

Weed Biological Control in Benton County

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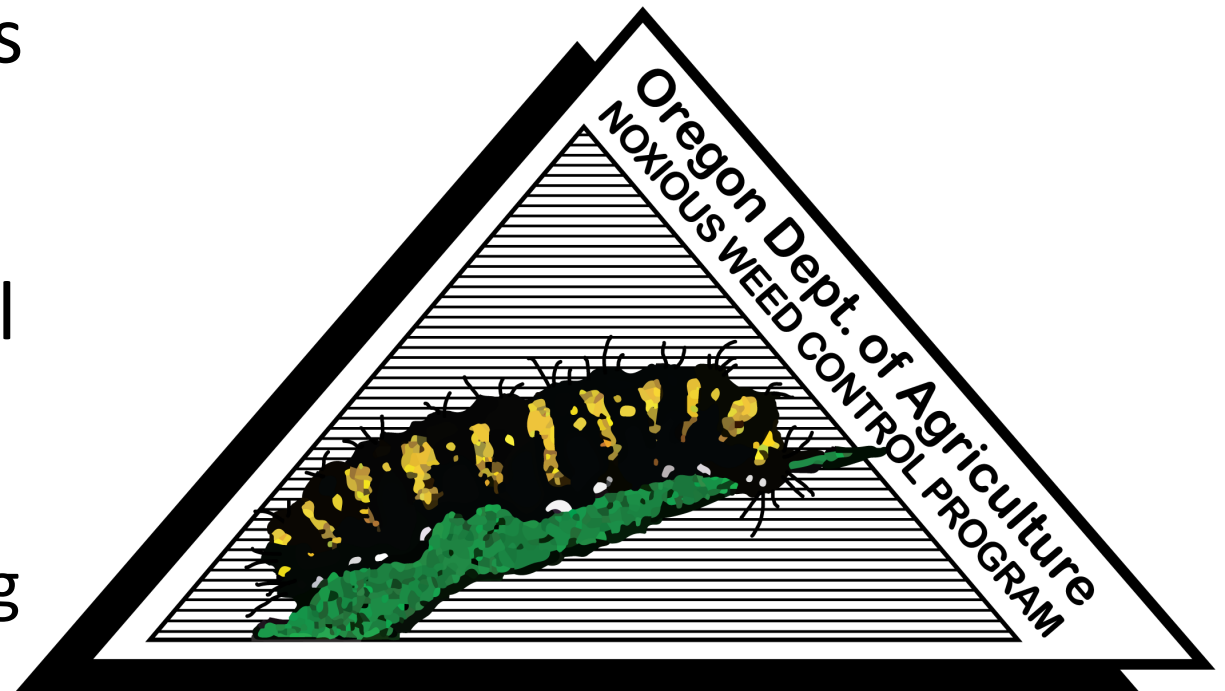
11/3/2025



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What is Classical Weed Biological Control?

- Method of weed control where natural enemies from a weed's native range are introduced into the exotic range to become self-sustaining control agents.
 - Safe, inexpensive, sustainable, and effective means of reducing pests



Why do we use biocontrol?

- Invasive noxious weeds in Oregon cost millions of dollars in economic damage
 - Biocontrol is a relatively cheap method of control
- Good option when pesticides cannot be used
 - Organic certified, schools, wetlands, difficult or dangerous to reach areas
- Globally, 75% of all agents have at least minor impact, and of those 35% are considered as having major impact.
- Benefits so high, failed projects would need to cost \$5.7 million each to erase gains (Navanjo, Frisvold, Ellsworth, 2019)
- Net benefit of biocontrol in OR = \$14.6 m/yr
- Over 100 years worldwide: 99% of weed biocontrol have no known significant adverse effects on non-target plants (Suckling & Sforza 2014, Schwarzlaender et al. 2018)

Limits of Biological Control

- Biocontrol is not a “silver bullet”
 - Not suitable for control of A-listed weeds or eradications
- It is a SLOW process
 - 10-20 years for successful control!
- It doesn't always work very well
 - some agents are unable to establish or offer little control of the weed.
- It requires a minimum weed density and release sites need to be left alone until insects establish

Historical Biocontrol Releases in Oregon



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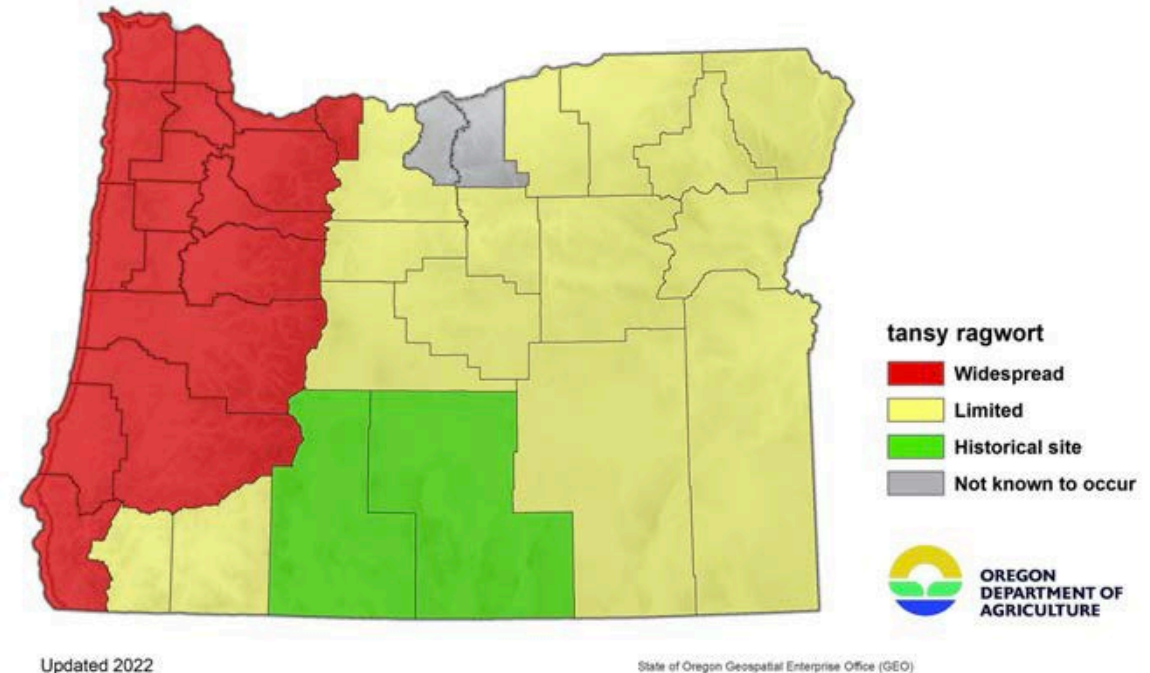
Tansy Ragwort (*Senecio jacobaea*)

- Native to Eurasia, appeared in 1922.
- Regionally abundant, statewide eradication is not feasible (B-list).
- Targeted for biocontrol in Western Oregon and eradication in Eastern Oregon.
- Seed viable for up to 15 years.
- Toxic to liver of cattle and horses.
- Dried plants still have poisonous alkaloids that show up in resulting milk or honey.
- Before the use of biocontrol, Oregon agriculture suffered \$5 million per year in livestock losses.



Tansy Ragwort in Oregon: A Success Story

- Ragwort infests 125,000 acres in Oregon
- Without controls it has the potential to infest 11 million acres resulting in over \$12 million of negative economic impact.
 - Tansy agents save \$5-10 million/yr
- ODA has coordinated successful use of millions of ragwort biocontrol agents for over 60 years at more than 200 locations; nearly all patches in Oregon have at least a small resident population of BCAs.



Cinnabar Moth: The Charismatic Agent



Tyria jacobaeae

Year: 1960

Distribution: Widespread

Attack rate: Heavy

Control: Excellent

Collectability: Mass

Comment: Best at large infestations. Not recommended for Eastern Oregon.

Tansy Seed Head Fly: The Eastern Oregon Agent



Botanophila seneciella

Year: 1966

Distribution: Widespread

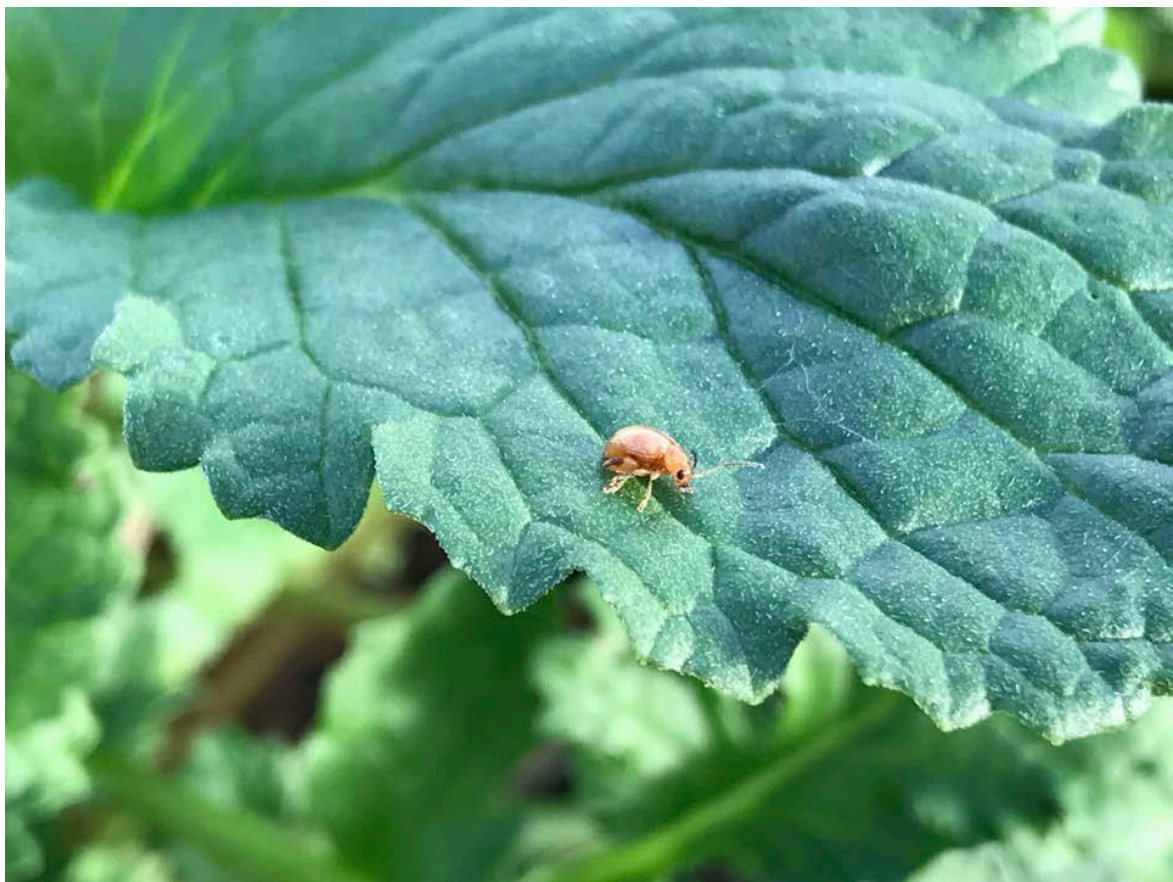
Attack rate: Light

Control: Poor

Collectability: Mass

Comment: While the control is not as successful as the other agents, it is the only agent that does well in Eastern Oregon.

Flea Beetle: The “Workhorse” Agent



Longitarsus jacobaeae

Year: 1971

Distribution: Widespread

Attack rate: Heavy

Control: Excellent

Collectability: Mass

Comment: Most effective agent. Reduced ragwort density by 90% in Oregon, seven years post-introduction. If ragwort flares back up, insects will usually control plants within two years. Not established in Eastern Oregon



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Field Results: Portland, OR

2020



2021



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If BC for Tansy is so successful, why am I still seeing it?

- Boom- bust cycles can cause temporary resurgences of Tansy, even with biocontrol agents well established in the area.
- Extreme weather can send the plant/herbivore cycle into significant annual swings causing a significant increase in growth of the patches with matching increase in biocontrol insects the year or two following
- Unusually wet springs can flood out overwintering insects in the soil
- Insects can regionally adapt to new conditions but may take a few years to do so
- Remember Biocontrol ≠ Eradication



Active Biocontrol Projects



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What are we currently working on?

BCA's being reared at ODA for:

- Japanese, Giant, and Hybrid Knotweed (psyllids)
- Gorse (thrips)
- Yellow Starthistle (rosette weevil)

BCA's overwintering at ODA for:

- Dalmation Toadflax (stem-boring weevil)
- Russian Knapweed (gall wasp)

BCA's monitored in the field for:

- Houndstongue (root weevil)
- Rush Skeletonweed (root moth)

BCA's collected and redistributed in the field for:

- Purple Loosestrife (2 leaf beetles and root weevil)
- Spotted Knapweed (root weevil & seedhead weevil)
- Field Bindweed (gall mites)
- Scotch Broom (seed beetle)
- St. Johns Wort (Klamath Weed Beetle)



Japanese Knotweed (*Reynoutria japonica*)

- Native to Eurasia
- Introduced to US as an ornamental and for stream bank stabilization in 1900s
- Flood events transported root masses leading to huge infestations on many Oregon Rivers
- Heart shaped leaves, grows up to 9 ft tall
- Mostly found in riparian areas, but can be found in the forest, yards and gravel
- Vigorous growth that exclude native vegetation and greatly alter tree regeneration

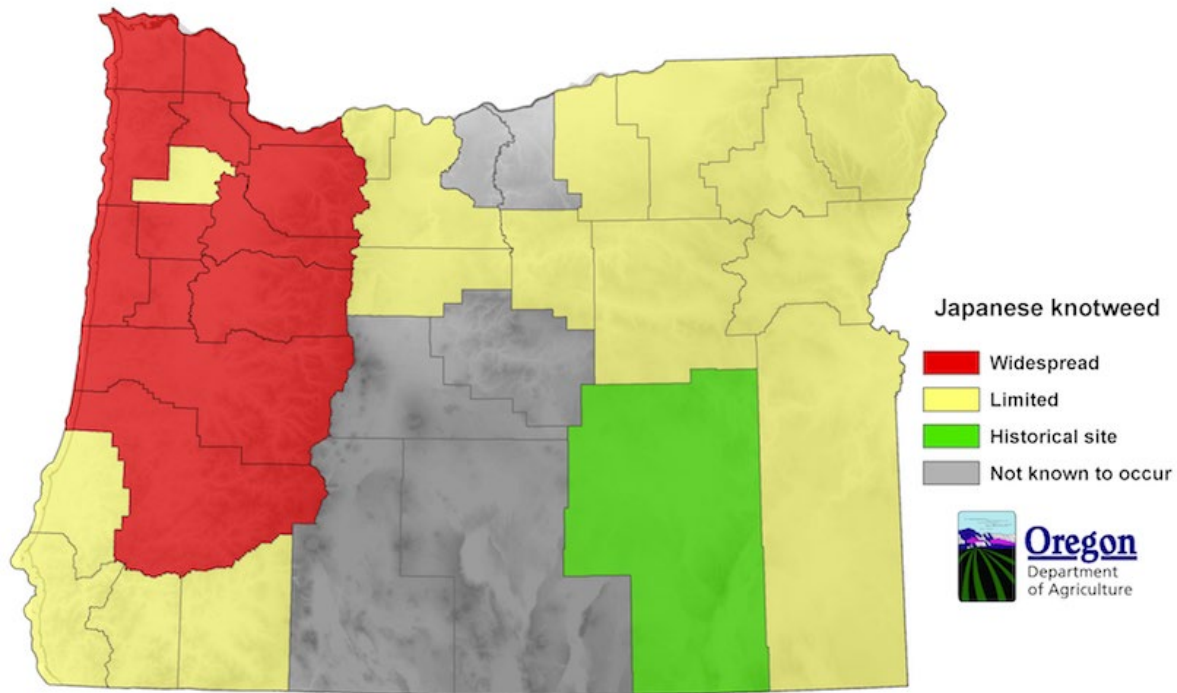


Giant Knotweed (*Reynoutria sachalinensis*)

- Native to a single island in Japan
- Introduced to US as an ornamental
- Huge leaves and can grow up over 10' tall
- Hybridizes with Japanese knotweed
- Grows annually from woody rhizomatous roots that can spread 65 ft laterally
- Spread by human movement & flood events
- Its large size allows it to outcompete and displace native or beneficial plants
- Roots produce allelopathic chemicals which aid in its dominance & rapid colonization

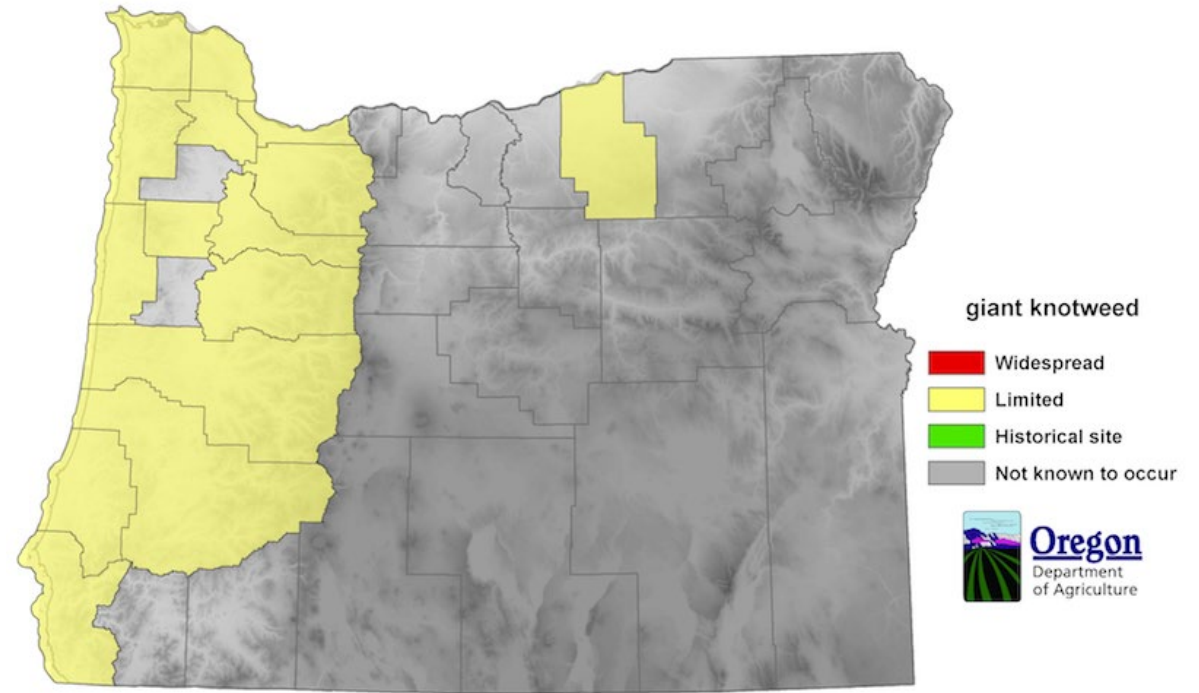


Knotweed Distribution in Oregon



Updated January 2015

State of Oregon Geospatial Enterprise Office (GEO)



Updated January 2015

State of Oregon Geospatial Enterprise Office (GEO)

Knotweed Psyllids: *Aphalara itadori*



Distribution

Native to Japan and Korea. First releases in Oregon in 2020.

History

One agent biotype from N. Japan prefers giant knotweed and another biotype from S. Japan prefers Japanese knotweed. A third biotype prefers hybrid knotweed. 700 eggs per female laid on leaf surface. One to three generations per year.

Impact on Target

Larvae and adults suck sap from phloem cells of leaves and stems. In lab settings, psyllids reduced attacked plant and root biomass by 50%. Feeding damages plant and causes leaf curl. This depletes plant energy supply and reduces leaf area for photosynthesis.

Knotweed Psyllid Establishment



- Agent is still relatively new
- The psyllids are having a difficult time establishing in the field
- Caged releases have helped
- Some agents just do not work out as well as hoped, and this may be one of those agents

Promoting and Protecting BCAs











- If a known release site is in your area, do not spray or mow release areas
- If eradication is not attainable on a property, leave a small population of the target weed as an insect reservoir.
- Planting native species near infestations for insect habitat. Some agents overwinter and need places to hide when target weed is dormant.
- Got weeds with known BCAs? Reach out! We may be able to get you on a list, and eventually send you agents for release.




ODA Agent Online Profiles: oda.direct/biocontrol

Oregon noxious weed biocontrol agents

Q Type to filter... Sort by: [Common Name](#) [Scientific Name](#)

	Bull Thistle Seed Head Gall Fly <i>Urophora stylata</i> Target Weed(s): Bull Thistle	+
	Canada Thistle Crown-Stem Weevil <i>Hadroplontus litura</i> (= <i>Ceutorhynchus</i>) Target Weed(s): Canada Thistle	+
	Canada Thistle Gall Fly <i>Urophora cardui</i> Target Weed(s): Canada Thistle	+
	Canada Thistle Rust Fungus <i>Puccinia punctiformis</i> Target Weed(s): Canada thistle	+
	Dalmatian and Yellow Toadflax Seed Capsule Weevil <i>Rhinusa antirrhini</i> (= <i>Gymnetron</i>) Target Weed(s): Dalmatian and Yellow Toadflax	+
	Dalmatian Toadflax Stem Boring Beetle <i>Mecinus janthiniformis</i> Target Weed(s): Dalmatian Toadflax	+
	Eurasian Watermilfoil Stem Mining Weevil <i>Euhrychiopsis lecontei</i> Target Weed(s): Eurasian Watermilfoil	+
	Field Bindweed Defoliating Moth <i>Tyta luctuosa</i> Target Weed(s): Field Bindweed	+
	Field Bindweed Gall Mite <i>Aceria malherbae</i> Target Weed(s): Field Bindweed	+
	Gorse Seed Weevil <i>Exapion ulicis</i> (= <i>Apion</i>) Target Weed(s): Gorse	+



Canada Thistle Rust Fungus
Puccinia punctiformis

Target Weed(s): Canada thistle

[Target Weed Profile](#)

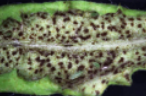


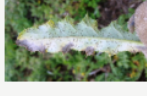

Impact on Target Plant: Spores germinate on leaves, travel down stems, and systemically infect the root system as a cryptic root parasitic fungus. The rust fungus often limits an infestation's ability to increase and, in some cases, causes infestations based on one or two mother plants to experience colony collapse.

Collection and Release: Sites with known infection can be collected from in September. Yellowing basal leaves with dark spots underneath (ruptured spore pustules) can be clipped off. Leaves are then dried, crushed, and sprinkled on fall emergent rosettes at a new release site (0.5 grams per rosette). Best applied with high likelihood of dew. Late fall mowing can increase rust abundance locally.

Distribution: Naturalized in North America and present at low levels throughout Canada thistle's range. Likely to be present statewide.

History: *Puccinia punctiformis* was likely introduced at the same time as Canada thistle and has since naturalized throughout all temperate regions of the globe. The USDA-ARS plant pathology labs in Maryland developed methods of utilizing the rust and transferred that knowledge to the Colorado Department of Agriculture in 2013. Using Colorado's expertise and source material for initial releases, Oregon added Canada thistle rust to the biocontrol program in 2018.

Additional Images

Questions?

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oda.direct/biocontrol



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