



Invasive Species Council
of British Columbia

Knotweeds

Japanese knotweed (*Fallopia japonica*)
Bohemian knotweed (*Fallopia x bohemica*)
Giant knotweed (*Fallopia sachalinensis*)
Himalayan knotweed (*Polygonum polystachyum*)

TIPS

Updated July 2016

About Knotweeds

Four knotweed species are currently found in British Columbia: Japanese knotweed (*Fallopia japonica*), Giant knotweed (*Fallopia sachalinensis*), Bohemian knotweed (*Fallopia x bohemica*), and Himalayan knotweed (*Polygonum polystachyum*). All four species are similar in appearance, biology, impacts, and distribution.

Knotweeds are one of the 100 worst invasive species as identified by the International Union for Conservation of Nature (IUCN) and a top-ten invasive species for eradication in BC. Its ability to tolerate a range of soil types and climates means that it has the potential to spread much further than it has to date.

Legal Status

Weed Control Act - requires all land occupiers to control the spread of provincial and/or regional noxious weeds, including, knotweed species, on their land and premises.

Forest and Range Practices Act - requires forest and range managers to specify and implement measures that prevent the introduction or spread of invasive plants, including knotweed species, within their forest stewardship plans, woodlot license plans, range use plans, and range stewardship plans.

Community Charter - enabling legislation that provides power to municipalities to impose legislation for control of invasive plants, including knotweed species.

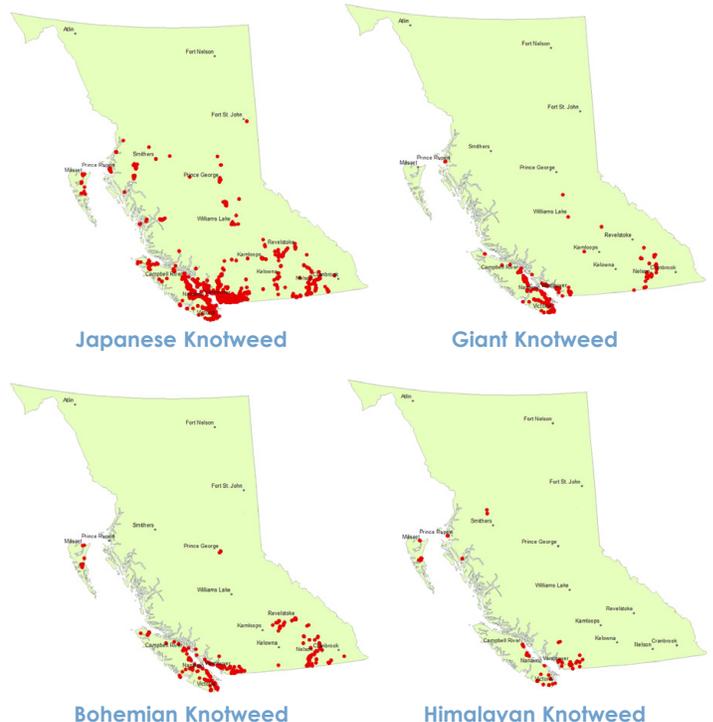
Distribution

Knotweeds are native to Asia and were introduced to British Columbia as an ornamental plant. In BC, they are found in the following areas: Vancouver Island, Sunshine Coast, Central Coast, North Coast (Haida Gwaii), Lower Mainland, Nechako, Cariboo, Thompson-Okanagan and the Kootenays.



Japanese Knotweed
T. Huetle

Knotweed Distribution in BC (IAPP June 2016)



Identification

Flowers: All knotweed species, with the exception of Himalayan knotweed, have small, white/green flowers that grow in showy, plumelike, branched clusters along the stem and leaf axils (joints). Himalayan knotweed flowers are usually pinkish/white.

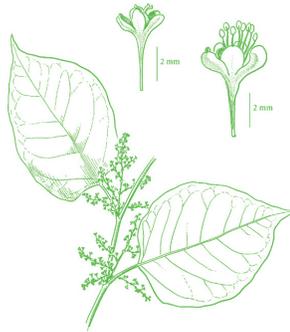
Stems: Green stems, or canes, are hollow, upright, and bamboo-like with reddish-brown/red speckles. Stems arise from the large bulbous rhizome crown that is 30 cm x 30 cm across. Stems grow in large, dense thickets and die back each fall and may persist through the winter as bare, grey or straw colored hollow stalks. Stems vary by species:

- Bohemian knotweed - 2 m to 5 m tall, few to several branches, mottled purple/brown
- Japanese knotweed - 1.5 m to 2.5 m tall, multiple branches, mottled purple/brown
- Giant knotweed - 3 m to 6 m tall, few or no branches, mottled purple/brown
- Himalayan knotweed - 2 m to 3 m tall, branched at upper half, reddish in color

Rhizomes: At maturity, rhizomes are thick and woody, and can spread up to 20 m laterally. Rhizomes have reduced leaf scales that span every 2-4 cm, and underside, adventitious roots that travel with penetrable force into soil.

Leaves: Leaves are a key defining feature of knotweed:

- Bohemian knotweed - leaves have a slight to moderate curve at the base, and are 5 to 30 cm long with a sharp tapered tip. Margins or veins on the underside of the leaf have small hairs or blunt spines.
- Japanese knotweed - leaves have a straight base; truncate with an abruptly pointed tip. They are 3 cm to 10 cm long. Leaf undersides have small ridges or bumps on veins or margins.
- Giant knotweed - Leaves are deeply curved and heart shaped base (cordate). Mature leaves are 20 - 40 cm long. Margins or veins on the underside of the leaf have distinct multi-cellular hairs.
- Himalayan knotweed - Leaves are broadly lance-shaped with a long pointed tip. They can grow up to 20 cm long and are about ½ as broad. Margins or veins on the underside of the leaf have copious hairs.



Fruits: Giant knotweed and Bohemian knotweed are the two knotweed species that usually produce seed. Their seeds are usually dark, glossy, 3 mm long and enclosed in a papery capsule. Japanese knotweed bears only female flowers so on its own it is sterile.

Similar Native Species: Knotweeds, also referred to as "false bamboo" are often confused with Dogwood (*Cornus spp.*) and Lilac (*Syringa vulgaris*) as the leaf shape of many woody shrubs and small/young trees can look very similar to knotweed. These species can be differentiated by leaves that grow opposite each other along a woody stems.

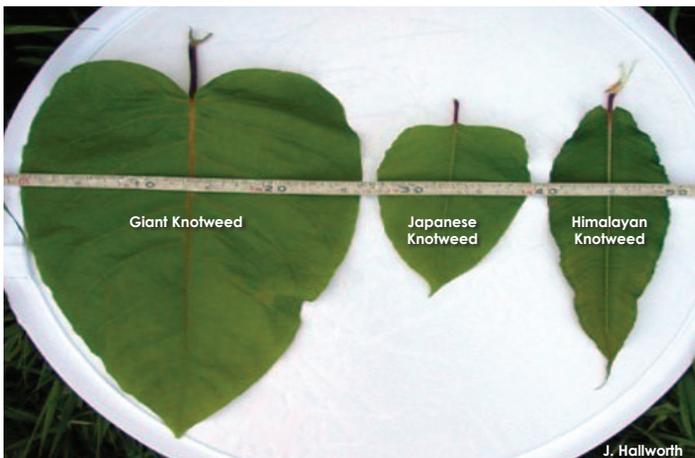
Ecological Characteristics

Habitat: Knotweeds are often found in riparian areas but can establish in a wide variety of ecosystems and site types, including road and railway right of ways, transmission lines, yards and gardens, and forest edges. Knotweed prefers moist soil and full or partial sun and can tolerate a wide range of soil types.

Reproduction: Small pieces of root and stem fragments can regenerate - making knotweeds very easy to spread. The primary mode of reproduction for all species of knotweed is vegetative, however Giant and Bohemian knotweed also spread by seed. Underground rhizomes can grow 2 m deep and extend up to 20 m laterally. Reproduction can occur from as little as 0.7 grams of stem or root tissue. Buried rhizomes can regenerate from depths up to 1 m, and are able to remain dormant for many years.

Hybridization: Bohemian knotweed's pollen can fertilize female Japanese knotweed flowers when they exist in close proximity to each other, in which case the Japanese knotweed will produce viable seed.

Dispersal: Plants are often spread through contaminated equipment and materials, and improper disposal of removed plant material such as dumping or composting of cut stems. Plants are also dispersed through water, wildlife, cutting and mowing, flooding events and through human actions such as selling, purchasing, and trading knotweed plants.



Integrated Pest Management (IPM)

IPM is a decision-making process that includes identification and inventory of invasive plant populations, assessment of the risks that they pose, development of well-informed control options that may include a number of methods, site treatment, and monitoring.

Because knotweeds reproduce vegetatively through root and stems, management options must be carefully evaluated on a site-by-site basis to avoid further spread. Eradication typically requires a dedicated, multi-year approach. Identification of knotweed species is critical to determine the appropriate response and best practices to prevent accidental spread while conducting control activities. **Follow up monitoring and treatments are required with all treatment options.**

Prevention

- Report infestations toll free: 1-888-933-3722
- Report Online: www.gov.bc.ca/invasive-species
- Do not purchase, trade, or grow knotweed. Instead, grow regional native plants as they are naturally adapted to the local environment and are non-invasive. For non-invasive alternatives, see ISCBC's Grow Me Instead booklet (bcinvasives.ca).
- Maintain or establish healthy plant communities that are resistant to invasion by invasive plants.
- Avoid unloading, parking, or storing equipment and vehicles in infested areas.
- Remove plants, plant parts, and seeds from personal gear, clothing, pets, vehicles, and equipment before leaving the infested area.
- Wash vehicles, including tires and undercarriage, and equipment at designated cleaning sites before leaving infested areas.
- Ensure soil, gravel, and other fill material are not contaminated with knotweed material before moving. If possible, leave all contaminated materials on site during construction activities and follow up with a treatment program; OR carefully transfer contaminated material to a suitable location where it can be treated.
- Minimize soil disturbance during activities and re-vegetate exposed soil as soon as possible. Avoid cutting or mowing knotweed stems as disturbance will encourage spread.
- Take special care when controlling knotweed near streams, or ditch lines, to prevent spread downstream.
- Bag or tarp plants, plant parts, and seeds before transporting to a designated disposal site (e.g. landfill).
- Dispose only fully desiccated stems (dried and brown).

Mechanical Control

IMPORTANT: *In general, mechanical control on its own is not an effective management tool for knotweed species due to their massive root structure and ability to reproduce from small root and stem fragments. Manual control is only recommended under specific circumstances, for small, newly established sites and should be carried out with extreme caution due to the likelihood of spread. Dispose all removed plant properly (see Disposal).*

- Cutting and mowing may be effective for small populations (< 200 m squared) if repeated several times a year with constant monitoring. Cutting should be repeated until root reserves are depleted (usually several years). Cutting is most effective when followed up with herbicide application. Note that a mechanical treatment program should not be started



Impacts

Economic: Knotweeds can grow through concrete and asphalt, damaging infrastructure. This results in significant control, management and repair costs. In the UK, the annual control cost of Japanese knotweed, on a national scale, is estimated at \$3 billion (USD). Other impacts include reduction of property values. In the UK, there have been examples where people have been unable to secure a mortgage or insurance on knotweed infested properties.

Ecological: Knotweeds grow rapidly, forming monocultures that limit resources for native plants. Their ability to out-compete native species threatens biodiversity and ecosystem functions. Knotweed roots lack the true root hairs necessary to bind to the soil, resulting in erosion and stream sedimentation along banks of creeks and rivers where it has become established, impacting fish and fish habitat and other aquatic organisms.

Social: Knotweeds affect home and business owners as knotweed rhizomes and stems can push through asphalt, building foundations, retaining walls, septic systems and drains causing significant damage and potential loss of property values. Due to their rapid growth, knotweeds also impact sightline maintenance along roadsides and railways, affecting the safety of motorists. They have also been known to reduce the stability and integrity of the rail bed and compromise train safety, and may pose a risk to bridge and overpass abutments. Knotweeds can also be a nuisance to anglers, boaters and other aquatic recreationalists as infestations impede access to the waterbody.



unless resources to continue ongoing maintenance for multiple years can occur, as infrequent disturbance to a knotweed site will cause it to increase in size.

- Burning is not recommended as the plants contain high water content and all plant tissue, particularly the rhizomes, will not burn.
- Grazing may result in short term reduction of above ground plant matter. Grazing must be continued for a long period of time over many years to be effective.
- Mechanical control is not recommended for larger populations (> 200 m squared) as there is risk of vegetative spread from plant parts left on site and the labour costs for long term management are very high.

Biocontrol

Biological Control or biocontrol is the use of an invasive plant's natural enemies - agents (chiefly insects, parasites and pathogens) - to reduce its population below a desired level. It is the long-term, self-sustaining treatment method for managing invasive plants.

A sap sucker psyllid, *Aphalara itadori*, has been studied as a potential biological control in the Pacific Northwest. *A. itadori* feeds on the sap in the phloem cells of the leaves and stems resulting in twisted and deformed leaves and, more importantly, damage to the meristems and reduced biomass. In 2012, host range screening was completed for *A. itadori* and a permit to import the psyllid into Canada was submitted to the Canadian Food Inspection Agency in October 2012. The agent has been permitted for release and Agriculture and Agri-Food Canada is at a very early research stage. For the current availability of *A. itadori*, please visit: www.for.gov.bc.ca/hra/Plants/biocontrolHome.htm

Chemical Control

Herbicide use must first consider site characteristics and be prescribed based on site goals and objectives. Herbicide labels must be followed at all times and all applicators must follow all requirements in the BC *Integrated Pest Management Act* and Regulation as well as any relevant local bylaws. On public and private lands, follow all herbicide labels and applicable laws. It is recommended to hire experienced professional certified applicators.

- Chemical treatment is a management strategy that requires monitoring and follow up treatments as long as there is re-growth. Generally knotweed sites can be controlled with herbicide within 3-5 years. Chemical treatment is most effective between bud formation and when the plant begins to die back after the first frost.
- Herbicides must be systemic for control of knotweed species, and may be applied using a variety of application methods depending on the site and product being used including hand spraying, backpack spraying, wipe-on and painting.
- Stem injections have proven to be a highly successful chemical treatment option however currently in Canada, there are no herbicide labels, that permit stem injection for knotweeds.
- Effective herbicides include: imazapyr, glyphosate, triclopyr, aminopyralid. Follow all application rates, site restrictions and set backs from sensitive areas and water on the labels and in Provincial legislation.

Disposal

Note: Disposal of invasive plants varies by region. Contact your local government for specific information on how to dispose your invasive plants.

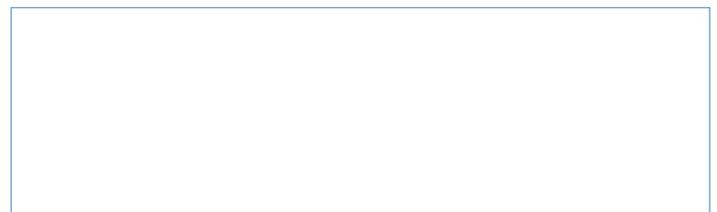
- Treated knotweed canes can be left on site to compost.
- Elevate cut or mowed stems until they are completely desiccated and no longer viable, and not permitted to touch soil or water during the desiccation process. Once completely brown and dry, they may be safely composted, as long as seeds are not present particularly on Bohemian knotweed stems.
- Tarp and bag removed knotweed plants, plant parts and seeds before transporting to a designated disposal site (e.g. landfill or transfer station). It is recommended that transfer stations provide disposal bins intended solely for invasive plants. This will ensure the plant matter within the container is transported in a sealed unit and properly disposed of at the landfill. All cut plant parts should undergo deep burial (min. 5m) at a landfill.
- Disposal options for knotweed root/rhizome material are limited, and should be left on site wherever possible.
- Burning and composting at home is not recommended as extreme temperatures are required.

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ADDITIONAL CONTACT INFO