

NITROGEN FERTILIZATION FOR WHEAT GROWN ON WET SOILS

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BACKGROUND:

Farmers in the Purchase Region of Kentucky (and other less than well drained areas) do not normally think of wheat as a crop with a high yield potential. One of the main production problems is applying nitrogen in a timely manner due to wet soil conditions in the early spring. This study was designed to examine the effects of delayed N applications on grain yield, and determine appropriate application rates for N applied as late as the Feekes 9 (flag leaf fully emerged).

METHODS:

We initiated a study last fall on very poorly drained soils in Caldwell and Calloway Counties to determine the effect of N sources and application timing on wheat yield. The two sources were urea and polymer coated urea, a slow release N source produced by Agrium Inc. (source effects reported in the previous report). Nitrogen application rates of 0, 40, 80, and 120 lbs N/acre as urea were applied at seven different times: fall, January, Feekes 3, Feekes 6, Feekes 7, Feekes 8, and Feekes 9 growth stage. The fall application was made within three weeks of planting and the January application was done when the ground was frozen. The Feekes growth stages are defined as F3 early green-up, F6 first node visible, F7 second node visible, F8 flag leaf visible, F9 flag leaf fully emerged. The F8 application at the Calloway county site was not applied. The plots were 4 x 15 feet and were harvested with a plot combine.

RESULTS:

The highest yielding treatments were ones receiving fertilization at the F3 stage, and both locations topped out over 100 bu/a (Table 1). Nitrogen applied earlier or later than F3 generally caused a reduction in yield. Probably the most interesting and unexpected result was N applied as late as Feeke's 9 increased yields by 34 bu/acre at the Caldwell site and 19 bu/a at the Calloway site when compared to the no N check. Even at this late date, added N stimulated additional tillering and weather conditions were such that these very late tillers contributed to grain yield. At this late time, between 40 and 80 lbs N/acre was needed to maximize yield.

CONCLUSIONS:

Keep in mind that the data presented is only from the first year of the study and growing conditions next year might alter the results. This study does, however, demonstrate that high wheat yields are possible on poorly drained soils, and there may actually be more flexibility in N application timing than growers generally think. Feekes 3 was the optimal time to fertilize these poorly drained soils, but relatively high yields were obtained with any N application timing from frozen ground applications in January to the flag leaf stage of growth. This study will be repeated to determine the effects with different growing conditions.

**TABLE 1. WHEAT YIELD RESPONSE TO UREA
NITROGEN APPLICATIONS (2004)**

| Application Time | Caldwell County lbs N/acre | | | | Calloway County lbs N/acre | | | |
|------------------|----------------------------|----|----|-----|----------------------------|-------------|----|-----|
| | 0 | 40 | 80 | 120 | 0 | 40 | 80 | 120 |
| Planting | ----- Yield bu/a ----- | | | | | | | |
| | 40 | 56 | 60 | 64 | 66 | 81 | 84 | 100 |
| Frozen Ground | | 59 | 64 | 85 | | 87 | 94 | 112 |
| Feeke's 3 | | 65 | 94 | 102 | | 88 | 94 | 111 |
| Feeke's 6 | | 67 | 83 | 93 | | 86 | 96 | 106 |
| Feeke's 7 | | 66 | 80 | 90 | | 87 | 88 | 91 |
| Feeke's 8 | | 60 | 67 | 77 | | Not Applied | | |
| Feeke's 9 | | 65 | 74 | 71 | | 84 | 82 | 84 |

Frozen ground applied early January

Feeke's 3 – early green-up

Feeke's 6 – jointing

Feeke's 7 – second node visible

Feeke's 8 – flag leaf visible

Feeke's 9 – flag leaf fully emerged