Application of Liquid Organic Fertilizer from Goat Feces on the Growth and Production of Cucumber Plant (*Cucumis Sativus L*)

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***Abstract*: This study aims to determine the effect of using liquid organic fertilizer from goat feces on the growth and production of cucumber plants. This study took place in March 2018 - May 2018 in the practice area of STPP Gowa, Bontomarannu District, Gowa Regency. This study method was carried out using the method with 4 treatments and 3 replications, each replication containing 12 plants to obtain the population of 144 plant plants. Seeds are planted in holes with a spacing of 40 x 40 cm. Planting land in the form of beds is 130 cm wide and 140 cm in length. the plots height is around 20-30 cm. The length of each seed holes is 5 cm. All plots are filled with the basic fertilizer of cow feces a week before planting. The result shows the best dose is 200cc per plant based on the vegetative growth, the plant height and a number of leaves. Using dosage 300 cc per plant gives a significantly different effect on the production of 943.61 grams of plants or 47, 18 ton-ha-**

***Index Terms*: vegetative growth, height, leaves**

I. INTRODUCTION

Cucumber is one type of plant that is widely cultivated in Indonesia. This plant is famous for being easily cultivated and fast growing. Besides that, the texture and taste of the fruit are delicious [1]. The cultivation of horticultural crops, especially cucumber plants in Indonesia, is still very low, namely 3.5 to 4.5 tonha-1, whereas hybrid cucumber production can reach 20 tonha-1. [2]. Cucumbers cultivation in a high and intensive production scale has not been widely carried out, generally cucumber plants are planted only as a crop.

Ministry of Agriculture data (2012) the average national cucumber production is 9,61 tons ha-1, while the production potential of cucumber plants can reach 49 tons ha-1. For South Sulawesi the harvested area is 3,674 ha with 1,29 tons ha-1 of productivity with 4,746 tons of production. Gowa Regency harvested area is 264ha with 4.33 tons ha-1 of average productivity with 1,142 tons of production (Department of Agriculture, Food Crops and Horticulture, South Sulawesi, 2009). This low production is due to decreased soil fertility due to continuous land use. One effort to increase soil fertility is by giving manure.

The using of animal manure can add to the availability of food ingredients (nutrients) for plants that can be absorbed from the soil. [3]. Nutrient content in goat manure with nutrient composition is containing 0.95% N, 0.35% P2O5 and 1.00% K2O. Such conditions stimulate microorganisms to make active changes, so that they occur quickly. The use of this fertilizer should be done 1 or 2 weeks before planting because the elements contained in it need time to dissolve and decompose. [4].

Animal manure is an organic fertilizer from fermented solid and liquid manure of livestock. The amount of solid and liquid impurities produced by livestock in a day is extremely large and varies according to the conditions and types of animals and the number and type of animal feed [5]. Production of goat manure for a day is 1.13 kg of solid waste and 0.68 kg of liquid. Manure contains complete nutrients needed by plants for growth. Besides containing macro elements such as nitrogen (N), phosphorus (P), and potassium (K), manure also contains micro elements such as calcium (Ca), magnesium (Mg) and sulfur (S). The phosphorus element in manure mostly comes from solid waste, while nitrogen and potassium come from liquid impurities. [6]–[8]

The aim of the study is to determine the effect of giving organic liquid fertilizer from goats on cucumber plant growth. This study is the basis for the development of the use of organic fertilizer in the cultivation of horticultural crops.

II. MATERIAL AND METHODS

Research began in March to May 2018 in Bontomarannu District, Gowa Regency, South Sulawesi Province. Indonesia. The tools and materials used in this study were: drums / barrels, gunny sacks, spray tools, filters, stirrers, scales, goat stools 15 kg, 75 liters of water, molasses and EM4.

Implementation Methode

This research was carried out using the Randomized Design Method with four treatments and three replications, each replication containing 12 plants to obtain a population of 144 plants. Seeds are planted in holes with a spacing of 40 x 40 cm. Planting land in the form of plots is 130 cm wide and 140 cm long. The plots height is around 20-30 cm The length on each seed holes is 5 cm. All plots are filled with basic fertilizer of cow feces a week before planting. The treatment given is as follows:

P0 : without treatment/controlling
P1 : 100 cc plant-1
P2 : 200 cc plant-1
P3 : 300 cc plant-1

The general application of liquid organic fertilizer is given four times, ie when plants are 15, 25, 35 and 45 days after planting. Parameters measured in this activity include vegetative growth, namely: number of leaves, number of branches, and number of branches of production. whereas for the observed production that is, production weight, the number of samples observed were 6 plants per plot of 12 plant plots, so that the number of samples was 72 trees.

III. Result and Discussion

Observation results from the growth and production of cucumber plants (cucumis sativus L) by giving liquid organic fertilizer from goat feces (bioculture) with parameters of plant height, number of leaves, number of branches, productive branches and weight of production.

Plant Height

The analysis results of the high variance analysis of cucumber plants can be seen in Table 1 below:

Table 1. Development Height of Cucumber Plants at The Age of 2-4 weeks after planting (WAP)

Treatments	Plant Age (WAP)		
	2	3	4
P0	22.500	69.722	127.722
P1	17.389	48.389	75.778
P2	29.556	84.667	144.333
P3	30.167	74.722	136.889
LSD 0.05	ns	ns	ns

The results of cucumber plant height measurements at the age of 2 to 4 weeks after planting showed that all treatments were not significantly different, but P2 treatment (200 cc plants-1) resulted in a better plant height growth pattern in line with increasing plant age as in Figure 1.

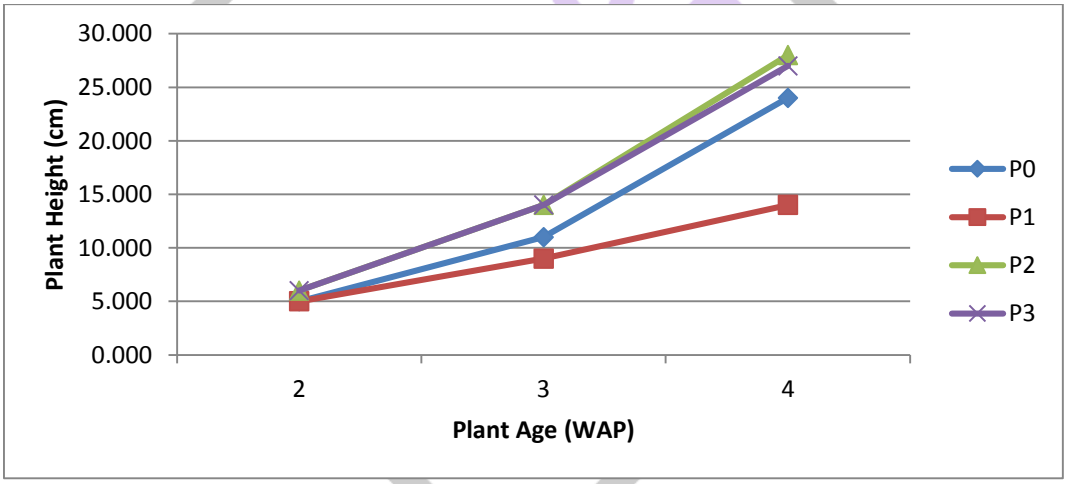

Fig 1: Pattern of High Growth of Cucumber Plant at The Age of 2-4 WAP

Number of Leaves

The the analysis results of the variance in the number of cucumber leaves can be seen in Table 2 below

Table 2. Development of Total Cucumber Leaves at the Age of 2-4 Weeks After Planting (WAP)

Treatments	Plant Age (WAP)		
	2	3	4
P0	5	11	24
P1	5	9	14
P2	6	14	28
P3	6	14	27
LSD 0.05	ns	ns	ns

Result data from the measurement of the total cucumber leaves at the age of 2 to 4 weeks after planting shows that among Po, P1, P2 and P3 is not significantly different. The number of leaves treated by P2 (200 cc plants-1) is more, and if it is depicted in the graph as presented in Figure 2

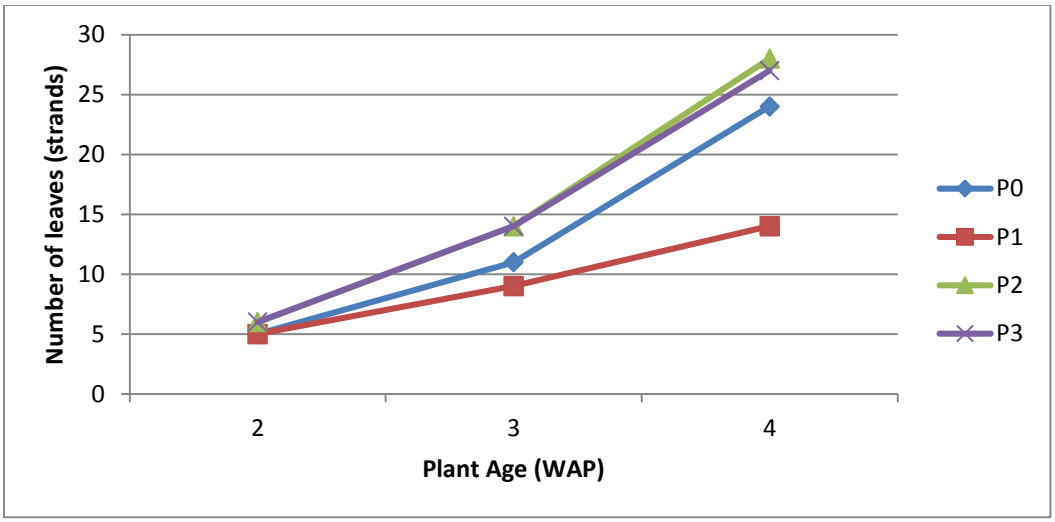

Fig 2: Growth Patterns of Cucumber Leaves at The Age of 2-4 WAP

Number of Branches

The calculation results of the analysis of the variance in the number of cucumber branches can be seen in the following Table 3:

Table 3. Development of the Number of Cucumber Branches at The Age of 2-4 WAP

Treatments	Plant Age (WAP)		
	2	3	4
P0	0	0	2
P1	0	0	1
P2	0	1	2
P3	0	1	2
LSD 0.05	ns	ns	ns

Results data from measurements of the number of cucumber branches at the age of 2 to 4 weeks after planting showed that all treatments were not significantly different. If it is depicted in graphical form as in Figure 3.

Fig 3: Growth Pattern of the Number of Cucumber Branches Age 2-4 WAP

Number of Productive Branches

Result data from the calculation of the analysis of variance in the number of cucumber productive branches can be seen in Table 4 below:

Table 4. Development of Cucumber Productive Branches at The Age of 2-4 WAP

Treatments	Plant Age (WAP)		
	2	3	4
P0	2.056	8.111	14.056
P1	2.222	5.611	7.056
P2	3.444	9.222	16.778
P3	3.222	7.778	15.833
LSD 0.05	ns	ns	ns

Result data from the measurement of productive cucumber branches at the age of 2 to 4 weeks showed that all treatments were not significantly different. The treatment of P2 (200 cc plants-1) produces a more productive productive branch. Graphical form is presented in Figure 4.

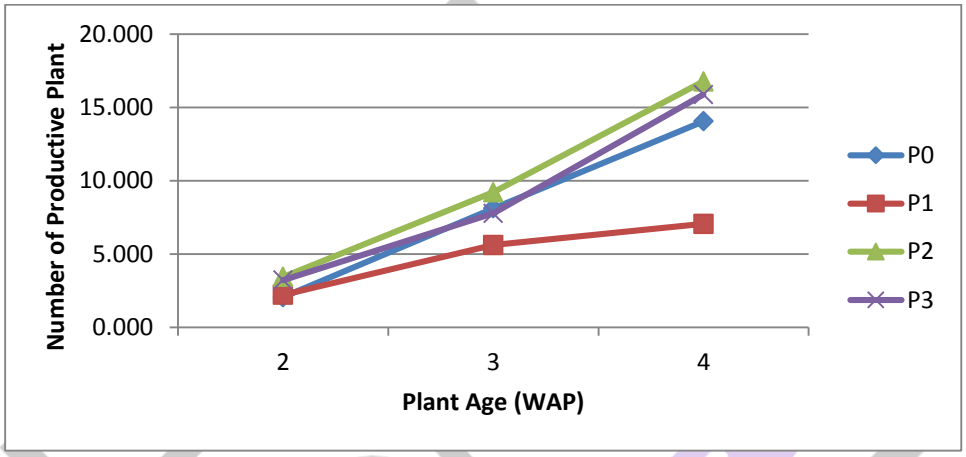

Fig.4. Growth Pattern of Productive Branches at The Age of 2-4 WAP.

Production

The analysis result of cucumber production variance can be seen in Table 5

Table 5. Cucumber Production (gram)

Treatments	Plant Age (DAP)				Total	Average
	30	37	44	51		
P0	229.44	113.33 a	147.78	193.92	684.47	171.12
P1	183.89	83.33 a	164,44	197.11	628.77	157.19
P2	256.67	203.33 b	157.50	211.39	828.89	207.22
P3	240.00	200.00 b	203.33	300.28	943.61	235.90
LSD 0.05	ns	50.281	ns	ns		

Result data from the measurement of cucumber plat production at harvesting shows that the harvesting age of 37 days is significantly different. If you see the highest production is P3 (300 cc plants-1), in the form of graphs are presented in Figure 5

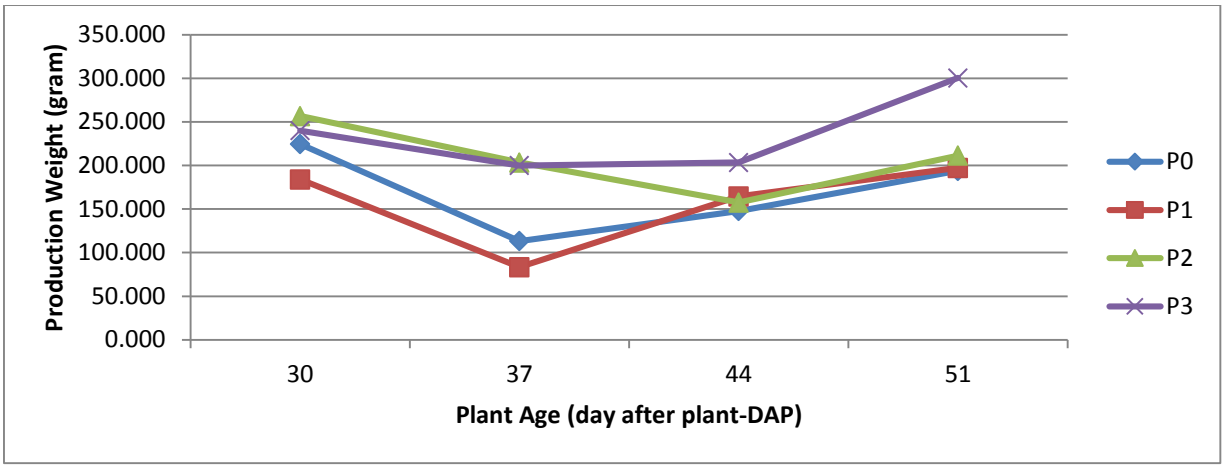

Fig.5. Production Pattern

The results of the analysis of variance carried out during the study activities by measuring various parameters that have been determined can be described as follows:

Plant growth response as shown in Table 1 and Figure 1 shows an increase in plant height in each treatment. The analysis result of variance with the F test showed an effect that was not significantly different on plant height, but according to the measurement results the treatment of 200 cc of plants-1 (P2) at the age of 4 weeks produced the longest plant height growth from other treatments, 144.3 cm, this showed that the administration of 200 cc of plant-1 had provided sufficient nutrients for the needs of the vegetative growth of cucumber plants.

The growth of the number of leaves is always followed by the growth of plant height, from the analysis result of variance the number of leaves treated with 200 cc plants-1 (P2) showed the highest number of leaves at the age of 4 weeks, namely 28 strands of other treatments, this is very influential with the vegetative growth rate. The using liquid manure can improve the physical and chemical properties of the soil. The fertilizer causing soil binding capacity to increase and help bind the elements of nitrogen, phosphorus and potassium in the soil needed by plants. Provision of organic fertilizer in clay soils will be light, water binding capacity becomes high, soil binding capacity to nutrients increases, and soil drainage and air conditioning can be improved [9]

Analysis of variance with the F test treatment of cucumber plants with treatment of 100 cc plants-1 (P1), 200 cc plants-1 (P2) and 300 cc plants-1 (P3) showed the highest number of branches at 4 mst from P0 (control), 2 branches of plant-1, this is very influential with the vegetative growth rate, because giving liquid manure can improve the chemical properties of the soil so that the growth process will be better.

Growth and development of plants is a result of the interaction among various internal factors of growth stimuli (ie in genetic control) and climatic, soil, and biological elements of the environment thus causing optimal plant growth.

The results of the analysis of variance with the F test showed that the treatment of 200 cc plants-1 (P2) showed the most productive branches, 16.78 branch-1 plants. The ability to grow productive branches is strongly influenced by the rate of plant growth which is directly influenced by external factors and internal factors. External factors that influence growth are soil (edafic), climate and biology. While internal factors are (1) plant resistance to climate, soil and biological pressure, (2) photosynthetic rate, (3) respiration, (4) distribution of assimilation results and N, (5) chlorophyll, carotene, and other pigment content, (6) meristem type and location, (7) capacity to store food reserves, (8) enzyme activity, (9) direct gene influences, and (10) differentiation.

The analysis result of variance with F test showed that the effect of giving Liquid Organic Fertilizer from Goat (Bioculture) treatment of 300 cc plants-1 (P3) was able to produce 943.61grams or 47.18 tons-ha-1 and significantly different at harvest on 37 days. This shows that manure made from livestock feces such as goat feces can increase productivity in accordance with existing nutrient content that can increase the nutrient nutrient in plants needed, including the influence of external factors and internal factors. External factors that affect productivity are soil (edafic), climate and biology. While internal factors are (1) plant resistance to climate, soil and biological pressure, (2) photosynthetic rate, (3) respiration, (4) distribution of assimilation results and N, (5) chlorophyll, carotene, and other pigment content, (6) meristem type and location, (7) capacity to store food reserves, (8) enzyme activity, (9) direct gene influences, and (10) differentiation, so that through the availability of elements and these factors can increase the production of cucumber plants.

IV. Conclusion

Giving of liquid organic fertilizer from P2 goat stools (200 cc plants-1) showed the best results on vegetative growth, namely on plant height and number of leaves. P3 gives a significant different effect on the production of 943.61 grams of plants or 47, 18ton-ha-1

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