Nature Safe® research

University research data

R-22

On-farm research using soil amendments for soil quality and disease suppression in organic vegetable systems

Test conducted by:
Lori Hoagland, Elizabeth Maynard, Natasha Cerruti, Dan Efel and Amy Thompson; Department of Horticulture and Landscape Architecture, Department of Botany and Plant Pathology, Purdue Cooperative Extension, Purdue University

Introduction and procedures

The objective of this study is to identify soil amendments that improve soil quality, provide nutrients and increase productivity on organic vegetable farms; and determine how resident soil microbial communities interact with soil amendments to regulate nutrient cycling and suppress plant pathogens.

Collaborating growers and researchers participated in a workshop in spring 2013 to learn about soil quality and on-farm research, and develop a plan for field trials and outreach activities.
Four organic soil amendments (Table 1) are applied annually from 2013 - 2015 on three farms in Indiana and Ohio in a randomized complete block design with four replicates. Application rates are based on recommendations for crop, assuming 50% of N is available. A common vegetable crop is grown on all farms in each year and evaluated for stand establishment, disease incidence and severity, leaf nutrients, yield and size.

Impacts of treatments on soil quality are evaluated using laboratory assays to determine nutrient availability, labile carbon, microbial activity, microbial community diversity, and pathogen suppression. Chemical composition of amendments is determined using 13C-TMAH thermochemolysis.

Test results

An organic soil management workshop and accompanying field day were held in July at Feed Good Farm near Sheridan, IN. Cabbage (Brassica oleracea) cv. 'Red Express' OG was grown in on-farm experiments in 2013 with the following results:

Nitrogen availability varied among farms and amendments, with largest differences shortly after transplanting. At that time plant available soil N (nitrate and ammonium) was higher with Nature Safe and Vedanta that with Fertrell or Vermicompost (Table 2).
Early season plant vigor was lower with Verdanta than with other amendments (Table 2).

Table 1: Soil Amendments

Product (N-P2O5-K2O)	Rate (T/A)
Fertrell 3-4-3 Bainbridge, PA	4.0
Nature Safe 8-5-5 Cold Spring, KY	1.5
Verdanta EcoVita 7-5-10 Bioworks, Victor, NY Vermicompost 1.2-0-1	1.7
Nature's Way, Seymour, IN + Fertrell 3-4-3	5 + 2

Table 2: Plant available soil N, seedling vigor, market- able head number and weight, and leaf N content on three farms.

Trt	Soil N	Vigor	Marketable Heads		Leaf N
	lb./A	1 = low 9 = high	no/plot*	lb./hd	%
FT	106b	5.3a	9.0	0.87	4.3bc†
NS	191a	5.2a	8.5	0.93	4.6a
VD	163a	4.6b	7.6	0.93	4.5ab
VM	101b	5.0a	7.1	0.93	4.2c

Conclusion

Results show that Nature Safe improved plant available nitrogen (PAN) levels in the soil by as much as 89% compared to other organic fertilizers while reducing application rates by as much as 78%.

DAR210713_NAT_STUDYLEAFLETS_USL_2108