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

Sri Madabhushi[1], Sanku Dattamudi[2], Saoli Chanda[2] and Krishnaswamy Jayachandran[2]

[1] Pembroke Pines Charter High School, Pembroke Pines, Florida

[2] Department of Earth and Environment, Florida International University, Miami, Florida

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

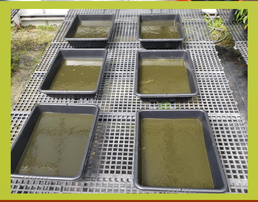
Fertilizer treatments were:

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)

ACTIVITIES AND METHODS

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).



Pictures of poultry manure collection, cyanobacteria biofertilizer application, experimental set up (raised beds), different plant growth stages, data collection and harvested okra

SUMMARY

Sri Madabhushi participated in this internship in which she acquired skills in collecting and evaluating data and gained knowledge pertaining to agroecology. She collected samples and monitor okra plant growth. She compared the 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. She assisted in preparing soil and plant biomass samples for chemical analysis. The young scholar completed the internship by creating a poster. She had the opportunity to present her work to the FIU agriculture department at the field day on September 9, 2022.

RESULTS

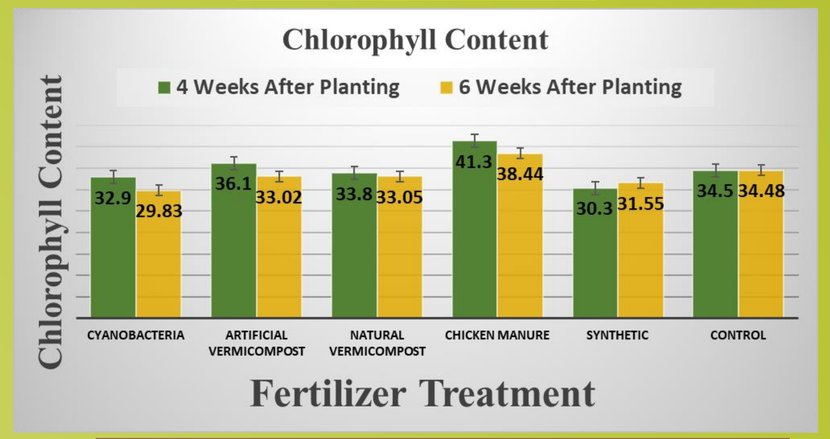


Figure 1: Average chlorophyll content measured in each treatment 4 weeks and 6 weeks after planting.

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.

KNOWLEDGE AND SKILLS OBTAINED

1. Learned about the anatomy and features of okra plants such as bifoliate leaves and development & prevention of chlorosis in leaves.
2. Learned how to measure stem diameter, plant height, chlorophyll content, and plant vigor using equipment such as SPAD and green seeker.
3. Learned laboratory methods such as sieving and grinding plant soil and biomass.
4. Learned extensively about sustainable agriculture practices.

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2020-38640-31521 *through the Southern Sustainable Agriculture Research and Education program, under sub-award number* RNIFA0001203501 *and* SUB00002601. *USDA is an equal opportunity employer and service provider. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.*