

Nutrient management through compost and cover crops under organic vegetable production

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Unpredictable weather conditions and a narrow seasonal window for producing vegetable crops in the Midwest have posed a commendable challenge for organic and transitional farmers in the region. Incorporation of cover crops, integrated nutrient and pest management bear paradigm importance in this context. The core objective of this study was to better understand and document changes associated with the use of cover crops and dairy compost with relevance to crop yield, fruit quality and cover crop management under an organic cropping system.

Yield is the primary concern for most farmers as it directly translates into economic returns. There was no significant interaction between cultivar and treatment for cucumber. Cucumbers were grown under both monoculture and polyculture (alternating rows of cucumber and tomato) system. There were significant differences in the yield under different cropping systems. Cover cropping with rye + vetch combined with compost had the highest cucumber yield (18.8 kg/12 plants) (Fig. 1). Rye in a polyculture system with or without compost also performed well (17.5 to 16.1 kg marketable fruits/12 plants) as compared to monoculture rye alone with or without treatments (11.8 to 8.8 kg/12 plants). The cucumber monoculture system did not perform well, primary because of higher cucumber beetle infestations and disease incidence (bacterial wilt). Observations from current study hint towards a potential use of polyculture as a crop insurance tool against cucumber beetles and other pests that pose a phenomenal threat to organic cucumber production in our region.

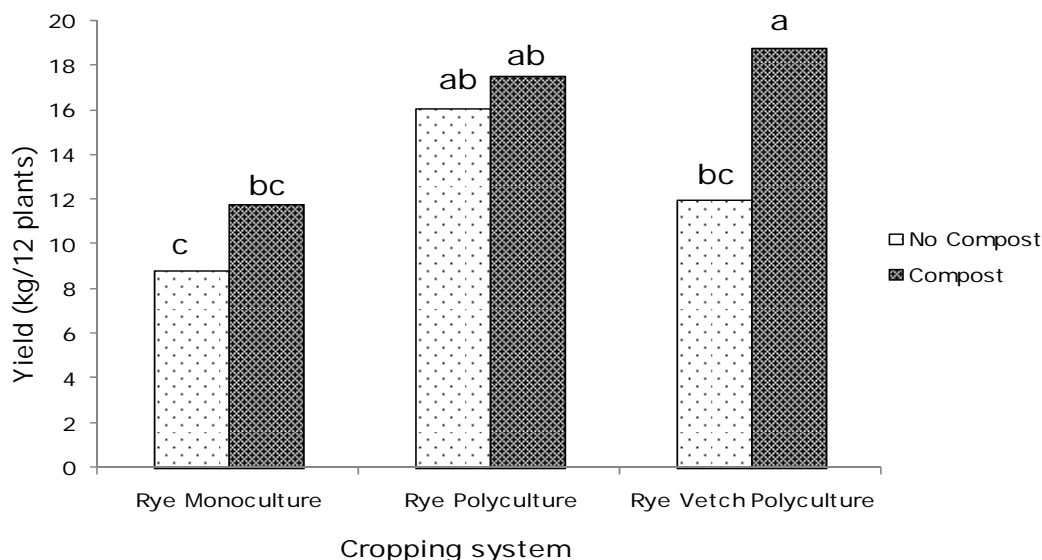


Figure 1. Effect of cropping system on marketable yield of cucumber grown under organic production system in 2008. The two cultivars ‘Cobra’ and ‘Dasher II’ had similar yield. Bars with similar alphabets are statistically equivalent by Fisher’s LSD test ($\alpha=0.05$).

Rye + no compost treatment produced higher yield as compared to rye + vetch + no compost treatment. The yield decline in rye + vetch + no compost is potentially due to the poor vetch establishment as a result of adverse soil conditions (poor drainage) in many rye + vetch + no compost treatments. This was due to the topography of the field and not due to treatment effects. Additionally seeding rate of rye was half in rye + vetch plots when compared to rye only plots, contributing to reduced biomass production. Even though vetch did not contribute significantly in plots without compost, in the long run advantages of vetch cannot be discounted as it plays a key role in nitrogen fixation, stimulation of soil microbial population and improvement of soil health. There was no significant difference in terms of marketable yield between the two cultivars. ‘Dasher II’ and ‘Cobra’ produced 14.6 and 13.8 kg marketable fruits/12 plants respectively (Table 1).

Cultivar	Cucumber	
	Marketable fruit number (per 12 plants)	Marketable fruit yield (kg/12 plants)
Cobra	37 a	13.8 a
Dasher	41 a	14.6 a

Mean separation within columns for each crop using Fisher’s LSD for each crop. Values followed by the same letter are not statistically significant $\alpha=0.05$.

In most vegetable production systems, especially organic, addition of compost is critical as it not only adds to the nutrient pool in the soil but also improves soil structure and other soil properties like soil health, by stimulating microbial growth and enhancing microbial biomass in the soil. Because of their ability to survive winter, both cereal rye and hairy vetch could easily fit into most vegetable cropping systems in the Great Lakes area.