

Compost Rate Study at the Neely-Kinyon LTAR Site, 2001

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Introduction

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

Materials and Methods

A randomized complete block design with four replicates was established in 1999. Compost was applied to individual plots (20 × 90 feet) at rates of 0, 6, 12, or 18 tons/acre on April 27, 2001, with each compost rate subdivided into subplots of 0, 40, 80, 120 lb N/acre from urea applied on May 8. Plots were disked May 8 and 10; Atrazine[®] was applied at a rate of 4

pints/acre May 16. Plots were cultivated May 17, then 'Pioneer 34W67' corn was planted May 18 at 30,200 seeds/acre. Corn plots were cultivated June 12, 26, and July 5, and hand-hoed July 9. Stalk nitrate sampling was conducted October 4 and plots were harvested October 27.

Results and Discussion

In 2001, corn yields ranged from 83.89 ± 6.31 bushels/acre to 126.66 ± 17.01 bushels/acre. Corn responded to the first 6 tons/acre of compost or the first 80 lb of synthetic nitrogen. After six tons, there was no statistically significant yield response to nitrogen (N), although the zero-N treatments may have gained yield as compost was increased from 6–12 tons/acre. Corn fertilized with compost at 12 tons/acre produced the highest organic yields (112 bushels/acre), the yield equivalent to the 80 lb N/acre treatment (Table 1). There was no significant yield increase when compost was increased beyond 6 tons/acre or 80 lb of synthetic N in this experiment.

Corn borer levels were low throughout the season, and there were no differences in corn borer damage among treatments. Stalk nitrate results were inconsistent, with the compost at 6 ton/acre showing an extremely low level compared with the other treatments. This trial will be repeated in 2002 using organic management practices throughout the experiment.

Table 1. Corn yields, corn borer damage, and stalk nitrate in compost rate experiment, 2001.

Compost (tons/acre)/urea N (lb/acre)	Yield (bu/acre)	Corn borer damage	Stalk nitrate (ppm N-NO ₃)
0/0	83.89 ± 6.31	0.0 ± 0.0	2,306 ± 1477
6/0	98.10 ± 10.33	—	10 ± 0
12/0	112.23 ± 13.51	0.11 ± 0.11	4,152 ± 1,061
18/0	108.56 ± 8.78	—	3,832 ± 2,270
0/40	101.30 ± 11.22	—	1,270 ± 446
0/80	114.20 ± 8.76	—	3,077 ± 1,663
0/120	120.00 ± 7.32	0.11 ± 0.11	3,097 ± 1,615
6/40	108.75 ± 2.11	—	1,650 ± 956
6/80	126.66 ± 17.01	—	3,926 ± 2,371
6/120	121.39 ± 10.25	—	4,200 ± 2,156
12/40	109.75 ± 7.78	—	3,285 ± 1,446
12/80	112.95 ± 11.65	—	1,735 ± 1,128
12/120	125.97 ± 13.98	—	4,152 ± 1,060
18/40	121.92 ± 7.45	—	2,985 ± 1,494
18/80	112.51 ± 8.53	—	429 ± 362
18/120	116.19 ± 7.83	—	2882 ± 1,108
LSD (0.05)	NSD	NSD	NSD