Peanut Pest Management (outside of disease)

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Information and Updates

Peanut Notes

Peanut Information Series

Field days

County production meetings

Risk Management Tool

Agronomy

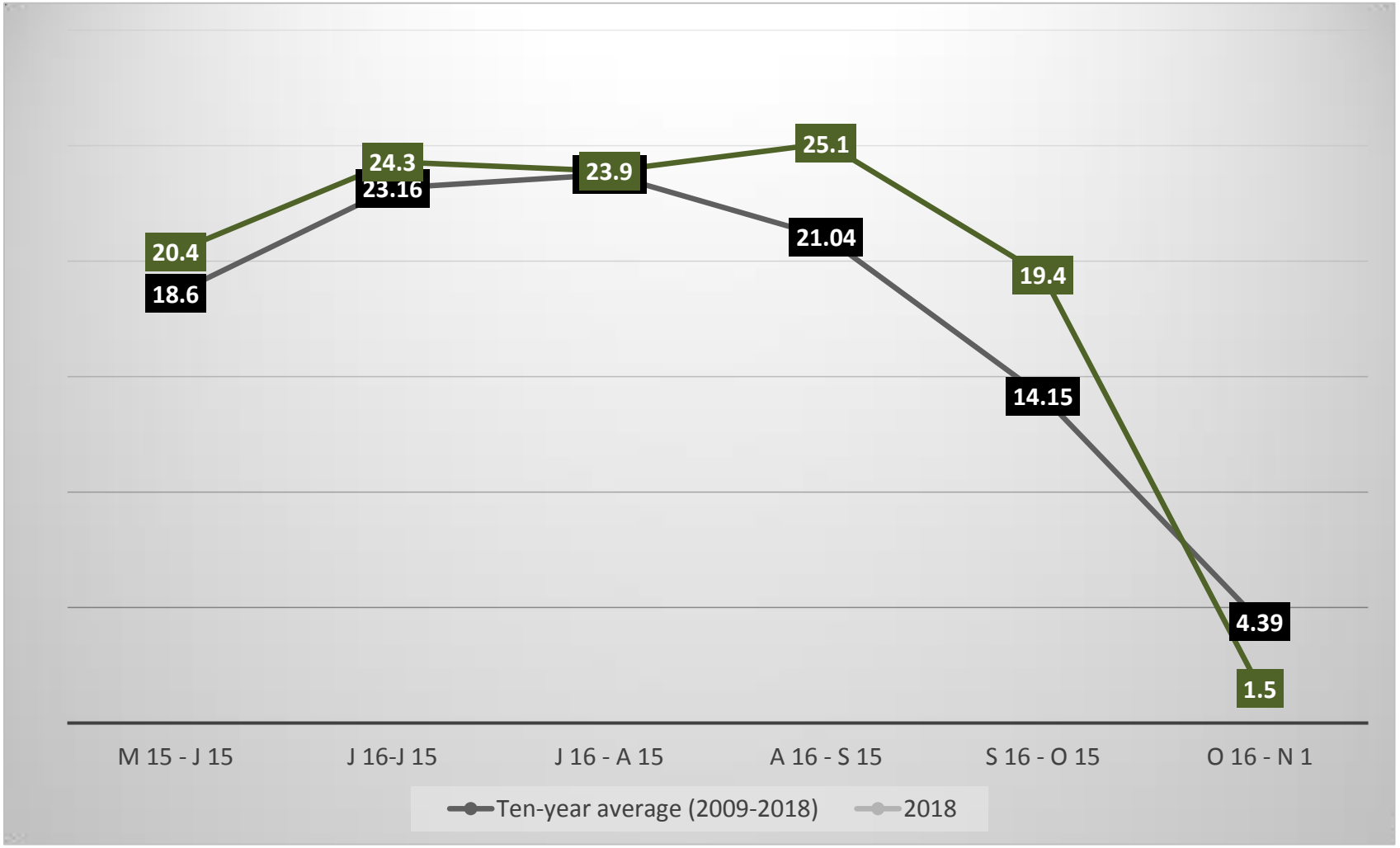
Heat units in Sep and Oct

Peanut yield

Varieties

Price and economic return

Average heat unit accumulation from 2009-2018
Lewiston-Woodville, NC



11. RISK OF PESTS IN PEANUT, INTEGRATED PEST MANAGEMENT, AND PESTICIDE STEWARDSHIP

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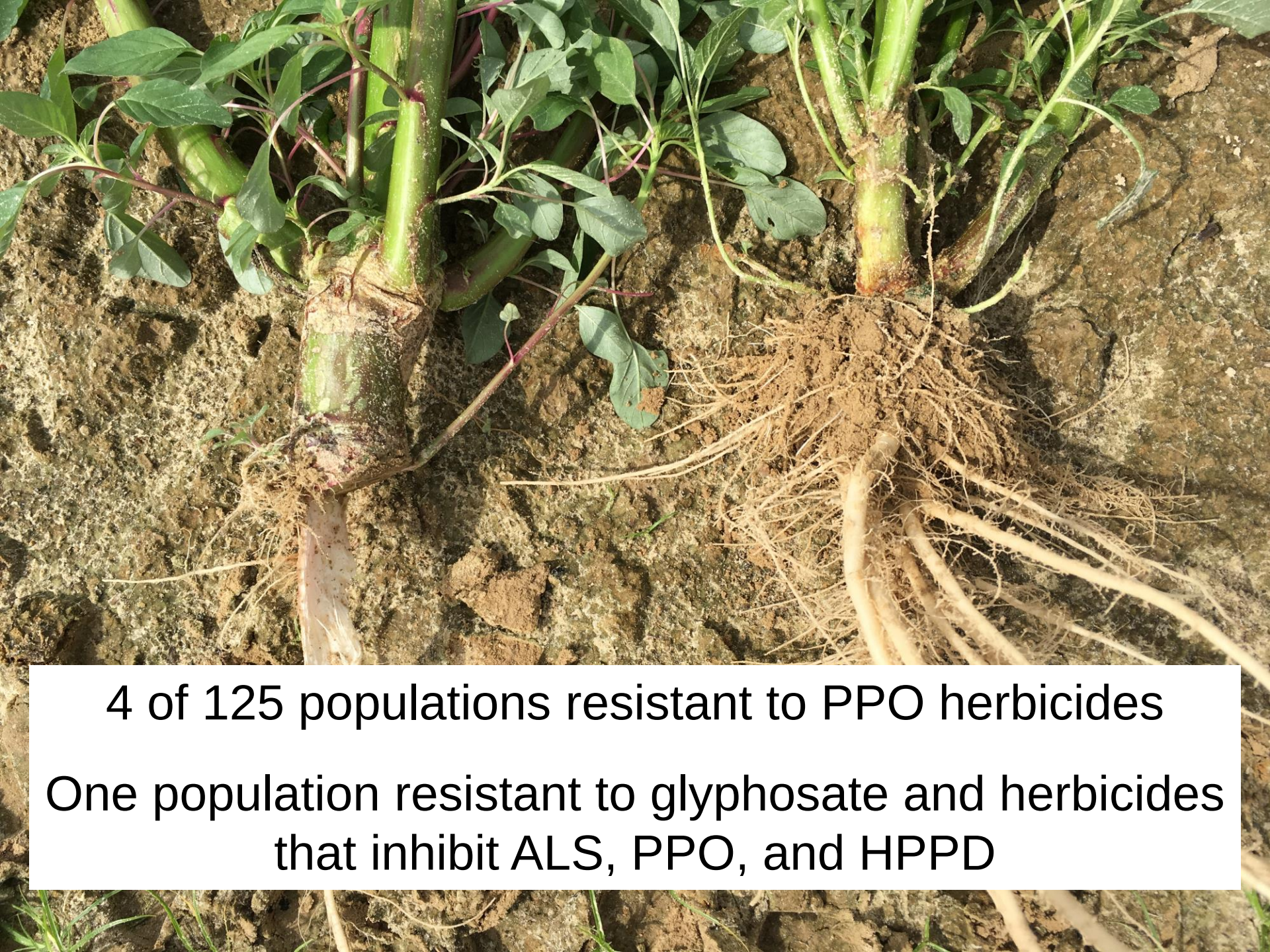


4 of 125 populations resistant to PPO herbicides

One population resistant to glyphosate and herbicides that inhibit ALS, PPO, and HPPD

Weed Control in Peanut

Overlapping residuals has been a component of success

Intensive weed control early in the season is important

Just as expensive and less effective to control weed escapes later in the season

Spraying large Palmer amaranth multiple times with PPO inhibitors later in the season most likely hastens development of resistant populations

Weed Control in Peanut

Effective PPI and PRE herbicides need to be supported with early POST applications of paraquat plus bentazon with residual herbicides

Acetochlor, dimethenamid-*P*, pyroxazulfone, or *S*-metolachlor/metolachlor are effective residual herbicides applied with paraquat plus bentazon

Which residual herbicide is most effective?

Still working on that answer in North Carolina

During the development phase we used the company protocol with pyroxasulfone and *S*-metolachlor primarily in a comprehensive program with other herbicides applied PRE and late POST

Currently determining the length of residual control with pyroxasulfone compared to traditional standards

Today we are discussing peanut safety and not weed control

Thrips Control in Peanut

Effective systemic in-furrow insecticides often need to be supported with early POST applications of acephate

Acetochlor, dimethenamid-*P*, pyroxazulfone, or *S*-metolachlor/metolachlor are effective residual herbicides applied with paraquat plus bentazon, and these combinations are often applied with acephate for thrips and weed control

Current Knowledge of Co-Application for Thrips and Weed Control

Many studies with *S*-metolachlor/metolachlor mixed with paraquat plus bentazon plus acephate

Some work with dimethenamid-*P*, but this herbicide is used less frequently

Information is limited with respect to mixtures of acetochlor or pyroxazulfone mixed with paraquat plus bentazon plus acephate

Peanut injury (%, chlorosis, necrosis, stunting) 5-6 WAP following application of in-furrow application of phorate, paraquat, bentazon, residual herbicides, and foliar application of acephate[a,b]

Herbicide		POST	In-furrow insecticide	
Contact	**Residual**	**Insecticide**	**No Phorate**	**Phorate**
Paraquat plus bentazon	-	-	43 a	18 cd
Paraquat plus bentazon	-	Acephate	28 b	12 de
Paraquat plus bentazon	Pyroxasulfone	-	37 a	18 cd
Paraquat plus bentazon	Acetochlor	-	40 a	16 d
Paraquat plus bentazon	Pyroxasulfone	Acephate	23 bc	12 de
Paraquat plus bentazon	Acetochlor	Acephate	23 bc	14 de
No herbicide	-	-	28 b	14 de
No herbicide	-	Acephate	17 cd	9 e

[a]Means followed by the same letter are not different according to Fisher's Protected LSD at $p \leq 0.05$. Data are pooled over 4 trials.

[b]Paraquat and bentazon applied at 8 oz/acre. Pyroxasulfone at 2.1 dry oz/acre or 3.3 fluid oz/acre. Acetochlor at 48 fluid oz/acre. Nonionic surfactant at 1 pint/100 gal. applied with all treatments in 15 GPA.

Peanut yield (lbs/acre) following application of in-furrow application of phorate, paraquat, bentazon, residual herbicides, and foliar application of acephate[a,b]

Herbicide		POST insecticide	In-furrow insecticide	
Contact	Residual		No Phorate	Phorate
Paraquat plus bentazon	-	-	4100 e	4600 a-d
Paraquat plus bentazon	-	Acephate	4070 e	4400 b-e
Paraquat plus bentazon	Pyroxasulfone	-	4270 de	4710 abc
Paraquat plus bentazon	Acetochlor	-	4100 e	4380 b-d
Paraquat plus bentazon	Pyroxasulfone	Acephate	4400 b-e	4660 abc
Paraquat plus bentazon	Acetochlor	Acephate	4360 cde	4820 a
No herbicide	-	-	4400 b-e	4270 e
No herbicide	-	Acephate	4220 e	4610 a-d

[a]Means followed by the same letter are not different according to Fisher's Protected LSD at $p \leq 0.05$. Data are pooled over 4 trials.

[b]Paraquat and bentazon applied at 8 oz/acre. Pyroxasulfone at 2.1 dry oz/acre or 3.3 fluid oz/acre. Acetochlor at 48 fluid oz/acre. Nonionic surfactant at 1 pint/100 gal. applied with all treatments in 15 GPA.

Peanut injury (%) following application of paraquat, bentazon, and residual herbicides[a]

Herbicides		Rate (oz/acre)	Visual injury (%)		
Contact	Residual		1 WAT	2 WAT	3 WAT
Paraquat plus bentazon	-	8 + 8	20 a	8 a	5 b
Paraquat plus bentazon	Pyroxasulfone	8 + 8 + 2.5	25 a	17 a	20 ab
Paraquat plus bentazon	Dimethenamid-*P*	8 + 8 + 12	27 a	12 a	25 ab
Paraquat plus bentazon	Acetochlor	8 + 8 + 40	25 a	20 a	20 ab
Paraquat plus bentazon	*S*-metolachlor	8 + 8 + 16	25 a	28 a	40 a
Paraquat plus bentazon	Pyroxasulfone	8 + 8 + 3.3	28 a	13 a	24 ab
Paraquat plus bentazon	Dimethenamid-*P*	8 + 8 + 16	38 a	25 a	33 ab
Paraquat plus bentazon	Acetochlor	8 + 8 + 54	25 a	13 a	15 ab
Paraquat plus bentazon	*S*-metolachlor	8 + 8 + 21	38 a	30 a	37 ab

[a]Means followed by the same letter are not different according to Fisher's Protected LSD at $p \leq 0.05$. Data are from 1 trial. Nonionic surfactant at 1 pint/100 gal. applied with all treatments in 15 GPA. Pendimethalin plus flumioxazin PRE.

Peanut injury (%) following application of paraquat, bentazon, and residual herbicides[a]

Herbicides		Rate (oz/acre)	Visual injury (%)		
Contact	**Residual**		**1 WAT**	**2 WAT**	**3 WAT**
Paraquat plus bentazon	-	8 + 8	15 c	9 b	16 a
Paraquat plus bentazon	Pyroxasulfone	8 + 8 + 2.5	31 b	21 ab	14 a
Paraquat plus bentazon	Dimethenamid-*P*	8 + 8 + 12	18 c	13 b	14 a
Paraquat plus bentazon	Acetochlor	8 + 8 + 40	41 a	30 a	23 a
Paraquat plus bentazon	*S*-metolachlor	8 + 8 + 16	24 bc	14 b	26 a

[a]Means followed by the same letter are not different according to Fisher's Protected LSD at $p \leq 0.05$. Data are from 1 trial. Nonionic surfactant at 1 pint/100 gal. applied with all treatments in 15 GPA. Pendimethalin plus flumioxazin PRE.

One Day after Treatment

Paraquat plus bentazon

Paraquat plus bentazon plus pyroxasulfone

One Day after Treatment

Paraquat plus bentazon

Paraquat plus bentazon plus dimethenamid-*P*

One Day after Treatment

Paraquat plus bentazon

Paraquat plus bentazon plus acetochlor

One Day after Treatment

Paraquat plus bentazon

Paraquat plus bentazon plus *S*-metolachlor

Two Weeks after Treatment

Paraquat plus bentazon

Paraquat plus bentazon plus pyroxasulfone

Two Weeks after Treatment

Paraquat plus bentazon

Paraquat plus bentazon plus dimethenamid-*P*

Two Weeks after Treatment

Paraquat plus bentazon

Paraquat plus bentazon plus acetochlor

Two Weeks after Treatment

Paraquat plus bentazon

Paraquat plus bentazon plus *S*-metolachlor

Importance of Thrips

Control Options

Systemic insecticides at planting

Acephate
Phorate/Thimet
Admire Pro/Generics
Velum Total
AgLogic

Foliar applications

Acephate

Concerns

Acephate and delayed peanut emergence

Imidacloprid increasing spotted wilt

Velum Total expense and unpredictable and erratic nematode populations

Thimet injury to peanut

Acephate and Thimet MOAs and registrations

Potential resistance to imidacloprid

AgLogic expense

Thimet injury

Challenges – Logistics Acephate POST

Planting Date, Phorate, Acephate

Jordan, Brandenburg, Shew

Thrips injury as affected by the interaction of planting date by phorate by acephate application.[a,b]

Treatment	Planting date		
	Early May	Mid May	Late May
	scale 5		
None	3.1 a	2.3 b	1.8 c
Phorate (IFG)	0.7 f	1.0 e	0.3 g
Acephate (POST)	1.2 d	1.0 e	1.1 de
Phorate fb acephate (IFG fb POST)	0.3 g	0.4 g	0.2 g

[a]Means within a year followed by the same letter are not significantly different according to Fisher's Protected LSD test at P ≤ 0.10. Data are pooled over years. Phorate applied in the seed furrow at planting and acephate applied POST 3 WAP at 5 lbs/acre and 8 oz/acre, respectively.

[b]Injury from thrips feeding was recorded 2 weeks after acephate was applied using an ordinal scale of 0 to 5, where 0 = no damage, 1 = noticeable feeding but no stunting, 2 = noticeable feeding and 25% stunting, 3 = feeding with blackened terminals and 50% stunting, 4 = severe feeding and 75% stunting, 5 = severe feeding and 90% stunting.

Less injury from thrips as planting is delayed in absence of insecticide

Peanut yield in 2013-2016 as affected by the interaction of phorate and acephate application. [a, b]

Treatment	Peanut yield
	lbs/acre
No insecticide	4830 b
Phorate	5080 a
Acephate	5020 a
Phorate followed by acephate	5120 a

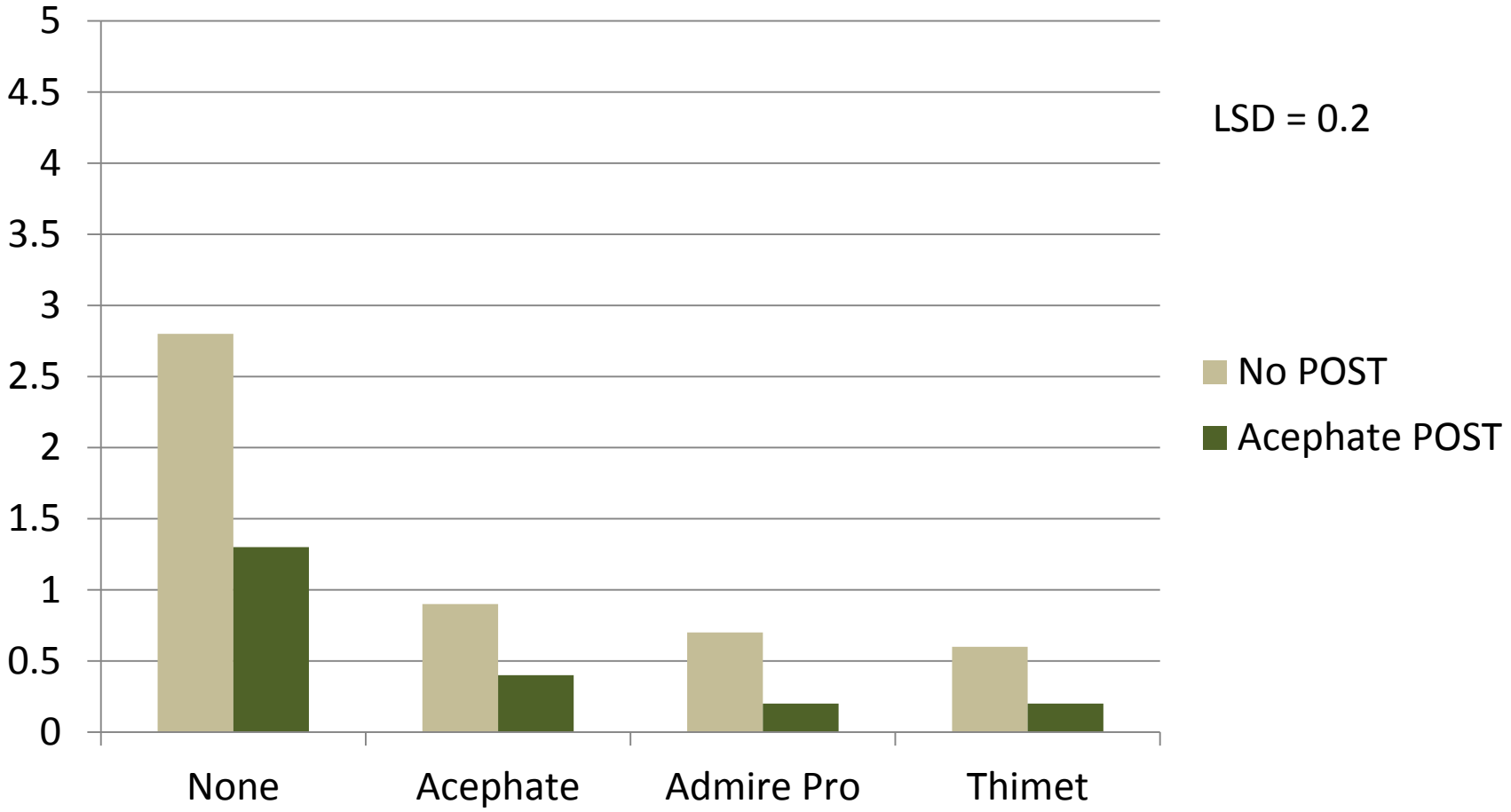
[a] Means followed by the same letter are not significantly different according to Fisher's Protected LSD test at P ≤ 0.10. Data are pooled over years and planting dates. Phorate applied in the seed furrow at planting and acephate applied POST 3 WAP at 5 lbs/acre and 8 oz/acre, respectively.

Protection from thrips injury is needed regardless of planting date

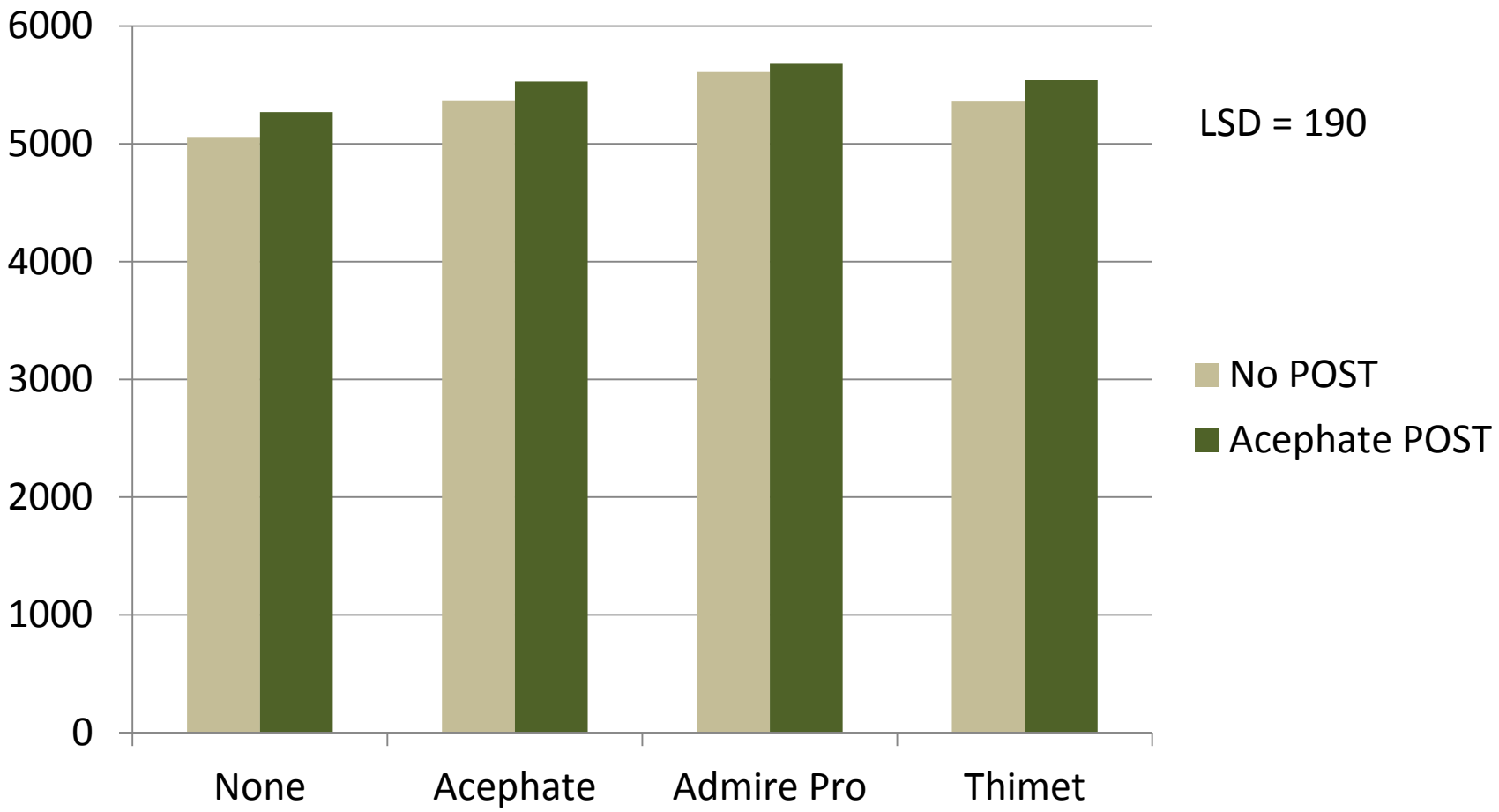
Admire Pro Trials

Brandenburg and Jordan

Thrips Injury (Scale 0-5) 5 Weeks after Planting (WAP)
Acephate applied 3 WAP
Brandenburg and Jordan Trials (7 total)



Peanut Yield (pounds/acre)
Brandenburg and Jordan Trials (7 total)

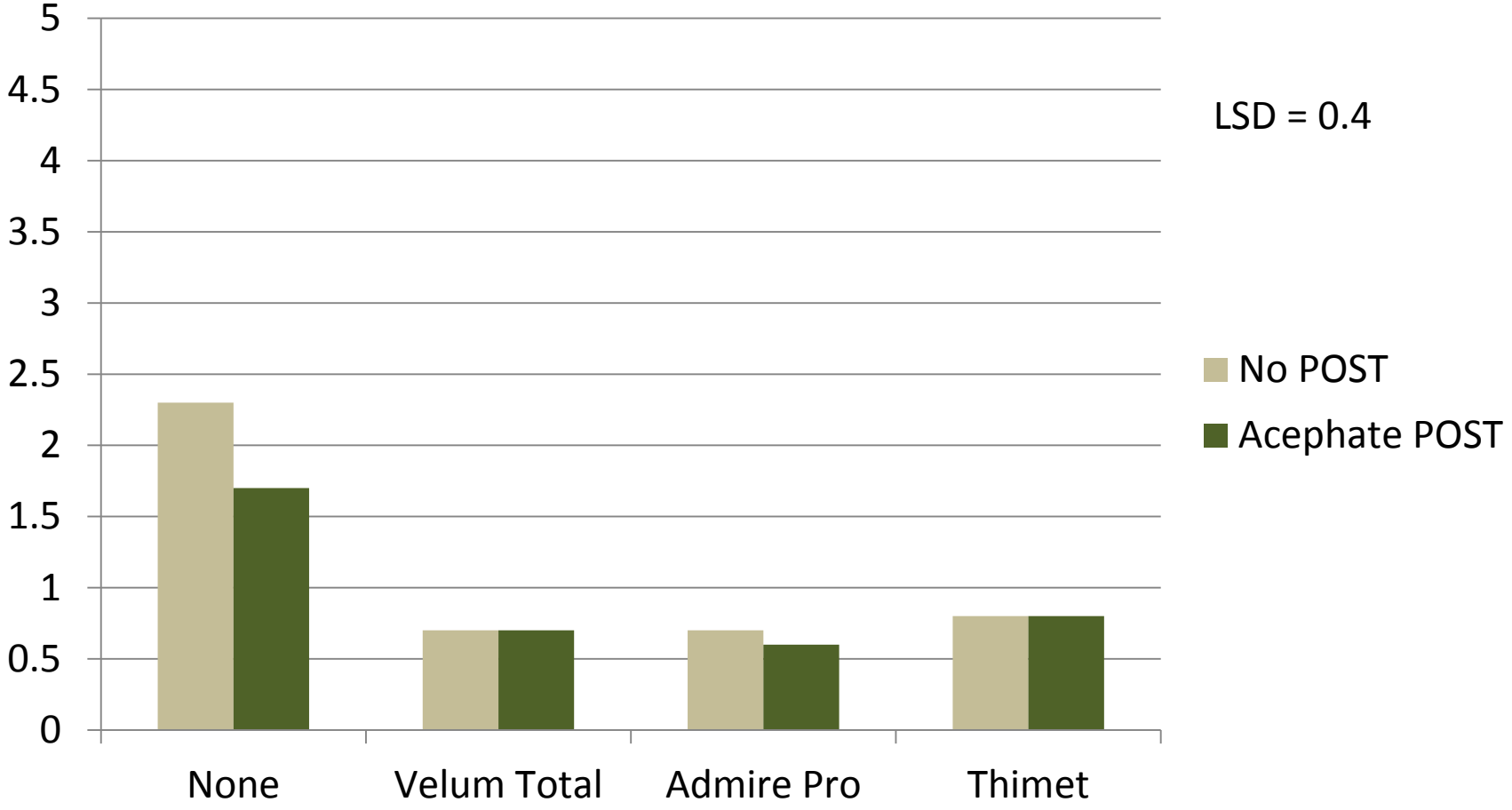


Positive yield response to Acephate regardless of in-furrow insecticide treatment
Admire Pro provided greater yield than other treatments

Velum Total Trials

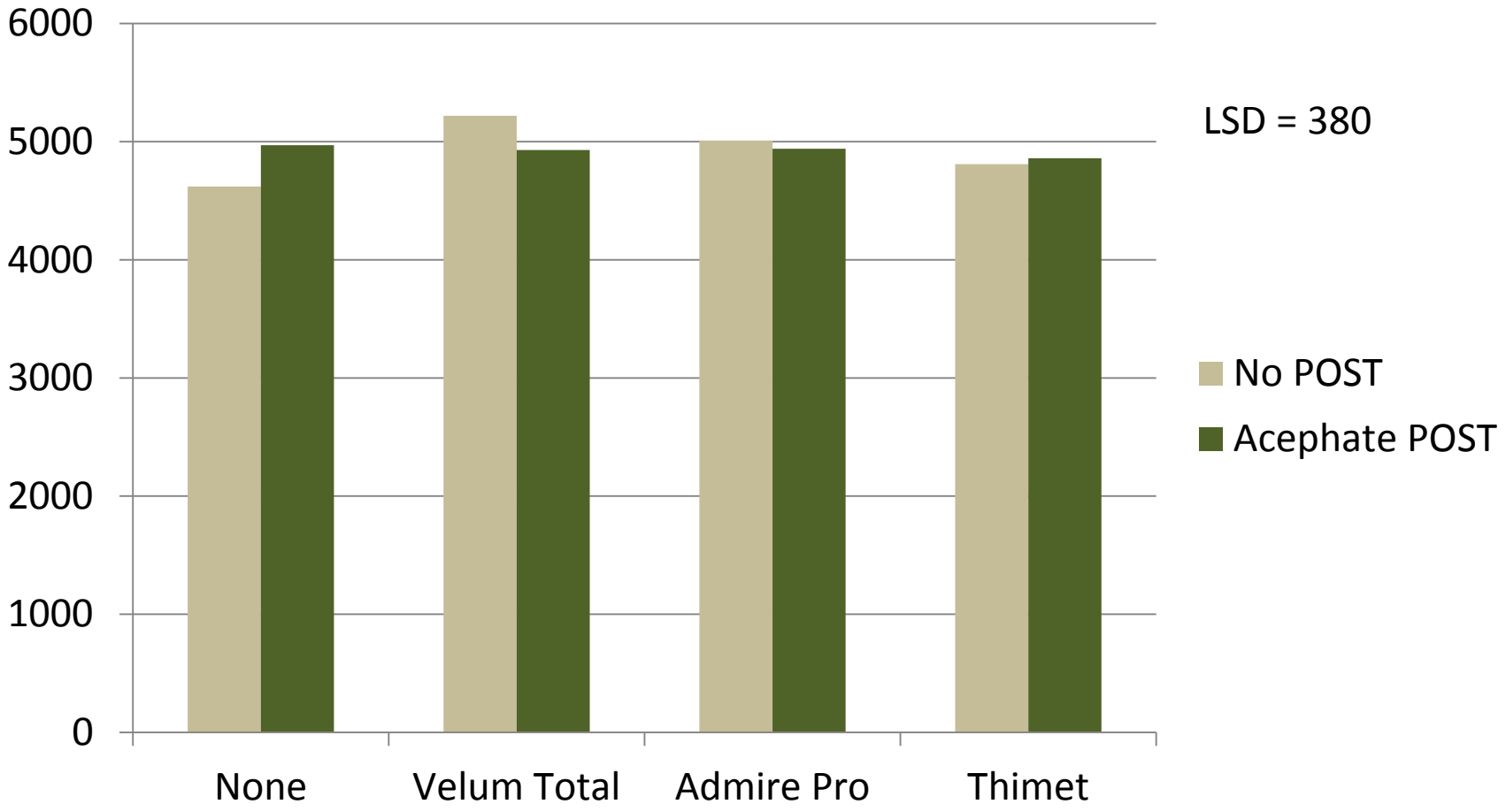
Brandenburg and Jordan

Thrips Injury (Scale 0-5) 5 Weeks after Planting (WAP)
Acephate applied 3 WAP
Brandenburg and Jordan Trials (6 total)



Peanut Yield (pounds/acre)

Brandenburg and Jordan Trials (6 total)



Velum Total Trials
Images from 2017 and 2018

2017 Trial

Non-treated control

Velum Total

Non-treated control

Admire Pro

Non-treated control

Thimet

Non-treated control

Acephate POST

Non-treated control

Velum Total/Acephate

Non-treated control

Admire Pro/Acephate

Non-treated control

Thimet/Acephate

2018 Trial

Non-treated control

Velum Total

Non-treated control

Admire Pro

Non-treated control

Thimet

Non-treated control

Acephate POST

Non-treated control

Velum Total/Acephate

Non-treated control

Admire Pro/Acephate

Non-treated control

Thimet/Acephate

Summary

Thrips control is critical in NC

Tools are currently effective

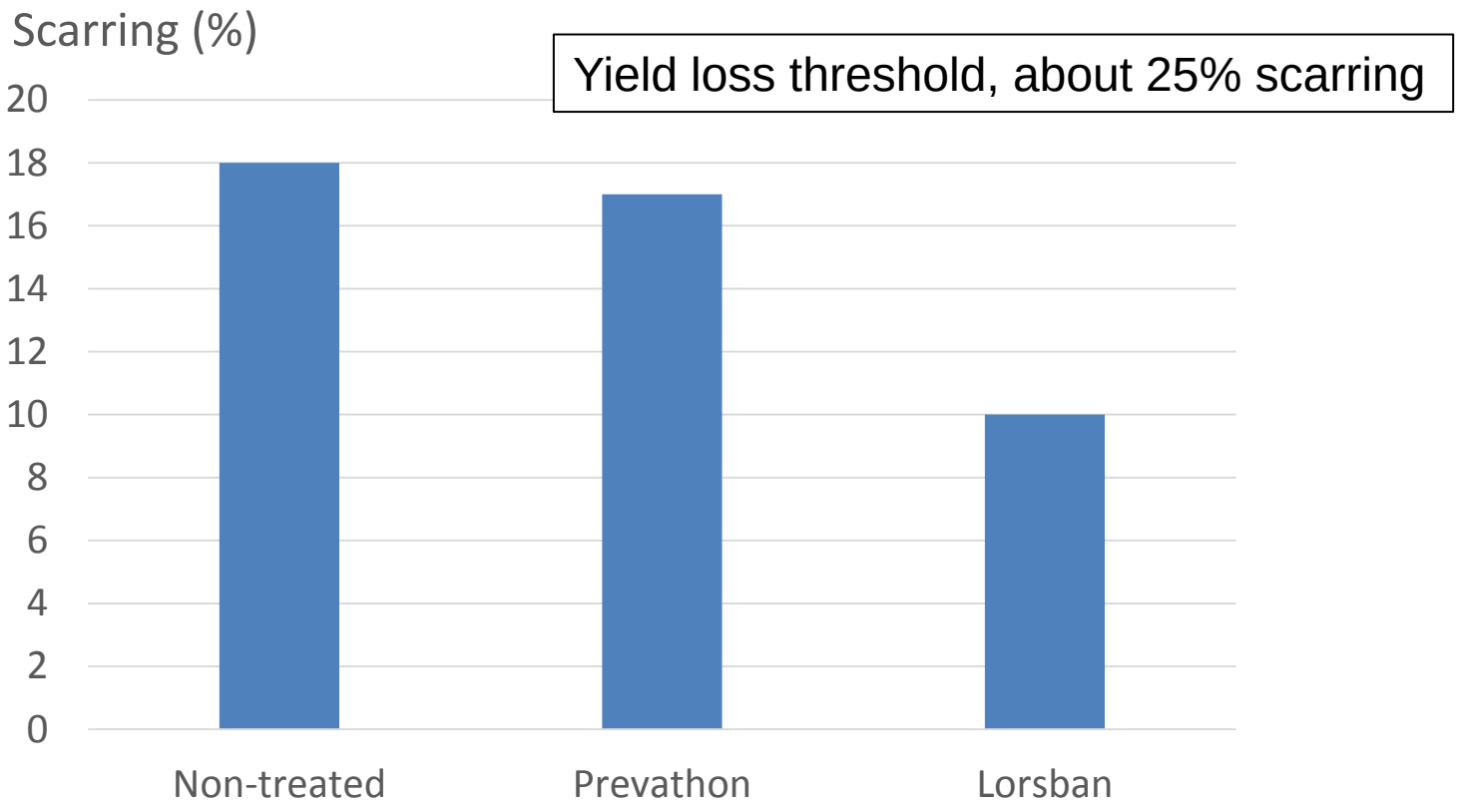
Some concerns about long-term utility of products (MOA of Thimet, potential for imidacloprid resistance, TSW)

Southern Corn Rootworm

Brandenburg, Royals, Jordan, Hare

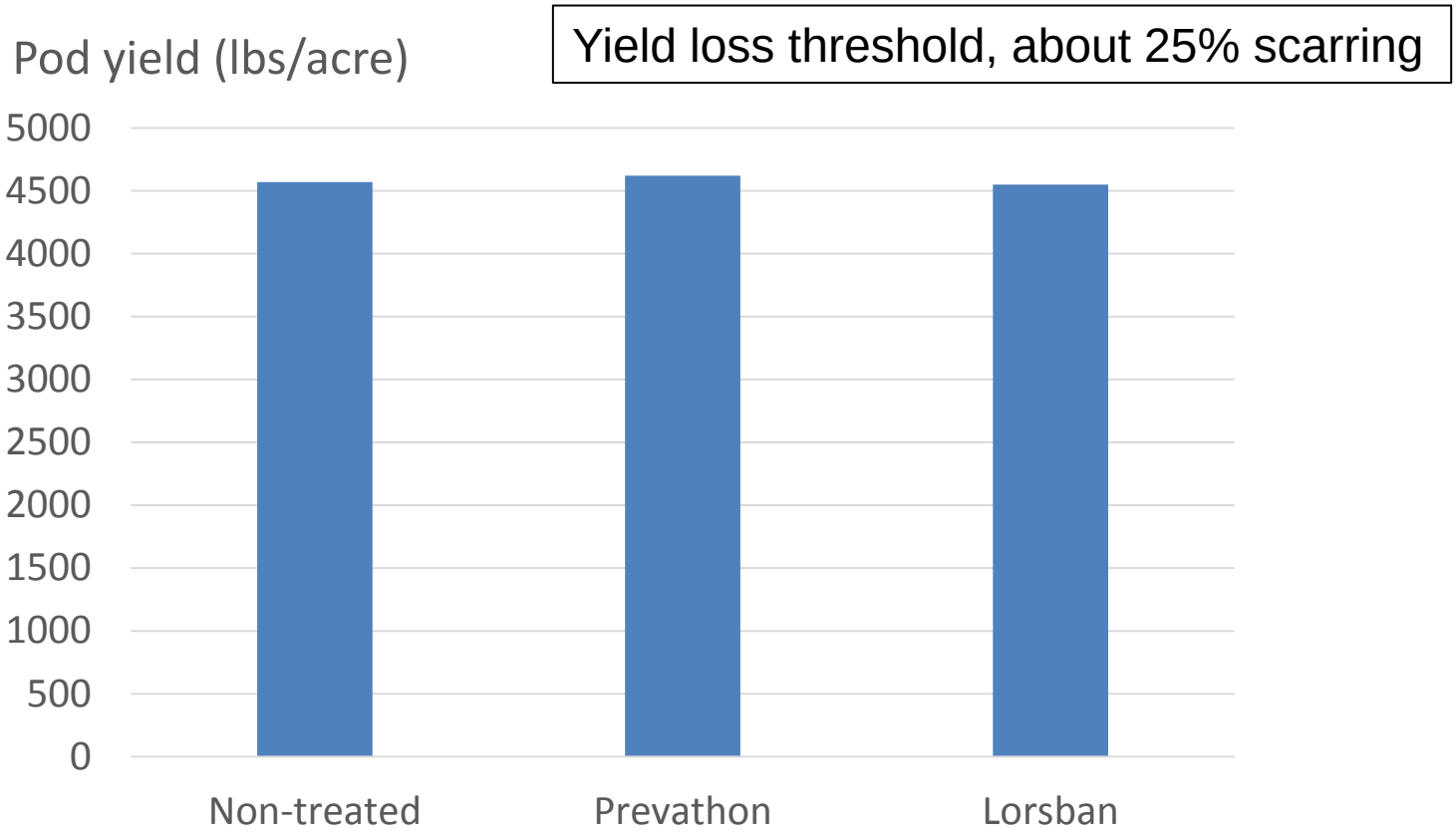
Injury from Southern Corn Rootworm

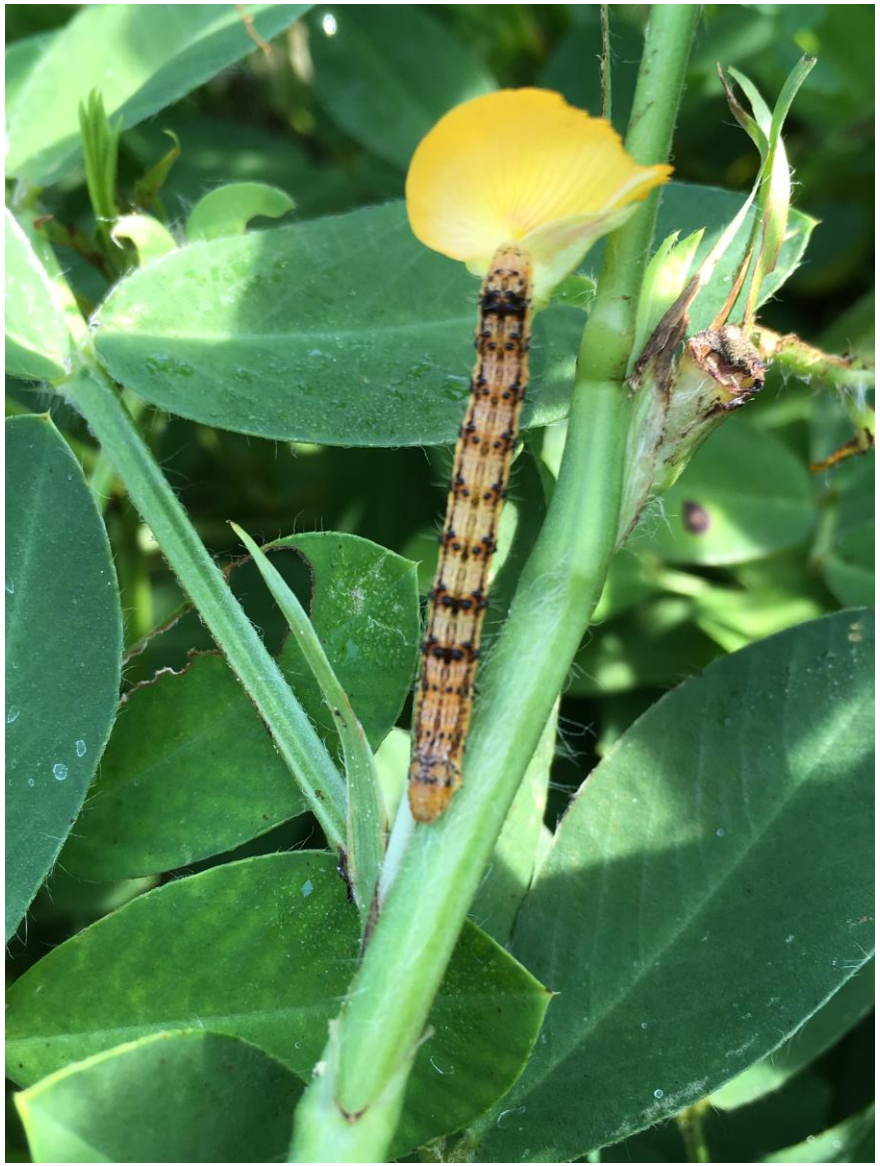
Data are from 25 trials during 2016-2017



Injury from Southern Corn Rootworm

Data are from 25 trials during 2016-2017





Pyrethroid resistance in corn earworm
Presence of tobacco budworm

Points to:

Use of more effective but certainly more expensive chemistries to control the foliar-feeding insect complex

Rick Brandenburg, DEPP
(Jordan paraphrase)