

AGRONOMY

MANAGING CORN PRODUCTION WITH PRE-TASSEL NITROGEN APPLICATIONS—NECESSITY OR ANOTHER TOOL IN THE PRODUCTION TOOL BOX?

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NITROGEN MANAGEMENT IS CRITICAL FOR OPTIMUM CROP PRODUCTION.... USE THE TOOLS IN YOUR TOOL BOX TO ACHIEVE MAXIMUM ECONOMIC POTENTIAL.

One of the biggest decisions producers make each year concerns nitrogen (N) fertility management. Environmental issues such as rainfall can directly impact the availability of both fertilizer N and soil available N (made available through biological transformations). The closer N applications are made to the time that plants can efficiently utilize the nutrient the better for overall crop production efficiency. In most cases, fertilizer N applications are made as a split application with the first portion applied at or near planting and the remainder applied at the V5 to V6 growth stage. However, recent research has shown that N applications, delayed until just before tassel emergence, have been effective in significantly increasing corn yields. The greatest response has been at lower standard N rates (less than 200 lb N/ac) with less response or no response at levels above 200 lb N/ac. Over the years, producers have gone in to fields with airplanes to “touch up” yellow areas that have apparent N deficiency due to numerous reasons but generally as a result of N loss (usually denitrification) where water has stood. Whether this practice led to increased yield was debatable and never really documented. However, producers felt that the practice was important enough to continue making the applications. After several years of replicated field studies, it is well documented

that the N is making its way into plants and there is a yield advantage when N levels are not sufficient early in the season.

Research was initiated at the DREC to evaluate pre-tassel N management for corn in a corn/soybean rotation system. Standard N rates were established at 120, 160, 200, 240, and 280 lb N/ac with 120 lb N/ac applied prior to planting as urea-ammonium nitrate solution (32% N) and the remainder applied as a sidedress application (0 to 160 lb N/ac). Pre-tassel nitrogen (PTN) as urea was then hand-applied at rates from 0 to 60 lb N/ac as a broadcast (to simulate aerial application) followed by irrigation or rainfall to incorporate. Grain yields have varied from year to year (Table 1) but yields have been consistently increased with the PTN applications up to 20 lb N/ac (Table 2) applied as urea (46-0-0). Grain yield response to N rates from 2011 through 2014 are summarized in Table 1 (averaged across the pre-tassel N rates) and Table 2 (averaged across N rates). Additional PTN did not significantly increase yields above the 20 lb N/ac rate in any of the four years. In most years, the biggest gain has come with only 20 lb N/ac even though the minimum aerial application is 100 lb product/ac. Along with grain yields, bushel test weight and seed weight were both significantly impacted by the standard N

Nitrogen Management with Pre-tassel Urea Applications 4-Year Summary of Main Effects DREC– Silt Loam Site				
Nitrogen Rate	2011 Yield	2012 Yield	2013 Yield	2014 Yield
(lb N/A) --Grain Yield @15.5%Moisture (BU/ac)--				
0	140 b	187 b	202 b	185
20	156 a	196 a	216 a	185
40	160 a	206 a	222 a	188
60	165 a	202 a	217 a	193
LSD (0.05)	11	6	12	11 ns
Means averaged across standard N rates (120 to 280 lb N/ac)				

rates and PTN rates.

This research was originally supported in part by the Mississippi Corn Promotion Board. The current evaluations are being conducted without additional funding. An effort has been underway to try to refine the pre-tassel N management by looking at additional cultivars and soil types. Also under investigation is the possible timing of the PTN application based on growth stage or growing degree days in an effort to identify the “best” time for pre-tassel N applications. Further research in producer fields has shown that the yield response may be related to cultivars as some cultivars did not respond to PTN applications.

Many producers are inquiring as to whether the PTN application should become a standard procedure when growing corn. While the research data over the last several years has shown that the plants are responding to the PTN application, the response is greatest when adequate N is not available prior to

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Nitrogen Rate	2011 Yield	2012 Yield	2013 Yield	2014 Yield
(lb N/A) --Grain Yield @15.5%Moisture (BU/ac)--				
120	109 d	173 d	171 d	161 d
160	139 c	187 c	204 c	178 c
200	159 b	204 b	221 b	194 b
240	181 a	212 a	235 a	200 a
280	189 a	213 a	241 a	207 a
LSD (0.05)	12	7	14	12
Means averaged across Pre-tassel N rates (0, 20, 40, and 60 lb N/ac)				

tassel emergence. However, the PTN application is the most expensive N and does require a water source (rainfall or irrigation) to incorporate the added N. Data also indicated that there was no response when the standard N rate was applied at recommended levels early in the growing season. Delaying N applications could lead to complications and N deficiencies if environmental conditions are not favorable. To address some of these questions, two studies were initiated in 2015 to evaluate the interaction of cultivars and PTN applications. The two studies involve 1) a lower than normal standard N rate (180 lb N/ac: 120 lb N/ac applied prior to planting + 60 lb N/ac as a sidedress at V5-V6), and 2) a high standard N rate (240 lb N/ac: 120 lb N/ac prior to planting + 120 lb N/ac as a sidedress at V5-V6). While there were responses to PTN in the low standard system, there was no response to PTN in the other. These studies are planned to continue in 2016.

Table 1, far left: Four-year summary of corn grain yield (@ 15.5% moisture) response to pre-tassel nitrogen (PTN) rates averaged across standard nitrogen application rates. Delta Research and Extension Center, Stoneville, MS. 2011 – 2014.

Table 2, left: Four-year summary of corn grain yields (@ 15.5% moisture) with varying nitrogen (N) management averaged across pre-tassel nitrogen (PTN) rates. Delta Research and Extension center, Stoneville, MS. 2011-2014