove or starve the root system. In experiments conducted by The Nature Conservancy between June 2000 and June 2003 and as reported in the literature, in the vast majority of cases, monthly cutting fails to eradicate even isolated and relatively small knotweed patches unless conducted for several years. However, The Japanese Knotweed Manual (Child and Wade 2000) reports successful control of an isolated and small patch after **three** consecutive years of uprooting the plants in August. TNC was able to control one small patch (25 stems) with 17 monthly cuttings over three field seasons. Child and Wade recommend against trying this technique for larger, more established patches.

So, unless you are prepared to cut knotweed patches TWICE A MONTH OR MORE - could we say it any stronger? - especially between April and August, and then once a month or more until the first frost, a program based on cutting alone is likely to be a recipe for frustration and failure. In some cases however, using manual / mechanical control may be the only viable option for legal or ethical reasons. For instance, if the knotweed is in a very environmentally sensitive area, if a particular landowner is opposed to pesticide use, on some federal lands and if labor costs are not an issue.

To be successful, one should plan for an aggressive mechanical control program (as described above and below) to be continued for at least two or three years if the patches are well established.

In the end, timely, thorough and persistent cutting over several years can eliminate knotweed, especially small, isolated patches. Because of the level of effort required, this approach is really best suited for individual landowners with easy access to their knotweed patches and a strong commitment to avoiding herbicides. Using a mower/weed-eater is an option if you can set it close to the ground. It is best to remove, rake or carefully dry all knotweed vegetation you cut or mow, because

stems or stem fragments can sprout, and the area (or adjacent areas) may become reinfested. Do not allow cut, mowed or pulled vegetation to enter waterways.

Digging or pulling (uprooting) is a good option if your soil is soft. This will eliminate some portion of, but not all of the root system each time you do it. Be sure to carefully dry or dispose of the roots. Do not put them in a compost pile. In England, soil contaminated with knotweed roots is considered an environmental contaminant and needs to be buried 3 meters (10 feet) deep. You will need to follow up frequently as for cutting/mowing to catch resprouted stems. Be sure to search at least 20 feet (7 meters) away from the original patch center.

There are multiple anecdotal reports of control attempts using extended covering, but no reliable reports of successful knotweed control with covering. This includes those of the Lummi Nation in Washington, who combined digging, tilling and covering with several layers of cardboard on 2, 1/4 acre patches. The results were poor however; they achieved only 80% reduction in stem number, at a cost of \$32,000/acre. An effort to control knotweed by covering conducted by the USFS Mt Hood National Forest in Zig-Zag, Oregon, also failed, despite extensive pre-covering digging. TNC also failed to achieve good control covering a single large patch for about 6 weeks in the spring. Others have also reported that knotweed grows out from under the covering material. If you must try it, this method is likely to work better with isolated and smaller patches on open terrain. Plan to leave the covering material in place throughout the growing season and well into the next. As always, check the site through at least September the following year and again the year after.

Mechanical Control - How To:

Hand Cutting

Using a machete, loppers or pruning shears, cut the stems down to the ground surface as often as possible, but at least every 2-3 weeks from April (or as soon as the plant appears) through August. Sprouting slows after August, so you can reduce cutting frequency, but try and prevent the plants from ever exceeding six inches (15cm) in height. Pile the cut stems where they will quickly dry out.

Mowing

Using a weed-eater or mower, cut as low as possible and as often as possible, but at least every 2-3 weeks through August. Be sure you are not scattering stem or root fragments onto moist soil or into the water.

Goats are reported to eat knotweed and in some circumstances controlled goat grazing may be an option similar to intensive mowing. Be aware they will eat desirable vegetation as well.

Digging/Pulling

If the knotweed has established in soft soil, or better yet sand, try pulling the plant and major rhizomes up by the root crown to remove as much of the root system as you can. Although you will almost certainly not kill the plant in one treatment, you will reduce the root mass. Each time you see new sprouts (start looking a week after you pull and search at least 20 feet away from the original plant), uproot them as well, trying to pull out as much of the root as you can each time. This is probably only feasible with small patches. Be sure to carefully dispose of any root material.

Tilling

Used alone, tilling or otherwise physically disturbing the root system will not provide control and will create many resprouts. This approach may however offer some benefit in an integrated strategy, since it will increase the shoot to root ratio.

Covering

First cut stems down to ground surface (and possibly follow with tilling). Cover the area with thick black plastic or multiple layers of cardboard expanding beyond the plant base and stems at least 2 meters (and preferably 7 meters) beyond the outside stems. Weight down the covering material and watch the perimeters to be sure new stems are not popping up outside your cover material. Try this right at the beginning of the year or after you've cut the plant down a couple of times in the spring and reduced some of the rapid plant growth. It may be necessary to leave the plant covered through at least one entire growing season.

**Note - there are no reports of successful long-term control using covering alone (see above).*

Comments on Manual Control and Combining Treatments

No matter which control method(s) is used, manual or mechanical control is going to be a lot of work. But, combining digging/pulling with cutting or even herbicides use, helps break up the root system and encourages the plant to send up new shoots. The more shoots there are per linear foot of root, the more likely you will be to be able to physically pull them out, exhaust them by depriving them of energy (i.e. by cutting the shoot off) or kill them with herbicides.

If you do try and control knotweed manually, be sure you practice the four T's: be timely, tenacious, tough and thorough. And as always, carefully dispose of any stem or root material.