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

Dr. Kathleen Delate, assistant professor, Depts. of Horticulture & Agronomy
Dr. Cynthia Cambardella, soil scientist, USDA National Soil Tilth Lab
Dr. Tom Richard, Dept. of Ag. & Biosystems Engineering
Dr. Derrick Exner, coordinator, Practical Farmers of Iowa
Bob Burcham, farm superintendent, Neely-Kinyon Research and Demonstration Farm
Heather Friedrich and Noreen Wantate, research associates, Depts. of Horticulture

Introduction

Many farmers are interested in utilizing manure and compost as sources of nutrients and microbial populations 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 replicates was established in 1999. Compost was applied to individual plots (20 x 90 ft.) 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 per acre from urea applied on May 8. Plots were disked on May 8 and 10 and Atrazine® applied at a rate of 4pt/acre on May 16. Plots were cultivated on May 17 and 'Pioneer 34W67' corn was planted May 18 at a population of 30,200 seeds/acre. Corn plots were cultivated on June 12, 26, and July 5 and hand-hoed on July 9, 2001. Stalk nitrate sampling was conducted on October 4 and plots were harvested on October 27.

Results and Discussion

In 2001, corn yields ranged from 83.89 ± 6.31 to 126.66 ± 17.01 bu/acre. The corn responded to the first 6 tons per acre of compost or the first 80 lbs of synthetic nitrogen. After 6 tons there was no statistically significant yield response to nitrogen, although the zero-N treatments may have gained yield as compost increased from 6 tons to 12 tons per acre. Corn fertilized with compost at 12 tons per acre produced the highest organic yields (112 bu/acre) (Table 1) producing yield equivalent to the 80 lb. N/acre treatment. There was no significant yield increase when compost was increased beyond 6 tons/acre or 80 lb. of synthetic N in this 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 $N\text{-}NO_3$)**
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 ± 1061
18/0	108.56 ± 8.78	—	3,832 ± 2270
0/40	101.30 ± 11.22	—	1,270 ± 446
0/80	114.20 ± 8.76	—	3,077 ± 1663
0/120	120.00 ± 7.32	0.11 ± 0.11	3,097 ± 1615
6/40	108.75 ± 2.11	—	1,650 ± 956
6/80	126.66 ± 17.01	—	3926 ± 2371
6/120	121.39 ± 10.25	—	4200 ± 2156
12/40	109.75 ± 7.78	—	3285 ± 1446
12/80	112.95 ± 11.65	—	1735 ± 1128
12/120	125.97 ± 13.98	—	4152 ± 1060
18/40	121.92 ± 7.45	—	2985 ± 1494
18/80	112.51 ± 8.53	—	429 ± 362
18/120	116.19 ± 7.83	—	2882 ± 1108
LSD (0.05)	NSD	NSD	NSD

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 treatment showing an extremely low level, compared to the other treatments. This trial will be repeated in 2002 using organic management practices throughout the experiment.