One Last Session: Thick-Cuticle Weeds (and others, too…)

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Today's Session

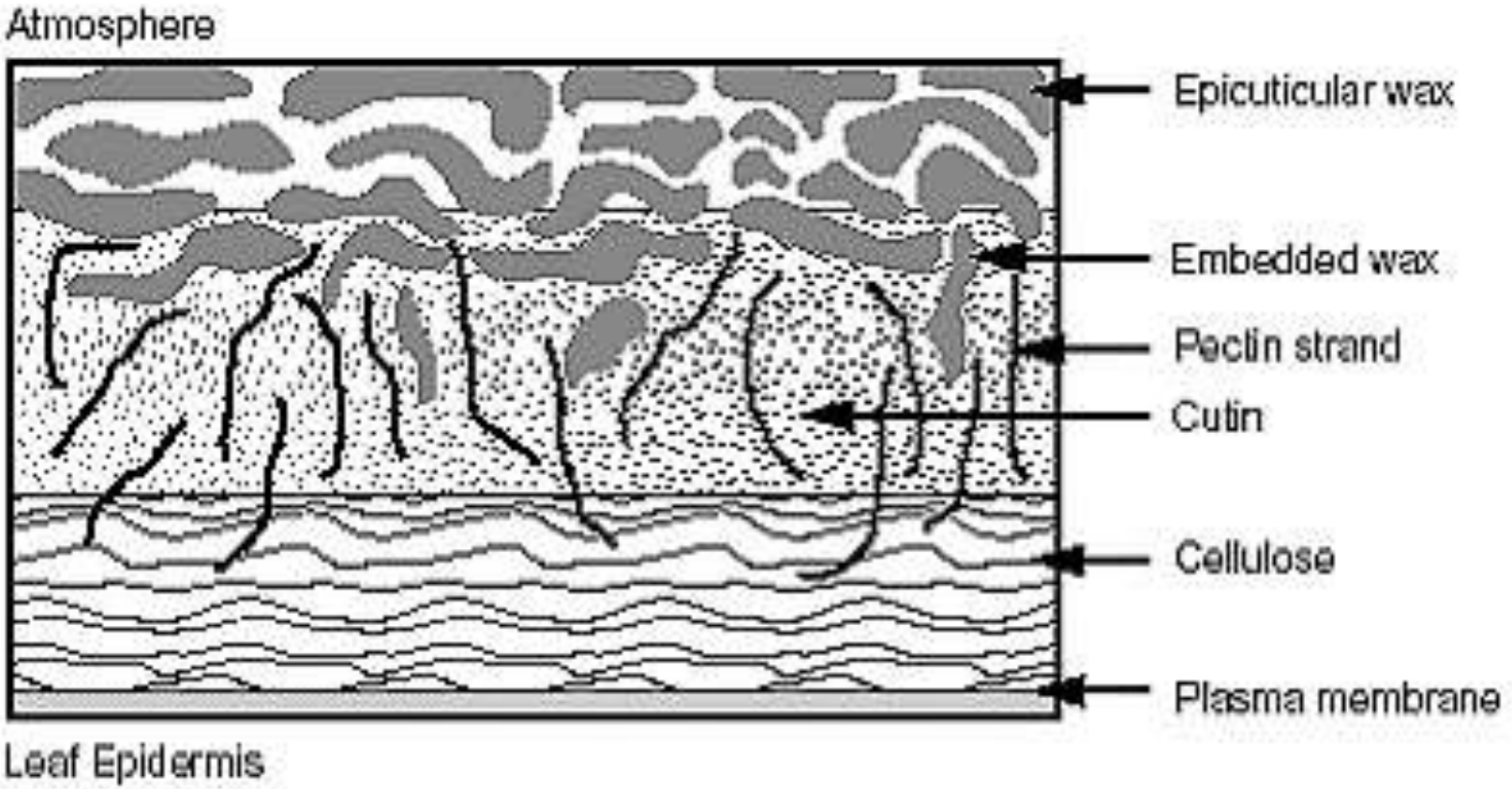
- What the heck is a cuticle?
- Identification, biology, and control of three (maybe 4 or 5?) tough noxious weeds
  - Italian Arum
  - Spurge Laurel
  - English Ivy
  - Yellow Archangel
  - European Coltsfoot

Leaf Surface Factors

- The leaf surface restricts water loss and hinders uptake of liquids from the environment
  - Cuticle (wax, cutin, pectin)
  - Hairs (density, length)
  - Stomata (holes in the surface that regulate gas exchange with the atmosphere)

Leaf Cuticle

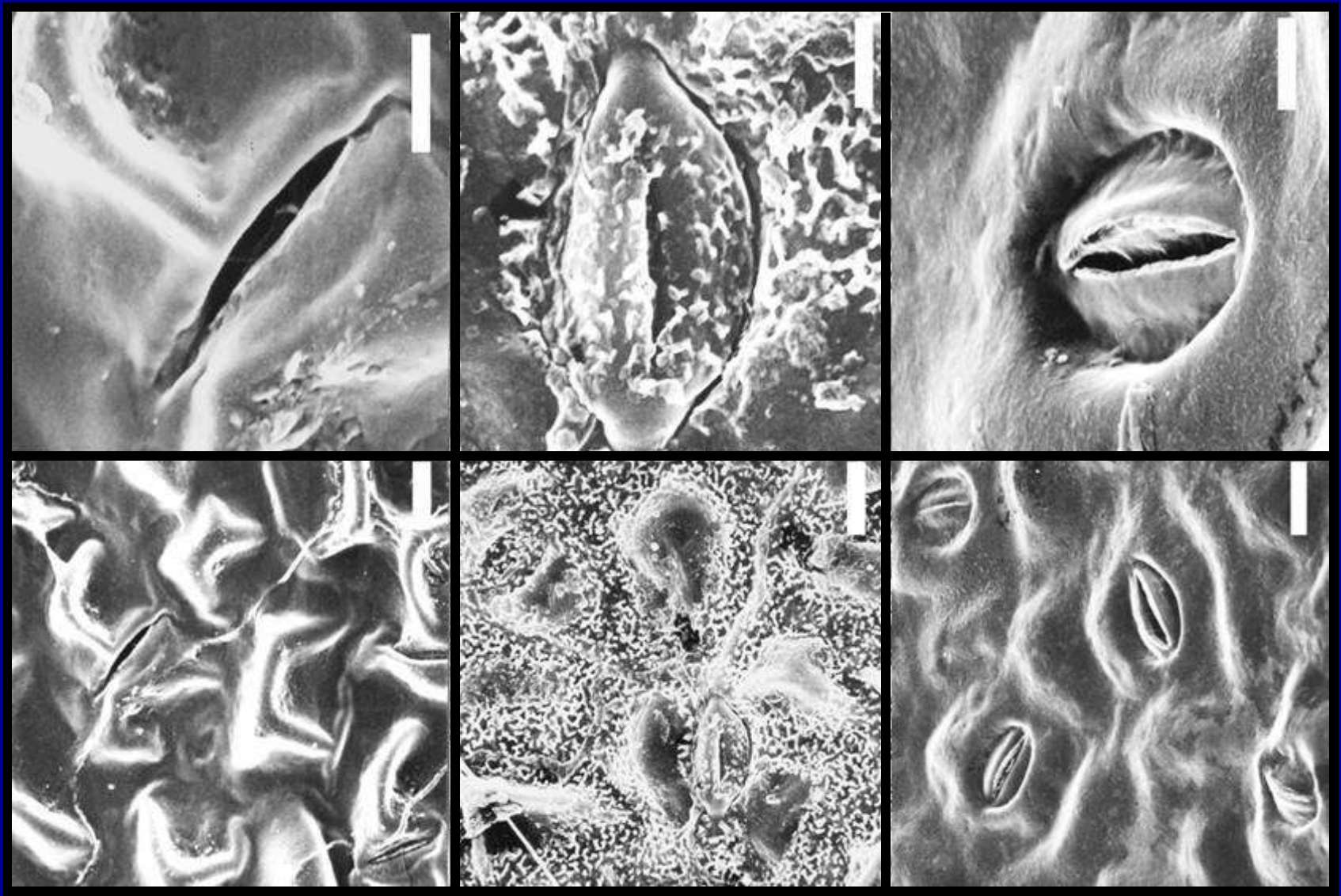
Figure 1. Simplified plant cuticle (taken from F. D. Hess, Sandoz Crop Protection)



Cuticular Wax

- Surface tension coupled with hydrophobic wax layer causes water to form droplets on leaf surfaces

Cuticle Surface And Stomata



1st Species

- Italian Arum (*Arum italicum*, Class C in WA), Araceae (arum family)
- Italian arum grows in a range of sites from full sun to mostly shade, often fully crowding out other vegetation
- It grows from tubers found beneath the cluster of leaves
- It generally spreads slowly unless cultivated

Leaves are glossy green, arrowhead-shaped, and usually variegated with white markings

Plants primarily reproduce from tubers produced among the roots

Italian arum produces a spadex and spathe that bears tight clusters of 3-seeded, bright orange berries in late summer and fall

Italian Arum Herbicide Trial

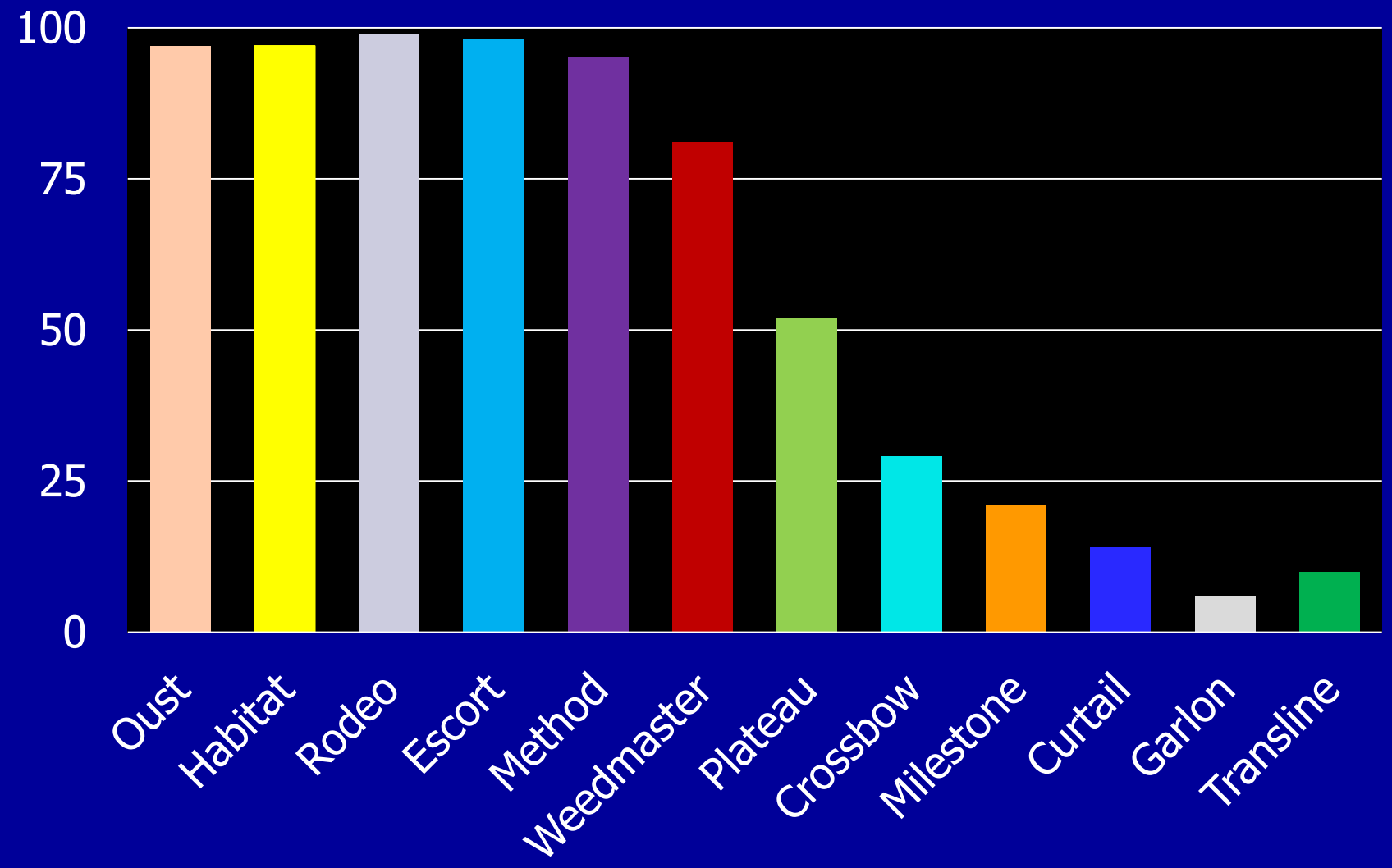
- Greenhouse trial conducted at WSU Mount Vernon NWREC (2011-12 and 2016)
- Italian arum tubers were dug from field infestations near Olympia and Mount Vernon
- Those were transplanted into small pots and placed in the greenhouse
- Nothing whatever happened for several months, but foliage finally started to emerge in the fall, to the point where every single pot eventually had leaves (!!)

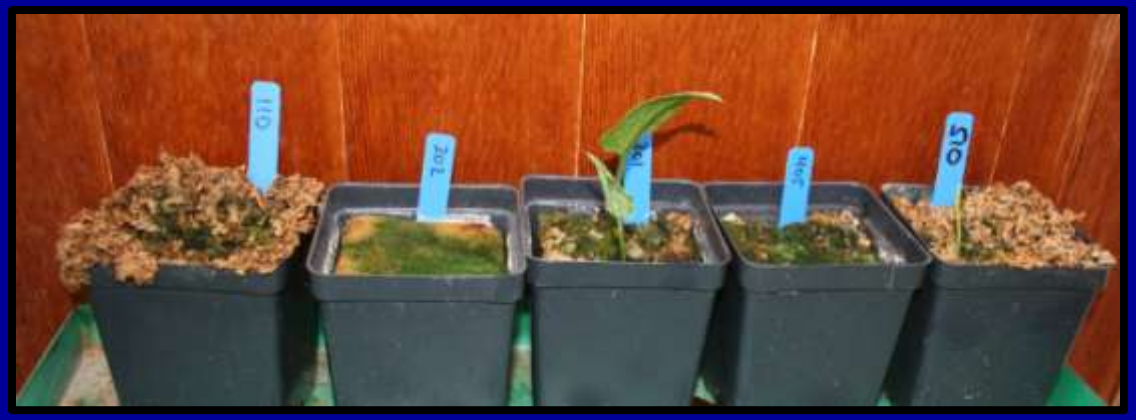
Italian Arum Herbicide Trial

- Plants grew through the winter, then were treated with 12 different herbicides in May
- Plants were allowed to translocate the herbicide for 30 days
- Foliar chlorosis was estimated in June (no difference noted between treatments)
- Foliage was then clipped off at the soil level
- The pots were then maintained for 5 more months and re-grown leaves were weighed to determine herbicide efficacy

Italian Arum Control

From Leaf Biomass at 7 MAT, 2012 & 2016





Habitat (1%)

Escort (1.5 oz/a)

Rodeo (3%)

So Do We Declare Success?

- Unfortunately, foliage of this species typically dies back in early summer anyway, so it's difficult to say the defoliation was entirely due to these herbicide treatments
- Tubers produced in the pots were collected at 12 MAT both years
  - Many of the treated plants, though leaves were dead, still had white, crisp tubers
  - Unsure if these tubers would be capable of sprouting or not

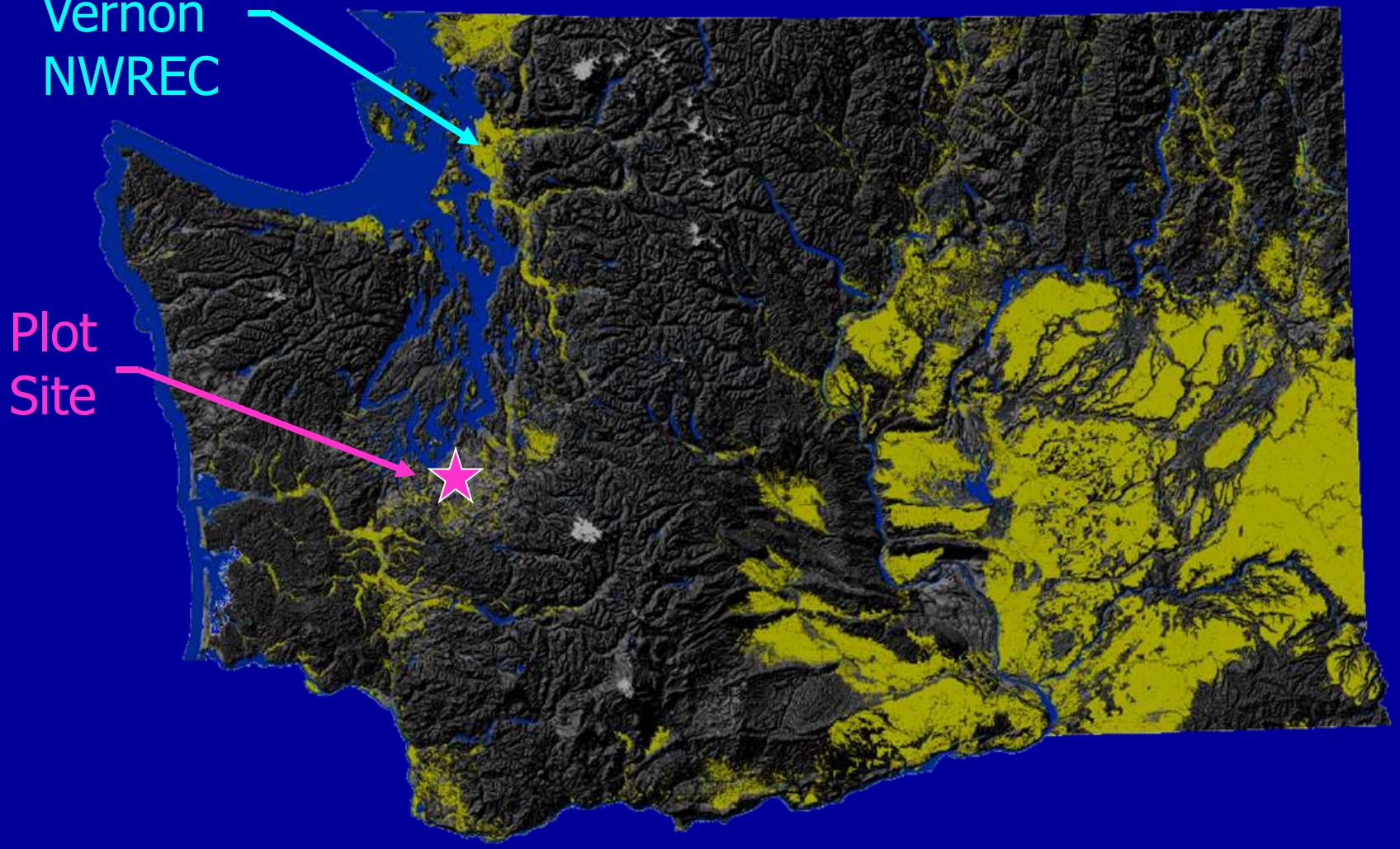
2nd Species

- Spurge Laurel (*Daphne laureola*) is a shrub in the plant family Thymelaeaceae (so it is neither a spurge nor a laurel)
- It is a Class B Noxious Weed in WA
- Up to about 5 feet tall, it is found primarily in shady areas
- Flowers are yellow-green and small found among the evergreen leaves; fruits are bluish-black, 1-seeded drupes

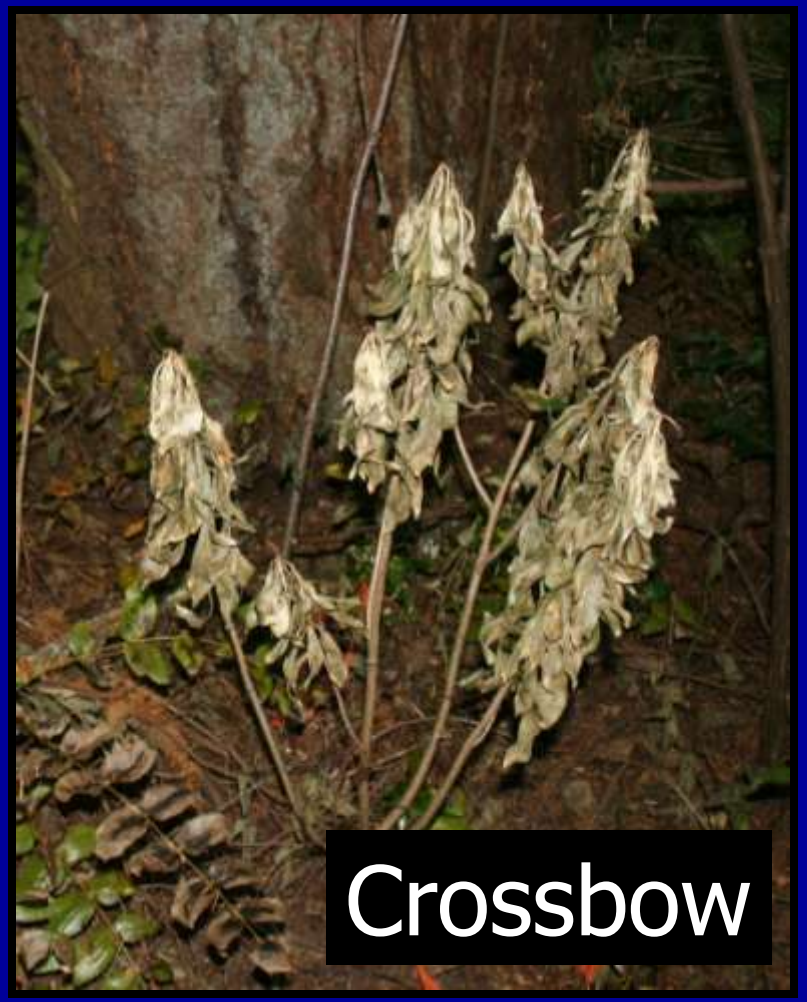
Spurge Laurel Trials

- Private residence, Lacey, WA; Rick Johnston, Thurston County Noxious Weed Control, co-investigator
- Trial #1: Cut-stem and foliar treatments applied June 11, 2010
  - Roundup, Habitat, Method, Crossbow, Milestone, and cut only
- Trial#2: Cut-stem treatments applied December 22, 2010

Spurge Laurel Trial Site



Foliar Treatments
6 MAT



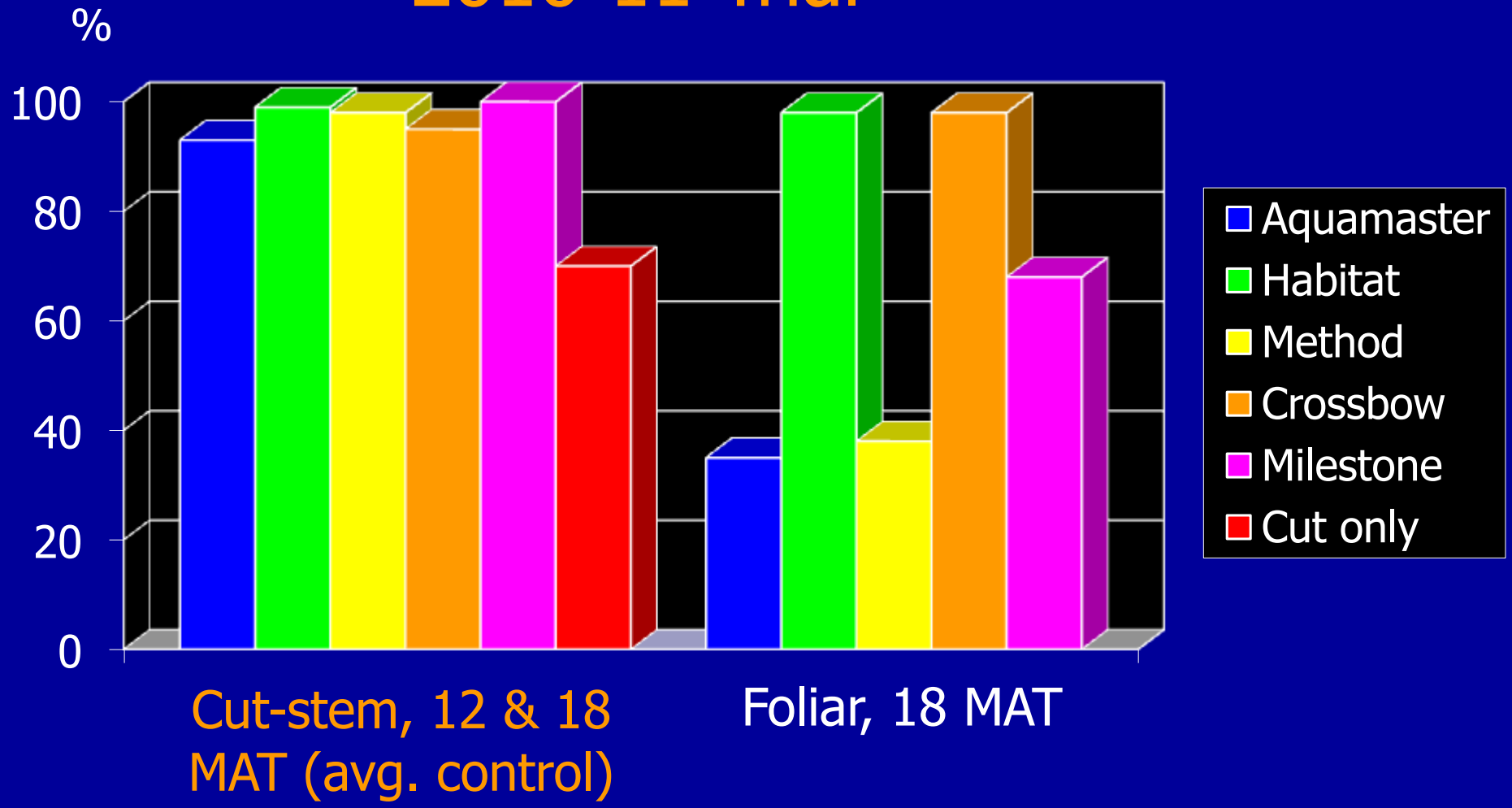
Cut-Stem Treatments
6 MAT

Roundup

Cut Only

Spurge Laurel Control

2010-11 Trial



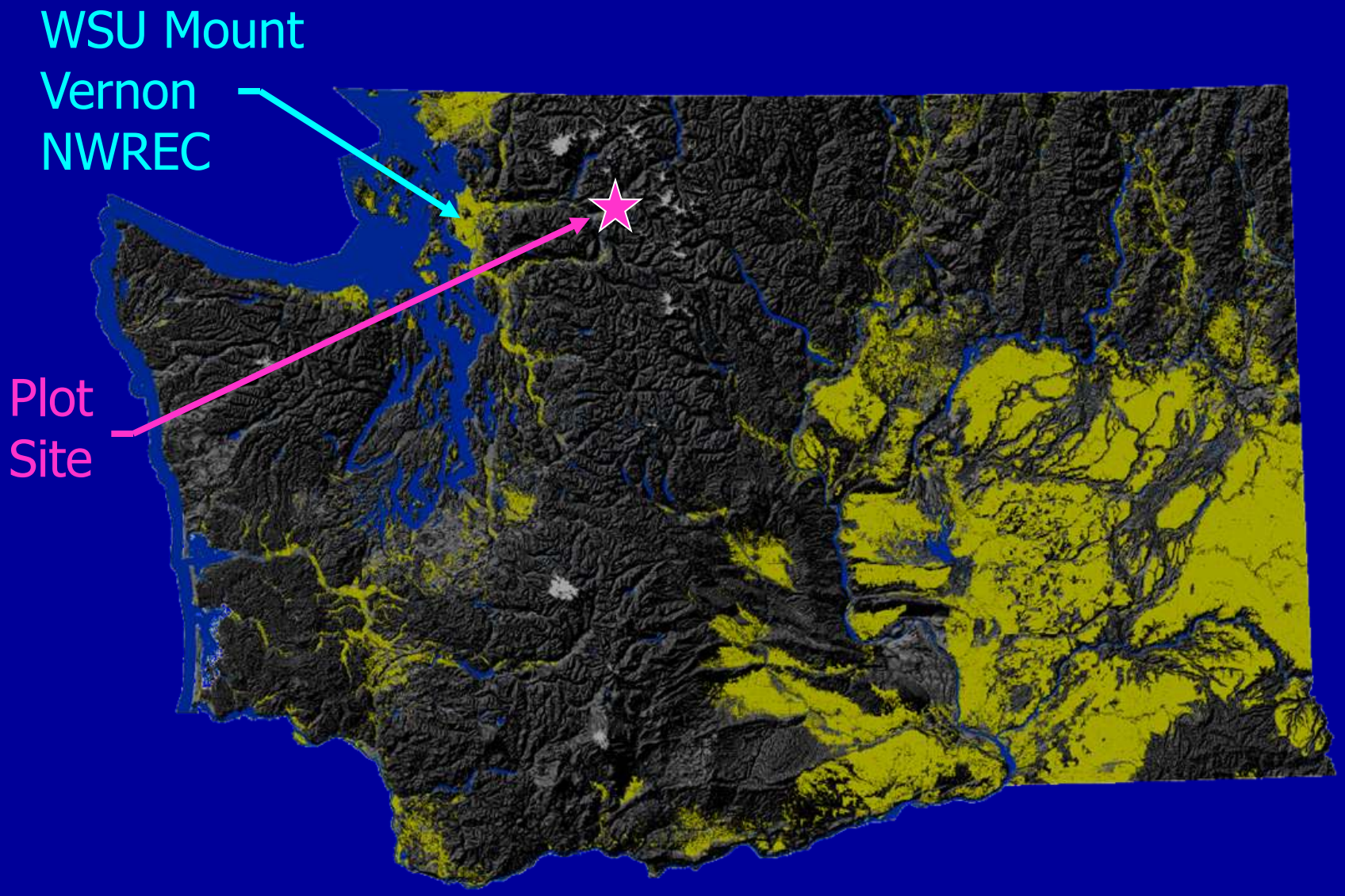
3rd Species

- English (Irish or Atlantic) Ivy (*Hedera helix* and *H. hibernica*) is a commonly-found vine in the plant family Araliaceae
- It is a Class C Noxious Weed in WA and a Class B and Quarantine List in OR
- Vines up to 100+ feet long on trees or buildings
- Flowers are yellow-green and small found among the evergreen leaves; fruits are bluish-black berries

English Ivy Trial

- US Park Service, near Marblemount, WA; Todd Neel, US Park Service, co-investigator
  - Treatments applied May 20, 2011
  - Roundup, Habitat, Method, Crossbow, and Milestone
  - Mixed with either 1 or 2% MSO

English Ivy Trial Site



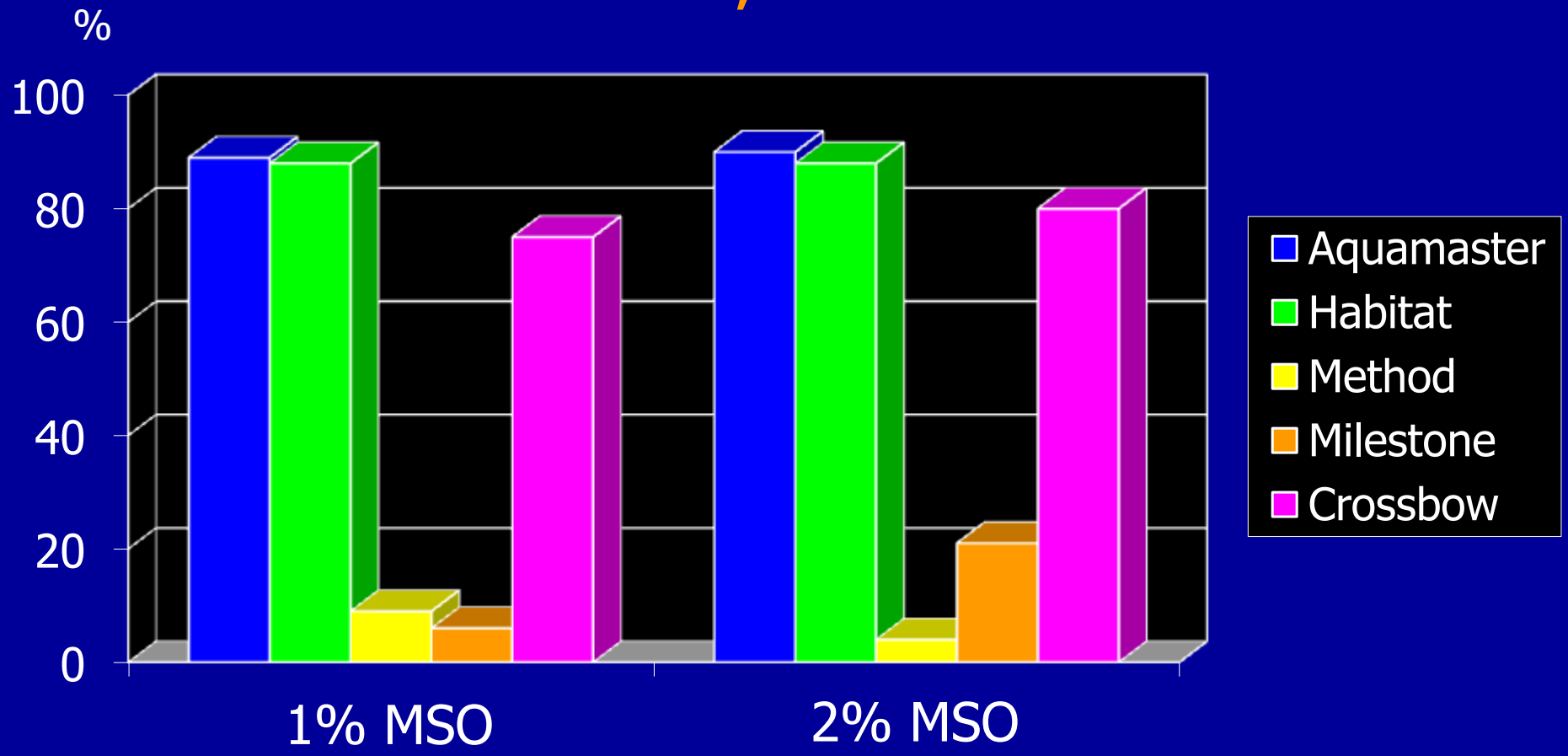
Foliar Treatments 2 MAT

Nontreated

Crossbow

English Ivy Control

2011-12 Trial, 12 MAT



4th Species

- Yellow Archangel (*Lamiastrum galeobdolon*, sometimes also as *Lamium galeobdolon*) (Class B in WA, List B in OR), Lamiaceae (mint family)
- Commonly-planted ground cover has attractive variegated foliage
- Grows well in half shade to full sun
  - Can grow under Douglas fir and western hemlock
  - Limited growth under western red cedar
- Reproduction primarily via rooting nodes, but also produces viable seeds

Bright yellow flowers in axillary whorls

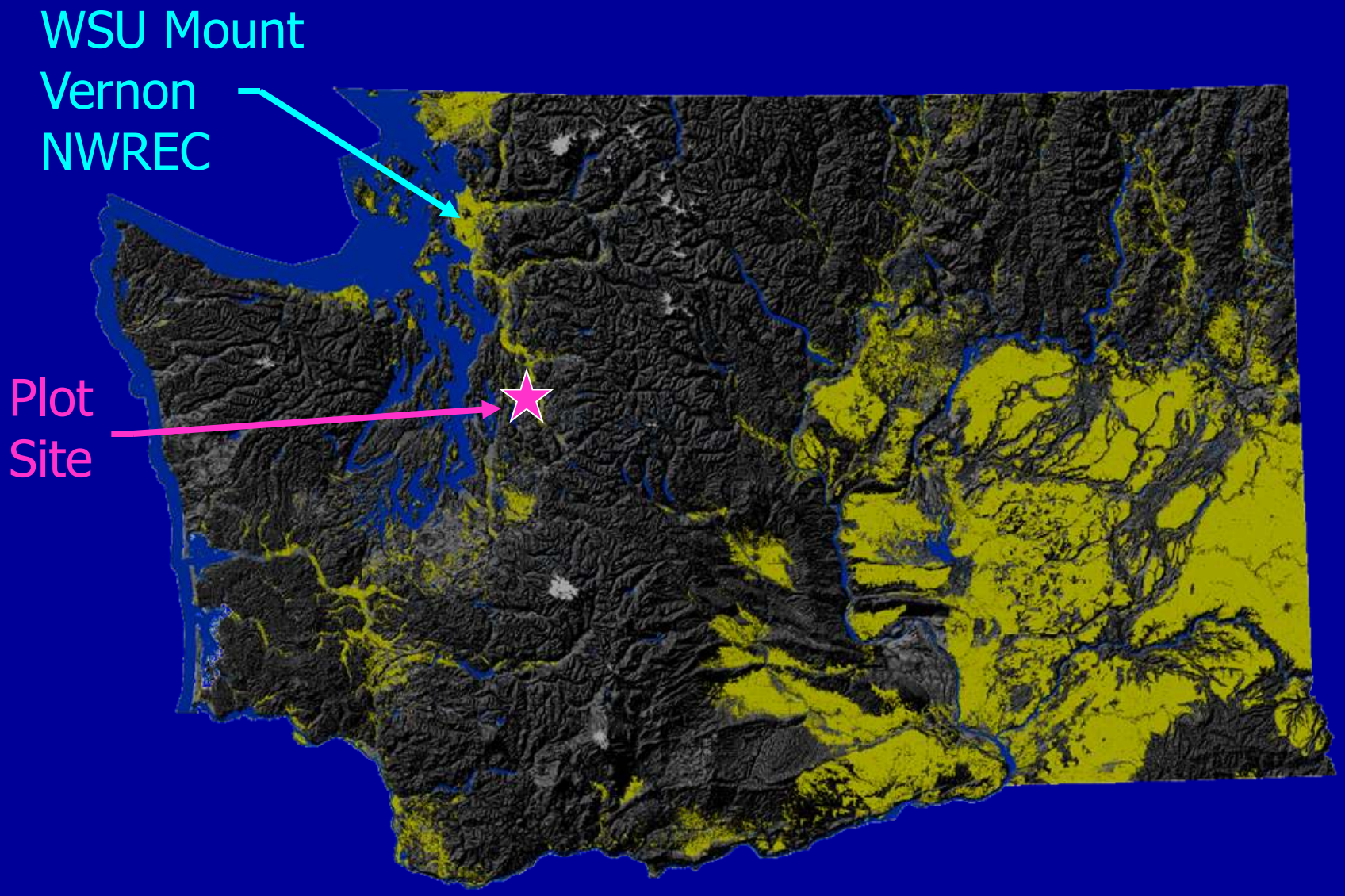
Almost complete ground coverage

Adventitious rooting

Yellow Archangel Field Trial
Phase 1, 2008-09

- Products working the best in a greenhouse trial were tested on a park population in Kirkland, WA (Sasha Shaw and Frances Lucero, co-investigators)
- Herbicides applied in mid-June, 2008, immediately after bloom
  - Vinegar and Matran EC also tested (applied twice: June and September, 2008)
- Visual observations and biomass collected

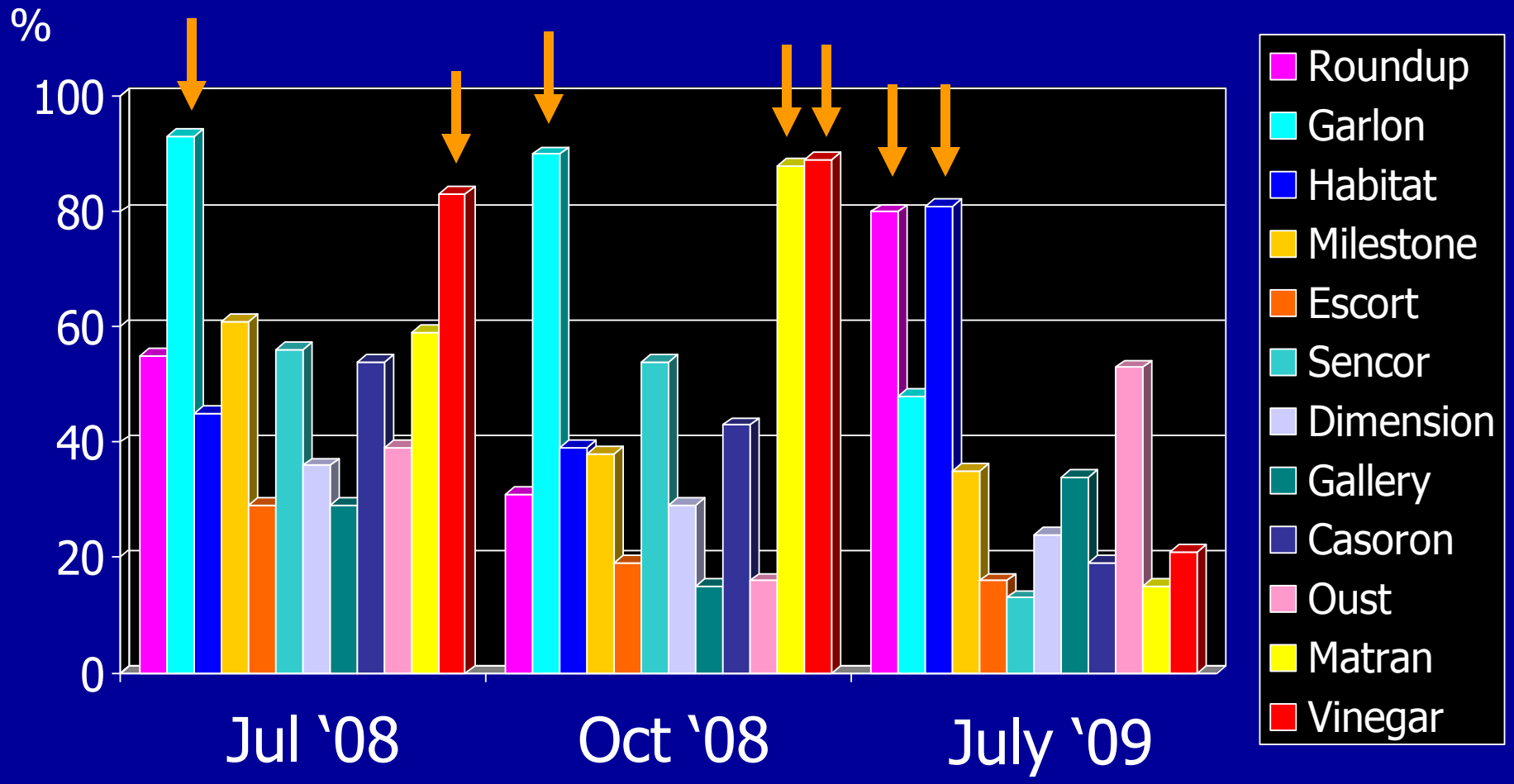
Yellow Archangel Trial Site



20% Acetic Acid Untreated

Level of leaf "burn" at 1 week after treatment

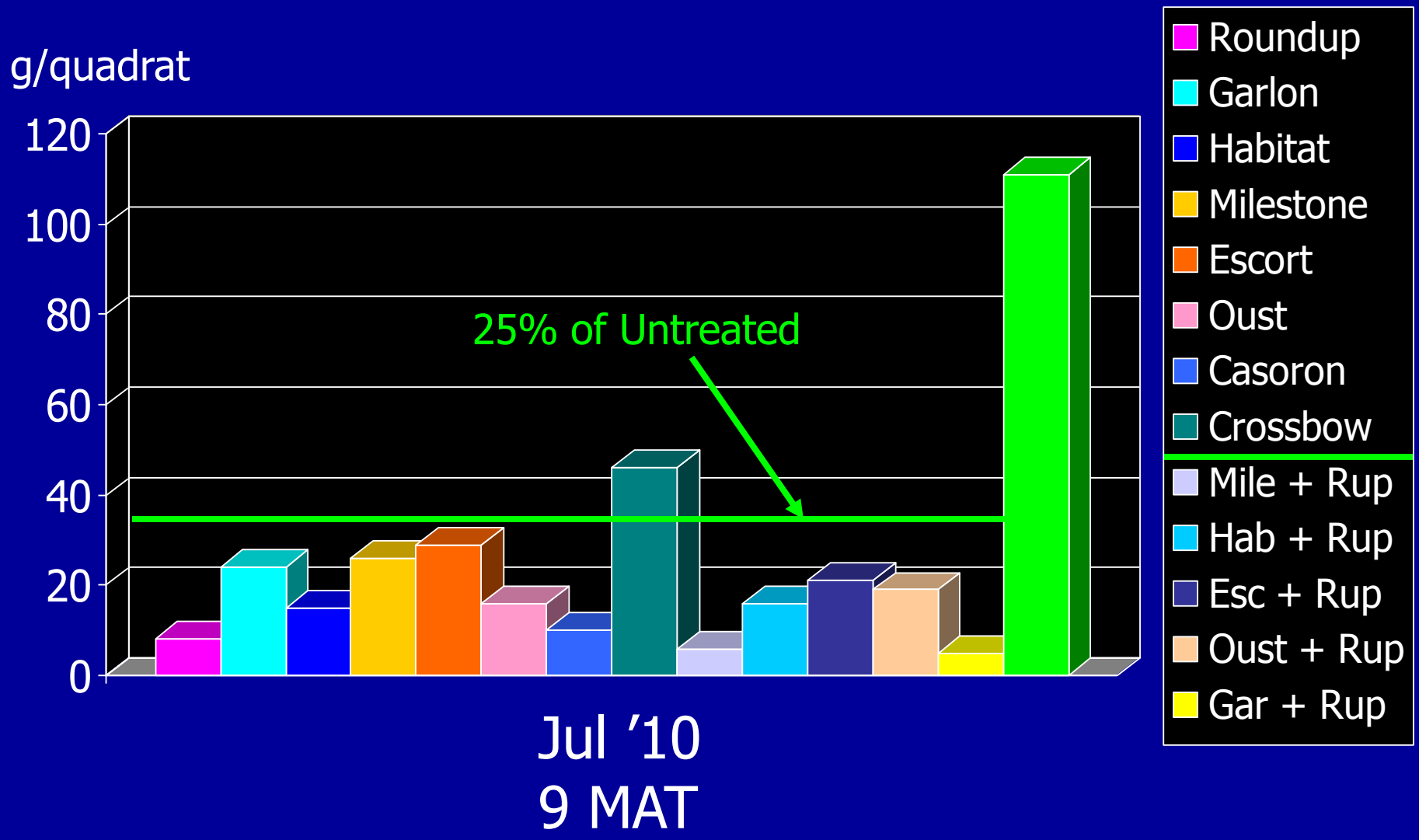
Yellow Archangel Control



Yellow Archangel Field Trial
Phase 2, 2009-10

- Six products from Phase 1 were re-applied in October, 2009 on the same field population
- Herbicides applied with and without Roundup in tank mixture
- Visual observations and biomass collected in July, 2010

Yellow Archangel Biomass



What About Yellow Archangel Seeds?

- Some seed germinated under simulated winter conditions
- Seed in soil sporadically germinated when areas were thoroughly weeded
  - It is not known how long these seeds were in the soil before they germinated
- While germination appears low, yellow archangel seedlings do occur
  - Areas should be monitored for seedlings following yellow archangel removal

5th Species

- European Coltsfoot (*Tussilago farfara,* List A in OR, Class B in WA), Asteraceae (sunflower family)
- European coltsfoot grows in a range of sites from full sun to mostly shade
- It grows from rhizomes, but also produces fuzzy seedheads that blow seeds far and wide

Flowers stalks arise in early spring, before emergence of leaves

Dandelion-like seedheads are borne as leaves emerge

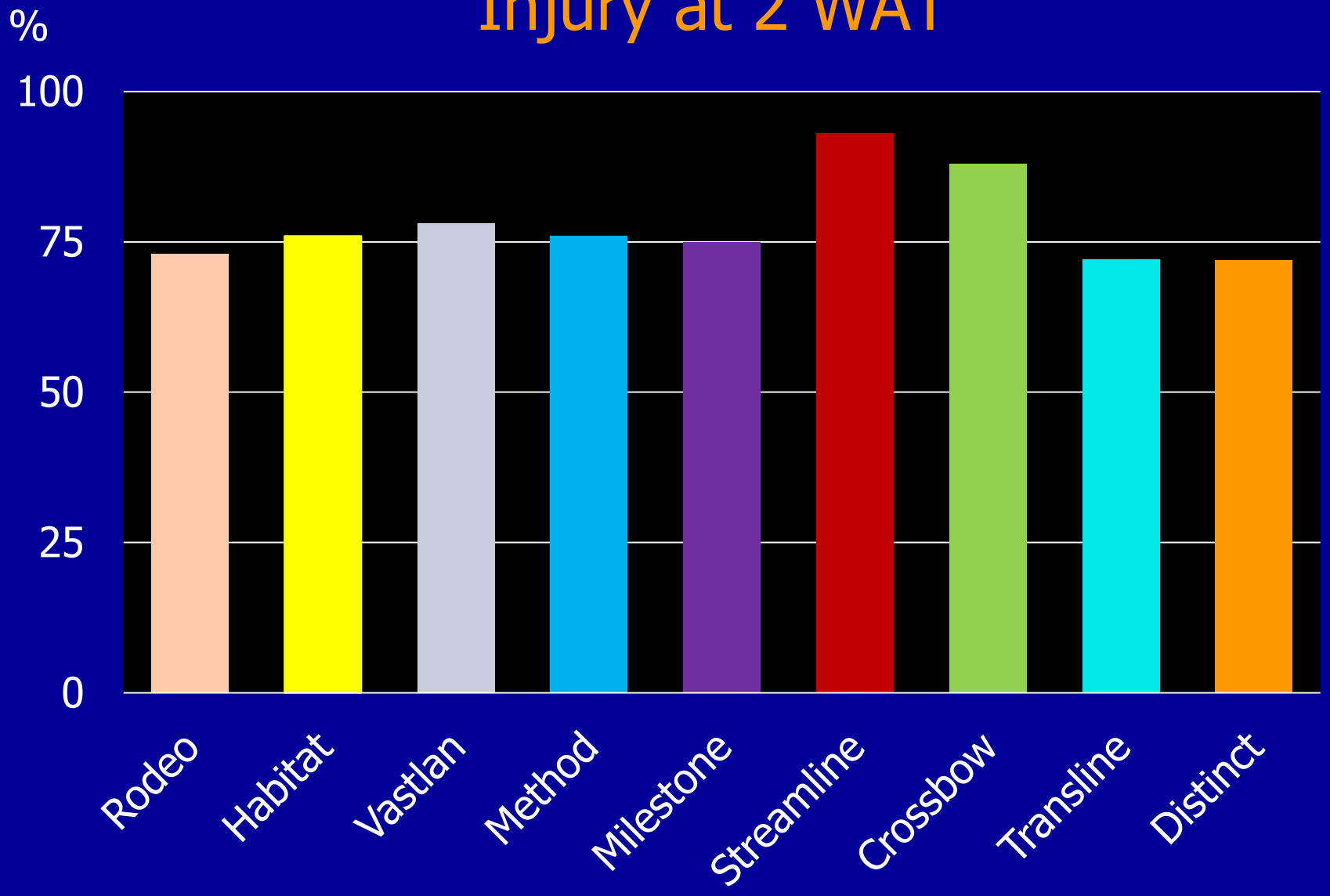
Leaves are fuzzy and heart-shaped (outline like a horse's hoof)

European Coltsfoot Trial

- Greenhouse trial conducted at WSU Mount Vernon NWREC (2018)
- Coltsfoot crowns and rhizomes were dug from a field infestation near Arlington in March
- Those were transplanted into small pots and placed in the greenhouse
- When at least three leaves were on each plant, herbicides were applied (May 1)
- Injury rated and plants clipped (May 14, 2 WAT)
- Regrowth rated, clipped, and weighed (June 14, 6 WAT)

European Coltsfoot Control

Injury at 2 WAT



European Coltsfoot Control

Leaf Biomass at 6 WAT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