Corn Yield Response to Nitrogen Rate after a Red Clover Cover Crop

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Objective

Determine the effect of corn yield response to nitrogen rates after a red clover cover crop.

Background

Crop Year: 2022	Tillage: Conventional
Location: Box Farms	Soil Test: 6/6/2022
County/Town: Lucas County/Waterville, OH	Planting Date: 5/13/2022
Soil Type: Mermill Loam	Seeding Rate: 34,000 seeds/ac
Drainage: Perpendicular	Harvest Date:10/19/2022
Previous Crop: Wheat	

Methods

This trial was a randomized complete block design with five nitrogen rate treatments and four replications. Plots were 40 feet wide (16 rows) and 200 feet long (entire field length). The red clover was planted in the fall of 2021 after wheat harvest. The red clover crop had around 1,978 lbs/ac of biomass and was terminated with a tillage pass in the spring one week prior to corn planting. The trial had anhydrous ammonia applied on June 6 at five different rates: 0 lbs N/acre, 60 lbs N/acre, 120 lbs N/acre, 180 lbs N/acre, and 240 lbs N/acre. Corn Stalk Nitrate Tests (CSNT) were conducted about 10 days before harvest to determine the nitrate-nitrogen levels left in the corn stalk.

Results

Table 1. Corn Yield Response to Nitrogen Rate (pounds per acre)

Rate (lbs N/acre)	CSNT (ppm)	Yield (bushels/acre)	Return over N ($/ac)
0	10	177 b	1,062
60	24	186 b	1,065
120	160	250 a	1,398
180	1333	256 a	1,383
240	3023	258 a	1,344

LSD (0.1) 14.0

Summary
The results of this study indicated no significant difference in yield among the 120, 180 and 240 lbs N/acre rates. However, there was a significant difference in yield between the highest three rates and the 60 lbs N/acre rate and zero N. Based on university recommendations and CSNT results, the 240 lbs N/acre rate was excessive, the 180 lbs N/acre was optimum, and the 120, 60 and zero lbs N/acre rates were considered low or yield-limiting. Based on a price of $0.85 per unit N and corn price of $6.00/bushel, the 120 lbs N/ac rate proved to maximize corn yields (250 bu/ac) and achieve the greatest return (1,398 $/ac) when applied in June after a red clover cover crop.

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