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Evaluating Accuracy and Distribution Uniformity of Gypsum Application with a Spinner-Disc Spreader

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EXTENSION

INTRODUCTION

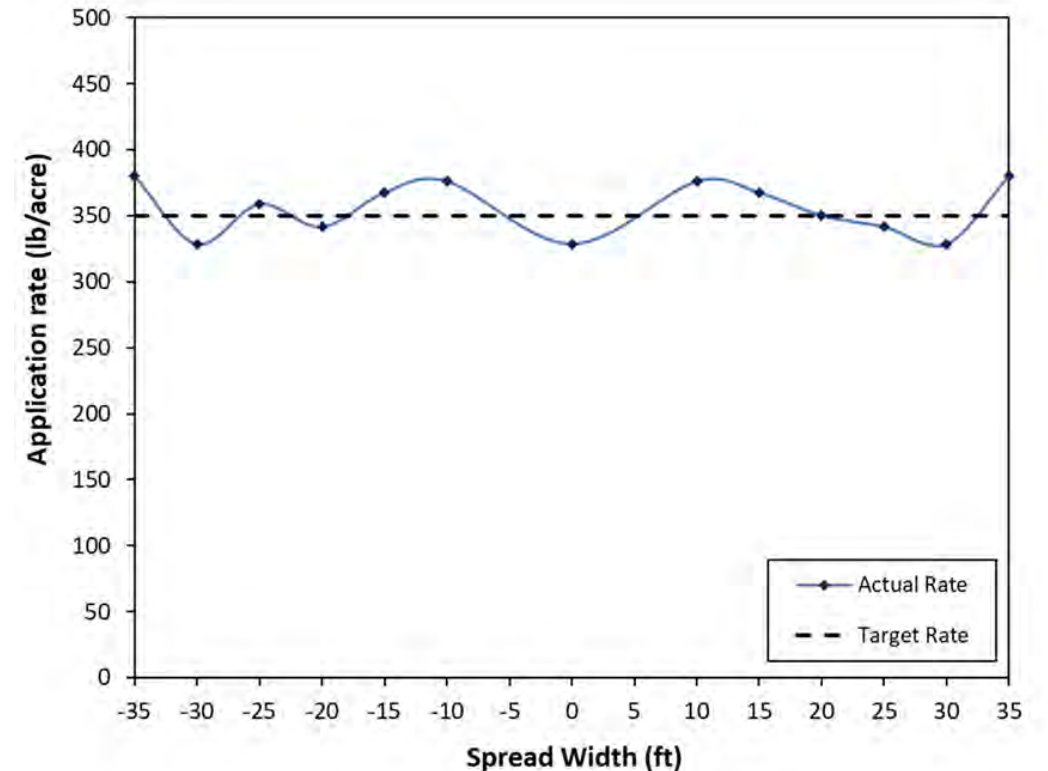
□ Gypsum application in Peanut

- Increases soil calcium levels and more soluble than lime
- Applied at early bloom (app. 30-45 days after planting)
- Adequate calcium in the pegging zone is needed to **reduce the likelihood of “pops”, pod rot,**
- Calcium is critical for germination of peanut seed saved for next year



SPINNER-DISC BROADCAST SPREADERS

- Common application equipment to broadcast apply dry granular fertilizer, lime and gypsum
 - Application issues are very common
 - Material properties influence application rate and uniformity





OBJECTIVE

To assess the application accuracy and distribution uniformity for gypsum applied using a spinner-disc spreader

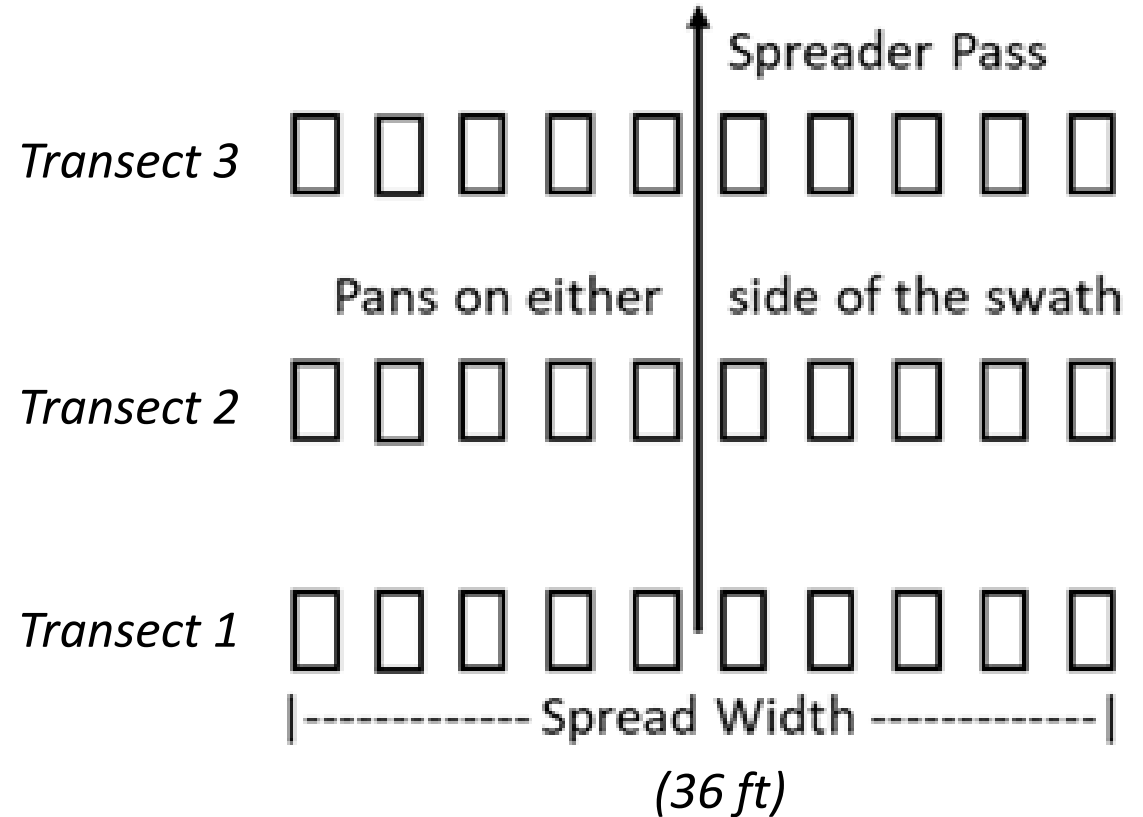


METHODS



Location and Equipment:

- Southwest Research and Education Center, Plains, GA
- Newton Crouch Pull-behind Spinner-disc spreader
- Gypsum source – land plaster
- Target Application Rate – 900 lbs/ac
- Spread width – 36 ft
- Flow divider position – **1”**, **4”** and **7”**
- Each divider setting replicated three times in the field



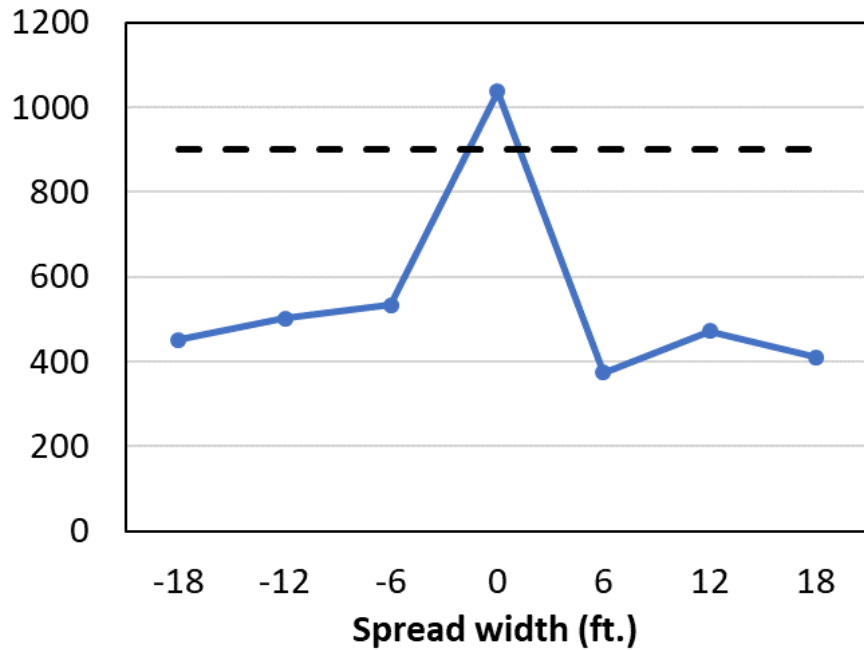
Data Collection & Analysis:

- Collection pans (14.5" x 10.5") were placed 6 ft apart along the swath at three transects (200 ft)
- Material from each pan was weighed and used to determine actual application rate (lbs/ac) and uniformity
- All statistical analysis was performed using JMP Pro using $\alpha = 0.10$.

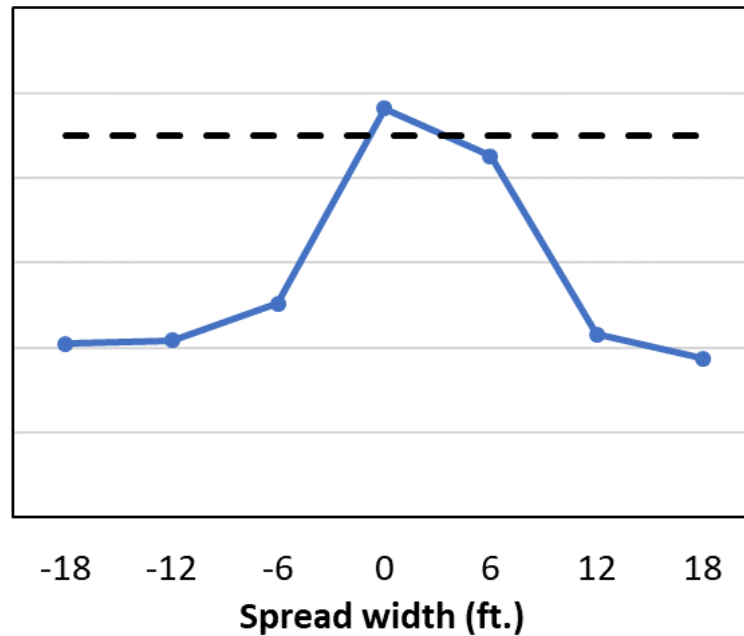
RESULTS

Application Accuracy & Uniformity within the swath

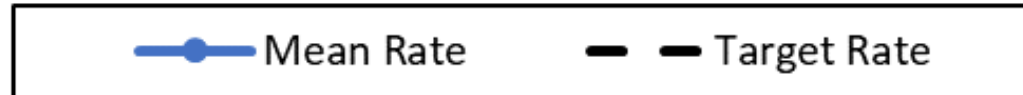
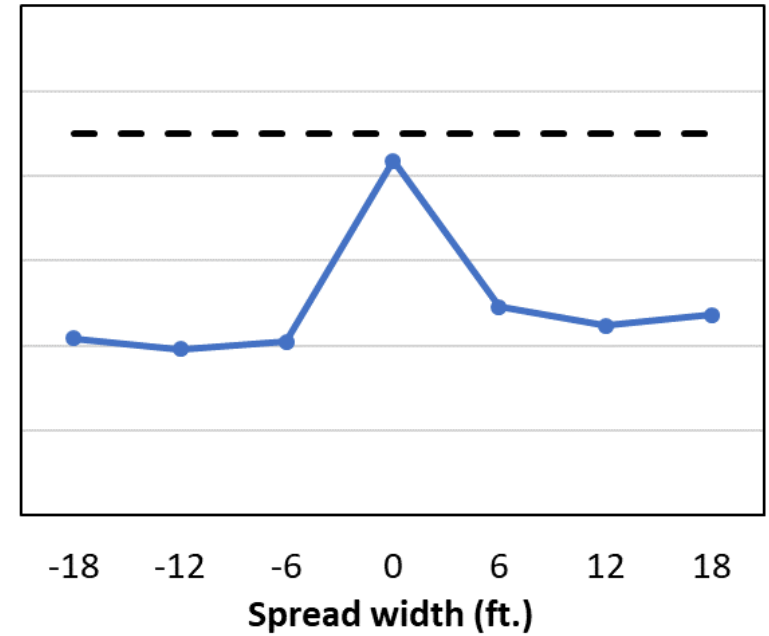
Divider Setting 1"



Divider Setting 4"



Divider Setting 7"



RESULTS

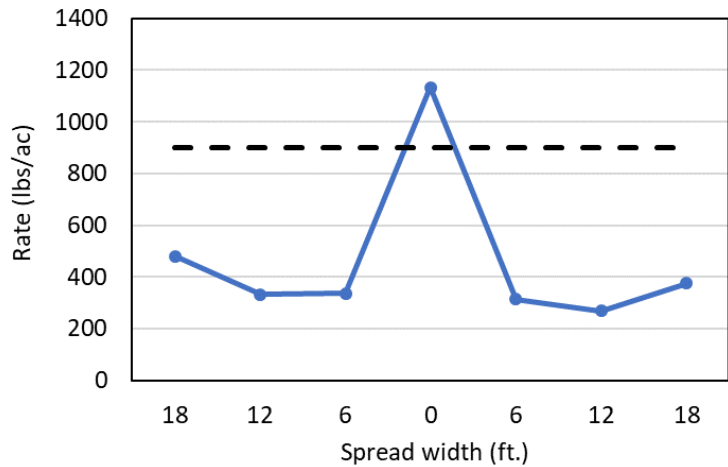
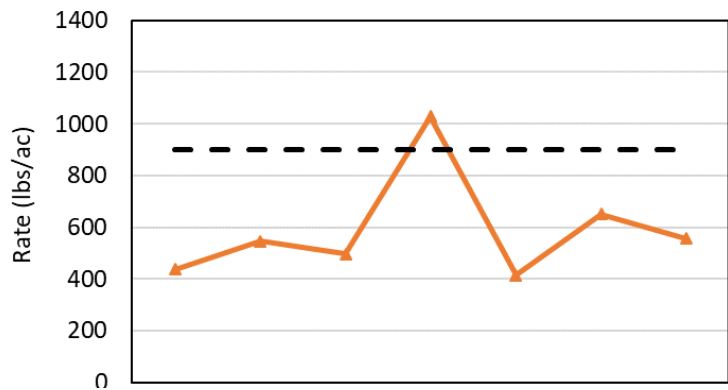
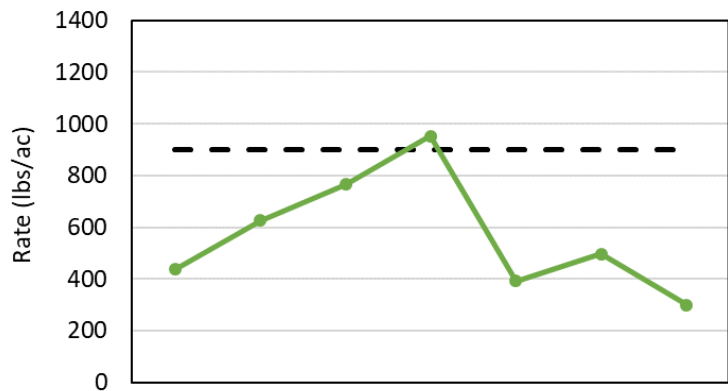


Application Accuracy

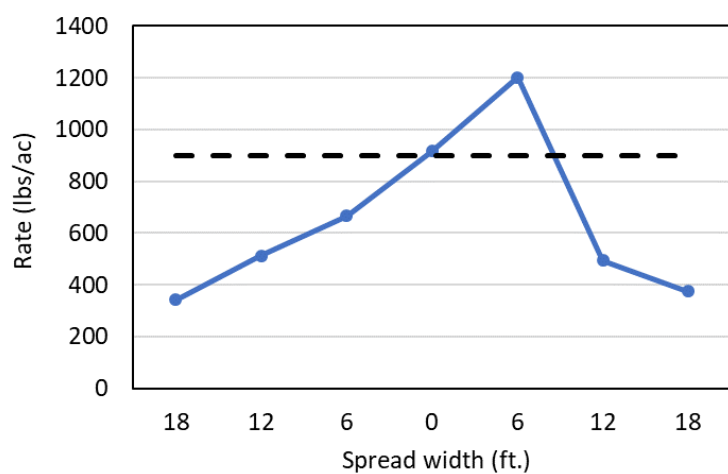
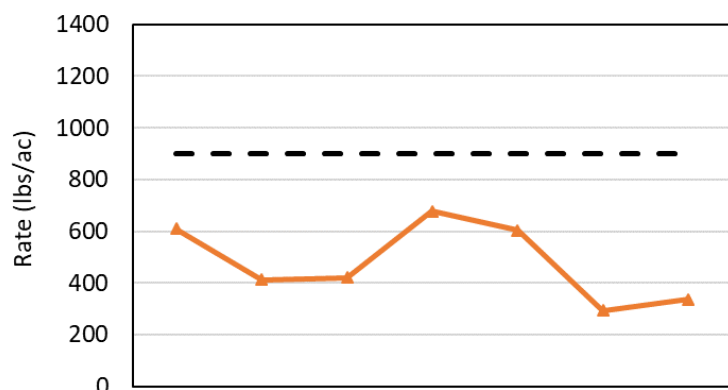
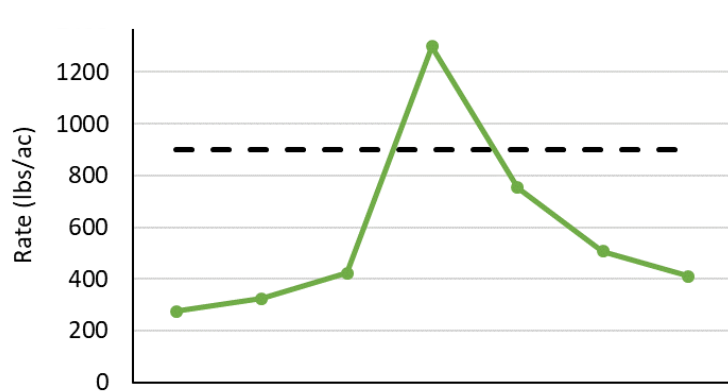
Setting	Mean Rate (lbs/ac)	Std. Dev. (lbs/ac)
Divider Position 1"	540 a	226
Divider Position 4"	564 a	240
Divider Position 7"	495 a	154

CV represents the uniformity of distribution within the swath (A CV value of zero means perfectly uniform distribution).

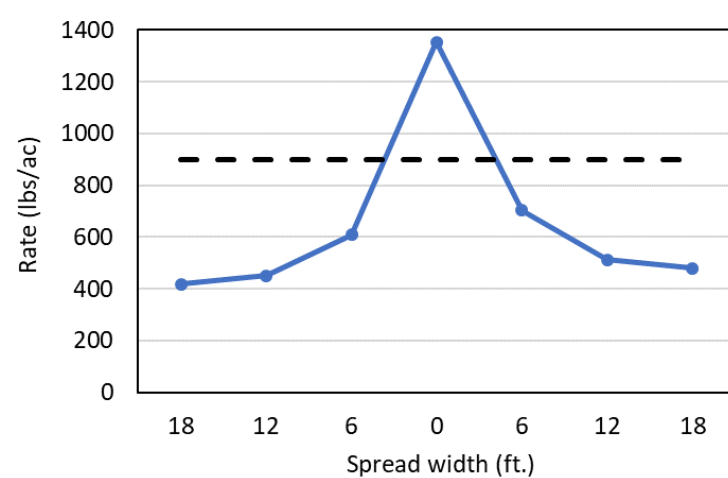
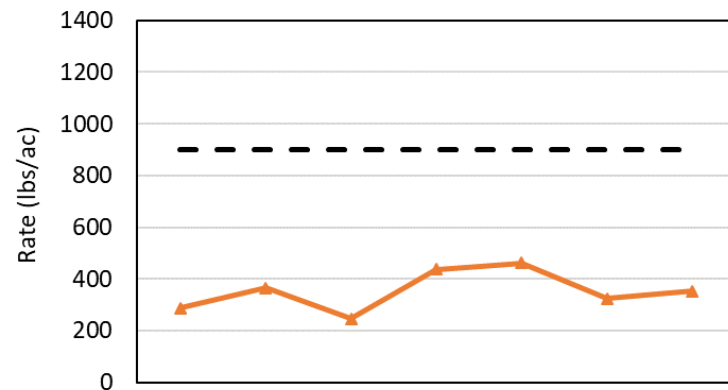
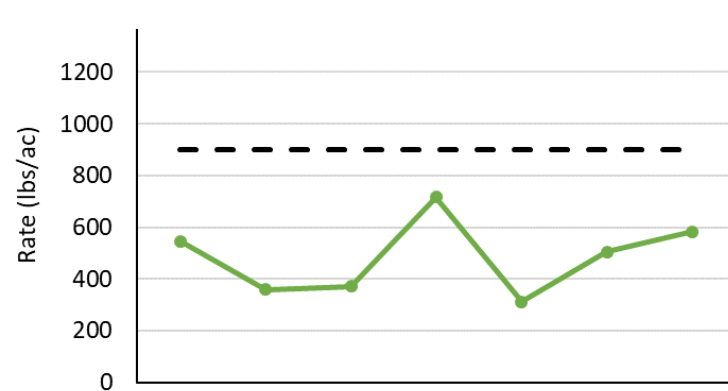
Divider Setting - 1"



Divider Setting - 4"



Divider Setting - 7"

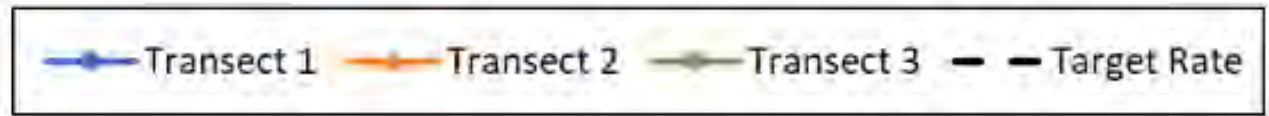
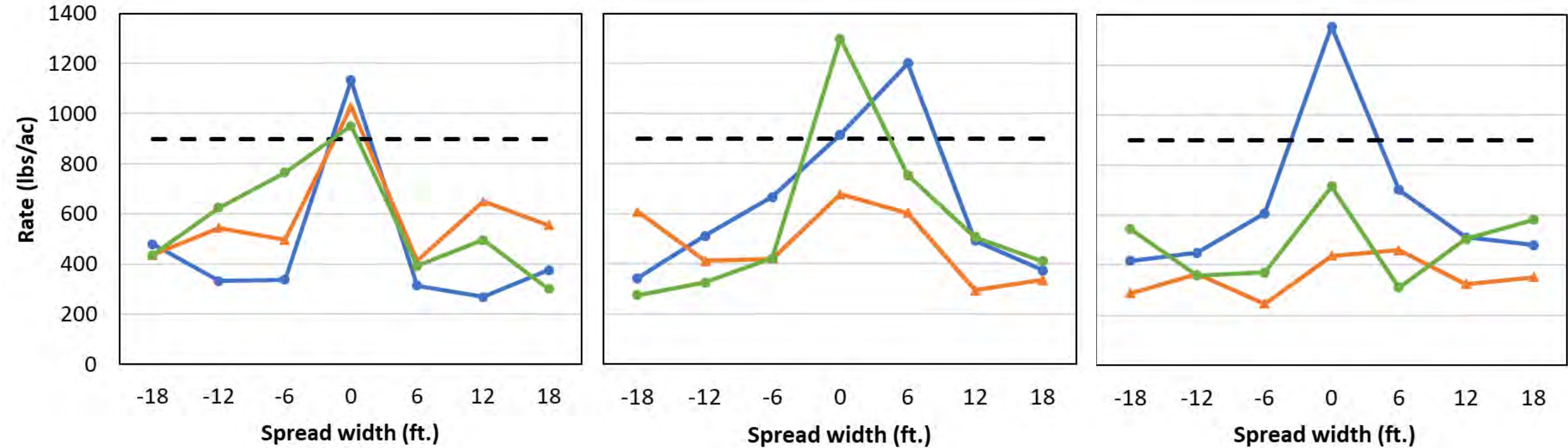


Application Accuracy & Uniformity along the Spreader Pass

Divider Setting - 1"

Divider Setting - 4"

Divider Setting - 7"



Application Accuracy Uniformity

Setting	Transect	Mean Rate (lbs/ac)	Std. Dev. (lbs/ac)	CV (%)
Divider Position 1"	1	463	302	65
	2	590	209	35
	3	567	229	40
Divider Position 4"	1	479	149	31
	2	644	313	49
	3	571	357	63
Divider Position 7"	1	354	77	22
	2	485	144	30
	3	646	327	51



CONCLUSIONS

- ❑ High application rate errors (50-75%) and highly non-uniform distribution (CV = 30–65%) were observed across all spreader settings.
- ❑ The gypsum application variability can lead to varying calcium levels (pod filling and germination) within the field.
- ❑ Both material properties and equipment settings influence spreader settings. It is important for growers to properly calibrate spinner-spreaders to verify application rate and uniformity.

Future Work: Assessing application accuracy for high-clearance broadcast spreaders and influence of material gypsum properties.



GM Harris

June 21, 2013 · Plains · 2

Nice day to spread gypsum on peanuts in Plains GA



Thanks!

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