

Paraquat-resistant Italian Ryegrass: Not Too Late to Change



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2021 MSU Row Crop Short Course

Italian Ryegrass Resistance



Rate (X) 0 .05 0.1 0.25 0.5 1 3 6 12 24 48 96



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Union County
biotype 3

Hoelon
(ACCase inhibitor)

Osprey
(ALS inhibitor)

PowerFlex
(ALS inhibitor)

Roundup PowerMax (32 fl oz)



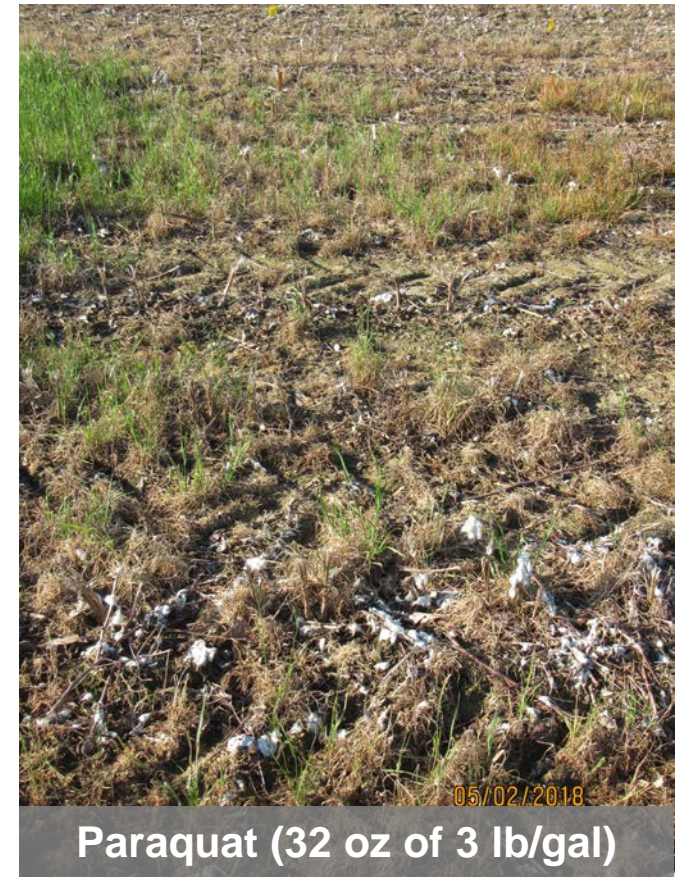
What's Left to Control HR Italian Ryegrass???



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Sprayed 10/27; Picture 7 DAA



Nontreated



Paraquat 2X + 1% COC



Paraquat 4X + 1% COC

2nd Location (sprayed 10/27; pics Nov 2)



Paraquat 2X lb + 1% COC

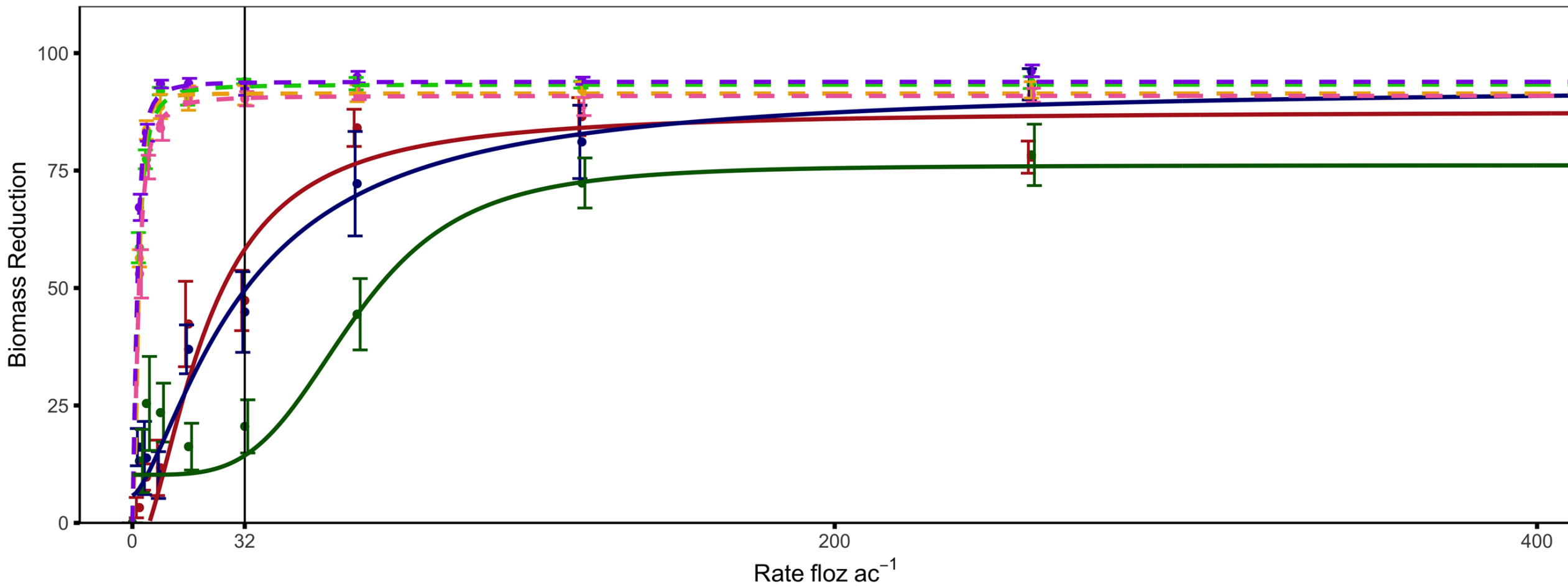


Paraquat 4X + 1% COC

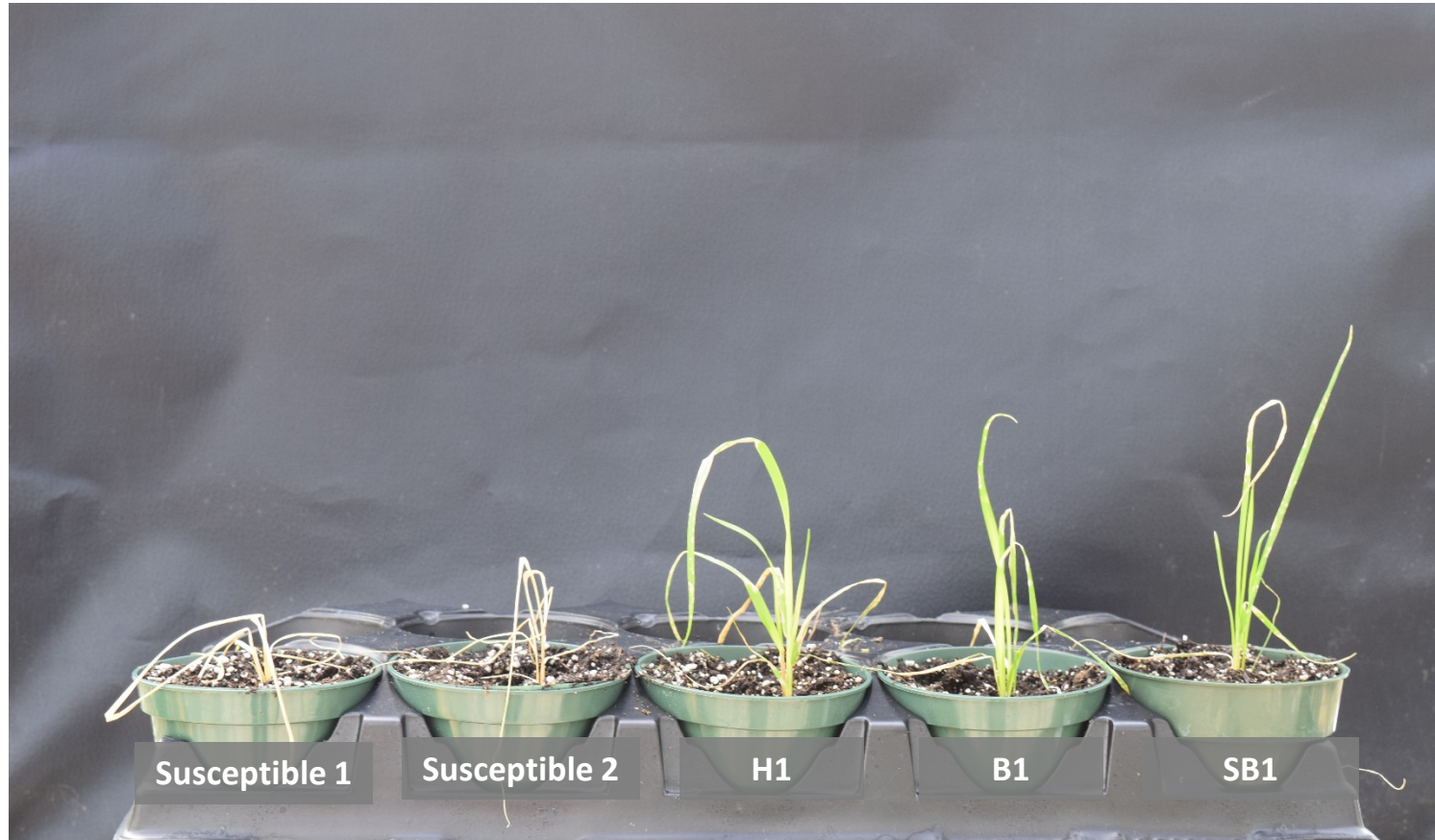


Paraquat 6X lb + 1% COC

Response of PR and PS Italian Ryegrass to Paraquat



Italian Ryegrass Populations Response to Paraquat



Legend:

Plants sprayed with paraquat at 32 fl oz/A at 3 days after application. From left to right: 2 susceptible pop (codes: 16-4, 36-4), H1, B1, and SB1.

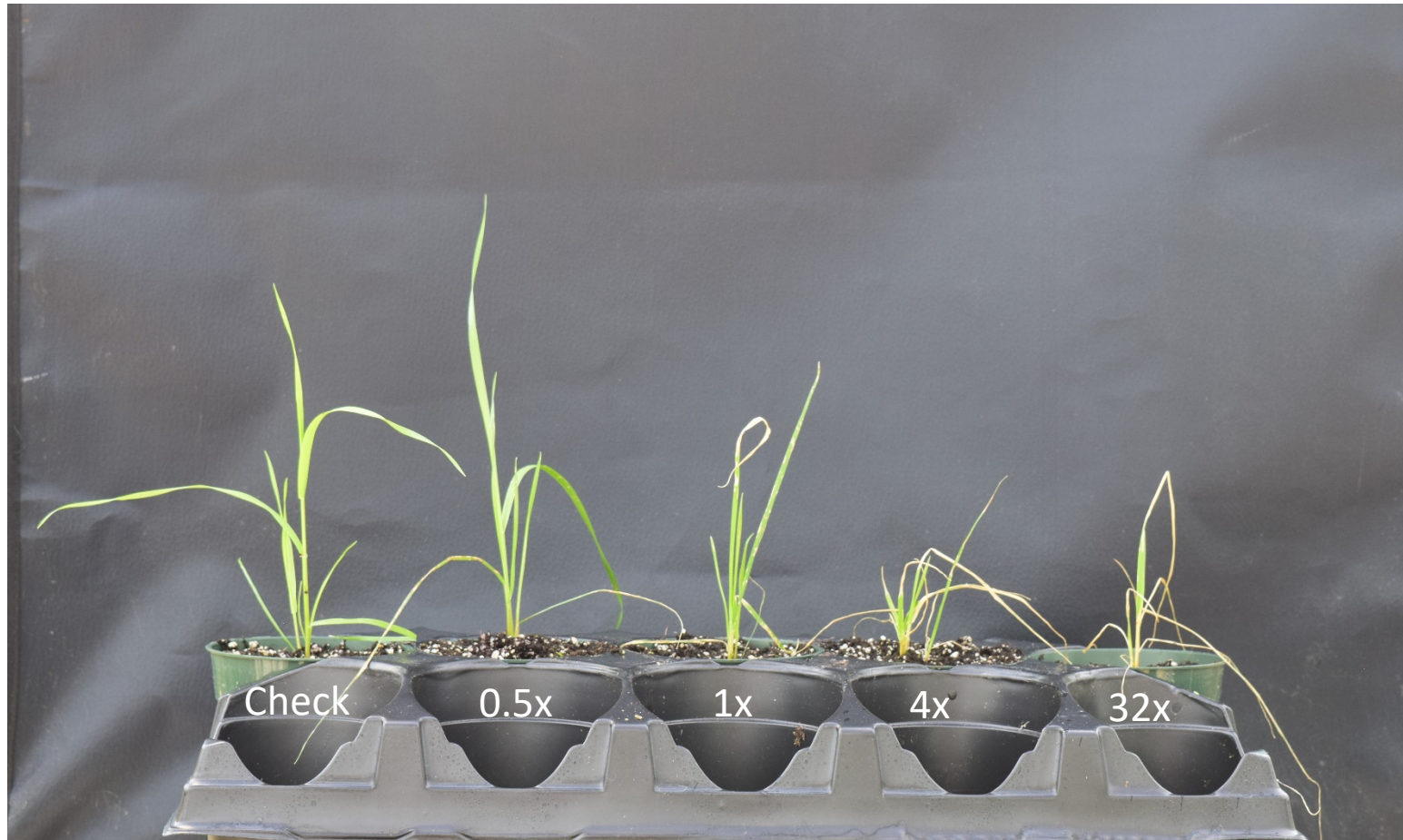
14- to 54-fold Resistant to Paraquat

Population	ED50		ED90	
	floz a ⁻¹	g ai ha ⁻¹	floz a ⁻¹	g ai ha ⁻¹
16	1.6	43.0	9.7	253.2
36	1.8	45.7	8.1	234.3
74	1.3	33.9	6.6	180.5
83	1.8	48.5	22.3	585.4
H1	32.5	851.8	314.1	8248.0
B1	25.8	677.1	NO	NO
SB1	69.8	1833.4	NO	NO

Abbreviations: ED50, effective paraquat dose that reduced 50% of the biomass; ED90, effective paraquat dose that reduced 90% of the biomass; NO, not observed.

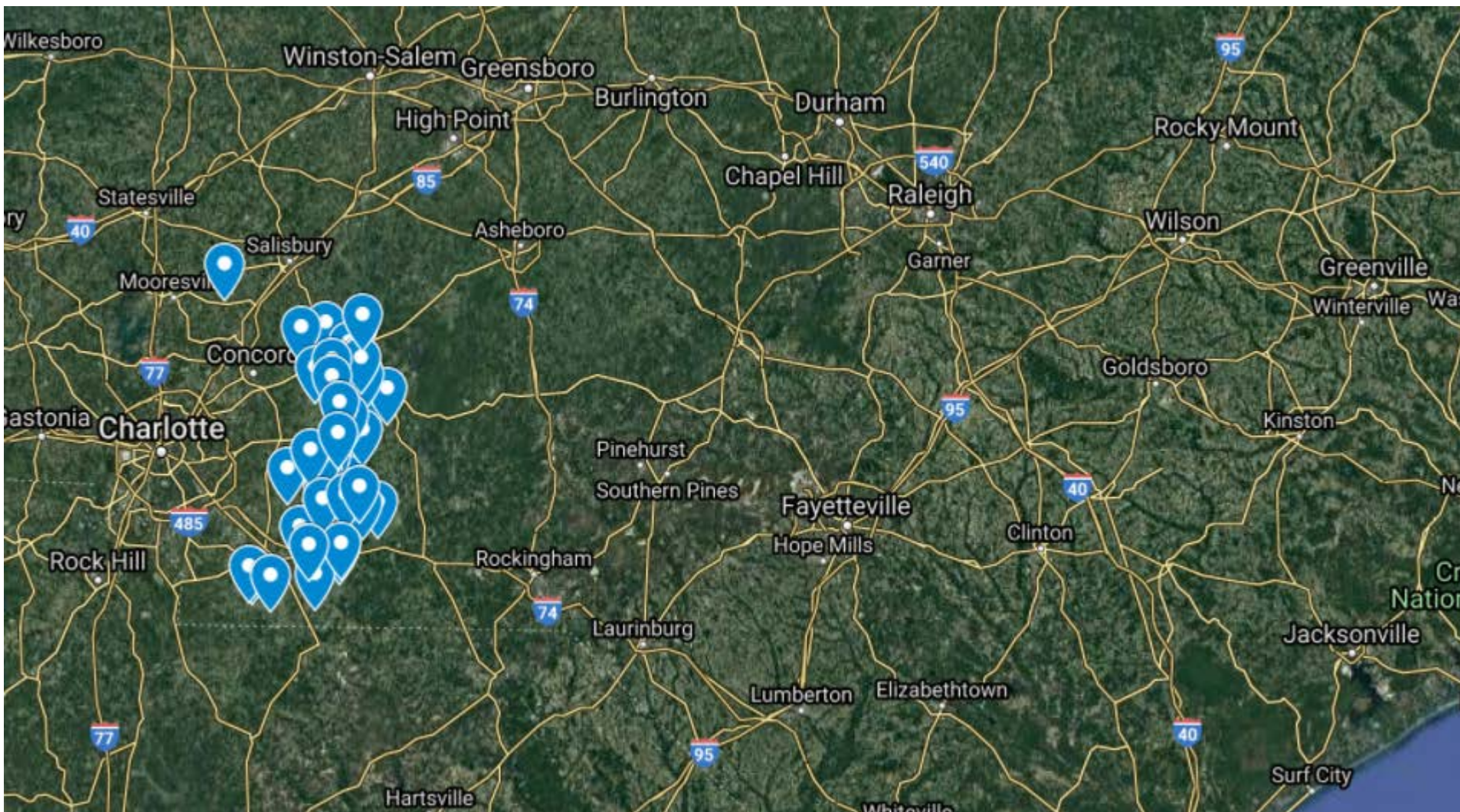
*Standard Gramoxone[®] SL 3.0 Rate = 32 floz a⁻¹ or 840 g ai ha⁻¹

SB1 Population



Legend:
SB1 population at 3 days
after application. From left to
right: nontreated control, 16
floz/a, 32 floz/a, 128 floz/a,
and 1024 floz/a.

Determine Distribution of Paraquat-resistant Italian Ryegrass



Southern Piedmont Herbicide Screening

	Number of surviving populations		Number of surviving populations
Herbicide		Stacked survival	
Paraquat	14	5	1
Glyphosate	24	4	6
Chethodim	4	3	13
Nicosulfuron	34	2	9
Glufosinate	18	1	1

Should You Be Concerned?

- NC Scenario Spring 2020
 - Sprayed Roundup and paraquat twice burndown → planted corn → ryegrass survived
 - Ryegrass overtook corn early
 - Sprayed Roundup + Accent Q POST → ryegrass survived
 - What would you do???

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 - Waited for heat to kill ryegrass → terminate 1st crop → replanted corn in June

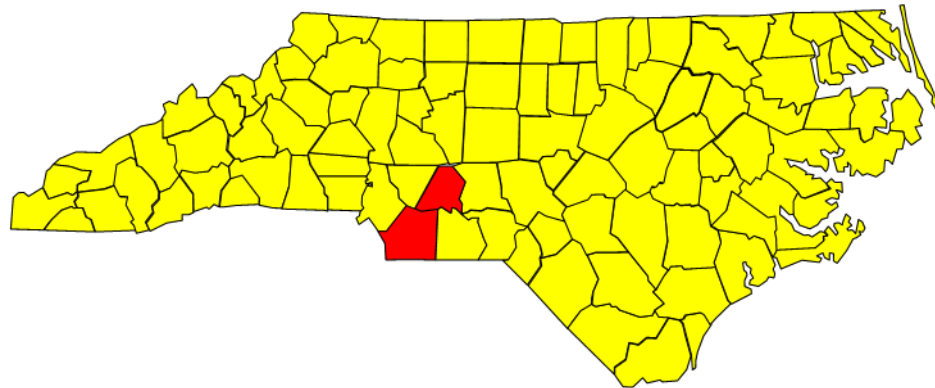


Should You Be Concerned?

- Paraquat-resistant Italian ryegrass poses a serious threat
- Coupled with ACCase, ALS, and Glyphosate resistance?
 - Winter small grains
 - How do we control emerged ryegrass at planting?
 - Corn, Cotton, Full-season soybean
 - How do we control emerged ryegrass at planting?
 - Delay planting → limit yield potential

Tactics for Managing Paraquat-resistant Italian Ryegrass

- No viable POST options for 4 way-resistant biotype (paraquat-, glyphosate-, ALS-, and ACCase-resistant)
- Control options???



Tactics for Managing Paraquat-resistant Italian Ryegrass

- No viable POST options for multiple-resistant biotype (paraquat-, glyphosate-, ALS-, and ACCase-resistant)
- Residual control in fall?
- Cover crops?
- Experiment: Fall 2021
 - 3 cover crop treatments by
 - Cereal rye, crimson clover, no cover crop
 - 5 fall residual herbicide treatments
 - Dual Magnum, Metribuzin, Valor, Zidua, no residual



Best Way to Manage for Paraquat-resistant Italian Ryegrass

- **Never let it on the farm!**



Questions?

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