



# Managing Nematodes in Corn and Soybean

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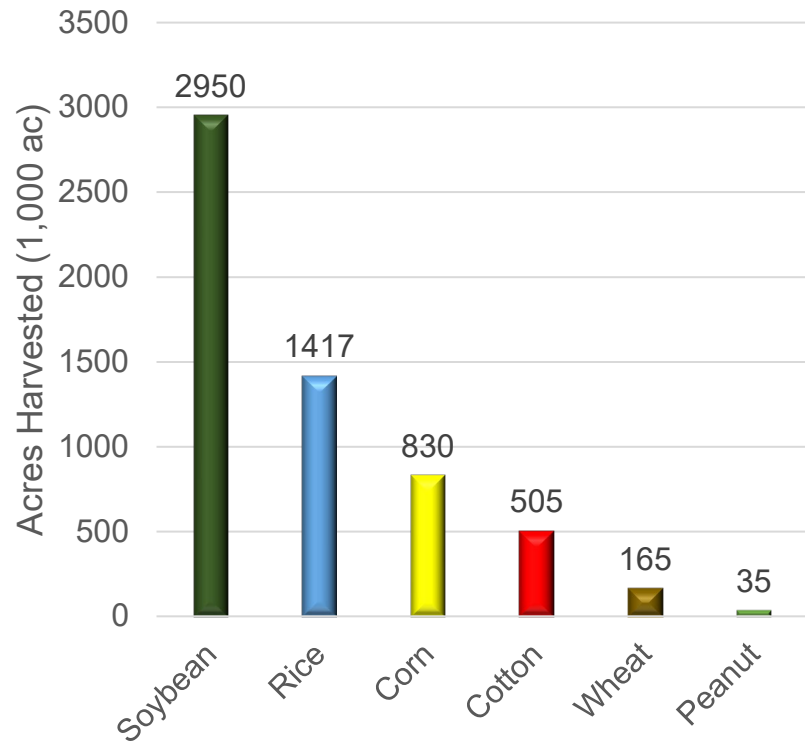
Indiana Certified Crops Advisor Program  
Indianapolis, IN  
December 17, 2024

T. R. Faske

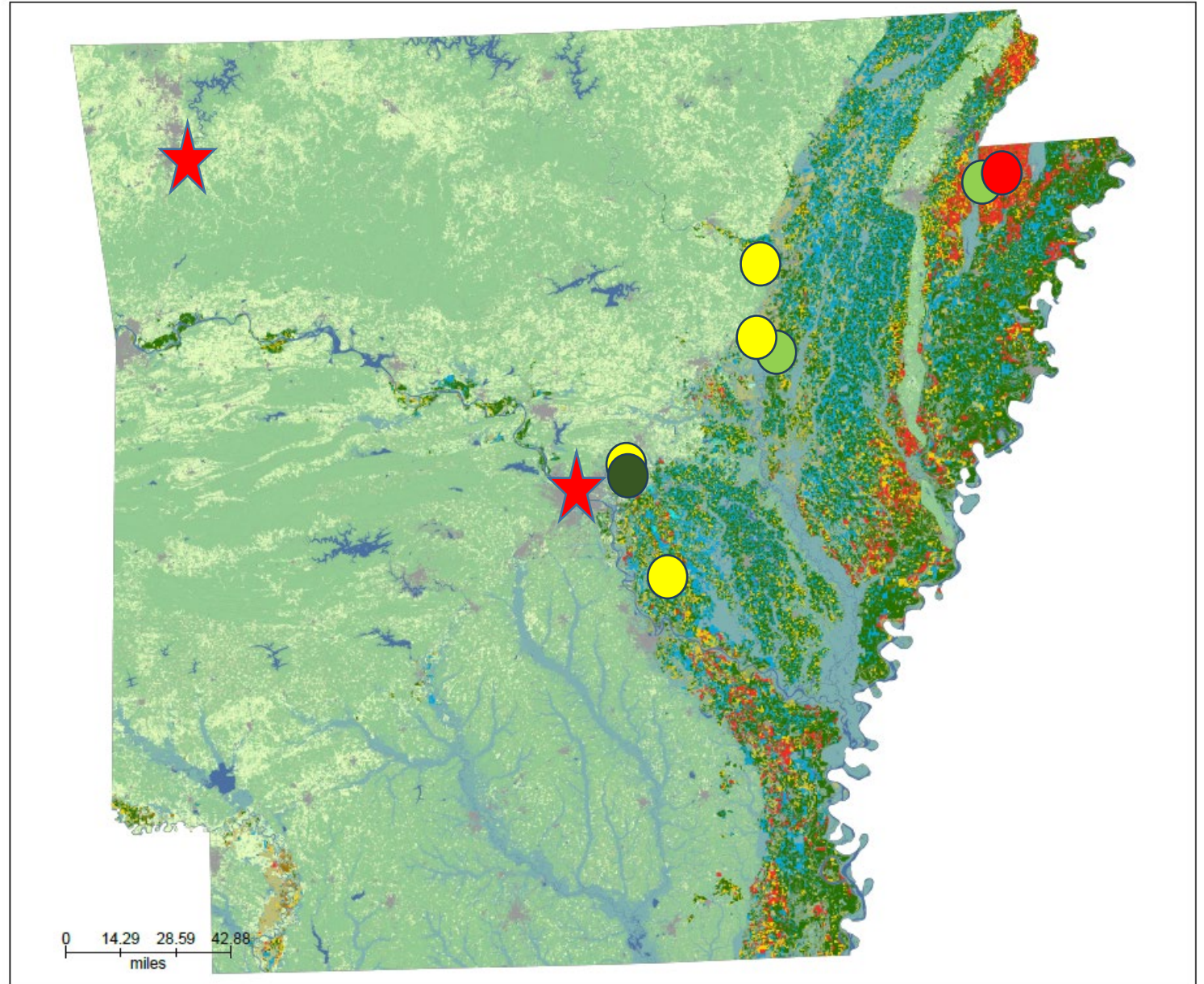


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# Agriculture Landscape 2023



Source: USDA-NASS



# Major Nematodes of Soybean in the South

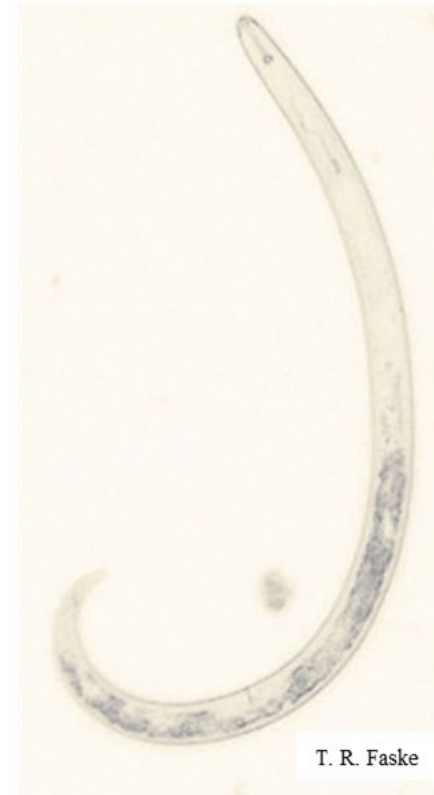
Southern root-knot nematode  
(*Meloidogyne incognita*)



Soybean Cyst Nematode  
(*Heterodera glycines*)



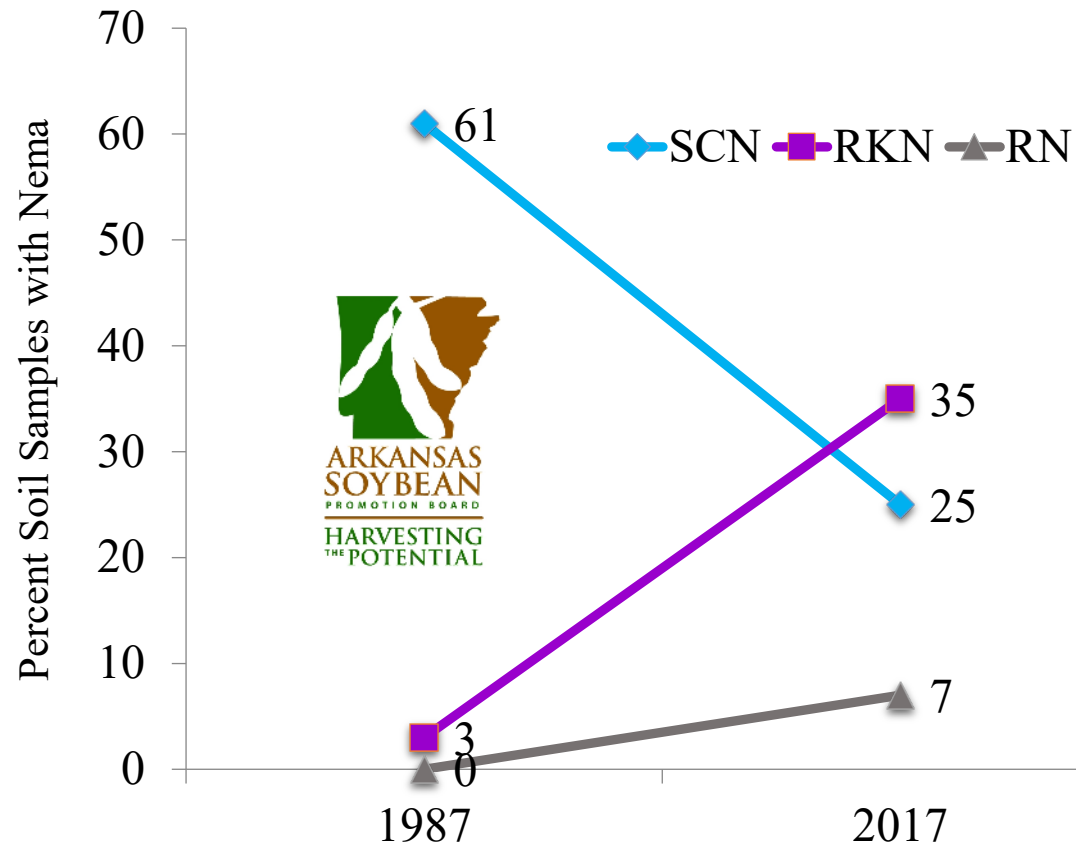
Reniform nematode  
(*Rotylenchulus reniformis*)



Infective  
stages

# Changes in soybean nematodes in 30 yrs in Arkansas

MC McDaniel (1958-90)



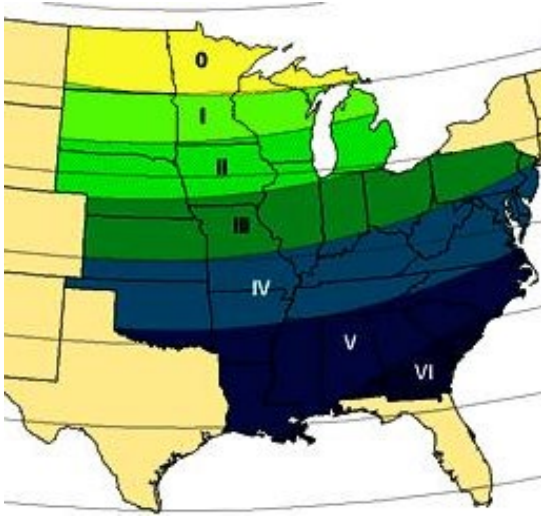
TL Kirkpatrick (1984-2019)



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# Contributing factors to increased Southern RKN

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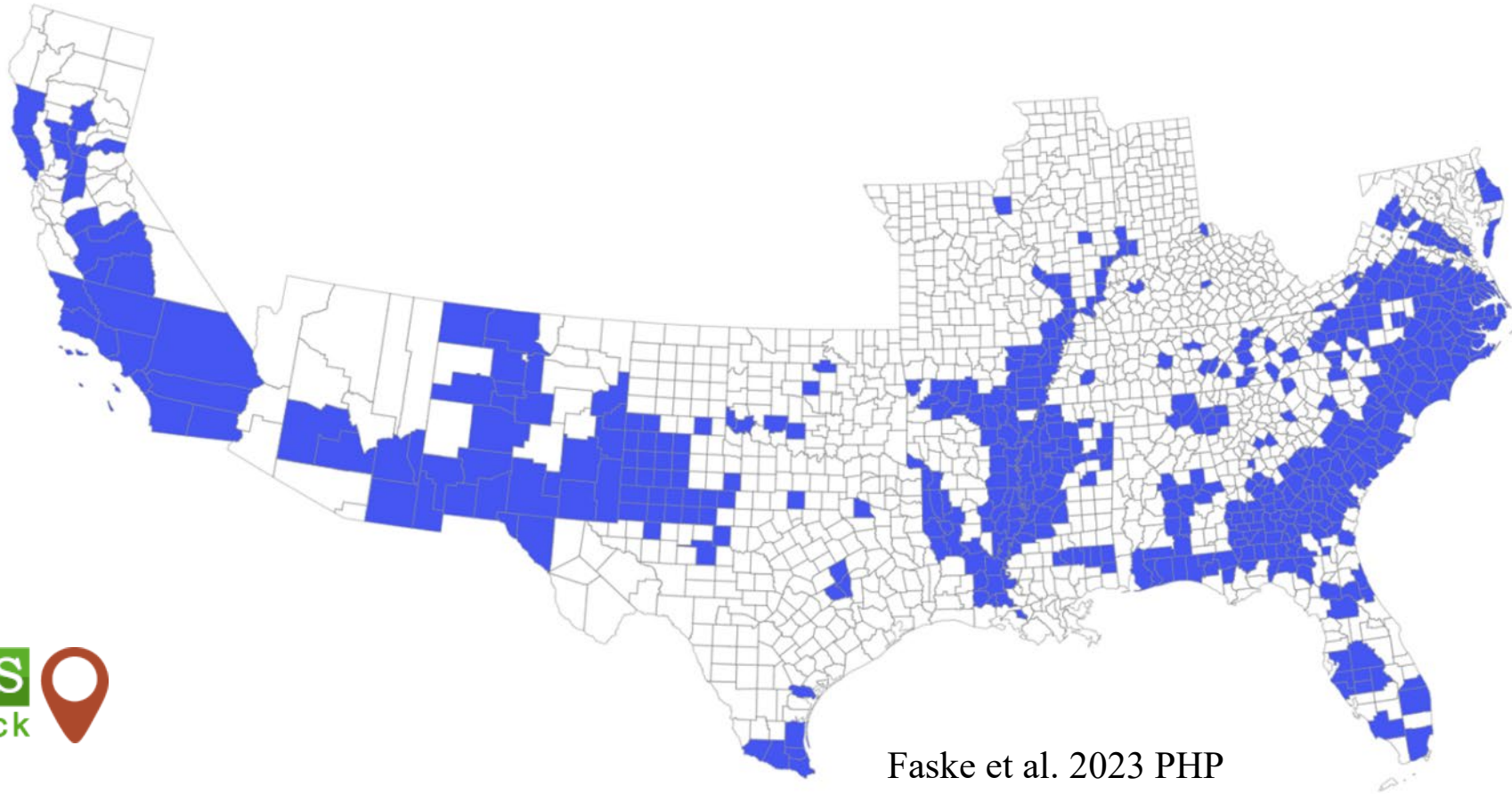
# *Meloidogyne* spp. that infect soybean

- Southern root-knot nematode (*M. incognita*)
- Peanut root-knot nematode (*M. arenaria*)
- Javanese root-knot nematode (*M. javanica*)
- Northern root-knot nematode (*M. hapla*)
- Guava root-knot nematode (*M. enterlobii*)
- Texas root-knot nematode (*M. haplanaria*)
- Others

Infective stage juvenile



# Distribution of the *M. incognita* in field crops



EDD MapS  
find • map • track

Faske et al. 2023 PHP



**When a root-knot nematode issue is often recognized**

T. R. Fenske







T. R. Faske



T. R. Faske



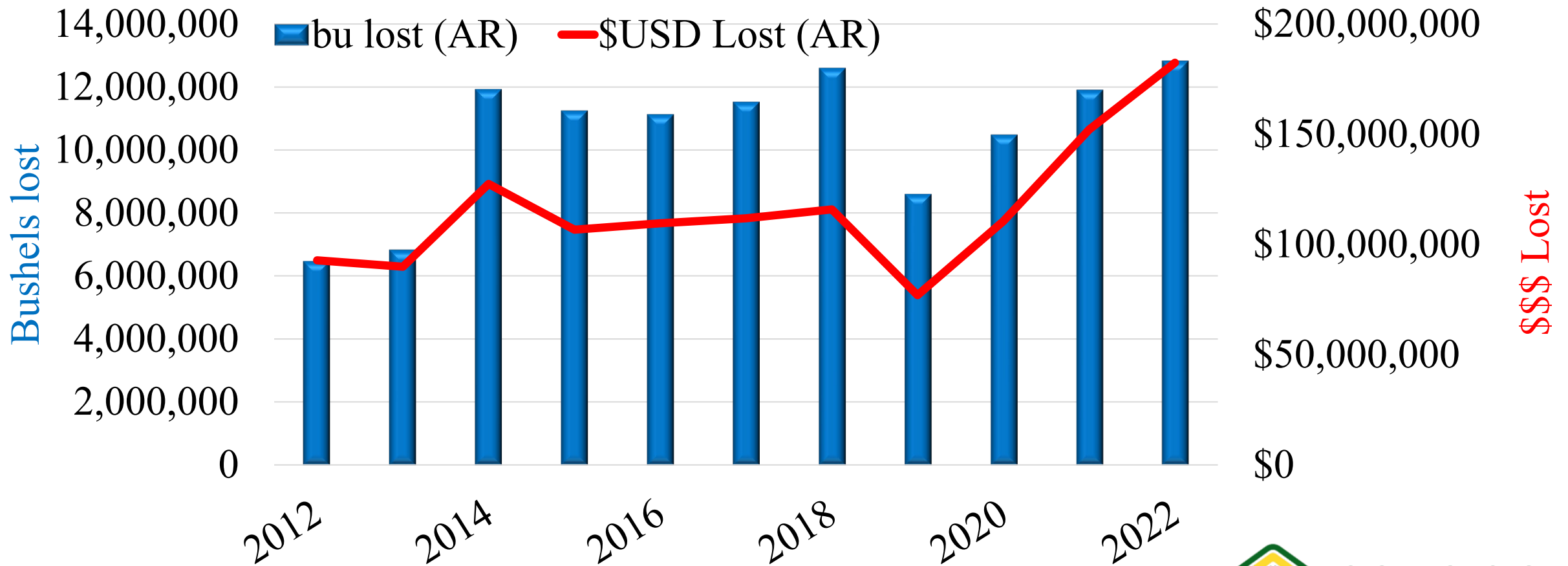
**Mississippi Co., AR:  
soybean following  
cotton (S. Monfort)**

**25 to 30% yield loss per field**

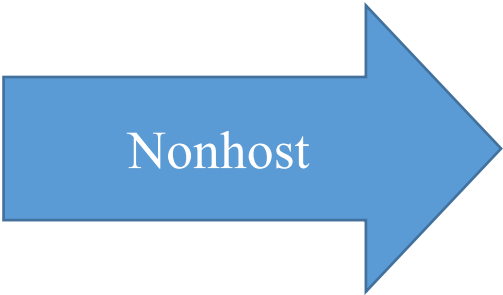
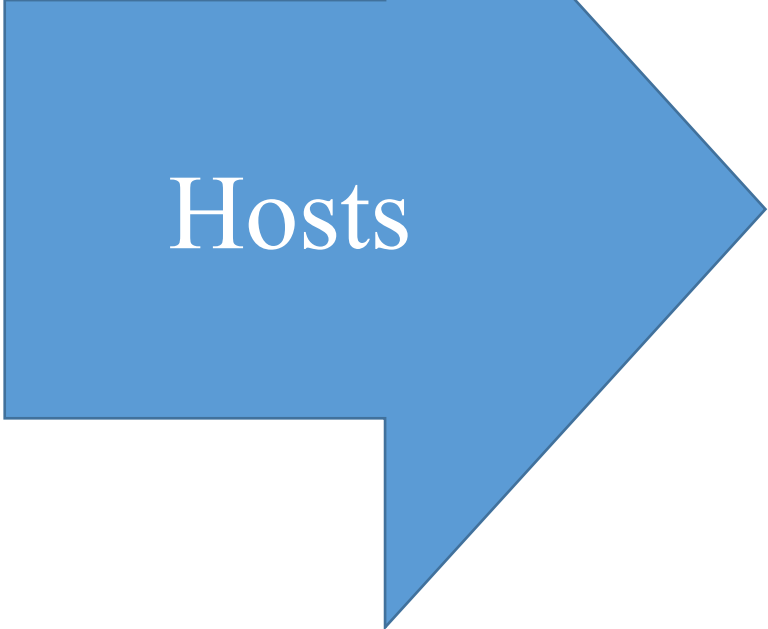


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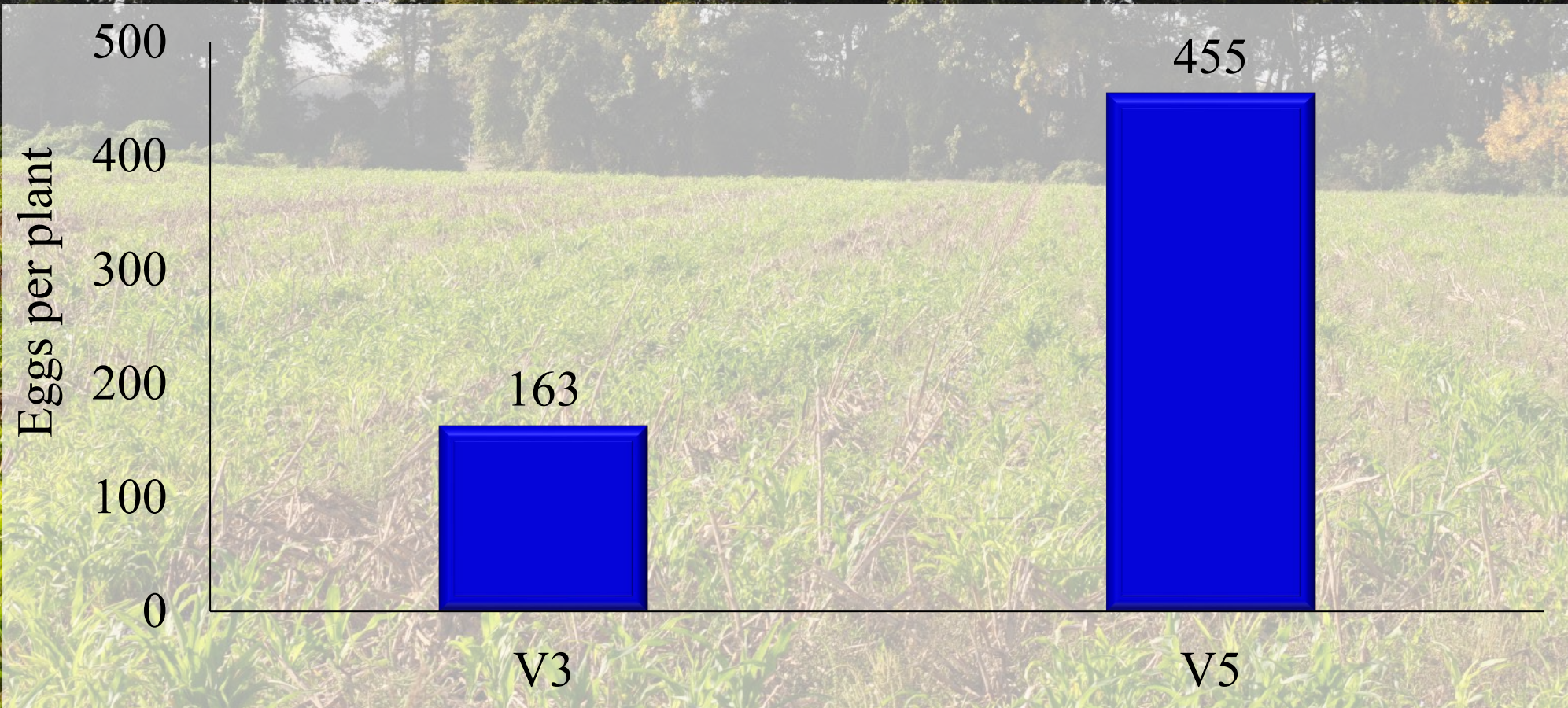
# Yield loss estimates due to Southern RKN in US



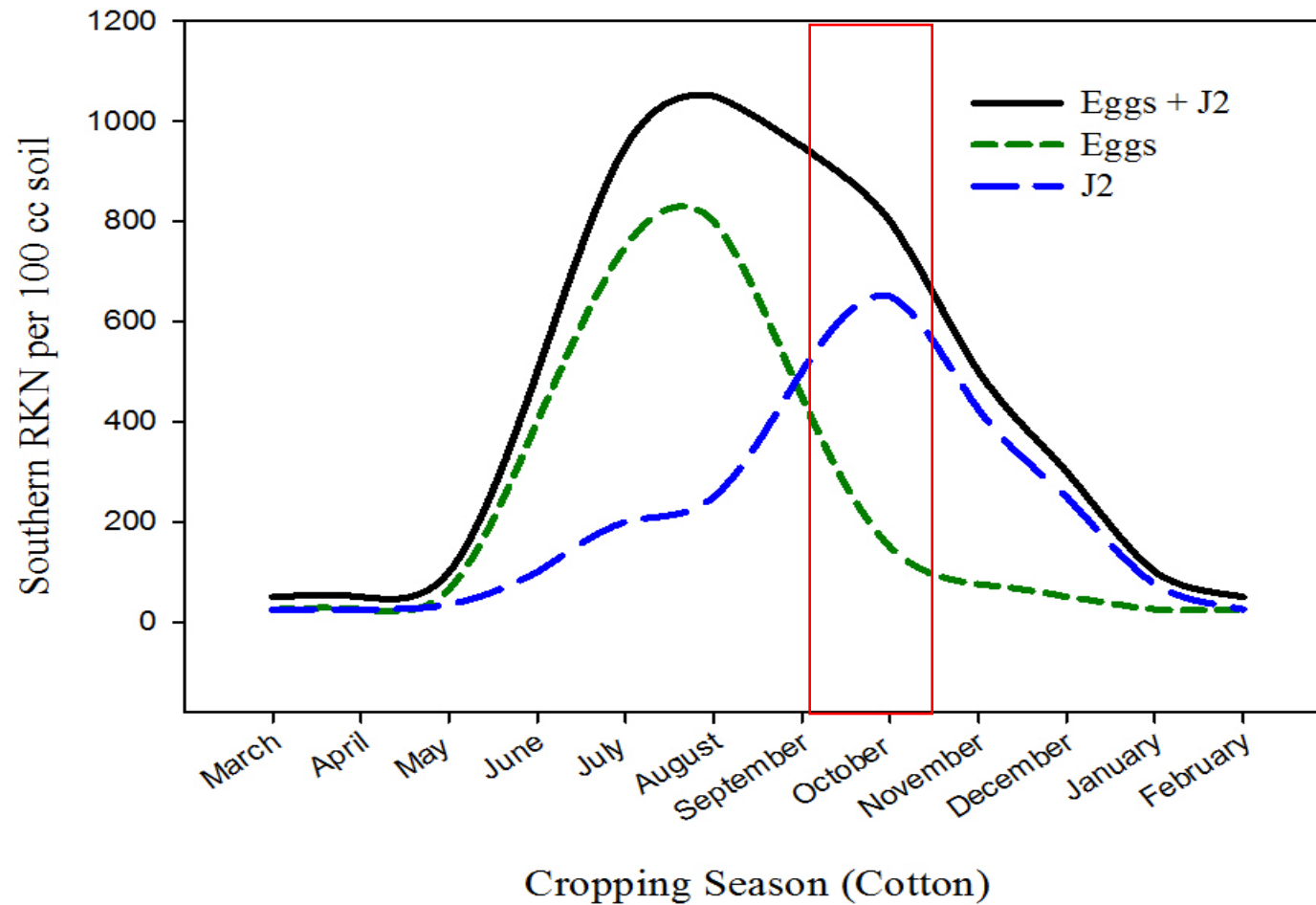
Southern root-knot nematode  
(*Meloidogyne incognita*)



# Volunteer corn



# Changes in RKN population density in a year

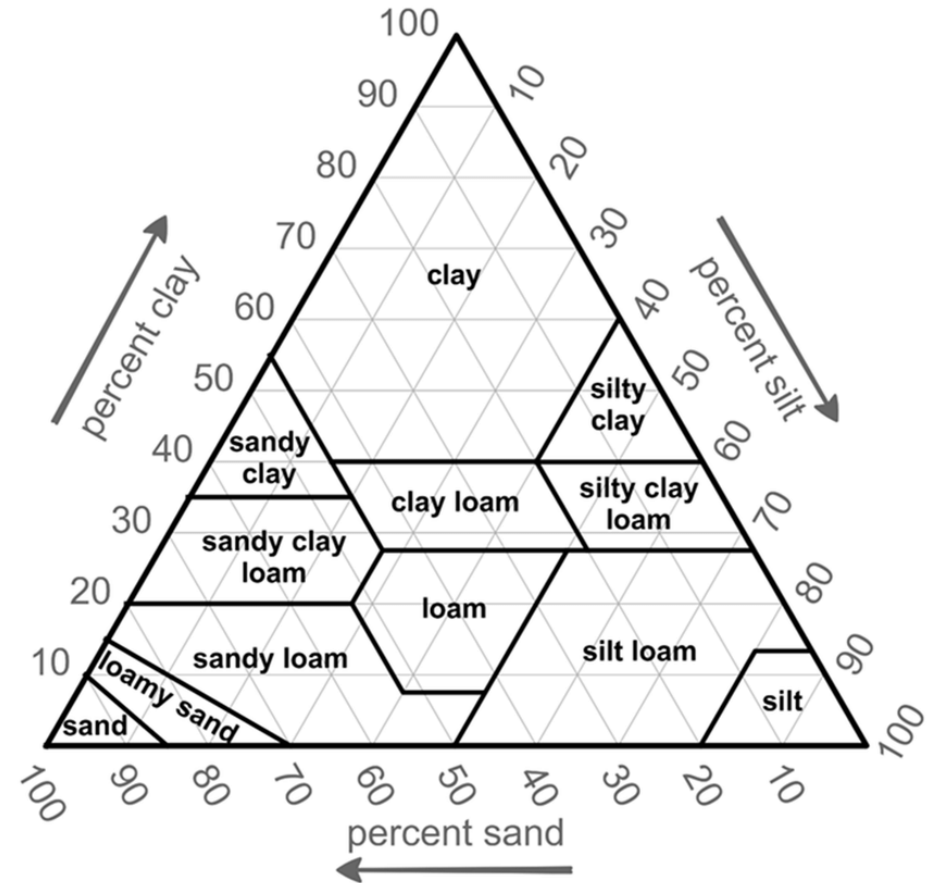




# Threshold in Arkansas

Post-harvest population density for...

Nematode	(nema/100 cm <sup>3</sup> )	(nema/pint)
southern root-knot	60	236





# Management

- Nematicides

# Seed-applied nematicides registered for use in soybean

Trade Name	Active Ingredient	Company	Year Reg.	Signal Word
Avicta	Abamectin	Syngenta	2010	Danger
ILEVO	Fluopyram	BASF	2014	Caution
NemaStrike ST	Tioxazafen	Bayer	2017	Caution
Saltro	Pydiflumetofen	Syngenta	2020	Caution

# Toxicity (24-hr EC<sub>50</sub>) to the southern RKN

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abamectin (0.4 µg ai/ml)

fluopyram (1.2 µg ai/ml)

tioxazafen (57.7 µg ai/ml)

pydiflumetofen (209.4 µg ai/ml)

Faske and Hurd, 2015 – JON - fluopyram

Faske et al. 2022 – JON - tioxazafen

Brown et al. 2023 – CP - pydiflumetofen

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<del>NemaStrike ST</del>	<del>Tioxazafen</del>	<del>Bayer</del>	<del>2017</del>	<del>Caution</del>
Saltro	Pydiflumetofen	Syngenta	2020	Caution
VOTiVO	<i>Bacillus firmus</i> I-1582	BASF	2010	Caution
BioST Nematicide or Nemasect	<i>Burkholderia rinojensis</i> A496	Albaugh or Becks	2014	Caution
AVEO EZ Nematicide	<i>B. amyloliquefaciens</i> PTA-4838	Valent	2017	Caution
Trunemco	<i>B. amyloliquefaciens</i> strain MBI 600 + cis-Jasmone	Nufarm	2020	Caution

# Soybean Nematicide Study (2018 to 2021)

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# Seed-applied nematicide study

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- 4 yr summary (2018 to 2021)
  - Delta Grow, DG 4880 GLY
  - 4 row, 30-ft long plots, 4 to 6 reps, RCBD
  - Pf avg. 500 J2/100 cm<sup>3</sup> soil
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# Soybean Nematicide Study

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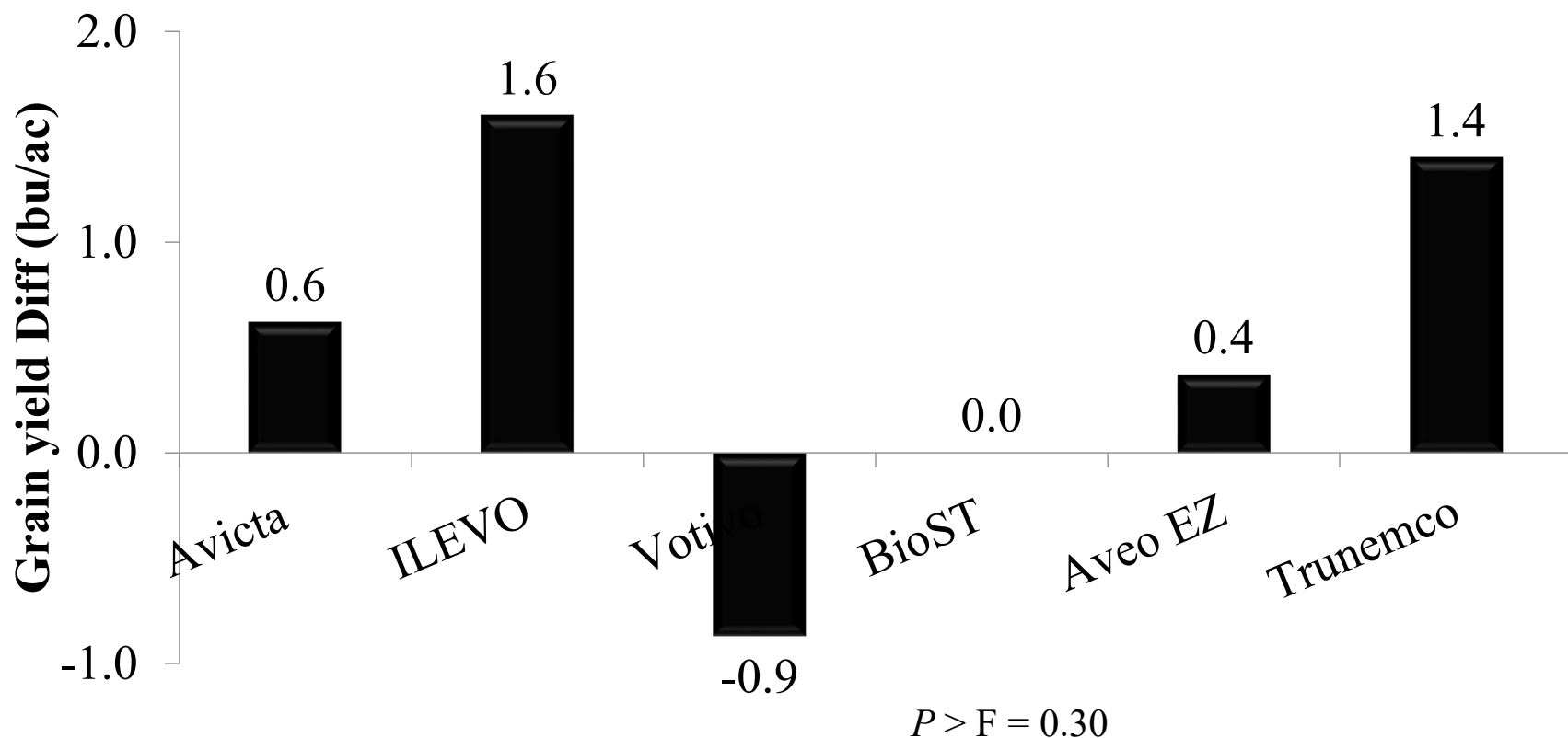
- No nematicide consistently suppressed RKN galling







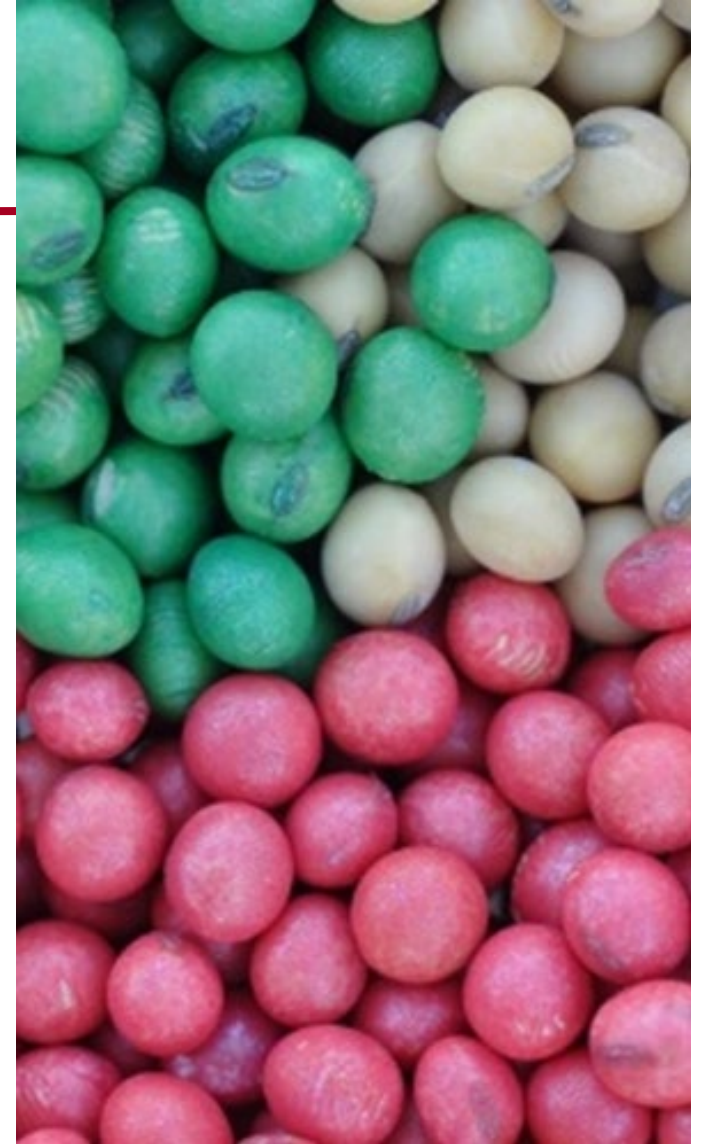
# Susceptible var. Avg. 36.1 bu/ac



Frequency of > 2 bu/ac:

- Trunemco = 45%
- ILEVO = 50%
  
- Avg. Yield protection 4%

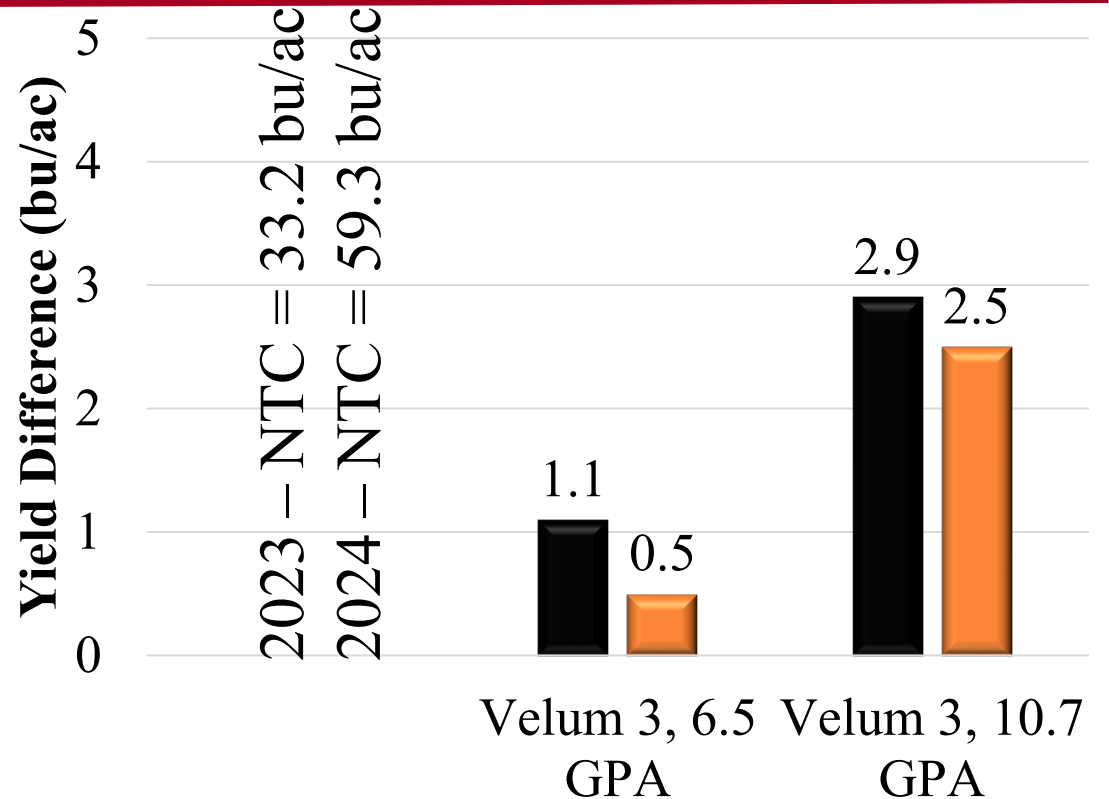
# Limitations in Root Protection by Seed- Applied Nematicides



# Velum Experiments (2023 and 2024)

4 RKN-S cv. used

1. 3 vs 5 fl oz at 6.5 GPA
2. 3 fl oz at 6.5 and 10.7 GPA



$P > F = 0.07$  for 2023

$P > F = 0.42$  for 2024



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# Challenges

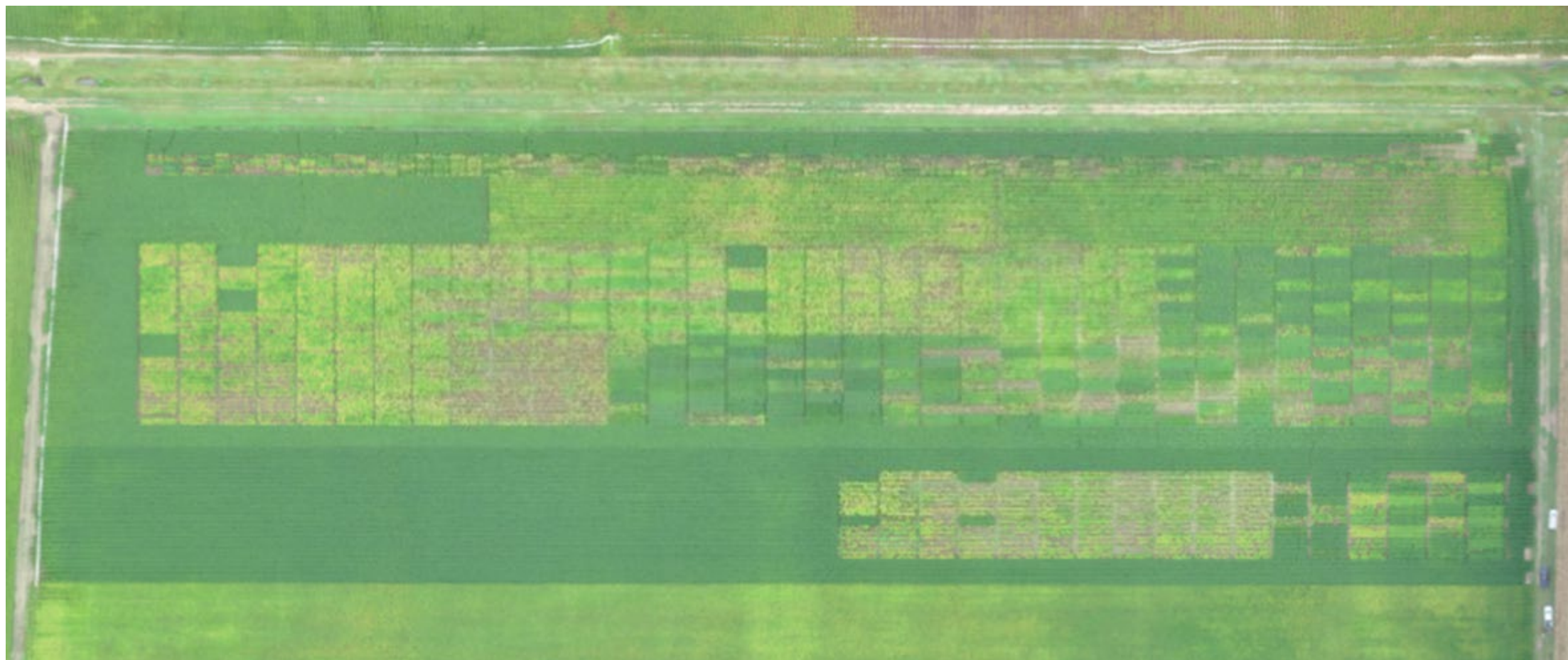
- Nematicides
  - Host Plant Resistance
-

# 2024 Field Call (XF Cultivar)

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# Nematode distribution in field screen



# Susceptibility Ratings

Percent Galling	Susceptibility
0.0– 1.0	VR
1.1 – 4.0	R
4.1 – 9.0	MR
9.1 – 20.0	MS
20.1 – 40.0	S
40.1 – 100.0	VS

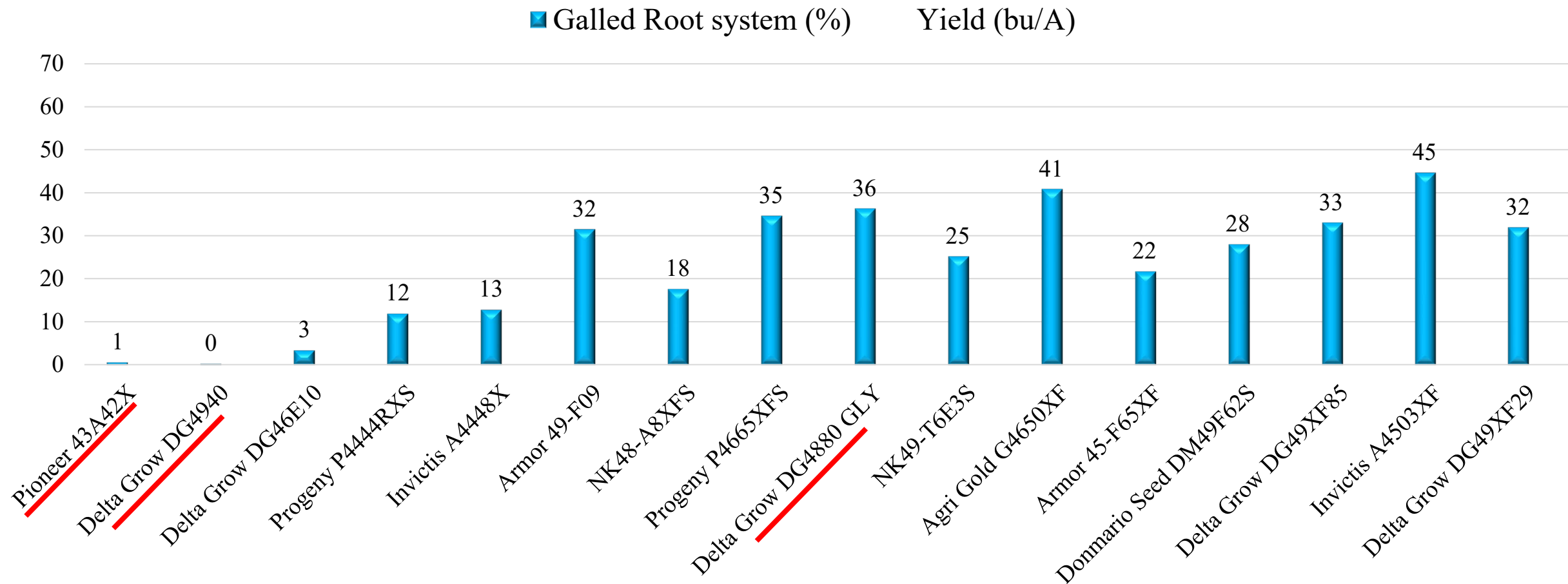


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# 2023 MG IV Exp. 1

Pf = 455 J2/100 cm<sup>3</sup> soil  
Sandy loam (49 – 46 – 5)

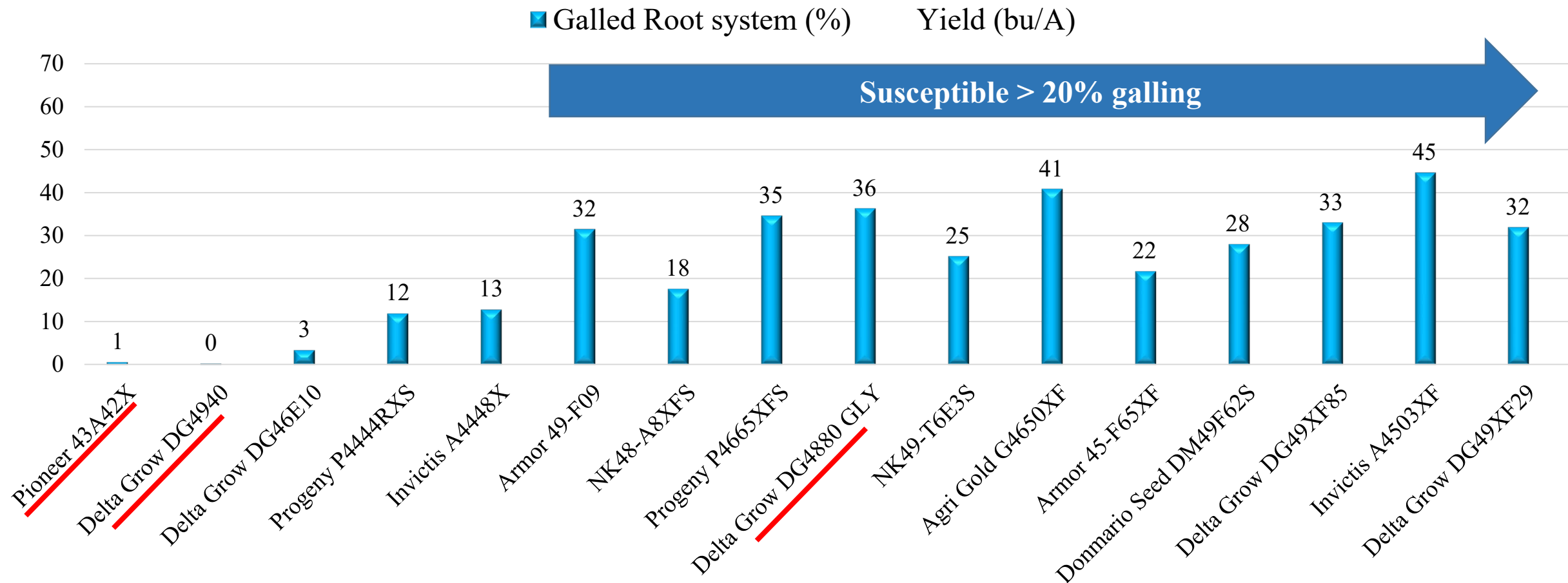






# 2023 MG IV Exp. 1

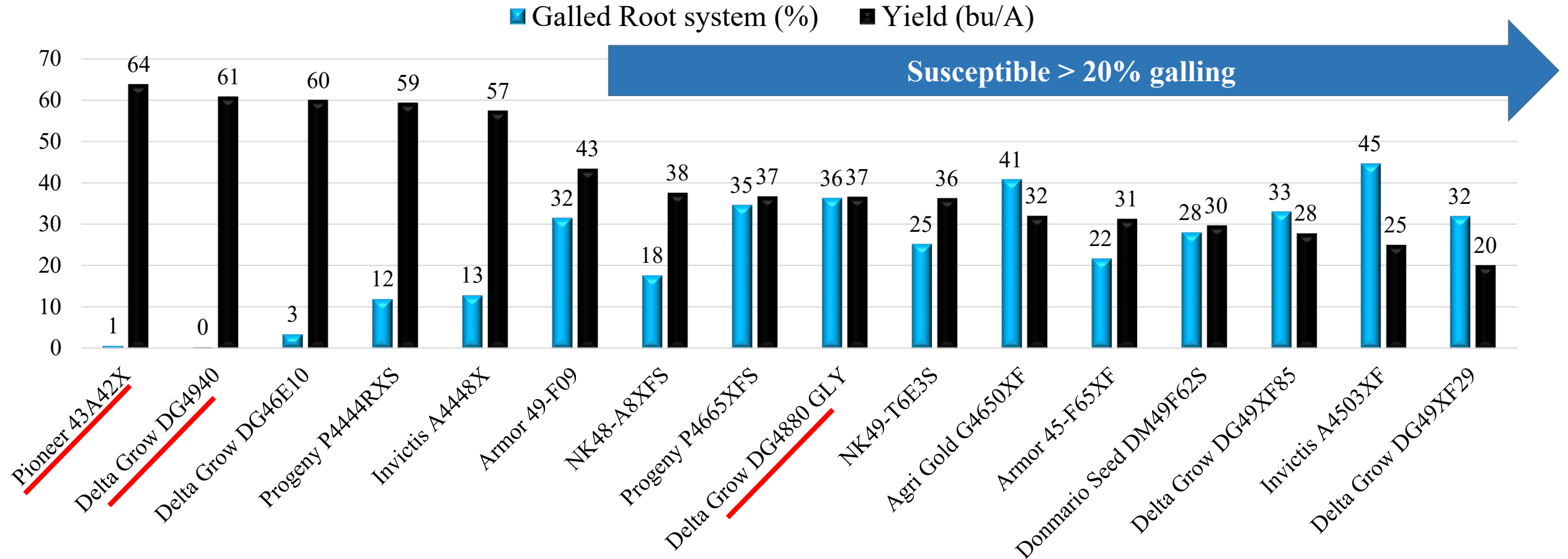
Pf = 455 J2/100 cm<sup>3</sup> soil  
Sandy loam (49 – 46 – 5)





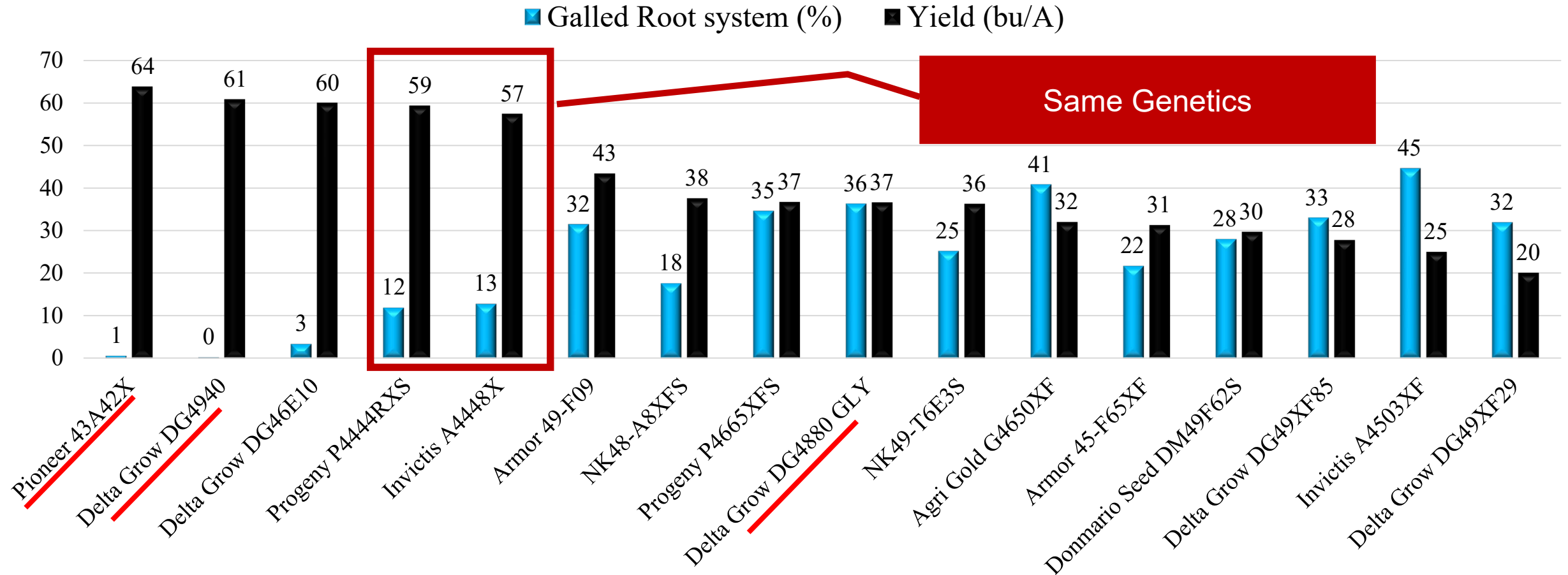
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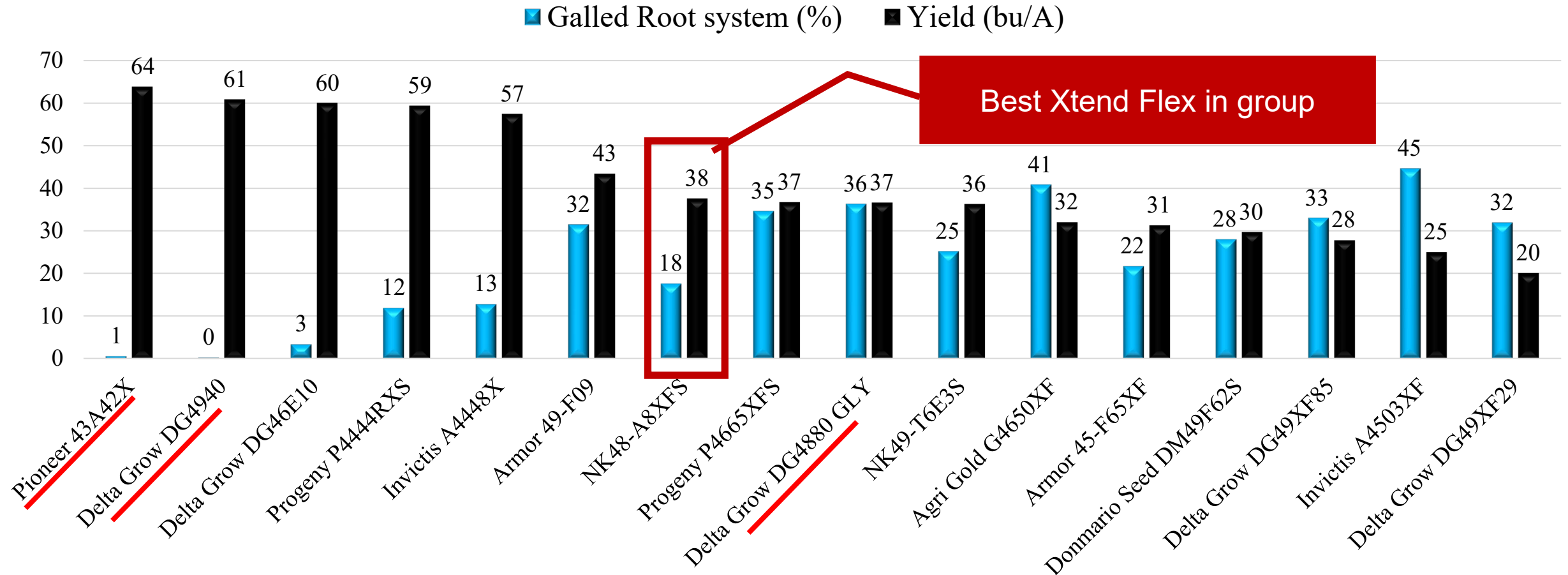
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# 2023 MG IV Exp. 1

Pf = 455 J2/100 cm<sup>3</sup> soil  
Sandy loam (49 – 46 – 5)



# Management

1. Nematicides
2. Resistant Soybean Cultivars
  - MG IV is MR at best and provide 35 to 45% grain yield protection.



## Selected MR, MGIV Cultivars

- Delta Grow DG46E10, DG4940
- Go Soy 493E22N
- Petrus Seed 49G16 GT
- Pioneer P43A42X, P46A36X, P43Z44SE\*, P46Z53E\*

\* = 1 yr data

[uaex.uada.edu/disease\\_pubs](http://uaex.uada.edu/disease_pubs)

**Soybean  
Variety Field  
Screen  
Results  
2017 to 2024**



## Avg. yield of MS and MR Entries

- MG IV = 58 bu/ac
- MG V = 64 bu/ac
  
- 10% difference or avg. 7 bu/ac

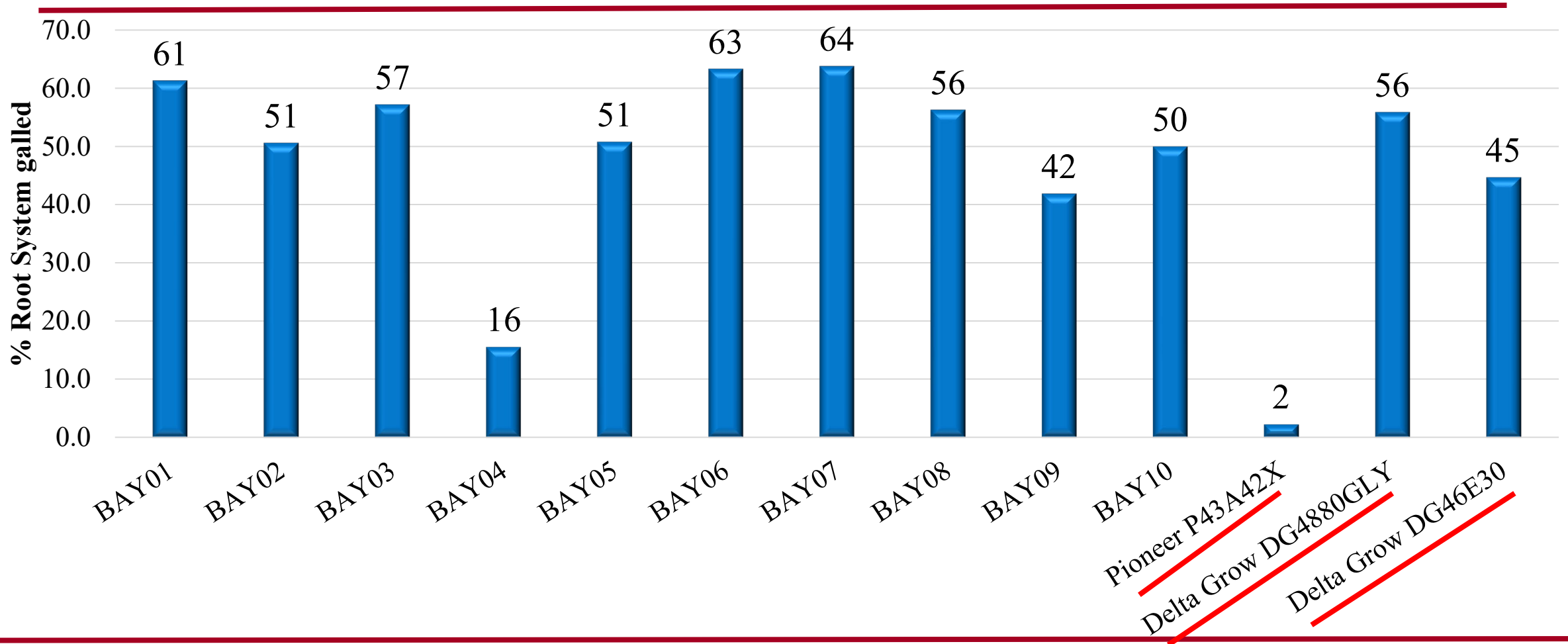


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# MG III Cultivars - 2024

## Kerr, Arkansas

Planting date: June 7, 2024  
Silt Loam (45 – 51 – 4)  
Pf = 693 J2/100 cm<sup>3</sup> soil





Impact of Variety  
selection on  
reduction of  
RKN densities.

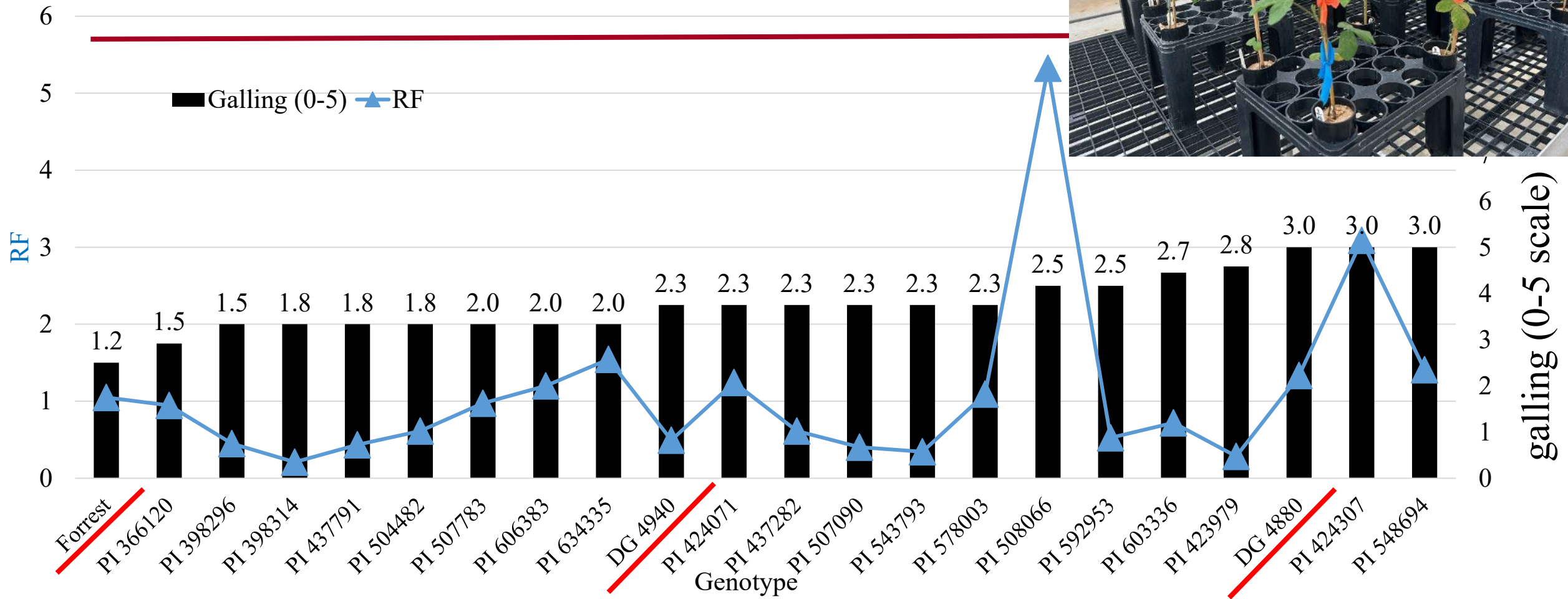




## **RKN Reduction**

- 50% with MR Soy
- 90% with R Cotton
- 99% with peanut

# Better Sources of Resistance



# Corn Nematodes



- Nematode survey sponsored by CGSB. In 360 samples...
  - Stubby-root nematode (22%)
  - Lesion nematode (63%)
  - Southern root-knot nematode (31%)





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J. D. Mueller

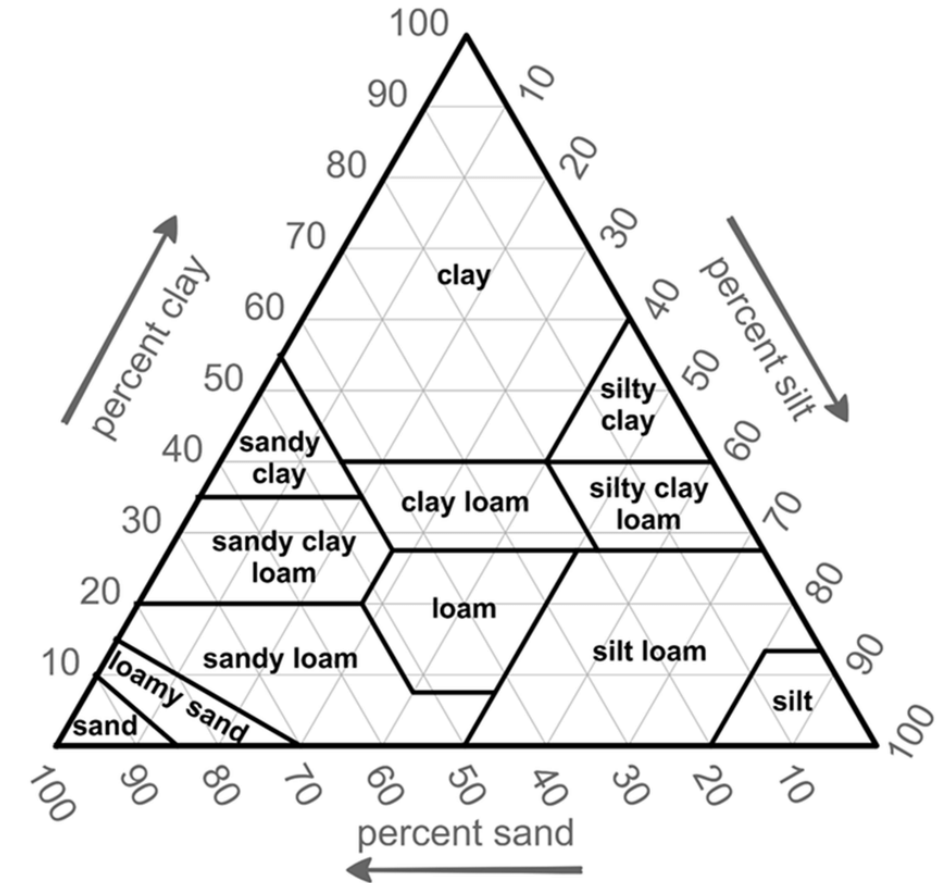


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# Fall thresholds (nema/100 cm<sup>3</sup> soil)

Nematode	Loamy Sand	Sandy Loam
Stubby-root	30	40
Lesion	250	500
Southern root-knot	400	500



# Management Options

Crop  
Rotation

Host  
Resistance

Avoidance

Nematicides





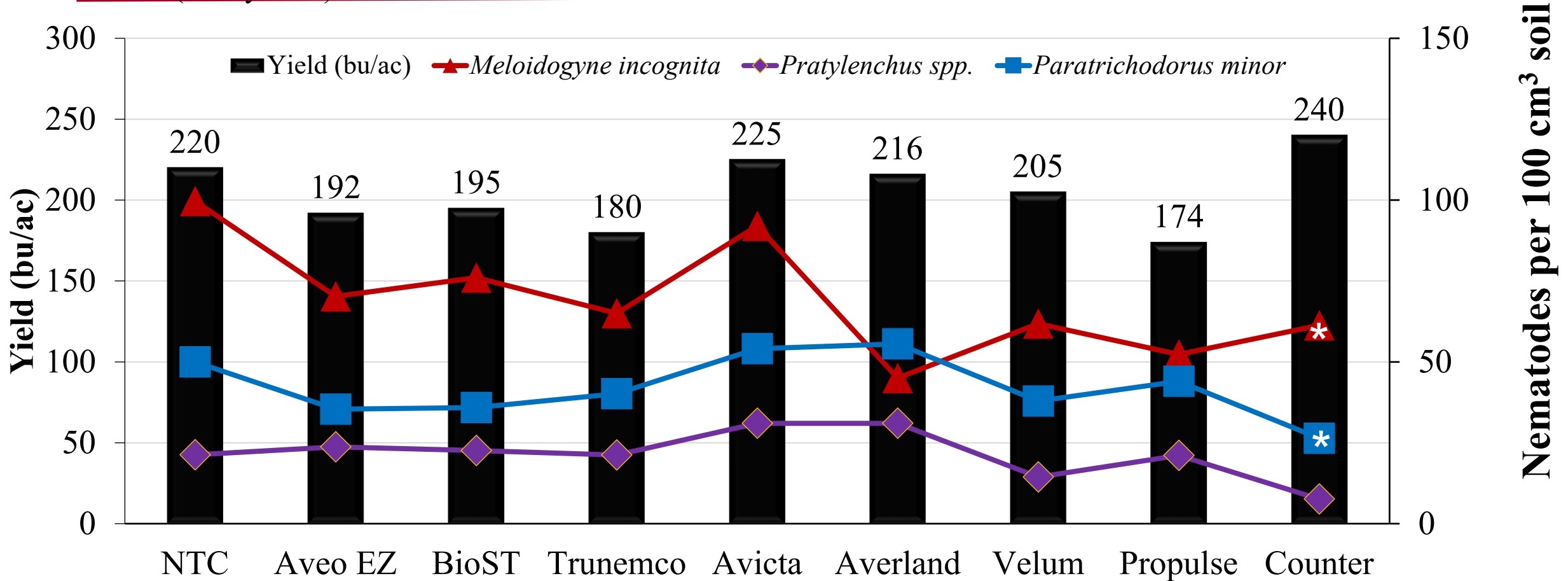
# 2021- 2022 Trial Treatments, Jackson Co.

Treatment (rate)	Nematicide	App
Non-nematicide control		
Aveo EZ Nematicide (0.1 fl oz/cwt)	<i>Bacillus amyloliquefaciens</i> PTA-4838	ST
BioST Nematicide 100 (7.0 oz/cwt)	<i>Burkholderia rinojensis</i> A396	ST
Trunemco corn/soy (0.30 fl oz/cwt)	<i>B. amyloliquefaciens</i> MBI 600 + cis-Jasmone	ST
Avicta 500 FS (2.37 fl oz/cwt)	abamectin	ST
<b>Averland 0.7 FC (6 fl oz/ac)</b>	<b>abamectin</b>	<b>IF</b>
<b>Velum 4.16 SC (3.0 fl oz/ac)*</b>	<b>fluopyram</b>	<b>IF</b>
<b>Propulse 3.34 SC (8.0 fl oz/ac)*</b>	<b>fluopyram + prothioconazole</b>	<b>IF</b>
<b>Counter 20 G (6.5 lb/ac)</b>	<b>terbufos</b>	<b>IF</b>

# Corn nematocides (2021), Jackson Co.

Local Seed LC1577, Planted April 13, 2021

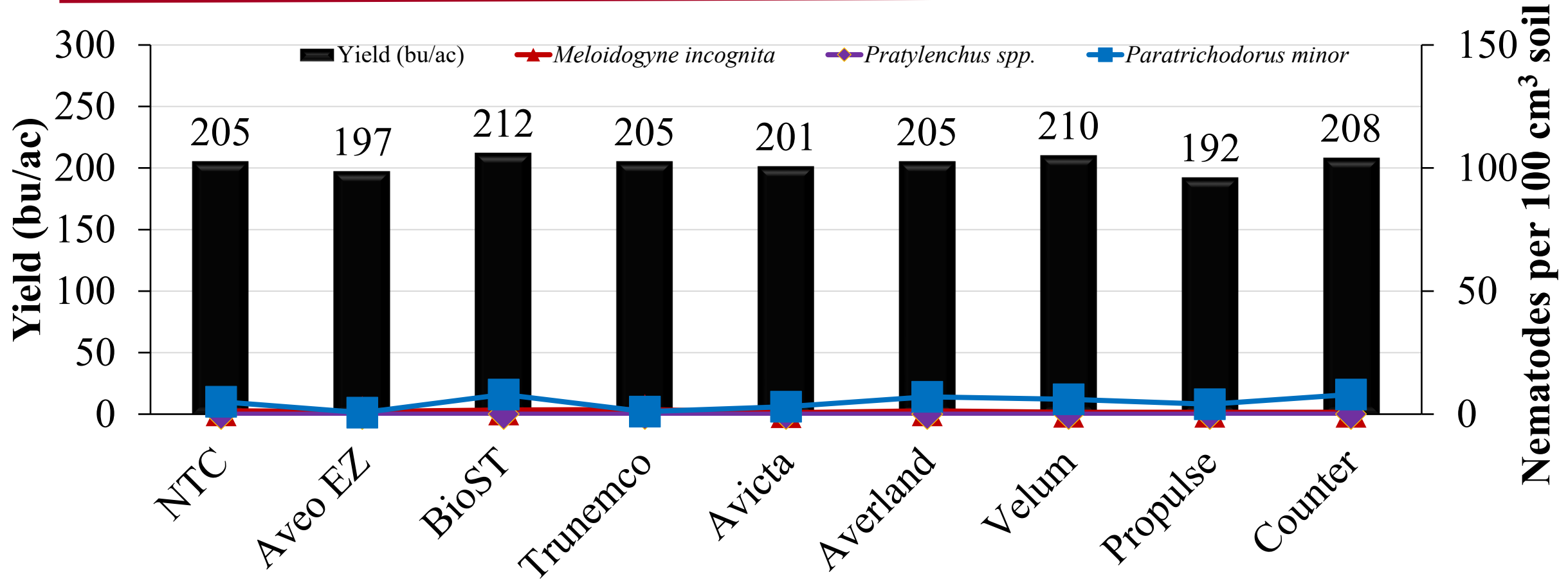
76-20-4 (loamy sand)



# Corn nematocides (2022), Jackson Co.

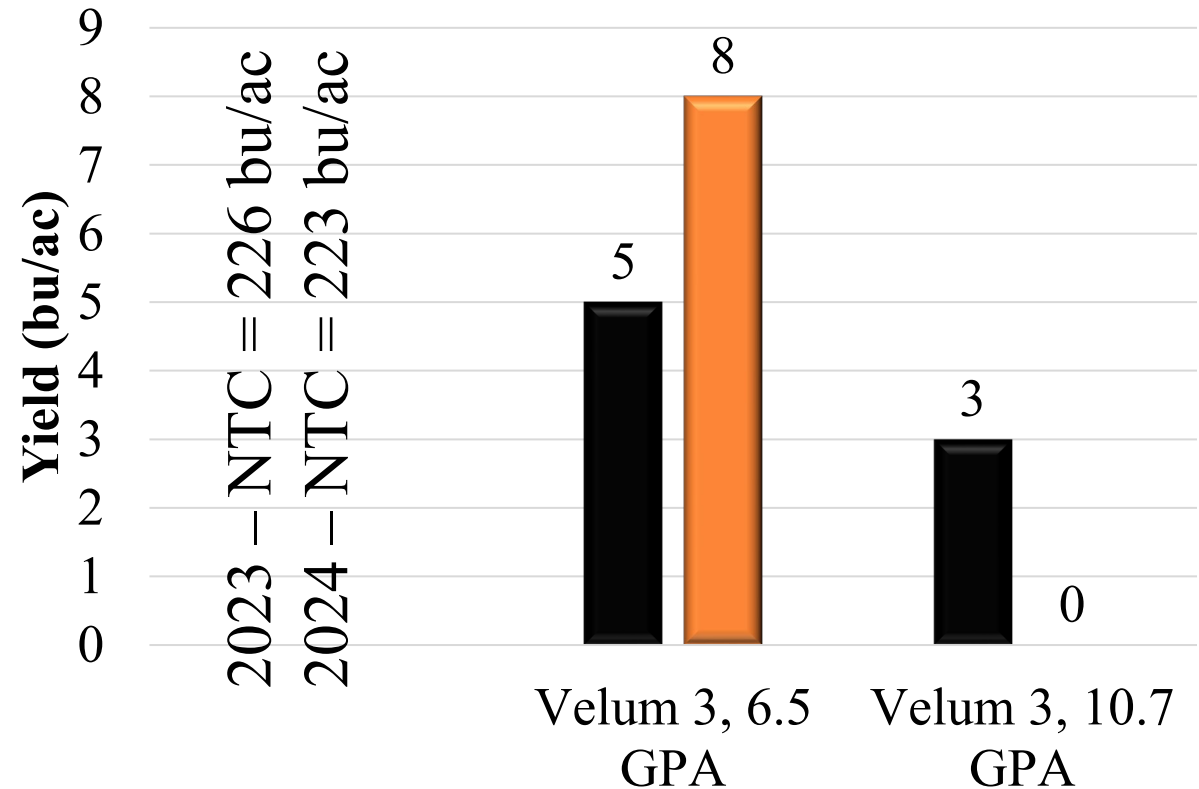
Pioneer P1870YHR, Planted May 11, 2022

Sandy loam 64-25-11



# Velum Experiments in corn

- 5 hybrids used
  - 3 fl oz/ac at 2 GPA



$P > F = 0.21$  for 2023

$P > F = 0.12$  for 2024

# Closing thoughts

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- Nematodes are not going away
- Nematicide availability has increased, but variable in root and yield protection.
- More resistant cultivars are needed in soybean



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**National Peanut Board**



**ARKANSAS  
SOYBEAN  
PROMOTION BOARD**  
**HARVESTING  
THE POTENTIAL**

# Funding Agencies





**Thank you**

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