

Winter 1-2021

2021 Update Mtg: Herbicide Research Update

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Herbicide Research Update

KATIE GHANTOUS AND HILARY SANDLER

UMASS CRANBERRY STATION
EAST WAREHAM, MA

Shifting weed populations

- ▶ Gaps from newer herbicides
 - Control of previously widespread weed creates room for new players to move into
- ▶ Changes in management
 - Water use
 - Nutrients
- ▶ Changes in climate





Moss Species



Haircap
(*Polytrichum commune*)



Sphagnum
(Multiple *Sphagnum* spp.)

Most common and “weedy” mosses in MA
cranberry

Moss Species – lots of diversity!

2017 survey of single cranberry bed at State Bog

- at least three additional moss species present



*Aulacomnium
palustre*
(Bog groove-moss)



*Ceratodon
purpureus*



Entodon seductrix

Moss Species – lots of diversity!

2018 survey of 2nd cranberry bed at State Bog

- at least four additional moss species identified



Atrichum crispum

<http://northernforestatlas.org>



*Callicladium
haldanianum*



Ditrichum pallidum

<http://bryophytes.plant.siu.edu>, Li Zhang



Pohlia nutans

<http://northernforestatlas.org>

Haircap moss – widespread and weedy







Documenting Haircap Moss Weed Impact

Is it just cosmetic?

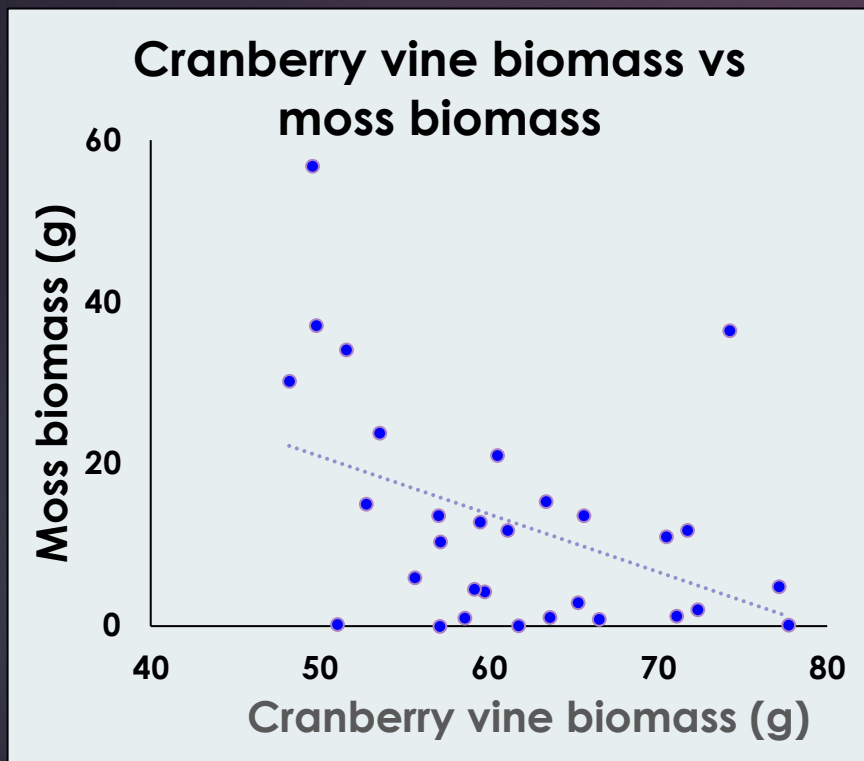
Two beds of 'Stevens' were sampled

- ▶ 15 1-ft² squares - clipped all plant material to the soil level
- ▶ Fruit sorted, counted, and weighted
- ▶ Cranberry tissue dried and weighed
- ▶ Moss tissue dried and weighed

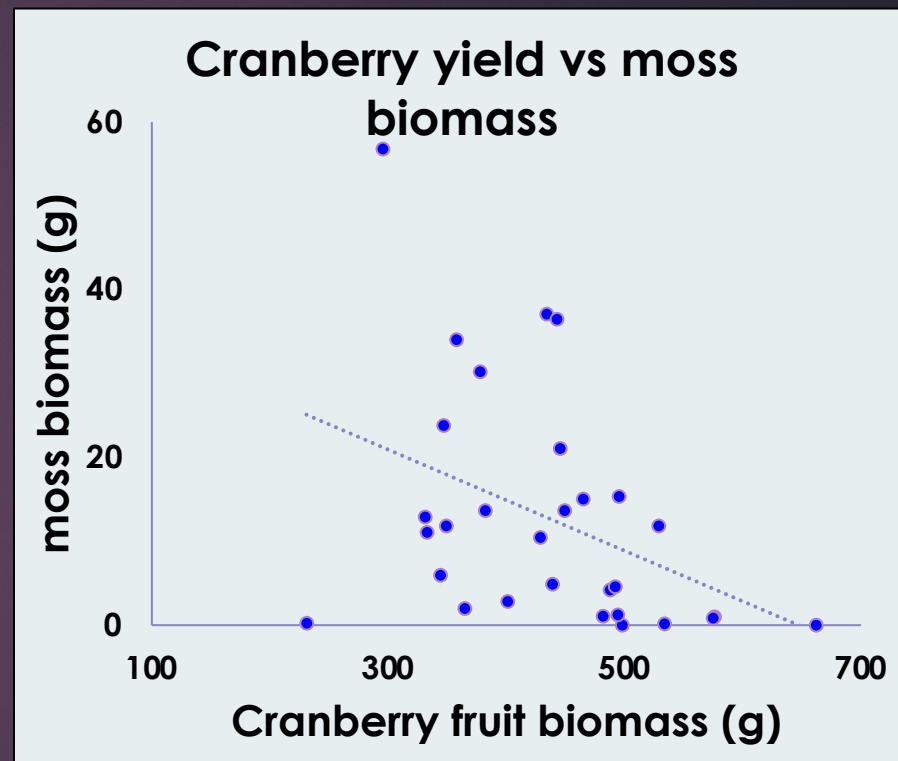


Documenting Impact of Haircap Moss

Direct competition between moss and cranberry



Cranberry biomass negatively correlated with moss biomass
(Pearson Correlation Coefficient -0.43)



Weight of sellable fruit negatively correlated with moss biomass
(Pearson Correlation Coefficients -0.40)

It IS a problem, now what do we do?

- Moss in turf & ornamentals, not common in food crops
- Not many food-use herbicides for moss
- Non-vascular plant – different than all of our other weeds
- Doesn't respond same way to herbicides

Registered cranberry herbicides provide little/no control!

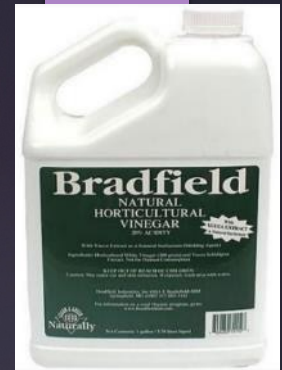
- ▶ Casoron (dichlobenil)
- ▶ Evital (norflurazon)
- ▶ Devrinol 2-XT (napropamide)
- ▶ QuinStar (quinclorac)
- ▶ Callisto (mesotrione)



Screened lots of other products over the years

Horticultural Vinegar (acetic acid)

- ▶ Injurious to cranberry
- ▶ Moss recovers, needs multiple apps



Herbicidal soap (22% Ammoniated Soap of Fatty Acids)

- ▶ Injurious to cranberry

Moss-aside (22% potassium salts of fatty acids)

Safe on cranberry but....

- ▶ Moss recovers, needs multiple apps
- ▶ Very cost prohibitive
- ▶ Would need hundreds of gallons (1:9 dilution)



Ferrous sulfate

Historical
recommendation

It works BUT...

- Not registered as a pesticide in cranberry
- Difficult to apply, not practical for treating large areas (acres of moss)
- May require multiple applications yearly



Screening identifies two promising herbicides

Preemergence (applied before cranberry bud-break)

- ▶ Registered in other food crops
- ▶ Effective for moss
- ▶ Safe on cranberry (if applied correctly)

Crop Safety Study

1-m² plots, var. Stevens, 4 reps

▶ A 4 oz

▶ A 6 oz

▶ B 8 oz

▶ B 12 oz

Early

Applied to
simulate
chemigation
400 GPA

▶ A 4 oz

▶ A 6 oz

▶ B 8 oz

▶ B 12 oz

Late

▶ Untreated



“early” = spring dormant/tight buds 4/17

“late” = cabbage head, buds swelling/scales loosening 5/7

Visual Evaluations

Cranberry and moss were visually evaluated

- ▶ Apps at later timing (5/7) showed some visual symptoms of cranberry stunting on the 25 June evaluation
- ▶ Plants grew out of these symptoms; no visual cranberry differences between treatments on final evaluation.
- ▶ All treatments injured moss compared to control

Stunting from later timing

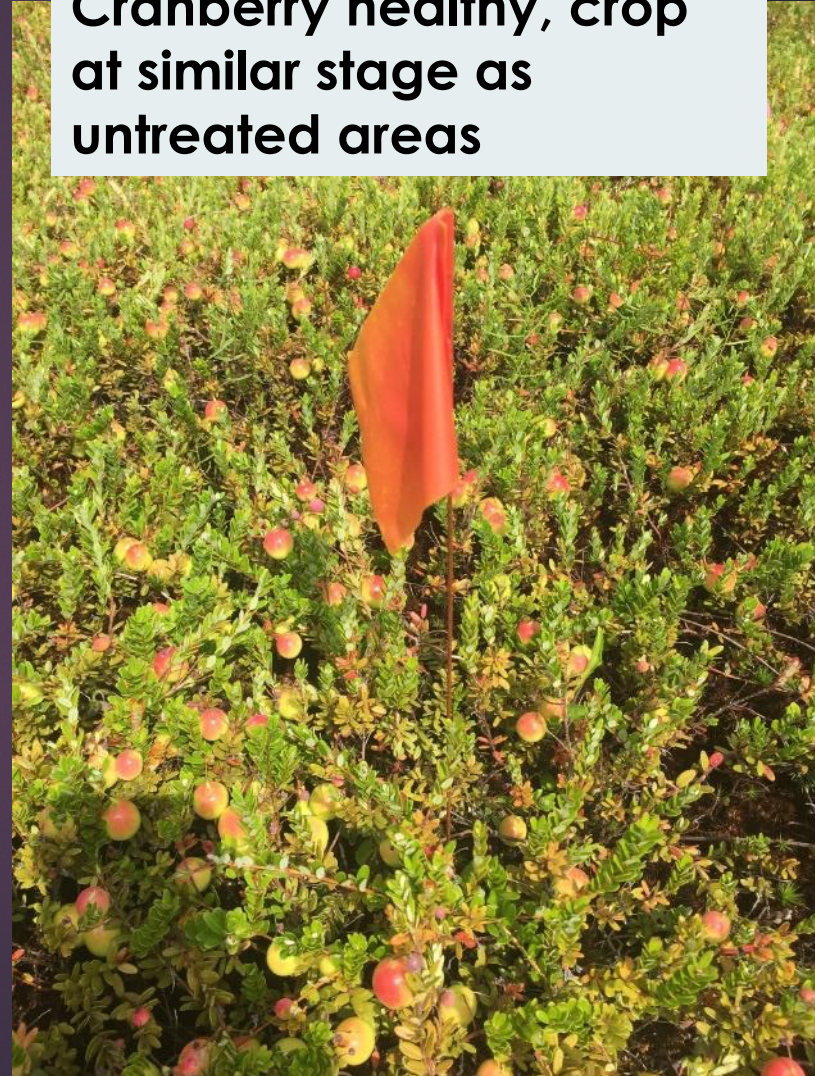
June 6

Cranberry tips red, not as developed as untreated areas



August 23

Cranberry healthy, crop at similar stage as untreated areas





Untreated

Moss injured by all
treatments

photos 8/23

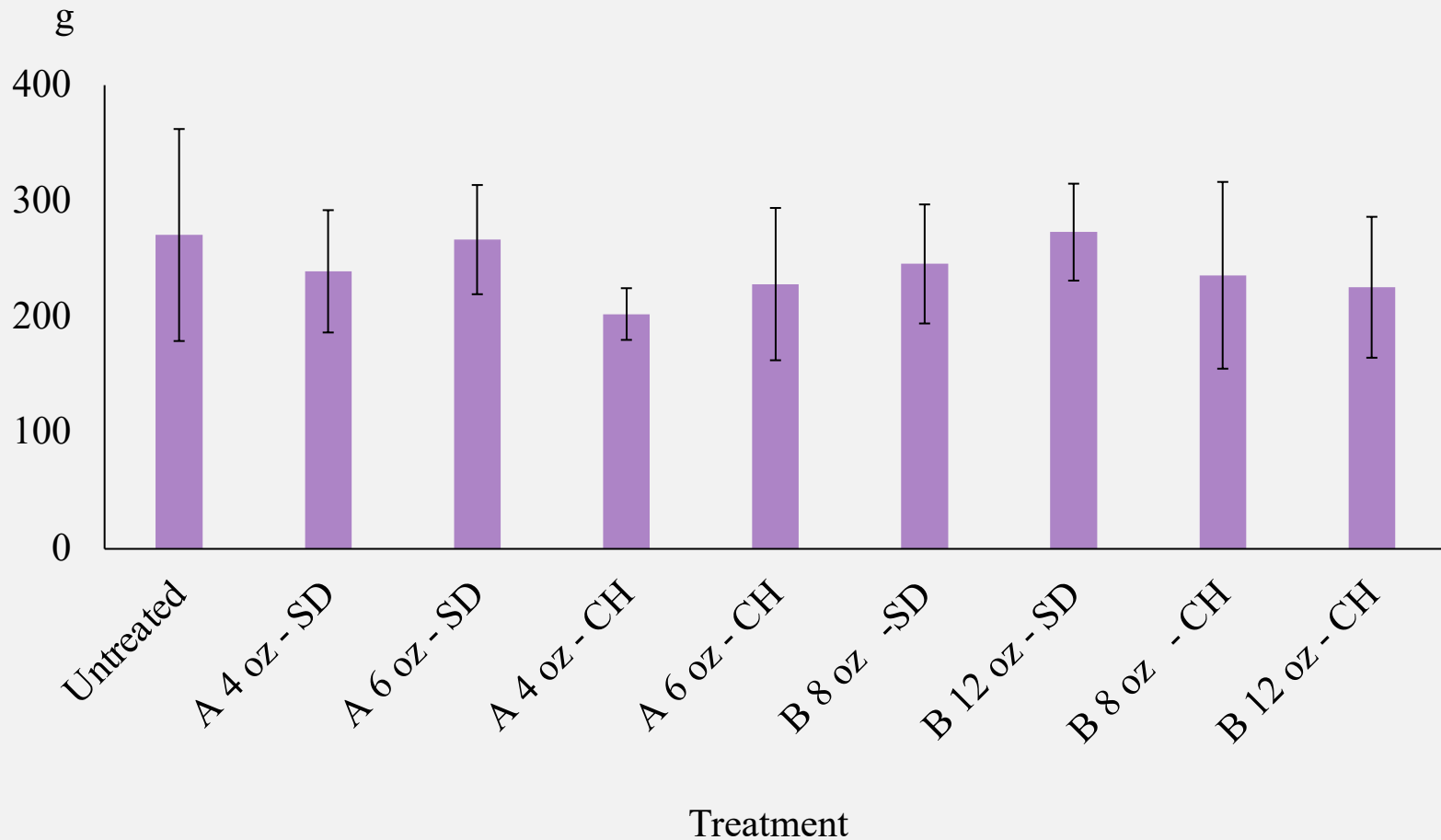


B 12 oz - SD



A 6 oz - SD

Weight of Sellable Fruit



Cranberry fruit collected September 20, 2018
Fruit was sorted, counted and weighed

* Treatments not statistically different from untreated $p \leq 0.05$

Conclusions

- ▶ Both herbicides demonstrated:
 - ▶ good crop safety
 - ▶ efficacy against moss
- ▶ Also have shown efficacy for other cranberry weeds like dodder.
- ▶ Both are registered for use in other food crops
 - ▶ IR-4 completed for one (slow road)
 - ▶ Possible label for other in the works!

Herbicide Tolerances of Large-fruited Varieties

Year 3 of Treatment

- ▶ Crop safety is based on older varieties
- ▶ There may be differences in varietal response

Four hybrid / large-fruited varieties tested

- Crimson Queen
- Demoranville
- Mullica Queen
- Stevens



| | Treatment | Rate | Active Ingredient |
|----------|---------------------------------|-------------|--------------------------|
| 1 | Untreated | N/A | N/A |
| 2 | Callisto - Conc. Spot 2x | 1 oz/gallon | mesotrione |
| 3 | Callisto - Chem 2x | 8 oz/A | mesotrione |
| 4 | Casoron | 60 lbs/A | dichlobenil |
| 5 | Devrinol | 18 qt/A | napropamide |
| 6 | QuinStar - Chem 2x | 8.4 oz/A | quinclorac |
| 7 | Intensity One | 16 oz/A | clethodim |
| 8 | Evital (Fall) – 2016 | 80 lbs/A | norflurazon |
| 9 | Evital (Spring) - 2017 | 80 lbs/A | norflurazon |

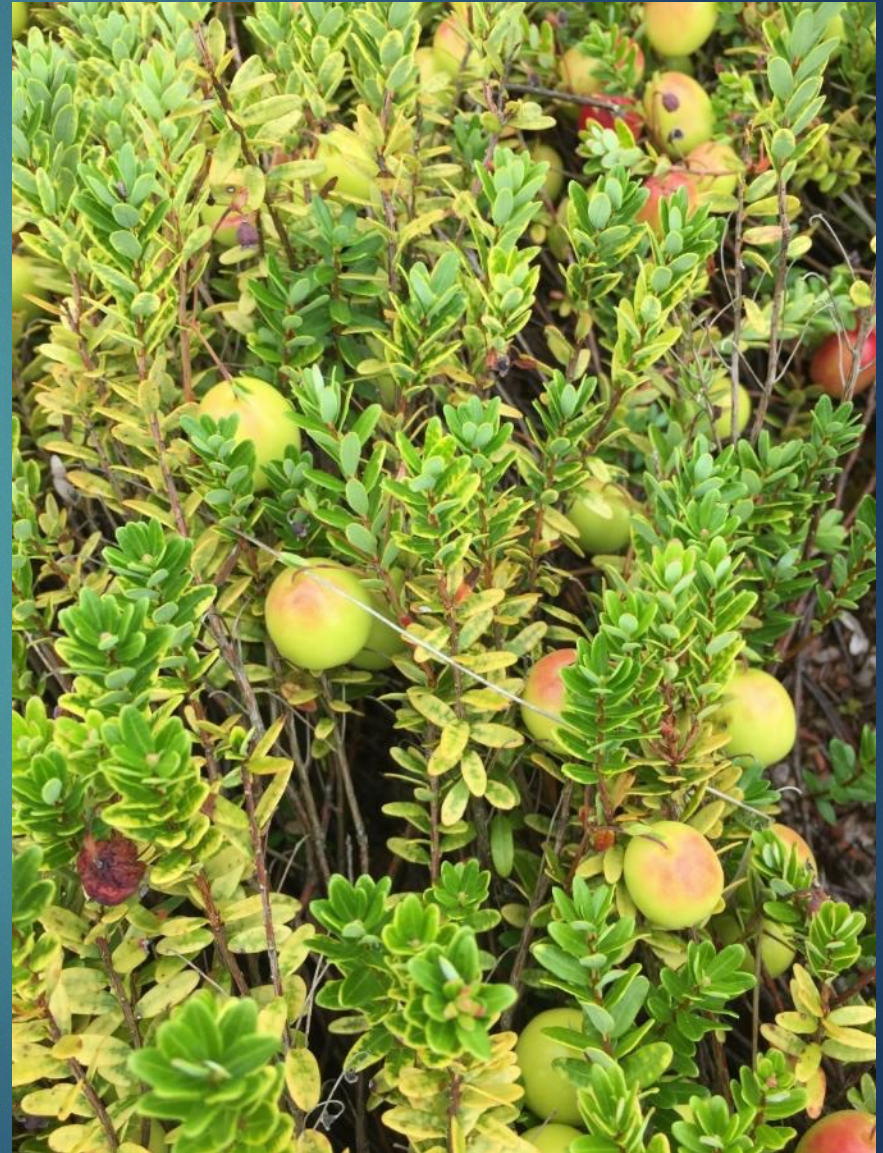
Casoron and Yellow Vine Syndrome (YVS)

- ▶ YVS in plots treated with Casoron
- ▶ All varieties
- ▶ Exacerbated by drought, didn't show up until August
- ▶ NO yield differences



YVS

- ▶ #60/A, 3 years in a row
 - ▶ Symptoms in 2016
 - ▶ No symptoms in 2017
 - ▶ Symptoms in 2018
- ▶ Exacerbated by drought, didn't show up until August
- ▶ Common for symptoms to be severe at fruit set when demand for resources in the plants is high
 - ▶ YVS not "caused" by Casoron.
 - ▶ YVS is a nutrient imbalance associated with root problems caused by stress.
 - ▶ Casoron can stress roots.



Callisto “tip flashing”

- ▶ Shows up quickly, resolves quickly (usually)
 - ▶ Plots treated 6/14, flashing noted on 6/20
 - ▶ Worse in spot-treatment plots
 - ▶ Yields were slightly lower in spot-treatment plots (not statistically significant)
 - ▶ Should not affect actual bog yield since only small areas are treated



Poverty Grass

Warm season grass

Broomsedge bluestem (*Andropogon virginicus*)

Little bluestem (*Schizachyrium scoparium*)



Poverty Grass Growth

Very slow starter

- Populations seem to explode in August



JUNE 3



JUNE 24



JULY 10



JULY 29

Poverty Grass Management

1. Preventing problem

- ▶ Stop seedling establishment (PRE)

2. Prevent problem from getting worse

- ▶ Stop seed production (POST)

3. Clean up weeds

- ▶ Kill adult plants (POST)

Poverty Grass Prevention



Stop seedling establishment (PRE)

- ▶ Control off-bog seed sources (as best you can)
- ▶ Use preemergence herbicides
 - ▶ Active in the soil, inhibits development
 - ▶ Must be incorporated into the soil by rain or irrigation

Devrinol and PG



Devrinol controls PG seeds in greenhouse

Is there lack of control in field?

- ▶ Timing issue?

- ▶ “warm season”, seeds germinate when soil is warm (+ 60 ° F)

- ▶ Or a perception issue?

- ▶ See weeds and think “it isn’t working”

Mow/cut

- Can be reduce seed production
- Timing critical!



Hand weed

- ▶ Can be effective whenever you have time!
 - ▶ Fall/Winter/Spring
- ▶ Time consuming, but worked well
- ▶ Plants did not regrow from where they were pulled



Poverty Grass Control

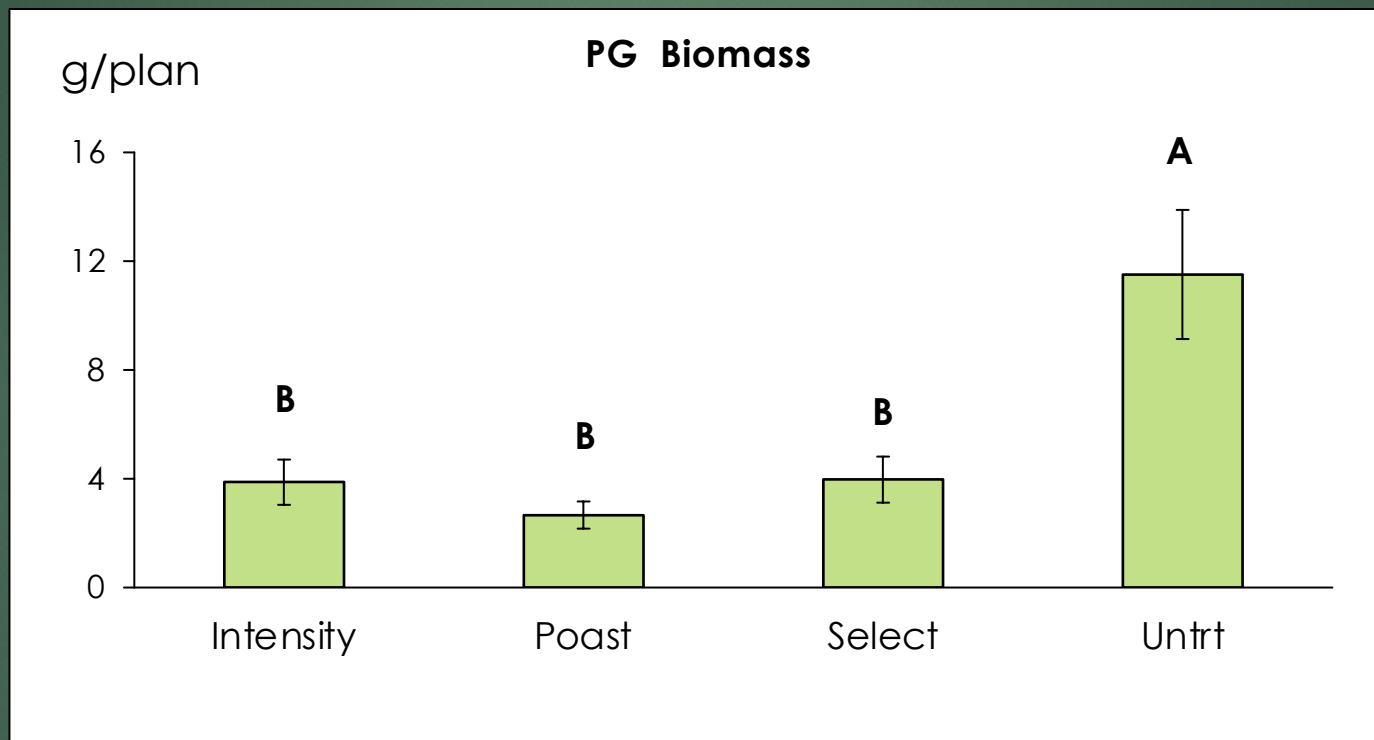


Controlling plants established on the bog

- ▶ Prevent seed production
 - ▶ Treat with herbicides
 - ▶ sethoxdim (Poast)
 - ▶ clethodim (Select, Select Max, Intensity, Intensity One, plus others)

Poverty grass – spot treating

- Grass herbicides work best on actively growing grass before seeds form



Treated 7/22/14, plants harvested 9/12/14

No treated plants made seeds!

Chemigating clethodim

- **ONLY** Intensity or Intensity One can be chemigated using the supplemental label
- Many growers report good results!
 - Make sure to use NIS when chemigating
 - Short injection times best, no soil activity



Timing Clethodim

Grass herbicides work on ACTIVELY growing grass

Work best before seeds are made



Seed
stems

Leaves

Clethodim and roughneck

Sometimes floral deformities occur after roughneck treatments

- ▶ Most severe in Howes
- ▶ No yield difference in our experiment
- ▶ Have had a grower report crop loss from roughneck apps on Howes



Timing Clethodim

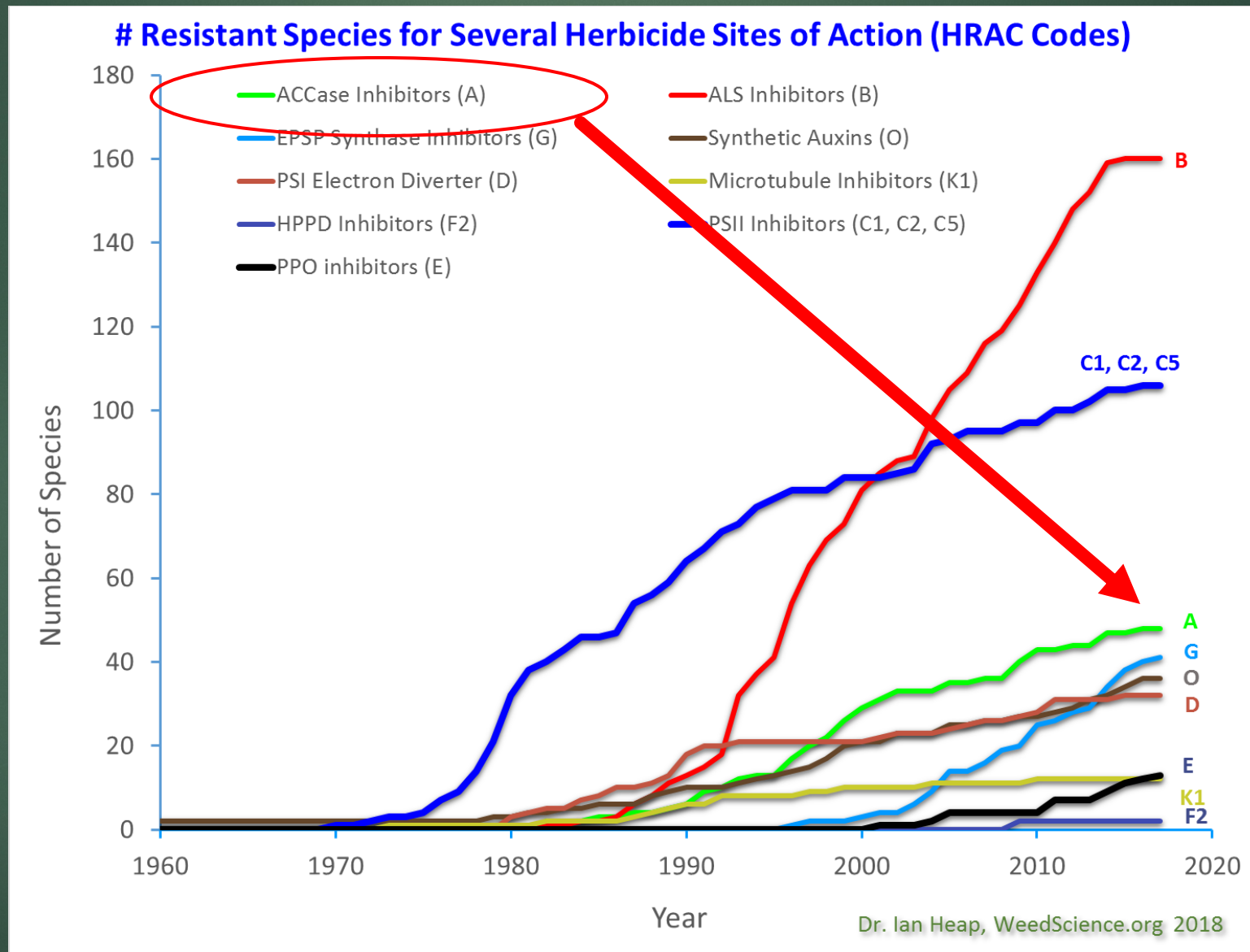


Current label : Can't apply between hook and fruit set

We are working towards a 24C to remove that restriction

- ▶ No yield loss seen with any application timing
 - ▶ Chemigation, single application
 - ▶ Cabbage, roughneck, pods, bloom, fruit
- ▶ Would let growers apply when grass is growing

Clethodim and Resistance Concerns



Clethodim and Resistance Concerns

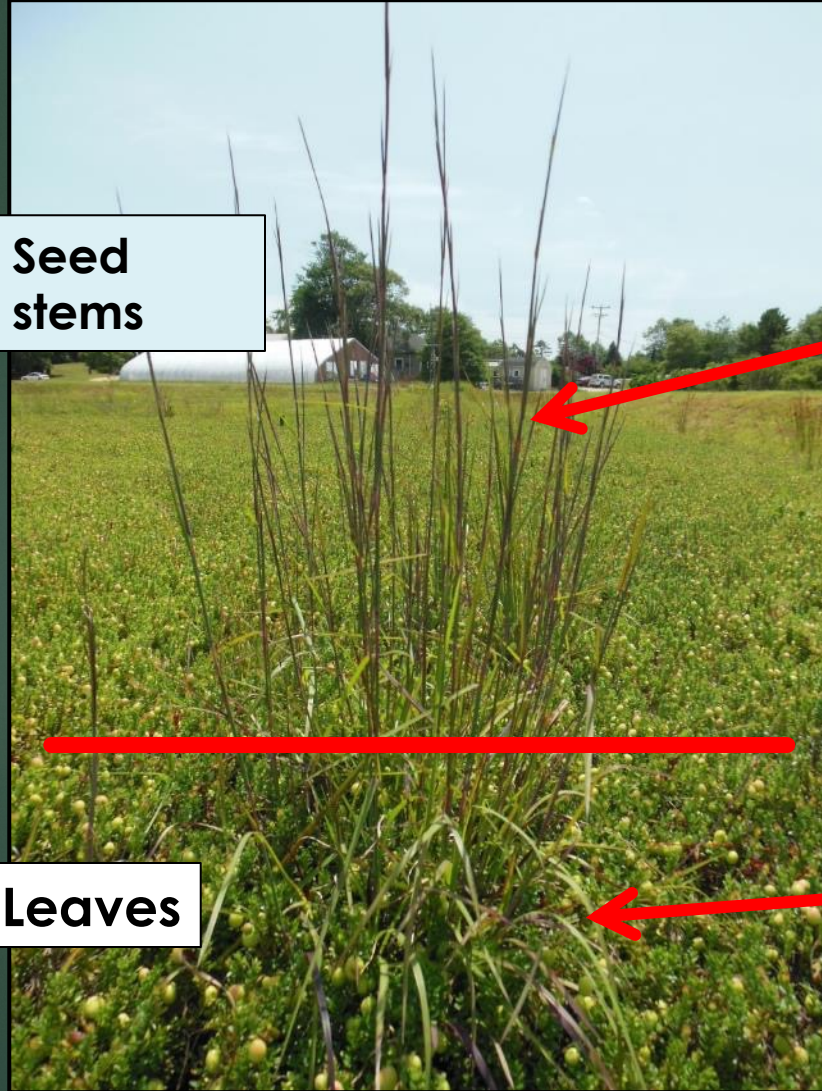
We have a tool for poverty grass – let's not lose it!

- Don't use repeatedly, year after year
- Integrate other controls in with clethodim use
 - Poast (sethoxydim) is NOT a true rotation, same Group
 - Hand-weed
 - Preemergence control
 - Sanitation and prevention

A Note About RoundUp Wipes....

Wiping this
Will do nothing!

Seed
stems



Leaves

Glyphosate can enter the
plant through living tissue, esp
leaves

Questions?

