

Management of Broadleaf Weeds

Tim Prather

Dept. Plant Sciences

College of
Agricultural and Life
Sciences

University of Idaho





Outline

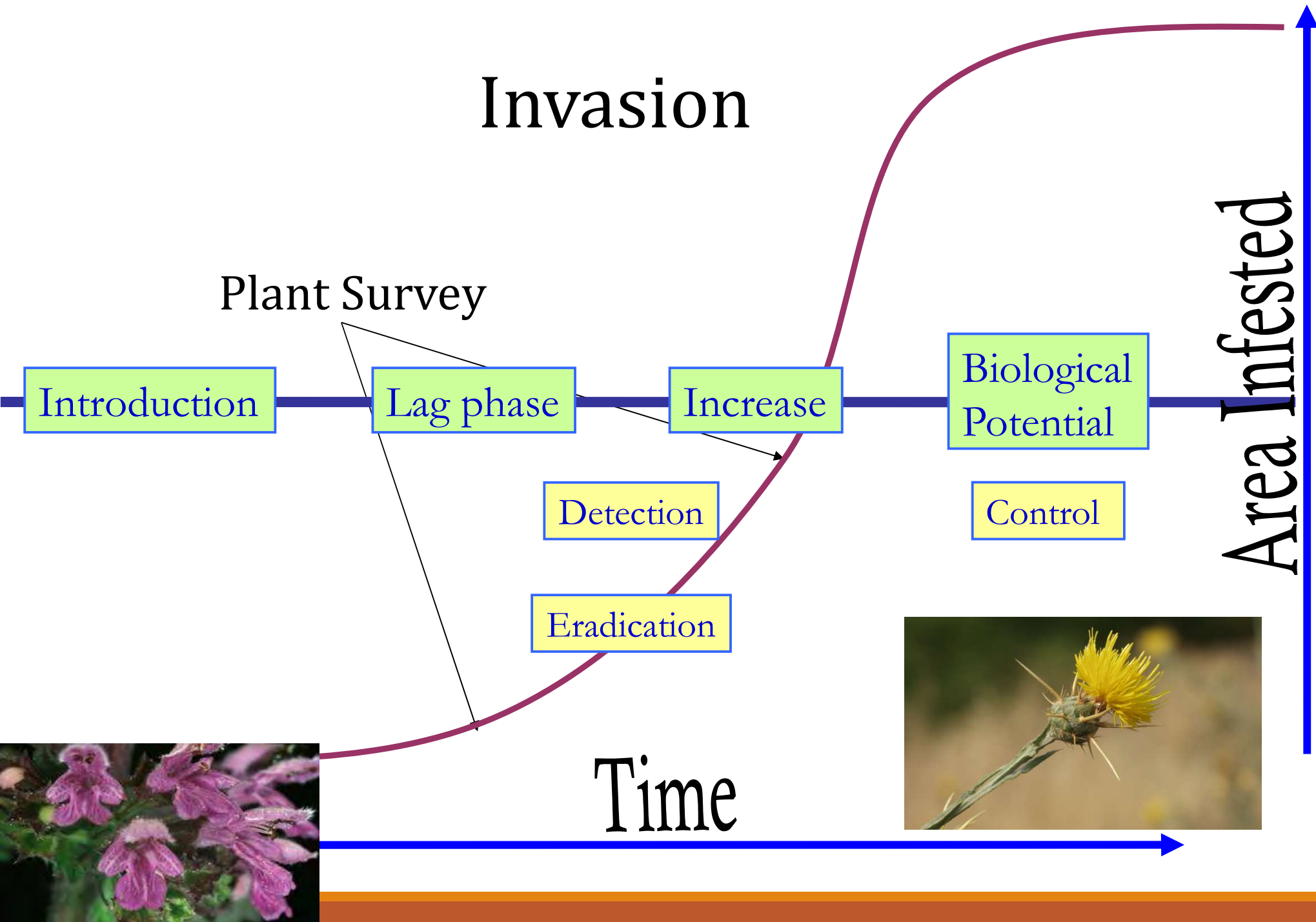
- Planning and Goals
- Control of Specific Broadleaves
- Biological Weed Control



Goal Examples

1. Sustainable harvest
2. Minimize factors affecting seedling and young tree growth
3. Do not increase distribution of weedy species
4. Improve forage availability for livestock

Invasion



*Timothy, or, Notes of an
Abject Reptile*
Verlyn Klinkenborg



A Lesson on Dispersal

Timothy has been missing for 2 weeks and 2 boys found him and returned him to Gilbert White

How did I escape?

It helps if they leave the wicket gate open.



A Lesson on Dispersal

Humans are attracted to
the quick.

They flash mirrors and
catch swifts in nets.

However, I move
through the holes in
their consciousness.

My slowness is
deceptively fast.





Disturbed Areas

- Road sides, rivers/streams, trails
- Equipment yards
- Livestock loading areas
- Hay - feeding



Know what is present
along roadways
Know what is present
on your property

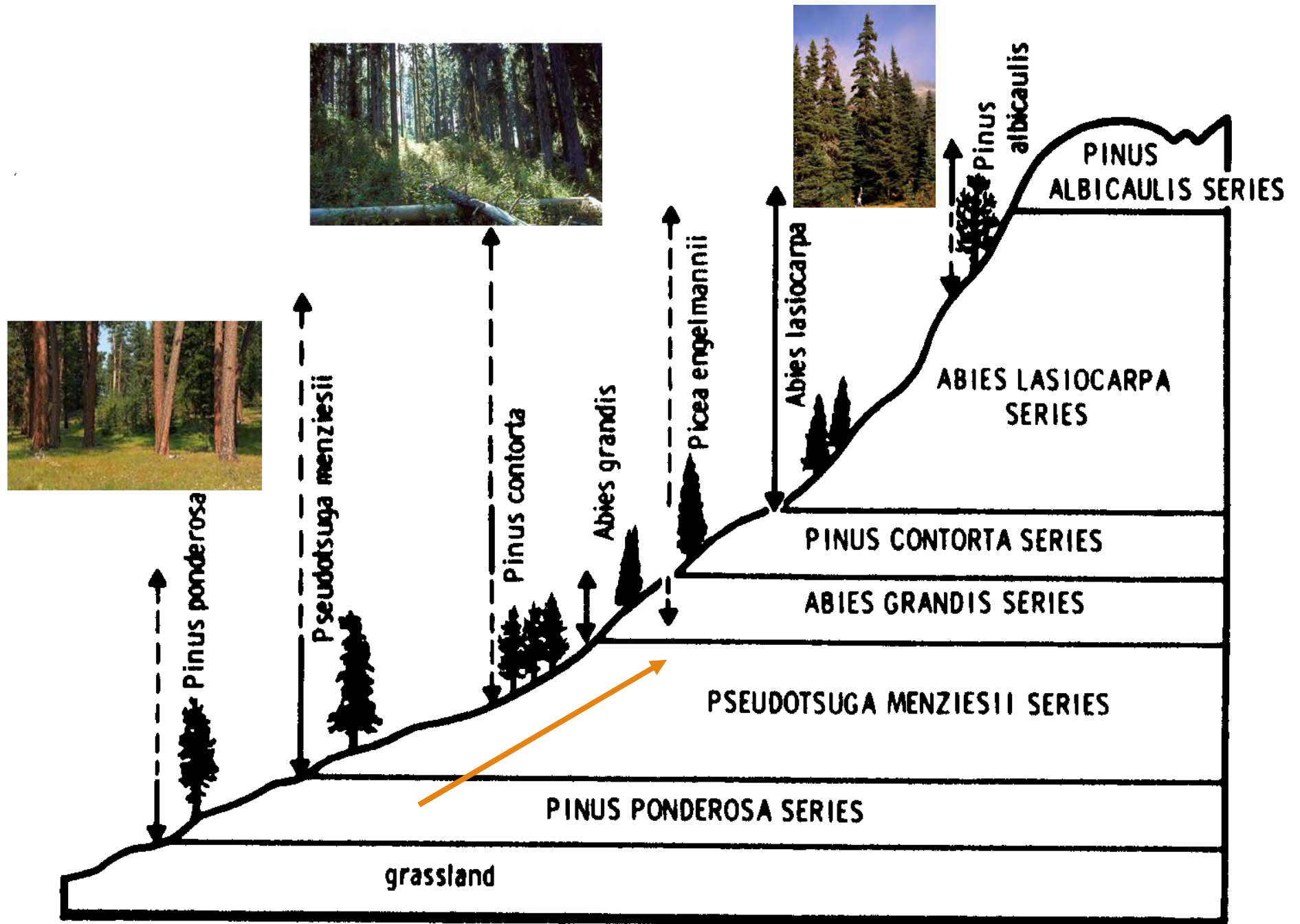
Wind	Explosive	Short distance	Creeping
Hawkweeds	Leafy spurge	Brooms	Canada thistle
Prickly lettuce	Policeman's helmet	Spotted knapweed	Rush skeletonweed
Rush skeletonweed			St John's wort
Canada thistle			
Bull thistle			

Dispersal Distance

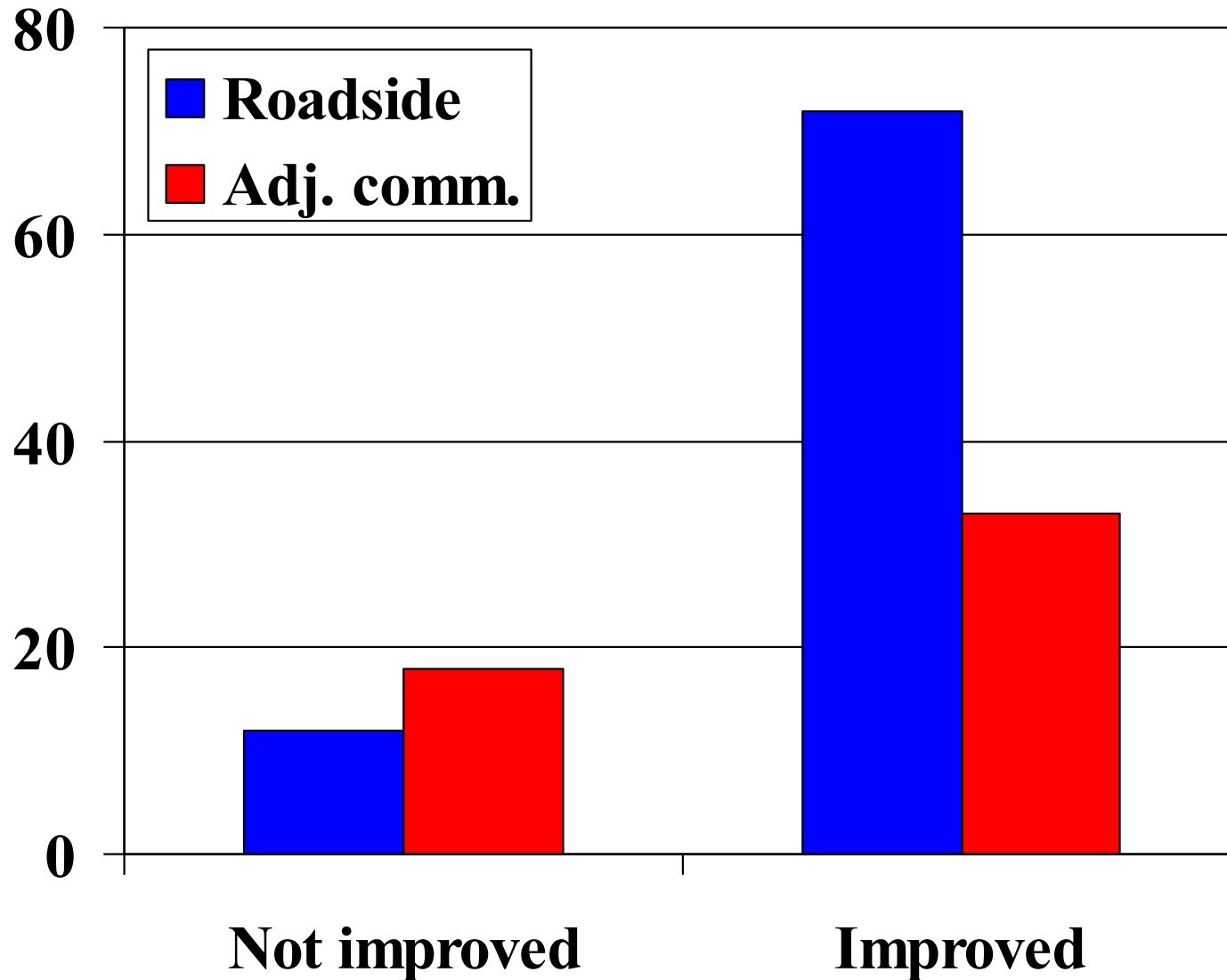


Know what is present along roadways
Know what is present on your property
Knapweed increase after harvest

Fewer Invasive Plant Species with Higher Elevation

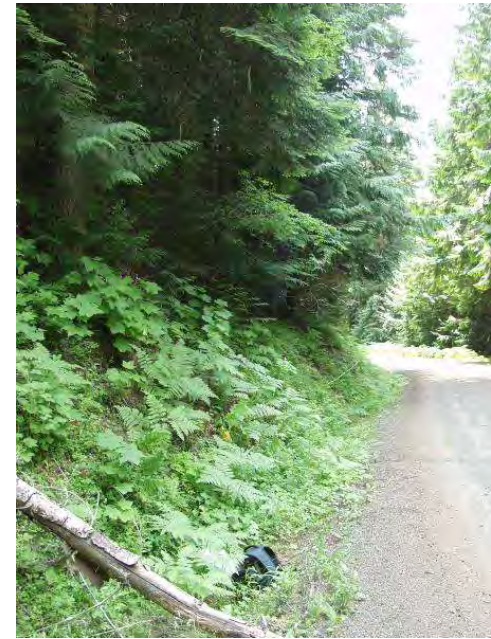
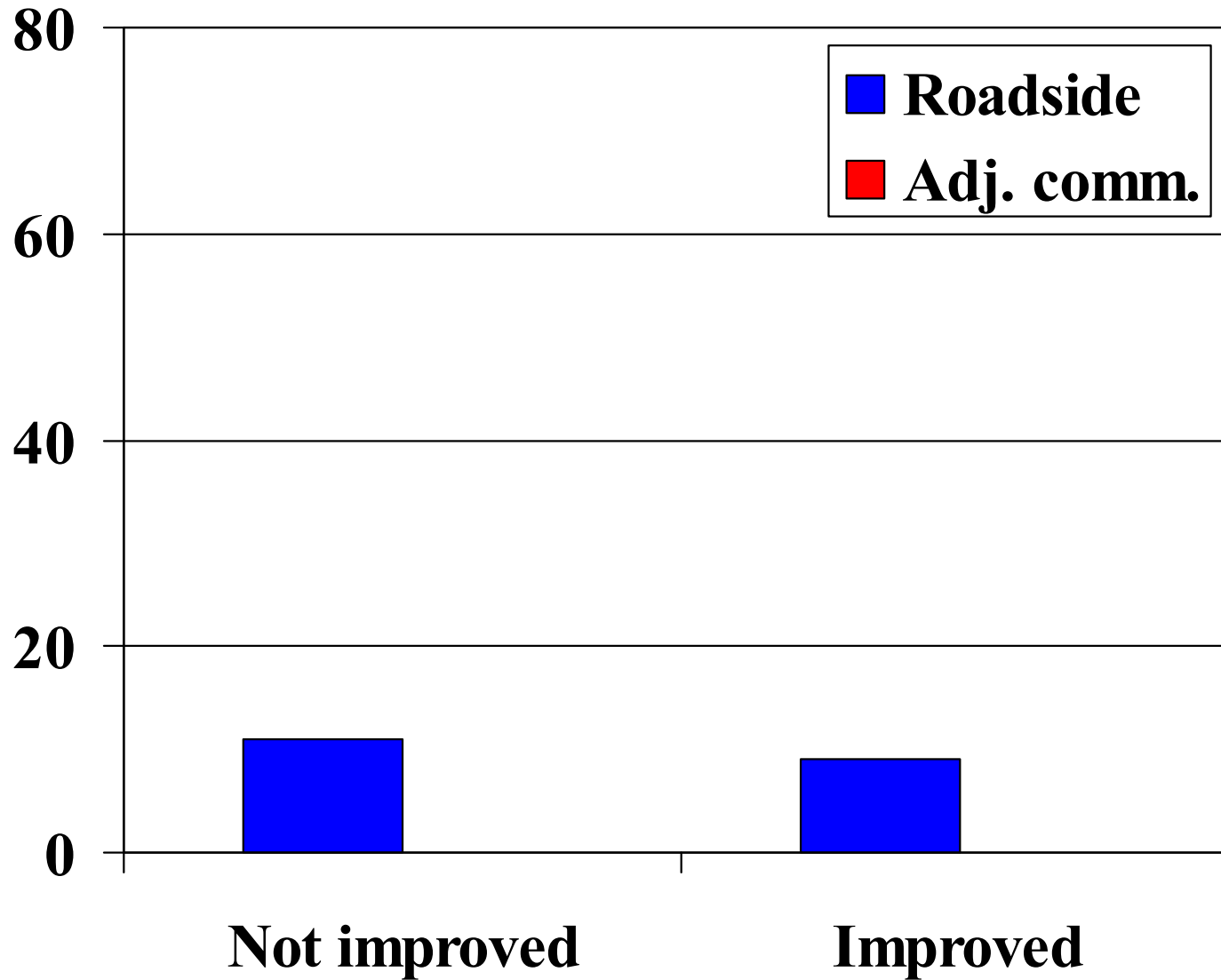


Site-Based Assessment Grasslands



Site-Based Assessment

Cedar/Hemlock



Tactics for Control

- III. How can I incorporate other strategies?
 - 1. Integrated Pest Management
 - a. Use fertilization when in pasture
 - b. Biological Control
 - c. Managing grazing
 - d. Incorporate fire
 - e. Reseeding



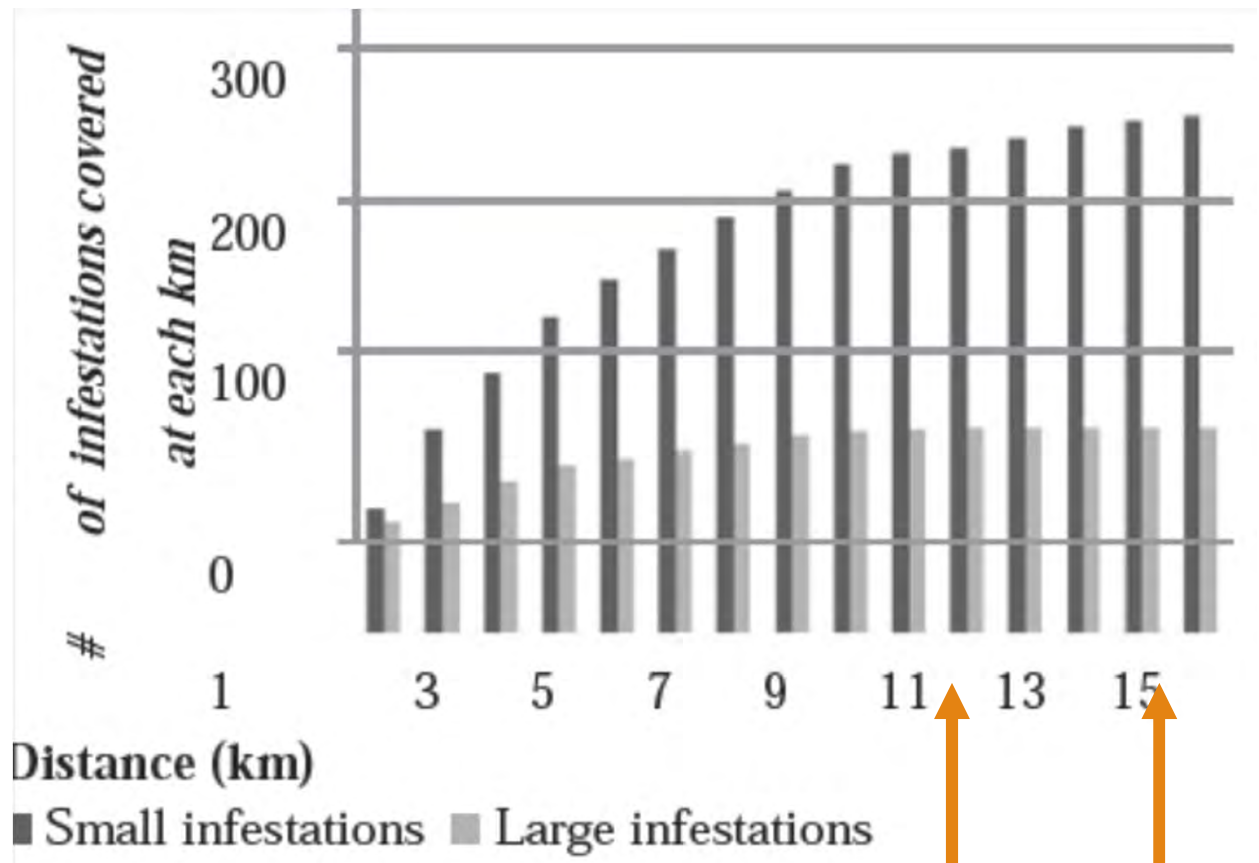
Rush Skeletonweed

Rosette similar to
dandelion

Base of main stem with
bristles

Yellow flowers

Seed with pappus (250 to
20,000/ plant)



Small (7 mi) Large (9)

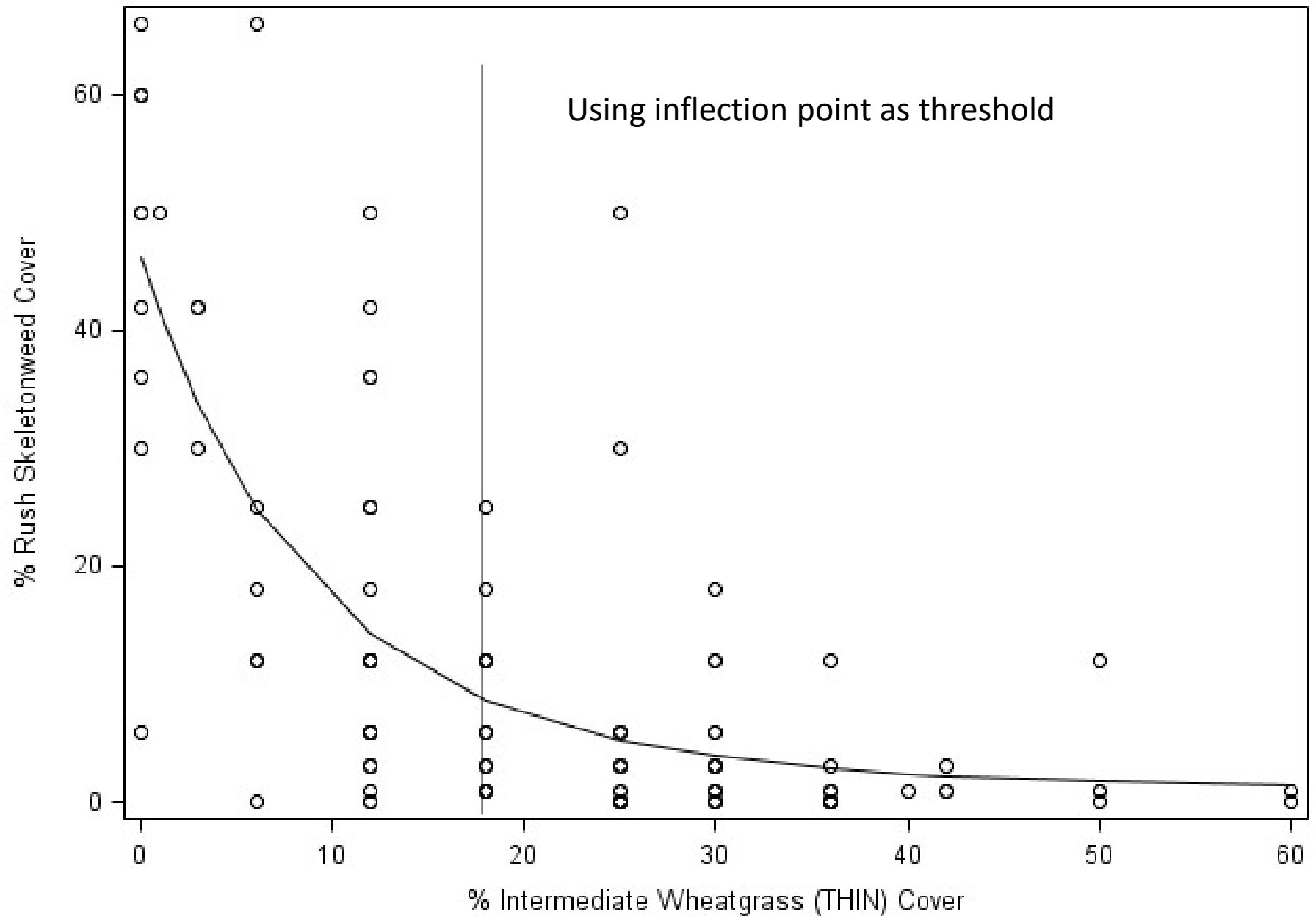


Rush Skeletonweed Competition and Biological Control

Moderate infestation

- With 800 mites initially
- With and without plant competition

Cover and Thresholds





Rush Skeletonweed

Milestone 7 oz/A Rosettes

Tordon 22 K 2 qt/A Rosette or Fall

Perspective 4.5 to 7 oz/A (stay away from trees)





Houndstongue (*Cynoglossum officinale*)

- Red to purple flowers
- Leaves like a dog's tongue
- Seeds stick to most anything
- Poisonous to livestock
- Plants die after setting seed, usually 2 to 4 years



Houndstongue (*Cynoglossum officinale*)

- Opensight at 2.5 oz/A
- Escort 1 oz/A
- Tordon 1 qt/A
- Perspective 4.5 oz/A

Sweetbriar rose

Rosa rubiginosa (eglantaria)



Shrub 3 to 9 feet tall with arching stems, prickles strongly hooked or curved with stout bases

Foliage sweetly aromatic, with an apple like odor

Leaflets double toothed with gland-tipped teeth

Lower surface of the leaves with stalked glands and hairs

Sweetbriar

(*Rosa eglantheria*)
Rosaceae, rose family

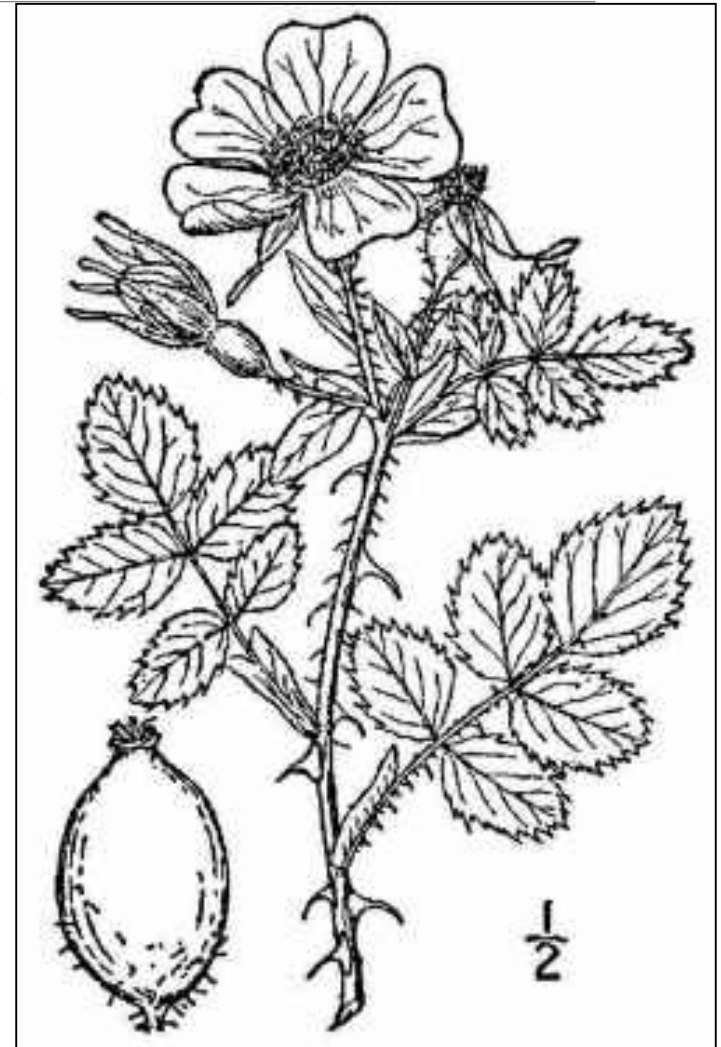


Deciduous shrub, erect, to 8-10 feet

Stems covered with stout curved prickles

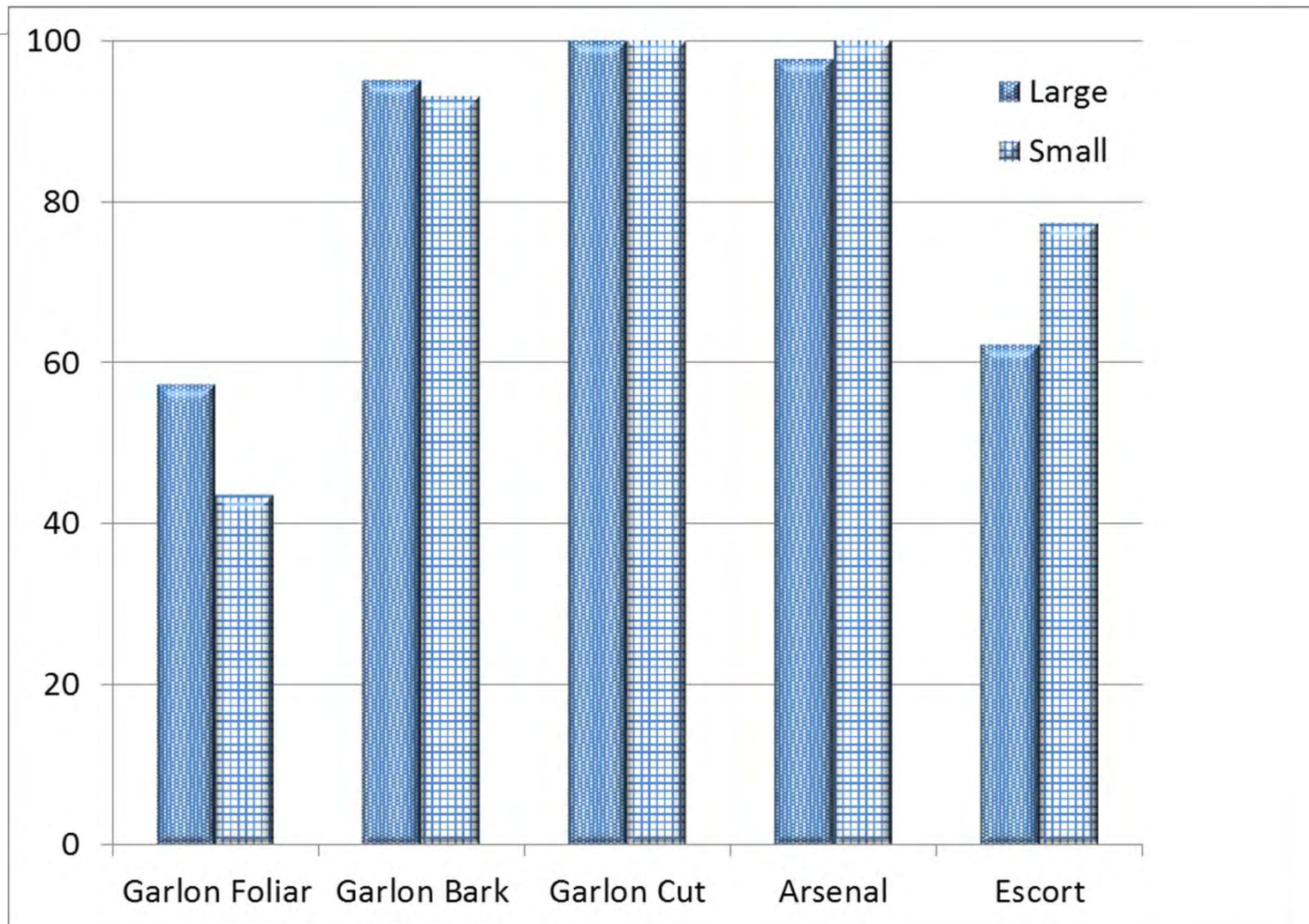
Foliage sweet scented

5-9 leaflets, lower surface of leaves and sepals have gland tipped hairs

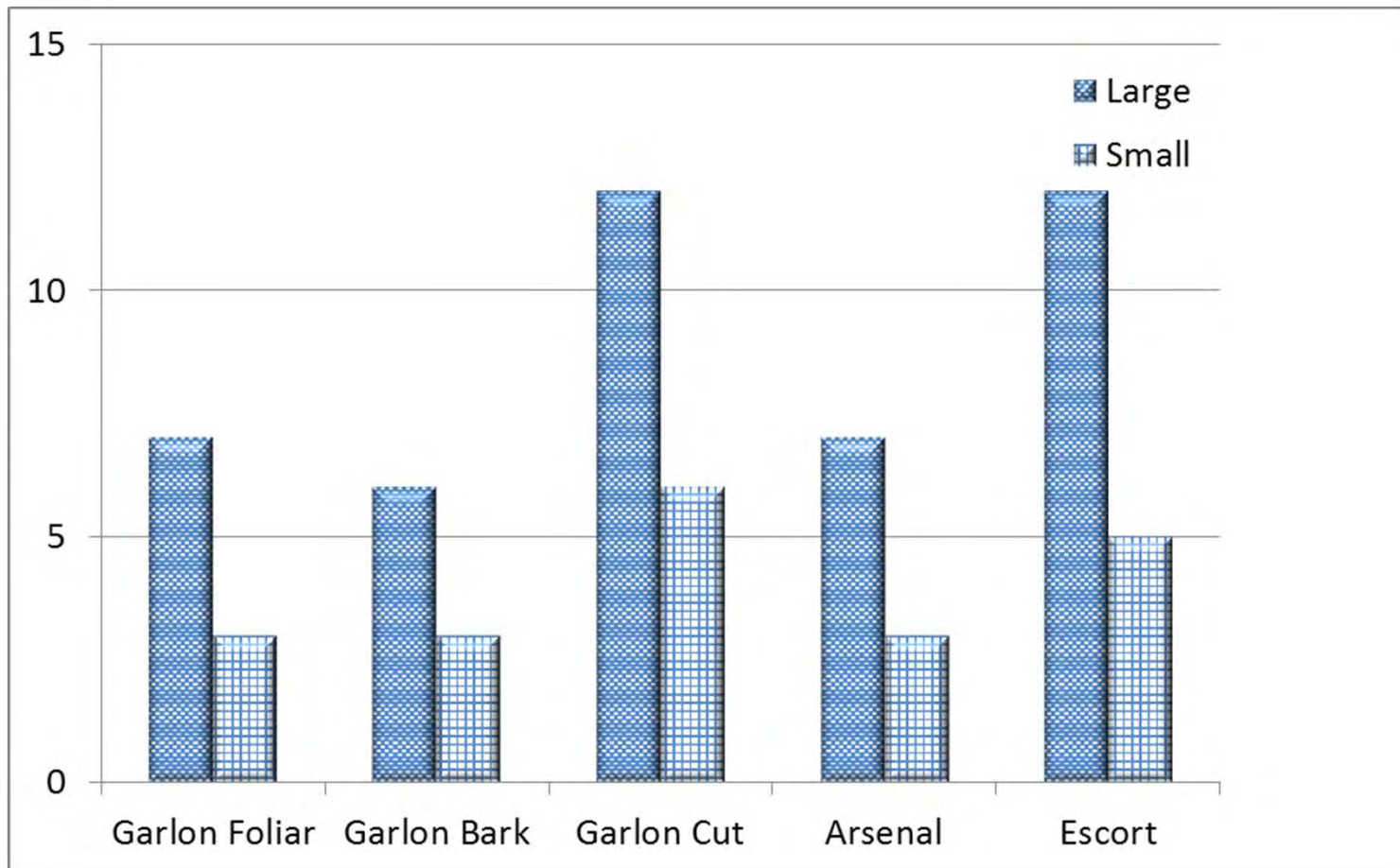




Control



Cost per Acre



Bohemian and Japanese knotweed

- Introduced perennial species that has become a major weed of riparian areas in many parts of the US and Canada
- Japanese knotweed has male and female plants
 - Primarily propagated vegetatively
 - Most (all?) plants in US and Britain produce only female flowers
 - Will produce seed if pollination occurs





Japanese/Bohemian knotweed

Control

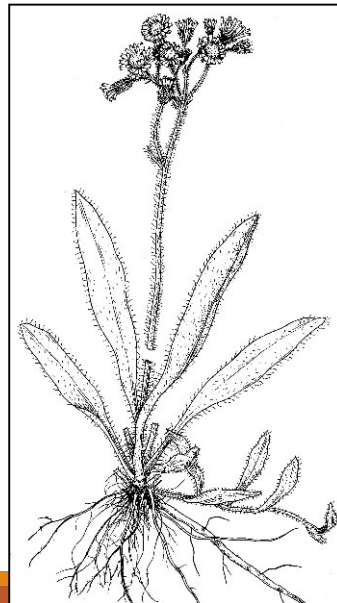


Meadow hawkweed (*Hieracium caespitosum*)

Sunflower family (Asteraceae)



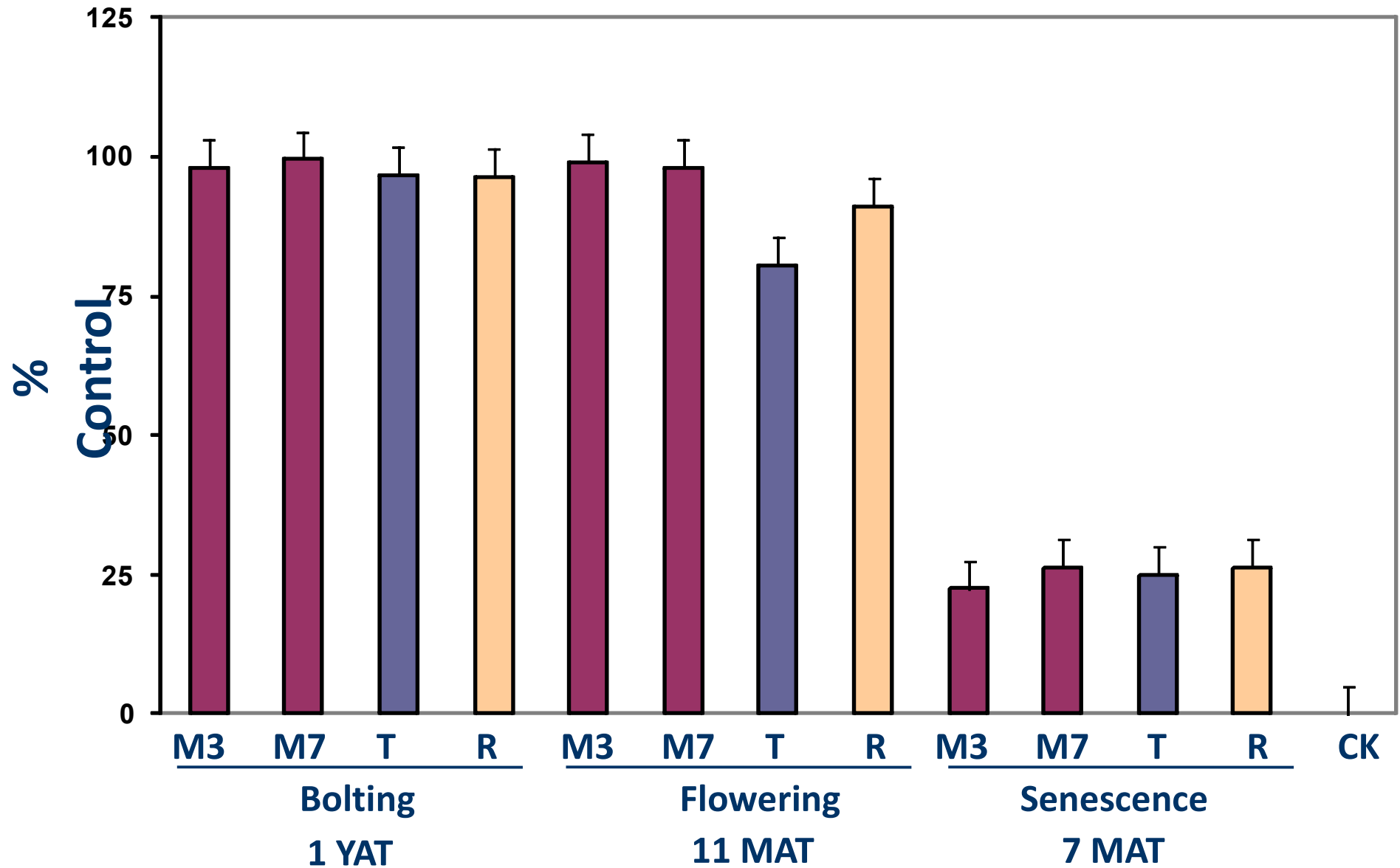
- Plant perennial, spreads by seeds, stolons or rhizomes
- Ray flowers yellow in compact flower clusters
- Lance-shaped leaves are hairy and form a basal rosette
- Flower stem leafless, occasionally there are one or two small leaves on the stem with a basal rosette
- Plant contains a milky juice



Meadow Hawkweed Invading Idaho Fescue

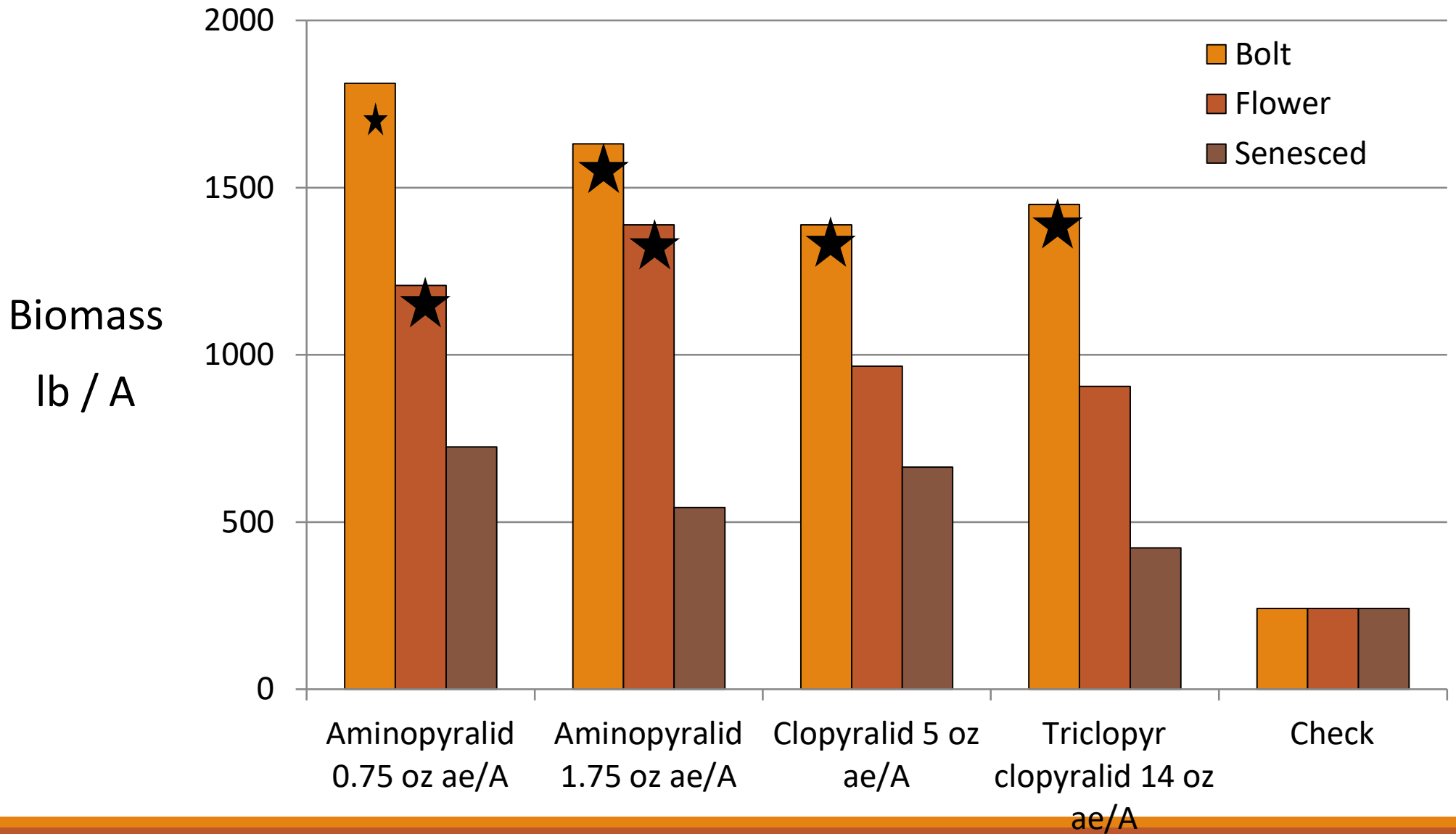


Timing for Hawkweed Control



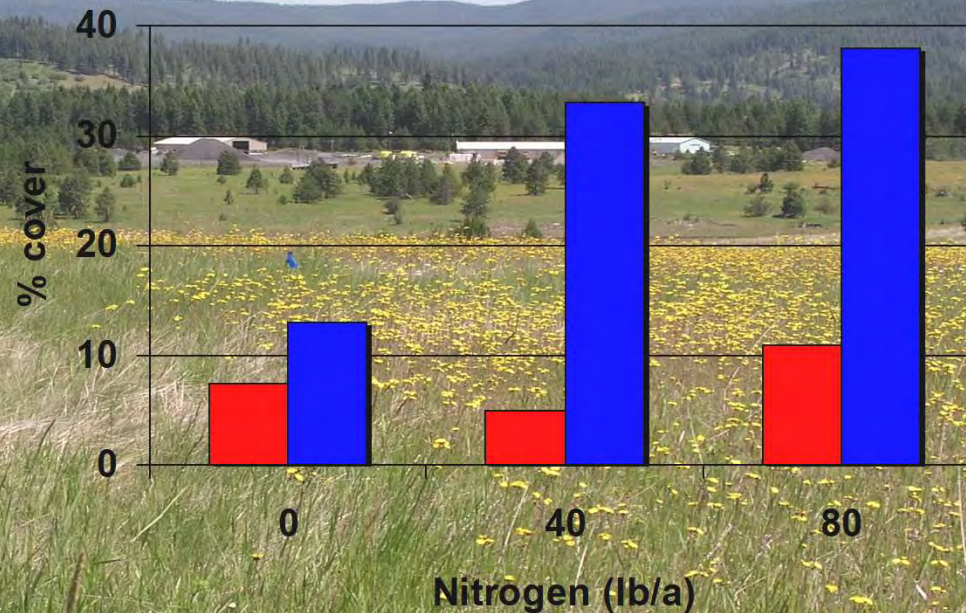
Forage Response

3 YAT



Application of Mycorrhizal Effects in Pasture

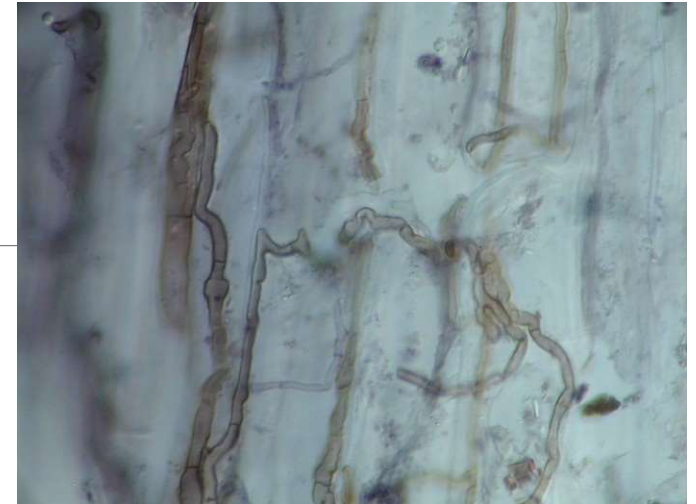
- Transline (clopyralid)
@ 11 oz/ac
- Ammonium sulfate



■ No herbicide ■ Herbicide

Arbuscular mycorrhizal fungi

- AMF are known to enhance growth and resource acquisition of many plant species (Grime et al. 1987)
- AMF have been shown to change competitive relationships between plants (van der Heijden et al. 2003, Allen and Allen 1990)
- Related hawkweeds have an obligate association with AMF (Klironomos 2002)
- AMF are associated with meadow hawkweed at this study site



Arbusculate coils

Herbicide and fertilizer studies

- 2003, 98-100% control with clopyralid (Transline) and N fertilizer
- Hawkweed has not reinvaded sites four years after treatment



Meadow Hawkweed – Idaho Fescue

- Soil is inoculated with fungi from the field site
- Why aren't there only toothpicks on the right side?
- Why are the Idaho fescue plants so small?



Fescue Inoc F-H

Meadow Hawkweed – Idaho Fescue

- Soil in this pot was not inoculated with mycorrhizal fungi
- Toothpicks at right should have meadow hawkweed, why isn't there hawkweed?



Meadow Hawkweed – Idaho Fescue

- Pots have fabric down the middle to exclude roots
- Soil was either sterile or inoculated from field site mentioned above
- Equal fertility and water in the pot initially
- Pots all watered the same
- Minimized competition for light



Meadow Hawkweed – Idaho Fescue

- Soil is inoculated with fungi from the field site
- Why are Idaho fescue plants the same size on each side of the fabric?



Fescue Inoc F-F

Canada thistle (*Cirsium arvense*)

Asteraceae (Sunflower family)

- Plant creeping perennial
- Numerous small compact flowerheads
- Disk flowers purple to lavender
- Leaves deeply divided with spiny margins



Canada thistle (*Cirsium arvense*)



Asteraceae (Sunflower family)


- Transline, 0,25 to 1.33 pt/A, up to bud stage
- Milestone at 5 oz/A, up to bud stage
- Telar, 1.5 oz/A, fall rosette or bud to bloom stage
- Banvel, 2 lb ae/A, actively growing plants
- Roundup, 1.5 to 2.25 lb ae/A, bud stage



Weed Management Handbook



Share This:  

Print-friendly version: 

[About the Weed Handbook](#)

[Authors and Contributors](#)

[Citing This Handbook](#)

[Contact us](#)



This handbook is designed as a quick and ready reference for weed control practices and herbicides used in various cropping systems or sites in Idaho, Oregon, and Washington.

This handbook will be useful to Extension agents, company field representatives, commercial spray applicators and consultants, herbicide dealers, teachers, and producers. More about the PNW Weed Management Handbook

Quick find: Problem weeds section only



Apply

Reset

Enter a few letters of a weed name

A Pacific Northwest Extension Publication

Oregon State University
Washington State University
University of Idaho

In case of emergency

Call your poison control center: 1-800-222-1222
If the patient has collapsed or is not breathing, call 9-1-1
Pesticide Safety Information

Pacific Northwest Handbooks

PNW Insect Management Handbook
PNW Plant Disease Management Handbook
PNW Weed Management Handbook

Copyright © Oregon State University | [Disclaimer](#) | [Web Disclaimer](#) | [Webmaster](#)

[Login](#)



Weed Control in Natural Areas in the Western United States



Weed Control in Natural Areas in the Western United States

Weed Research & Information Center • University of California



\$37.00

2013 by University of California Weed Research & Information Center
544 pages, color throughout

This book will be an excellent resource for any land manager confronting invasive plants, including biology and control methods for 340 species, plus tables of chemical and non-chemical control options. Authored by 15 experts from California, Colorado, Idaho, Montana, Utah, & Washington.

Please note: When added to your cart, this item will incur an \$5 extra shipping & handling for weight (above and beyond "flat rate" shipping & tax)

[SHOP HOME](#) | [BOOKS, REPORTS, VIDEOS & DIGITAL](#) | [BROCHURES](#) | [CAL-IPC GEAR](#) | [CART](#)

1

Add to cart

Category: Books, Reports, Videos, & Digital

Description

Support Cal-IPC

Search ...

Search

Biological Control

Defined:

Classical: Use of organisms from a native range of the target invasive plant that are:

- host specific,
- self – sustaining with fluctuations that are density dependent, as in predator-prey relationships,
- reduce the target invasive plant density to an “acceptable level.”



Theory behind biological control

Enemy Release Hypothesis: A species introduced outside of its native range escapes the diseases, parasites, and predators that have coevolved with it

Disease, parasites and predators decrease competitive ability in the home range

Biological control brings organisms into the new range to decrease competitive ability

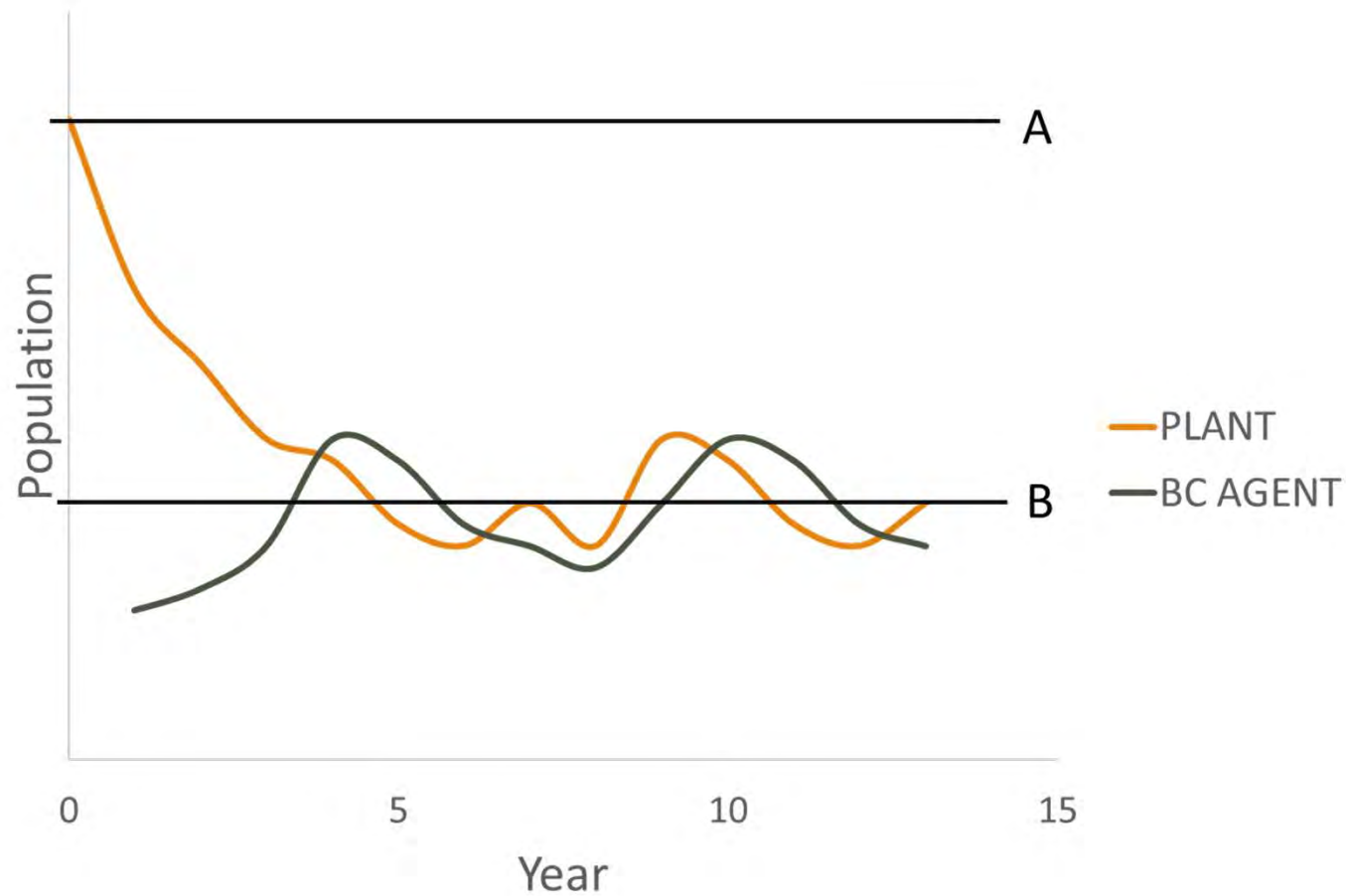
Risks of biological control

Introduced biocontrol agent attacks native plants or crops

Biocontrol agent evolves over time to be less host specific

- Different from other methods of control because it cannot be discontinued once the biocontrol agent is released.

Density Dependent Reduce Invasive Species Population



Functions of the Quarantine Facility in Classical Biological Control



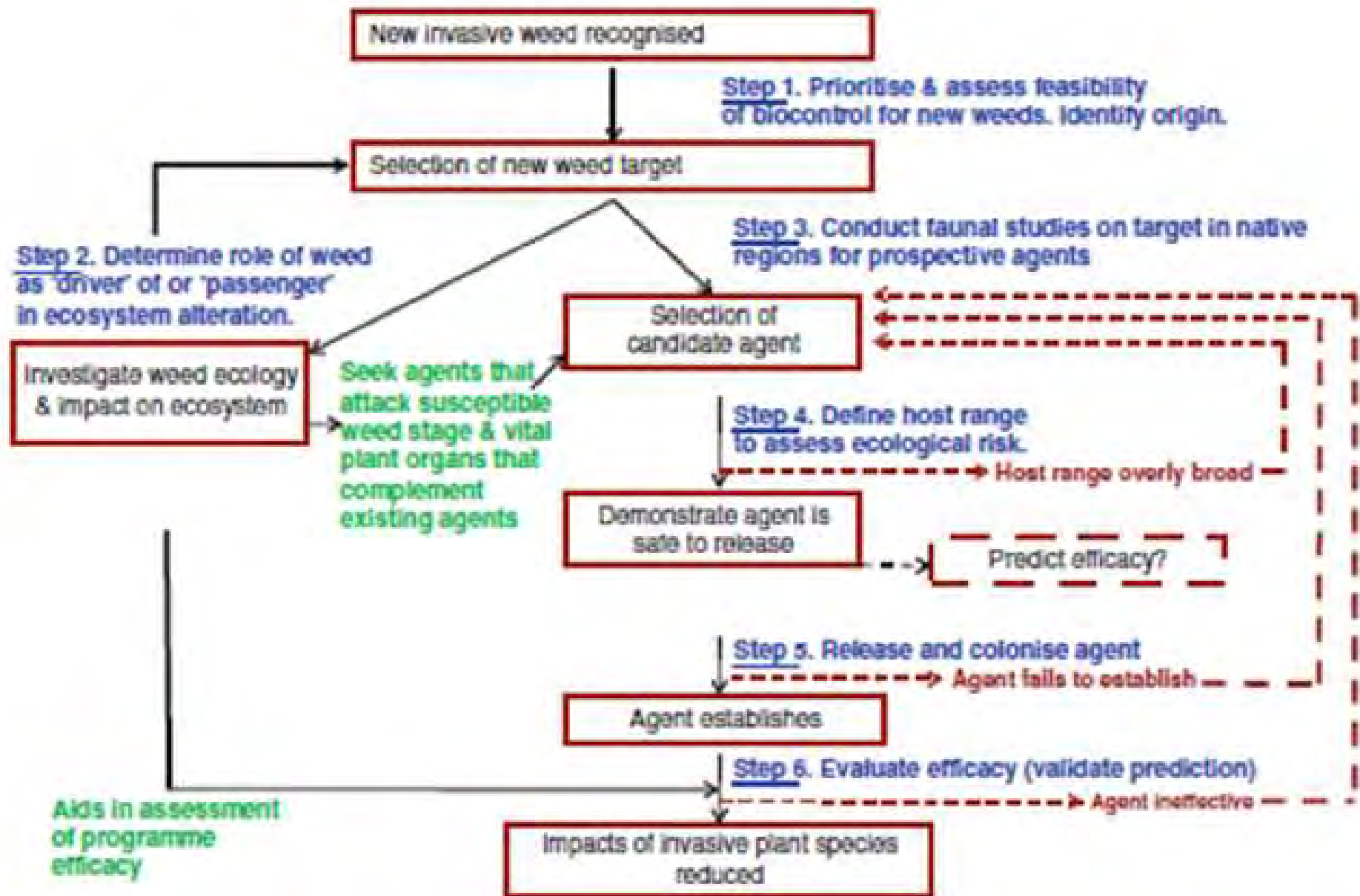
Release Process

- Determine home range
- Determine overlap in environmental conditions between new range and home range
- Review literature
- Collect potential agents that may be host-specific
- Screen potential agents for efficacy and specificity
- Petition for release into new range
- Establish criteria for nursery site location, use nursery sites to build populations



Biological Control Facility
Switzerland, CABI
<http://www.cabi.org/projects/>

Process for Release



Biological Control Worldwide

- Total Releases 2042
- Agents 551
- Plants Targeted 244
- Successful control
 - 33% Complete or substantial control
 - 33% Partial control
 - 33% No control

BIOLOGICAL CONTROL OF WEEDS

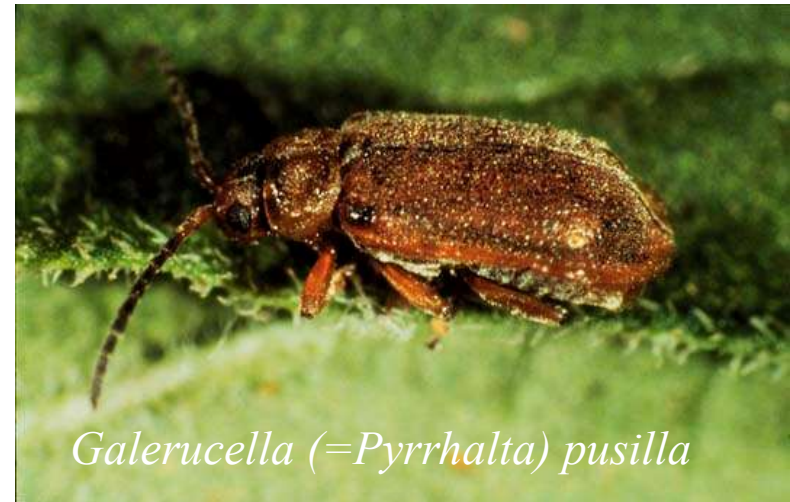
A WORLD CATALOGUE OF AGENTS
AND THEIR TARGET WEEDS

FIFTH EDITION

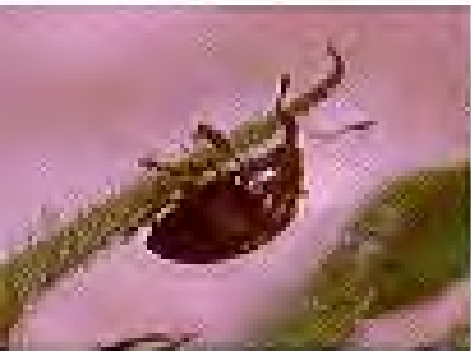


http://www.ibiocontrol.org/catalog/JulienCatalogueFHTET_2014_04.pdf

4 insect species were approved for release to control purple loosestrife in the U.S. and Canada



Purple Loosestrife and Introduced Biological Control Agents



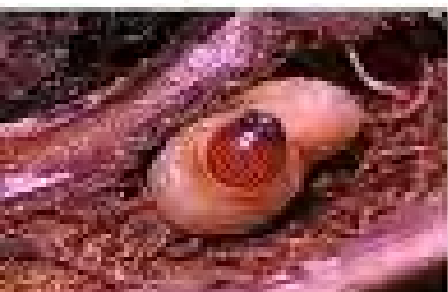
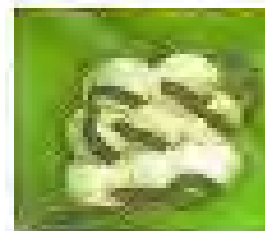
Nanophyes marmoratus



Galerucella spp.



*Hylebius
transversovittatus*



slides courtesy Oregon State, Corvallis

Has biological control been successful?



Biological Control

Other successes?

Spotted knapweed, British Columbia

Cyphocleonus achates

Larinus obtusus

Agapeta zoegana



Seven years later

Knapweed Agents

Cyphocleonus achates

- Overwinters as larvae
- Adults emerge July to September
- Adults eat rosette leaves
- Eggs laid at root just below the surface
- Larvae hatch and feed within roots



Knapweed Agents

Agapeta zoegana

- Larvae live in roots, beginning in August to September
- Adults emerge in July to September
- Eggs are laid in stem crevices
- Larvae hatch in 10 days and move to roots



Knapweed Agents

Larinus obtusus

- Adults emerge from soil in late spring
- Mating and egg laying during flowering
- Eggs are laid in flowers
- Larvae hatch and burrow to the capitula



Toadflax Agent

Mecinus janthiniformis







Future

- Rush skeletonweed (*Bradyrrhoa* increasing)
- Houndstongue
- Bohemian knotweed
- Whitetop
- Flowering rush

Questions?

