Picture your favorite trout stream or canoeing river lined for miles with a tangle of rigid, bamboo-like stems 10 feet tall. These canes confront you like prison bars, and to get through them you have to use a machete to hack your way to the water's edge. Once there, you find that erosion has driven fish away and that you can't move up or down the shoreline. You can enter the waterway only where you chopped your way in.

This is the unfortunate scene on some rivers in the Eastern United States now, and could be along many of Wisconsin's streams and shorelines in the future if Japanese knotweed* is allowed to begin colonizing them. Fortunately, we can act now to ensure that our wild waterways, lakeshores and wetlands remain open and accessible for future generations.

Tom Heutte photo, www.invasive.org

Dense stand of 10-foot-tall Japanese knotweed.

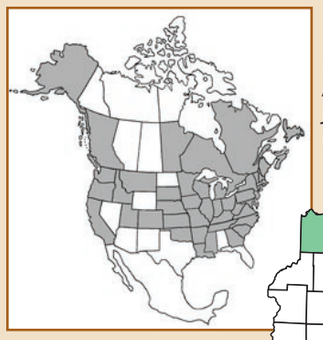
Tom Heutte photo, www.invasive.org

Large roadside stands are also typical along streams.

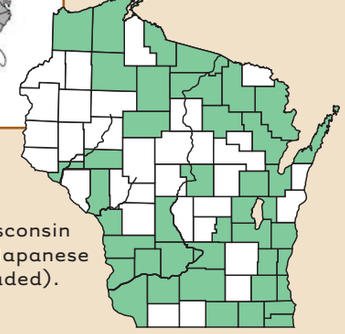
WHERE DID IT COME FROM?

The plant is a large, aggressive perennial from Asia that was exported without the insects and diseases that control it. Introduced to Europe by 1800, it has alarmed country after country there with its rapid spread and difficult control.

Japanese knotweed appeared in the U.S. in the late 1800s and has since spread across the continent from Northeast Canada to Georgia and west to the Pacific (see map). It is now a plant of great concern in most states.



Left — Current North American status of Japanese knotweed (shaded).



Counties in Wisconsin with reported Japanese knotweed (shaded).

SPREAD THROUGH PLANTING

The experiences of other countries and states are being duplicated here and are cause for alarm. Brought to Wisconsin in the mid-1900s, the species is planted in urban areas around the state. However, many landowners now regret having Japanese knotweed on their land, as it usurps garden space and encroaches on the rest of their property. One unhappy man in Green Bay has been mowing this plant for 40 years, unable to eliminate it from his lawn!

Japanese knotweed is now reported in most Wisconsin counties (see state map). Once established, this plant defies control, with roots that grow as deep as 9 feet and rhizomes (horizontal roots that send up shoots) that grow out to 60 feet. Though it dies to the ground with the first frost, every spring it sends up numerous early shoots along the whole length of these rhizomes.

The rhizomes can also push their way under streets and up through pavement. In Bayfield, rhizomes have grown under streets to infest neighboring properties. A business in the United Kingdom spent over $600,000 to replace its parking lot after extensive damage from rhizomes, and one Welsh family even found the plant invading its living room as it pushed up from beneath the floor!

Wisconsin is poised to suffer an explosion of Japanese knotweed in wetlands and along stream banks and lake shores unless we act to prevent its spread.

*Giant knotweed, *Polygonum sachalinense* (*Fallopia sachalinensis*) and hybrids are other exotic knotweeds now found in Wisconsin. Giant knotweed is reported in northern counties and grows taller (up to 15 ft) and has larger leaves than Japanese knotweed. Seed fertility in both is uncertain. Hybrids are intermediate between the two knotweeds in height and leaf size and do produce viable seeds. Learn to distinguish these plants (see video link under *Resources*). All knotweeds should be eliminated or controlled, especially Giant and hybrids due to the increased likelihood of dispersal from viable seeds that can complicate exotic knotweed control. The seeds need open habitat and moist soil to germinate.

YOU CAN HELP CONTROL JAPANESE KNOTWEED!

- **Learn to identify it** (and other invasive plants):
  - Carry this brochure or a Japanese knotweed wildcard (WDNR # PUB ER-106V-2014) when you travel.
  - Learn more about the knotweed species and hybrids (see Extension's YouTube video under *Resources*).
  - Use a field guide or take a native plant class to discover your area's rich native diversity, how to tell natives from Japanese knotweed and what to use to replace it.
- **Report infestations** in wild areas, especially along watercourses:
  - Search "Invasives" on WDNR's website **(dnr.wi.gov)** & click "Report." Then click "Shoreline & Wetlands" or "Terrestrial," depending on your site's habitat, and follow directions.
  - Or call 608-266-2554 for riparian/wetland sites or 608-267-5066 for upland sites.
- **Help prevent** the spread of knotweed:
  - Clean footwear when leaving an infested site to slow seed dispersal.
  - Be sure your local highway mowers do not disperse plant fragments.
  - Help curb local use of the plant for landscaping. Avoid moving contaminated fill.
  - Work to get Japanese knotweed on your local noxious weed list, with incentives for prevention of the plant (early removal), and reasonable elimination requirements.
  - Work with landowners to remove pioneering plants.
  - Dispose of all plant parts properly, especially away from moving water.
- **Teach others** about Japanese knotweed (and other invasive plants):
  - Learn about the many invasive plant species already in Wisconsin and how to help control them by searching "Invasives" on WDNR's website **(dnr.wi.gov)** and clicking "Learn."
  - Learn about future invasive plants by searching "Future Invasives" on WDNR's website.
  - Get educational materials from WDNR and Extension to use with other people and groups in your area.
- **Urge elected officials** to provide adequate funding for biological control research for all invasive plants:
  - Help Wisconsin become part of international efforts to find effective, long-term control insects or plant diseases specific to Japanese knotweed and other invasive plants. These biological controls can help us control invasive plants efficiently with minimal herbicide use.
- **Help control** Japanese knotweed in your area by eliminating established clones and working with others to develop your watershed's control plan.
  - Be responsible and know and control the plant on your own land first.
  - Always get landowner permission for work on private property.
  - Control grants from WDNR may be available to organizations.

Resources for more information

WEBSITES:

dnr.wi.gov/topic/invasives/fact/japaneseknotweed.html

plants.usda.gov/core/profile?symbol=POCU6

www.invasivespeciesinfo.gov/plants/knotweed.shtml

dnr.wi.gov/topic/Invasives/what.html

ONLINE VIDEOS:

www.youtube.com/watch?v=7R4kSFR9uCA

(plus other YouTube videos)

ONLINE DOCUMENTS:

learningstore.uwex.edu/Assets/pdfs/A3924-11.pdf

www.fs.fed.us/foresthealth/technology/pdfs/FS_jaknotweed.pdf

Jenn Grieser photo, www.invasive.org

Regrowth after early-season cutting.

COVER PHOTO: Japanese knotweed leaves and flowers (Tom Heutte photo, www.invasive.org).

NOTE: References to pesticide and other products in this publication are for your convenience and are not an endorsement or criticism of one product over similar products. You are responsible for using pesticides according to the manufacturer's current label directions. Follow directions exactly to protect the environment and people from pesticide exposure. Failure to do so violates the law.

Invasive species publications are available at most WDNR service centers and can be ordered by DNR publication number. Many are also on WDNR and Extension web sites.

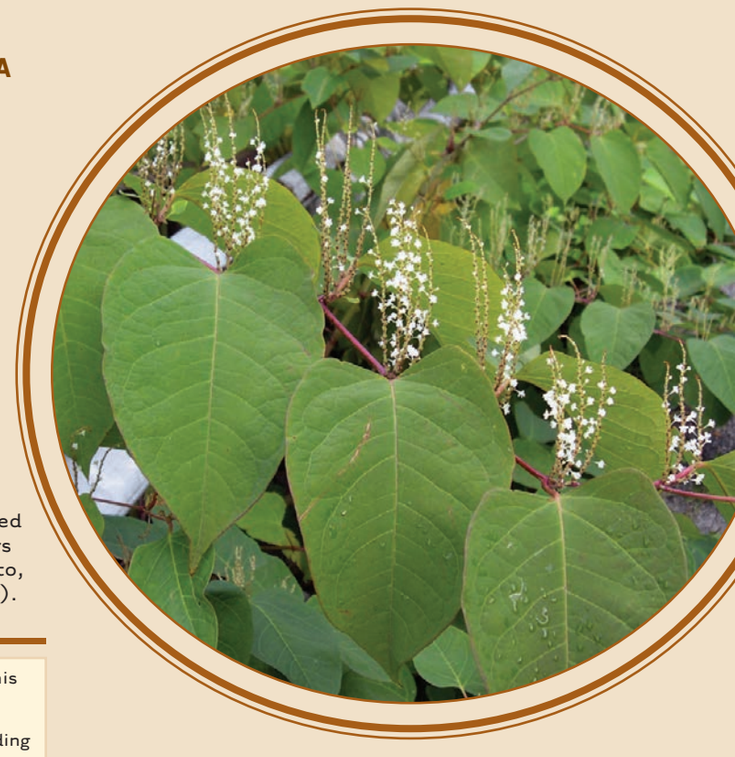
Brochure by Brock Woods, Extension, with review by Kelly Kearns, WDNR. Assistance in the development of this publication was provided by the Extension Natural Resources Institute.

Extension
UNIVERSITY OF WISCONSIN-MADISON

WISCONSIN DEPT. OF NATURAL RESOURCES

Japanese KNOTWEED

***Polygonum cuspidatum* (*Fallopia japonica*)**



A REAL THREAT TO WISCONSIN'S WATERWAYS, LAKESHORES AND WETLANDS

WDNR PUB-WY-090-2018

JAPANESE KNOTWEED IS NOW APPEARING IN WISCONSIN'S WILD PLACES

- ✓ Appears in such places as shady woods and dry uplands, but of main concern are patches found in valuable open wetland habitats and riparian areas.
- ✓ Grows faster and taller than most native herbs; its long rhizomes quickly form dense thickets up to several acres in size that shade out native plants and reduce site biodiversity.
- ✓ Is food for few native insects or other animals, which contributes to its vigorous growth and makes it of little value to wildlife.
- ✓ Creates bare ground under its clones, which results in faster erosion and more flooding and makes stream banks more vulnerable to flood damage.
- ✓ Spreads quickly, both filling up its sites and spreading to new ones, especially when stream banks are undercut and fragments of stems and roots fall into the water and are carried downstream.
- ✓ Begins new clones in many open streamside and shoreline sites because root and stem fragments as small as ½ inch can sprout new roots.

WHAT'S A CLONE?

A plant clone is a stand that is genetically uniform and identical to the parent plant. While Japanese knotweed can reproduce sexually with fertile seeds, most of its reproduction is asexual because a root/rhizome piece or stem fragment can easily become a new clone.

Jenn Grieser photo, www.invasive.org

Dispersal of streamside Japanese knotweed caused by high water.

The widespread planting of Japanese knotweed, its ability to spread easily to new sites and its increasing frequency in wild places suggest it is starting to follow a trajectory similar to other serious invasive plant species. It is likely to begin expanding at an alarming rate if nothing is done to prevent it from doing so.

Manual, mechanical and chemical control methods described below can slow the spread of the plant, but have proven inadequate to stop its spread in Europe.

European workers are now banking on biological control as the critical long-term control method.

IDENTIFICATION

How to identify Japanese/Giant knotweeds & hybrids:

- ✤ Upright, semi-woody, shrub-like herb: up to 10 feet for Japanese and 15 feet for Giant.
- ✤ Leaves: variable, about 6 inches long by 4 inches wide and triangular for Japanese, about twice as large and heart-shaped for Giant. Both have a pointed tip. Hybrids are intermediate in height and leaves.
- ✤ Stems: resemble bamboo, smooth and hollow between swollen joints that have a membranous sheath, often tinged red, with few branches.
- ✤ Winter stems: usually stout, persistent, rust-colored and often numerous.
- ✤ Flowers: tiny, greenish-white, arranged in branched sprays in late summer.
- ✤ Fruits: small and winged, with tiny, triangular, shiny seeds.
- ✤ Grows in dense stands that often line moist areas such as stream banks and road ditches. May be up to several acres.
- ✤ Sprouts very early in spring and grows fast, quickly towering over other plants.

Leslie J. Mehrhoff photo, www.invasive.org

Japanese knotweed leaves and flowers.

Jenn Grieser photo, www.invasive.org

Winter is a good time to look for Japanese knotweed.

Chris Evans photo, www.invasive.org

Stems resemble bamboo.

CONTROL METHODS

(These methods apply to Japanese/Giant knotweeds & hybrids.)

Eradication of Japanese knotweed from the landscape is unlikely since it grows in so many locations and its clones are so difficult to eliminate. Thus, control on a watershed scale should be considered. Highest priority should be given to sites where it has established along water courses, starting at the top of the watershed. High priority should also go to eliminating any plants producing seeds, regardless of location.

Control of clones Control is possible though not easy because large clones are usually a single plant with an extensive root system. Find and destroy such plants before they become large clones! Eradication of even small patches typically takes several years with multiple attempts. The methods you choose will depend on patch location, resources available, etc. Most control measures result in vigorous resprouting from rhizomes, so whatever method you use, watch the area 2–7 yards out from the obvious infestation edge to be sure rhizomes are not sending up new shoots outside of the controlled area. All removed plant material must be dried, removed from the site and burned, or put into a capped landfill.

Manual/Mechanical In many cases continual cutting of Japanese knotweed has failed to eliminate the plant, though in some small infestations cutting the whole clone at least twice a month in the growing season for 2–3 consecutive years has eliminated it. If cutting works, it may be the only method available for very sensitive areas where herbicides are unwelcome. Easy site access is necessary for frequent cutting work, and the labor involved usually relegates the cutting to small sites. Mowing is easier than hand cutting, but the mower must bag material — all must be kept off moist soil and out of water. Cut as close to the ground as possible. Reexamine these sites for several years to be sure the clone does not return. Cutting plant tops as flowering begins can eliminate seed production for the season.

A variety of other methods might reduce stem density or even eliminate young stands. Digging and pulling roots may eliminate young, small clones, especially in loose soil, though root fragments usually remain to produce new plants. Tilling the soil will not control knotweed, but can be combined with a number of other later control measures, including herbicides. Covering the soil surface to eliminate light to the plant has not been very successful or economically viable, though it may work for smaller, isolated patches when done carefully. Coverage through two whole growing seasons will be required. Spring burning or grazing can also suppress above-ground growth.

Herbicides Herbicides are currently the most effective control option for Japanese knotweed. Many different chemicals have been tried with varying results; all have advantages and disadvantages. Refer to the Extension publication, *Japanese knotweed,* available at **learningstore.uwex.edu/Assets/pdfs/A3924-11.pdf** for details about herbicides that can be used for spraying, stem treatments and even pre-emergence use. This website gives some common herbicide trade names, effectiveness ratings, typical application rates, timing, cautions and other remarks. Be sure to use herbicides in accordance with their label instructions to ensure safety and efficacy. Different methods and rates of application available for each herbicide will help dictate how and when it is used.

More herbicide is not always better; too much active ingredient may kill plant tissue before translocation to its roots, rendering it useless in killing the plant. Always try to use the least amount of herbicide that will do the job. Field-test your herbicide and rate of delivery to ensure best results. Apply it only on sites listed for use on the label. Using herbicides over or very near water, or anywhere where water contamination is likely, requires a permit from your regional WDNR Aquatic Plant Manager. Find yours at: **dnr.wi.gov/lakes/invasives/ContactsByCounty.aspx?role=AP_MNGT&location=54**.

• *Foliar spraying* is a common way to apply herbicides, though it carries a risk of damaging other plants from overspray when using non-selective chemicals unless done carefully and in still-wind conditions. Many chemicals have been effective on Japanese knotweed, including glyphosate, triclopyr, 2,4-D, imazapyr and aminopyralid. Consult the Extension publication, Extension agents and educators, local WDNR or manufacturers for advice on choosing the best foliar spray for your site and application. Be sure to use a legal surfactant or sticking agent to increase herbicide uptake.

Timing is important in foliar applications, with flower bud stage being the best for deep rooted perennials. The most practical spray time, however, is when plants are only 3–6 feet tall, too early in summer for the herbicide to be most effective. Thus, consider cutting all the knotweed stems earlier in summer to retard their growth in order to apply the herbicide at the clone's best developmental stage late in summer on short, conveniently sized stems.

• *Applying herbicides to Japanese knotweed stems* can include surface treatments, cutting stems just below the second joint above the ground and pouring herbicide into the hollows below, or injecting hollow stems with a special tool. The latter application may be the easiest and most effective on some sites and can be more environmentally sound in wet or sensitive sites since there may be less chance of chemical spill. An injection tool (costing about $200) is available that delivers precise amounts of herbicide per stem. The minimum stem diameter for injection is ½ inch, so it may not work well on sites with small plants. Label restrictions on rates must be followed that might dictate how many stems can be treated in an area. In some cases, follow-up foliar spraying might be necessary.

Integrating methods Combining methods, such as early cutting and later herbicide use as suggested above, allows more options and flexibility. Digging, pulling, tilling, burning or grazing before spraying might all also increase the effectiveness of herbicides.

Biological Control Japanese knotweed grows aggressively on very disturbed volcanic sites in its natural range, but does not get out of control there. Surveys in Japan of the plant's pests have found many insect species and a number of fungal pathogens that are promising biocontrol organisms because they appear to feed exclusively on the plant. These reduce the plant to an innocuous member of the flora. Research on the identification, safety and efficacy of potential biocontrol organisms for Japanese knotweed has been underway since 2000. In 2003–2005, release and control sites were identified in Oregon and Washington state, and data were collected concerning knotweed growth patterns.

By 2004, three insects and one pathogen were selected for further research. Work on these organisms continues as potential biological control agents for release in North America. *Aphalaris itadori,* a sap-sucking psyllid, was selected for release in the U.K. and first releases were made from 2010–2012. In 2012, release and control sites were also identified in MA, VT and NH. In 2013, the federal TAG committee recommended release of *A. itadori* in the U.S. Release is being reviewed by USDA-APHIS and test field releases might be made in 2019 or 2020. A rearing process has been developed to produce large numbers of insects, and if releases are safe and effective, Wisconsin will push to get involved as early as possible.

Carefully researched biocontrol insect species have helped immensely with the control of purple loosestrife, leafy spurge and other pest plants in the state. Given the difficulty of controlling Japanese knotweed with conventional means, biocontrol may be the best hope for keeping the plant in check, especially with minimal use of chemical poisons.