Efficacy of Cyanobacteria Biofertilizer and Two Other Common Organic Nutrient Sources for Okra (*Abelmoschus esculentus*) Production

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Introduction

Organic farming for high-value crop production is gaining popularity mainly due to health awareness among common people and overall improvement of environmental sustainability. In this project, we evaluated the efficacy of a newly developed organic fertilizer (cyanobacteria biofertilizer) with other organic nutrient sources and a synthetic fertilizer for okra production. This short-term project also provided research experiences to a young scholar on organic agriculture.

Objectives

1. Evaluate the effects of different organic fertilizers (chicken manure, vermicompost, and cyanobacteria fertilizer) on okra production in South Florida.
2. Enhancement of knowledge and research experiences of pre-collegiate STEM student. Also, an aim to encourage women in science through this YES grant.
3. Demonstrate and disseminate the knowledge about different options of organic fertilizer for vegetable production among South Florida farmers, FIU Agroecology undergraduate and graduate students.

Materials and methods

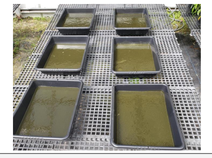
Fertilizer treatments were:

1. Reclaimed Cyanobacteria (Cyano)
2. Synthetic Fertilizer (SF)
3. Chicken Manure (CM)
4. Artificial Vermicompost (AV)
5. Natural Vermicompost (NV)
6. Okra seeds (var: Clemson spineless)

Research was conducted in the organic garden at Florida International University (FIU). Raised beds (12'x5') were prepared for okra production. Treatments were assigned in RCBD with six replications for each treatment. Urea was used as a synthetic fertilizer.

1. Cyanobacteria was prepared by drying the algal biomass harvested from Lake Jesup of Central Florida.
2. Natural and artificial vermicompost and chicken manure were collected from Farmer's field of Homestead, FL.
3. Okra seeds were planted in raised beds.
4. Monitored growth of plants regularly and watered the plants daily.

1. The young scholar periodically measured plant properties, such as stem diameter, plant height, and chlorophyll content.
2. Harvested the okra vegetable once they were ready (about 70 days after seeding).



Results

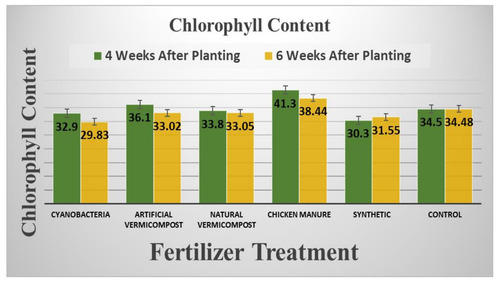


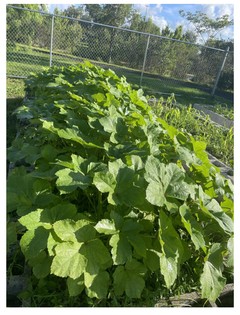
Figure 1. Average leaf chlorophyll content measured in each treatment 4 weeks and 6 weeks after planting

Chlorophyll: The chlorophyll content decreased by 9% for AV and Cyano, 7% for CM, and increased by 4% for SF from Week 4 to Week 6 after planting.

Table 1. Measurement of average plant heights 4 weeks after planting, stem diameter after 4 weeks of planting, and stem diameter 6 weeks after planting.

Fertilizer	Plant Height (inches)	Stem Diameter (mm)	Stem Diameter (mm)
	4 weeks after planting		6 weeks after planting
Cyanobacteria	15.4	8.8	9.1
Artificial Vermicompost	22	10.2	13.0
Natural Vermicompost	15.8	8.3	8.5
Chicken Manure	14.6	9.3	9.9
Synthetic	15.8	8.3	9.1
Control	15.6	7.7	7.7

Stem Diameter: The stem diameter increased by 13% for AV, 9.9% for CM, and 9.1% for Cyano from Week 4 to Week 6 after planting the seeds.



Conclusions

The okra plant growth was monitored, and samples were collected to determine the efficacy of the use of various fertilizers. Growth and yield of the okra crops between various treatments to determine the efficacy of the cyanobacteria fertilizer and production ability of other organic fertilizers such as chicken manure and vermicompost. Soil and plant biomass samples were also prepared for chemical analysis. As demonstrated in the graphs, the chlorophyll content decreased by 9% for Artificial Vermicompost and Cyanobacteria. It decreased by 7% for Chicken Manure. It also increased by 4% for the Synthetic fertilizer treatment. From Week 4 to Week 6 after planting the okra seeds, the stem diameter increased by 13% for Artificial Vermicompost, 9.9% for Chicken Manure, and 9.1% for Cyanobacteria from Week 4 to Week 6 after planting the seeds.

Literature cited

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Acknowledgments

I would like to thank Dr. Dattamudi, Dr. Chanda, and Dr. Jayachandran for their guidance throughout this project. I would also like to thank Sandra Blackwell of Southern SARE, Dr. Bhat, and Dr. Scinto for their support as well. I would like to thank FIU for providing the Organic Garden for this project. I would lastly like to thank AECOM for providing the algae samples. Funding for this project was provided by the USDA NIFA Young Scholar Enhancement Program (2020-38640-31521).

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