1-29-2001

Optimal N rates in dry years

Alfred M. Blackmer
Iowa State University, ablackmr@iastate.edu

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Abstract
Relatively small amounts of nitrogen (N) were needed to maximize profits in dry parts of the state last year. This observation deserves attention now because soils are dry in much of the state and because N prices may be unusually high next spring. Evidence in support of this conclusion was obtained in precision farming trials conducted at three sites, two in Greene County and one in Hamilton County. Each trial covered approximately 80 acres of corn after soybean. Yields of corn seemed to be severely limited by lack of rainfall at the two sites in Greene County and somewhat limited by rainfall at the Hamilton County site.

Keywords
Agronomy

Disciplines
Agricultural Science | Agriculture | Agronomy and Crop Sciences

INTEGRATED CROP MANAGEMENT

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Evidence in support of this conclusion was obtained in precision farming trials conducted at three sites, two in Greene County and one in Hamilton County. Each trial covered approximately 80 acres of corn after soybean. Yields of corn seemed to be severely limited by lack of rainfall at the two sites in Greene County and somewhat limited by rainfall at the Hamilton County site.

Sidedressing enables farmers to adjust N rates for weather.

Each trial included numerous treatments that consisted of various times, rates, and/or methods of application as shown in Table 1. All treatments received 25 lb N/acre as fall-applied diammonium phosphate fertilizer that is not included in the rates shown. Mean yields across all sites were between 130 and 133 bu/acre for all treatments where N was applied in the fall or soon after crop emergence. Rates of application between 50 and 150 lb N/acre, therefore, resulted in essentially the same yields.

Application of 50 lb N/acre when plants were about a foot tall resulted in a mean yield of 136 bu/acre. Increasing rates of fertilization at this time resulted in slight decreases in yields. The reason for this negative effect of fertilizer is not known, but this effect often is observed in dry

years.

Results of this study support mounting evidence that weather is a key factor affecting N fertilizer needs for corn. Much of the explanation seems to be that losses of soil and fertilizer N are minimal when soils are relatively dry early in the season. Some of the explanation may be that less soil and fertilizer N is needed when yields are limited by lack of water.

The results clearly show no yield penalties associated with delaying the applications of fertilizer N until corn (after soybean) is approximately 12 inches tall. This observation is consistent with all studies we have conducted in Iowa, but it should not necessarily be extrapolated to corn after corn or to soils that have significantly less organic matter than usually found in Iowa soils.

Results of this study clearly support the idea that delaying N fertilization until after plants are 6 inches tall is an effective way to address variability in weather. This strategy minimizes the potential for early season losses of N on wet springs, and it makes it possible to reduce rates of N slightly following dry springs. Predicting the optimal N rates may be no easier than predicting the weather, but it seems like a good bet to back off on N rates when soils are relatively dry through May and N is relatively expensive.

Table 1. **Yields of grain observed with various fertilizer N treatments in three precision farming trials in 2000.**

N treatment[a]		**Site**			
Time	**Rate**	**Greene S**	**Greene N**	**Hamilton**	**Mean**
	lb N/acre	**bu/acre**			
Fall only	100	118.6	123.8	155.1	132.5
	100+NS	112.8	123.2	155.2	130.4
V1 only	50	114.9	129.7	149.3	131.3
	75	114.0	130.4	152.5	132.3
	100	114.9	127.4	151.3	131.2
	125	113.6	127.6	151.7	131.0
	150	118.7	130.2	149.0	132.6
V6 only	50	123.8	132.9	151.4	136.0
	100	120.0	129.2	155.2	134.8
	150	118.6	128.2	154.2	133.8
Fall+V6	100+100	114.9	124.0	153.8	130.9
	100+NS+100	115.4	123.1	154.6	131.0

[a]Fall indicates late November 1999, V1 indicates soon after plants emerge, V6 indicates when plants are approximately 12 inches tall, NS indicates N-Serve was added. Fall N was applied as anhydrous ammonia injected to 8 inches. Spring N was applied as a 28 percent urea-ammonia solution injected to 4 inches.

This article originally appeared on pages 6-7 of the IC-486 (1) -- January 29, 2001 issue.
