Biology and Control of Several Noxious Weeds

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Today's Session

- Blackberry (Himalayan and Evergreen)
- Common Teasel
- Scotch Broom
- Herb Robert/Shiny Geranium

1st Species: Non-native Blackberry

- Himalaya (or Armenian) blackberry (*Rubus armeniacus*)
- Evergreen (or cutleaf) blackberry (*Rubus laciniatus*)
- Both are Class C in Washington; Armenian is List B in Oregon
- Perennials in Rosaceae, but with a biennial bearing habit

Himalaya

Evergreen

Blackberry Control Trial

- Various products tested for blackberry control (conducted in 2002)
  - Blackberry & Brush Blocker, Crossbow, Roundup, and Finale tested
- Products were applied as cut-stem (crowns mowed to 6”) and foliar treatments in mid-February (late dormant)
- Foliar B&BB, Roundup, and Finale applied again in late May (non-dormant)

Untreated Blackberries

Uncut canes

Cut canes

Blackberry & Brush Blocker

Diluted, foliar
6.4 fl.oz./400 ft^2

Full strength, cut stem 1/3 qt/400 ft^2

Crossbow

Foliar, 1.5%

Cut stem, 33%

Roundup

Foliar, 1.5%

Cut stem, 33%

Finale

Foliar, 1.5%

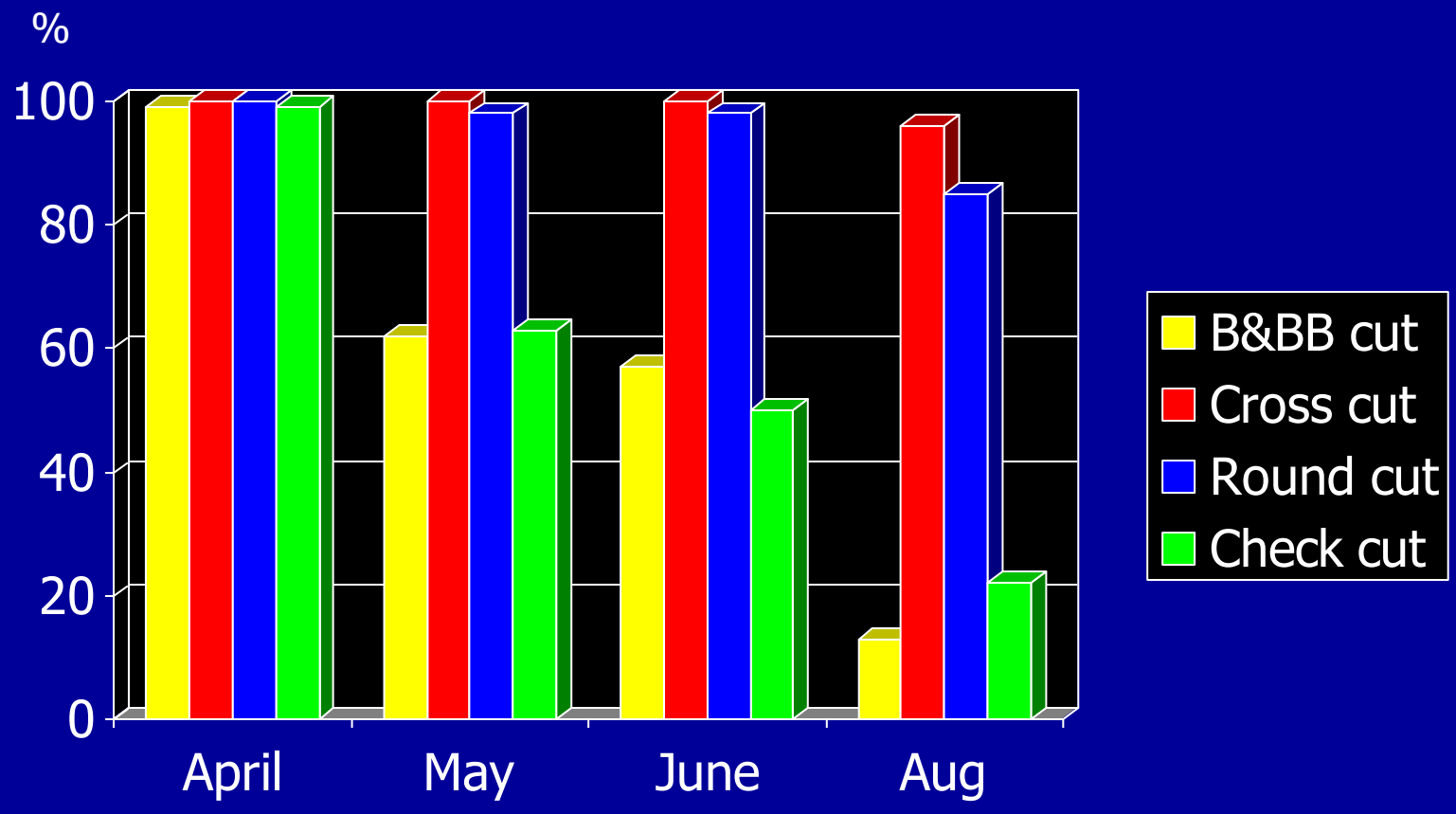
Blackberry & Brush Blocker

Summer Treatment

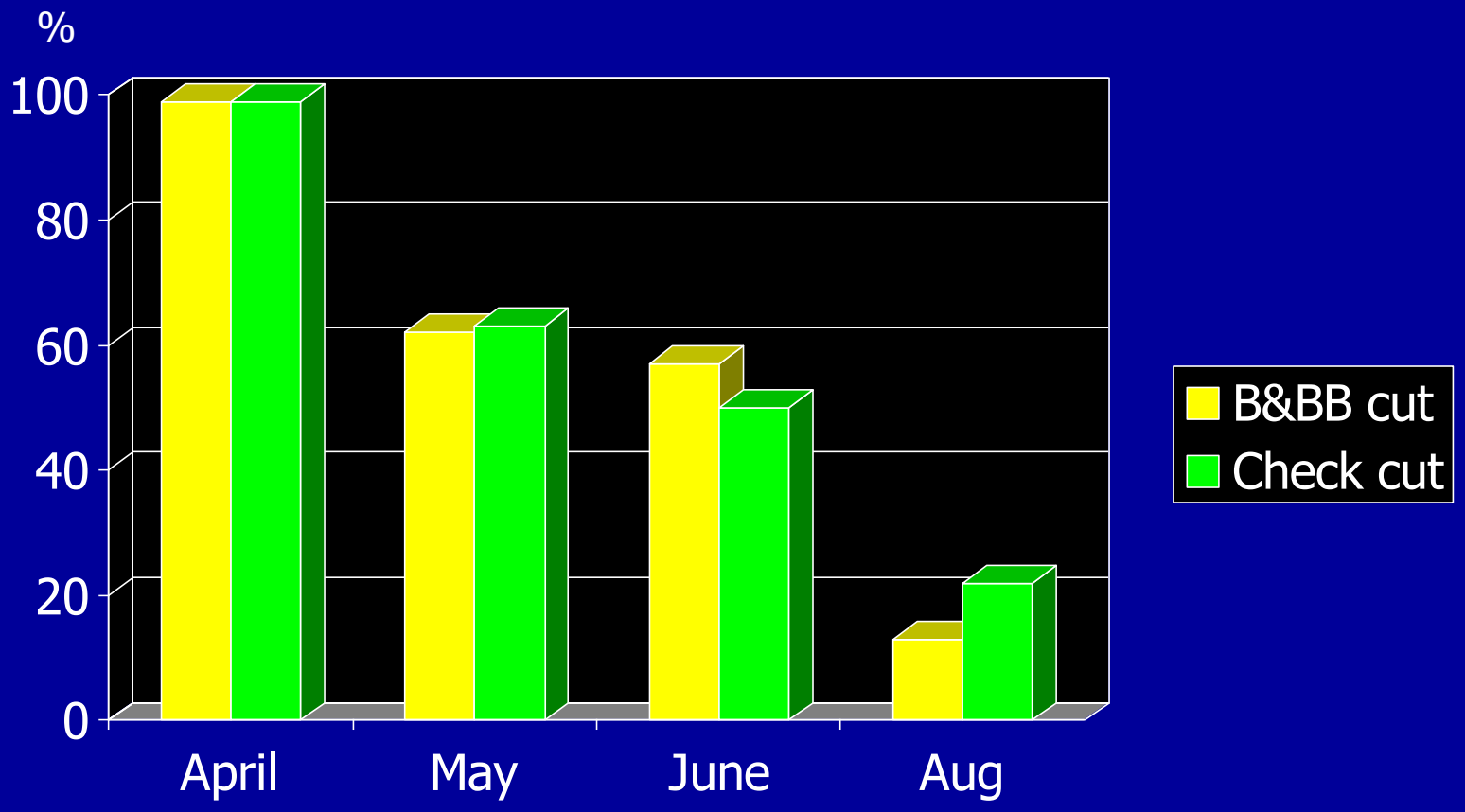
Diluted, foliar 11.3 fl.oz./400 ft^2

Full strength 1/3 qt/400 ft^2

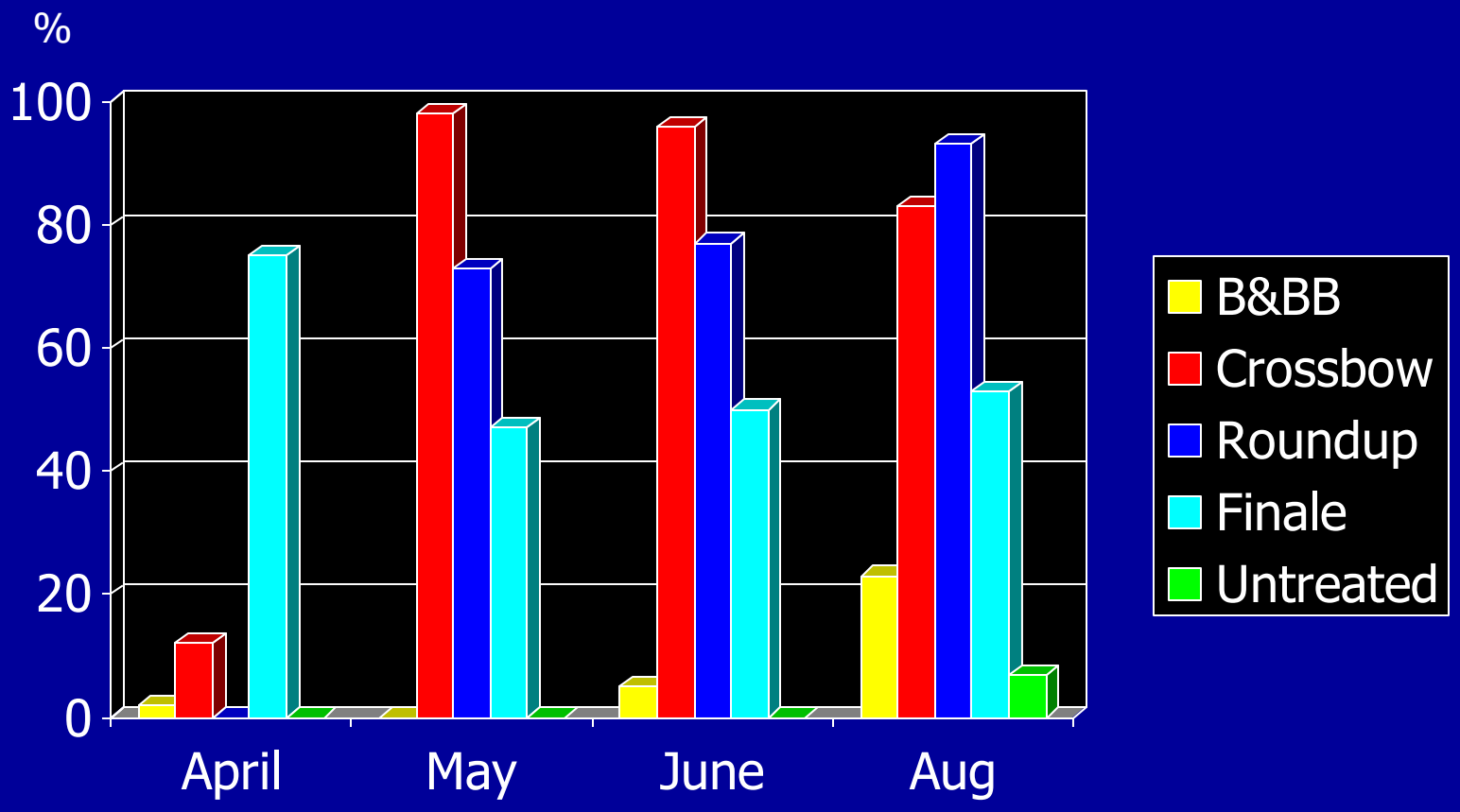
Blackberry control after cut-stem treatment with several products



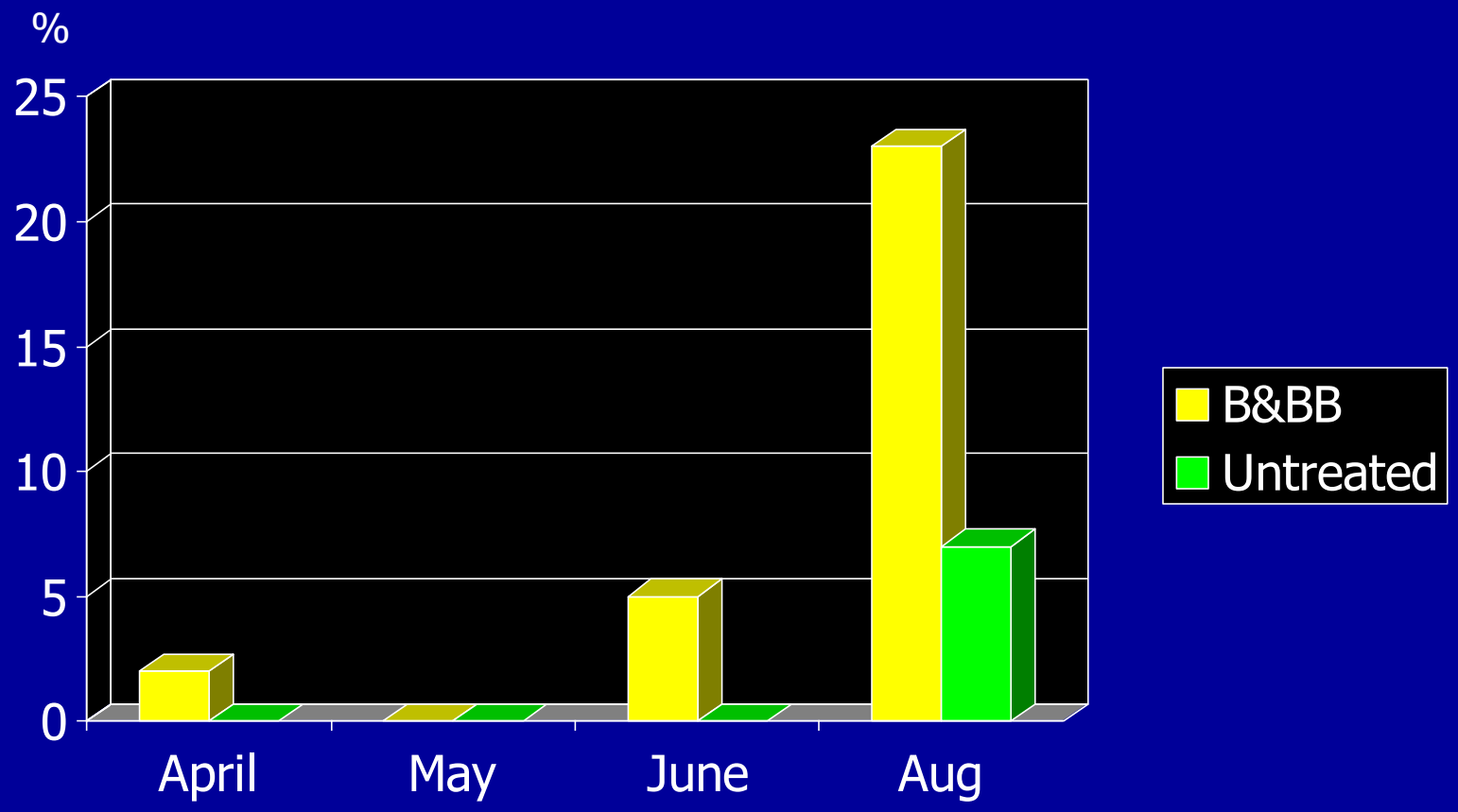
Blackberry control after cut-stem treatment with several products



Blackberry control after foliar treatment with several products



Blackberry control after foliar treatment with several products



Blackberry & Brush Blocker

Summer Treatment, Bittersweet Nightshade

Full strength, 1.3 qt/400ft^2

Blackberry Re-growth Following Roundup

Summer Treatment

Foliar, 1.5%

Scythe

Foliar, 10%

Using Vinegar Drenches

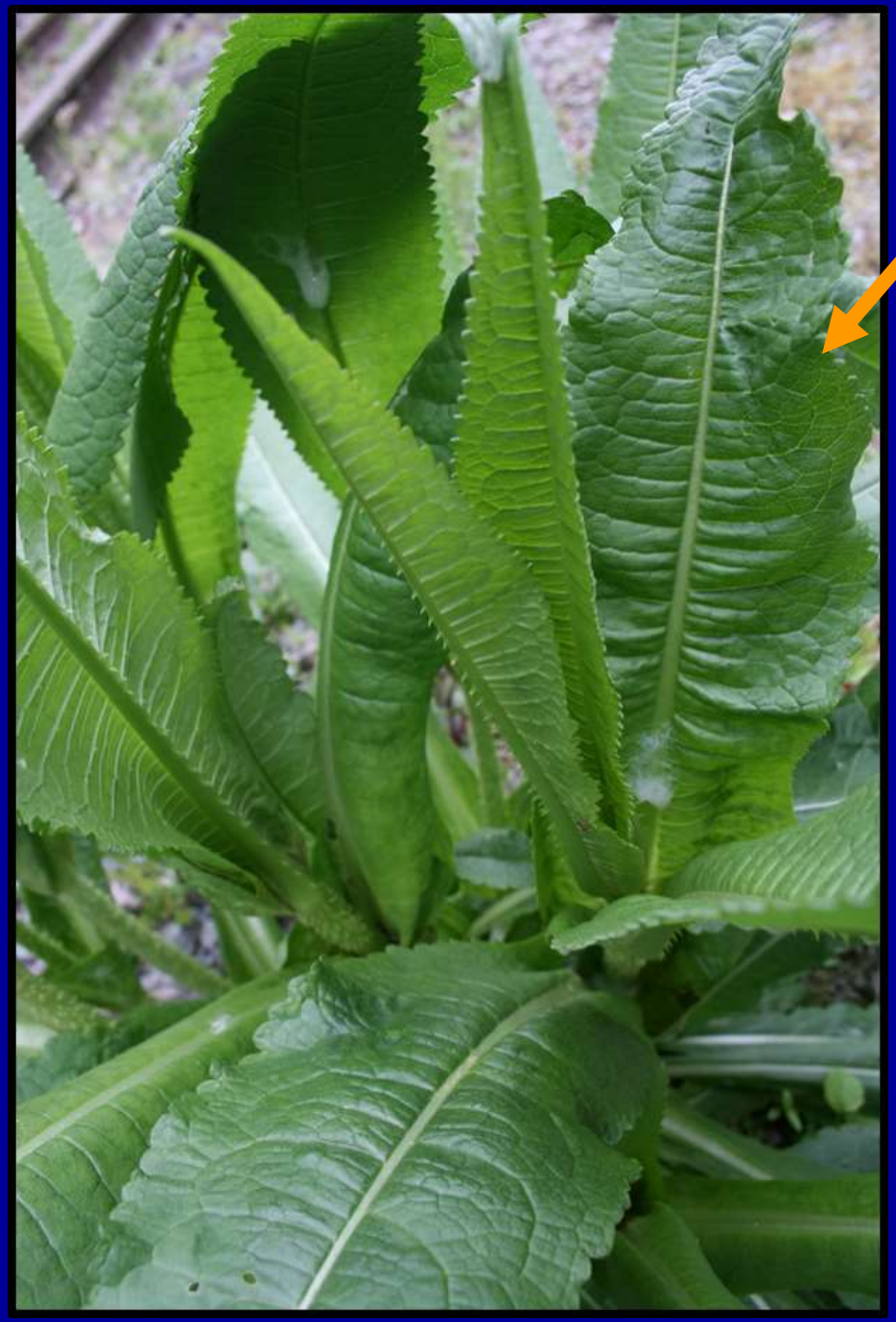
- Blackberry work (mine)
  - One pint of B&BB reduced re-sprouting of clipped blackberry crowns by 67%
  - At the price of $40/gal = $5 per crown
- Cranberry work (Kim Patten, WSU Long Beach)
  - One gallon vinegar (5% acetic acid) per weed in cranberry bogs gave excellent control of some perennial weeds
  - At Safeway price $3.50/gal (per weed)

Herbicides for Blackberry

- Escort, glyphosate, Streamline (watch out for trees!), Tordon, triclopyr (Vastlan, Crossbow, Garlon)
- Remember that blackberry often grows near water, so not all of the listed herbicides can be used on all sites
- Fall vs. spring timings
- Only second-year canes bear flowers and fruit (floricanes), so kill first-year canes (primocanes)

2nd Species: Common Teasel
Dipsacus fullonum

- Class C in Washington; culeaf teasel (*Dipsacus laciniatus*) is List B in Oregon
- Biennial plant in Dipsacaceae
- Most often found near water, or on seasonally saturated sites
- Leaves and stems are remarkably prickly
- Was cultivated for use in textile processing, or may have been introduced accidentally with other varieties of teasel



Common Teasel

Watch for
Cutleaf Teasel

Common Teasel

Cutleaf Teasel

Herbicides For Teasel

- Most products are more effective on rosettes
  - 2,4-D, Weedmaster, Escort, Milestone, Overdrive, Perspective (watch out for trees!), Plateau, Telar, and Transline
- Remember that teasel likes wet sites, so not all of the listed herbicides can be used on all sites

3rd Species: Scotch Broom

Cytisus scoparius

- Class B in Washington, List B in Oregon
- Perennial in Fabaceae
- Although its pollen is too large to travel far on the wind, the scent of Scotch broom flowers is enough to trigger allergic reactions in some people
- Similar noxious species are Spanish broom (*Spartium junceum*) (Class A), French broom (*Genista monspessulana*) (Class A), and gorse (*Ulex europaeus*) (Class B)

Scotch broom is extremely widespread on the West Side of the Cascades on forested sites, in pastures, and along roadsides

Flowers are bright yellow, distinctly pea-shaped, and appear in early spring

Pods soon follow the flowers and are flat and fuzzy along the margin

How Does Scotch Broom Spread?

- Primarily by movement of seed
  - Does not spread appreciably by roots or crowns
  - Seeds may lie dormant for years, allowing re-colonization after removal of established plants

Mechanical Control

- Scotch broom is not a strong re-sprouter, but it can re-grow from the crown if stems are merely sawed off at ground level
- Hand-pulling, if persistently applied, will control Scotch broom
  - A long lever is helpful for hand removal of established plants
  - Extractigator, Pullerbear, Uprooter, Others?
- Watch for newly-germinating plants!

Pretty effective for pulling non-sprouting woody weeds

Biological Control

- Three biological control organisms are available (seed beetle, seed weevil, twig mining moth)

Biological Control

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Gall mite?

Chemical Control

- Herbicides effective on Scotch broom:
  - Foliar treatments are effective: Glyphosate, triclopyr (Garlon, Vastlan, or Crossbow), Milestone, Perspective (watch out for trees!), and imazapyr (Habitat, Stalker, Chopper, Arsenal, Polaris)
  - Cut-stem treatments with these same products have also shown good effect
  - Burch Wet Blade, Brown Brush Monitor, Weed Bug are possibilities for wiper treatments

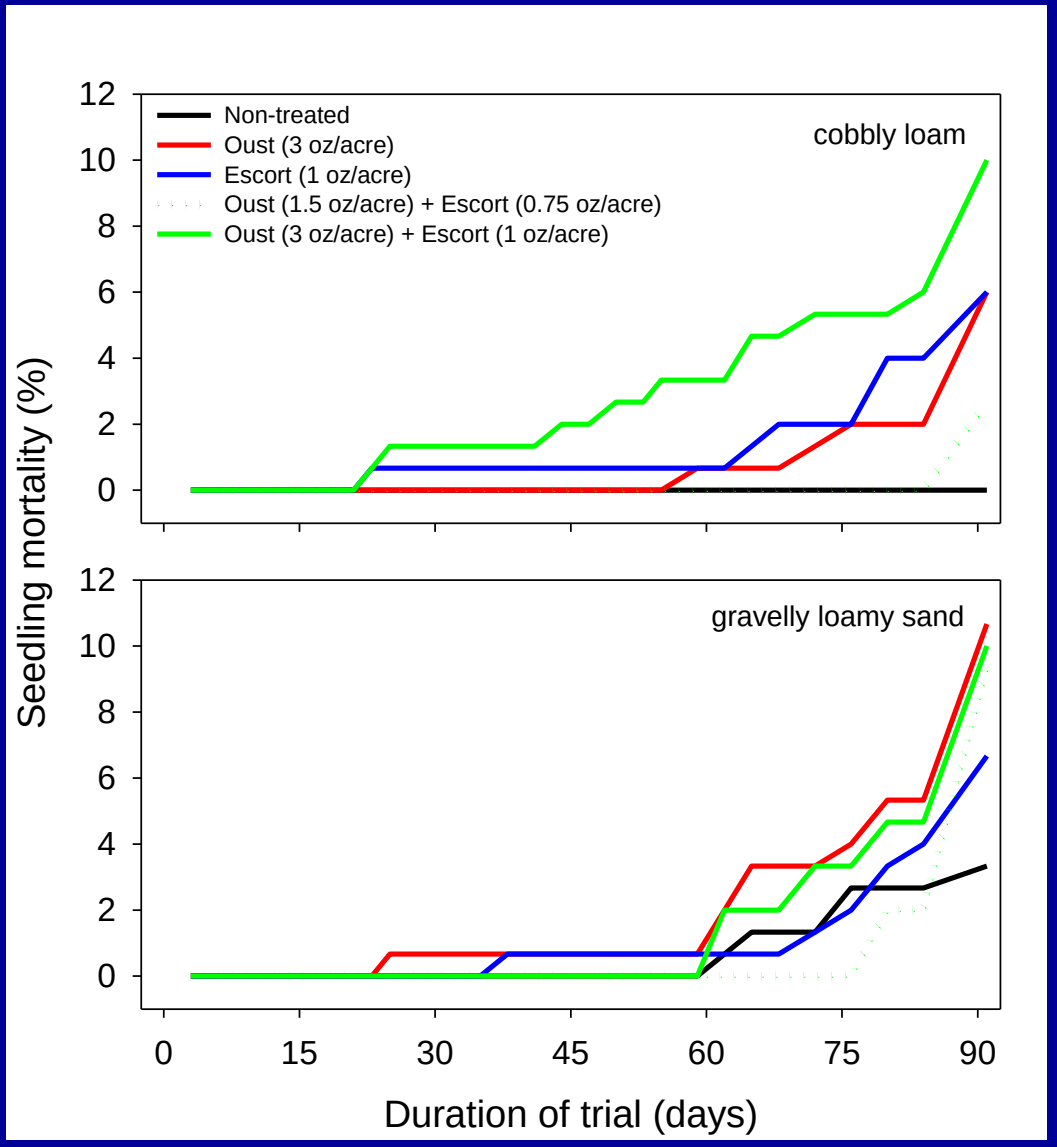
How About The Seeds?

- Glad you asked!
- Data from Tim Harrington, USDA Forest Service, Olympia

Oust (sulfometuron) and Escort Can Persist in Moist Soil

- Seedling mortality averaged 7% for treated soils versus 1% for non-treated soils.

90 days after application of Oust + Escort

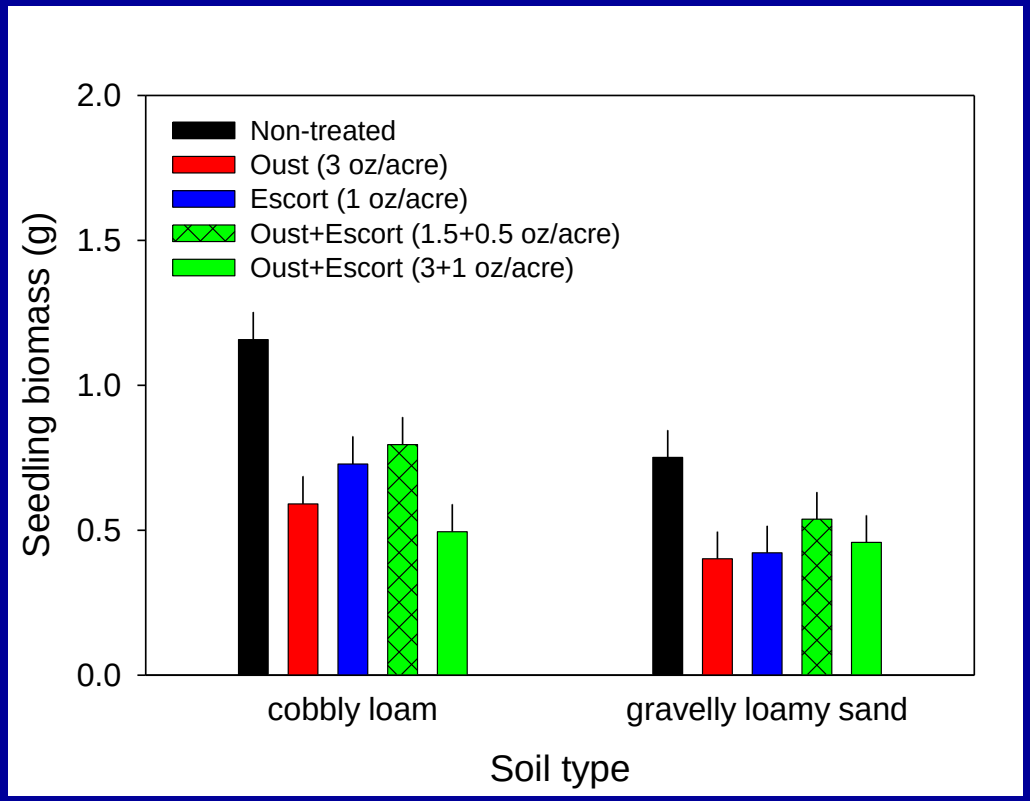


Harrington, Weed Sci. 2009

Nontreated seedlings

Oust-treated seedlings

While not strongly active against Scotch broom, Oust at 90 days reduced seedling biomass, seedlings produced fewer lateral roots, and seedlings did not produce compound leaves



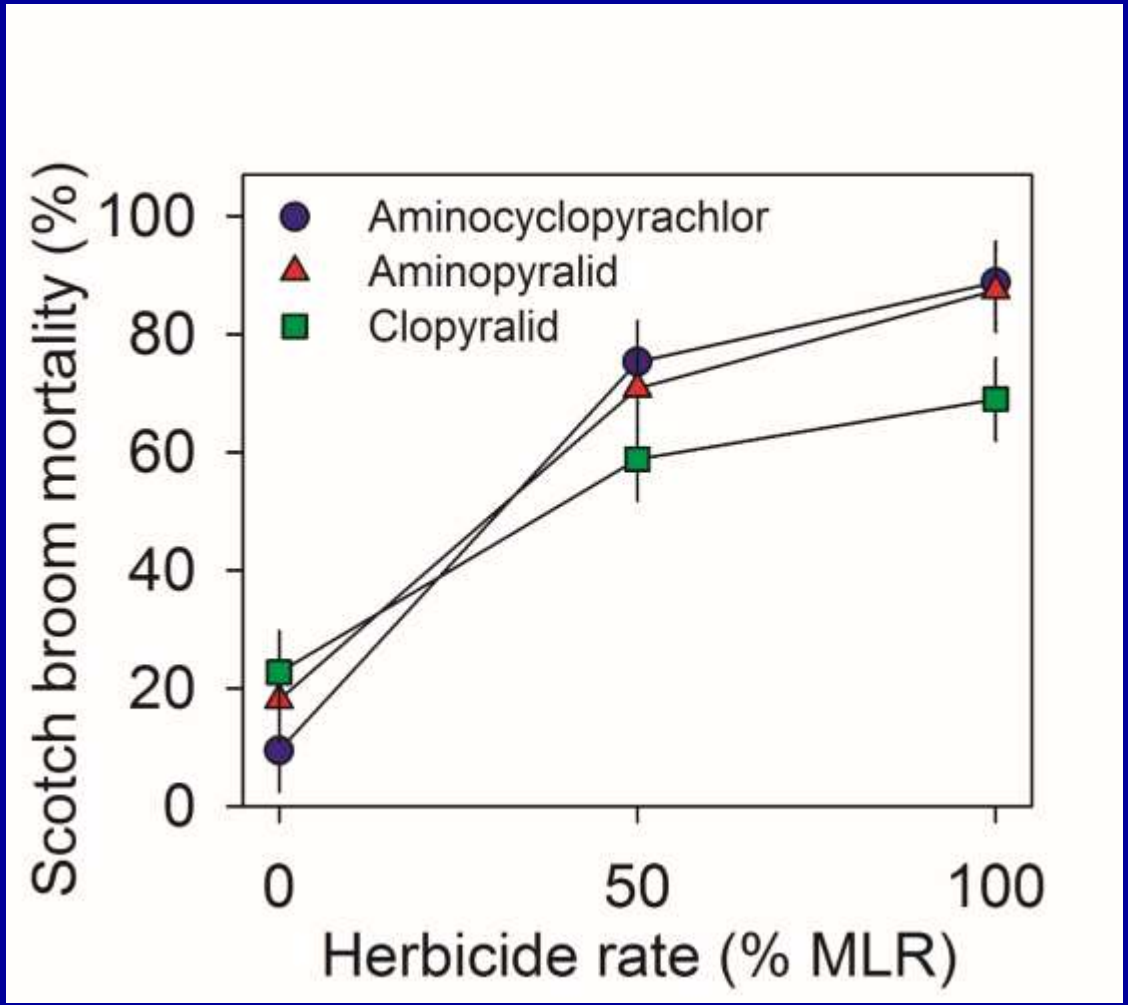
Harrington, Weed Sci. 2009

Preemergent Control of Scotch Broom with Auxinic Herbicides

In a growth chamber study, these herbicides caused over 80% seedling mortality

Nontreated, Day 14

Aminopyralid, Day 14



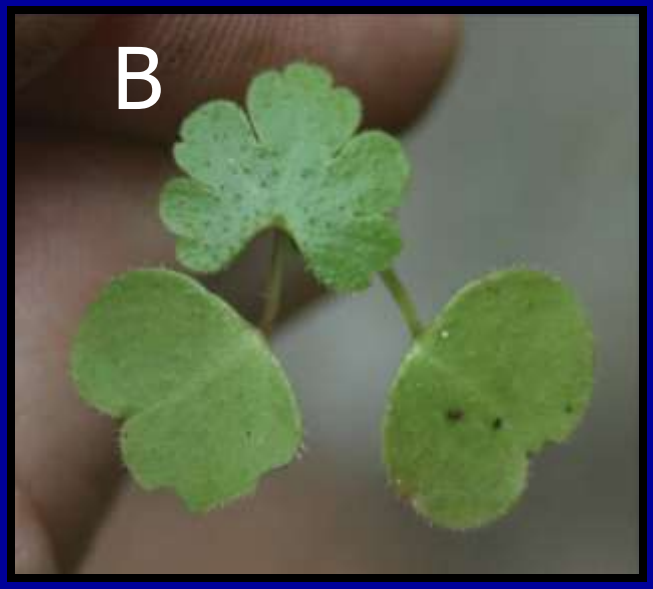
Harrington, Weed Technology, 2014

4th Species: Noxious Geraniums

- Two species of geranium are listed as noxious weeds (Class B in Washington, List B in Oregon):
  - Herb Robert (*Geranium robertianum*)
  - Shiny geranium (*Geranium lucidum*)
- Both are annuals in Geraniaceae
- Both species can successfully colonize a range of sites from full sun to underneath 90% canopy cover, often achieving near monotypic stands

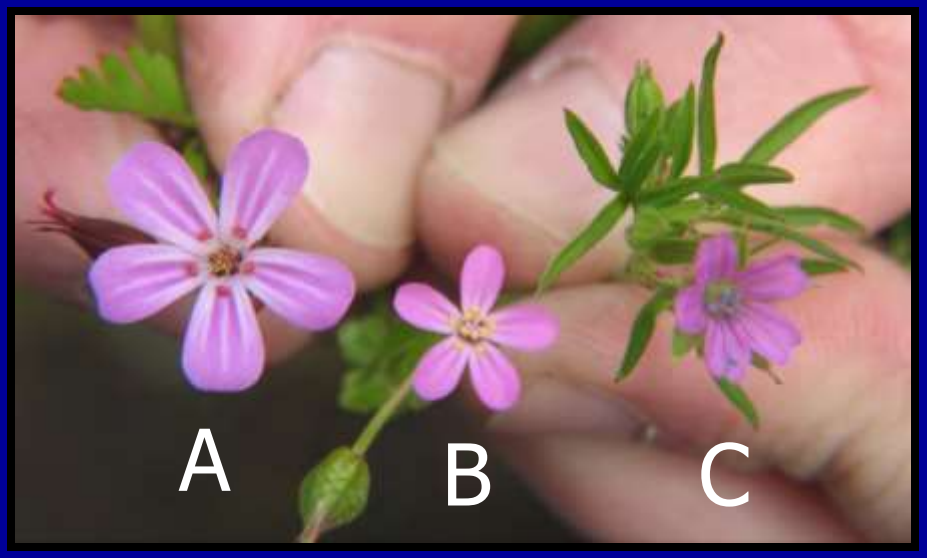
Shiny Geranium

Herb Robert



A = herb Robert
B = shiny geranium
C = dovefoot geranium

Herb Robert cotyledons and first true leaves are usually lightly covered with downy, glandular hairs, while shiny geranium cotyledons and first true leaves are sparsely covered with upright, bristly hairs



A = herb Robert
B = shiny geranium
C = cut-leaf geranium

While herb Robert sepals are striped with dark red, shiny geranium sepals are green with a midrib that bows outward forming a dorsal ridge

Herb Robert has many glandular hairs on mature petioles and blades (missing on shiny geranium), resulting in herb Robert earning the alternative common name of "stinky Bob"

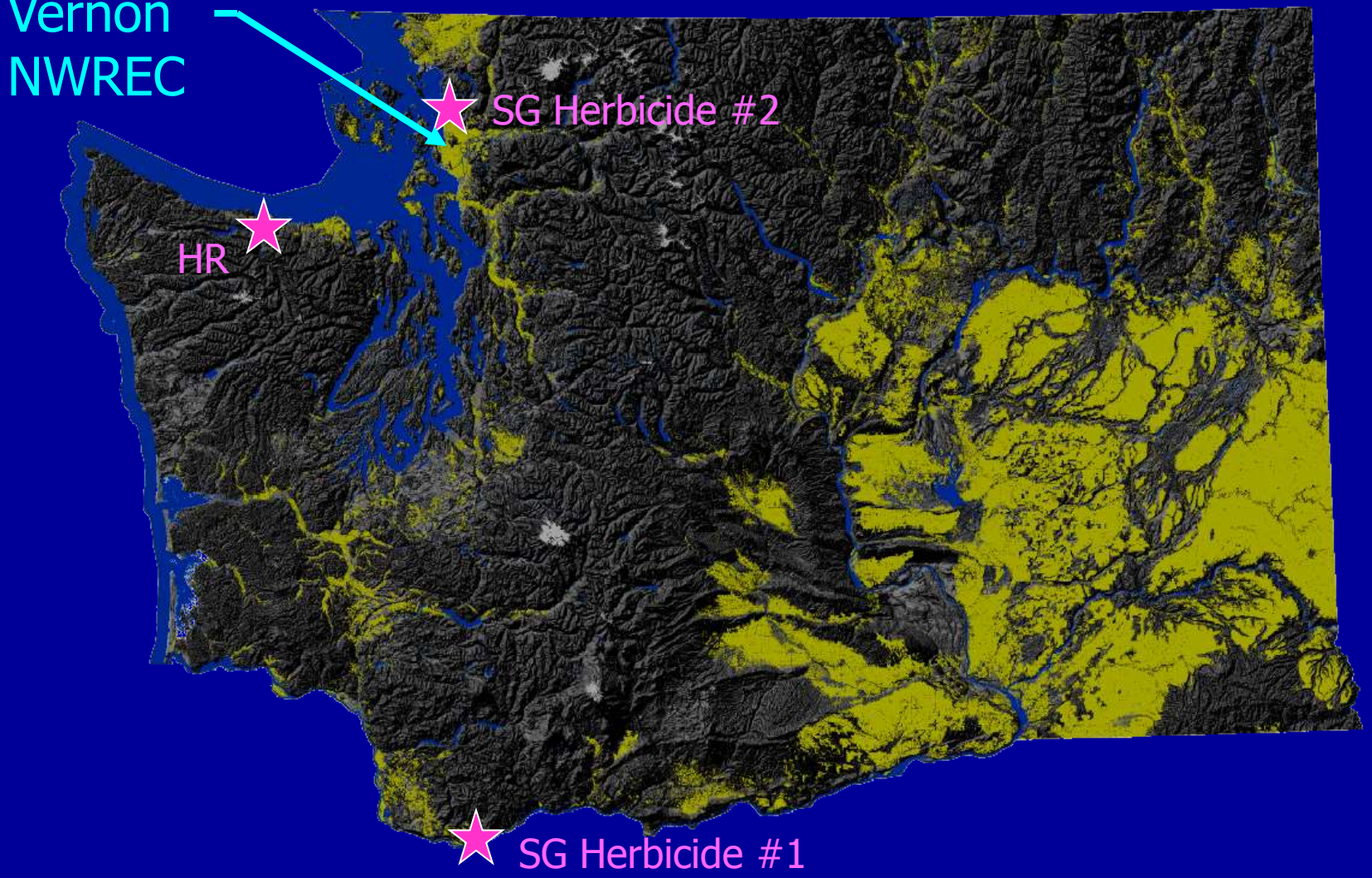
Noxious Geraniums

- Shiny geranium has a limited distribution in the Pacific Northwest
  - In OR it is found primarily in oak woodlands, seasonally wet ash forests, and on forest edges
  - In WA it is known only from two sites, one in the southwest and one in the northwest
- Herb Robert primarily inhabits forest lands on the west side of the Cascades
  - It is also found in the Columbia River Gorge and can be expected to further establish in wetter areas of eastern OR and WA

WA Field Trials, 2008-10
Herb Robert and Shiny Geranium

- Three sites
  - Herb Robert, Port Angeles
    - Cathy Lucero, co-investigator, Clallam County Noxious Weed Control Board
  - Shiny Geranium, Washougal Oaks and Bayview State Park
    - Carlo Abbruzzese and Alison Halpern, co-investigators, WA State Department of Natural Resources and WA State Noxious Weed Control Board

Noxious Geranium Field Sites

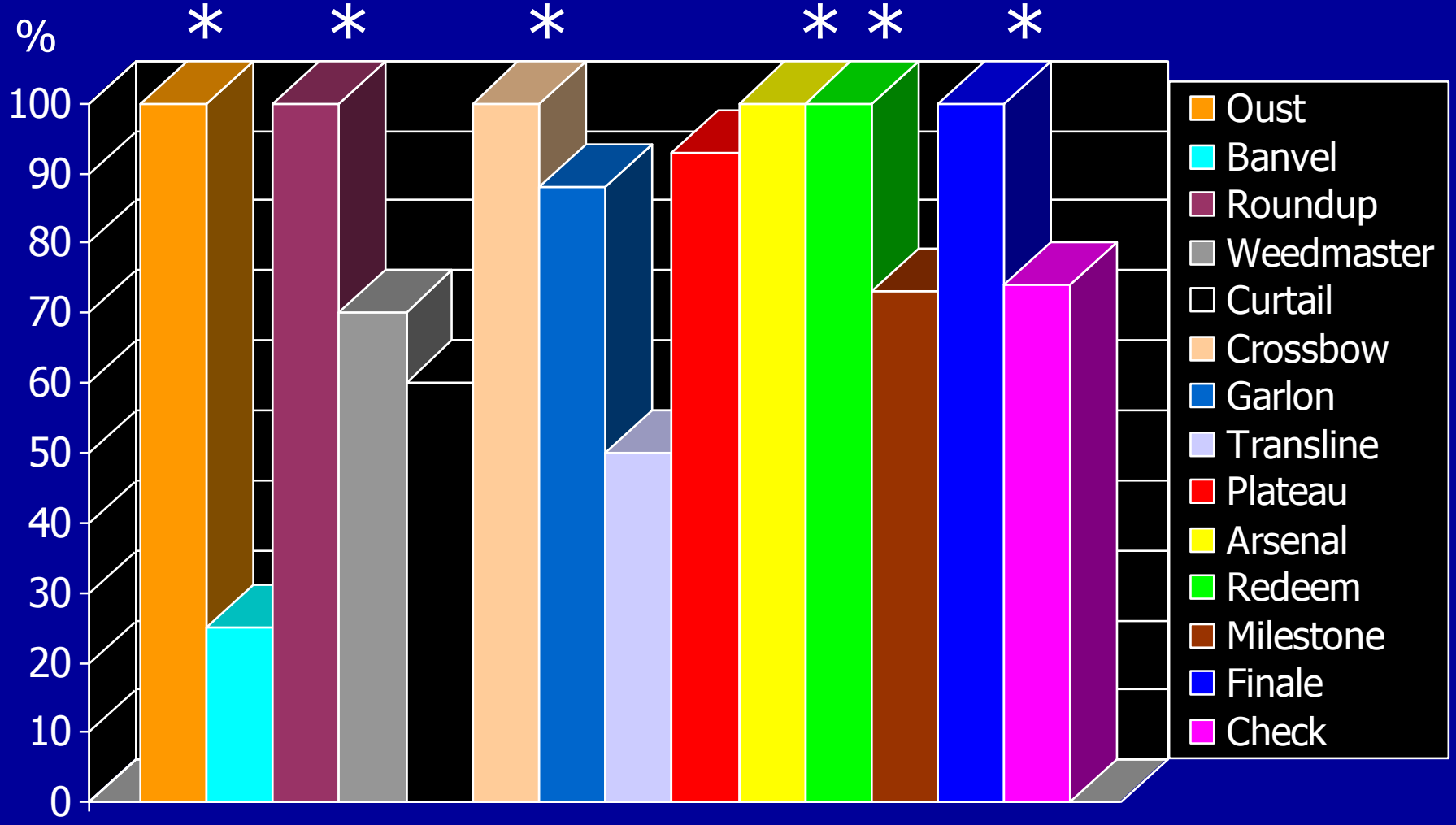


Herb Robert Herbicide Trial

- Trial conducted along an asphalt road shoulder in Port Angeles, WA
- Herbicides applied October 4, 2007; a second application was made on the same plots May 28, 2008
- Control was estimated November 30, 2007 and April 10, 2008 (2 and 6 months after first treatment, MA1T) and July 16, and November 9, 2008 (2 and 6 months after second treatment, MA2T)

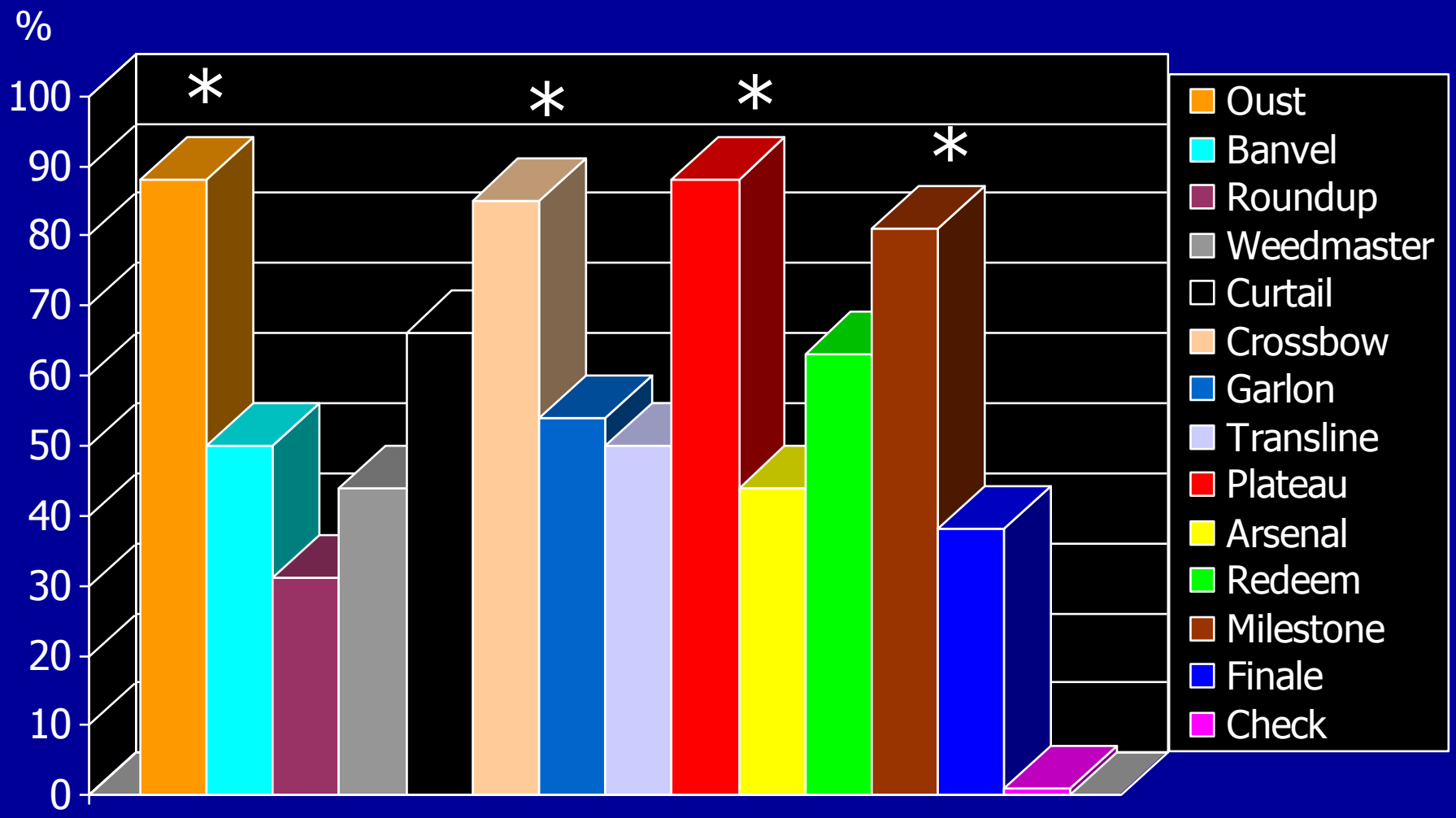
Herb Robert Herbicide Trial

Control, 6 MAT



Herb Robert Herbicide Trial

Control, 6 MA2T

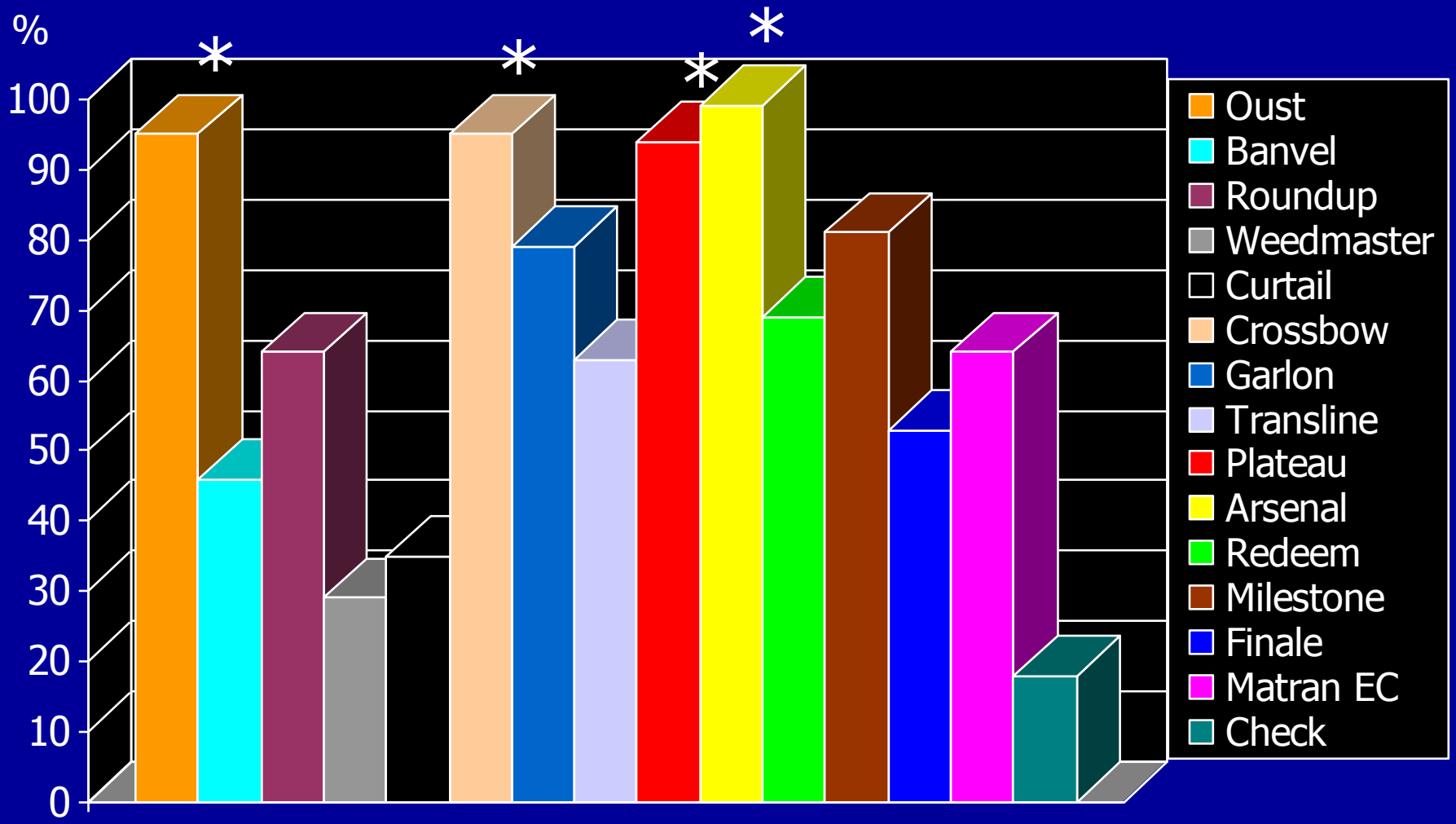


Shiny Geranium Herbicide Trial #1

- Conducted in the first of two known infestations of this species, along the edge of a gravel road east of Vancouver near Washougal Oaks Natural Area, WA
- Herbicides were applied October 20, 2008
- Control of shiny geranium was estimated January 26 and June 11, 2009 (3 and 8 months after treatment, MAT)

Shiny Geranium Herbicide Trial #1

Control, 8 MAT

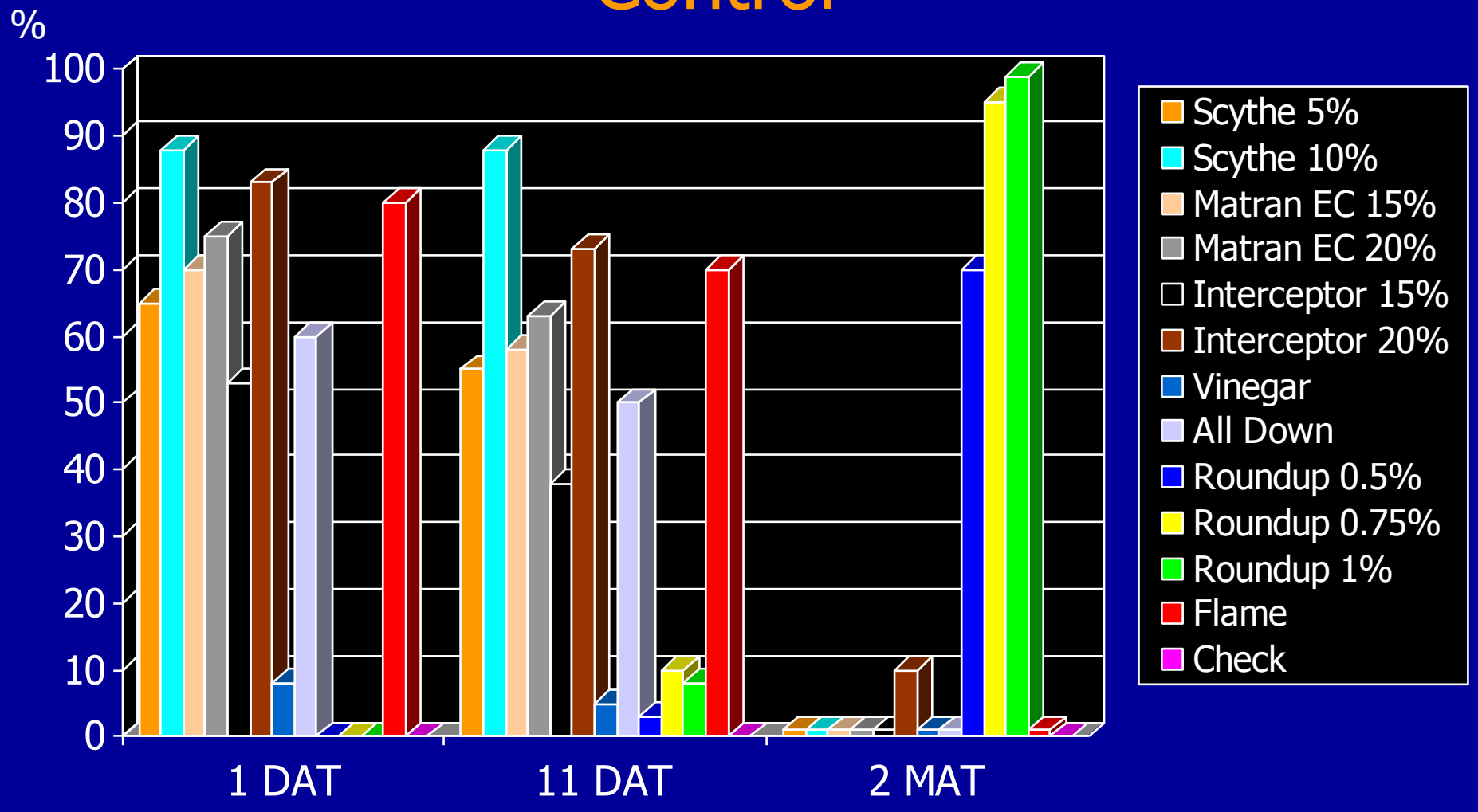


Shiny Geranium Herbicide Trial #2

- Conducted in the second of two known infestations of this species, along an asphalt road shoulder and in campsites of Bayview State Park west of Mount Vernon, WA
- Non-synthetic herbicides and glyphosate (Roundup Pro) were applied March 5, 2009
- Control of shiny geranium was estimated March 6 (1 day after treatment, DAT), March 16 (11 DAT), and April 28 (2 MAT).

Shiny Geranium Herbicide Trial #2

Control



Noxious Geranium Conclusions

- Control of these annual weeds can be done with most herbicides
  - Control with Roundup, Arsenal, Oust, and Plateau was excellent
  - Auxinic herbicides were not as good
  - Non-synthetic products and flame could defoliate these geraniums, but must be applied before seedlings are too large to be successful
- Expect new germinations to occur as long as seeds remain in seed bank

Organic Herbicides For Control Of Annual Weed Species

- Of the non-synthetic herbicides evaluated for non-selective weed control:
  - Acetic acid: General consensus is that products should contain a minimum of 20% acetic acid; acetic acid and limonene should be used full strength (no dilution)
  - Clove oil and pine oil: General consensus on rate is for 15 to 20% of the product in water
  - Pelargonic acid: New formulation may become organically certified; general consensus on rate is for 5 to 10% of the product in water

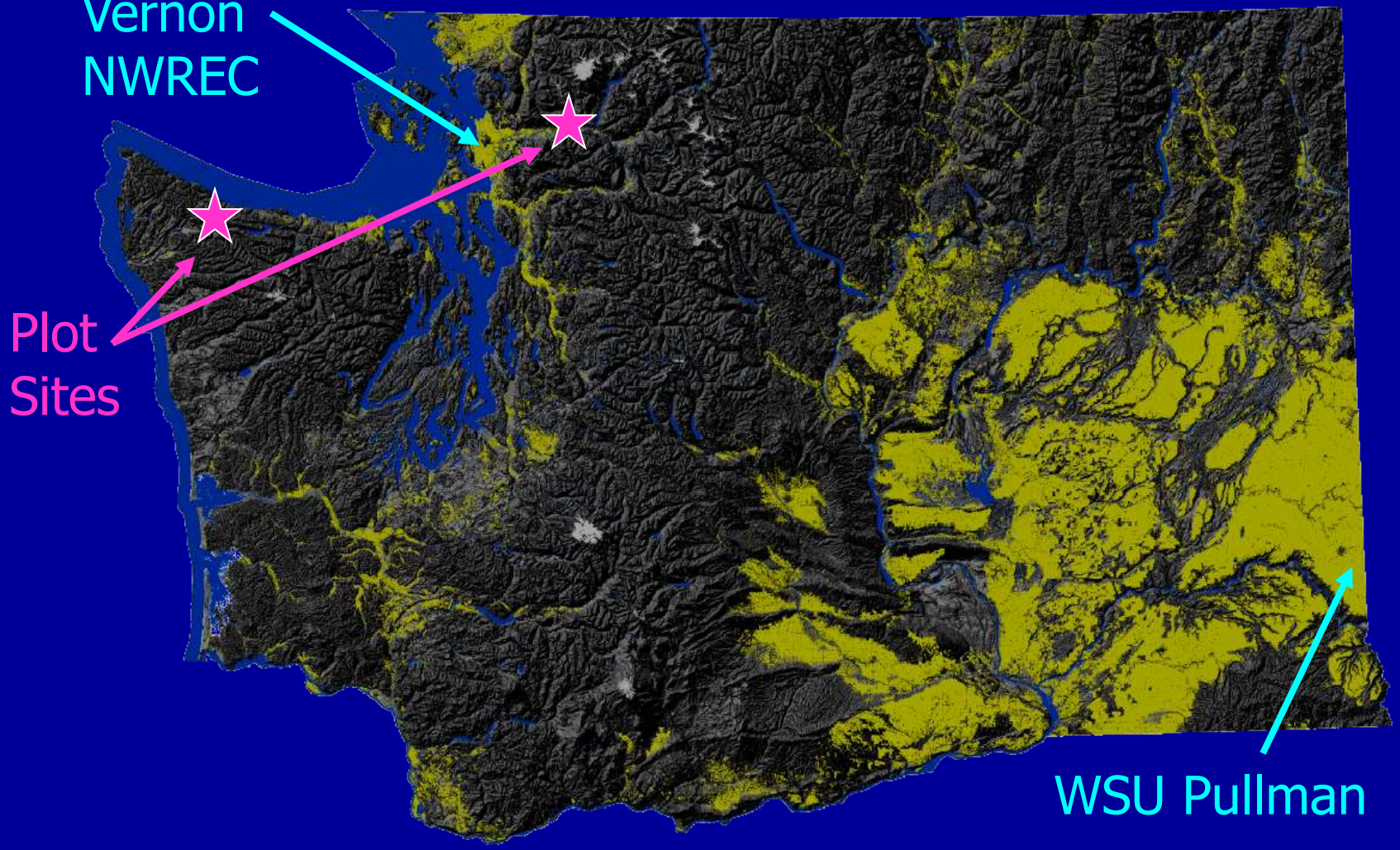
A New Set of Trials Was Conducted 2015-16

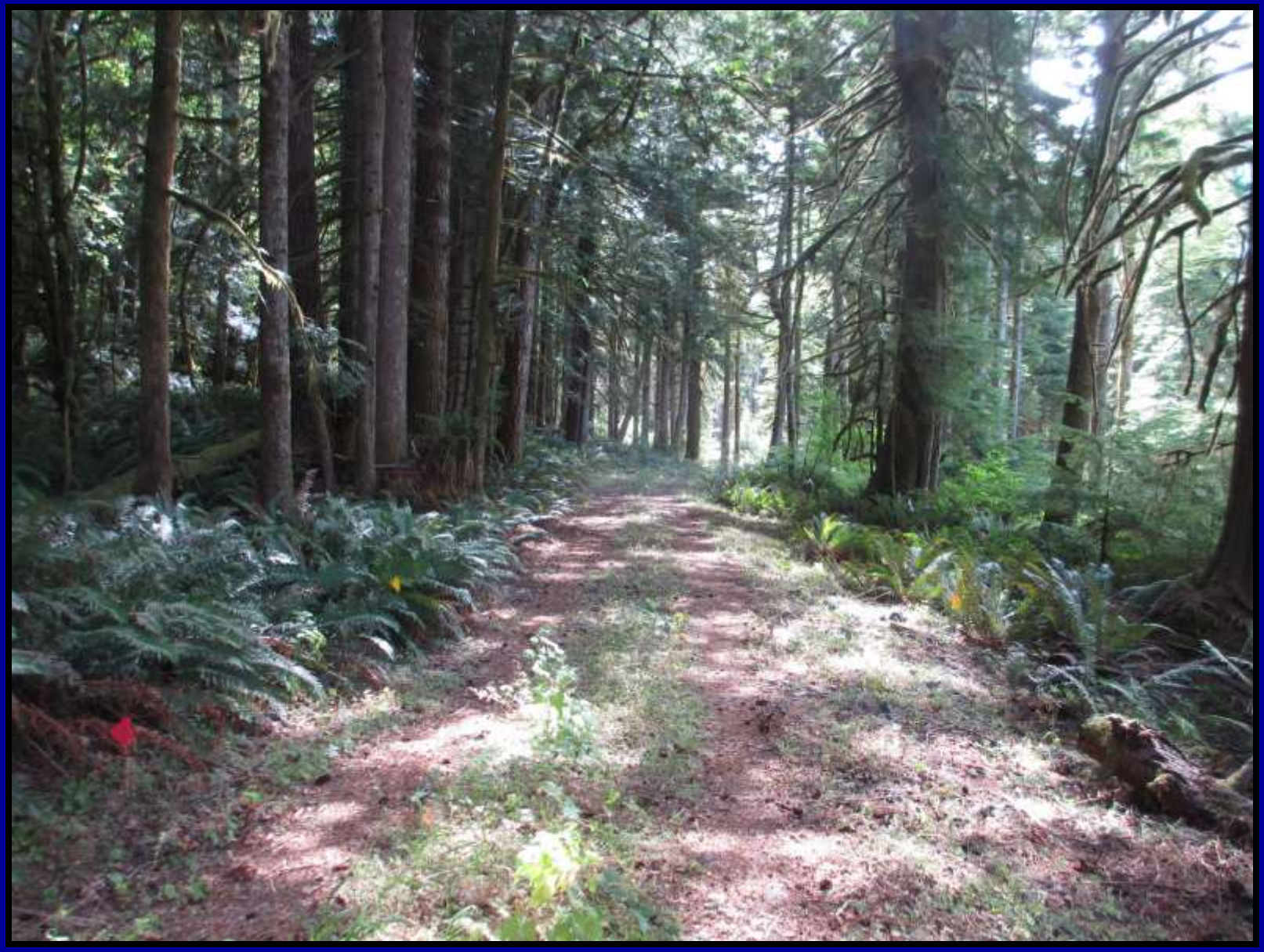
- Efficacy of low-rate herbicide applications at different timings to herb Robert and established native perennial species
- Funded by the US Forest Service's Pesticide Impact Assessment Program
  - Low rates of standard herbicides: Roundup, Habitat, Oust, and Milestone
  - Non-synthetic herbicides: acetic acid, clove oil, and limonene
  - Three timings: early, mid, and late
  - Two sites: Olympic and North Cascades National Parks

Trial Information

- Both trials were established along old gravel road shoulders in fully-shaded forest habitats
  - Olympic National Park had western red cedar, western hemlock, and Douglas-fir overstory
  - North Cascades National Park had red alder, bigleaf maple, black cottonwood, and Douglas-fir overstory
- Herbicides were applied early May, mid July, and late September in 2015
- Percent injury was estimated at about 1 month after each treatment (weeds and native plants)

Herbicide Trial Sites





Olympic National Park Trial Site

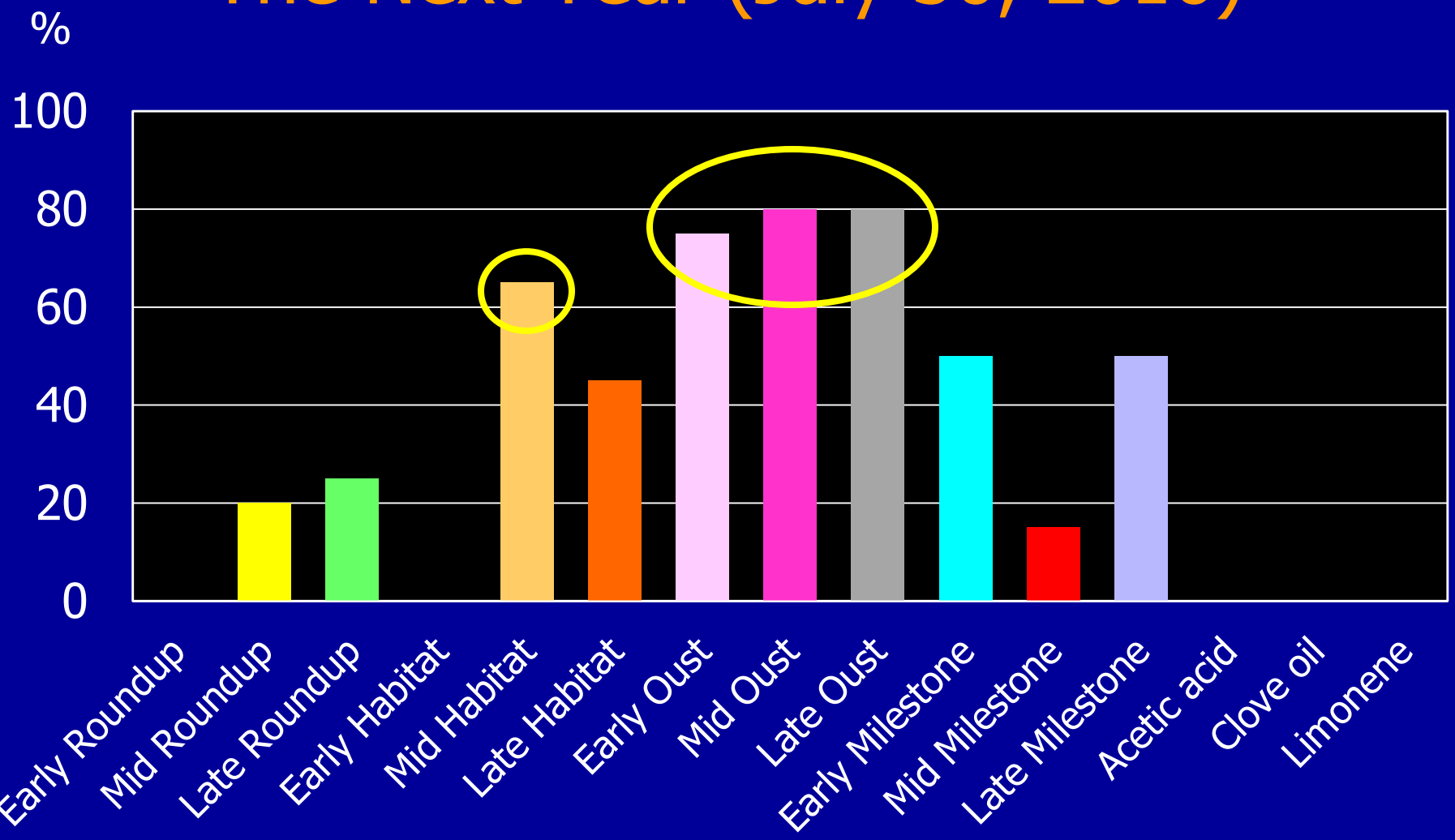
North Cascades National Park Trial Site

A funny thing happened on the way to make the September applications at NCNP (uh, oh!)

S’mores, anyone?

Herb Robert Control

The Next Year (July 30, 2016)



What About The Natives?

- Most were not greatly injured
- A few experienced injury of more than 30%

Natives With ≥30% Injury

- Roundup
- Oust

Red Alder

Alnus rubra

Natives With ≥30% Injury

- Clove oil

Salal

Gaultheria shallon

Natives With ≥30% Injury

- Roundup
- Oust
- Limonene

Salmonberry

Rubus spectabilis

Natives With ≥30% Injury

- Roundup
- Habitat
- Milestone
- Acetic acid
- Clove oil

Thimbleberry

Rubus parviflorus

Natives With ≥30% Injury

- Roundup
- Milestone

Spring Beauty

Claytonia lanceolata

Natives With ≥30% Injury

- Roundup

Spiders-On-A-String

Mitella caulescens

Natives With ≥30% Injury

- Roundup
- Habitat

Grass/Sedge spp.

Conclusions

- Multiple applications of nonsynthetic herbicides were not effective against herb Robert
- Conversely, nontarget injury to established perennial species was moderate at worst and always temporary
- Herb Robert control was better from low-rate applications of Roundup, Habitat, Oust, or Milestone, although injury to nontarget plants was also greater

Conclusions

- The native plant species most sensitive to synthetic herbicides were Pacific blackberry, salmonberry, thimbleberry, and huckleberry
  - This may be a relatively arbitrary result, as these species were widespread in the plots (23 to 77% of the ONP plots) so herbicide effects were fairly clear
  - Also, because a boom sprayer was used for these applications, most of the foliage of these species received herbicide treatment, which no doubt increased the level of injury observed
  - Still, these plants were rarely killed outright from the herbicides applied at these rates; rather, they were injured and displayed symptomatic foliar growth, but their full recovery is likely

Recommendation

- Based on these results, it appears that Oust applied in summer or fall was the best treatment for herb Robert
  - Oust provided up to 12 months of herb Robert control while not greatly injuring existing nontarget vegetation
  - Although nontarget injury could exceed 30% in some cases, most individual plants of these species should survive these applications
  - Damage to salmonberry, thimbleberry, and huckleberry could be reduced by applying the herbicide as a directed spray to herb Robert and therefore below most of the berry foliage

Have You Had Enough?


Lake Crescent
Olympic National Park


WASHINGTON STATE
UNIVERSITY
World Class. Face to Face.