these inputs are implemented or at acceptable levels, pushing the envelope with these variables produce diminishing returns. Therefore, production gains are more likely to come through incorporation of new technology or more efficient utilization of practices and/or inputs. Mississippi State University's Corn Verification program has identified several key limitations which often drastically reduce productivity in Mid-south corn fields.

Several factors involved in the planting process often create undesirable results. Soil temperature and soil moisture must be acceptable to germinate seeds and produce healthy, vigorous plants. Planter settings must be set for the specific seed size and weight, and seed depth and operation should be continuously monitored during the planting process. Growers should also be aware that seed treatments have shortfalls and either select appropriate products for anticipated pests, supplement the treatment rate, or use alternative pest control methods.

Utilization of corn in crop rotation systems can substantially reduce pest management issues, but proactive planning and thorough crop scouting can greatly improve results and profitability. For instance, you should be prepared to implement management changes to address pesticide resistance problems, not only for glyphosate resistant weeds, but other issues as well. Active management and scouting will also greatly improve performance and also often avoid unnecessary application expenses. Growers can make considerable improvements regarding irrigation scheduling relative to crop needs and environmental conditions.

Program 7CR-2

▸ Enhancement Of Nitrogen Fertilizer Efficiency For Corn Production On Mississippi River Alluvial Soils

Presented by Dr. H.J. "Rick" Mascangi, Jr.
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Introduction

Nitrogen (N) fertilization is a critical cultural practice required for producing maximum corn yield. Many factors, including soil type and crop management systems, determine optimum N rates. Nitrogen is typically knifed-in soon after the crop has emerged and an adequate stand established. After fertilization, uncontrollable factors such as excessive or lack of rainfall, may produce soil conditions conducive to N fertilizer loss through denitrification and/or inefficient plant N uptake. Sometimes N applications are delayed or omitted due to inclement weather. While at other times, growers apply the recommended N rate for an expected yield potential; however, as the crop develops yield potential may be higher than expected and additional N may be required. In each of the above situations the question arises, how late can N fertilizer be applied and be effective? The objective of this trial was to evaluate the timing of supplemental N applications on Mississippi River alluvial soils.

Procedures

Field experiments were conducted in 2008, 2009, and 2010 on Commerce silt loam and Sharkey clay at LSU AgCenter's Northeast Research Station near St. Joseph to evaluate the influence of N rate and timing on corn yield and N fertilizer use efficiency (NFUE). Conventional tillage was used in the Commerce study and a stale-seedbed tillage system was used in the Sharkey study. Early-season N rates (ESN) were injected at about the two-leaf growth stage as 30-0-0-2 solution at N rates of 0, 150, 180, 210, and 240 lb/acre on Commerce and 0, 180, 210, 240, and 270 lb/acre on Sharkey. Additionally, supplemental N rates were applied at about the 8-leaf, 12-leaf, and early silk growth stages at rates of 30 and 60 lb N/acre. The 8-leaf application was knifed-in, while the two later side-dress applications were applied by hand using a syringe simulating a dribble application. Furrow irrigation was also evaluated on Sharkey clay. Using the Arkansas Irrigation Scheduler, irrigations were triggered whenever the soil moisture deficit reached 1.5-inches. Planting dates for DynaGro DG58P59 were: March 28, 2008 (on Commerce and Sharkey); March 23, 2009 (Commerce) and April 17, 2009 (replant) (Sharkey); and April 1, 2010 (Commerce and Sharkey). Final harvest populations were about 30,000 plants/acre. Cotton was the previous crop in each trial. Cultural practices as recommended by the LSU AgCenter were followed.

The experimental design was a randomized complete block (RCB) with four replications for both the non-irrigated and irrigated trials on Sharkey and five replications for trial on Commerce. Grain yield and yield components were measured. Grain yield was determined by machine harvest of the two middle rows of four-row plots and reported at 15.5% moisture. NFUE was determined using seed N. Remote sensing data, Greenseeker and SPAD meter readings, were determined at multiple growth stages. This report focuses on yield response to N treatments. Statistical analyses were performed using the GLM procedure of SAS at probability level of 0.10.

Results

Commerce silt loam: Yield responses to N treatments on the Commerce silt loam are presented in Table 1. Optimum ESN rate was between 180 and 210 lb/acre in 2008 and 180 lb/acre in 2009. The lower N requirement in 2009 was partly due to the very high residual-N carryover, with the no-N control plots yielding 93.6 bu/acre (see footnote below Table 1). Each year yields were increased at each timing by the supplemental N rates, more so for the 60 lb/acre rate. Yield responses were greater for the 8-leaf and 12-leaf growth stage applications compared to early- silk applications. However, there was generally no advantage to the supplemental N rate when comparing the equivalent N rate applied once early in the season (2-leaf growth stage).

Sharkey clay: Higher yields and greater responses occurred on the irrigated plots (Table 2). Optimum N rates were about 210 lb/acre on the non-irrigated plots in 2008, 2009, and 2010 and irrigated plots in 2008 and between 240 and 270 lb/acre in the irrigated plots in 2009 and 2010. Similar to the Commerce study, yields were increased at each timing by the supplemental N rates, more so for the 60 lb/acre rate. However in this study, yield responses were similar across the different timings. In 2009, the supplemental N application was greater than the equivalent N rate applied early season, especially for the 8-leaf supplemental application. The 8-leaf 240 lb N/acre application (180 + 60 lb N/acre) yielded as well as the ESN rate of 270 lb/acre.

These studies indicate that supplemental N applications as late as early silk may increase yield. However, these applications may not be as effective as applications applied earlier in the season.

Table 1. Influence of N rate and time of application on corn yield on Commerce silt loam at St. Joseph for three years.

	Time of N application					
ESN rate[1]	8-leaf	12-leaf	Early silk	2008	2009	2010
lb N/a	lb N/a			bu/a[2]		
150	-	-	-	174.9	140.6	113.6
150	30	-	-	185.2	148.2	127.9
150	60	-	-	191.7	154.4	136.8
150	-	30	-	187.5	146.6	120.4
150	-	60	-	191.0	152.1	130.3
150	-	-	30	176.6	149.8	110.2
150	-	-	60	187.5	151.6	117.9
180	-	-	-	187.2	148.7	117.6
210	-	-	-	193.2	152.1	141.3
240	-	-	-	197.4	154.7	136.6
Average				186.3	149.9	107.1
LSD (0.10)				6.2	9.8	8.6

1Applied at about the 2-leaf growth stage.
2For the no-N control, yields were 21.2 bu/a in 2008, 93.6 bu/a in 2009, and 16.2 bu/a in 2010.

ESN rate[1]	Time of N application 8-leaf	12-leaf	Early silk	2008 Non-irr	Irr	2009 Non-irr	Irr	2010 Non-irr	Irr
lb N/a	----------lb N/a----------			---------------------------bu/a[2]---------------------------					
180	-	-	-	162.7	189.5	93.2	127.6	43.3	129.7
180	30	-	-	169.3	191.1	106.1	155.4	51.2	140.7
180	60	-	-	167.0	195.0	100.8	167.9	56.6	148.2
180	-	30	-	167.4	196.0	99.7	142.3	40.3	143.2
180	-	60	-	166.1	203.0	101.8	156.3	52.4	142.7
180	-	-	30	160.9	191.8	94.3	147.5	47.7	133.8
180	-	-	60	169.1	194.0	94.4	152.0	48.8	140.3
210	-	-	-	165.1	194.1	108.1	143.1	47.1	138.7
240	-	-	-	166.4	202.8	106.0	147.3	52.3	149.1
270	-	-	-	170.7	194.5	108.4	163.5	51.0	157.7
Average				167.3	194.9	101.3	150.3	45.7	129.8
LSD (0.10)				NS	7.7	6.8	6.2	10.2	7.8

Table 2. Influence of N rate and time of application on corn yield in non-irrigated and irrigated plots on Sharkey clay at St. Joseph for three years.

1Applied at about the 2-leaf growth stage.

2For the no-N control, yields were 12.1 bu/a in non-irrigated and 20.3 bu/a in irrigated plots in 2008, 15.6 in non-irrigated and 22.3 bu/a in irrigated plots in 2009, and 1.4 bu/a in non-irrigated and 3.9 bu/a in irrigated plots in 2010.

Program 5CR-2

▸ Impact And Management Of Diseases And Mycotoxins In Corn

Presented by Dr. W. Scott Monfort

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Management of foliar diseases and mycotoxins in corn has become an important factor in production with increased acreage and expansion of the current planting window in Arkansas. For foliar disease, fungicides are often utilized to protect the crop. One of the major limiting factors for this control strategy is a lack of information for the proper usage and timing of fungicide applications, especially in later planted corn. Also, limited information is available regarding resistance to southern rust and other important corn diseases on currently planted hybrids.

Beyond foliar diseases, aflatoxin contamination remains the most important disease-related problem in Arkansas corn production. Once contaminated, there is no easy or practical answer for dealing with the grain, from a farmer standpoint. So preventing aflatoxin contamination is key. Aflatoxin can reduce the value of corn from 50 – 100%, depending on US corn supply current market conditions. In an epidemic year, like 1998, it affected up to 50% of Arkansas' corn acreage costing our growers an estimated $15,000,000 in direct losses. One potential option for growers in managing aflatoxin development may be usage of the newly available microbial antifungal crop protection product Afla-Guard. Afla-Guard contains a naturally-occurring, non-toxic fungus that reduces the development of the fungi that produce aflatoxin in grains, nuts and oil seeds through competition. Although Afla-Guard is registered for use in corn, little research has been conducted in Arkansas regarding the effectiveness of non-toxic fungus to reduce the aflatoxin development in our environment, optimum application methods, timing of application, and economical benefit or return of this bio-control agent.

Research efforts in Arkansas have concentrated on the most effective usage of fungicides and bio-control products to lessen the impact of major foliar diseases and mycotoxins. However, to control corn diseases and mycotoxins effectively these products need to be utilized in combination with other management strategies including resistance, hybrid adaptability, planting