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Effects of Nitrogen Fertilization on Corn Grain Quality

Abstract

Much of Iowa's corn is fed to livestock for energy and protein. Management practices that would increase the protein and or energy content of corn could increase its value. This study was set up to determine what effect N fertilization had on the protein and oil content of corn grain.

Disciplines

Agricultural Science | Agriculture

Effects of Nitrogen Fertilization on Corn Grain Quality

David Rueber, superintendent

Introduction

Much of Iowa's corn is fed to livestock for energy and protein. Management practices that would increase the protein and or energy content of corn could increase its value. This study was set up to determine what effect N fertilization had on the protein and oil content of corn grain.

Materials and Methods

The experiment was a split-plot in a randomized, complete-block design with three replications. The main plots were the corn hybrids, and the split plots were the N rates. Two corn varieties (Supercede 2654 and Supercede 2555) were tested at three preplant nitrogen rates (80, 120, and 160 lb N/acre) and two sidedress rates (40 and 80 lb N/acre). The corn was planted at 33,000 seeds per acre. The sidedress N was incorporated with a cultivator June 9. Grain was mechanically harvested and analyzed with a Foss-Tecator NIR analyzer for protein, oil, and starch.

Results and Discussion

Neither preplant nor sidedress rates of nitrogen significantly affected yield, protein, or oil (Table 1). There seems to have been a small protein response to applied nitrogen with one hybrid, but the observed differences were not large enough to distinguish from experimental error. The lack of yield response to nitrogen is consistent with all the plots testing adequate (> 40 ppm N) for nitrogen with the late spring nitrogen test. The previous fall and winter were dry, which probably limited the loss of nitrogen from the soil resulting in adequate nitrogen available to the plants this year. The hot, dry weather in the late summer was most likely more of a limiting factor for plant growth than nitrogen. The protein and oil content was higher over all this year than last year for both varieties, but the yields were lower. This is the second year of a planned three-year study. Therefore results should be viewed as preliminary.

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Hybrid	N rate	Yield	Protein	Oil
	lb/a	bu/a	----%----	
54	80	154	9.9	6.3
	120	155	9.8	6.3
	160	157	10.0	6.3
	80+80	163	10.0	6.3
	120+40	158	9.9	6.2
	Hybrid average		157	9.9
55	80	158	9.5	6.3
	120	162	9.7	6.3
	160	160	9.7	6.3
	80+80	157	9.8	6.3
	120+40	157	9.8	6.3
	Hybrid average		159	9.7
Statistics			p>F	
	Hybrid (H)	0.36	0.10	0.50
	N rate (N)	0.61	0.32	0.40
	H*N	0.17	0.73	0.37

