Compost Rate Study at the Neely-Kinyon LTAR Site, 2002

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Introduction

Many farmers are interested in using manure and compost as sources of nutrients and microbial populations that are necessary for nutrient cycling in agroecosystems. Compost and synthetic fertilizer effects on corn yields and soil fertility have been compared in a Practical Farmers of Iowa cooperative trial at the Neely-Kinyon Farm since 1999.

Materials and Methods

A randomized complete block design with four replications was established in 2002. On April 25, 2002, 28% urea was applied to plots measuring 20 × 40 ft at a rate of 0, 20, 40, or 60 lbs/acre N to plots. In order to evaluate the effect of the previous year's nitrogen, rates were half that applied in 2002. In 2001, compost was applied to plots at rates of 0, 6, 12, or 18 tons/acre with each compost rate subdivided into subplots of 0, 40, 80, 120 lb N (from 28% urea)/acre. Plots were prepared for planting by disking on April 26 and harrowing on May 10, 2002. Plots were planted to Pioneer 34M94 corn on May 15 at a population of 30,200 seeds/acre. Corn plots were harrowed on May 20 and rotary hoed on May 28. Cultivation took place on June 6 and 25. Corn borer sampling occurred on July 17. Stalk nitrate sampling was conducted on September 24 from the 60 lb N treatments in 2002. Plots were harvested on October 19.

Results and Discussion

In 2002, corn yields in the compost trial ranged from 96 to 160 bushels/acre. The highest yields were obtained from plots that were treated with 12 tons of compost in 2001 and 60 lb synthetic N in 2002 (Table 1), demonstrating a strong residual effect from the 2001 compost application. There was a significant increase in 2002 corn yield in the 60 lb synthetic N 2002 plots, when the compost rate had been increased from 12 to 18 tons/acre in 2001 (Table 1). Organic corn yields (from plots that received no synthetic nitrogen in either year) ranged from 95.8 in the control (no nitrogen) to 114.2 bushels/acre in the plots that received 18 tons of compost in 2001 and no nitrogen in 2002. There were no significant differences in corn borer populations among treatments (Table 1). There were also no significant stalk nitrate differences among treatments (Table 2), with stalk nitrate levels below that recommended by Iowa State University at the end of the season (minimum 700 ppm), suggesting that higher corn yields could have been obtained if additional synthetic N (for conventional corn) or compost (in the organic system) would have been applied.

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Table 1. Corn yields and corn borer populations from compost trial, N-K, 2002.

Treatment (Tons/acre compost in 2001 lb N/acre in 2002)[z]	Yield (bu/acre)	Corn borer damaged stalks (%)
0-0	95.8 a	5.0
0-20	129.0 def	4.0
0-40	121.7 cde	3.0
0-60	150.0 h	2.0
12-0	103.8 ab	3.0
12-20	133.3 efg	3.0
12-40	143.7 fgh	3.0
12-60	159.9 i	2.0
18-0	114.2 bcd	2.0
18-20	121.4 cde	4.0
18-40	151.3 h	2.0
18-60	150.6 h	4.0
6-0	108.9 abc	4.0
6-20	114.7 bcd	1.0
6-40	149.0 gh	3.0
6-60	142.4 fgh	2.0
LSD 0.05	16.62	NSD

[z] Plots were treated with a combination of compost and nitrogen in 2001, but synthetic nitrogen (28% urea) only in 2002.

Table 2. Stalk nitrate, Sept. 24, 2002

Treatment (Tons/acre compost in 2001 lb N/acre in 2002)	Stalk Nitrate (ppm $N\text{-}NO_3$)
0-0	23.0
0-60	BDL[z]
12-0	21.25
18-0	40.50
6-0	BDL
LSD 0.05	NSD

[z] Below detectable limit