Using Compost to Feed the Soil Community and Meet the Nutrient Requirements of Sweet Corn, Is it Realistic?

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Vegetable growers have long been interested in the effect of compost amendments on sweet corn production and soil health. Compost provides a diversity of organic matter from living microbes to stable humus which feeds the soil biological community while building and maintaining high soil quality. The long term investment in soil quality improves the long term production capacity of the soil.

This study evaluated two composts, leaf and yard waste (LY) and biosolids (BS) as soil amendments at three application rates on sweet corn production. The study conducted over two growing seasons. A partial listing of the composts characteristics are shown in Table1.

Table 1: Compost Characteristics

Compost Type	Total Nitrogen %	Bulk Density (lbs/cu yd)	pH	C:N
Leaf and Yard Waste	0.45	956	7.2	15.3
Biosolids	0.61	657	7.9	31.9

Biosolids compost was provided by the Lewiston Auburn Pollution Control Authority (LAPCA). The leaf and yard waste compost was made at the University of Maine Compost Research and Education Facility.

The study was conducted on an Agawam fine sandy loam. Prior to planting in 2010, 80 lbs. of P_2O_5 was broadcasted as recommended by soil tests. No additional conventional or organic fertilizer was added in either year. In both 2010 and 2011, BC 0805 sweet corn (82 days), was planted on 34" rows with a plant population of approximately 28,000 plants per acre. Composts were hand applied at the rates of 0, 10, 20 and 40 tons per acre and incorporated with a Perfecta harrow in replicated plots. A cover crop of oats was planted in August of 2010 after harvest over the entire research area.

In 2011, each plot was split in half. One half received the same treatment as in 2010, 0, 10, 20 and 40 tons/acre. The second half did not receive any additional compost or fertilizer. Conventional herbicide weed control was implemented each year.

In 2010, marketable yield (Figure 1) was greater than the control in all treatments. Biosolid compost (BS) application rates of 20 and 40 tons/acre produce acceptable yields, 1069 and 1263 dozen per acre, respectfully, in 2010 (Figure1). Leaf and yard waste compost (LY) yields were consistently lower then acceptable yield levels of 1000 dozen per acre in 2010.

Preside-dress Soil Nitrate Test (PSNT), data not shown, indicated that soil nitrate levels were above the recommended 25 ppm for only the BS 40 treatment. PSNT values for LY was well below the recommended level which follows the yield. With a PSNT value of 25 ppm you can expect approximately 100 lbs. of N to be plant available during the growing season.

A second year compost application increased yield in all treatments. Yields were significantly higher, 1386 to 1833 dozen per acre for all BS treatments. Leaf and yard waste compost yields were also at or above expected yields. A likely cause is the additional soil organic matter available to microbes for N mineralization. All PSNT values except for BS 40 were above the 25 ppm recommendation. However, the yield increase was greater than a single application which indicates there is an accumulative effect of compost in soils from previous applications.

Plots with no additional compost applications had similar yields as 2010 (Figure1). This indicates that the effects of compost last for at least two years. Compost has a wide diversity of organic matter, from unstable to very stable, therefore mineralization happens over a longer period of time. Under proper soil conditions, stable organic material is mineralized, releasing plant available N.

PSNT data (Figure 2) indicated that soil nitrate levels were below optimal levels without additional compost application but similar to 2010. This supports the idea that compost has a residual effect on the soil and crop productivity. Compost continued to feed the soil microbial population through year two.

Conventional insecticides were not used in either year. There was no marketable yield loss from insect damage.

In conclusion, both types of compost had a positive effect on the yield of sweet corn over a two year period. Compost did provide some plant available nitrogen in both application years. Yield data indicates there was both an accumulative and residual effect of compost applications.

Figure 1. Effect of two compost sources applied pre-planting at three rates on the growth and yield characteristics of sweet corn; Highmoor Farm, 2010 and 2011.

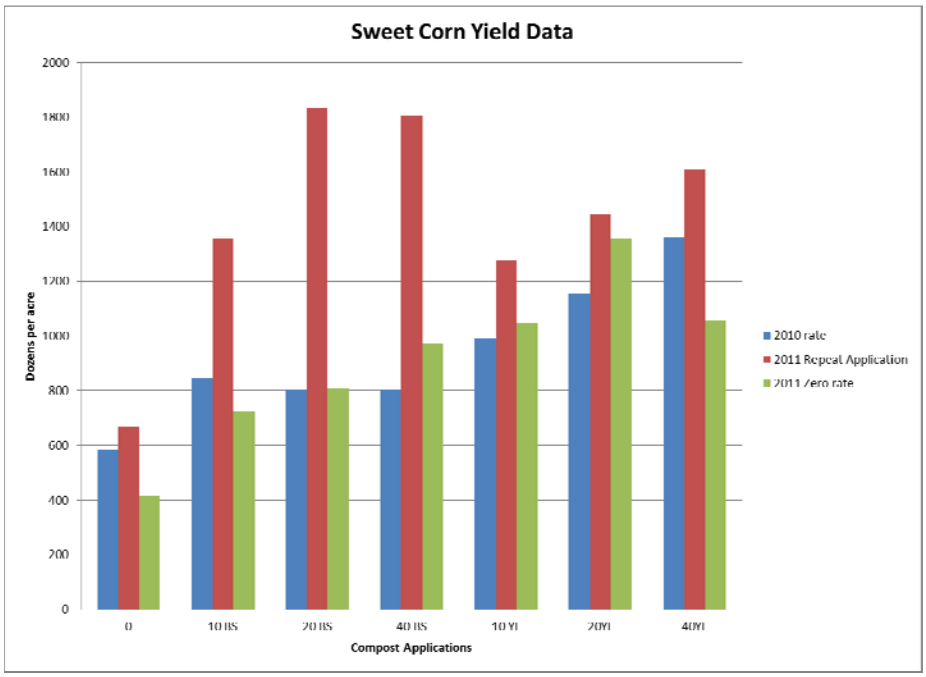

Figure 2. 2011 Preside-dress soil nitrate test from soil amended with compost.