What is the Threat from Invasive Knotweed Seed Production?

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Japanese Knotweed
*Polygonum cuspidatum*

- Japanese knotweed is an introduced perennial species that has become a major weed of riparian areas in many parts of the US and Canada
  - Primarily propagated *vegetatively*
  - Japanese knotweed is *dioecious*
    - Most (all?) plants in PNW produce *only female flowers*
  - Will produce seed if pollination occurs
  - Excellent bee forage
Three Other “Big” Knotweeds

- **Giant knotweed (Sakhalin)**, *Polygonum sachalinense*
  - Flowers are perfect and fertile
  - Reliably produces seed
- **Bohemian knotweed**, *Polygonum xbohemicum*
  - PNW population first described in 2004, hybrid between giant and Japanese knotweed
  - Flowers are presumably not fertile (plants dioecious?)
  - The most widespread of these taxa in the PNW (?)
  - Rarely produces seed
- **Himalayan knotweed**, *Polygonum polystachyum*
  - Flowers are perfect and fertile
  - Less widespread than giant in western WA and OR
  - Does not produce seed in PNW (?)
Female Japanese knotweed

Male (?) Bohemian knotweed
Perfect flowers on giant knotweed and on Himalayan knotweed

Photos from WA State Noxious Weed Control Board
Knotweed Seed Production

• Forman and Kesseli (2003*) tested Japanese knotweed seed from several sites
  - 1998: Fifteen plants at four sites near Milton, Dorchester, and Walpole, MA
    • 0 to 70% germination
    • 10% mean germination
  - 1999: Eleven plants at two sites in Braintree and Boston, MA
    • 0 to 100% germination
    • 63% mean germination

* Amer. J. Bot. 90:586-592
Knotweed Seed Production

• Pacific Northwest data
  – 2003-04: Japanese knotweed seed from two plants near Acme and Marblemount, WA
    • Acme seed approximately 30% germinable
    • Marblemount not directly tested, but seedling emergence was low
  – 2003: Giant knotweed seed from six plants near Quilcene, WA
    • Approximately 60% germination
Knotweed Seedlings in the Wild?

Giant knotweed shoot from a rhizome
Cotyledons are narrow and long.

Photos from Laurel Baldwin, Whatcom County Noxious Weed Control Board
Giant knotweed seedlings
Knotweed Seedling Establishment

• Forman and Kesseli reported on three Japanese knotweed sites:
  - Site #1: Neponset River, Milton, MA
    • 2001
      - First-year seedlings emerged
      - Seedlings were overwhelmed by other vegetation and presumably died at about four weeks
Knotweed Seedling Establishment

• Forman and Kesseli reported on three Japanese knotweed sites (cont.):
  - Site #2: Neponset River, Dorchester, MA
    • 2001:
      - First-year seedlings emerged
      - Very dry site, so growth was very slow (still cotyledon-stage at four weeks)
      - A few seedlings produced one leaf before being buried by bike path construction
Knotweed Seedling Establishment

• Forman and Kesseli reported on three Japanese knotweed sites (cont.):
  - **Site #3: Monatiquot River, Braintree, MA**
    - 2000:
      - Branches from female plants break and fall to base of hill
    - 2001:
      - 100+ first-year seedlings, many of which lost their cotyledons and produced up to five leaves and short rhizomes
    - 2002:
      - Four second-year seedlings broke bud, three were stunted and one was normal, but all continued to grow
    - 2002:
      - There were also additional first-year seedlings
Knotweed Seedling Establishment

• Pacific Northwest
  - 2004:
    • A few giant knotweed seedlings (?) found on a gravel bar on the Big Quilcene River
      - Two- to three-inch tall plants did not appear to come from a rhizome, although cotyledons were not present
    • Most small plants were attached to rhizomes from scattered plants on the bar or rhizome fragments from who knows where
  - 2004:
    • Bohemian (?) knotweed seedlings in Whatcom County, WA (intentional planting in nursery from seed collected in fall of 2003 on the Nooksack River near Bellingham)
What Is The Threat From Seed?

• We know **some seed is produced:** giant and Bohemian; other hybrids (?)
• Seed germination ranges from **0% to 60%** (as high as 100% has been reported)
• Resultant seedlings appear to be **poor competitors** with other vegetation and have high seedling mortality
  - In MA, first-year seedlings needed to achieve **five leaves** for winter survival
  - Hybridization may result in plants with **greater vegetative reproductive vigor or greater aggressivity**
• If seed is likely to be produced, control of parent plants should be done **prior to flowering**
At the reception tonight, please enjoy the cinemagraphic excitement of the 1964 “B” movie adaptation of the classic fairy tale *Elvis Climbs the Giant Knotweed*