

Scotch Thistle

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****In the following presentation any mention of pesticide or pesticide trade name is not an recommendation by the University of California. Pesticides are mentioned by trade name for informational purposes only. Mention of any pesticide is not a guarantee of their effectiveness or an endorsement of other pesticides not mentioned. When ever using a pesticide make sure to read and follow the entire label. Some uses of pesticides mentioned could be experimental not labeled uses.

Outline

- Background
- Biology
- Control Methods
- Research



Native Range

- Eurasia



Why “Scotch Thistle”?

- Story
- 13th century
- Norse king invading Scotland
- Stealthy night attack
- “Barefoot”
- Thistle!
- Now symbol of defense



Image Courtesy of: Wikipedia

What's in a name?

- *Onopordum acanthium*
- Onus=Donkey
Pored=Flatulence



Photo Courtesy of www.siasat.pk

Historical Uses

Edible

- Immature flower heads - boiled
- Stems blanched, or raw in salad

Hair on leaves used for pillows

Medicinal values

- Rashes
- Ulcers
- Nervous disorders
- Etc.



Photo courtesy of: [Leslie J. Mehrhoff, University of Connecticut, Bugwood.org](#)

Introduction


- Introduced North America late 19th century
- “Decorative plant”




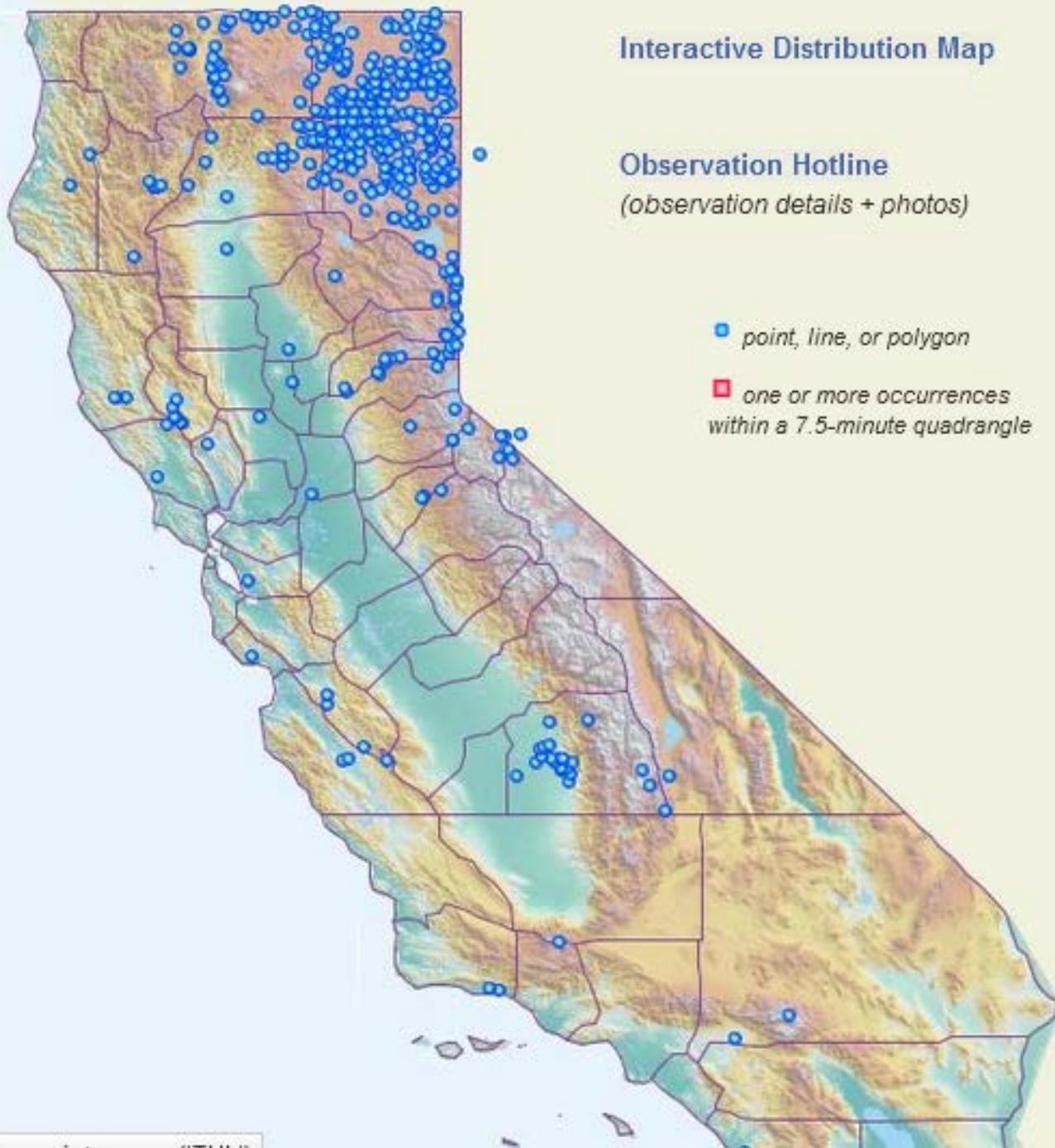
Interactive Distribution Map

Observation Hotline

(observation details + photos)

 *point, line, or polygon*

 *one or more occurrences within a 7.5-minute quadrangle*



Invasive

- Noxious weed in all but 12 states
 - A list weed in California
- Cal IPC- “High Invasiveness”
- Also problematic in Canada, Argentina, and Australia, and New Zealand.
 - Can hybridize with Illyrian thistle
- “Weedy” behavior grazed lands - Spain, Turkey Russia and UK

Wide Range of Environments

- Full sun
- Soils
 - Fertile to poor
 - Sandy to clay
 - Neutral to alkaline
- Typically not in waterlogged soils
- Associated with disturbance
- Large plants more fertile loamy soils



Ecological Impacts

- Monoculture
- Reduced biodiversity
- Wildlife habitat



Societal Impacts

- Reduced forage value
- Physical barrier
 - Livestock
 - People
- Injuries
- Cost to control!



Hooper, Young, and Evans 1970

- Economic Evaluation of Scotch Thistle Suppression
- In Northeastern California
- Loss of forage utilization/production
 - Estimated 80% in Scotch stands
- Estimated annual loss
 - Wet meadows - \$10.20/acre (Adj to 2016 - \$64/acre)
 - Wheatgrass - \$6.70/acre (Adj to 2016 - \$42/acre)
 - Cheatgrass - \$ 3.40/acre (Adj to 2016 - \$21/acre)



Why ID?

- Nearly 50 native thistle California
- 16 native thistles Lassen and Modoc county
- Other invasive thistles as well



Photo courtesy: of Richard Spellner Cal flora

Bull Thistle



Musk Thistle

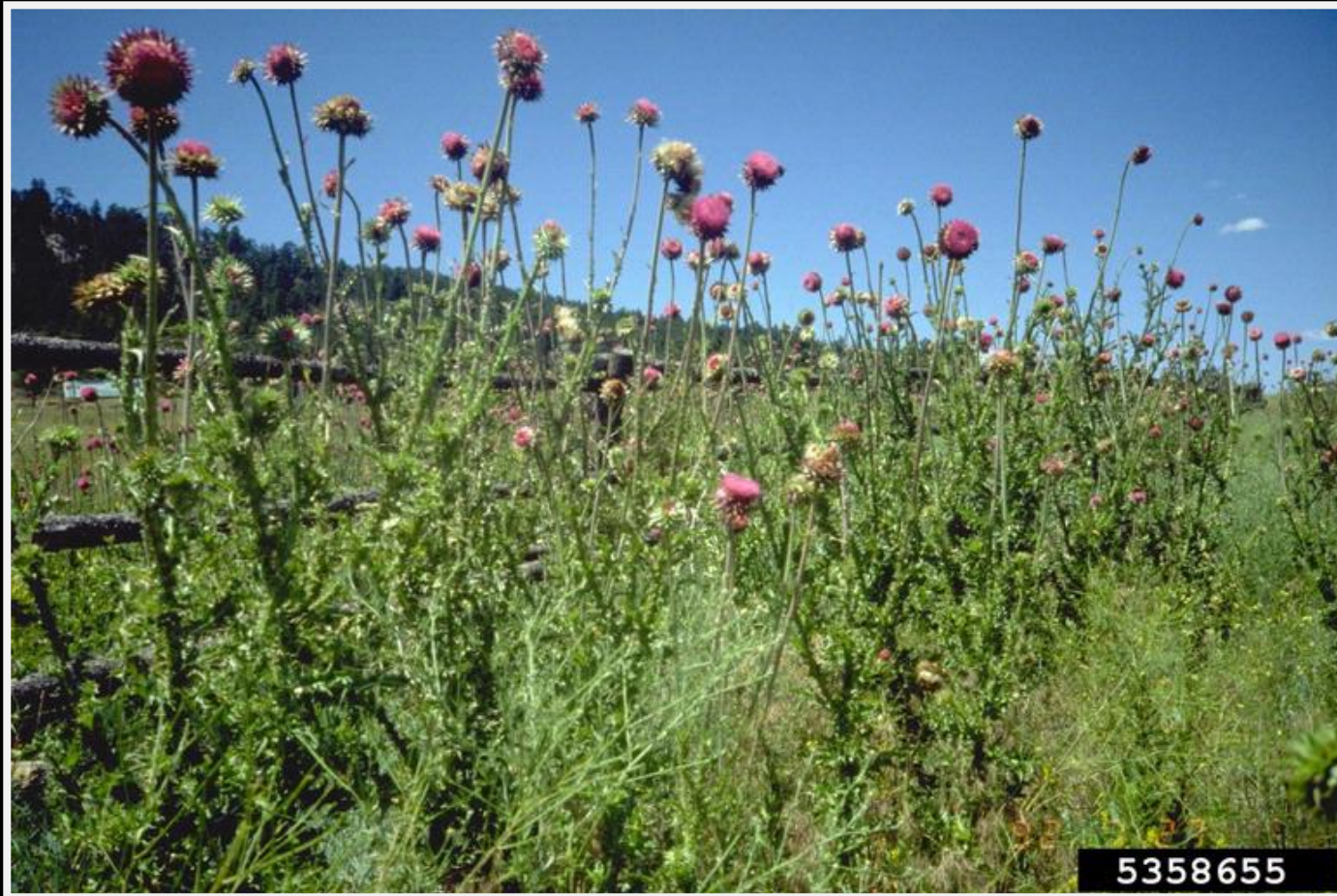


Photo Courtesy of: [L.L. Berry, Bugwood.org](https://bugwood.org)

University of California
Agriculture and Natural Resources

Canada Thistle



Flower heads

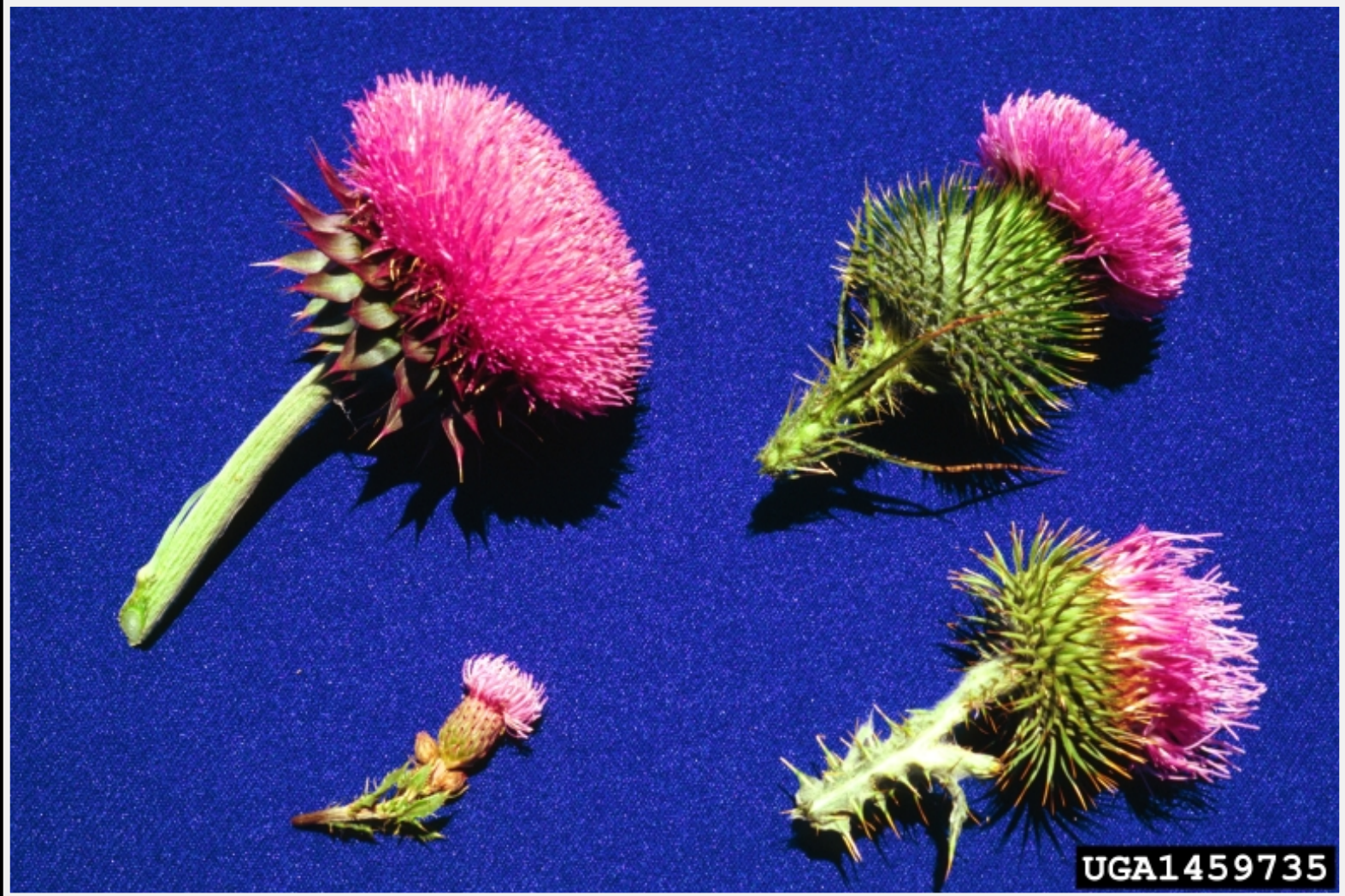


Photo Courtesy of: [Steve Dewey, Utah State University, Bugwood.org](http://Bugwood.org)

Identification

- Leaves and stems
Covered white
hairs
Bluish color
Cotton thistle
- Winged stems
- Large spines!



Photo courtesy of: [Leslie J. Mehrhoff, University of Connecticut, Bugwood.org](http://Leslie.J.Mehrhoff,UniversityofConnecticut,Bugwood.org)



Flowers

Flowers

- Purple
- 1-3 inches in diameter
- Solitary or clusters
- 70-100 per plant



Biology

- Biennial
 - *occasionally annual or short lived perennial
- Can germinate spring or fall
- Basal rosette
 - 1st year 5-12 inches diameter
 - 2nd year up to 4 feet diameter
- Bolt
 - Typically 3-8 feet tall



Seeds

- Seeds
 - Up to 20,000 per large plant
- Dormancy
 - 7-39 years
 - 80% innate dormancy



Dispersal

- Wind
 - Not particularly adapt to this
- Water
- Livestock
- Wildlife
- Humans
- Machinery



Scotch Thistle Control

- One goal - Eliminate seed production!



Cultural

- Prevention!



Cultural Control

- Prevention!
- Clean equipment
- Reduce disturbance
- Competitive pastures/rangelands
 - Suppress Scotch establishment
- Control before establishment/seed production!



Mechanical

- Sever plant below soil surface
 - Hand pulling
 - Tillage
 - Grubbing
 - Digging
- Mowing
 - Suppress



Photo courtesy of: [This old house.com](http://Thisoldhouse.com)

Bio control

- Successful control program in Australia
- Weevils
 - Lixus carduis*
 - Larinus latus*



Photo Courtesy of: Natureswonders.org

Bio control

What makes Australia different?

Australia

- No native thistles

North America

- We have lots of natives
- No biocontrol agents tested feed exclusively on Scotch
- Still looking



Photo Courtesy of: Natureswonders.org

Grazing

- Conflicting information?
- Goats
 - Will eat heads
 - Digest seeds
- Sheep
 - Will eat rosettes
- Both can have an impact
- Need to maintain grass!
- Cattle
 - Typically avoid grazing Scotch



Timing Chemical Control

- Smaller plants=better control
- Rosettes
 - Fall or Spring
- Bolting plants
 - Harder to control
 - Higher herbicide rates
 - Sometimes ineffective
- Flowering plants
 - May still set seed!



Use a
Surfactant!



- Typically a Non Ionic Surfactant
- Read the label!

Milestone (Aminopyralid)

- 5-7 oz per acre
- \$15-\$21 per acre
- Apply to rosettes and young bolting stage
- Has post and pre-emergence activity
- Safe on established grasses



Transline (Clopyralid)

- 2/3 pints to 1 1/3 pints per acre
- \$17 to \$33 per acre
- Apply to rosettes and young bolting plants
- Not as long of residual as Milestone
- Safe on established grasses



Telar (Chlorsulfuron)

- 1 to 2.6 oz per acre
- \$19-\$49 per acre
- Apply from rosette to flower bud stage
- Post and pre-activity
- Safe on established grasses
- Not safe for reseeding



2,4-D

- 1-2 quarts per acre
- \$6-\$12 per acre
- Apply to rosettes and young bolting plants
- No pre-emergence activity
- Safe on grasses
- Ester and Amine formulations
- Can be tank mixed with Banvel, Milestone, and Telar-Quicker burndown



Banvel (Dicamba)

- ½ to 2 pints per acre
- \$5-\$20 per acre
- Typically tank mixed with 2,4-D
- Apply to rosette to young bolting stage
- Safe on grasses
- Only post activity

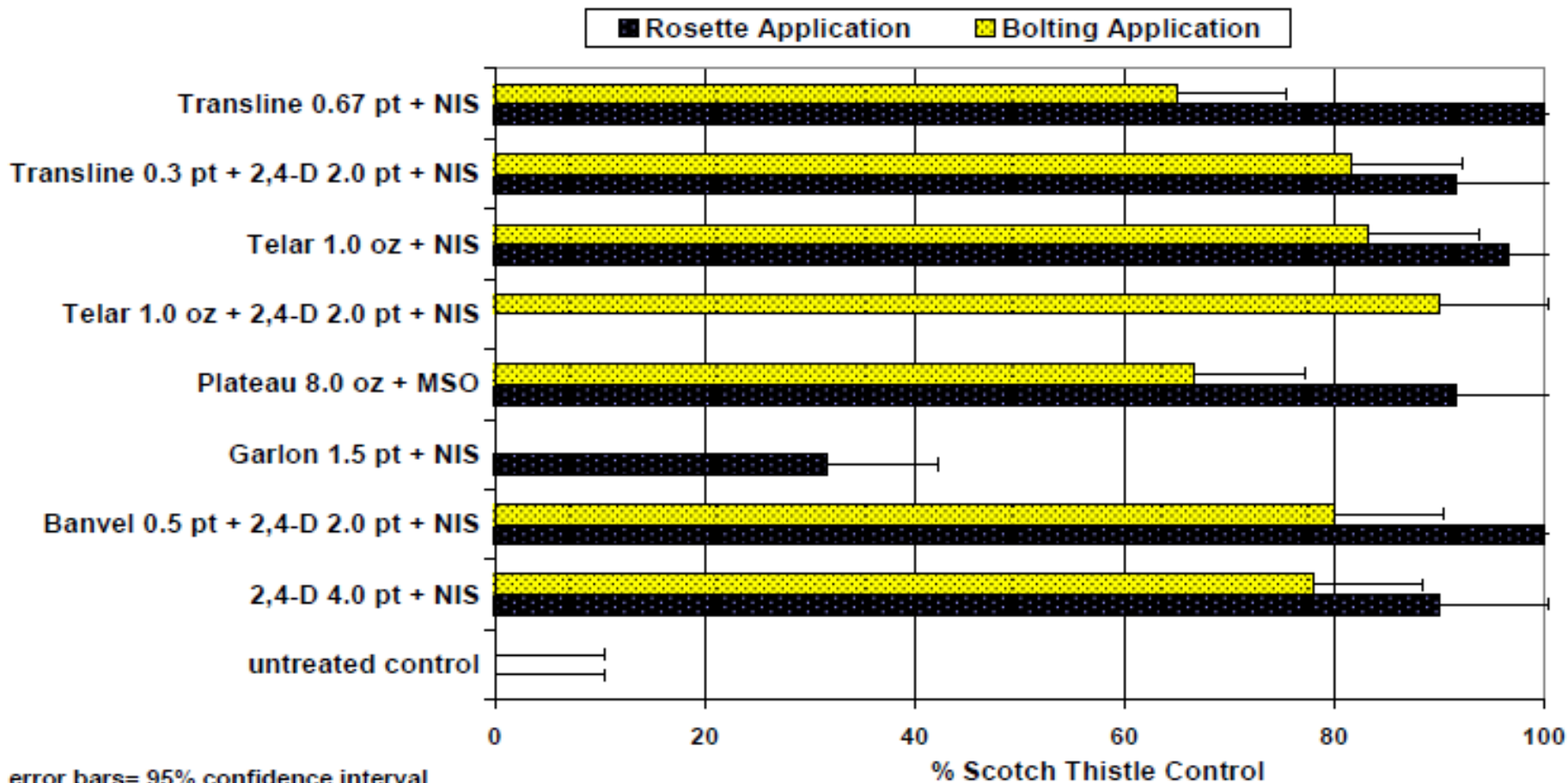


Rob Wilson- 2004

- Scotch thistle trial
- Rosette and bolting treatments
- Various herbicides

Rob Wilson- 2004

Figure 2. The Effect of Herbicides Applied in Spring 2004 at the Rosette or Bolting Stage on Scotch Thistle Control August 2004



error bars= 95% confidence interval

NIS= non-ionic surfactant at 0.25% V/V; MSO= methylated seed oil at 1.0 qt/A

Rates are listed as Product Rate per Acre

DiTomaso, Kyser, and Wilson 2007

- Rosette and Bolting Stage
 - Milestone
 - Milestone + 2,4-D
 - Telar
 - Telar + 2,4-D
 - Banvel + 2,4-D
 - Transline

DiTomaso, Kyser, and Wilson 2007

- Rosette Stage
 - All treatments gave 95-100% control
 - Foliage and Seedheads

DiTomaso, Kyser, and Wilson 2007

- Bolting Stage
 - Milestone and Transline
Not effective (30-50% control)
 - Telar alone (1 oz)
88% control of seedheads
 - Telar (1 oz) + 2,4-D (1 quart)
90% control foliage
95% control seedheads
 - Dicamba (8 oz) + 2,4-D (1 quart)
87% control foliage
90% control seedheads
- No Treatments gave 100% control

Hard Species to Manage

- Joe Moreo and Craig Hemphill
Agricultural Commissioners in Lassen and Modoc
Treating same areas for years and years
Lots of money goes into spraying year after year
- Need multiyear control

Scotch Thistle Trial (South of Doyle)

- Fall
Rosettes
- Spring
Rosettes

Objective

- Investigate
 - Fall vs Spring Applications
 - Literature
 - Both effective
 - Various Herbicides
 - Method (aminocyclopyrachlor)





Applications

- Old skeltons knocked over
 - Bull dozer lifted blade
- Plots
 - Four replications
 - 10*20 Feet
- Fall Treatments
 - October 22, 2016
 - 62 Degrees
 - Rosettes 3-12 inches
 - Much left to germinate







Applications

- Spring treatments
 - May 2, 2017
 - 59 Degrees
 - Rosettes 4-22 inches in diameter







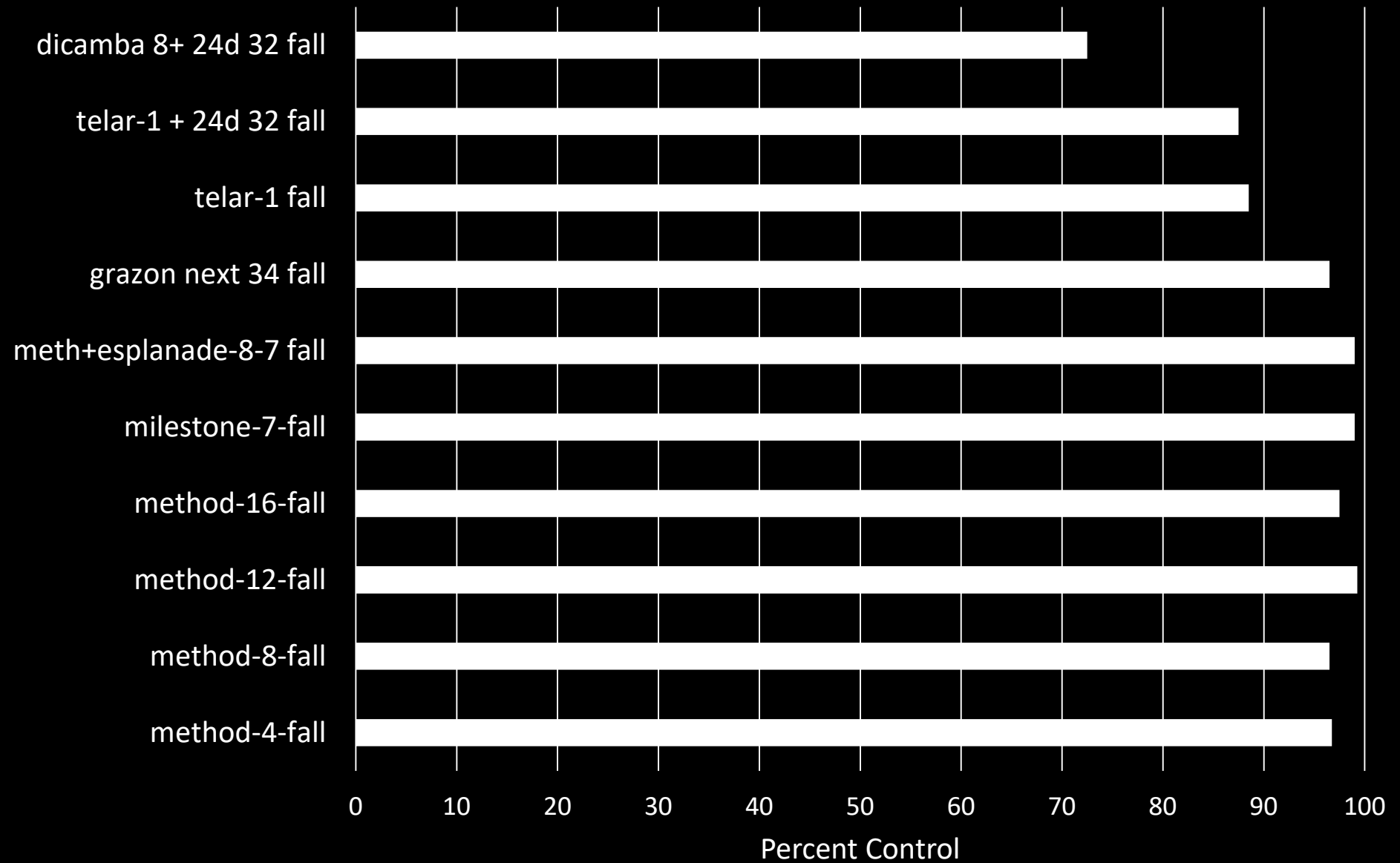


Assessments 2017

- March, June, July, August and October
- Thistle control
- Percent cover

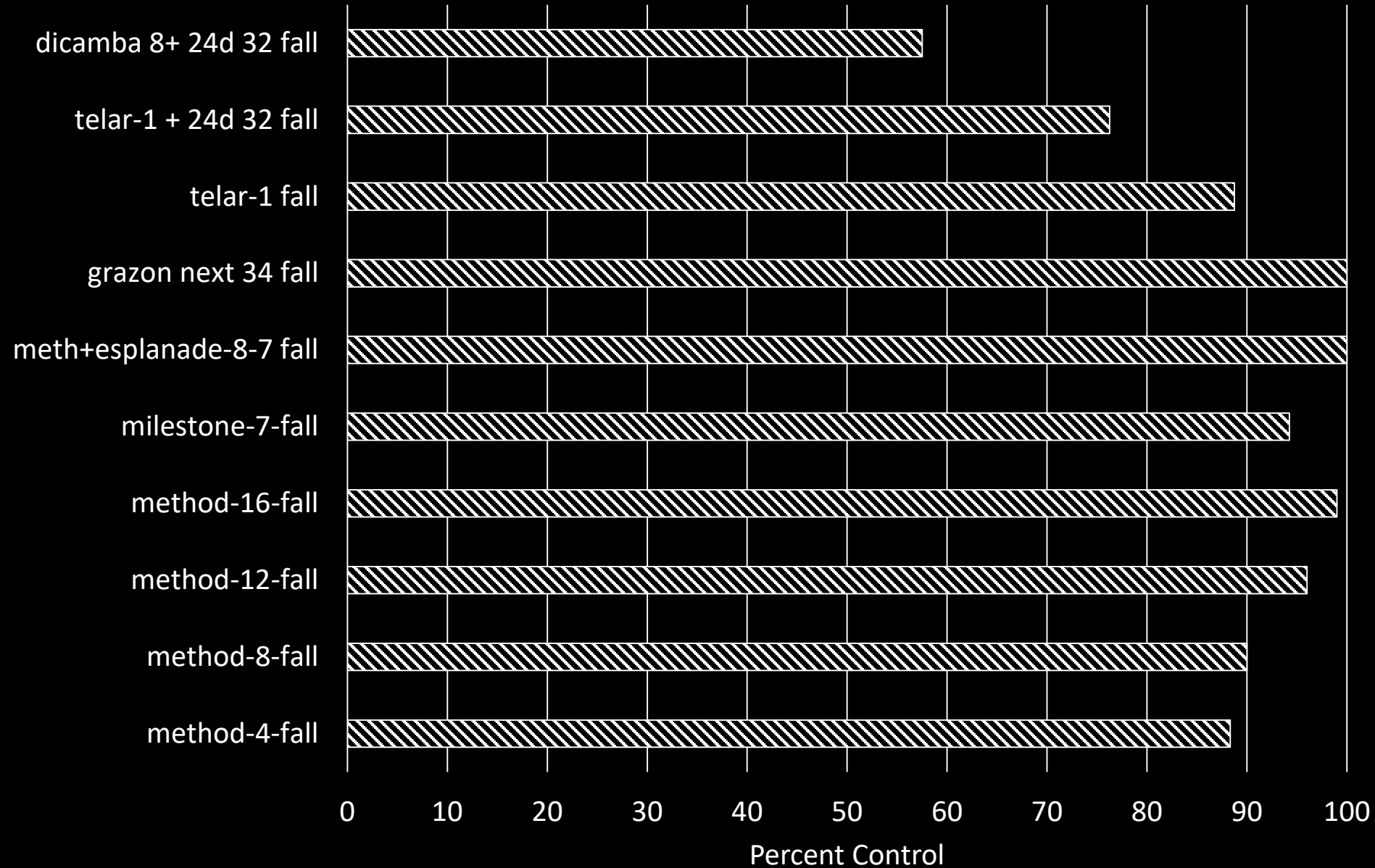
Fall Treatments

■ March



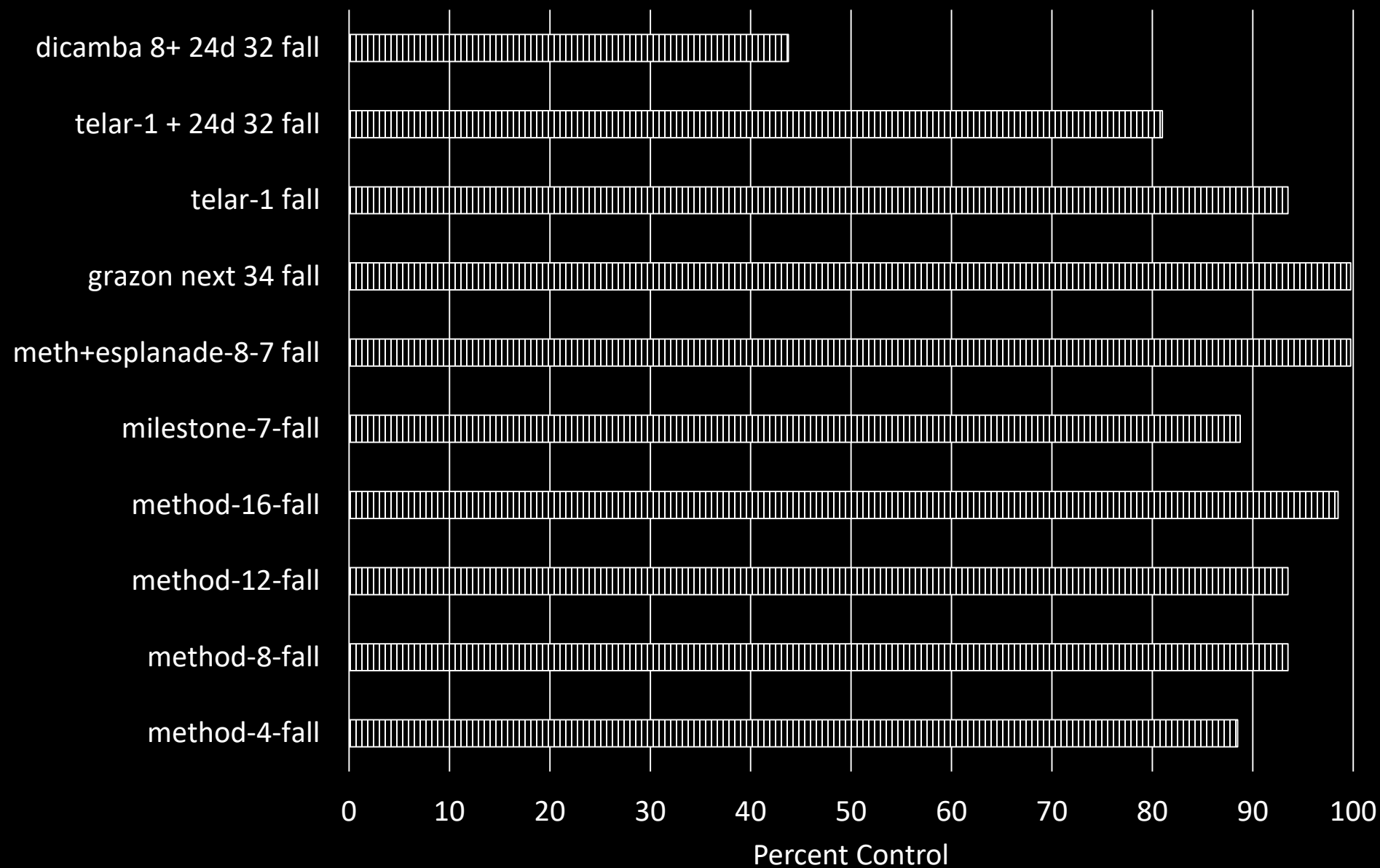
Fall Treatments

▨ July



Fall Treatments

▣ October



Untreated Control - July



Milestone Fall - July



Telar Fall - July

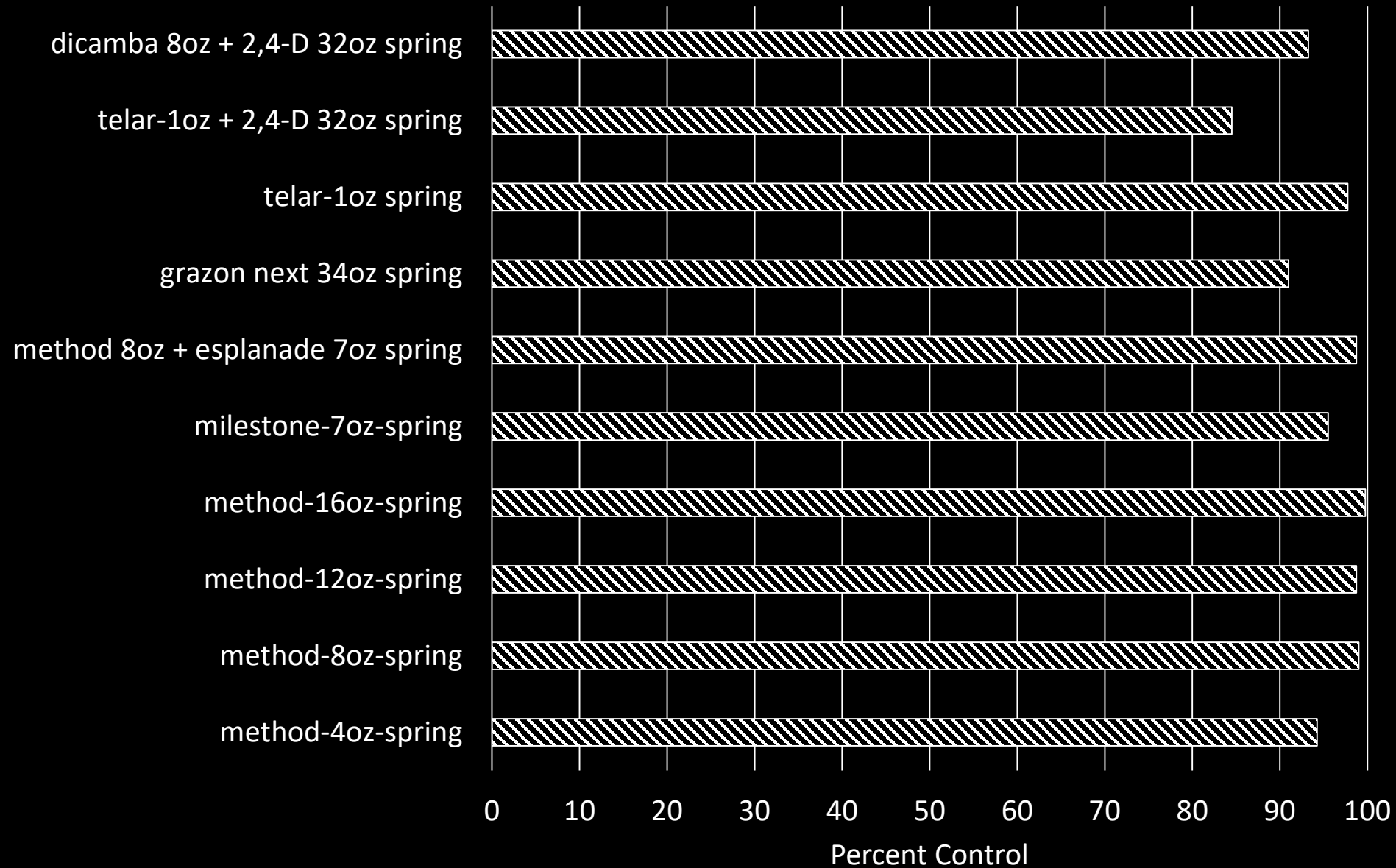


Method - 8 oz July



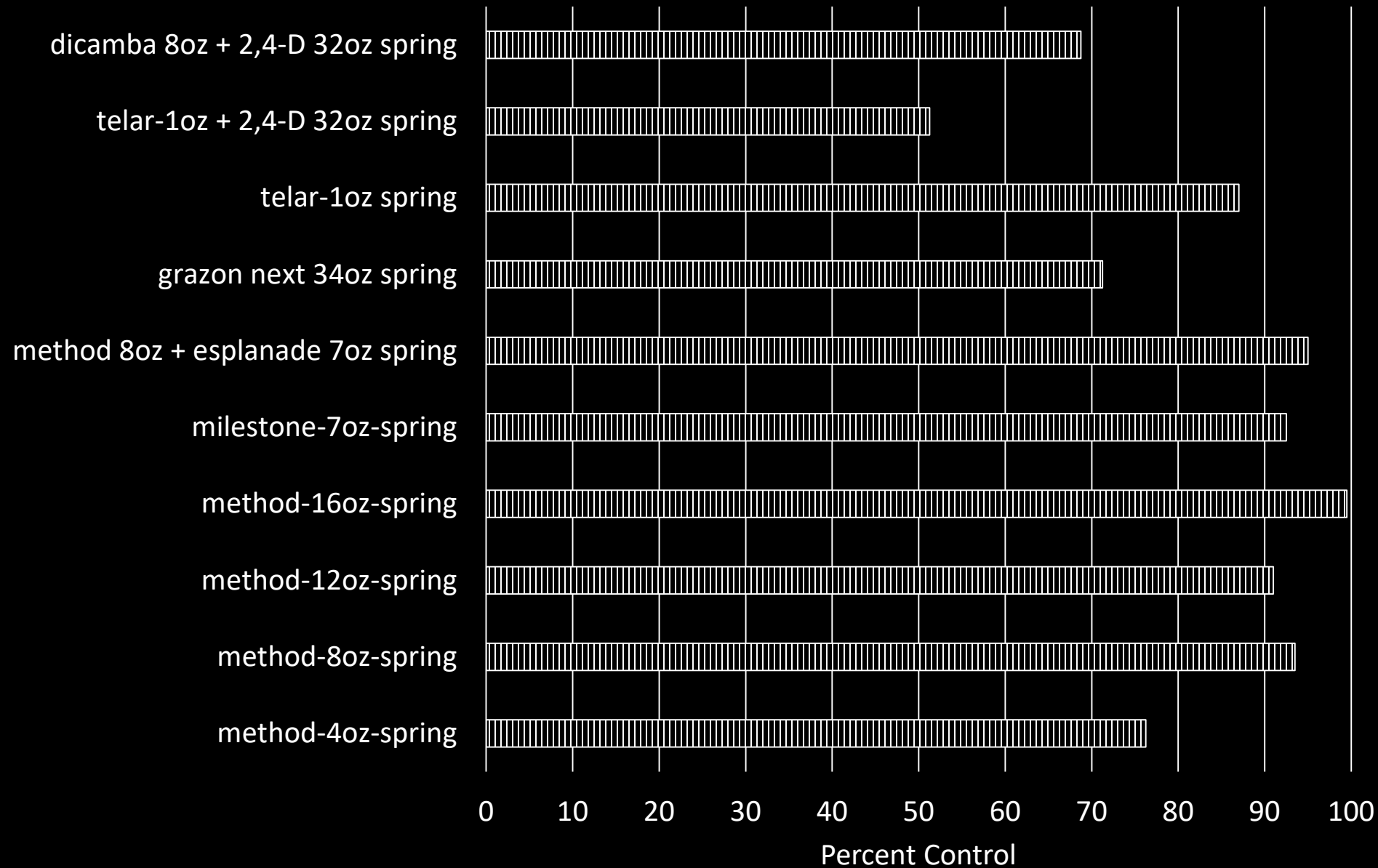
Spring Treatments

▨ July



Spring Treatments

October



Telar+ 2,4-D-June



Milestone 7 oz Spring - June



Method 8 oz Spring - June



Untreated - June



GrazonNext Spring - July



GrazonNext Spring - July



Method 8 oz Spring - July



Dicamba 2,4-D Spring - July



Telar+ 2,4-D Spring - July



Telar+ 2,4-D Spring - July



Untreated - July



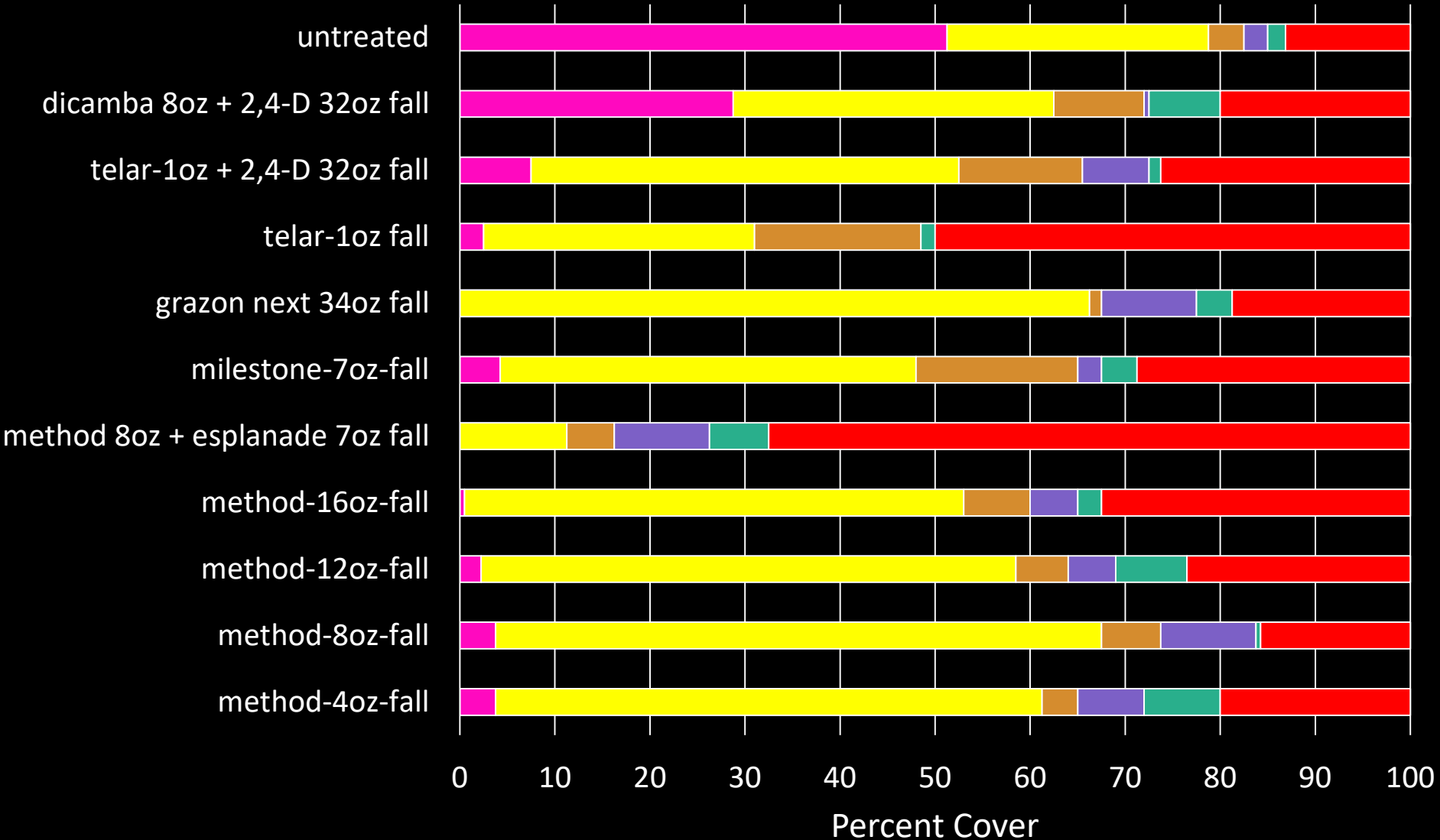
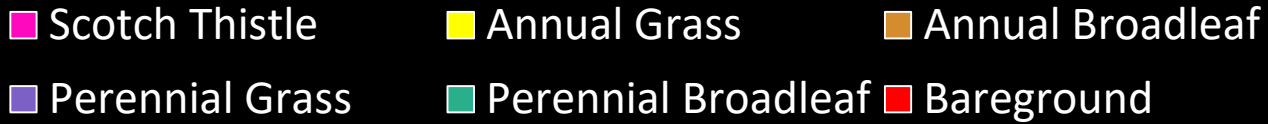
Telar+2,4-D Spring - October



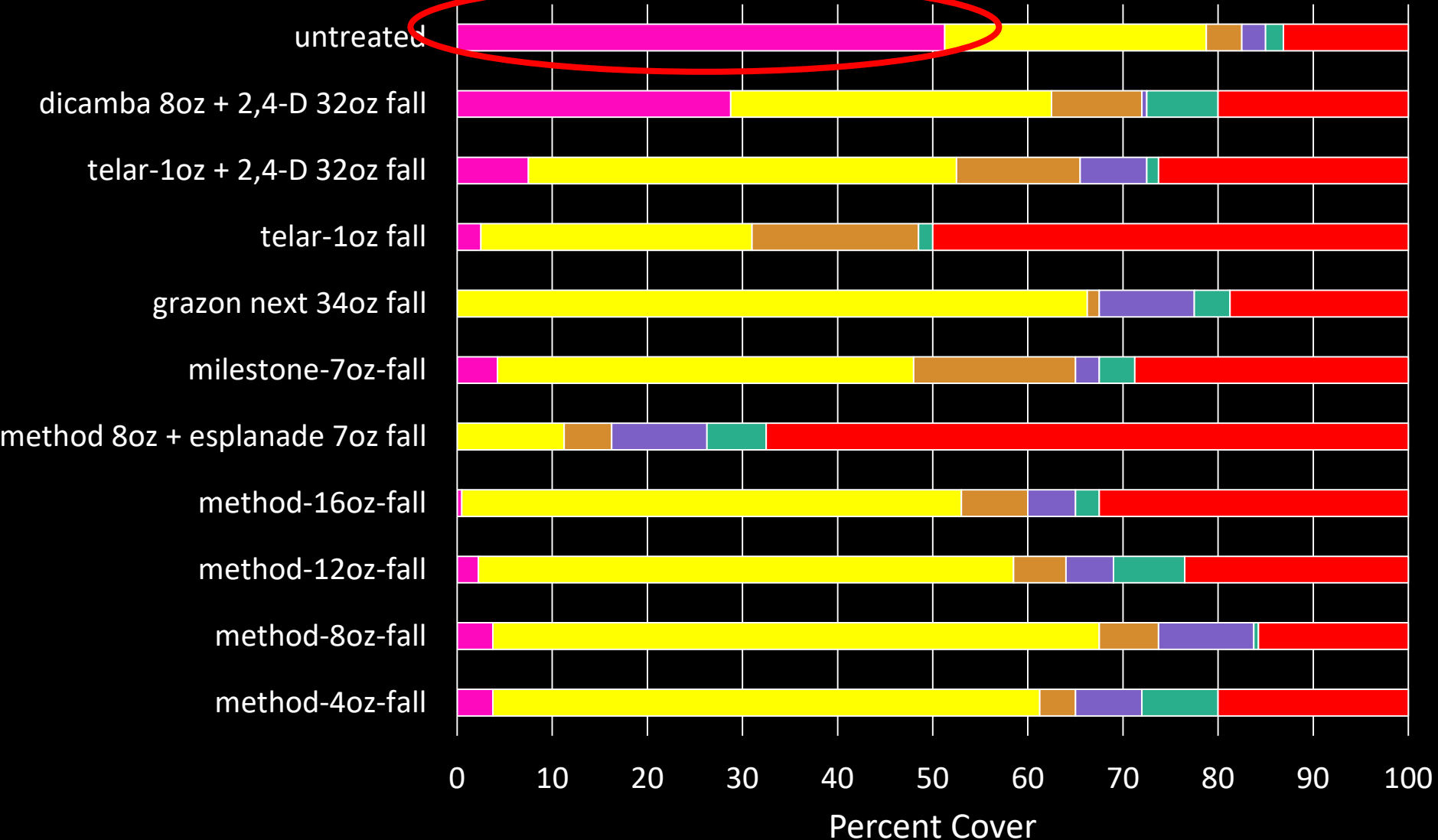
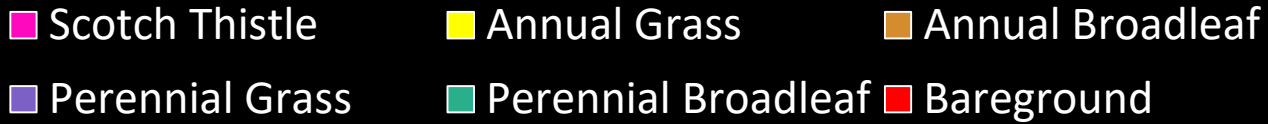
Untreated - October



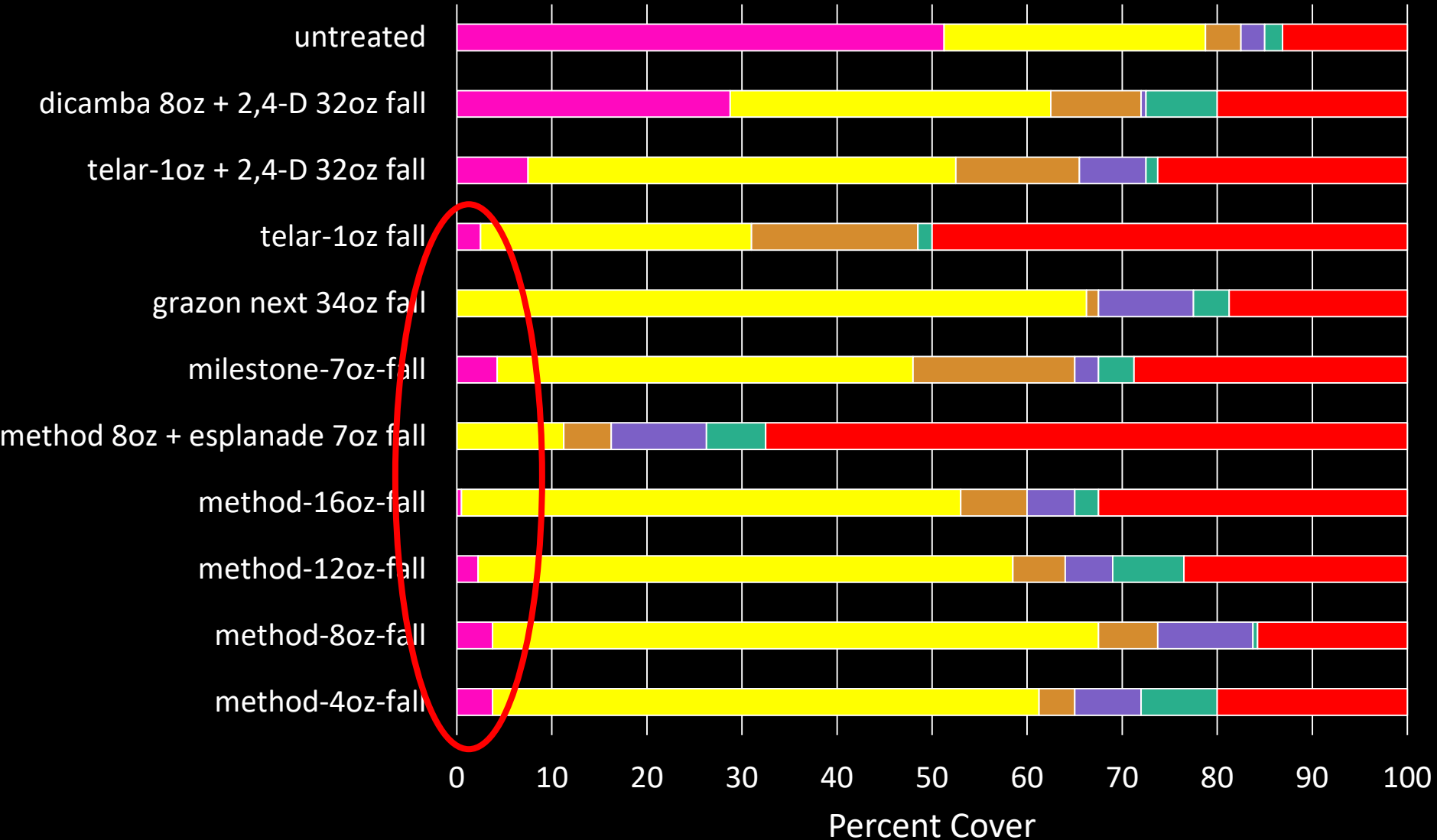
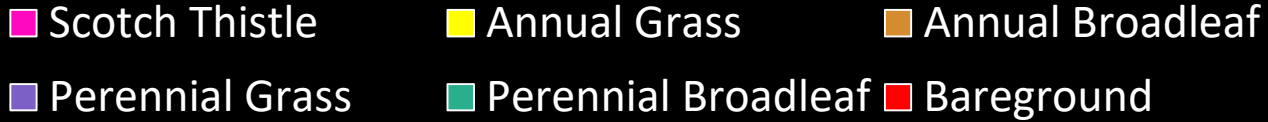
Fall Treatments October 2017 Species Cover



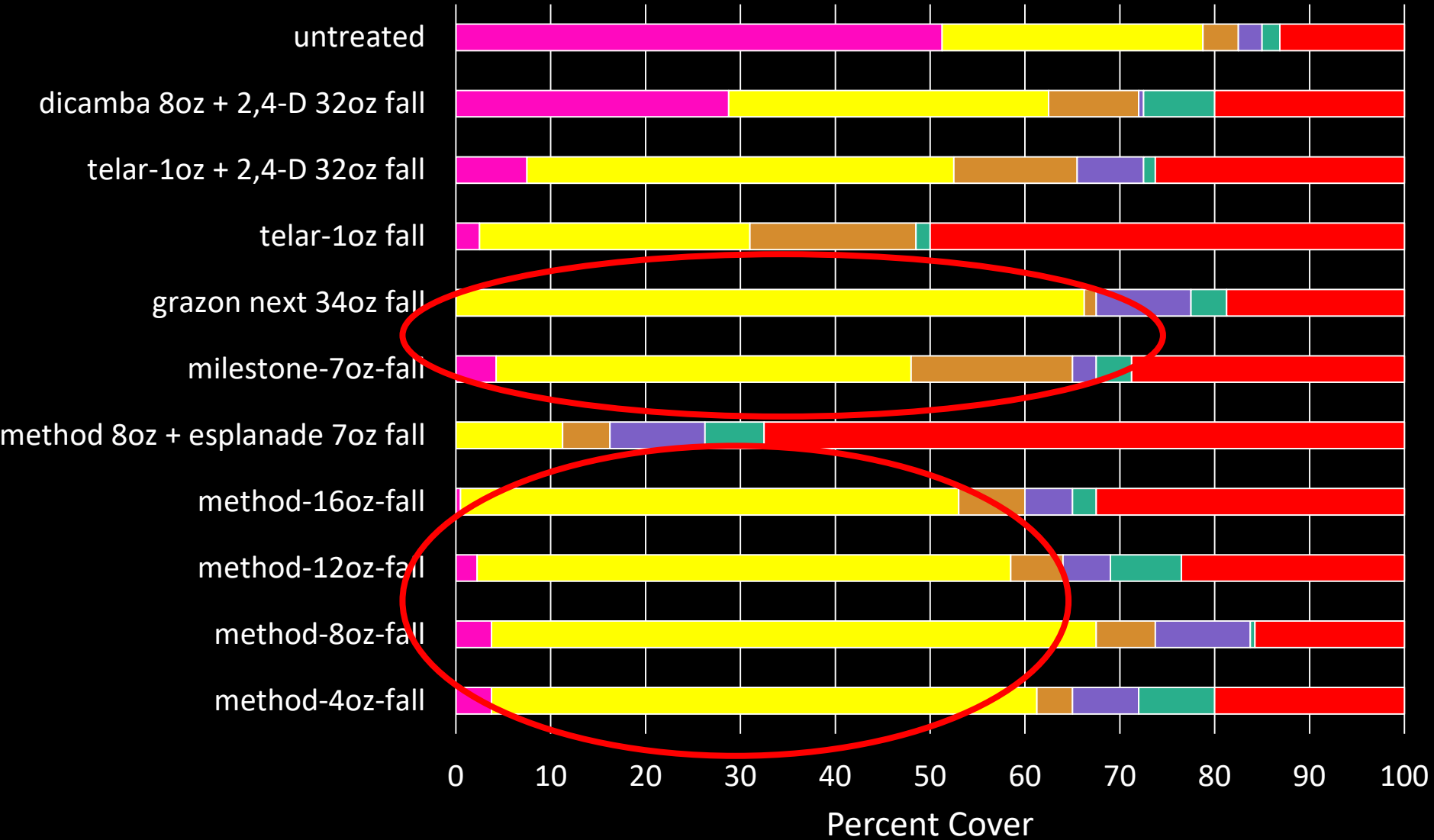
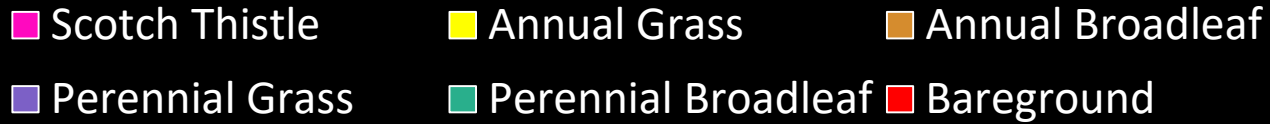
Fall Treatments October 2017 Species Cover



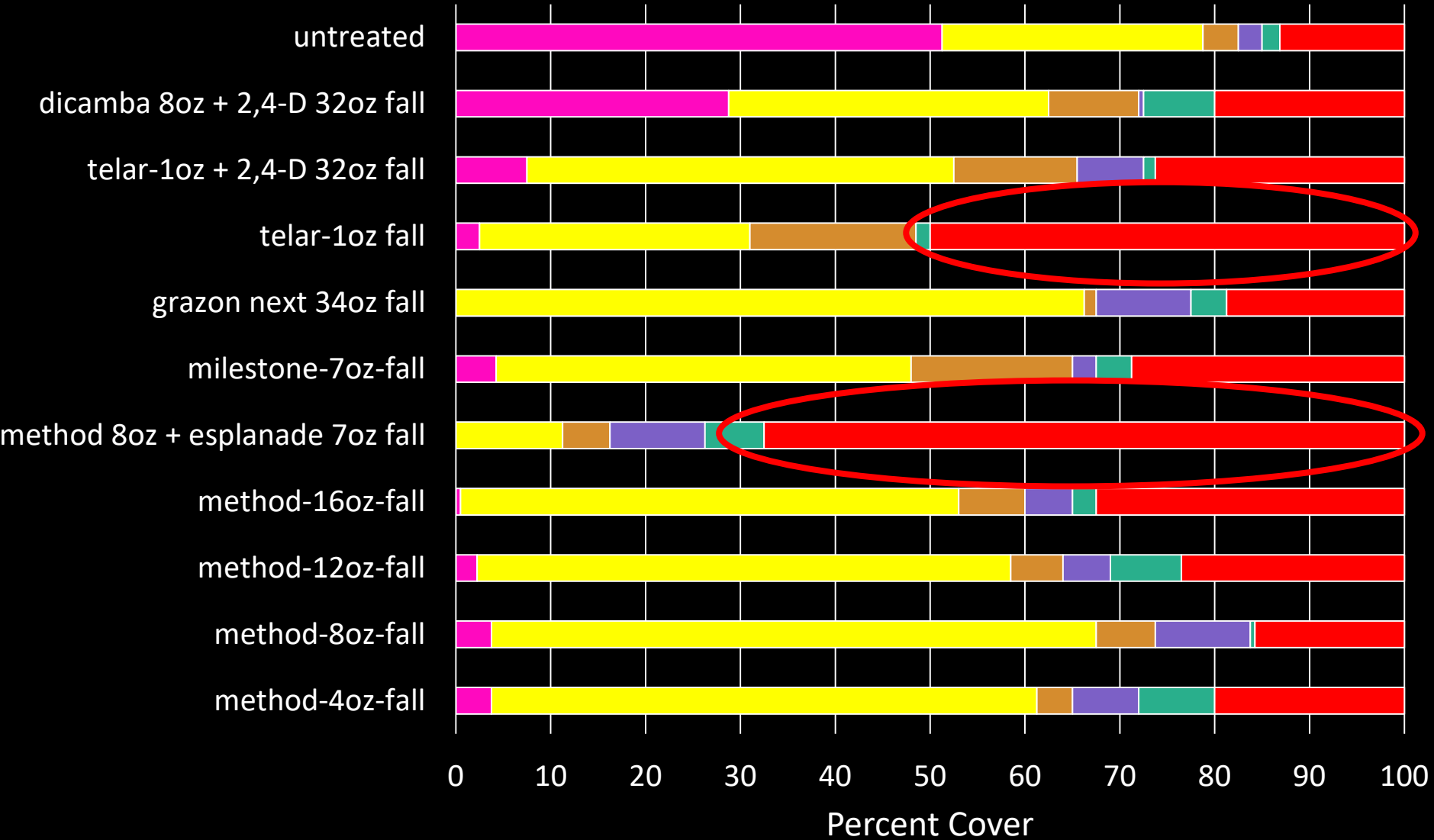
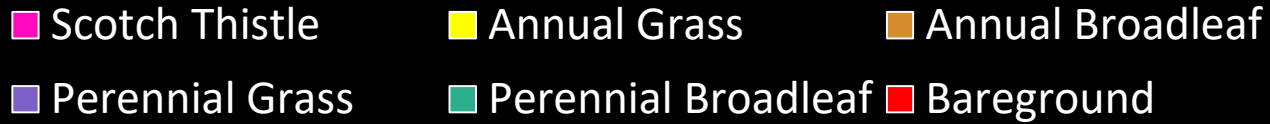
Fall Treatments October 2017 Species Cover



Fall Treatments October 2017 Species Cover



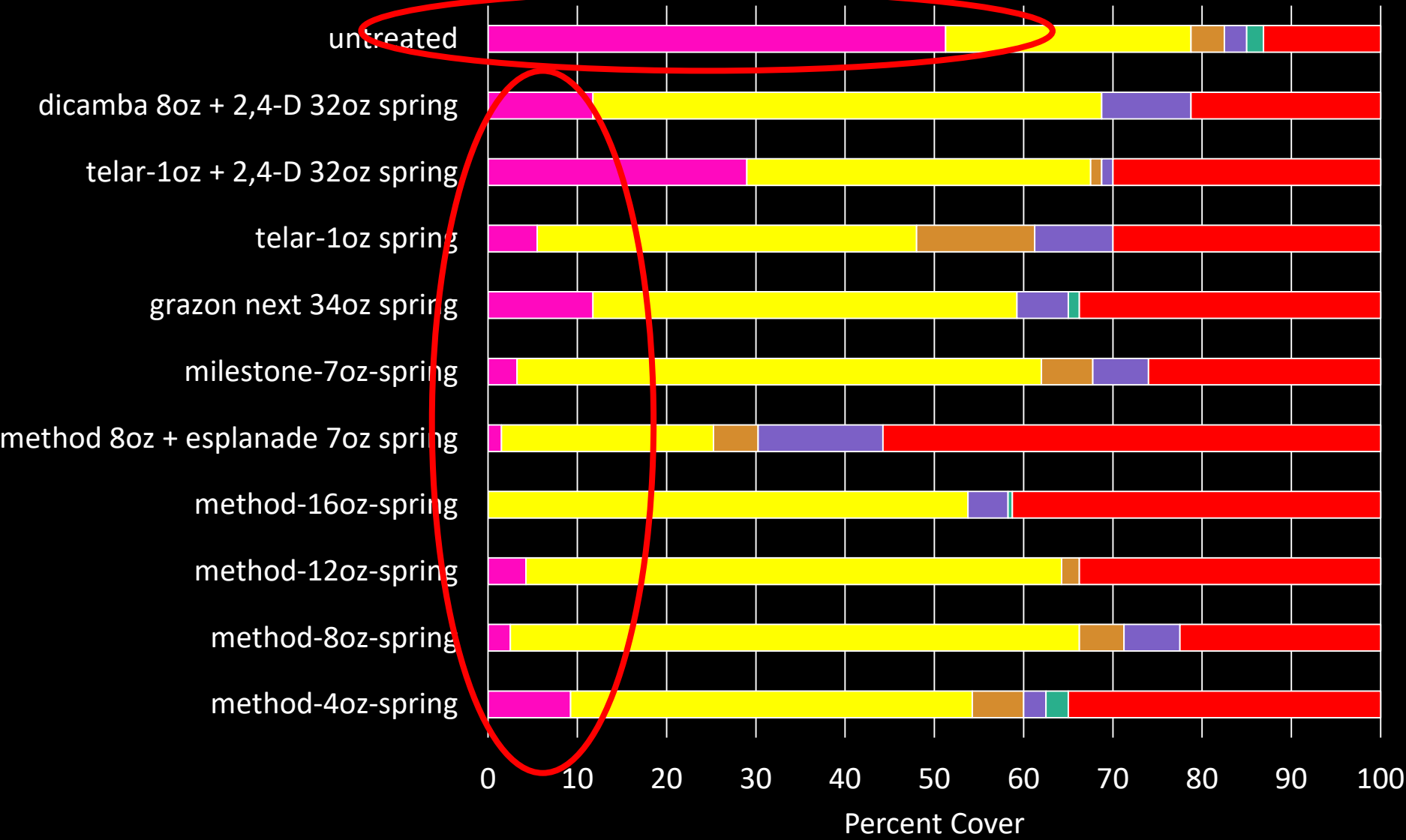
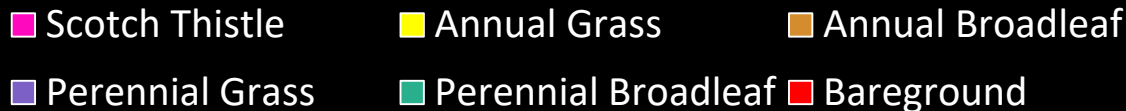
Fall Treatments October 2017 Species Cover



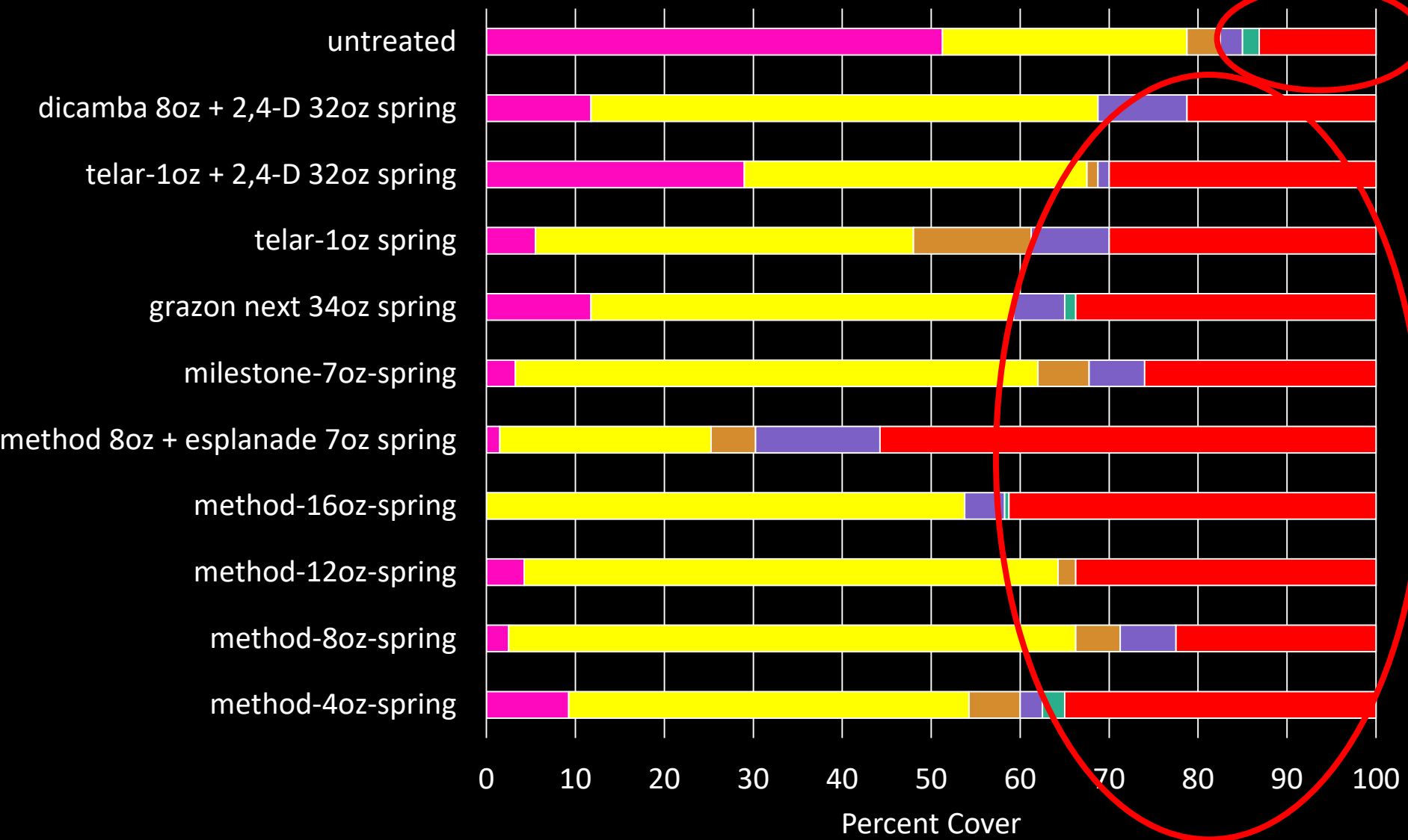
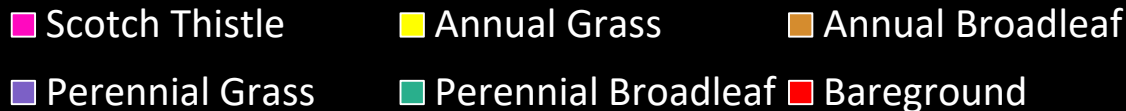




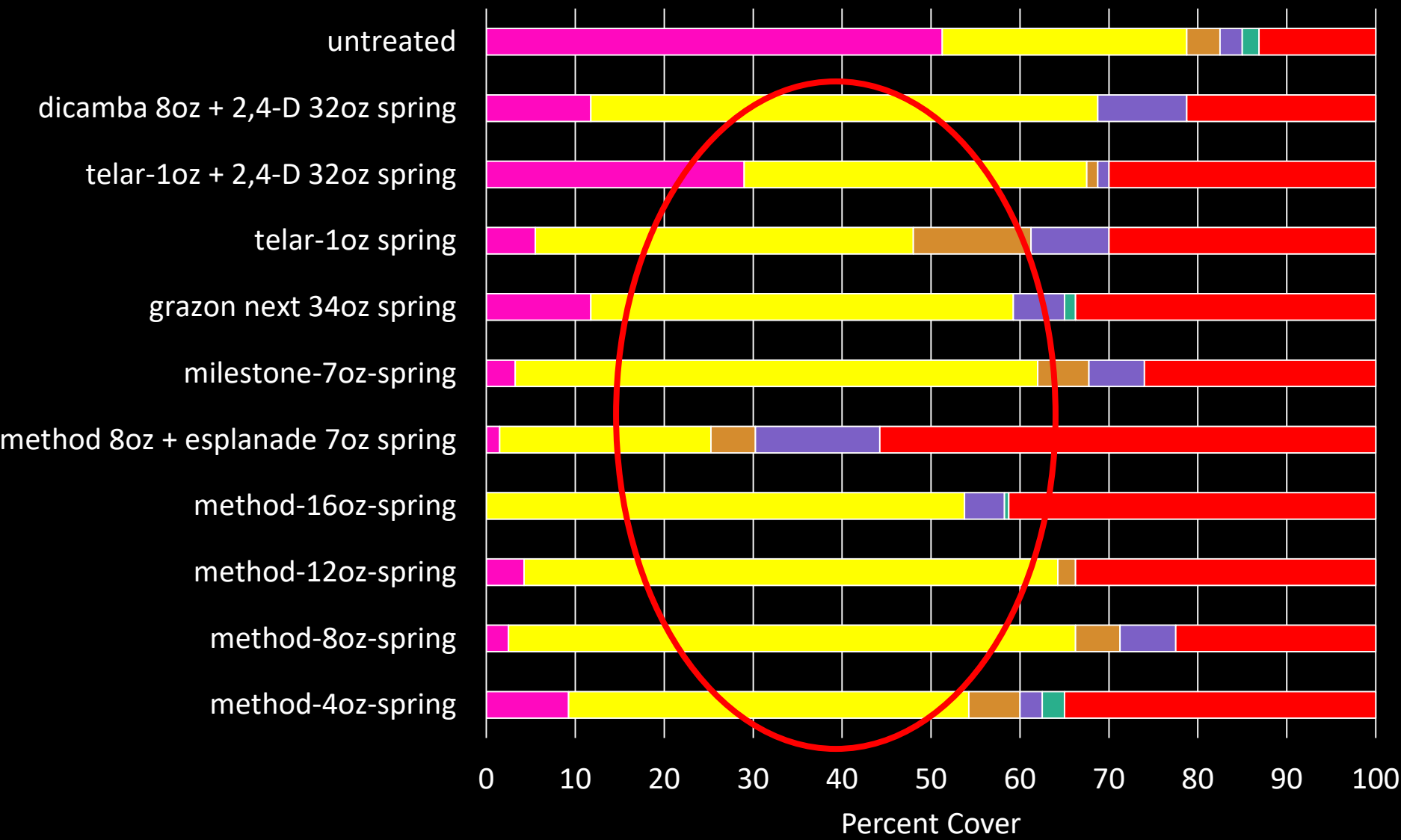
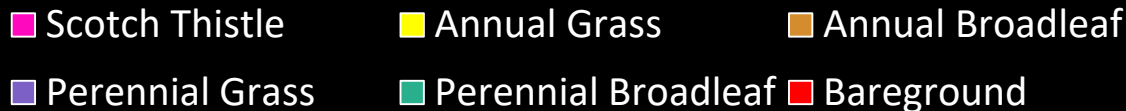
Spring Treatments October 2017 Species Cover



Spring Treatments October 2017 Species Cover



Spring Treatments October 2017 Species Cover





Summary

- Scotch Thistle
 - Fall applications of soil residual herbicides slightly more effective than spring applications
 - Many treatments had individual plants survive application
 - Require follow up before seed set!
 - This was replaced by bare ground, annual grasses, and perennial grasses
 - More perennial broadleaf plants were present in fall applications

Questions

