Growth, Yield and Return on Investment (ROI) of Green Onion (*Allium fistulosum*) as Affected by Different Organic Fertilizers

Chona B. Nisnisan[1], Shainah Jann A. Ohuman[2] and Abdani D. Bandera[3]

[1 2]Undergraduate Students, College of Agriculture, Mindanao State University – Buug Campus, Buug, Zamboanga Sibugay, Philippines
[3]Assistant Professor, College of Agriculture, Mindanao State University – Buug Campus, Buug, Zamboanga Sibugay, Philippines
abdani.bandera@g.msuiit.edu.ph

ABSTRACT

The study titled "Growth and Yield Response of Green Onion (*Allium fistulosum*) as Affected by Different Organic Fertilizers", under the prevailing soil and climatic conditions of Datu Panas, Buug, Zamboanga Sibugay was laid out using Randomized Complete Block Design (RCBD) with three replications. The objective of the study is to determine the growth and yield of Green Onion as affected by different organic fertilizers on the growth and yield parameters. The results for analysis of variance for the average growth and yield in first, second, third data gathering, average number of leaves, and average number of clumps per plot per treatment application showed that the computed f level values were all lesser than the tabulated f of 5% and 1% which means that there were no significant differences. But, as for the analysis of variance on the average growth in the fourth data gathering, average plant height, average weight and total weight per plot per treatment application, the results showed that there is a significant effect as it shows that the computed f is greater than tabulated f 5% and 1%. Based on the findings, the researchers came up with the following recommendation: the adaption of T_3: obtained the highest average growth in fourth data gathering, acquired the average height, weight in grams and total weight in grams per plot per treatment. Chicken dung obtained the highest return on investment with 197.46 percent and also noted with highest net income.

Keywords: Green Onion, Organic Fertilizers, Chicken Dung

1 INTRODUCTION

Green onion has nearly limitless quantity of make use of and it can be grown from seed or assets; onions can be soups, salads, a top of a pleasant steak, baked potato tapping, and a variety of other dishes are all possible according to Ware and Mc Collum (1975). As similarity in different nations like the United States, it is also one of the predominant veggies in the American diet. Green onions are known as "sibuyas" derived from the Spanish "cebulla".

Over 3.6 million hectares of onions are grown annually around the world, and approximately 170 countries cultivate this crop for domestic use. Egyptian onion crop is famous all over the world for its most appropriate excellence and early appearance in European markets (Hussein et al, 2007). Onion can be grown all year in the Philippines in any type of soil and climate where its maximum conditions prevail. Most researchers and growers believe that if proper fertilization and effective management practices are used throughout the production period, this crop will yield more. The enhancement of onion production can be related to different growth factors. Onion dry bulb production relies on nutrient requirements, region of production, variety, soil type, agronomic practices etc. (Ware and McCollum, 1980).

According to PCARRD Farm News (2000) in the Philippines, the onion is a priority commercial crop that can generate progressive and viable markets for the country. Local demand for onion is increasing by 2.3 percent while exports average 12,340 tons or 85 percent of the country's total volume of vegetable exports. Onion growers in Nueva Ecija only use imported seeds. From November to January, regular planting begins (Alvarez, 1983). For off-season planting, seedbeds are plowed and sown in August.

Organic fertilizers are naturally available mineral sources that contain moderate amount of plant essential nutrients. They are capable of mitigating problems associated with synthetic fertilizers. They reduce the necessity of repeated application of synthetic fertilizers to maintain soil fertility. They gradually release nutrients into the soil solution and maintain nutrient balance for healthy growth of crop plants (Shaji & Mattew, 2021).

Increase production attained by successful farmers is attributed to adoption of approved cultural practices. This study was conducted with the hope to increase the growth and yield of green onion and convince local growers to produce. This study also serves as reference and

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information to other people and students who wish to know about green onion production and could be a contribution to existing literature.

2 METHODOLOGIES

3.1 Land Preparation

The land area: 88 square meters including the canal, was used in this study. This was done by cutting off all grasses and removing it from the experimental area. Plowed two times at two-week interval. Followed by harrowing until the soil was well pulverized to ensure that good land was developed and controlled.

3.2 Experimental Design

The experimental design adopted was Randomized Complete Block Design (RCBD). The total measure of the area was 88 square meters including canal divided into three blocks which represented one replication. The distance between blocks was 50 centimeters. Each block was divided into three plots, separated by 30 centimeters between the two plots. Each plot measured 1 by 4 meters. There were 12 plots representing four (4) treatments and three replications. Each plot consisted of three (3) furrows with three hills per furrow with thirteen (13) hills per furrow. The plant spacing was 30 cm x 30 cm. There were 39 green onion plants in every plot.

3.3 Factors and Treatments

The different organic fertilizers were the factors for this study. The treatments were the following: T_1- Vermicast, T_2- Cow dung, T_3- Chicken dung, and T_4- Carbonized rice hull

3.4 Fertilization

The organic fertilizers (vermicast, cow dung, chicken dung, and carbonized rice hull) were applied 4 kilograms each plot basally 2 weeks before planting by mixing them to the soil thoroughly to prevent leaching during heavy rains.

3.5 Sampling Procedure

The sample plant was determined by taking the 30% from the plot population which will be equal to 12 sample plants per plot. The sample plant will be determined using systematic random sampling. It will be done by selecting the n^{th} element in row of the entire plant population in every plot until the desired sample will be obtained. The n^{th} will be obtained by dividing the population size (39) by sample size (12) which will be equal to 3 or every 3^{rd} plant. The sample plant will be selected in every 3^{rd} plant starting from the 1^{st} plant in every row.

3.6 Harvesting

The green onion was harvested fifty-six days after planting that is, upon reaching its maturity. This was done early in the morning and late in the afternoon by pulling the plants. Onion clumps were washed to remove the soil that stuck in the roots.

3.7 Collection of Data

Collection of data was done after harvesting the plants. The yield for each plot was separated by using different containers.

The following were undertaken to obtain essential data for analysis and interpretation.

1. Growth Parameters

1.1 Average plant growth was taken every two weeks: 14 days after emergence, (DAE); 28 days after emergence, (DAE); 42 days after emergence, (DAE); 56 days after emergence, (DAE).

This was undertaken by measuring from one inch from the top soil of the plant up to the tip of the highest leaf two weeks after first treatment application. The data gathered were added and divided by the total sample plants to get the average height of green onion per plot.

2. Yield Components

2.1 Average number of leaves per plot.

This was taken by counting the number of leaves per plant after harvesting.

2.2 Average number of green onion clumps per plot.

This was realized by counting the number of clumps per plant after harvesting.

2.3 Average height in centimeters of plant per plot.

To gather the data on the height of green onion clumps, the plant with the longest scallions was chosen. Choosing the longest clumps from the plant, the researchers measured the height from the base of the white bulb to the tip of the green stalk.

2.4 Average weight (g) of plant per plot.

This was done by weighting the green onion plants. The data gathered were added and divided by the total sample plants to get the average weight of green onion plants per plot per treatment.

2.5 Total average weight (g) of plant in yield per plot.

This was realized by weighting the harvested green onion plants per plot per treatment. The data which were collected were added to get the total weight of the harvested green onion crops.

3.8 Statistical Analysis of Data

To Analyze the data, Analysis of variance (ANOVA) for one-way classification was used in the study to determine if there was a significant difference among the growth and yield of green onion plants as affected by different organic fertilizers. Tukey HSD Test was used to further verify the result of the Analysis of Variance.

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3 PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

The results are summarized in the following tables:

Table 1. Growth Parameters

Table 1.1 Average Growth, First Data Gathering (January 24,2022)

Treatment	Growth, cm			Treatment Total	Treatment Mean
Vermicast	8.78	7.58	7.94	24.3	6.08
Cow Dung	8.64	9.35	8.1	26.09	6.52
Chicken Dung	8.86	8.23	6.39	23.48	5.87
Carbonized Rice Hull	8.53	8.19	6.93	23.65	5.91
Rep. Total	34.81	33.35	29.36		
Grand Total				97.52	
Grand Mean					6.09

Table 1.2 Average Growth, Second Data Gathering (February 07,2022)

Treatment	Growth, cm			Treatment Total	Treatment Mean
Vermicast	16.82	16.31	18.08	51.21	12.80
Cow Dung	15.71	17.5	16.83	50.04	12.51
Chicken Dung	19.39	20.67	17.33	57.39	14.34
Carbonized Rice Hull	15.54	17.21	15.33	48.08	12.02
Rep. Total	67.46	71.69	67.57		
Grand Total				206.72	
Grand Mean					12.92

Table 1.3 Average Growth, Third Data Gathering (February 21, 2022)

Treatment	Growth, cm			Treatment Total	Treatment Mean
Vermicast	21.23	23	22.33	66.56	16.64
Cow Dung	19.75	17.96	21.08	58.79	14.70
Chicken Dung	23.25	24.67	21.38	69.3	17.33
Carbonized Rice Hull	20.25	20.88	19.63	60.76	15.19
Rep. Total	84.48	86.51	84.42		
Grand Total				255.41	
Grand Mean					15.97

Table 1.4 Average Growth, Fourth Data Gathering (March 14,2022)

Treatment	Growth, cm			Treatment Total	Treatment Mean
Vermicast	30.75	34.33	33.13	98.21	24.55
Cow dung	28.38	32.5	28.38	89.26	22.32
Chicken dung	35.41	40.92	35.92	112.25	28.06
Carbonized rice hull	32.5	33	28.58	94.08	23.52
Rep. Total	127.07	140.75	126.01		
Grand Total				398.8	
Grand Mean					24.61

The table 1 above presents the average height of green onion plants in centimeters per plot per treatment. It shows that, the blue highlight obtained the highest growth and the red highlight obtained the lowest growth of green onion per plot. The result in the first data gathering of green onion has an interaction of treatment T_2, in second, third and fourth shows that T_3 has an interaction in the growth of green onion.

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Table 2. Yield Components

Table 2.1 Average Number of Leaves Per Plot Per Treatment

Treatment	Number of leaves			Treatment Total	Treatment Mean
Vermicast	16.17	15.33	16.67	48.17	12.04
Cow dung	15.5	19.42	14.75	49.67	12.42
Chicken dung	17.58	18.33	19.83	55.74	13.94
Carbonized rice hull	17.58	15	16.67	49.25	12.31
Rep. Total	66.83	68.08	67.92		
Grand Total				202.83	
Grand Mean					12.68

Table 2.3 Average Number of Clumps Per Plot Per Treatment

Treatment	Number of Clumps			Treatment Total	Treatment Mean
Vermicast	3.17	2.5	2.75	8.42	2.11
Cow dung	2.5	5.58	2.92	11	2.75
Chicken dung	3	3.5	3.42	9.92	2.48
Carbonized rice hull	3.92	2.5	2.67	9.09	2.27
Rep.Total	12.59	14.08	11.76		
Grand Total				38.48	
Grand Mean					2.40

2.4 Average Height of Green Onion Per Plot Per Treatment

Treatment	Yield, grams			Treatment Total	Treatment Mean
Vermicast	37.76	38.23	38.45	114.44	28.61
Cow dung	36.42	37.97	35.18	109.57	27.39
Chicken dung	40	41.5	42.4	123.9	31
Carbonized rice hull	37.5	36.82	34.63	108.95	27.24
Rep.Total	151.68	154.52	150.66		
Grand Total				456.86	
Grand Mean					28.56

2.5 Average Weight(g) of Green Onion Per Plot Per Treatment

Treatment	Weight, grams			Treatment Total	Treatment Mean
Vermicast	24.27	29.27	28.43	81.97	20.49
Cow dung	20.81	29.41	22.8	73.02	18.26
Chicken dung	37.98	49.83	42.13	129.94	32.49
Carbonized rice hull	25.95	21.57	21.31	68.83	17.21
Rep.Total	109.01	130.08	114.64		
Grand Total				353.76	
Grand Mean					22.11

Table 9. Total Average Weight (g) of Green Onion per plot per treatment

Treatment	Total Weight, grams			Treatment Total	Treatment Mean
Vermicast	25.15	26.54	28.29	79.98	20
Cow dung	23.42	28.40	25.76	77.58	19.40
Chicken dung	35.46	49.41	39.13	124	31
Carbonized rice hull	27.84	21.52	24.6	73.96	19.49
Rep.Total	111.87	125.87	117.78		
Grand Total				355.52	
Grand Mean					22.47

The table 2 above presents the average number of leaves, number of clumps, plant height, weight in grams and total weight in grams of green onion per plot per treatment. It shows that, the blue highlights obtain the highest yield and the red highlights obtain the lowest yield of green onion per plot. The result in the average number of leaves T_3 obtained the highest number, in clumps T_3 also obtained the highest number, then in height, weight and total weight in grams.

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Table 3. ANOVA for the Growth Parameters and Yield Components of Green Onion

ANOVA for Growth Parameters							
	Source of Variation	Sum of Squares	DF	Mean Square	Computed F	Tabular F 5% 1%	CV
First Data Gathering (January 24,2022)	Replication	3.99	2	0.33	1.26^{ns}	4.76 9.78	10.01 %
	Treatment	1.43	3	0.43			
	Error	2.26	6	0.38			
	Total	7.68	11				
Second Data Gathering (February 07, 2022)	Replication	2.9	2	1.45	3.93^{ns}	4.76 9.78	9.05 %
	Treatment	16.15	3	5.38			
	Error	8.19	6	1.37			
	Total	27.24	11				
Third Data Gathering (February 21,2022)	Replication	0.71	2	0.36	0.009^{ns}	4.76 9.78	18.80 %
	Treatment	24.06	3	8.02			
	Error	5,411.42	6	901.90			
	Total	5,436.19	11				
Fourth Data Gathering (March 14,2022)	Replication	33.11	2	16.56	1,722.38*	4.76 9.78	6.42 %
	Treatment	13,021.22	3	4,340.41			
	Error	15.11	6	2.52			
	Total	13,069.44	11				

The result of the Analysis of Variance in first data, second data, and third data gathering reveals that there was no significant difference, and in fourth data gathering results showed that there were significant differences of growth. The present result does conform to the findings of Casim (2020), the analysis of variance reveals that there is a significant difference on the average growth of green onion as affected by different organic fertilizers.

ANOVA for Yield Parameters							
	Source of Variation	Sum of Squares	DF	Mean Square	Computed F	Tabular F 5% 1%	CV
Average Number of Leaves	Replication	0.24	2	0.12	0.31^{ns}	4.76 9.78	28.07%
	Treatment	11.66	3	3.89			
	Error	76.16	6	12.69			
	Total	88.06	11				
Average Number of Clumps	Replication	0.7	2	0.35	0.27^{ns}	4.76 9.78	5.08%
	Treatment	1.24	3	0.41			
	Error	8.97	6	1.50			
	Total	10.91	11				
Average Height in cm	Replication	2	2	1	9.94*	4.76 9.78	4.41%
	Treatment	47.71	3	15.90			
	Error	9.6	6	1.6			
	Total	59.31	11				
Average Weight in Grams	Replication	59.45	2	29.73	19.55*	4.76 9.78	16.64%
	Treatment	795.47	3	265.16			
	Error	81.32	6	13.56			
	Total	936.24	11				
Total Average Weight in Grams	Replication	24.7	2	12.35	9.46*	4.76 9.78	19.67%
	Treatment	554.31	3	184.77			
	Error	117.23	6	19.54			
	Total	696.24	11				

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The result of the Analysis of Variance for the average number of leaves per plot per treatment, average number of clumps per plot per treatment were not significant. While in average height per plot per treatment, average weight per plot per treatment and total average weight per plot per treatment revealed that the computed "f" was greater than the tabulated "f" at 5% and 1 % level of significance. This led to the rejection of null hypothesis (H_o) and the acceptance of alternative hypothesis (H_1). The result unveiled a significant difference.

The present result does conform to the findings of Casim (2020), the analysis of variance reveals that there was no significant different on the average number of leaves and clumps. And there was a significant different on the average height, weight, and total average weight in grams.

5 CONCLUSION AND RECOMMENDATION

Based on the results of the study the following conclusions were drawn. There was no significant difference in the average growth of green onion in the first, second, third data gathering, average number of clumps and average number leaves per plot per treatment. There was a significant difference on the fourth data gathering, average height, average weight in grams and total average weight in grams per plot per treatment. Based on the findings, the researchers came up with the following recommendations. The adoption of T3 having obtained the highest average growth in green onion, acquired the average height of green onion, attained heavier average weight of green onion in grams, gained more total average weight of green onion in grams.

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