Evaluating New Production Inputs that will contribute to High Yield Soybeans
Project 28-2020

PIs: Southern Ag - Alan Blaine, alan@southernaginc.com; Dan Prevost, dan@southernaginc.com; Christina Hall, christina@southernaginc.com; Zach Reynolds, zach@southernaginc.com; Will McCarty, willm4590@comcast.net; Mitt Wardlaw, mitt@southernaginc.com; Brian Ward, boz@southernaginc.com; W. R. Thompson, bobthompson54@yahoo.com; William Kingery, wlk@msstate.edu.

RATIONALE/JUSTIFICATION FOR RESEARCH:

Much of the current research focuses on specific factors within a cropping system. Many growers have achieved higher than average yields through intensive management. However, many feel they have reached a "glass ceiling" with regards to yield and profit. While there are many acres that can still be improved; it is those that have hit a "glass ceiling" that ask questions regarding how do we break through this barrier. Through observation and discussion with growers, there are a myriad of factors that limit yield. Oftentimes, these factors are things that cannot be adjusted mid-season such as drainage. With that being said, growers in some high yield environments want to increase profitability through different mid-season management strategies.

Several years ago, we observed a soybean crop planted next to cotton. The grower was spraying mepiquat chloride (Pix) plus a plant bug material in the cotton that drifted onto the soybeans. When he began harvest, the soybeans next to the cotton had increased yields and declined as he moved farther from the drifted area. Questions were asked then and in numerous other situations about plant growth regulators and the effect of a cotton spray program on soybeans (materials specifically being applied for plant bugs). In years past we have tried to use Pix on soybeans, but observed no visual results. No one feels plant bugs are impacting soybean growth/ development, but they are considered a major pest in cotton. Based on past observations and numerous questions we would like to evaluate some different insect control strategies combined with growth regulators to see if we can duplicate past observations and improve soybean yields even more.

OBJECTIVE(S):

Soybeans are being grown under management that was unheard of in years past. Although, a lot of inputs go into making a crop, additional inputs need to be evaluated to determine their place in a production system. In the case of high yields, many growers feel they have maxed out or hit a ceiling. Many produce high yields, but would like to do so consistently. Statewide there are still strides that can be made in soil fertility coupled with some possible micronutrient mixes, but in a lot of situations fertility does not appear to be the limiting factor. For any cropping system, we must first identify the most yield limiting factor. As we identity and solve for these initial limiting factors, other factors will then reveal themselves and the process is repeated. The proposed research will let us look at some strategies that have not been evaluated, but discussed quite a lot over the years.

1. Determine efficacy of higher use rates of Dimilin insecticide in providing season long control of pests.
2. Evaluate the effect of plant bug control on soybean yield using insecticide (Transform) application and timing strategies.
3. Evaluate the effect of plant growth regulators (Pix, Apogee, and Stance) on soybean physiology and yield.
4. Evaluate combinations of treatments listed in Objectives 1-3 for synergism and opportunities to minimize trips across the field.

APPROACH AND EXPERIMENT CONDUCT:

This research is an attempt to identify some new production inputs that will allow growers to achieve higher soybean yields. We implemented three trials: one on a highly fertilized/ leveled field in the hill area and two on high yield potential soil in the MS Delta. Progressive management practices were followed surrounding 1) variety selection, 2) row spacing, 3) planting date, 4) fertility, 5) weed control, etc. Within the growing season, pests will be monitored and control provided as outlined in the objectives listed below.

Objective 1: Determine efficacy of higher use rates of Dimilin insecticide in providing season long control of pests.

Objective 2: Evaluate the effect of plant bug control on soybean yield using insecticide (Transform) application and timing strategies.

Plant bugs are generally overlooked in soybean production. They are considered a non-threat by most entomologists, but they are a major pest in cotton.

Objective 3: Evaluate the effect of plant growth regulators (Pix, Apogee, and Stance) on soybean physiology and yield.

Our goal is to identify which products/ rates/ timings will influence yields. Timings will be at various growth stages, but may be triggered based on insect populations.

Objective 4: Evaluate combinations of treatments listed in Objectives 1-3 for synergism and opportunities to minimize trips across the field.

Our desire is to identify opportunities for combining insecticides/ growth regulators to minimize trips across the field.

REPORT OF ACTIVITY/ACCOMPLISHMENTS

Objective 1: Determine efficacy of higher use rates of Dimilin insecticide in providing season long control of pests.

Dimilin was not evaluated with growth regulator application. This was due to no effect on plant bugs and Dimilin not being a suitable tank mix partner with growth regulators.

Objective 2: Evaluate the effect of plant bug control on soybean yield using insecticide (Transform and Orthene) application and timing strategies.

All treatments were initiated in the delta and hill locations; however, no plant bug pressure materialized at any location

Objective 3: Evaluate the effect of plant growth regulators (Mepstar (Pix), Stance, and Apogee) on soybean physiology and yield.

Final height and node counts were recorded between the R6 and R7 growth stages (Tables 1-4). These data revealed that plant growth regulators had no effect on total height of soybean. While not statistically significant, Stance did seem to reduce plant height the most from a numerical standpoint when compared to the untreated control. Final node counts were increased from multiple Stance applications combined with Transform only at the Chatham location (Table 1). All other locations and when averaged together, height and node counts were not different from the untreated. Harvest was conducted with an Almaco SPC 40 plot combine, yields were calculated and reported in dry bu/ac with a standard moisture of 13%. Tables 1-4 display that there were no differences in yield when compared to the untreated control.

An additional experiment was performed examining the effect of multiple applications of Pix on soybean growth, development, and yield. These treatments are listed in Table 5 showing initiation at V4 growth stage and applications every two weeks following. There were single applications at every timing along with sequential treatments. Even with 4 sequential applications of Mepstar 6X, final soybean height, node, and yield was no different when compared to the untreated control (Table 5).

Objective 4: Evaluate combinations of treatments listed in Objectives 2&3 for synergism and opportunities to minimize trips across the field.

Due to low insect pressure and the lack of a growth regulator effect, no synergism/interaction was observed.

Table 1. Effect of production inputs on soybean height, node, and yield. Chatham, Mississippi 2020

Treatment[ab]	Timing	Height (in)[c]	Node[d]	Yield (bu/ac)[e]
Untreated		31.5 ab	14.8 b	81.0 abc
Mepstar 6X	R1	29.9 b	15.3 ab	78.0 bc
Apogee	R1	31.2 ab	15.4 ab	88.2 abc
Stance	R1	30.1 b	15.2 ab	81.7 abc
Transform	R1	31.4 ab	15.0 b	74.9 c
Mepstar 6X Transform	R1 R1	31.2 ab	15.5 ab	80.3 abc
Apogee Transform	R1 R1	32.3 ab	15.5 ab	86.6 abc
Stance Transform	R1 R1	33.8 a	16.0 ab	85.8 abc
Mepstar 6X Mepstar 6X	R1 R3	32.4 ab	15.6 ab	82.0 abc
Apogee Apogee	R1 R3	31.3 ab	15.6 ab	87.6 abc
Stance Stance	R1 R3	31.9 ab	15.3 ab	88.7 abc
Mepstar 6X Transform Mepstar 6X	R1 R1 R3	33.0 a	14.8 b	92.8 a
Apogee Transform Apogee	R1 R1 R3	32.3 ab	14.8 b	85.3 abc
Stance Transform Stance	R1 R1 R3	31.8 ab	16.3 a	91.3 ab

Means followed by same letter or symbol do not significantly differ (α=0.05)

[a] Treatment rates at all applications: Mepstar 6X: 2 fl oz/ac; Apogee: 7.25 oz/ac; Stance: 4 fl oz/ac; Transform: 2 oz/ac

[b] All Apogee applications were mixed with AMS: 1 lb/ac + COC: 1 qt/ac

[c] Total plant height measured in inches (in) at growth stage R6

[d] Total number of nodes counted at growth stage R6

[e] Yield reported in bushels per acre (bu/ac)

Table 2. Effect of production inputs on soybean height, node, and yield. Wayside, Mississippi 2020

Treatment[ab]	Timing	Height (in)[c]	Node[d]	Yield (bu/ac)[e]
Untreated		37.6 abc	19.7 a	99.2 ab
Mepstar 6X	R1	39.3 a	20.1 a	103.9 ab
Apogee	R1	36.8 abc	19.7 a	94.2 b
Stance	R1	38.7 ab	20.1 a	107.8 a
Transform	R1	37.4 abc	19.5 a	93.2 b
Mepstar 6X Transform	R1 R1	37.4 abc	19.5 a	101.8 ab
Apogee Transform	R1 R1	39.2 a	19.6 a	98.9 ab
Stance Transform	R1 R1	36.1 bc	20.1 a	93.4 b
Mepstar 6X Mepstar 6X	R1 R3	38.0 abc	20.3 a	100.9 ab
Apogee Apogee	R1 R3	39.0 a	20.4 a	102.0 ab
Stance Stance	R1 R3	35.5 c	19.0 a	98.3 ab
Mepstar 6X Transform Mepstar 6X	R1 R1 R3	35.8 c	19.3 a	93.6 b
Apogee Transform Apogee	R1 R1 R3	37.3 abc	19.5 a	92.6 b
Stance Transform Stance	R1 R1 R3	35.4 c	19.7 a	100.1 ab

Means followed by same letter or symbol do not significantly differ (α=0.05)
[a] Treatment rates at all applications: Mepstar 6X: 2 fl oz/ac; Apogee: 7.25 oz/ac; Stance: 4 fl oz/ac; Transform: 2 oz/ac
[b] All Apogee applications were mixed with AMS: 1 lb/ac + COC: 1 qt/ac
[c] Total plant height measured in inches (in) at growth stage R6
[d] Total number of nodes counted at growth stage R6
[e] Yield reported in bushels per acre (bu/ac)

Table 3. Effect of production inputs on soybean height, node, and yield. Mantee, Mississippi 2020

Treatment[ab]	Timing	Height (in)[c]	Node[d]	Yield (bu/ac)[e]
Untreated		44.4 ab	21.4 abc	72.3 ab
Mepstar 6X	R1	41.5 b	21.3 abc	65.7 b
Apogee	R1	44.4 ab	20.9 bc	74.2 ab
Stance	R1	43.4 ab	21.7 ab	75.9 ab
Transform	R1	44.5 ab	21.4 abc	76.2 a
Mepstar 6X Transform	R1 R1	44.6 ab	21.8 ab	76.7 a
Apogee Transform	R1 R1	45.6 a	21.2 abc	74.5 ab
Stance Transform	R1 R1	43.7 ab	21.3 abc	72.3 ab
Mepstar 6X Mepstar 6X	R1 R3	41.9 b	20.2 c	66.6 ab
Apogee Apogee	R1 R3	45.4 a	21.7 ab	75.0 ab
Stance Stance	R1 R3	41.9 b	21.4 abc	72.9 ab
Mepstar 6X Transform Mepstar 6X	R1 R1 R3	44.4 ab	21.0 bc	76.3 a
Apogee Transform Apogee	R1 R1 R3	44.7 ab	21.2 abc	68.5 ab
Stance Transform Stance	R1 R1 R3	44.1 ab	22.3 a	74.8 ab

Means followed by same letter or symbol do not significantly differ (α=0.05)
[a] Treatment rates at all applications: Mepstar 6X: 2 fl oz/ac; Apogee: 7.25 oz/ac; Stance: 4 fl oz/ac; Transform: 2 oz/ac
[b] All Apogee applications were mixed with AMS: 1 lb/ac + COC: 1 qt/ac
[c] Total plant height measured in inches (in) at growth stage R6
[d] Total number of nodes counted at growth stage R6
[e] Yield reported in bushels per acre (bu/ac)

Table 4. Effect of production inputs on soybean height, node, and yield averaged across three locations in Mississippi 2020

Treatment[ab]	Timing	Height (in)[c]	Node[d]	Yield (bu/ac)[e]
Untreated		37.8 abc	18.7 abc	84.15 ab
Mepstar 6X	R1	36.9 bc	18.9 abc	82.54 ab
Apogee	R1	37.4 abc	18.7 abc	85.53 ab
Stance	R1	37.4 abc	19.0 abc	88.44 a
Transform	R1	37.7 abc	18.6 bc	81.98 ab
Mepstar 6X Transform	R1 R1	37.7 abc	19.0 abc	86.29 ab
Apogee Transform	R1 R1	39.0 a	18.8 abc	86.67 ab
Stance Transform	R1 R1	37.9 abc	19.1 abc	83.21 ab
Mepstar 6X Mepstar 6X	R1 R3	37.4 abc	18.7 abc	80.71 b
Apogee Apogee	R1 R3	38.5 ab	19.2 ab	88.21 a
Stance Stance	R1 R3	36.4 c	18.6 bc	86.59 ab
Mepstar 6X Transform Mepstar 6X	R1 R1 R3	37.8 abc	18.3 c	87.56 ab
Apogee Transform Apogee	R1 R1 R3	38.1 abc	18.5 bc	82.11 ab
Stance Transform Stance	R1 R1 R3	37.1 bc	19.4 a	88.73 a

Means followed by same letter or symbol do not significantly differ (α=0.05)

[a] Treatment rates at all applications: Mepstar 6X: 2 fl oz/ac; Apogee: 7.25 oz/ac; Stance: 4 fl oz/ac; Transform: 2 oz/ac

[b] All Apogee applications were mixed with AMS: 1 lb/ac + COC: 1 qt/ac

[c] Total plant height measured in inches (in) at growth stage R6

[d] Total number of nodes counted at growth stage R6

[e] Yield reported in bushels per acre (bu/ac)

Table 5. Effect of multiple applications of Mepstar 6X[a] on soybean height, node, and yield. Mantee, Mississippi 2020

Timing[b]	Height (in)[c]	Node[d]	Yield (bu/ac)[e]
Untreated	47.8 a	21.5 ab	86.8 a
V4	49.6 a	21.8 ab	87.7 a
2 Weeks	48.8 a	21.7 ab	86.6 a
4 Weeks	48.2 a	21.5 ab	86.3 a
6 Weeks	47.1 a	20.7 a	83.6 a
V4 2 Weeks 4 Weeks 6 Weeks	47.9 a	21.0 ab	88.3 a
2 Weeks 4 Weeks 6 Weeks	48.9 a	22.3 a	87.3 a
4 Weeks 6 Weeks	49.7 a	21.4 ab	91.7 a

Means followed by same letter or symbol do not significantly differ (α=0.05)
[a] Rate of Mepstar 6X at all application timings: 2.6 fl oz/ac
[b] Timings 2 weeks, 4 weeks, 6 weeks indicate time after V4 growth stage
[c] Total plant height measured in inches (in) at growth stage R6
[d] Total number of nodes counted at growth stage R6
[e] Yield reported in bushels per acre (bu/ac)