Effect of Indigenous Microorganisms and Fish Amino Acids on the Yield Potential of Eggplant (Solanum Melongena*)* through Foliar Application

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ABSTRACT

This research was conducted at the experimental area of SSC School of Agriculture, Gandasuli, Patikul, Sulu, from June 17, 2024, to September 08, 2024. It especially sought to answer the following queries: What is the reaction of eggplant in terms of fruit length (inches) produced per treatment of the study? How many marketable sizes of eggplant fruit are produced per treatment of the study? What is the total average weight (kilogram) of eggplant fruit produced per treatment of the study?

The area of the study consists of 100 square meters. It was analyzed using Randomized Complete Block Design (RCBD), which was divided into three replications, and each replication was subdivided into three treatments: treatment 1—Indigenous Microorganism (IMO), treatment 2—Fish Amino Acid (FAA), and treatment 3—Control (no fertilizer).

As the results were analyzed, the researchers found out that there was significant variation in terms of fruit length, total number of marketable sizes, and the general average weight of eggplant applied with these two organic fertilizers. Moreover, applying indigenous microorganisms (IMO) and fish amino acids (FAA) has a positive impact on the yield potential of eggplant. In addition, using these two organic fertilizers can help to improve the number of marketable sizes of eggplants and eventually increase income.

Keywords: Yield Potentiality, Foliar Application, Indigenous Microorganism, Fish Amino Acid, Eggplant.

INTRODUCTION

Background of Study

As a popular vegetable crop farmed all over the world, eggplant is valued for its high nutritional content and variety in cooking. But in order for eggplant to flourish and yield large amounts, just like any other crop, it needs proper nourishment. Fertilizers are a vital component of crop production because they supply the nutrients required for plant growth and development.

According to UPLB, College of Agriculture and Food Science, eggplant is one of the world's most important vegetables and a staple in some South and Southeast Asian countries. In the Philippines, eggplant, or talong, is the leading vegetable crop in terms of volume (248,000 metric tons) and area of production (14,000 hectares), based on the 2022 Philippine Statistics Authority report. Eggplant farming also offers huge income potential for resource-poor farmers in many provinces in the country. For years, eggplant production in the Philippines suffered huge losses of up to 73% annually due to its most devastating insect pest, the eggplant fruit and shoot borer (EFSB).

Solanum melongena L. (2n=24), also known as aubergine or brinjal, is an important solanaceous vegetable crop in many countries. Eggplant is a good source of minerals and vitamins, and in total nutritional value, it can be compared with tomatoes. The important eggplant-growing countries are India, Japan, Indonesia, China, Bulgaria,

many African countries, Italy, France, and the USA, according to G. Kalloo, Genetic improvement of vegetable crops, 587-604,1993).

Because organic fertilizers are good for the environment and human health, their usage in agriculture has gained popularity in recent years. Examples of organic fertilizers that have been demonstrated to enhance soil fertility and plant growth while lessening the detrimental effects of chemical fertilizers on the environment are fish amino acid and indigenous microorganisms.

Fish Amino Acid (FAA) is a liquid made from fish. FAA is of great value to both plants and microorganisms in their growth because it contains an abundant amount of nutrients and various types of amino acids (which will constitute a source of nitrogen (N) for plants). Blue, back-colored fish will get good FAA. It is absorbed directly by the crops, and it also stimulates the activity of the microorganisms, according to 81-6467 Mamalahoa Hwy, Kealakekua, HI 96750, 808 4279972,

Fish amino acid is an organic liquid manure made from fish waste. Fish amino acids are of great value to both plants and microorganisms in their growth because they contain various nutrients and types of amino acids. Foliar application or soil drenching of fish amino acid could maximize uptake and minimize runoff or leaching, providing just enough N to the plant to produce chlorophyll to maintain plant health. Fish amino acid diluted with water (1:1000) with other natural farming inputs and applied as a foliar

Spray as well as soil drench increased the fruit numbers of crops, according to Aung and Flick (1980).

Lastly, indigenous microorganisms are a group of innate microbial consortia that inhabit the soil and the surfaces of all living things, inside and outside, that have the potential for biodegradation, bioleaching, biocomposting, nitrogen fixation, improving soil fertility, and the production of plant growth hormones (Kumar B. L., Gopal D. V., *3* Biotech (2015)).

The indigenous microorganisms, mainly fungi, could effectively fix microalgae to the bio-carrier and enhance its biomass production. They could also degrade RS into dissolved matter for microalgal utilization, leading to the physicochemical properties change of RS in the direction that favored its energy conversion. This study showed that RS can be used effectively as a microalgal biofilm carrier, thus presenting a new possibility for the recycling of rice straw (Hongbin Yan, Qi Zhang, Yunpu Wang, Xian Cui, Yuhuan Lui, Zhigang Yu, Shuming Xu, and Roger Ruan, https://dio.org/10.1016/j.jenvaman.2023.118075).

Statement of the Problem

The aim of this study is to assess the effects of indigenous microorganisms and fish amino acids on eggplant.

Specifically, it answered the following question:

1. What is the reaction of eggplant in terms of fruit length (inches) produced per treatment of the study?
2. How many marketable sizes of eggplant fruit are produced per treatment of the study?
3. What is the total average weight (kilogram) of eggplant fruit produced per treatment of the study?

Objectives of the Study

1. To give direction to the study, this goal is to gather facts on the efficacy of eggplant as treated with two kinds of organic fertilizer, namely, indigenous microorganisms and fish amino acids. These specific objectives are
2. To be able to determine the reaction of eggplant in terms of fruit length as treated with indigenous microorganism (IMO), fish amino acid (FAA), and control.
3. To determine the marketable sizes of eggplant fruit as treated with the various treatments of the study.
4. To be able to determine the total average of eggplant fruit as treated with indigenous microorganism (IMO), fish amino acid (FAA), and control.

Hypotheses of the Study

The hypotheses posited in this study are the following:

1. There is no significant difference in the measurement of eggplant fruit produced per treatment.
2. There is no significant difference in the total number of marketable sizes of eggplant fruit produced per treatment.

There is no significant difference in the total average weight of eggplant produced per treatment.

Significance of Study

Eggplants are a food that is rich in nutrients, low in calories, and high in fiber, vitamins, and minerals. Eggplant is a widely grown vegetable crop that is prized for its excellent nutritional value and versatility in cooking. But like any other crop, eggplant requires the right nutrition to grow well and produce abundantly. Since fertilizers provide the nutrients needed for plant growth and development, they are an essential part of agricultural production. Here are the nutritional details for eggplant. Vitamin A ,Vitamin C, Antioxidants .

This research study is employing an experimental design to determine the effects of fish amino acids and indigenous microorganisms on the growth and yield response of eggplant through foliar application.

The students—this experimental research has a vital role for all the students at SSC School of Agriculture; it serves as their reference if they want to conduct research with the same aspect.

To fish consumers, the province of Sulu is abundant in aquatic resources, especially when it comes to fish sustainability. In this research study, it can help them to realize that fish waste is not only a waste, but it can also make organic fertilizer to sustain the nutrients for the plant growth and development of yield potentiality.

Farmers—The outcomes of this research study have a huge impact on Sulu farmers, most especially those farmers who are engaged in eggplant production. It can help them as a guide of how eggplant production can sustain the economic demand of the province of Sulu.

Scope and Delimitation of the Study

This study was delimited to the efficacy of indigenous microorganisms and fish amino acids on the growth and yield of eggplant. It also focused on the effects of these fertilizers on the total number of marketable sizes, the length of the fruit, and the total average weight of eggplant.

The statistical tool used to treat the study is the Randomized Complete Block Design (RCBD), which was used to calculate the differences in treatments and in replication. There were 3 treatments and 3 replications used, which are

Treatment 1: Indigenous microorganism

Treatment 2 – Fish Amino Acid

Treatment 3 – Control (no fertilizer used)

Operational Definition of Terms:

Crop—refers to any group of plants grown by people for food or other use, especially on a large scale in farming or horticulture.

Cultivation refers to planting, growing, and harvesting crops or plants, or preparing land for this purpose.

Data—refers to information, often in the form of facts or figures obtained from experiments or surveys, used as a basis for making calculations or drawing conclusions.

Eggplant—tender perennial plant of the nightshade family grown for its edible fruits.

Fertilizer refers to an organic or synthetic substance usually added to or spread onto soil to increase its ability to support plant growth.

Fish Amino Acid is a Korean natural farming supplement that is abundant in amino acids and nutrients.

Germination—the process of a seed starting to grow, or the act of causing a seed to start growing.

Growth refers to the growing process: the process of becoming larger and more mature through natural development.

Indigenous microorganisms are just that—tiny organisms that are native to the environment they inhabit.

RCBD – Randomized Complete Block Design

Replication refers to a multiple repetition of experimental errors.

Research refers to methodical investigation into a subject to discover facts, to establish or revise a theory, or to develop a plan of action based on the facts discovered.

Seed—connotes both immature and mature ovules that have undergone sexual reproduction and fertilization.

Soil—A thin surface of the earth in which plants grow and plant habitats of life.

Thesis—refers to a dissertation based on original research, especially as work towards an academic degree.

Treatment refers to a management and manipulation of fertilization in a research work.

Weed—refers to a plant, especially a wild plant, growing where it is not wanted.

Yield—to produce something naturally or because of cultivation.

METHODOLOGY

Methods:

Experimental Design—*The study employed the Randomized Complete Block Design (RCBD). An area of 100 square meters was subdivided into three blocks, which refer to the number of replications. Each block is divided into three plots, and each plot consists of one treatment. This arrangement is patterned according to RCBD. The following treatments were applied in the study: Treatment 1 (indigenous microorganism), Treatment 2 (fish amino acid), and Treatment 3 (control or no fertilizer to be used).*

Field Layout—The area of the study is divided into three blocks, and each block is subdivided into three plots, and it is incorporated with Randomized Complete Block Design (RCBD).

REPLICATION I

REPLICATION II

REPLICATION III

Land Preparation—Last June, in 2024, the group of fourth-year students gathered at the field to divide the area for their experimental research. The area of the study is intended for research and development for planting crops. It is advisable to do plowing two times; each plowing should be followed by harrowing. These operations are for the good and are a great help for growing plants.

Preparation of Planting Materials—The seed for germination was provided by the researcher.

Planting—When engaging in eggplant production, transplanting was done by the researchers.

Proper Farm Management—The experimental farm or field area was always visited to check the plants at least twice a day to maintain the water supply as well as the fertilizer used with the proper farm procedures together with the insecticides. In addition, it is important to check that the plants are fenced to avoid animal entrance.

Cultivation and Weeding—Weeding was done several times when the researcher observed that there was a competition for absorbing the nutrients between weeds and embryos. Also, cultivation was done several times or at least twice a month.

Application of Fertilizers—This experimental research used the foliar method for applying the fertilizers, and those two organic fertilizers were applied at least once a week.

Harvesting—The researchers started harvesting when the fruit of the eggplant had reached the marketable size, when it was at the right age so that it could be eaten or sold to any marketplace.

Financial Statement—The Return on Investment (ROI) of accomplishing the research study work was properly counted from the beginning until the end of the study.

Statistical Treatment of Data—The researchers used the ANOVA to identify the result using the F-tabulated value under 5%. To analyze the data, the following steps were applied.

1. To measure the fruit length of eggplant every time we harvest.

2. To count the number of marketable sizes of eggplant fruit.

3. Average weight of eggplant fruit in every treatment.

4. Return on Investment (ROI).

RESULTS AND DISCUSSION

Observation

After several meetings, gathering information, and searching for the commodity that our province lacks today,. The researchers started by measuring the area for planting. After those preparations, cleaning, cultivating the soil, and propagating the seeds were done.

This section presents the summary of findings on the yield potentiality of eggplant applied with Indigenous Microorganism and Fish Amino Acid through foliar application. Applying these two organic fertilizers has a good result on the yield performance of eggplants; it shows the effectiveness through the fruit length (inches), the number of marketable sizes, and the general average weight (kilogram) of eggplant.

Table 1 The Fruit Length of Eggplant in Inches Applied with Different Treatment Per Replication

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
I	360. 87	299.26	271. 13	931.26	310.42
II	316.43	281.03	263.17	860.63	286.88
III	294.31	232.75	242.61	769. 67	256.56
TOTAL	**971.61**	**813.04**	**776.91**	**2,561.56**	
MEAN	**323.87**	**271.01**	**258.97**		**284.65**

ANOVA

SV	DF	SS	MS	F COMPUTED	F TAB 5%
TREATMENT	**2**	**4, 374.86**	**2, 187.43**	**6.09 NS**	**6.94**
REPLICATION	**2**	**7, 150.88**	**3, 575.44**	**9.95 S**	**6.94**
ERROR	**4**	**718.74**	**359.37**		
TOTAL	**8**	**12, 244.48**	**6,122.24**		

Result:

Treatment – Not Significant

Replication – Significant

The results of the study are presented in three tables. Table 1 revealed the result of the study in terms of fruit length (inches) of eggplant applied with Fish Amino Acid (FAA), Indigenous Microorganism (IMO), and the Control (no fertilizer to be used). It shows that treatment 1 has the highest total rate in terms of fruit length, consisting of 931.26 inches, followed by treatment 2 with a total of 860.63 inches, and lastly treatment 3 with a total fruit length of 769.67 inches.

The analysis of variance further emphasized that there was a significant variation in terms of fruit length, with a computed F-value for treatment of 6.09, which is less than the F-tabulated value of 6.94% under the 5% significance level. For the F-value of replication, 9.95, which is greater than the F-tabulated value of 6.94% under 5% of significance levels. Therefore, the first hypotheses of the study have been rejected.

Table 2 The Number of Marketable Sizes of Eggplant Applied with Different Treatment Per Replication

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
I	38	23	16	**77**	**25.67**
II	30	20	15	**65**	**21.67**
III	23	13	15	**51**	**17**
TOTAL	**91**	**56**	**46**	**193**	
MEAN	**30.33**	**18.67**	**15.33**		**21.44**

ANOVA

SV	DF	SS	MS	F COMPUTED	F TAB 5%
TREATMENT	**2**	**112.88**	**56.44**	**2.12 NS**	**6.94**
REPLICATION	**2**	**372.21**	**186.11**	**7.00 S**	**6.94**
ERROR	**4**	**53.13**	**26.57**		
TOTAL	**8**	**538.22**	**269.12**		

Result:

Treatment – Not Significant

Replication – Significant

Table 2 shows the number of marketable sizes of eggplant. This experimental study has three treatments, and among those three, treatment 1 has the highest number of marketable sizes of eggplant, consisting of 77 pieces, followed by treatment 2 with a total number of 65 pieces, and lastly treatment 3 with only 51 pieces.

The analysis of variance presents that there was a significant variation in terms of marketable sizes of eggplant, with the F-value for treatment 2.12, which is less than the F-tabulated value of 6.94% under the 5% significance level. On the other hand, the replication shows that there is significant variation in terms of marketable sizes of eggplant, with an F-value for replication of 7.00, which is greater than the F-tabulated value of 6.94% under the 5% significance level. Therefore, the second hypothesis of the study has been rejected.

Table 3 The General Average Weight (Kilograms) Of Eggplant Applied with Different Treatment Per Replication

TREATMENT	REPLICATION			TOTAL	MEAN
	I	II	III		
I	3.8	2.4	1.89	**8.09**	**2.70**
II	2.9	2.05	1.49	**6.44**	**2.15**
III	2.4	1.15	1.49	**5.04**	**1.68**
TOTAL	**9.1**	**5.6**	**4.87**	**19.57**	
MEAN	**3.03**	**1.87**	**1.62**		**2.18**

ANOVA

SV	DF	SS	MS	F COMPUTED	F TAB 5%
TREATMENT	**2**	**1.56**	**0.78**	**3.9 NS**	**6.94**
REPLICATION	**2**	**3.41**	**1.71**	**8.55 S**	**6.94**
ERROR	**4**	**0.39**	**0.2**		
TOTAL	**8**	**5.36**	**2.69**		

Result:

Treatment – Not Significant

Replication – Significant

Table 3 shows the general average weight (kilogram) of eggplant. This table shows that treatment 1 gets the highest result, consisting of 8.09 kilograms; next is treatment 2, which obtained the second highest with the rate of 6.44 kilograms, and treatment 3 with the total average weight of 5.04 kilograms.

The analysis of variance shows that there is a significant variation in terms of the general average weight of eggplant, with the F-value for treatment 3.9, which is less than the F-tabulated value of 6.94% under the 5% significance level. However, the F-value for replication is 8.55, which is greater than the F-tabulated value of 6.94% under the 5% significance level. Therefore, the third hypothesis of the study has been rejected.

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary:

This section presents the summary of findings on the ramification of indigenous microorganisms and fish amino acids on the yield potentiality of eggplant through foliar application. The study was conducted from June 17, 2024, to September 08, 2024, in an area of 100 square meters at Gandasuli, Patikuls Sulu. The said area was divided into three replications, and each replication was subdivided into three blocks for three treatments. Treatment 1: Indigenous Microorganism; treatment 2: Fish Amino Acid; and treatment 3: Control (no fertilizer). This design is known as Randomized Complete Block Design (RCBD).

This experimental study was completedver a 3–4-month duration. It focused on the effectiveness of Indigenous Microorganism (IMO) and Fish Amino Acid (FAA) on the yield potentiality of eggplant, specifically on the fruit length (inches), number of marketable sizes, and the general average weight (kilograms) of eggplants.

Conclusion

The researchers conclude that, when engaging in eggplant production, the correct procedure and method of planting eggplant should be observed. This experimental study shows that there is significant variation in terms of fruit length, average weight, and the number of marketable sizes of eggplant. Therefore, these two organic fertilizers, Indigenous Microorganism (IMO) and Fish Amino Acid (FAA), have a positive effect on the yield potential of eggplant. Moreover, applying these two organic fertilizers can precipitate higher earnings for the farmers and ensure health benefits to the consumers because the nutrient content of eggplant will improve when applied with these two organic fertilizers, and there has been no adverse effect on human health.

Recommendation

Based on the findings of the study, the following recommendations are forwarded:

1. Apply the indigenous microorganism (IMO) to the soil seven days before transplanting.

2. Use indigenous microorganisms on plants every 7-10 days until they reach maturity.

3. Mixed indigenous microorganism with 2 tablespoons per 1 liter of water.

4. Mix fish amino acid with 2 tablespoons per 1 liter of water.

5. Apply fish amino acid to plants every 7-10 days until they reach maturity.

6. Apply Fish Amino Acid to soil seven days before transplanting.

7. Prepare the study area properly when planting eggplant.

8. The researchers recommend using these two organic fertilizers to have a higher income.

9. As the results presented, the researchers are highly recommended to use the indigenous microorganism as an organic fertilizer on planting eggplant.

10. The researchers recommend the use of organic fertilizers like Indigenous Microorganism (IMO) and Fish Amino Acid (FAA) for planting, especially when you are engaging in eggplant production for food security.

REFERENCES

1. (81-6467 Mamalahoa Hwy, Kealakekua, HI 96750 808 4279972, gingerhillfarmretreat@gmail.com
2. Hongbin Yan, Qi Zhang, Yunpu Wang, Xian Cui, Yuhuan Lui, Zhigang Yu, Shuming Xu, Rogerr Ruan, https://dio.org/10.1016/j.jenvaman.2023.11807 5).
3. Johari N, Abdul Mutalib A, Ismail F, Ab Latif Z, Che Man S, Tang J, Ismail Z, Journal of Vocational Education Studies (2020) 3(2) 35.
4. Meenakshi Sharma and Prashant Kaushik, Applied Science 11 (15), 7078,2021).
5. Microbial Technology for Sustainable Environment, 365-417,2021, AD Sarangi NP Athukorala).
6. Ngueuleu D. A., Muyang R. F., Wamba F. O., Ngotta B. B., Tefouet V. D., Nyemene K. P. J., Asseng C. C., Taffouo V. D., See fewer, African Journal of Agricultural Research (2021).
7. Panomjan, N.., & Sukkaew, J.. (2023). Stimulation Seedling Growth in Rice by Seed Priming and Foliar Application with Fish Amino Acid. Songklanakarin Journal of Plant Science, 10(1), 25–34. Retrieved from https://www.sjplantscience.com/index.php/ojs/article/view/75
8. Saputra R, Sari N, Norsaleha R, Int. J. Bioscie (2022) 2022.
9. Xa L. T., Nghia N. K., Engineering and Technology (2020).

APPENDIX-A

Return Of Investment

List Of Expenses:

ITEM	NO. OF ITEM	PRICE UNIT	TOTAL PRICE
Brown Sugar	3 kilos'	80/kilo	240.00
Fish	1 kilo	30	30.00
Eggplant Seeds	1 pack	150	150.00
Manila Paper	2 pieces	8/pieces	16.00
Rice	1 kilo	50/kilo	50.00
TOTAL			**486.00 PhP**

Figure 1: List of Expenses

Total Kilogram of Eggplant Fruit Harvested:

TOTAL KILOGRAM	PRICE UNIT	TOTAL COST
19.57	45/Kilogram	**880.65 PhP**

Figure 2: Total kilograms of eggplant harvested

Computattion Of Total Profit:

Total Cost – Total Expenses = Profit

880.65 – 486 = 394.65 PhP

APPENDIX - B

Photo Documentation

Figure 1. Land preparation and Removing of the weeds

Figure 2. Making of two Organic fertilizers (Indigenous Microorganism and Fish Amino Acid)

Figure 3. Eggplant for 1 month after applying IMO, FAA fertilizers and Control

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Figure 4. Vegetative Stage

Figure 5. Eggplant Fruit Harvested