

The Response of Cucumber Plants Vegetative Growth Through the Liquid Organic Fertilizer Application from Banana Peels Waste in Tarakan

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ABSTRACT

Application of liquid organic fertilizer is known to increase the vegetative growth of cucumber plants. This research used liquid organic fertilizer obtained from banana peel waste. The aim of this study was to determine the appropriate dose of liquid organic fertilizer to enhance the vegetative growth of cucumber plants. Research design used was block design with 5 treatments and six replications. There were 5 beds used in this study. Each of beds was applied 100 gram of manure as basic fertilizer. Trial components were P0= control (without liquid organic fertilizer application), P1= 10 ml of liquid organic fertilizers, P2= 20 ml of liquid organic fertilizers, P3= 40 ml of liquid organic fertilizers, P4= 80 ml of liquid organic fertilizers. Liquid organic fertilizers were applied at 2, 3, 4 and 5 WAP (weeks after planting). Vegetative parameters were observed i.e., plant height, number of leaves, leaf width and leaf length. The result showed that optimal vegetative growth was found in cucumber plants were applied to 40 ml of liquid organic fertilizer.

Keywords:

Cucumber,
vegetative growth,
liquid organic
fertilizer, banana
peel

INTRODUCTION

Cucumber (*Cucumis sativus*) is a horticultural plant that belongs to the Cucurbitaceae family. This plant can be cultivated at an altitude of 200 - 800 meters above sea level, and is able to adapt to various types of climates. However, cucumber cultivation is more optimal in dry climatic conditions with full irradiation at a temperature of 21-27°C, and an optimal altitude of 400 meters above sea level. Cucumbers are suitable for planting in soils that contain quite a lot of organic nutrients. Good soil texture is soil with low clay content with a pH of 6-7 [1] [2] [3]. Cucumber is one of the agricultural products that are quite widely consumed by the people of Indonesia. It is

because cucumbers can be processed into various types of dishes and drinks, and have a fairly high nutritional value. Due to high consumer demand, cucumber cultivation is increasingly being improved.

Various attempts have been made to increase yields in cucumber cultivation. However, in reality, cucumber production in Indonesia is still fluctuating from year to year, in the range of 9.61-10.96 tons ha⁻¹ [4]. Cucumber production fluctuations in Indonesia are caused by several factors, including climatic factors and farming techniques, such as tillage, fertilization, irrigation, and the presence of pests and diseases [5]. Tarakan as a research site is one of the areas in

North Kalimantan, in the form of an island with an area of about 250.80 km² and a population of around 239,787 people [6]. Tarakan is one of the areas in North Kalimantan where most of the farmers cultivate horticultural crops, especially vegetables. However, the productivity of vegetable crops in Tarakan is still very low. One of the factors causing the low productivity of horticultural crops in Tarakan is the level of soil fertility and its management. The level of fertility of a soil is strongly influenced by the properties of the soil. In marginal lands such as the one in Tarakan, the fertility level is low [7].

Therefore, it is necessary to increase the production and productivity of cucumber plants. Efforts to increase it can be done in various ways, one of which is by improving farming techniques, among others, through fertilization. Fertilization plays an important role because fertilization is one way to improve the level of soil fertility in increasing crop production. The use of inorganic fertilizers has a quick reaction effect for plants, but in the long run it will harden the soil and reduce its fertility [8]. In addition, the use of inorganic fertilizers is one of the factors that causes the accumulation of greenhouse gases in the atmosphere so that it can increase global warming [9] [10]. This needs to be addressed by reducing the use of inorganic fertilizers by using organic fertilizers which are cheaper and environmentally friendly [11]. One type of organic fertilizer is liquid organic fertilizer.

Liquid Organic Fertilizer is a plant fertilizing agent derived from organic materials and is in liquid form. Liquid organic fertilizer is pure

organic material in the form of liquid from livestock and poultry waste, natural and plant waste, residues of certain types of plants, as well as household organic waste/certain natural substances that are processed naturally. The benefits of liquid organic fertilizer include fertilizing plants, maintaining the stability of nutrients in the soil, reducing the impact of organic waste in the surrounding environment, helping to revitalize soil productivity, to improve production quality [12] [13] [14] [15].

One of the materials that can be used for the manufacture of liquid organic fertilizer is banana peel. So far, the utilization of banana peel waste is still lacking, only some people use it as animal feed. In addition to producing the xylase enzyme, banana peels also contain other chemical elements [16]. Based on the research of Susetya [16], banana peel contains protein, potassium, phosphorus, magnesium, sodium and sulfur. In addition to the research conducted by Nasution et al., [17] shows that banana peel contains 1.137% of potassium. Dewanti [18] also described the P elements contained about 63 mg/100 grams in a banana peel. Because of many nutrients contained in this banana peel, made it potential to be used as fertilizer liquid organic matter (POC).

METHOD

The research was conducted at the Experimental Garden in Tarakan from January to April 2022. The materials used included cucumber plant seeds, manure, liquid organic fertilizer, and water. This study used a randomized block design with 1 factor, i.e., the application of liquid organic fertilizer. This factor

consists of 5 treatments, namely P0 = control (without liquid organic fertilizers application), P1 = 10 ml of liquid organic fertilizers, P2 = 20 ml of liquid organic fertilizers, P3 = 40 ml of liquid organic fertilizers, P4 = 80 ml of liquid organic fertilizers. Each treatment was repeated 6 times. Liquid organic fertilizers were applied at 2, 3, 4 and 5 WAP (weeks after planting). Vegetative parameters were observed i.e., plant height, number of leaves, leaf width and leaf length.

The research procedure begins with land preparation which was conducted by clearing the land and making five beds, then the soil was loosened and left for one week. Bed with bed size 1 m x 2 m. Furthermore, fertilization was carried out which aims to meet the nutrients needed by plants. Chicken manure was used as basic fertilizer and given at the beginning of planting at a dose of 100 grams/planting hole. Then, supplementary fertilization in the form of POC fertilizer was carried out at the age of 2,3,4, and 5 WAP. Fertilization was carried out using POC fertilizer by sprinkling it using a predetermined measuring cup, where each bed had a different dose, i.e., 0 ml, 10 ml, 20 ml, 40 ml, and 80 ml. Planting was conducted by making a planting hole with a depth of 10 cm, then inserting 3 seeds/holes. Plant maintenance includes replanting, fertilizing, watering, weeding, hoarding, and controlling pests and diseases.

RESULT AND DISCUSSION

Based on the results of the study, there was a significant growth in each treatment. However, the most optimal growth was found in P3 treatment with a dose of 40 ml of liquid organic

fertilizer. It can be showed by the plant height in the last week of observation of 102.23 cm; number of leaves 20.81; leaf width 13.54 cm; and Leaf length 14.54 cm (Figure 1).

P3 treatment showed the most optimal growth result because a dose of liquid organic fertilizer of 40 ml was assumed to be able to fulfill the nutrient needs of cucumber plants to stimulate optimal vegetative growth. Based on the chemical analysis, banana peel contained of some nutrients i.e., 6.19% C-organics; 1.34% N-total; 0.05 % P2O5; 1.478% K2O; 4.62% C/N; and pH 4.8. Meanwhile, liquid organic fertilizer made from banana peel also contained of some nutrients i.e., 0.55% C-organics; 0.18% N-total; 0.043% P2O5; 1.13% K2O; 3.06% C/N; and pH 4.5 [19].

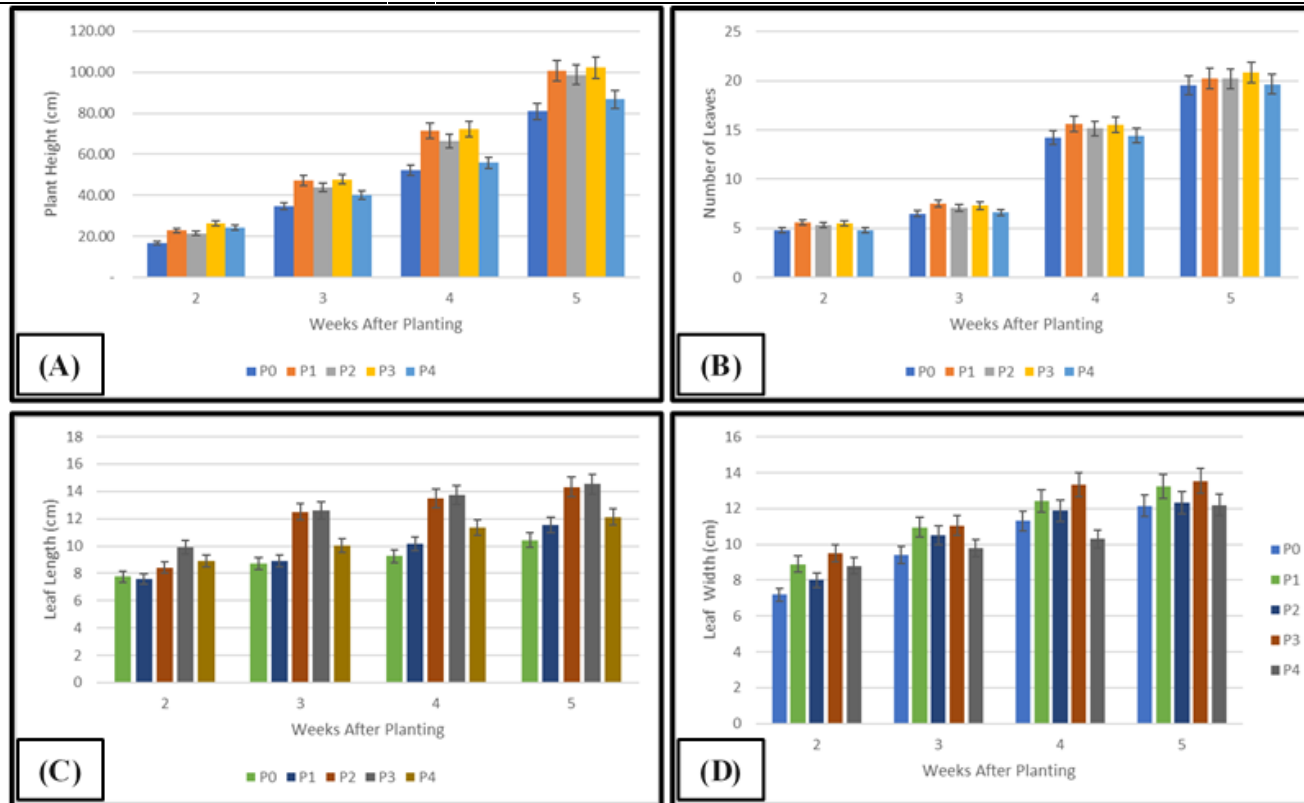


Figure 1. The influence of liquid organic fertilizer from banana peel towards vegetative growth of cucumber: (A) Plant height; (B) Number of leaves; (C) Leaf length; (D) Leaf width. Note: P0= Control; P1= 10 ml of liquid organic fertilizers, P2= 20 ml of liquid organic fertilizers, P3= 40 ml of liquid organic fertilizers, P4= 80 ml of liquid organic fertilizers

Based on the previous research cucumbers need nitrogen in low level, meanwhile the requirements of potassium and phosphorus in high levels. In the other side, different soil types also stimulated different result. Sandy soils dissolve important substances so that it become lack of nutrient quickly. Besides that, Heavy soils can lock up the nutrients. Organic fertilizer played important role for the soil fertility. Adding organic fertlizer before planting improves the fertility most of garden soil. The organic substances enriches light sandy soils and lightens heavy clay soils [20]. Vegetative growth quality is required early in the crop cycle so the plants can establish basic strength. By creating this basic strength, the plant has the potential to support a highly productive generative state later on which is focuses on managing plant productivity [21].

CONCLUSION

40 ml of liquid organic fertilizer from banana peel waste have potency to stimulate the vegetative growth of cucumber plants.

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