

Response of Goat Manure on Growth and Production of Sweet Corn Plants (*Zea mays saccharata* L.)

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Abstract

The purpose of this study was to find out how the response of giving goat manure to the growth of sweet corn plants. This research was conducted at the Faculty of Agriculture Field, Cokroaminoto Palopo University in Palopo City. This research took place from December 2018 to March 2019. This research method used a Randomized Block Design consisting of 6 treatments which were repeated 4 times so that 24 treatment units were formed. The treatment used is P0: Without Treatment (Control), P1: Giving Goat Dose 250 g/plant, P2: Giving Dose of Goat Manure 300 g/plant, P3: Giving Dose of Goat Goat 350 g/plant, P4: Giving Dose of Dirt Goat 400 g/plant, P5: Giving Dose of Goat Manure 450 g/plant. The results showed that the administration of goat manure had a significant effect on the weight parameters of the cob, this was caused by the provision of manure on the plants was sufficient. The parameters that did not significantly affect were the administration of goat manure, namely plant height, number of leaves and number of cobs. This is presumably due to factors that influence, among others, sunlight (irradiation), moisture and soil fertility.

Keywords: *growth, goat manure, sweet corn*

1. Background

Sweet corn plants (*Zea mays saccharata* L.) is one of the food plants that are very popular among the people of Indonesia. Sweet corn is widely consumed because the sweet taste, smells more fragrant, and contains sugar, sucrose, and low fat so it is good for diabetics (Putri, 2011). As one source of food, corn has become a major commodity after rice (Purwono and Hartono, 2011). Besides that, sweet corn has a large role in meeting the nutritional needs of the community (Novira et al., 2015). In addition to the seeds, other parts such as young stems and leaves can be used for animal feed, old stems and leaves (after harvest) for green manure / compost, stems and dried leaves for fuel substitute for firewood, young corn fruit for vegetables, etc. (Syofia et al., 2014). Age of sweet corn production is shorter (genja), so it can be beneficial in terms of time (Palungkun and Asiani, 2004). The content of sweet corn nutrients is energy 96 calories, 3.5 g protein, 1.0 g fat, 22.8 g carbohydrates, 3.0 mg calcium, 111.0 mg phosphorus, 0.7 mg iron, vitamin A 400 SI, vitamin B 0.15 mg, vitamin C 12 mg, water 72.7 g (PS Writer Team, 1993).

Based on data from BPS and the Directorate General of Food Crops, the average productivity of sweet corn in Indonesia from 2010-2015 is relatively low, reaching only 4.81 tons/ha (BPS, 2016). This productivity is far below the potential yield of sweet corn which can

reach 14-18 tons/ha. One of the causes of low productivity of sweet corn is the provision of fertilizers and the amount of nutrients available in the soil has not been able to meet the needs of plants (Musfal, 2008). There are four important things that must be considered in increasing crop productivity, namely: irrigation, fertilization, pest control, and the use of good plant varieties (Poehlman and Borthakur, 1969).

The application of fertilizer does not always provide effective results because it is influenced by several factors including dosage, method and timing of improper administration (Harjadi, 1989). Cultivation of Sweet Corn by farmers in Indonesia no longer pays attention to aspects of soil fertility. The use of chemical fertilizers continuously can cause soil pollution which will affect the population of microorganisms (Irvan, 2007). According to Nasahi (2010), chemical fertilizers cause depletion of micro nutrients such as zinc, iron, copper, manganese, magnesium, and boron, which can affect plants, animals, and human health. The provision of goat manure organic fertilizer in sweet corn cultivation is expected to improve soil fertility and increase the growth and production of sweet corn plants in Indonesia. Manure is one of the organic fertilizers that has nutrient content that can support soil fertility and the growth of microorganisms in the soil (Adi Hermawansyah, 2013).

The provision of manure besides being able to increase the availability of nutrients can also support the growth of microorganisms and can improve soil structure (Mayadewi, 2007). Manure has natural properties that do not damage the soil (Adi Hermawansyah, 2013). Manure provides macro elements (nitrogen, phosphorus, potassium, calcium and sulfur) and micro elements (iron, zinc, boron, cobalt, and molybdenum) (Mayadewi, 2007 ; Nasahi, 2010).

According to Widayanti and Widalestari (1996), goat manure contains 40-50% of dry matter and a certain amount of nitrogen. Organic fertilizer from goat manure is very beneficial for the soil and plants. The goat manure used is mashed goat manure containing organic material that can meet the needs of plants.

Based on the background above, it is necessary to conduct research in this case an effort to increase the growth and yield of sweet corn plants by giving goat manure. The purpose of this study was to determine the response of giving goat manure to the growth of sweet corn plants and to determine the dose of goat manure that was effective against the growth of sweet corn plants.

2. Method

Place and Time

This research carried out at the Experimental Field of the Faculty of Agriculture, Cokroaminoto Palopo University, Jalan Lamaranginang, Batupasi Subdistrict, North Wara District, Palopo City, which began in December 2018 until February 2019.

Materials and Tools

The several ingredients that used in this study were sweet corn seeds and goat manure and the tools were: hoes, machetes, shovels, wood, wood, iron wire, scales, calipers, rulers, meters, pens, markers, notebooks, stakes, rope, buckets, bailers, labels and cameras.

Experiment Method

The research activity carried out using the Randomized Block Design (RBD) method which consists of 6 treatments and 4 replications, so that there were 24 experimental units. The level of treatment used can be seen in table 1.

The data obtained were analyzed statistically using variance. Then tested with the smallest real difference (BNJ) at the level of 5%.

Table 1. Code and level of treatment used

Code Treatment	Treatment
P0	Without treatment
P1	Provision of 250 gr goat manure/plants
P2	Provision of 300 gr goat manure/plants
P3	Provision of 350 gr goat manure/plants
P4	Provision of 400 gr goat manure/plants
P5	Provision of 450 gr goat manure/plants

Implementation of Research

Land Preparation

Land processing was done twice or more before the research was conducted. Processing was done by hoeing or hijacking until the structure is loose. The objectives of perfect soil management were (1) Improving soil texture and structure, (2) Eradicating weeds and pests in the soil, (3) Improving aerase and soil drainage, (4) Encouraging the activity of soil microorganisms, and (5) Removing gas toxic gas in the soil (Rukmana, 2006).

Seed Preparation

Seed preparation includes the provision of sweet corn seeds. The selected seeds must be normal, healthy, and free of pests and diseases. Such seeds can be obtained when using certified seeds. The use of hybrid sweet corn seeds will produce higher production. Hybrid sweet corn seed therapy has several disadvantages compared to free varieties, namely the price of seeds that are more expensive and can only be used a maximum of 2 times the derivative and available in limited quantities (Karya Tani Mandiri Team, 2010).

Planting

Planting sweet corn, is an activity to seed seeds into the ground, can be done manually or with the help of tools, and agricultural machinery (Karya Tani Mandiri Team, 2010). Planting sweet corn seeds was carried out according to the predetermined treatment pattern. Planting was done with a system of Portugal as deep as 3-5 cm and the distance between plants is 20 cm. Each hole was inserted 2 seeds per planting hole and if the seeds have grown, then a good plant selection done at the age of 14 plantations.

Embroidering

Embroidering is the planting of seeds back in the planting hole where the plants do not grow and die whose seeds are first sown with sipolibags or nursery containers. Seeding is done simultaneously when planting sweet corn seeds so that the seedling age is the same as the age of seeds planted on the land. Planting is done when the plant is 4 DAP. Embedding was done so that the number of plants in each bed was the same number.

Fertilizer Application

The application of goat manure after making a disc shaped hole next to the plant with a diameter of approximately 15 cm and a depth of 10 cm. Then the goat manure is put into the disk hole and then closed again using the soil. Fertilization was given according to the prescribed dose. The fertilizer given was goat manure. The application of goat manure was done twice, when the plants were 10 DAP and 35 DAP.

Maintenance

Maintenance includes watering, weeding, piling and pest and disease control activities. Watering was done once a day if there is no rain, if the soil was still wet enough, watering

was not done. Weeding was done when the plants are 14 days after planting and have been done manually by removing weeds around the plant or mechanically with a small hoe (kored). The concoction was carried out together at the time of weeding weeding in order to make the corn plant sturdy and not easily fall down. Pest and disease control was carried out chemically by spraying pesticides and manually by removing the affected plants.

Harvesting

Harvesting was done when the plants were 82-84 days after planting. The criterion of sweet corn ready to harvest was blackish brown hair, dry, and sticky (cannot be decomposed), the tip of the cob was fully filled, when the seeds were pressed out the milk yellow liquid. The right way to harvest to maintain the quality of sweet corn was to be picked with the kelobot, kelobot did not open, did not put in a container that was too tight, immediately may be placed in a cool and open place, if packing will not be done should not be thrown (Syukur dan Aziz, 2013).

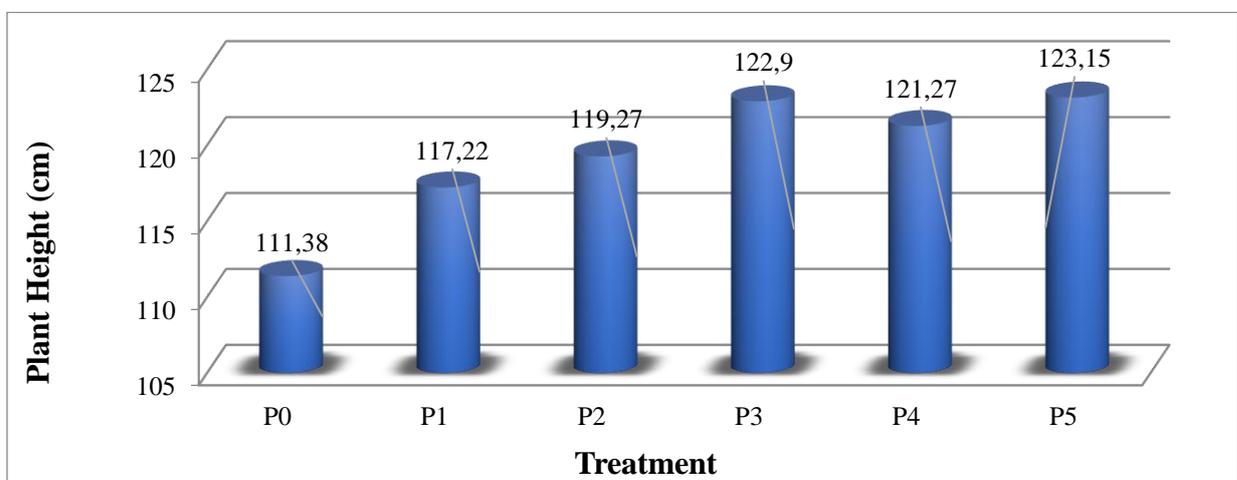
Observation Parameters

1. Plant height (cm)
2. Number of leaves (strands)
3. Number of cobs (fruit)
4. Cob weight (kg)

3. Results & Discussion

Plant Height (cm)

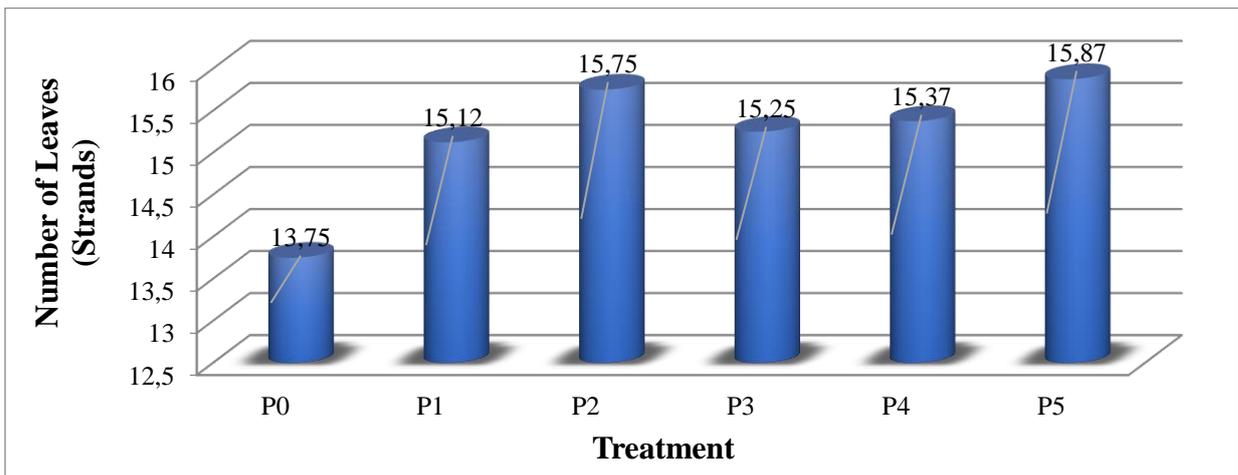
The results of the analysis of the average height of sweet corn plantations showed that the administration of sweet corn goat manure did not significantly affect plant height and can be seen in picture 1. The average plant height was shown in treatment P5, which was 450 g/goat doses. Plants with an average yield of 123.15 cm, the second P3 treatment was giving the dose of goat manure as much as 350 g/plant with an average yield of 122.9 cm, the third treatment P4 was giving a dose of 400 g of goat manure / plant with average yield -ata 121.27 cm. The four P2 treatments were given with a dose of 300 g of goat manure/plant with an average yield of 119.27 cm, the fifth P1 was 250 g / plant dose of goat manure, with an average yield of 117.22 cm. And the treatment that shows the lowest results is in treatment P0 (without treatment) with an average yield of 111.38 cm.



Picture 1. Diagram Plant Height of Sweet Corn (*Zea mays saccharata* L.) for Giving Goat Manure.

Number of Leaves (strands)

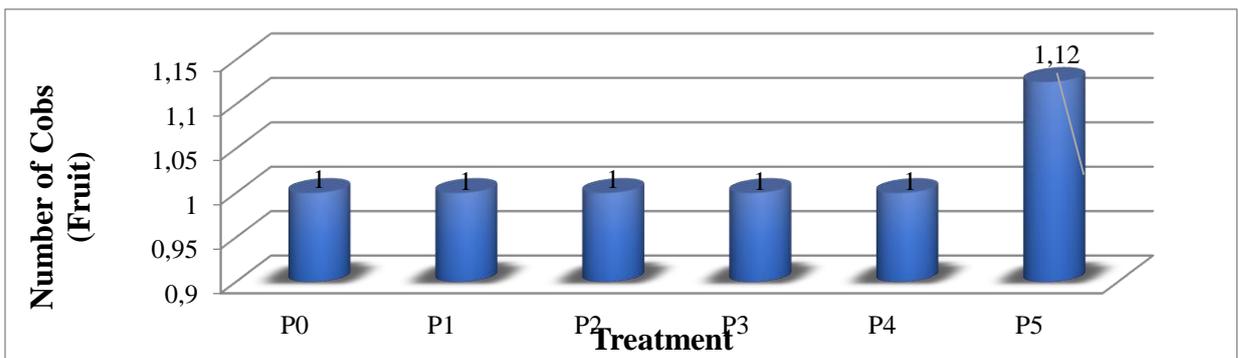
The data showed that the response of giving goat manure to the growth and yield of sweet corn plants did not significantly affect the number of leaves of sweet corn plants. Diagram in picture 2. shows that the highest number of leaves was directed at treatment P5, namely by giving a dose of 450 g of goat manure / plant with an average yield of 15.87 strands, followed by P2 treatment by giving 300 g / plant doses of goat manure with gasil averaged 15.75 strands, then treatment P4 namely by giving a dose of 400 g / goat manure with an average yield of 15.37 strands, then P3 treatment by giving a dose of 350 g goat manure / plant with average yield. -15.25 strands. Treatment of P1 is by giving 250 g / plant doses of goat manure with an average yield of 15.12 strands, and the lowest number of leaves is aimed at treatment P0, ie treatment or control stress with an average yield of 13.75 strands.



Picture 2. Diagram Number of Leaves Plant of Sweet Corn (*Zea mays saccharata* L.) for Giving Goat Manure.

Number of Cobs (fruit)

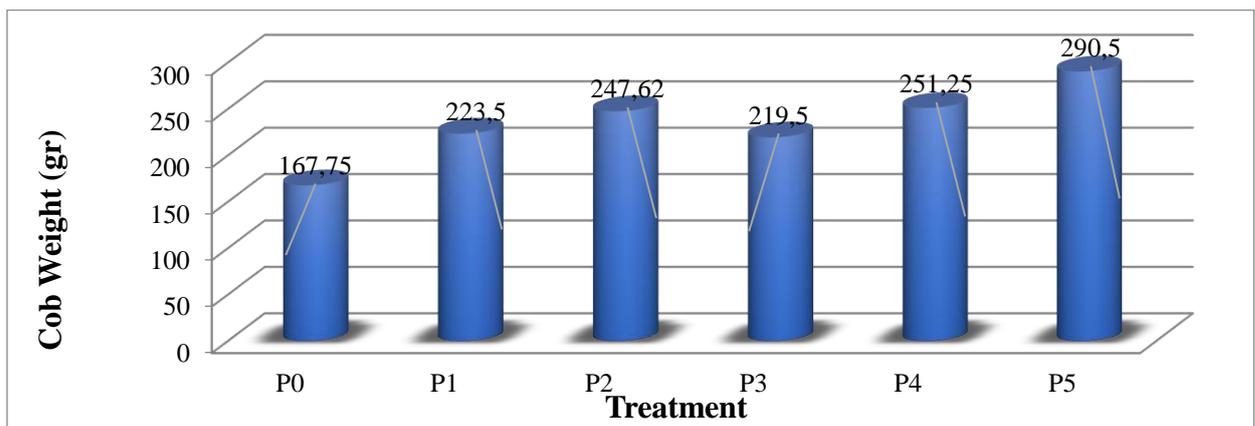
The final data showed that the administration of goat manure with various doses on the growth and yield of sweet corn did not significantly affect the number of cob on sweet corn plants. From the diagram above shows that the administration of goat manure shows the highest number of cobs found on P5, which is giving a dose of 450 g of goat manure / plant with an average value of 1.12 fruits. The treatment with a smaller number of cobs was found in P0 without treatment or control, P1 which was the dose of 250 g / plant of goat manure, P2 was 300 g / plant dose of goat manure, P3 was 350 g / goat doses plants and P4, namely giving doses of goat manure as much as 400 g / plant, with the average yield of the same number of cobs, namely P0 1 fruit, P1 1 fruit, P2 1 fruit, P3 1 fruit, and P4 1 fruit.



Picture 3. Diagram Number of Cobs Plant of Sweet Corn (*Zea mays saccharata* L.) for Giving Goat Manure.

Cob Weight (gr)

The average weight parameters of cob showed that the administration of goat manure with various doses significantly affected the growth and yield of sweet corn plants. The diagram above shows the heaviest weight of the cob on treatment P5, which is by giving a dose of 450 g of goat manure / plant with an average weight loss of 290.5 grams. Followed by treatment P4 is by giving a dose of 400 g of goat manure / plant with an average weight of 251.25 grams, then treatment P2 is by giving 300 g / plant doses of goat dung with an average weight of 247.62 gram, treatment P1 is by giving a dose of 250 g of goat manure / plant with an average weight of 223.5 grams. Furthermore, in the treatment of P3, namely by giving a dose of goat manure as much as 350 g / plant with the average weight loss rate 219.5 grams. The treatment that has a lighter weight is P0 without treatment or control with an average weight of 167.75 grams.



Picture 4. Diagram Cob Weight Plant of Sweet Corn (*Zea mays saccharata* L.) for Giving Goat Manure.

Discussion

Based on the results of research that has been done through variance, it shows that it has a significant effect on the weight parameters of the cob. However, observations of plant height, number of leaves and number of cobs did not show significant differences from all treatments.

The results of the parameters of plant height, leaf number, ear weight, and number of cobs showed the highest yield in treatment P5 with a dose of 450 g of goat manure / plant. Whereas in treatment P0 shows the lowest result among all observational parameters. However, each highest and lowest treatment on each parameter has a different average yield. The parameters of sweet corn plant height show that P5 with an average yield of 123.15 cm while P0 with an average yield of 111.38 cm shows the lowest crop. The highest number of leaves shows an average yield of 15.87 strands on P5 while the lowest number of leaves with an average value of 13.75 strands at P0. Then on observing cob weight, P5 shows the heaviest cob with an average yield of 290.5 grams, while P0 shows the lightest cob with an average yield of 167.75 grams. Furthermore, on observing the number of cobs, P5 for the highest number of cobs with results an average of 1.12 pieces, while P0, P1, P2, P3 and P4 for a small number of cobs with an average yield of 1 fruit, this is in accordance with the statement, Sutejo (2002), states that manure (goat manure) can indeed increase the availability of nutrients for plants. In addition, manure (goat manure) also has a positive influence on the physical and chemical properties of the soil, and encourages the development of small maneuvers.

The growth and yield of sweet corn is also influenced by environmental factors. As stated by, Gardner (1991) that in addition to the genetic factors of the plant itself, environmental

factors also provide influences including sunlight (irradiation), humidity and soil fertility. Limitations of these factors will affect plant growth and production. Furthermore, stated by, Dwijisoputro (1991) that sunlight is needed in photosynthesis, with the amount of light received by plants, the results of photosynthesis are also increasing. Furthermore, it will produce better growth and results.

The results of the above analysis also showed that the administration of goat manure had an effect on plant height, leaf number, ear weight and number of sweet corn cobs. This shows that nutrients in the soil are insufficient for the growth and development of sweet corn plants, so that these plants lack nutrients. In accordance with the opinion of Suriatna (1992) states that plants that lack nutrients in the vegetative phase will cause plants to become stunted.

4. Conclusion

Based on the results of the study, can be concluded that the most influential parameters in this study are the most effective parameters of ear cob and the dose of goat droppings in treatment P5 with 450 g of goat manure dosing / plant with 123.15 cm plant height, number of leaves 15.87 strands, ear weight 290, 5 grams, and the number of ears of 1.12 pieces. This is caused by the provision of goat manure which can add macro nutrients (N, P, K), micro (Ca, Mg, S, Na, Fe, Cu, Mo), living microorganisms and organic materials that can increase and increase soil capacity to bind water.

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