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N Sidedress Rates on Corn Following Soybeans

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Soybeans occupy about 150,000 acres in New York. Corn follows soybeans on close to 15% of the total corn acreage in New York. Cornell currently recommends similar N rates for corn following soybeans as for corn following corn in the rotation due to a lack of research on corn response to N application when following soybean.

We initiated a 3-year study in 2000 at the Aurora Research Farm to evaluate the response of corn to sidedress N rates (with 25 lbs N/acre in the starter) of 0, 50, 100, 150, and 200 lbs/acre when following soybeans in rotation. We used liquid urea-ammonium nitrate (UAN) as an N source and injected it about 4 inches deep when corn was at the 4-5 leaf stage in each year of the study. The corn was harvested with a small plot combine at grain moistures between 20 and 25%.

The 2000 growing season can be characterized as cool and wet, the 2001 growing seasons as warm and somewhat dry, and the 2002 growing season as excessively wet in the spring and excessively dry in the summer (Table 1). Soybean yields on the fields those years were 30 bu/acre in 1999, 45 bu/acre in 2000 and 39 bu/acre in 2001. Corn yields reflected growing conditions with high yields in 2000, average yields in 2001, and low yields in 2002 (Fig. 1). Maximum corn yields were obtained with a sidedress N rate of 100 lbs/acre in 2000, 50 lbs N/acre in 2001, and 0 lbs N/acre in 2002 (Fig. 1). When averaged across the 3 years, maximum corn yields were obtained with a sidedress N rate of 85 lbs N/acre or a total N application of about 110 lbs N/acre (25 lbs N/acre as a starter and 85 lbs N/acre sidedressed). The Cornell N recommendation for corn following corn at the experimental site (Honeoye silt loam soil) was 120-140 lbs N/acre. These data suggest that N recommendations can be reduced for corn following soybean as compared to corn following corn but it is obvious that growing conditions have a major impact on the yields and N requirements.

Table 1. Precipitation and growing degree days (GDD) at the Aurora Research Farm during the growing season in 2000, 2001, and 2002.

	PRECIPITATION				GDD (86/50 system)			
Month	2000	2001	2002	Mean	2000	2001	2002	Mean
	----------in.----------				----------°F----------			
April	4.84	1.07	3.30	3.07	-	-	-	-
May	4.45	2.20	4.76	3.80	346	355	221	307
June	4.37	3.31	4.53	4.07	493	495	515	501
July	2.56	2.52	0.81	1.96	527	563	680	590
August	3.23	2.91	1.52	2.55	549	677	643	623
September	-	-	-	-	378	393	493	421
Total	19.45	12.01	14.92	15.46	2293	2483	2552	2443

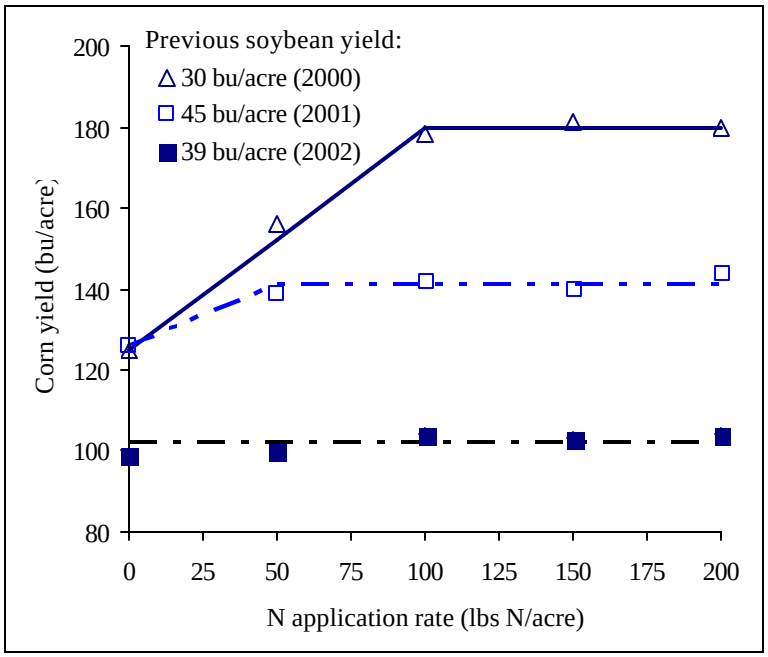

Figure 1: Corn yields following soybean in 2000 (a wet year), 2001 (a dry year) and 2002 (an extremely dry year). All treatments received 25 lbs N/acre in a starter fertilizer. Currently, the recommendation for nitrogen for continuous corn at this site is 120-140 lbs N/acre.

Conclusion

A direct comparison with corn following corn was not done making it hard to compare the two systems. However, our results suggest that optimum N recommendations for corn following soybean are 20-40 lbs lower than what Cornell University currently recommends for corn following corn and that optimum rates may be considerably lower in drought years versus "normal" years. The results of this study are similar to those from a study conducted from 1993-1997 where optimum N recommendations for corn following soybean were 40-50 lbs N/acre less than for corn following corn in 3 of the 5 years. Thus, we conclude that total N applications at the experimental site for corn following soybean may be 20-40 lbs N/acre lower than current recommendations for N for continuous corn at the site.