



Biological Control of Invasive Knotweeds

A Research Project of the Beneficial Insects Lab (BIL)
North Carolina Department of Agriculture & Consumer Services



- Genus *Reynoutria*
- Planted as ornamentals since the 1800's
- Invasive within sensitive riparian areas, row crops, forest ecotones, and orchards
- Outcompetes native species (allelopathy) & creates ecological imbalance
- Winter dieback facilitates soil erosion



Knotweed invading apple orchard



Challenges

- Very adaptable; few natural enemies here
- Soil movement transports rhizomes, creates new KW stands
- Chemical control inadvisable in riparian corridors; control is only temporary
- Mechanical control not always feasible; can stimulate growth

Control Strategy

- Biological Control as part of an integrated management plan
- Host-specific, stringently vetted natural enemy: A "plant flea"
- Evaluate overwintering ability and abiotic effects via predator exclusion



Knotweed Psyllid, *Aphalara itadori*
Photo Credit: Fritzi Grevstad



Leaf-curl damage caused by Knotweed Psyllids

Plant Damage cause by Psyllids

- Predation, climate, and other factors control efficacy in the field
- Regional differences in longevity, number of generations, plant damage

Environmental Factors that Influence Knotweed Biocontrol

Predators



Late-season frost



Additional climatic factors that might reduce biocontrol agent fitness

- Microclimatic effects: humidity, temperatures outside of developmental thresholds
- Extended drought: Effects on host plant quality and psyllid survival

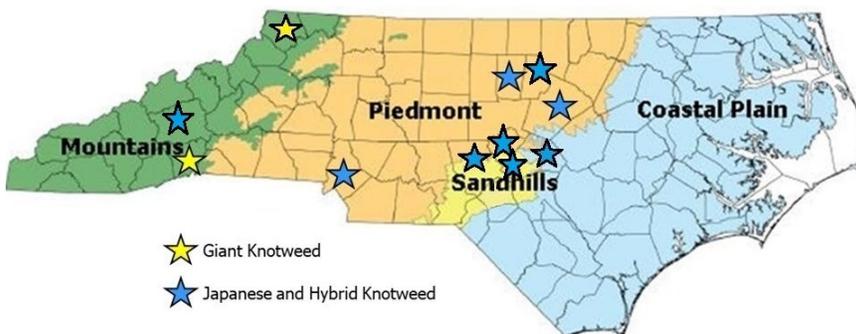
To mitigate these factors

- Exclude predators, mitigate temperature and RH effects by use of a field cage
- Initiate releases later in the season



Results

Over 100,000 psyllids released to date



- Psyllids survive winter
- Dramatic plant damage in laboratory settings
- Field studies are ongoing
- Initiated releases of new strain in 2024