United States Department of Agriculture

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SUBJECT: Japanese Knotweed – Plant Materials Technical Note No. 39

Purpose: To distribute to all Oregon offices the publication "History, Biology, and Suppression of Japanese Knotweed (*Fallopia japonica*)".

Filing Instructions: File this Note sequentially in the Plant Materials section of your Technical Note binder.

Expiration Date: None

Japanese knotweed and it closely related allies are becoming increasingly invasive in riparian zones and stream corridors throughout the Pacific Northwest. "History, Biology, and Suppression of Japanese Knotweed (*Fallopia japonica*)" provides background information on the introduction and threat of this species, growth and adaptation characteristics, and methods of control. Information was obtained from current literature. It should be useful in addressing this problem species.

Copies of this Technical Note may be downloaded by accessing the Plant Materials website [http://plant-materials.nrcs.usda.gov/orpmc/publications.html]or links through the NRCS Oregon web site [http://www.or.nrcs.usda.gov/, then click on "plants", "Corvallis Plant Materials Center", and "Publications".]

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Enclosure

DIST:
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TECHNICAL NOTES

U. S. DEPT. OF AGRICULTURE — NATURAL RESOURCES CONSERVATION SERVICE
Portland, Oregon — September 2006

PLANT MATERIALS No. 39

HISTORY, BIOLOGY, AND SUPPRESSION OF JAPANESE KNOTWEED (*Fallopia japonica*)*

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Photos by Dale Darris

- **Japanese knotweed, its close relatives Himalayan knotweed and giant knotweed, and their hybrids are invasive species problematic in the Pacific Northwest and throughout the United States.**
- **Japanese knotweed forms dense monocultures that exclude other vegetation.**
- **It is often found along waterways where herbicide control is limited due to a lack of products labeled for use near water.**
- **Knotweeds are perennials with vigorous rhizomes that form deep, dense underground mats.**
- **A stand of knotweed can establish from a tiny vegetative fragment. Thus, extra care must be taken when disposing of vegetative waste from removal efforts.**

***Alternative names:** *Polygonum cuspidatum* (Sieb and Zucc.), *Polygonum sieboldii* (Vriese), *Reynoutria japonica* (Houtt.)*, Polygonum japonicum,* and *Polygonum zuccharini;* Common names include: Japanese bamboo, Mexican bamboo, elephant ear bamboo, fleece flower, Sally rhubarb, Hancock's curse, crimson beauty, and pea-shooter plant.

Similar species: Himalayan knotweed (*Polygonum polystachyum*), giant knotweed (*P. sachalinense*) and hybrids all exist along with Japanese knotweed in the Pacific Northwest. In fact, many Pacific Northwest infestations are thought to be hybrids of Japanese and giant knotweed, referred to commonly as Bohemian knotweed (Dobrowolski and Stannard 2004). Adaptation, concerns, and control of all these species are similar if not identical to those of Japanese knotweed. Plant description varies primarily in plant height (giant knotweed reaching a height of 15 feet, Japanese 10 feet, and Himalayan 4-6 feet) and leaf shape (Soll 2004).

History

Japanese knotweed is native to eastern Asia. It was introduced as an ornamental in England in 1825 where it quickly spread and became a problem weed. Despite this ominous reputation it was introduced to North America in the late 19th century for use in ornamental hedges, livestock forage, and erosion control. It is praised by those in the ornamental plant trade for its ability to form attractive and rapidly-grown hedges. Once established, the dense stands formed by Japanese knotweed crowd out all other vegetation. Their deep, dense mats of vigorous rhizomes along with their ability to resprout from small fragments make them a persistent and readily spread pest. Japanese knotweed has become a widespread concern and is now recognized as a threat throughout North America, Europe, South America, Australia and New Zealand. It is currently present in at least 36 of the lower 48 states (Shaw and Seiger 2002) and is listed as a noxious weed for the states of Oregon and Washington.

Although it is still possible to purchase Japanese knotweed through ornamental plant nurseries, availability has become very low and most gardeners recognize the danger of this plant.

Biology

Japanese knotweed is a member of the buckwheat family (Polygonaceae). It is semi-woody with hollow stems that resemble those of bamboo, growing upright with distinct, swollen nodes. Leaves are large, smooth-edged, and heart-shaped. Flowers are creamy to greenish white and grow in dense, elongate clusters that branch from leaf joints. Plants flower in late summer and die back after the first hard frost (Soll 2004). Japanese knotweed is a rhizomatous perennial that returns every spring from the same root system. Stems usually persist as bare, reddish-brown stalks through the winter. At low elevations in the Pacific Northwest, Japanese knotweed typically starts growth in early April, while higher elevation stands begin as late as June. Emergence of new growth depends on root depth with deeply buried roots growing stems that break ground as late as August (Soll, 2004). Growth is rapid both above (up to 3 inches per day [Shaw and Seiger 2002]) and below ground. Foliage reaches a height of around 10 feet and rhizomes reach a depth of 10 feet and a length of up to 30 feet (University of Washington 2005). Stands usually form extremely dense monocultures.

Japanese knotweed has been observed growing in a variety of soil types from loam to cobble and in soils with a wide range of salinity and a pH between 4.5 and 7.4 (Shaw and Seiger 2002). It readily takes advantage of freshly disturbed sites where its fast growth easily out-competes most other plant species. Although its preference is for open sites where its high light requirements are met, it can tolerate full shade. Knotweed also tolerates drought, though it is most often found in moist areas, particularly streambanks.

Its propensity to be found along riparian corridors has led it to be classified as an invasive freshwater weed. It often spreads downstream when plant parts ride the water's current. Fragment regrowth and vigorous rhizomes are the primary means by which introduced populations are established. Although seeds are the principle method of reproduction in native populations, seedlings have rarely been observed in its exotic ranges. One possible explanation for the apparent lack of sexual reproduction is that the majority of infestations are thought to trace back to a single female (Japanese knotweed is a dioecious species) cloned for the ornamental trade. Seedlings that have been reported are most likely all offspring of the common hybrid Bohemian knotweed which is known to produce viable seeds.

Although one of the reasons for Japanese knotweed introduction to North America was for erosion control, it is now known to leave waterway banks especially vulnerable to erosion and flooding. During the winter and early spring when the Pacific Northwest is most susceptible to flooding, Japanese knotweed stands die back to the ground leaving riparian surfaces bare or covered only by dead knotweed canes. These canes often wash into the water increasing the stream load and causing more flooding. Both the dead canes and especially the live stalks leave no room for native plants and the dense monocultures of knotweed are of little or no use to wildlife. Leaf litter and other vegetative debris accumulate quickly and persist as a heavy mulch unfavorable to other species of flora or fauna. Japanese knotweed's deep and rapidly spreading rhizomes have proven to be poor soil stabilizers and yet are effective at making removal extremely difficult.

Control

The best method of eradication depends on the resources available as well as the size and location of the stand. Mechanical or manual control methods require the most dedication and persistence and thus are generally best used on small, isolated patches. Herbicide spraying can be effective but has environmental limitations due to drift and Japanese knotweed's tendency to be found in riparian areas where regulations can restrict herbicide use. Herbicide injection, on the other hand, eliminates drift and has promising experimental results. Integrating multiple techniques can offer more flexibility (Child and Wade 2000). One thing is certain: Japanese knotweed and its close relatives are stubborn weeds that require attention and persistence.

Mowing and cutting: Any technique that produces new fragments of vegetative material should be used with caution and care. Many reviews of such methods deem them unproductive and warn against spreading infestation further. However, if labor is plentiful and persistent, and pesticides are unfavorable, mowing or cutting can control small stands within three years (Soll 2004). The most important things to keep in mind when employing either of these methods are to search at least 30 feet from the original patch center for stems and cut them as low as possible to the ground; remove and dry ALL FRAGMENTS of Japanese knotweed; and be dedicated to frequent and timely re-treatments. A stand should be cut at least twice monthly from the time sprouts appear through August and monthly thereafter until the first frost. Mowing and cutting should be continued at least three consecutive years. Goat grazing is an option similar to cutting, but be aware that goats will eat indiscriminately and Japanese knotweed is likely to re-establish when grazing pressure is lifted.

Digging and pulling: Digging or pulling can be effective on small populations growing in loose soil. It is important to remove the entire stand including its root system as fragments of rhizome as little as 0.7 grams can produce a new plant (Japanese Knotweed Alliance 2005). The site should be revisited subsequently to search for new sprouts (again, search up to 30 feet from the center of the stand).

Covering: There is no solid evidence in support of this technique. Japanese knotweed has been known to sprout through asphalt several inches thick. Thus,, covering an infected area with plastic or other material is not recommended as a control technique on its own. In conjunction with cutting, covering slows regrowth and therefore may be helpful.

Foliar spray: Japanese knotweed's vigorous underground system has been known to evade foliar treatments. However, choosing an herbicide that translocates well and spraying at the optimal time helps to increase rhizome damage. For example, spraying glyphosate or triclopyr has been proven to be a practical approach for controlling large infestations. Unfortunately, plants are above a reasonable spraying height when in the desired flower bud stage, or when leaf surface area is maximal. Therefore, spraying when stands are in their first month of growth or preceding a late summer spraying with a May or June cutting are the most reasonable options (Dobrowolski and Stannard 2004; University of Washington 2005). Any glyphosate or triclopyr spray regime will need to be repeated twice per season for three to four years and is most effective on new stands (University of Washington 2005). One reported result of foliar spray is the occurrence of stunted, abnormal growth that returns year after year (University of Washington 2005). It is unknown if, in time, these populations will return to normal growth. Another commonly used and aquatic approved herbicide for Japanese knotweed control is Imazapyr. It is perhaps the most promising (and most expensive) choice for foliar spray with a rumored 90 percent control rate after just one application (University of Washington 2005). Always keep in mind that repeated applications, while necessary for total control, increase the risk to non-target species. Also, be aware of waterways and follow local and manufacturer restrictions.

Cut-and-fill: By cutting Japanese knotweed canes down to just below the second node and filling the stem cavity with herbicide, usually glyphosate, plant tissue is effectively exposed to herbicide while avoiding the possibility of spray drift. This method should not be used, however, if there is any chance of rain or flooding. Due to the extent of labor involved in this technique, it is not recommended for large patches.

Stem injection: A favorite among Japanese knotweed foe, this method has the speed and efficiency of foliar spraying while doing little to no damage to surrounding plants. It can be done in high wind and light rain and has reported success rates of 95 to 100 percent control after only one treatment (University of Washington 2005)! This method is still fairly new and research is in progress to work through issues such as what to do with stems that are too thin to be injected and whether or not there is significant danger of herbicides leaching from rhizomes into the soil where other vegetation could then be affected. Injection tools are currently available on the market and Aquamaster has been approved and labeled for this method in Oregon.

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