The Use of Resistance Genes to Fight Against Nematodes

Marina Rondon, T. Wheeler & K. Lege
Plant Pathology & Microbiology Department

TEXAS A&M AGRILIFE EXTENSION

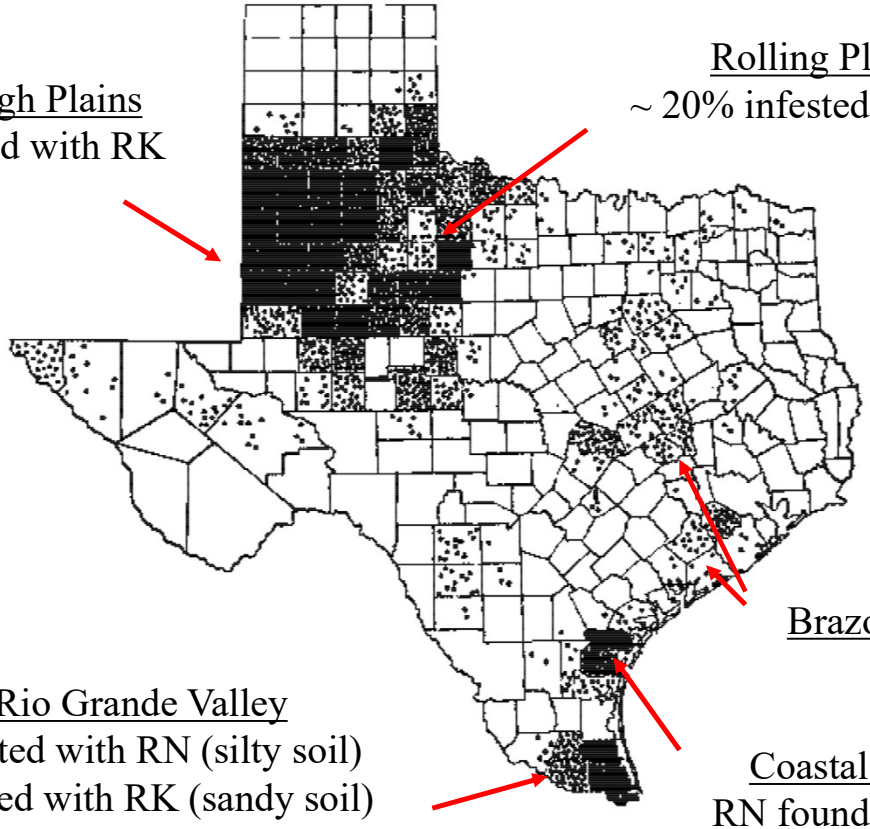
2025 Southwest Cotton Physiology Conference

Integrated Nematode Management (INM)

Sikora RA, Helder J, Molendijk LPG, Desaeger J, Eves-van den Akker S, Mahlein AK. Integrated Nematode Management in a World in Transition: Constraints, Policy, Processes, and Technologies for the Future. *Annu Rev Phytopathol*. 2023 Sep 5;61:209-230.

Root-knot and Reniform Nematode Distribution on Cotton

YIELD LOSSES
RKN: ~ 26%
RN: ~ 50%



Southern High Plains
~ 50% infested with RK

Rolling Plains
~ 20% infested with RK

Brazos Valley & Upper Gulf Coast
occasional RN

Lower Rio Grande Valley
~ 30% infested with RN (silty soil)
~ 25% infested with RK (sandy soil)

Coastal Bend
RN found in 2004

T. Wheeler

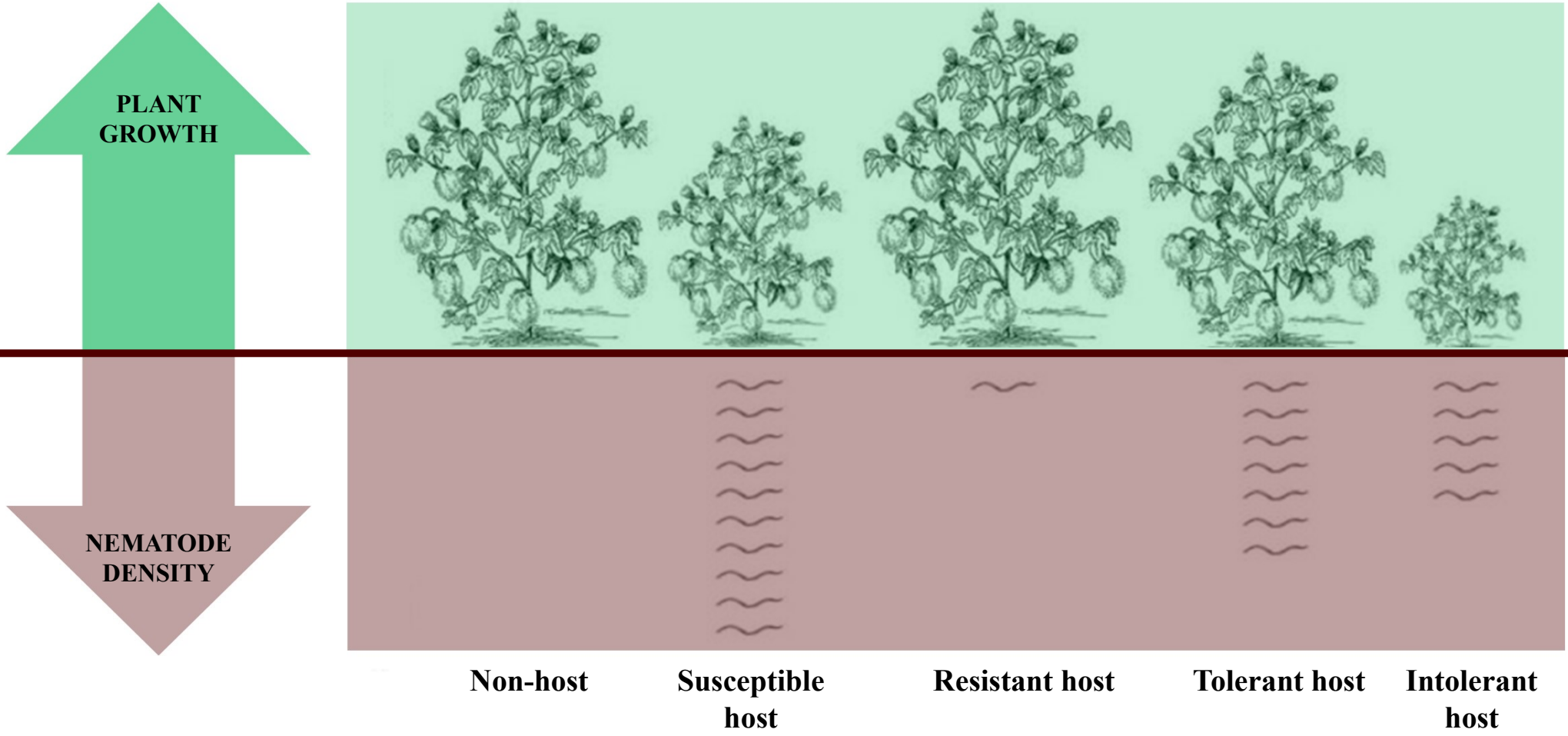
Genetic control

Susceptible cultivar DP 1646 B2XF

Nematode-resistant cultivar DP 2141NR B3XF

Trial at NFREC-Quincy under reniform nematode pressure, at 74 days after planting. Source: Zane Grabau, UF.

Modeled after McKerny and Roberts

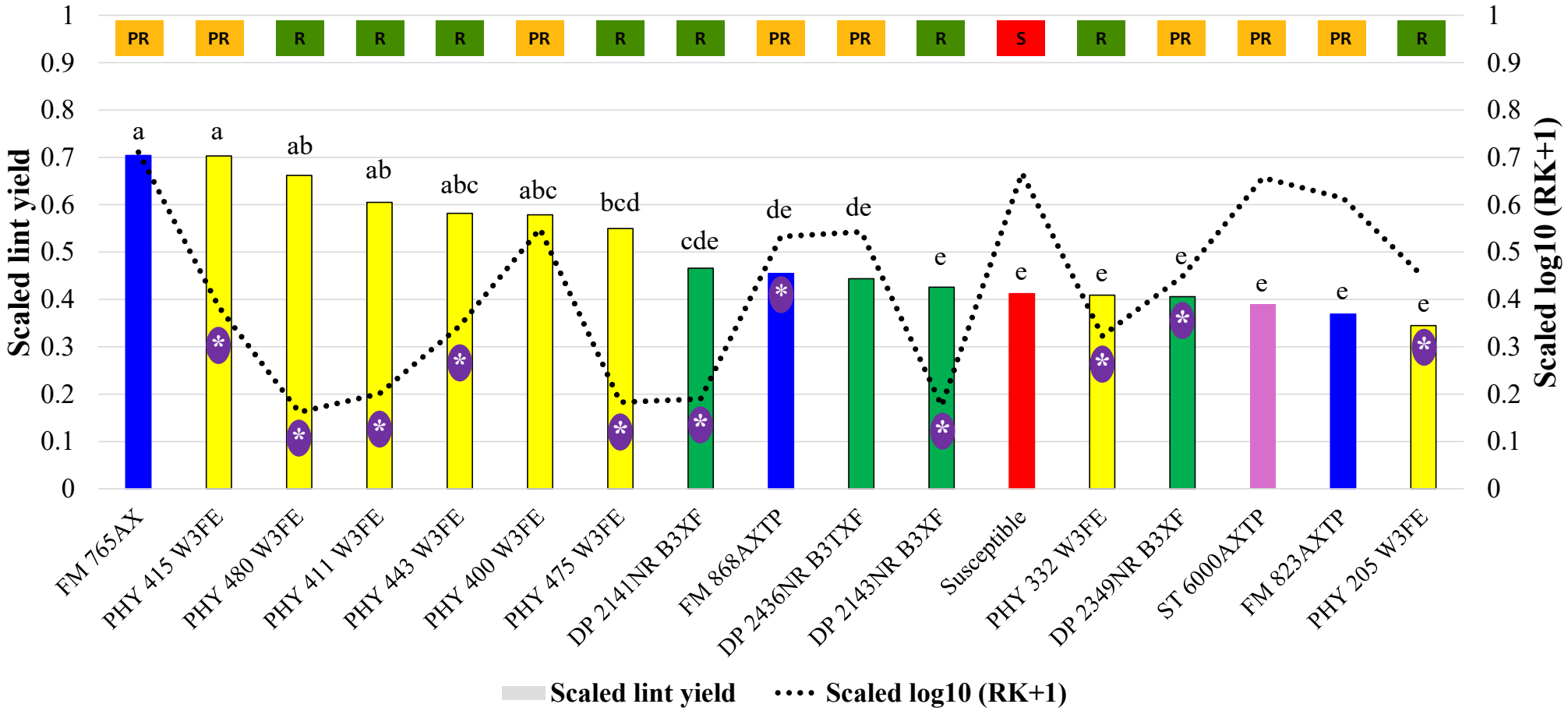


Season 2024

Root-knot Nematode (*Meloidogyne incognita*)

Texas A&M AgriLife Extension

Root-knot Nematode (nine locations)

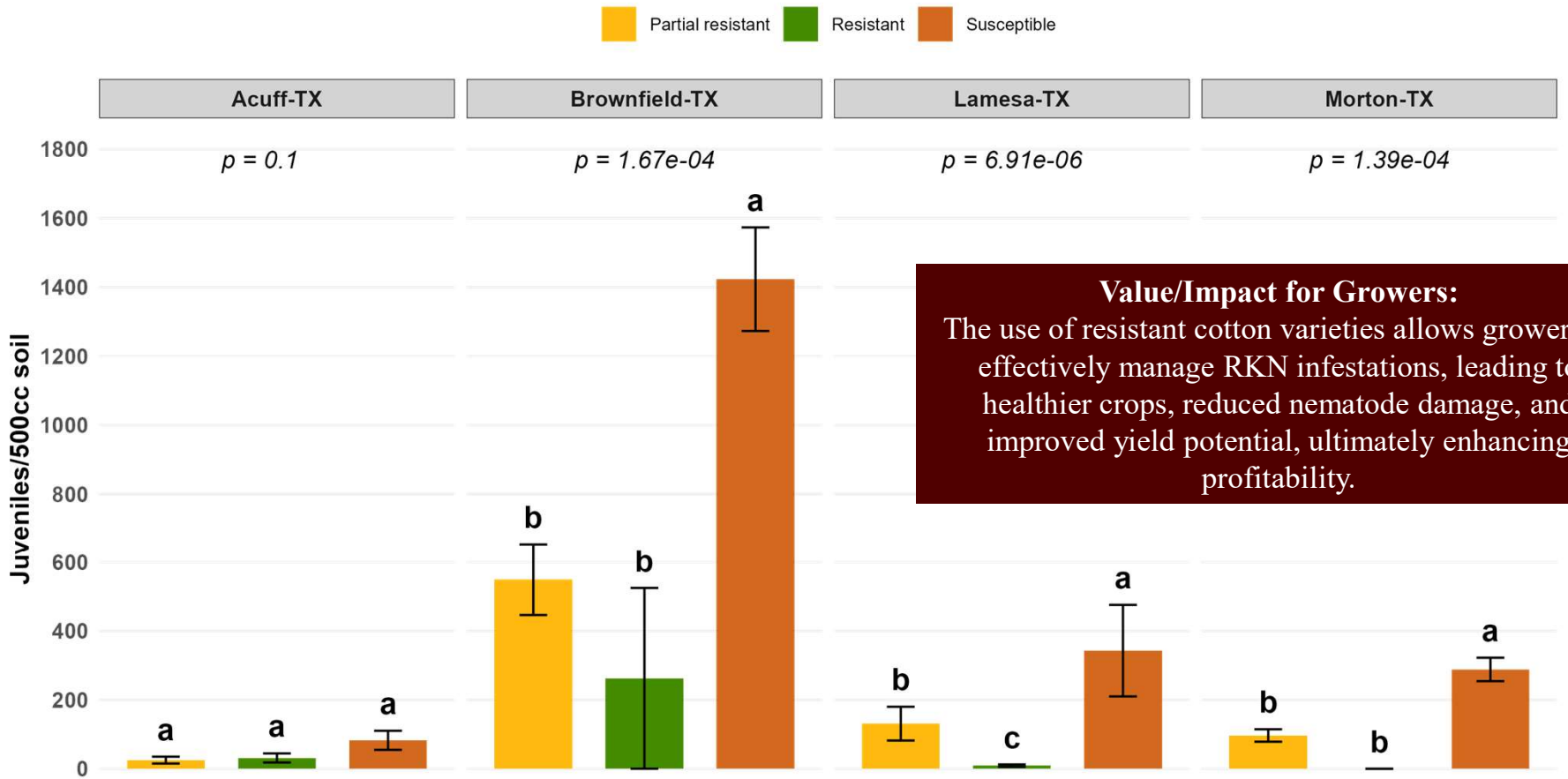


* Scaled $\log_{10}$(RK+1) is significantly < than the susceptible group (p = 0.05).

Texas A&M AgriLife Extension

Root-knot Nematode Density in 2024

35 feet plots



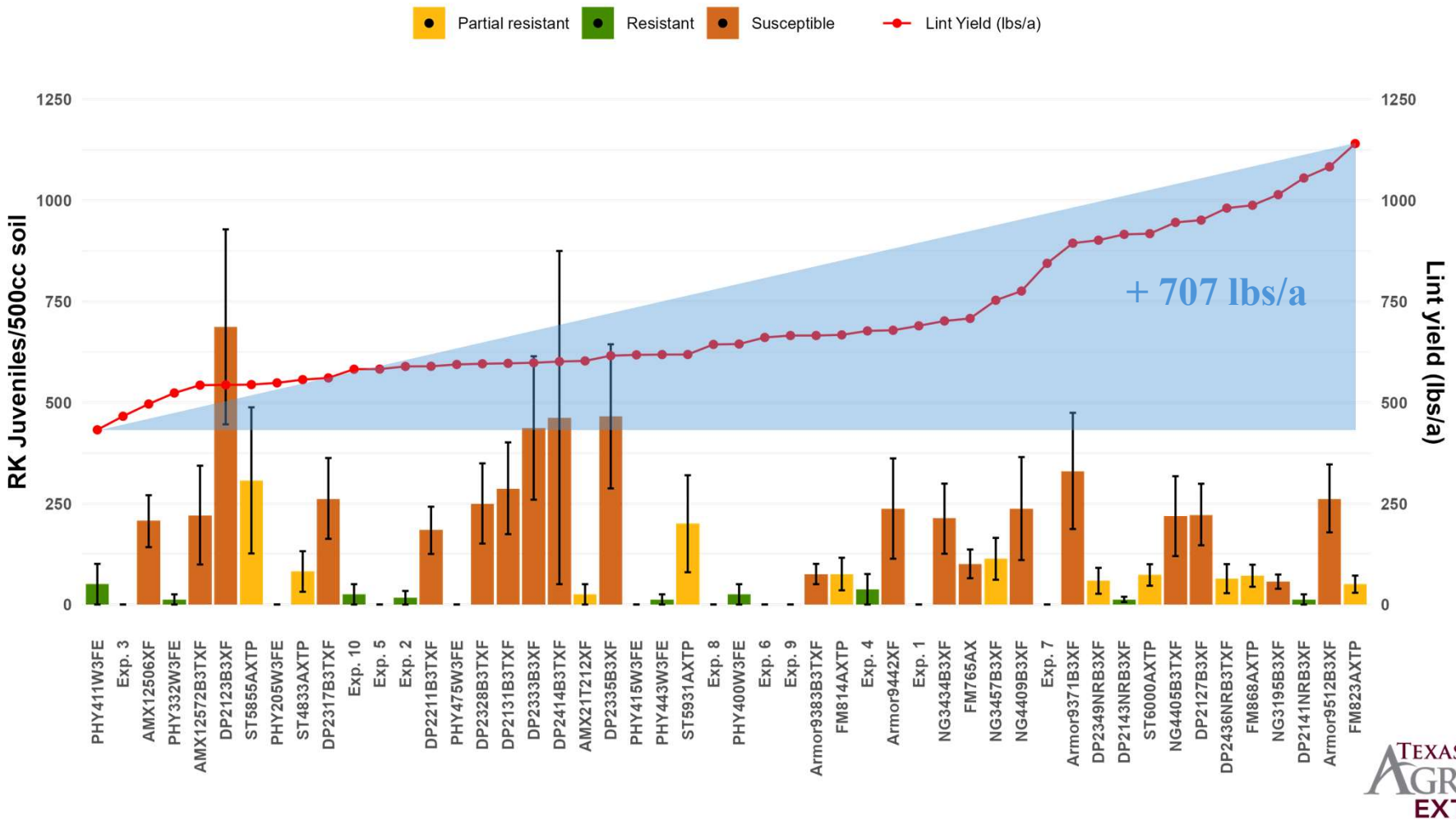
Value/Impact for Growers:

The use of resistant cotton varieties allows growers to effectively manage RKN infestations, leading to healthier crops, reduced nematode damage, and improved yield potential, ultimately enhancing profitability.

TEXAS A&M AGRILIFE EXTENSION

Cotton Response to Root-knot vs. Lint Yield

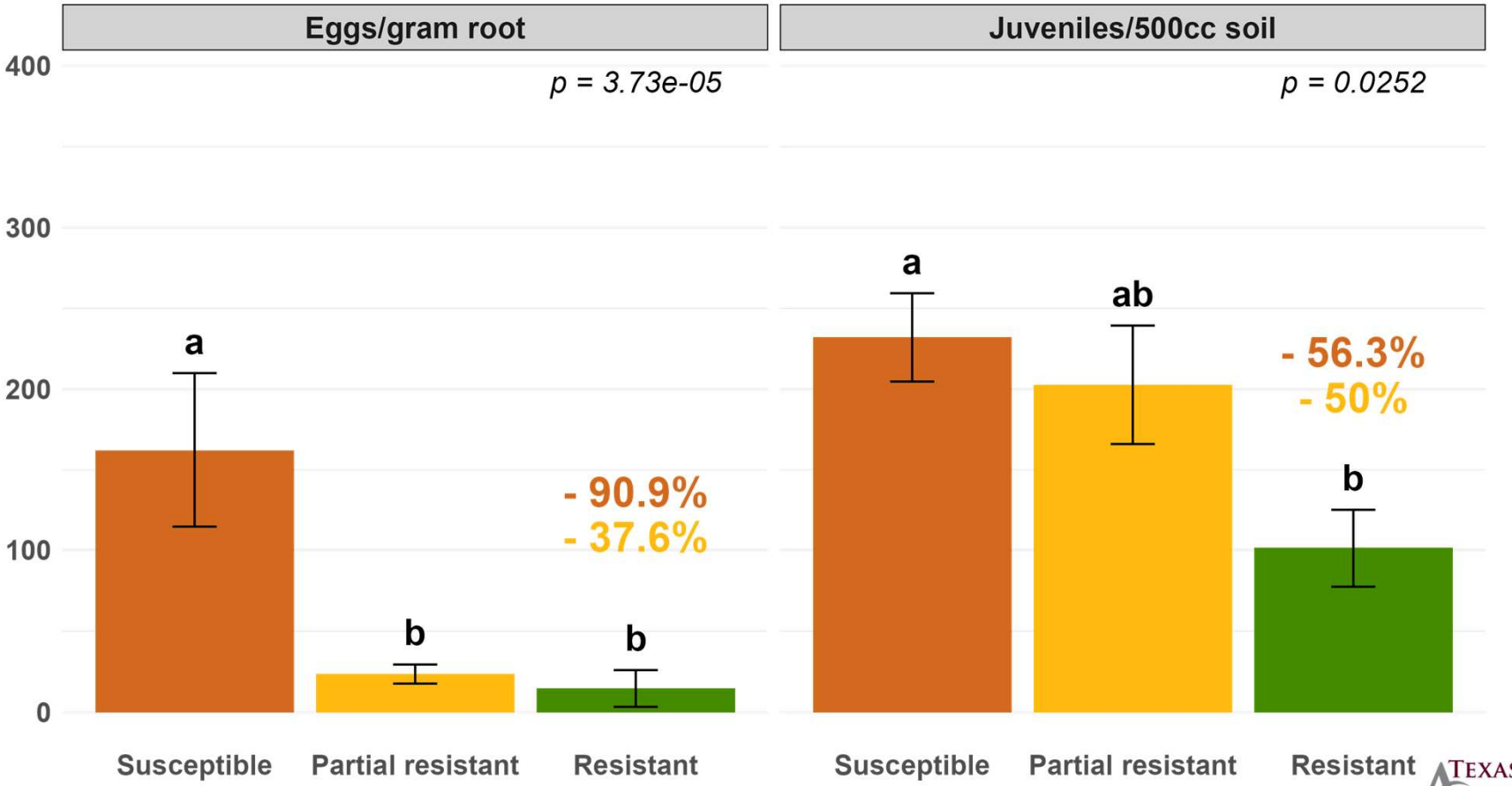
Acuff, Lamesa & Morton-TX, 2024 (35 feet plots)



TEXAS A&M AGRILIFE EXTENSION

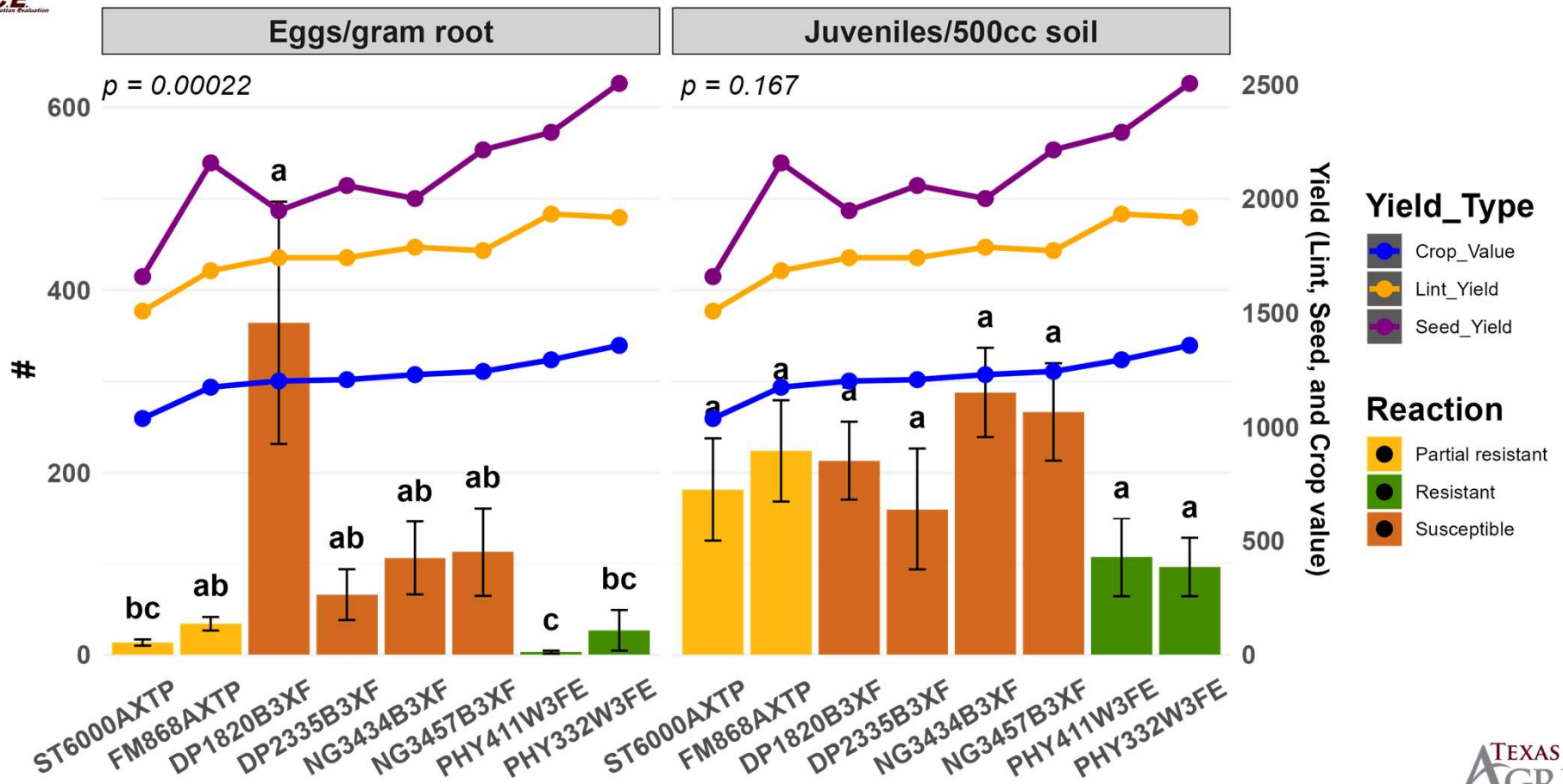
Effectiveness of Resistance Genes in RKN Management (Lubbock, 2024)

Large plots (~ 2640 feet long), RACE trial



Cultivars Response to Root-Knot Nematode (Lubbock, 2024)

Large plots (~ 2640 feet long), RACE trial



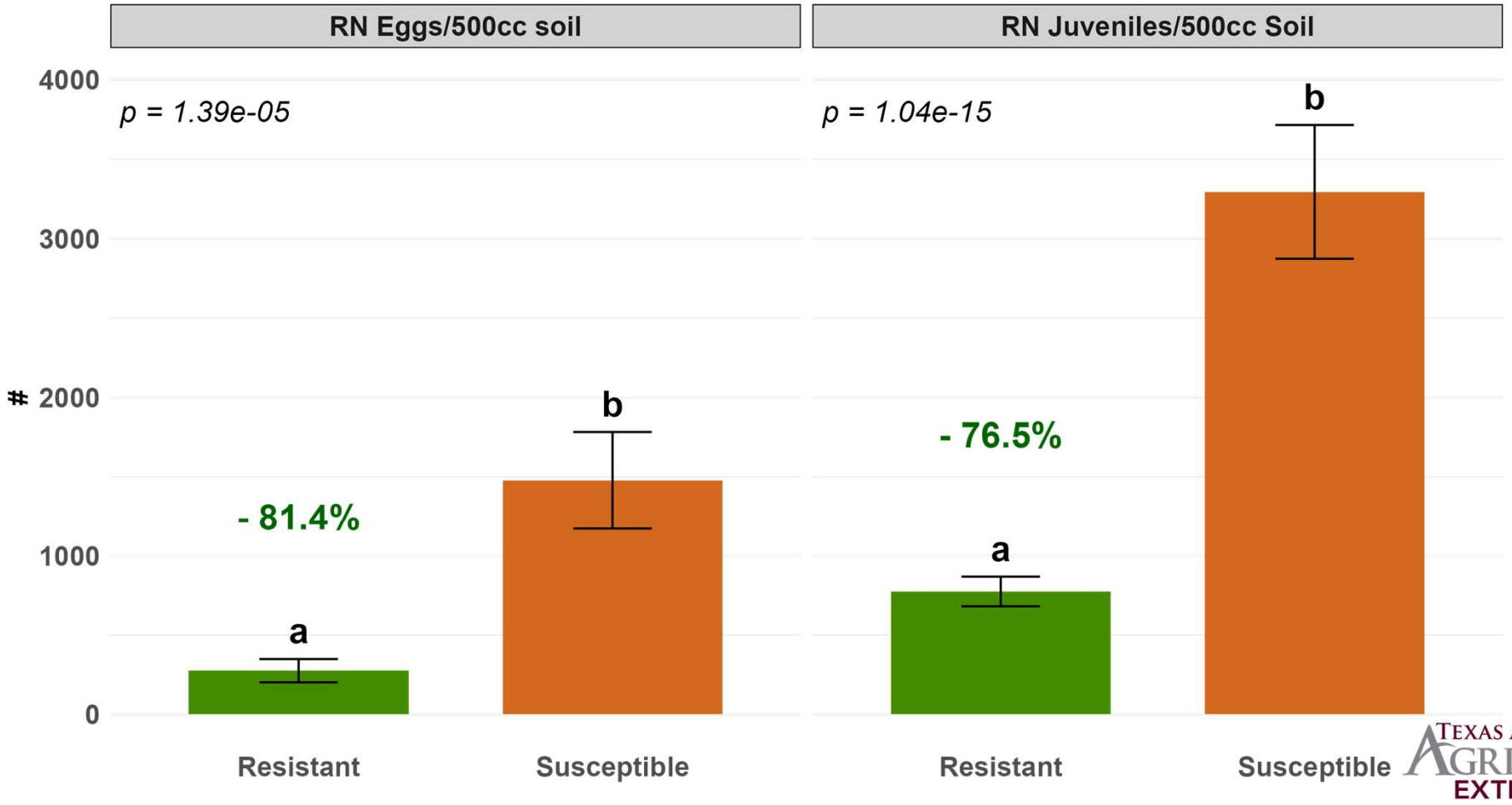
Season 2024

Reniform Nematode (*Rotylenchulus reniformis*)

TEXAS A&M AGRILIFE EXTENSION

Effectiveness of Resistant Varieties for Reniform Management (Lubbock, 2024)

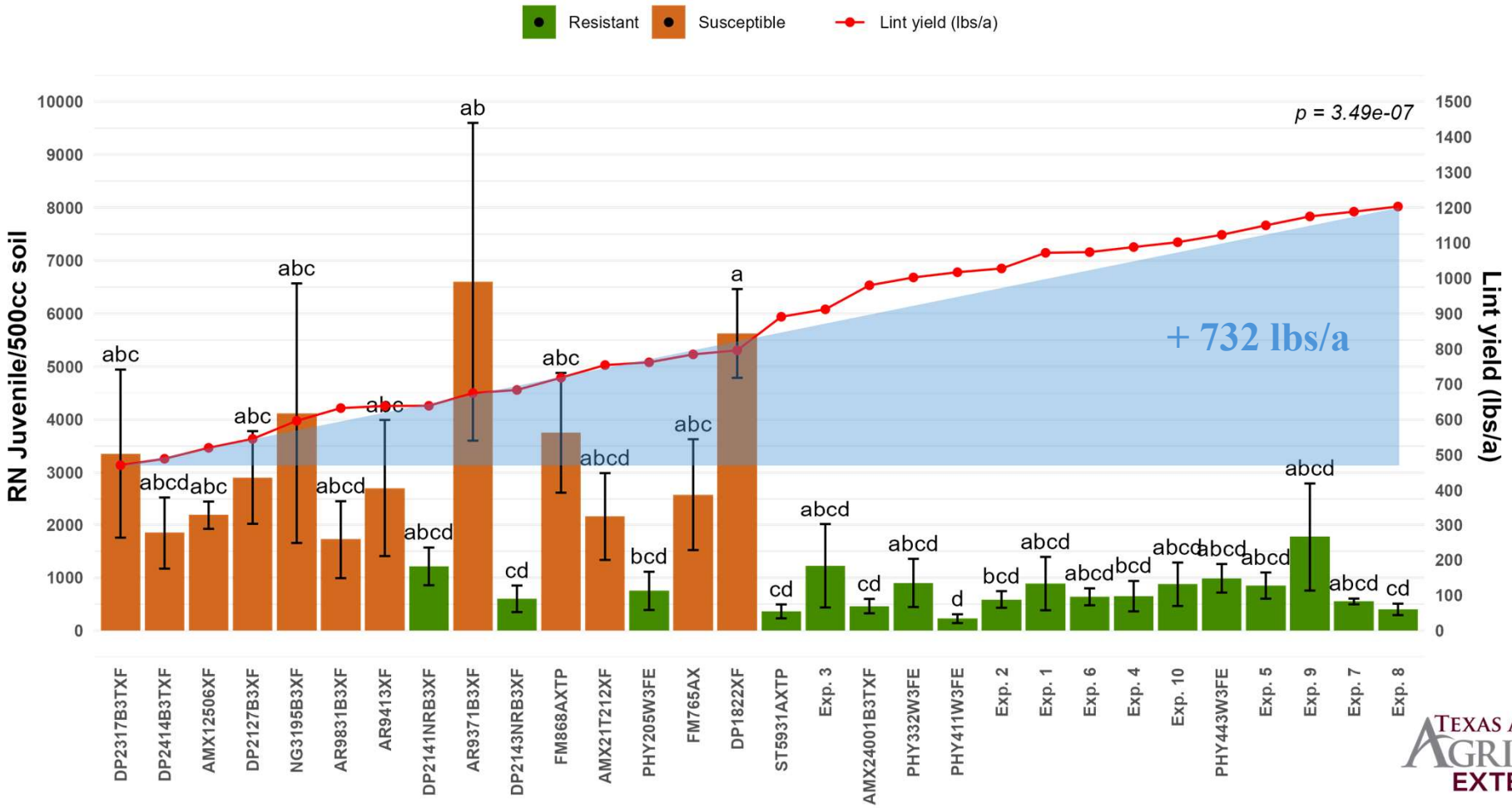
Small plots, 35 feet long



TEXAS A&M AGRILIFE EXTENSION

Cotton Response to Reniform Nematode vs. Lint Yield

Lubbock-TX, 2024 (35-foot plots)



TEXAS A&M AGRILIFE EXTENSION

Conclusion

- Nematode-resistant and partially resistant cotton varieties significantly reduce nematode pressure and yield loss.
- Season 2024:
  - RKN resistance reduced eggs (gram/root) by up to 91% and juveniles (500cc soil) by 56%.
  - RN resistance reduced eggs (500cc soil) by 81% and juveniles (500cc soil) by 76%.
- Resistant varieties consistently had the lowest nematode counts, and usually the highest yields, reinforcing their importance in nematode management.

THANK YOU!

Marina Rondon

Assistant Professor & Extension Specialist, Texas A&M AgriLife Extension

806.723.8416

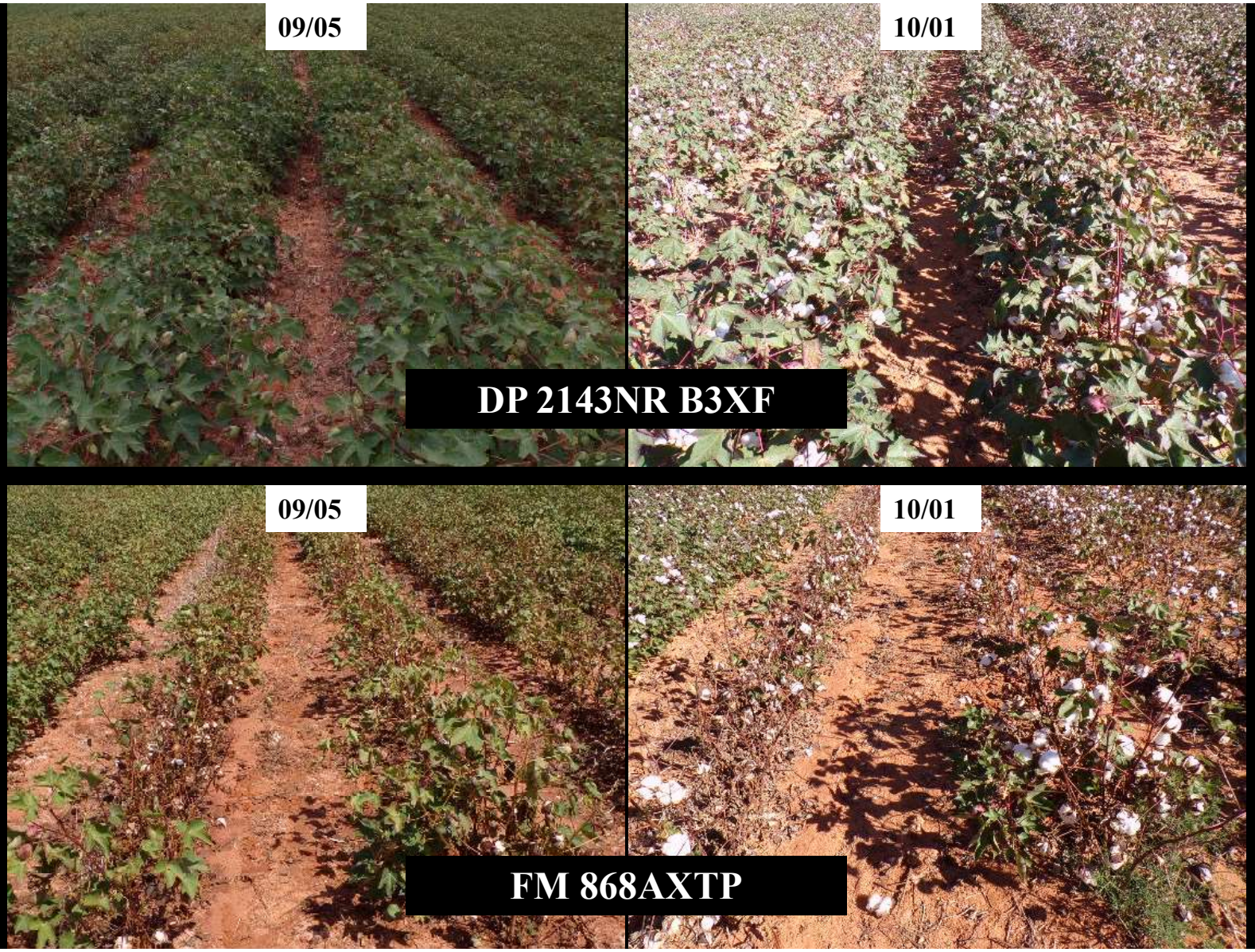
marina.rondon@ag.tamu.edu

PLAINS COTTON GROWERS

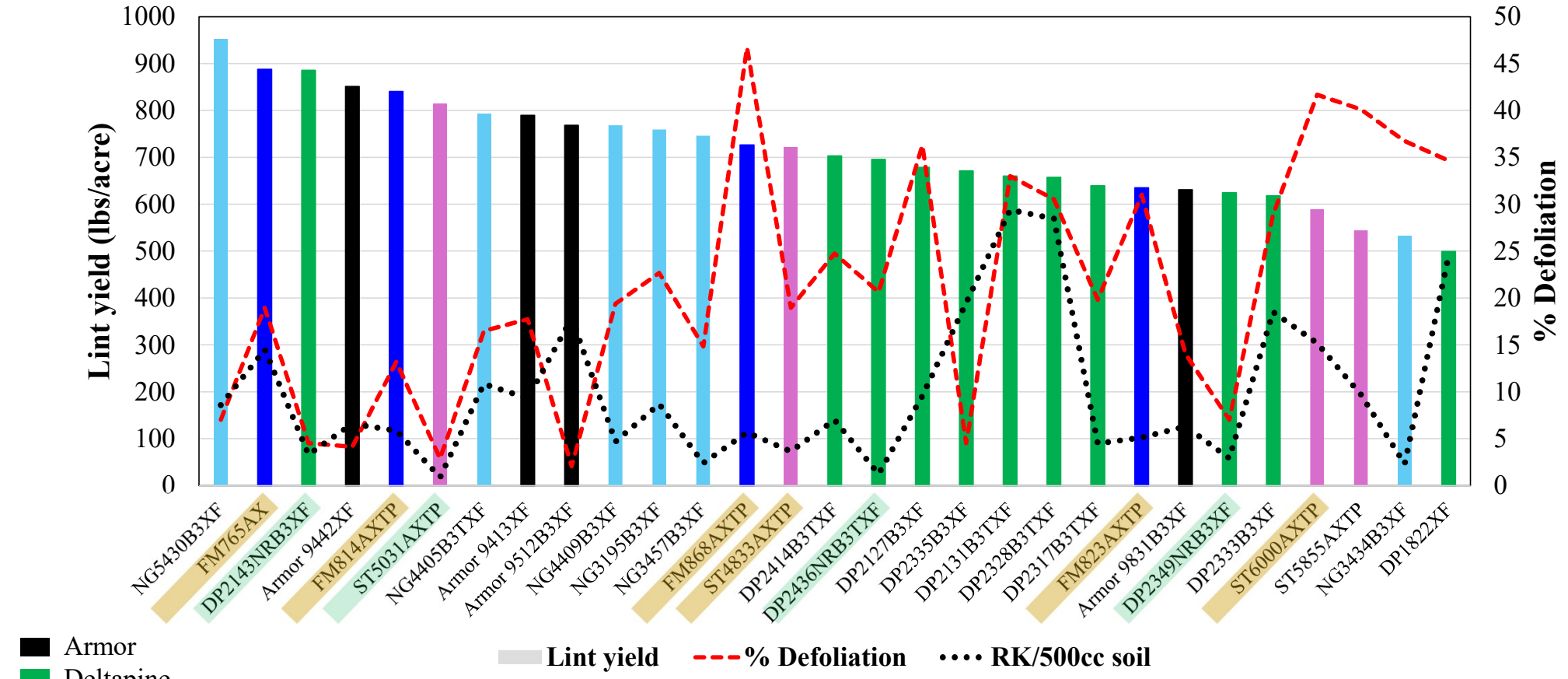
cotton

TEXAS A&M UNIVERSITY
Plant Pathology & Microbiology

TEXAS A&M AGRILIFE EXTENSION


09/05
10/01
DP 2143NR B3XF
09/05
10/01
FM 868AXTP

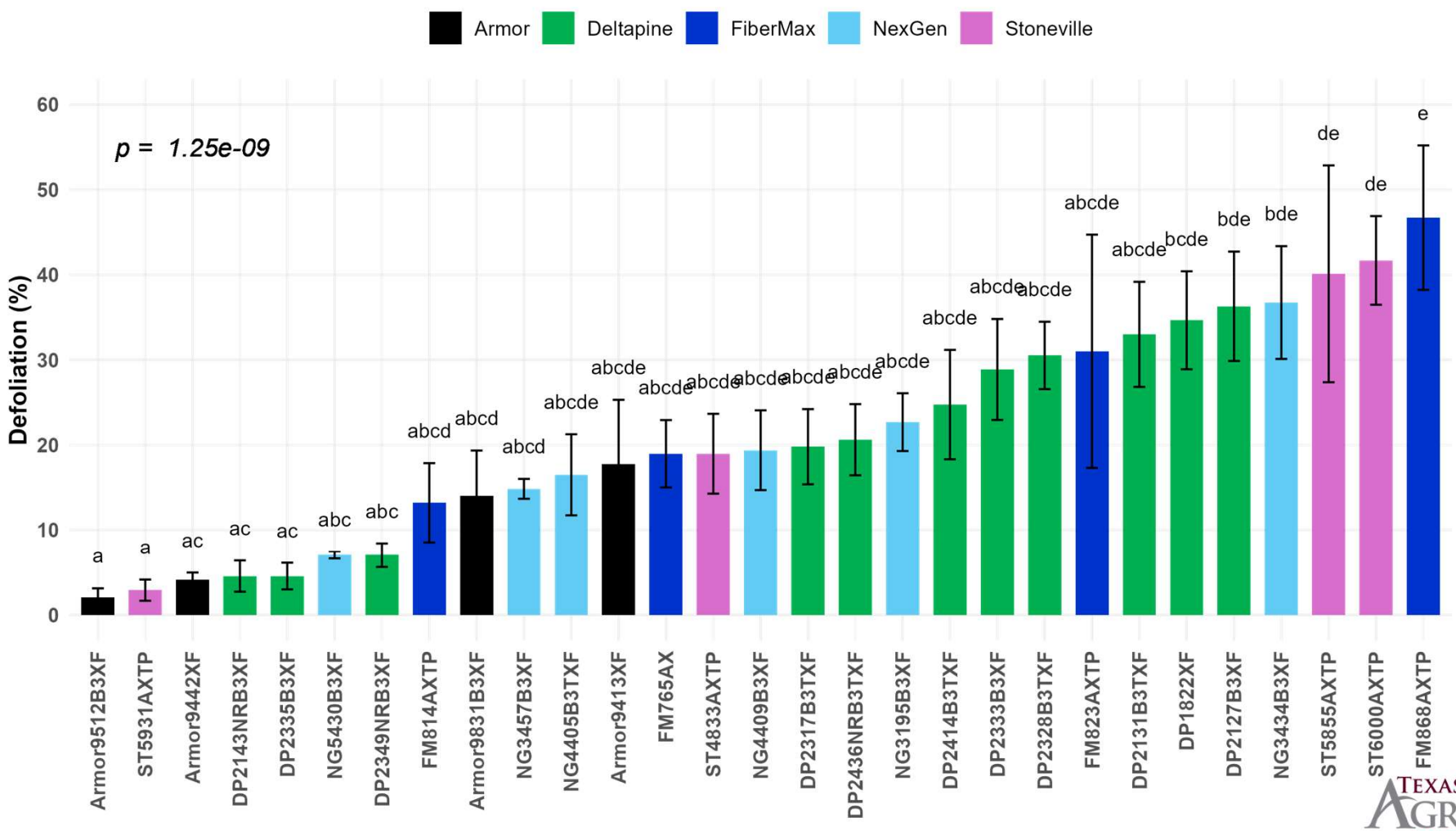
Root-knot Nematode Trial (Brownfield, 2024)



Earthquake on July 26 resulted in no water at the site for approximately 3 weeks.

Texas A&M AgriLife Extension

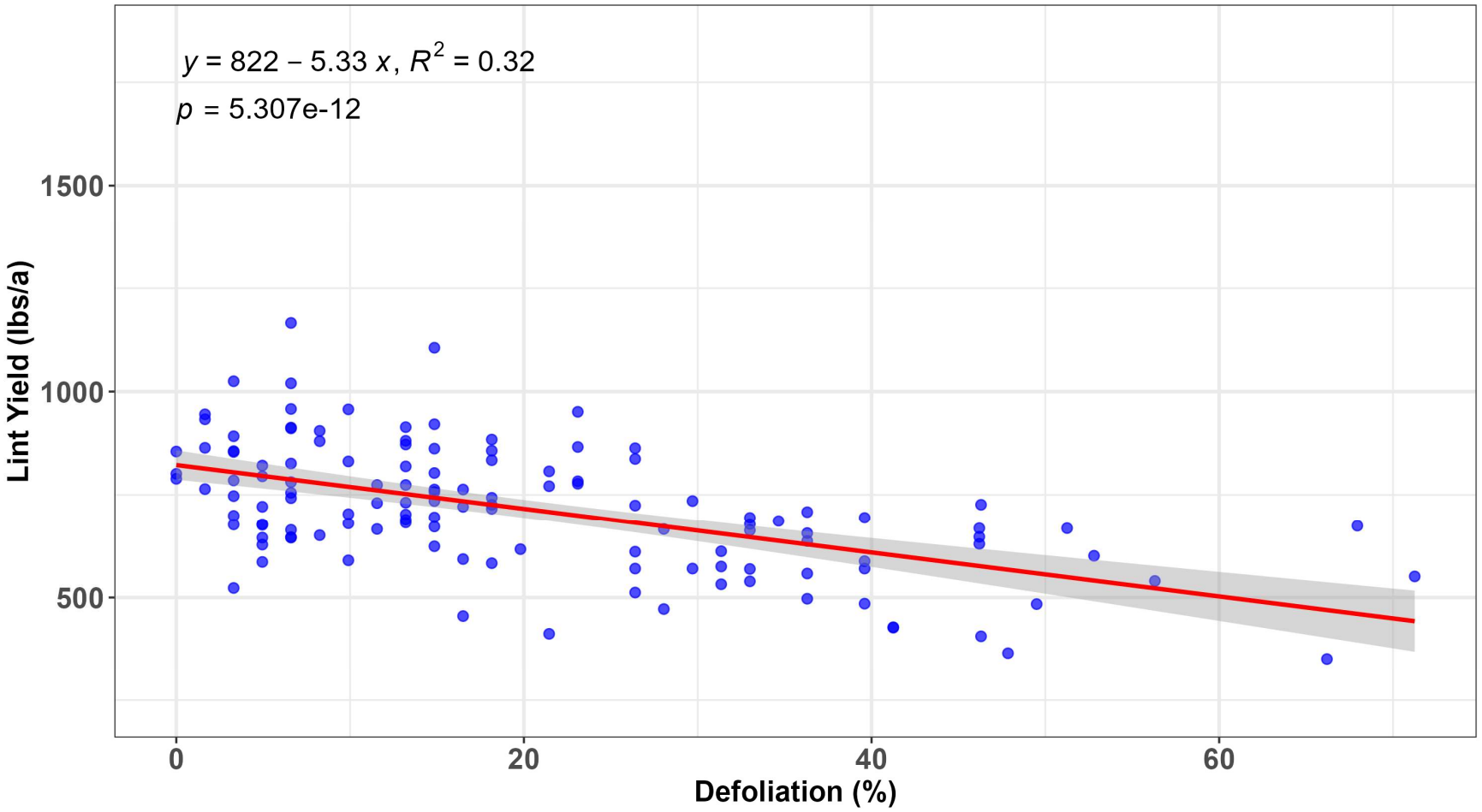
Defoliation in Brownfield-TX (2024)



TEXAS A&M AGRILIFE EXTENSION

Correlation Between Defoliation (%) and Lint Yield (lbs/a)

Brownfield-TX, 2024



Texas A&M AgriLife Extension