Johnsongrass Control

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Johnsongrass

- Perennial
  - Propagation: seeds and rhizomes
- Grows 6-8 feet tall
- A single plant can produce more than 80,000 seeds in a single growing season, and 275 feet of rhizomes!
  - Average 60 ft of rhizomes

275 feet = 91 yards

Johnsongrass

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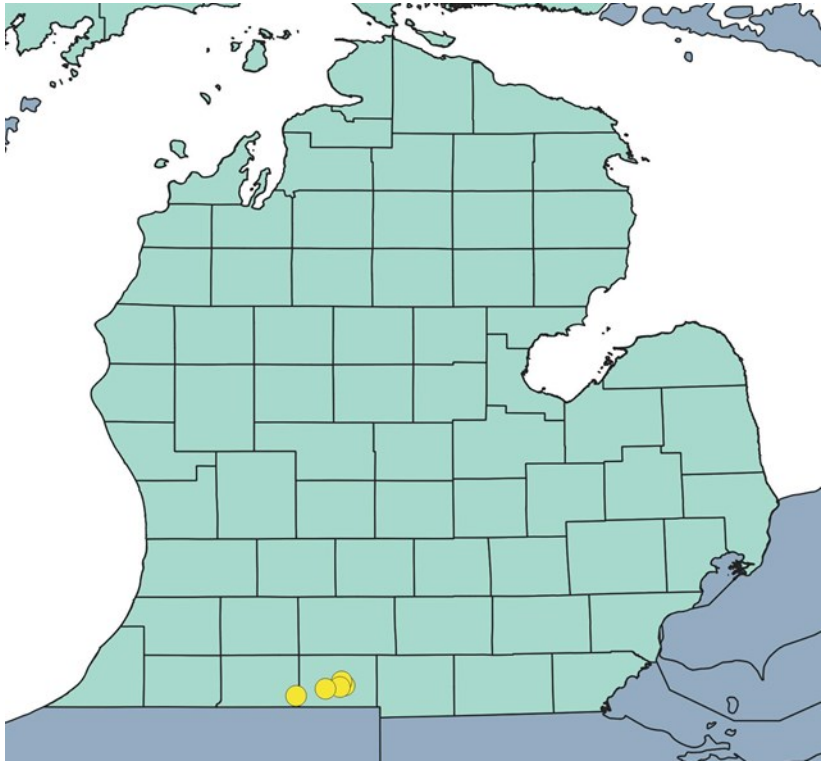
- A single plant may produce more than 80,000 seeds in a single growing season, and 275 feet of rhizomes!
- Seed can remain viable in the soil for more than 10 years

Johnsongrass Rhizomes

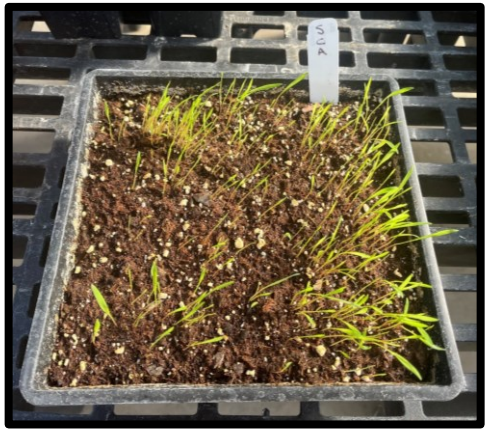
- Rhizomes are produced in the top 10 inches of soil
  - Can be found as deep as 5 ft!
- Seedling plants can produce rhizomes in as few as 19 days after emergence
  - 5 to 7 leaf stage
  - Rhizome development is slow at first until 10 leaf stage
  - Rhizome system well developed 6-7 wks after emergence
- Plants originating from rhizomes emerge earlier in the spring than from seed
- Prolonged emergence pattern, with new plants emerging from seed and rhizomes throughout the growing season

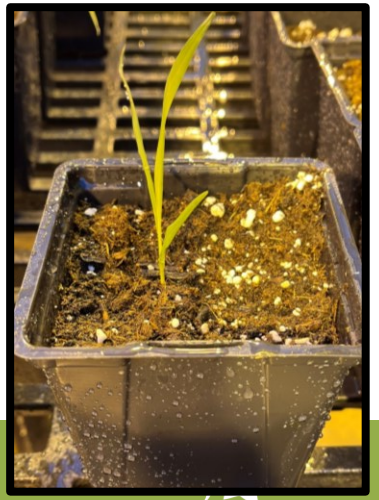
Herbicide Resistant Johnsongrass

- Known ALS (Group 2) resistant populations in Michigan
  - How widespread?
    - Accent Q (nicosulfuron)
    - Thiencarbazone (component in Capreno)
    - Pursuit (imazethapyr)
- Are there resistant populations to other herbicide sites of action?
  - Glyphosate (Roundup, Group 9)
  - Select Max (clethodim, Group 1)



Growth



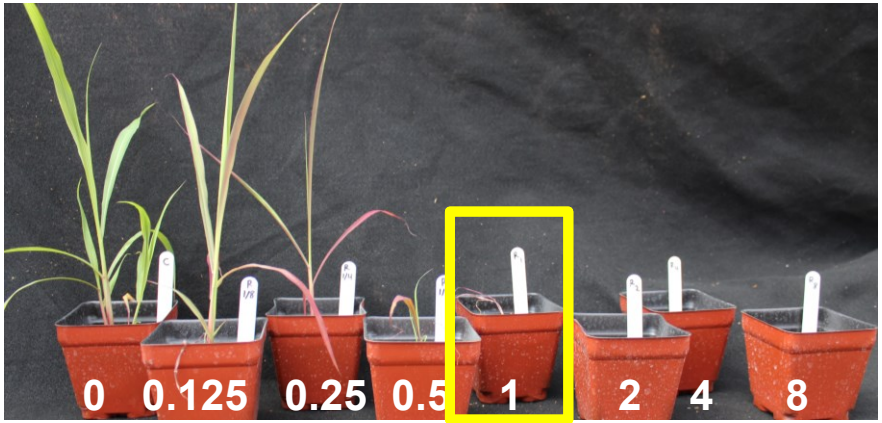


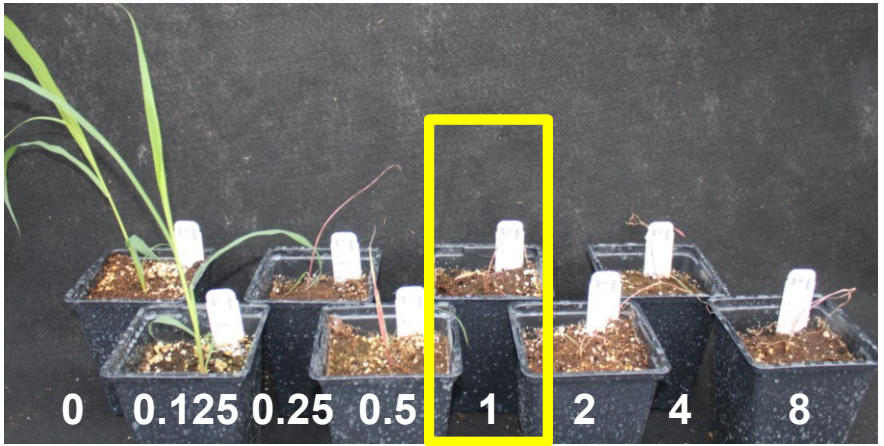
Application

Apply rates from 0-8, 0-64 times the 1x field use rate

Glyphosate and Select Max

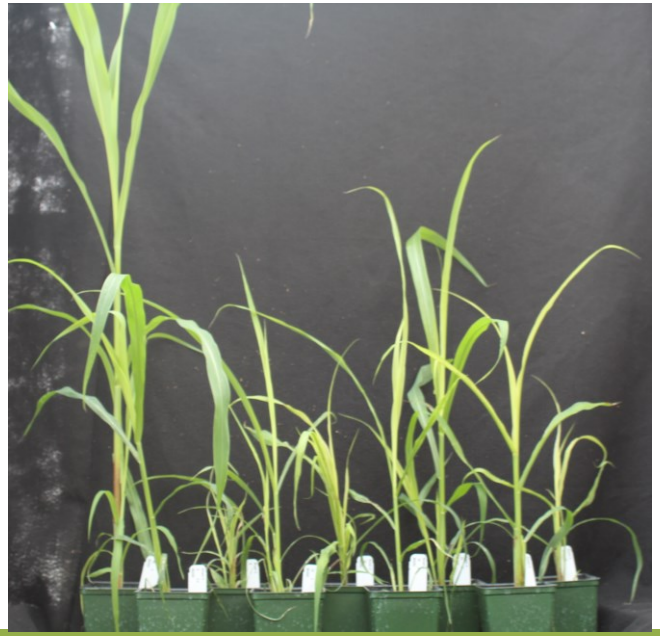
- All populations screened were susceptible





Accent Q

- Two populations survived 64x rate

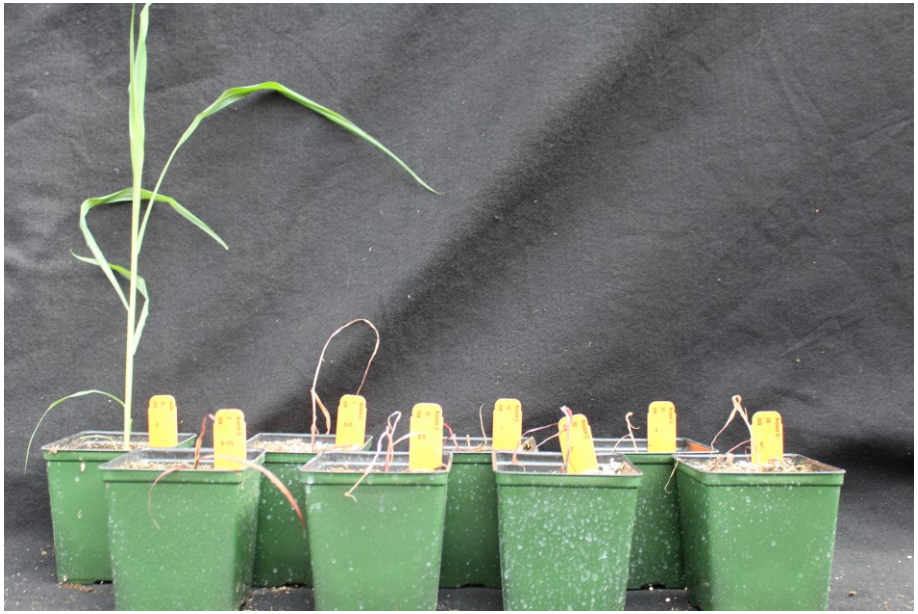


Accent Q

- Two populations survived 8x rate

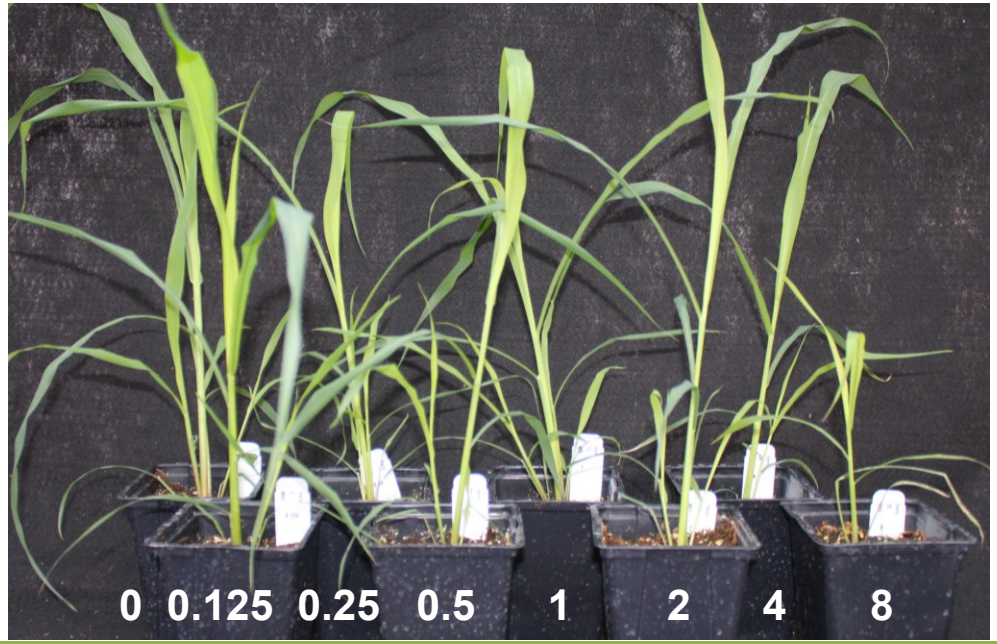
Accent Q

- Indiana population was susceptible



Thiencarbazone (Component in Capreno)

- All Michigan populations survived the 8x field use rate

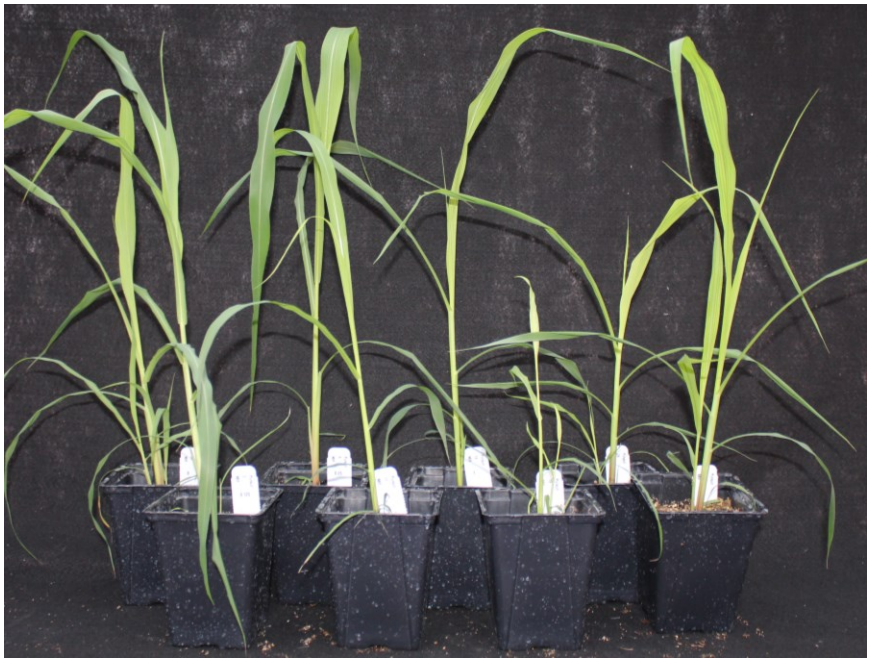


Thiencarbazone (Component in Capreno)

- Indiana population survived 4x herbicide application

Pursuit

- All Michigan populations survived 8x rate

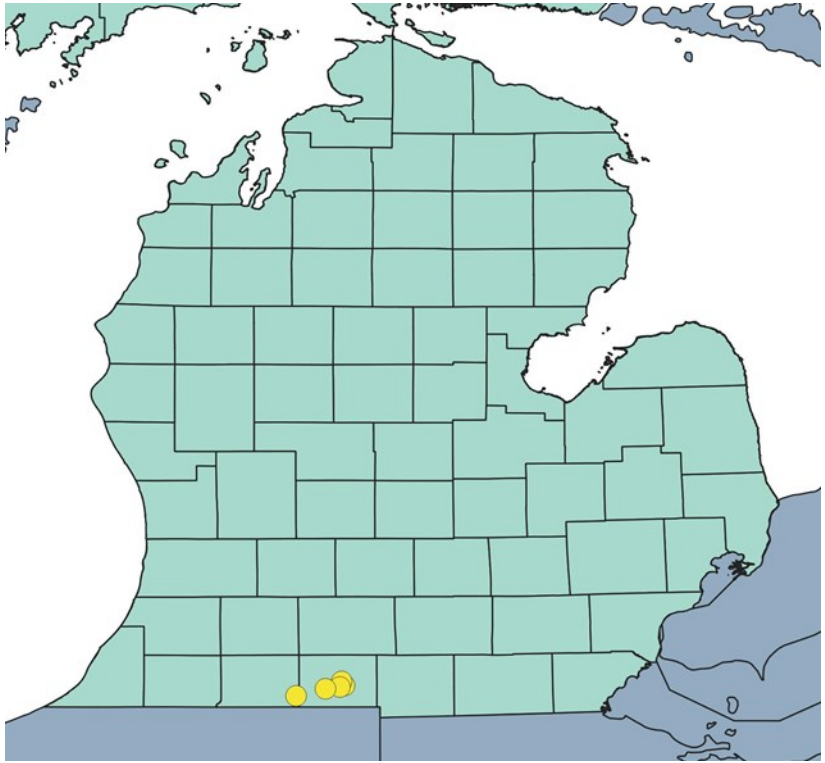


Pursuit

- Indiana population survived 8x rate

Herbicide Resistance Conclusions

- Glyphosate and Select Max
  - All populations susceptible
- Accent Q
  - Michigan resistant
  - Indiana susceptible (only 1 population screened)
- Thiencarbazone (component in Capreno)
  - All populations resistant
- Pursuit
  - All populations resistant



Taking Control of Johnsongrass Before it Takes Control of Your Fields

- Prevent johnsongrass from becoming established in new fields
  - Prevent spread of rhizomes from infested to uninfested areas
  - Clean equipment (especially combines) after working in infested fields
  - Harvest infested fields last
- Uncontrolled johnsongrass in fence rows and ditch banks is a common source of new johnsongrass infestations
  - Spot sprays on fences and ditch banks can eliminate these sources of seeds and rhizomes

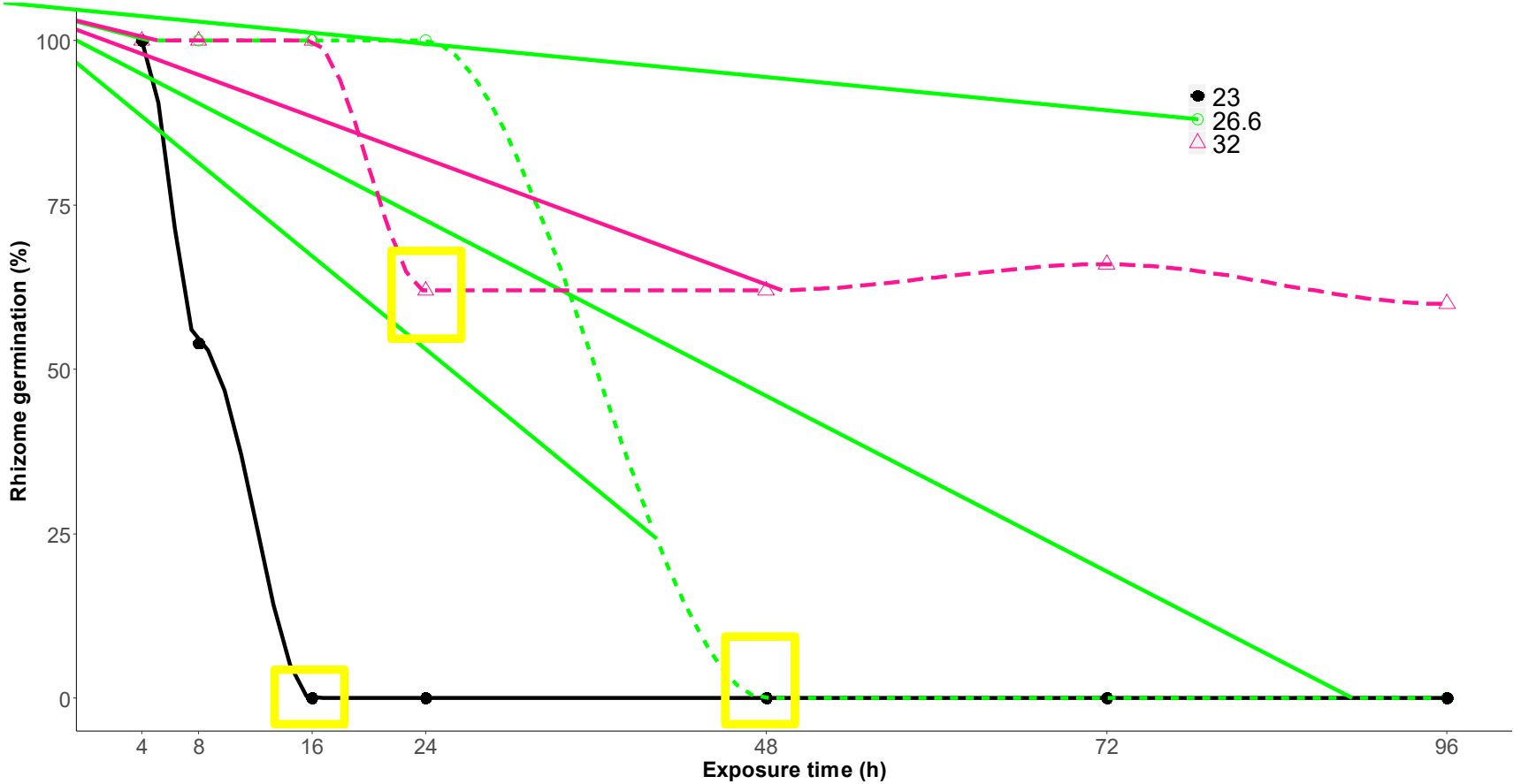
Pictures from Bruce MacKellar, MSUE

Taking Control of Johnsongrass Before it Takes Control of Your Fields

- The critical time to kill johnsongrass is while the weed is becoming established and before it has spread over the entire field
  - Scout fields
  - Plants emerging from seed can produce rhizomes within 3-4 weeks
- Plant high-yielding varieties adapted to field conditions
  - Soil test

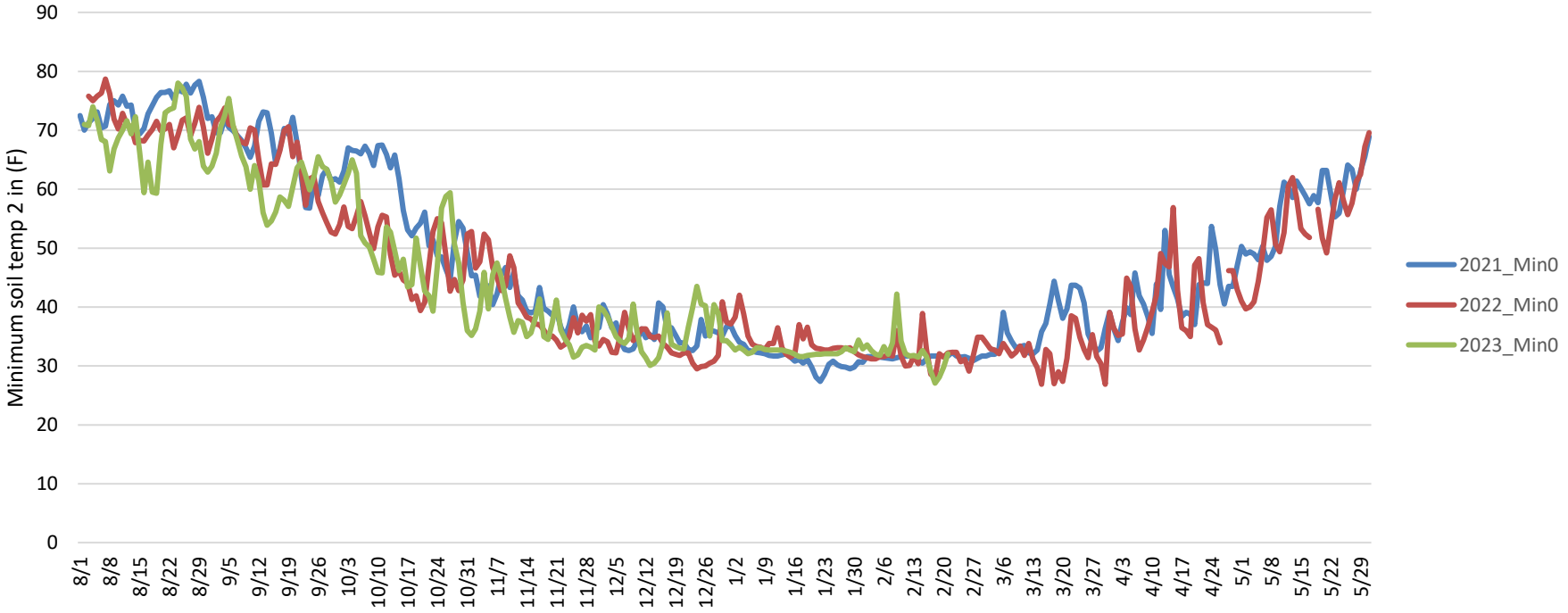
Rhizomes are the Friend and Foe of Johnsongrass!

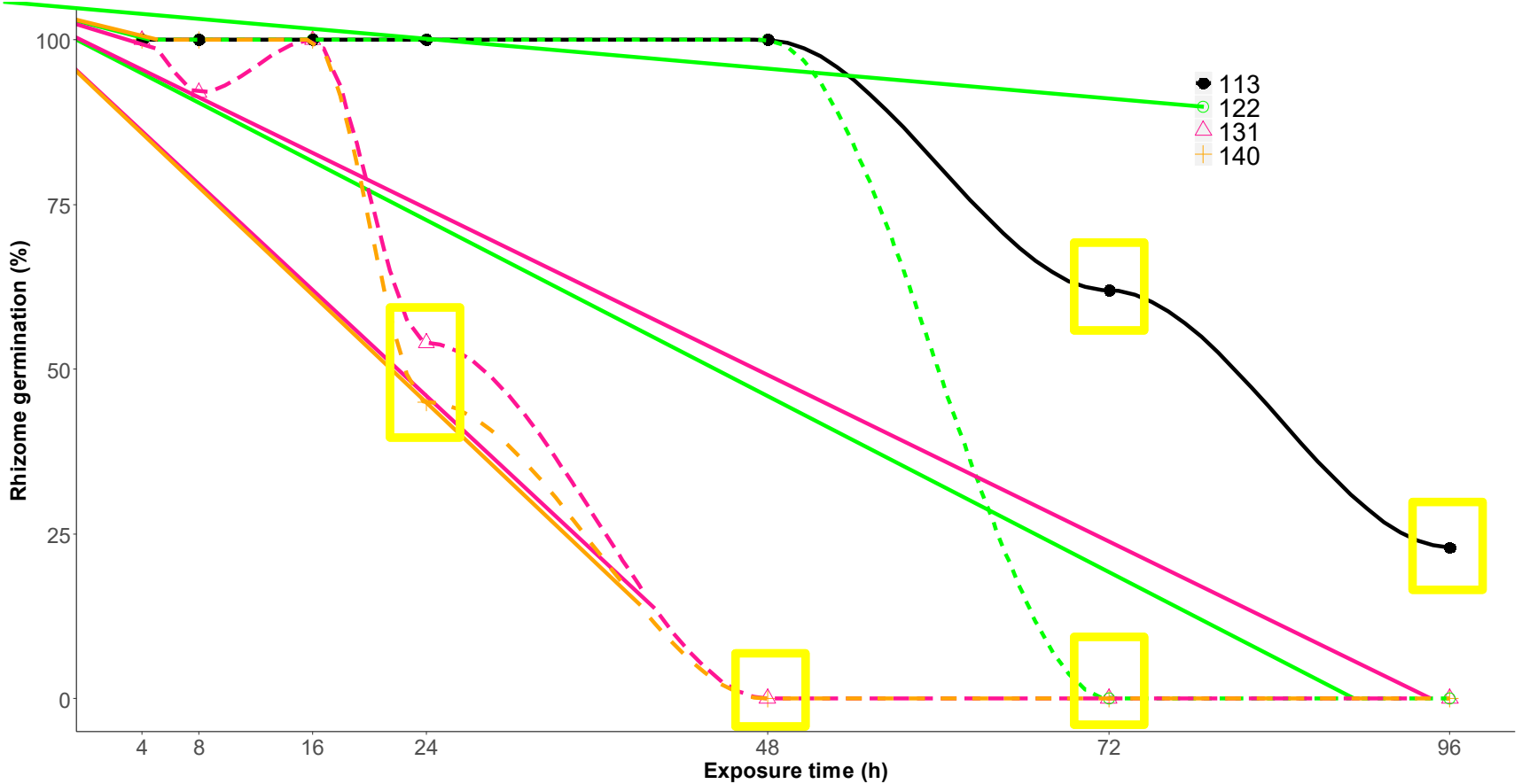
- Johnsongrass is an extremely aggressive weed due to its rhizome system
- Use fall tillage to bring rhizomes to soil surface, where they may be killed by winter conditions
- Rhizomes are also one of johnsongrass' largest weaknesses because they are not very cold tolerant
  - Factors Affecting Johnsongrass Rhizome Production and Germination (McWhorter 1972)
    - Buried rhizomes 1 inch deep in loam soil
    - Held at three "hot" and "cold" for 4-96 hr



(McWhorter 1972)

Minimum Soil Temperature 2in (F) - Constantine





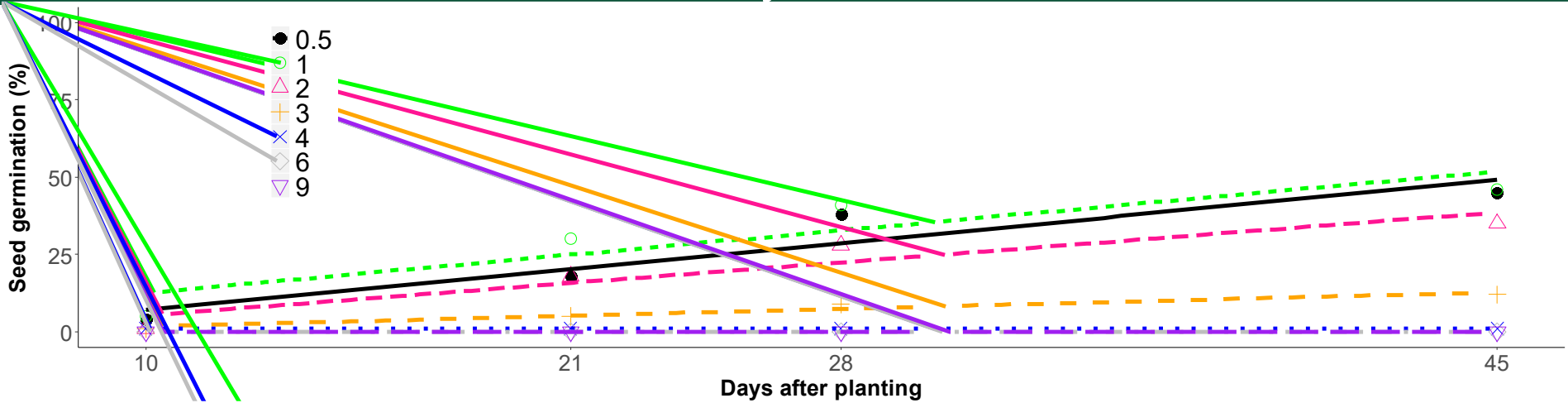
(McWhorter 1972)

Tillage Impacts on Johnsongrass

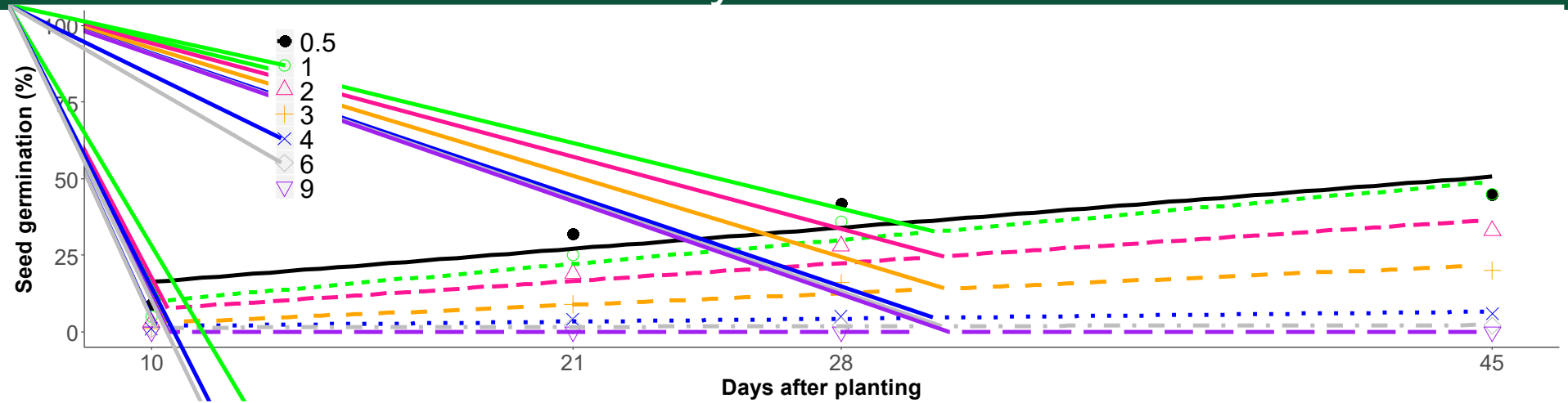
- Seeds cannot successfully emerge when buried at least 12 inches
  - Aggressive deep tillage, e.g. moldboard plow, may be another control tactic

- Tillage depth and impacts on bud emergence from rhizomes
  - Factors Affecting Johnsongrass Rhizome Production and Germination (McWhorter 1972)
    - Buried rhizomes or seeds 0.5-9 inches deep in clay or sandy-loam soil

Clay Soil


0.5
1
2
3
4
6
9
Seed germination (%)
100
75
50
25
0
10
21
28
45
Days after planting

Sandy Loam Soil



Tillage Impacts on Johnsongrass

- Disking chops johnsongrass rhizomes, making them more susceptible to herbicides
  - Disk to a 6- to 8-inch depth several times before planting, followed by herbicide program that is effective on johnsongrass
  - Disking alone can spread rhizome fragments!
    - Clean equipment!

Effective Johnsongrass Herbicide Programs-PRE

- Apply PRE herbicides with activity on johnsongrass to reduce competition
  - Disk if possible
- Suppression of rhizomes and control of seedlings
  - Balance Flexx
  - Corvus
    - Application rates vary by soil type
  - Effective preemergence, may be applied postemergence from spike through V2

Effective Johnsongrass Herbicide Programs-POST

- Many foliar-applied herbicides do not provide soil residual control of johnsongrass, two applications may be necessary

Postemergence	Site of Action No.*	Seedling Efficacy	Rhizome Efficacy	Corn Height/Stage
Accent Q	2	Excellent	Good	-20 inches tall or V6 -20–36 inches tall, use drop nozzles
Beacon	2	Good	Fair	-4–20 inches tall -Drop nozzles can be used up to tassel emergence
Capreno	2, 27	Excellent	Good	-V1 to V5
Revulin Q	2, 27	Excellent	Good	-20 inches tall or V6 -Drop nozzles can be used up to 30 inch tall or V8
Steadfast Q	2, 2	Excellent	Good	-20 inches tall or V6
Glyphosate	9	Excellent	Excellent	-30 inches tall or V8 -30 to 48 inches drop nozzles only
Liberty	10	Good	Fair	-Emergence up to V6 -Drop nozzles until 36 inch tall

Johnsongrass Management in Soybean

- Control existing plants prior to planting
  - Burndown herbicide or tillage
- Utilize Group 1 herbicide postemergence
  - Assure II
  - Fusilade DX
  - Glyphosate
  - Select Max
  - Poast

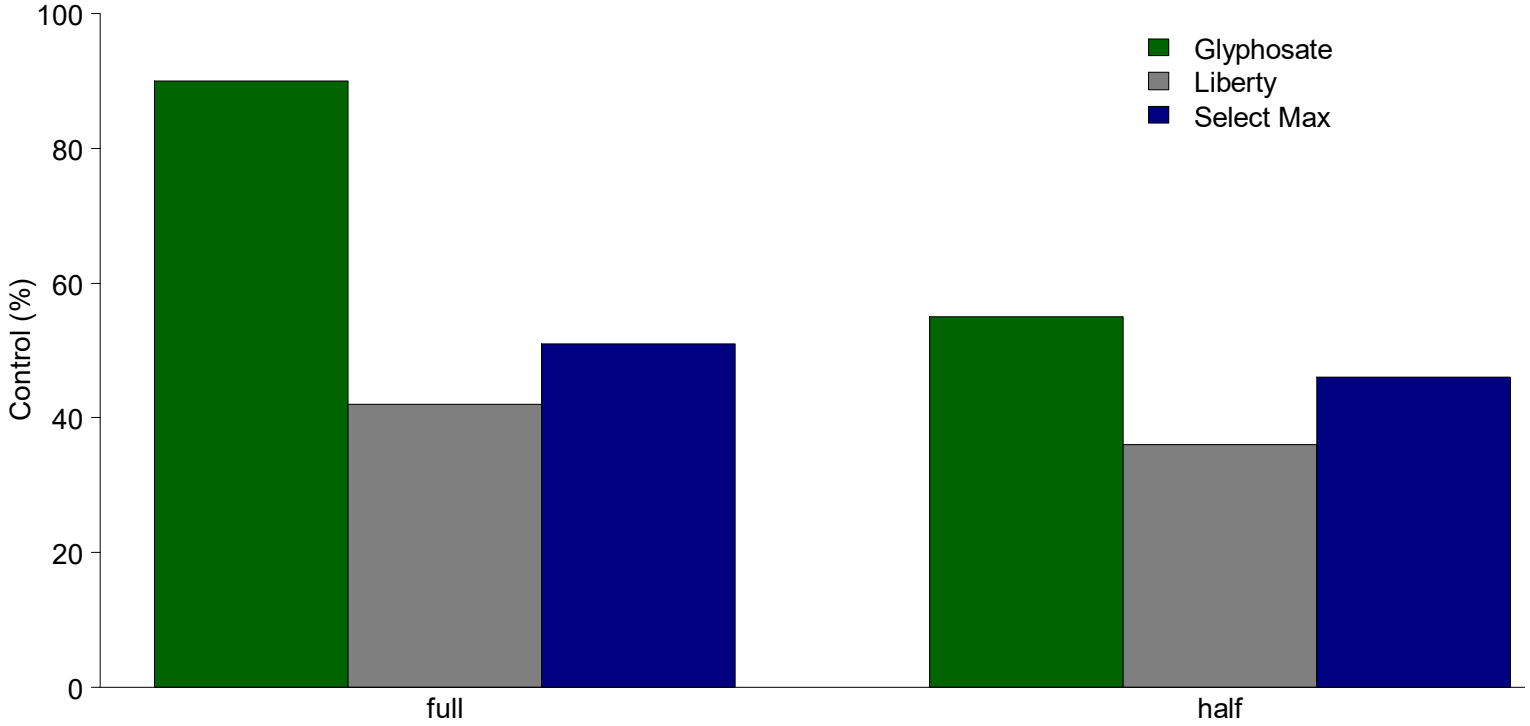
Can late season herbicide applications control large johnsongrass and reduce seed production/viability?

Herbicide	Rate (fl oz/A)	Timing
Glyphosate (Powermax3)	10	Boot
		Full panicle
Glyphosate (Powermax3)	20	Boot
		Full panicle
Liberty 280 SL	28.8	Boot
		Full panicle
Liberty 280 SL	36	Boot
		Full panicle
Select Max	8	Boot
		Full panicle
Select Max	16	Boot
		Full panicle

- Measurements
  - Control three weeks after application
  - Seed production
  - Seed viability
  - Progeny emergence

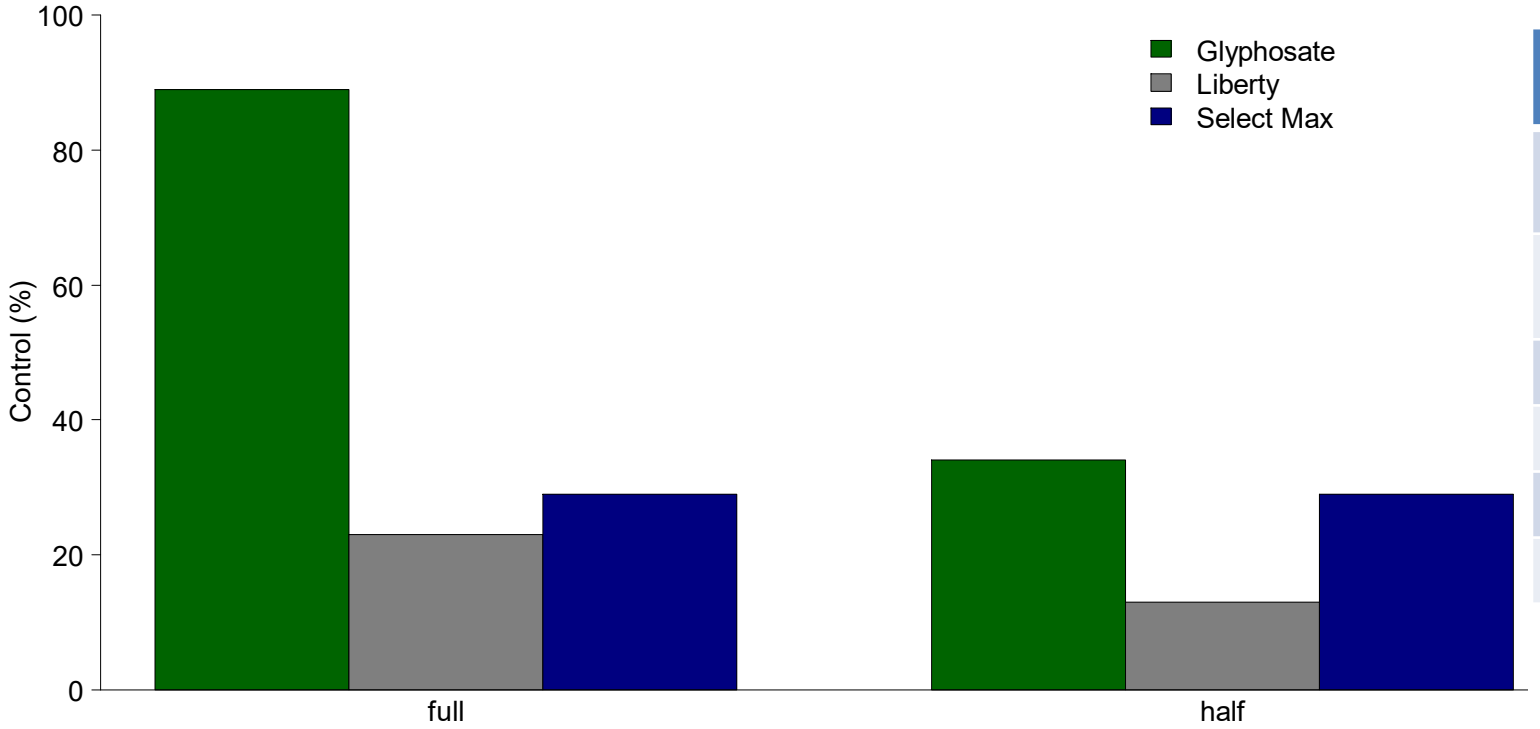
Johnson, D. B., & Norsworthy, J. K. (2014). Johnsongrass (*Sorghum halepense*) management as influenced by herbicide selection and application timing. *Weed Technology*, *28*(1), 142-150.

Late Season Herbicide Application Control (%) - Boot



Herbicide	Rate (fl oz/A)
Glyphosate (Powermax3)	10
Glyphosate (Powermax3)	20
Liberty 280 SL	28.8
Liberty 280 SL	36
Select Max	8
Select Max	16

Late Season Herbicide Application Control (%) – Full Panicle



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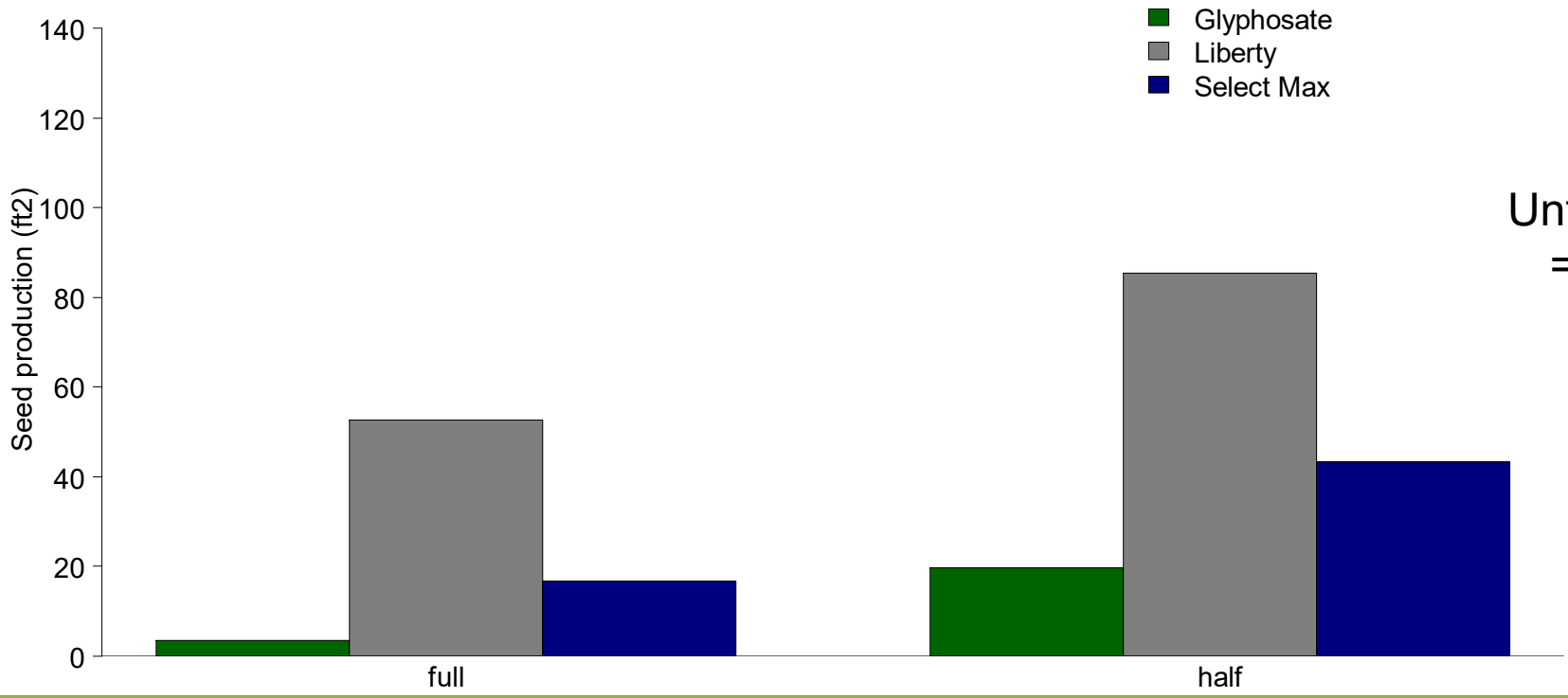
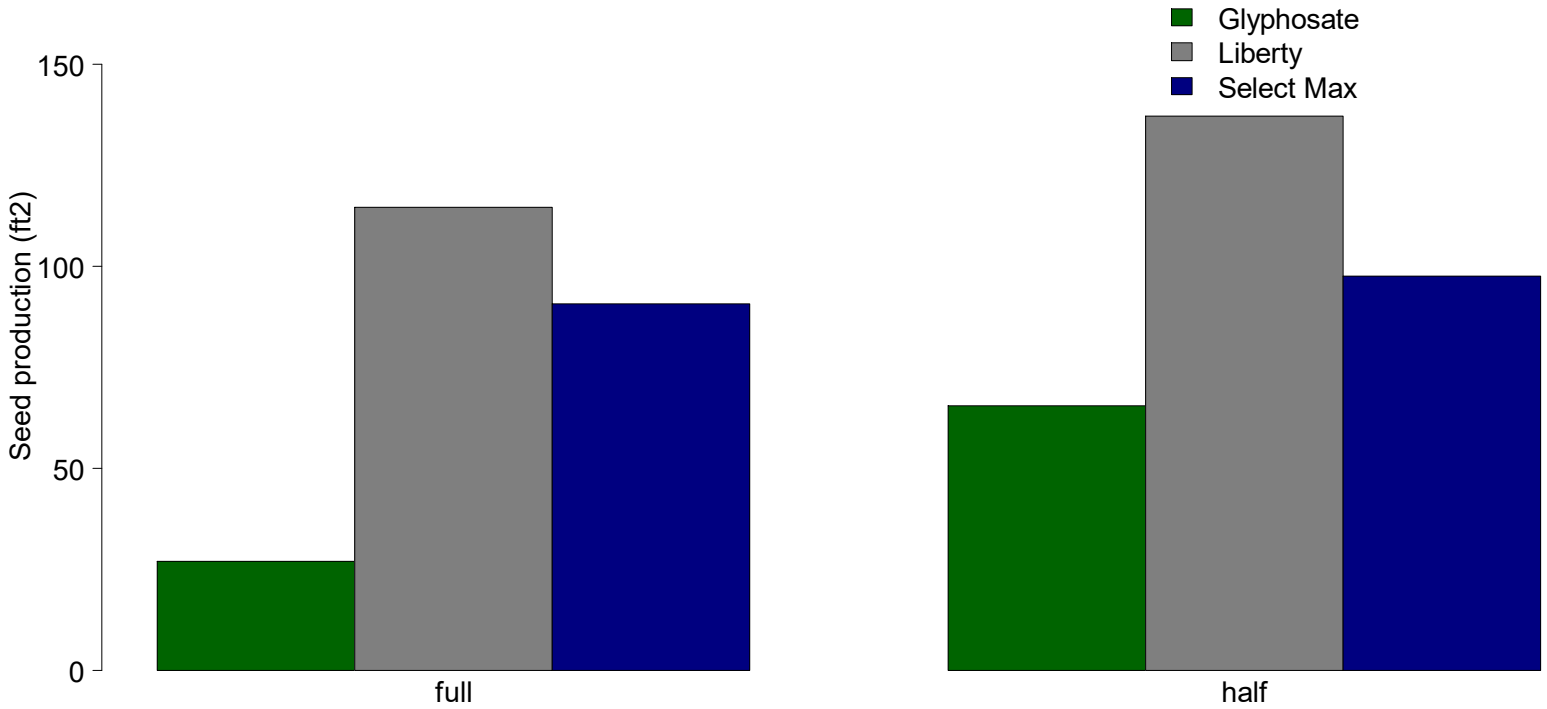
Late Season Herbicide Application Seed Production - Boot



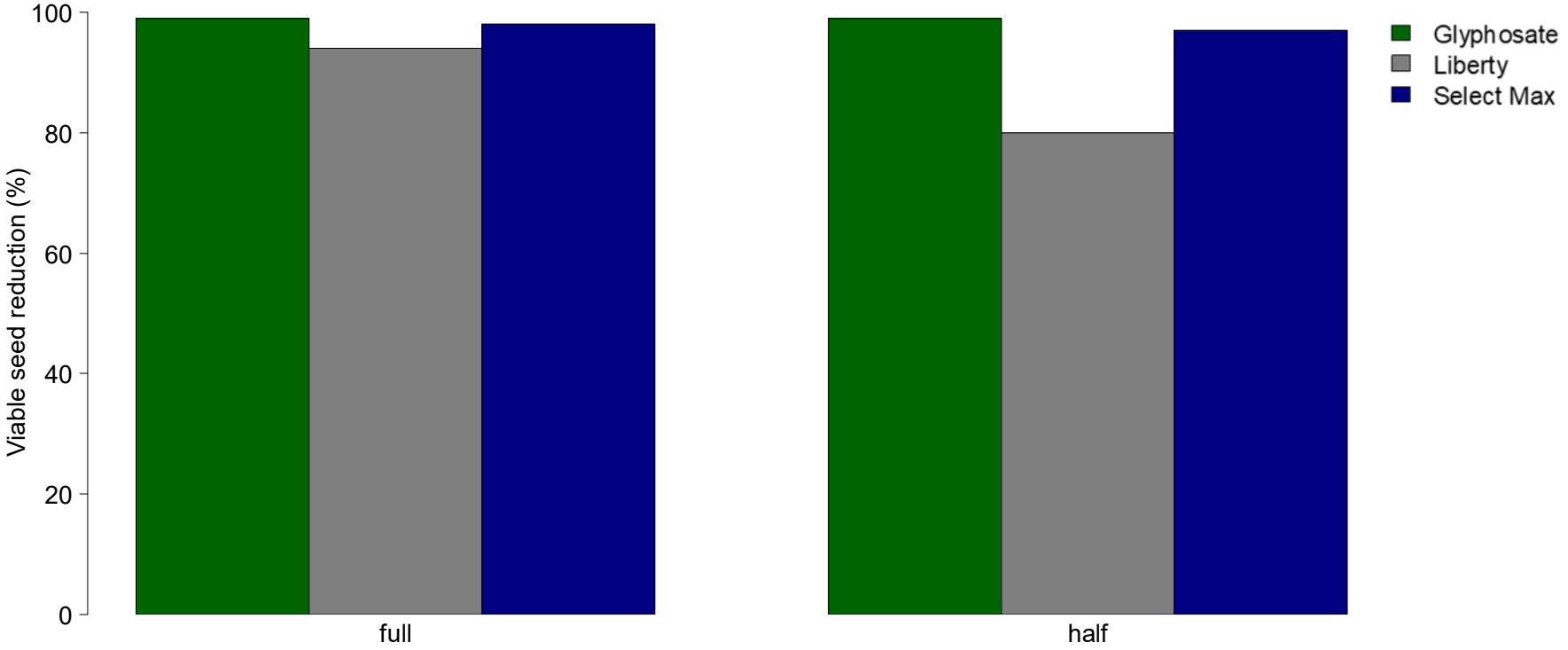
Untreated = 943

Late Season Herbicide Application Seed Production – Full panicle

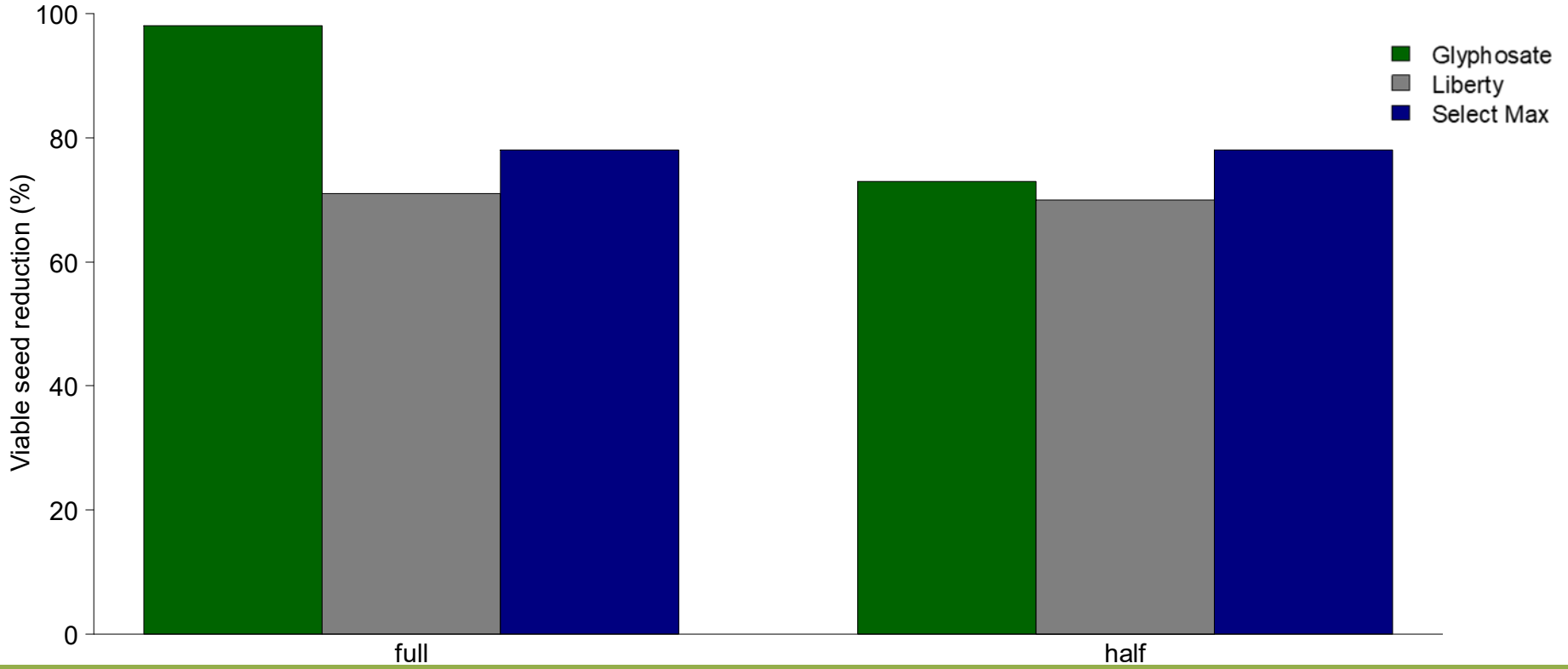


Untreated = 943

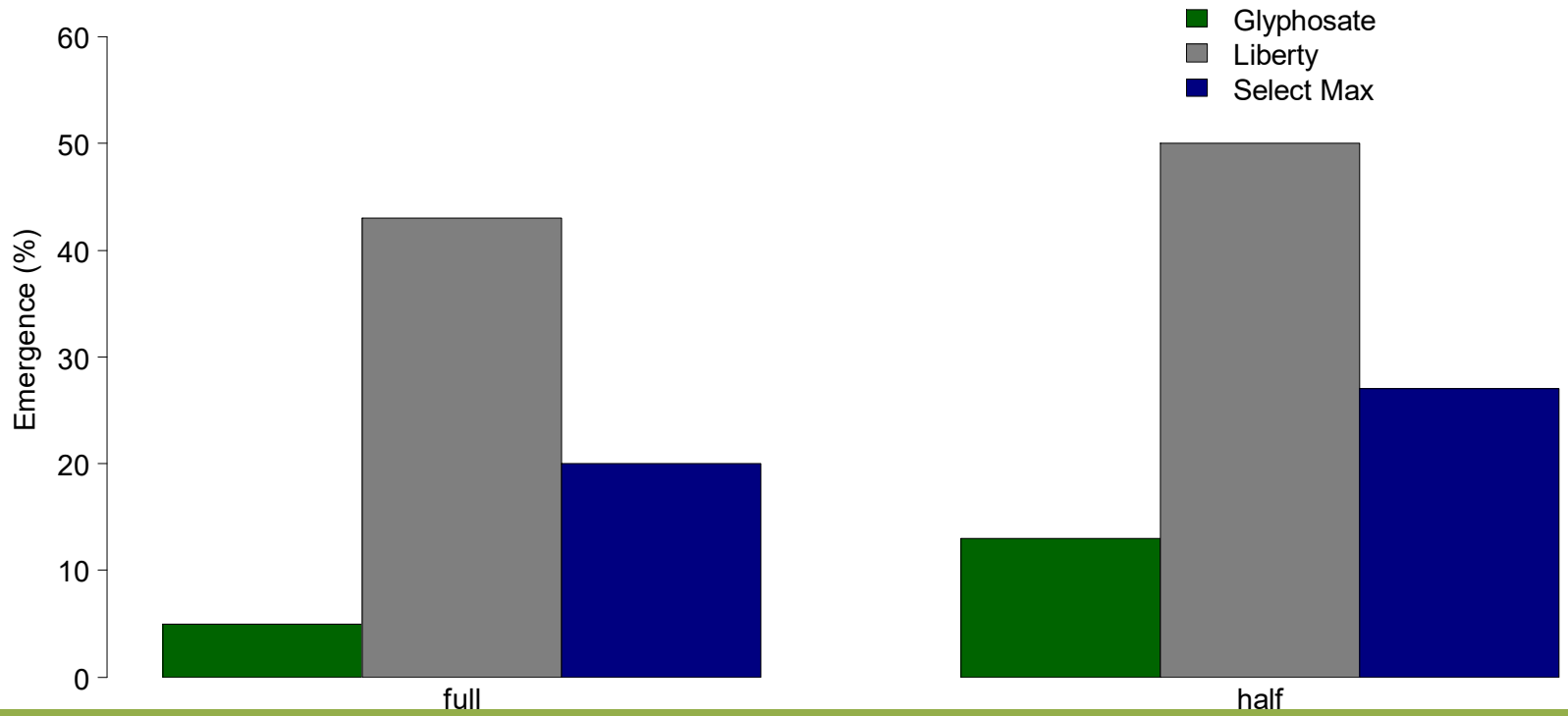
Late Season Herbicide Application Viable Seed Reduction - Boot



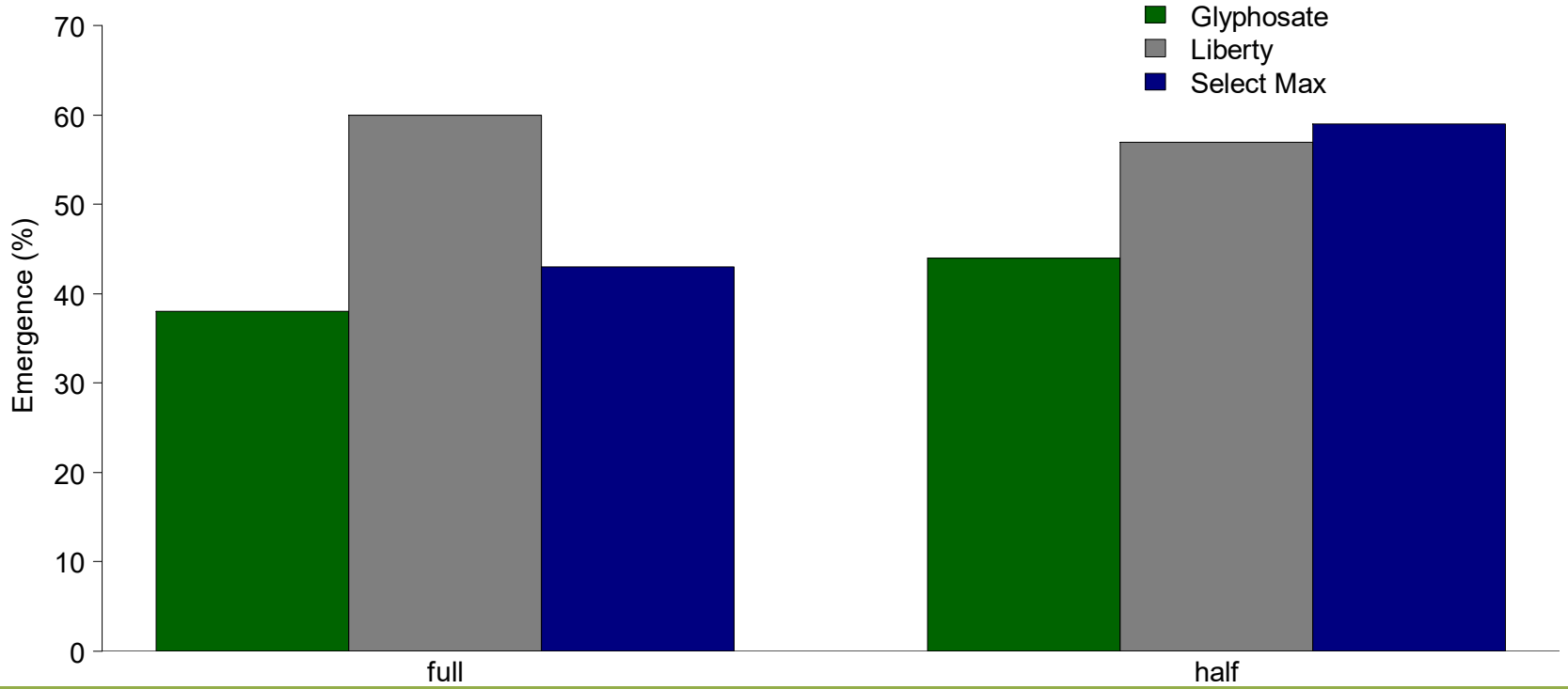
Late Season Herbicide Application Viable Seed Reduction – Full panicle



Late Season Herbicide Application Emergence - Boot



Late Season Herbicide Application Emergence – Full panicle



Effective Johnsongrass Programs Take An Integrated Approach

- Step 1: prevention
- Step 2: control prior to becoming established
- Step 3: fall tillage to bring rhizomes to soil surface
- Step 4: disk in spring prior to herbicide application
- Step 5: two-pass programs with full labeled rates
- Intense infestations of Johnsongrass did not develop overnight
  - It will take persistence over several years to knock back well-established Johnsongrass infestations

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