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1 APPLICATIONS OF VARIOUS TYPES AND DOSAGE OF BIO-COMPOSTS ON GINGER PLANT (*Zingiber officinale* L.) Misfit Putrina 1), Yulensri 2) dan Kresna Murti 3) 1.3) Department of Estate Crops, Agricultural State Polytechnic of Payakumbuh Indonesia 2) Department of Food Crops , Payakumbuh State Agricultural Polytechnic Indonesia misfitputrina@yahoo.co.id

ABSTRACT The prospect of ginger in Indonesia is still quite good, especially for exports, the traditional medicine, the food and beverage industry. Increasing crop production using chemical fertilizers and pesticides is not a wise step, which recently has increased consumer pressure to get agricultural products free of pesticide residues and chemical fertilizers so that the product is safe for consumption and the creation of a healthy environment. The combination of organic fertilizer and biological fertilizer is one solution to answer this challenge. This study aims to determine the role of various types and doses of biocompost on the ginger plant. The design factorial randomized block design (RBD) (4 x 3) with 3 replications, where Factor K (bio-compost type) with 4 levels, namely K1 = cattle manure bio-compost, K2 = tithonia bio-compost, K3 = straw bio-compost, and K4 = without bio-compost. Factor D (dosage) with 3 levels, namely D1 = 3 tons / Ha; D2 = 6 tons / Ha, D3 = 9 tons / Ha, so there were 36 experimental plots. Treatment at planting by inserting it into the planting hole. Observations were made at the age of 60 days after planting. The data obtained were analyzed for variance (Anova) and continued by duncan test. The results showed there was no effect of biocompost types and dosages on plant height and number of ginger tillers. This research continues until production. Key words : bio-compost, ginger, *Zingiber officinale* L.

1. Introduction Prospects of ginger in Indonesia are still quite good especially in exports, the traditional medicine industry, the food and beverage industry. Increasing the productivity of plants using chemical fertilizers and pesticides is not a wise way, the increase in consumer pressure for agricultural products that are free of pesticide residues and chemical fertilizers so that the products are safe for consumption and the creation of a healthy environment (Sutanto, 2002). The application of biotechnology and organic materials is an alternative that is considered very appropriate to answer all of these

challenges, one of the way by using multipurpose microorganisms that both as a fertilizer and biological pesticides and plant growth stimulants (PGR), then combined with organic fertilizer in a form of bio-organic fertilizer. Organic fertilizer is fertilizer that consists mainly or entirely of organic material derived from plants and/or animals that have been produced by engineering process, which can be in the form of solid or liquid which is used to supply organic materials to improve physical, chemical, and biological properties of the soil. Whereas biological fertilizer is defined as inoculants made from active living organisms which are

2 functional groups of soil microbes that have function as providers of nutrients in the soil so that they can be available to plants (Suriadikarta and Simanungkalit, 2012). The use of bio-compost as a solid form is an alternative that is expected to overcome the problem of the negative effects of excessive use of pesticides and fertilizers as well as bias as a growth regulator. Bio-compost fertilizer is processed by mixing organic matters with the microorganisms of the bacteria *Pseudomonas flourensens*, *Serratia marcescens* and *Bacillus thuringiensis* which have been formulated. The population density of these three bacteria in solid form is $0.7-2.4 \times 10^8$ CFU / 100 gr sample (Yulensri, Agustamar and Putrina, 2016). Compost quality analysis results showed that the three types of compost (tithonia, straw, chicken manure) produced have met the minimum technical requirements of organic fertilizer. Tithonia compost contains organic C, total N and K₂O is higher than chicken manure compost and straw compost. P₂O₅ is highest in straw compost (Putrina, Yulensri and Murti, 2018). This study aims to determine the role of various types and dosage of biocompost in ginger.

2. Material and Methods This ² research was conducted in the Laboratory and experimental land of the Payakumbuh State Agricultural Polytechnic, Harau District, Limapuluh Kota Regency, from April to July 2019. This research consists of two stages, namely in the laboratory and in the field. In the laboratory, we carried out the rejuvenation of *S. marcescens*, *B. thuringiensis* and *P. fluorescens* and making the media for formulation. In the field, the design used was a factorial ¹

randomized block design (RBD) with 3 replications, in which Factor K (bio-compost type) with 4 levels, namely K1 = bio-compost of cattle dung, K2 = bio-compost of tithonia, K3 = bio-compost of straw and K4 = without bio-compost (None). Factor D (bio-compost dosage) with 3 levels, namely D1 = 3 tons/ha, D2 = 6 tons/ha, D3 = 9 tons/ha, so there were 36 experimental plots. Bio-compost is produced by adding the bacteria *S. marcescens*, *B. thuringiensis* and *P. fluorescens* which have been formulated into each type of compost. Application

3 of treatment at planting by giving it into the planting hole. Observations were made on ginger plants aged 60 after planting.

3. Results and Discussion a. Plant height Table 1

The average of plant height (cm) at the aged of 60 days

Kind of Bio-compost	Bio-compost Dose	Main effect of bio-compost
K1	D1	46,00
K1	D2	49,44
K1	D3	46,89
K2	D1	58,33
K2	D2	46,67
K2	D3	48,78
K3	D1	51,26
K3	D2	48,11
K3	D3	35,11
K4	D1	38,78
K4	D2	40,67
K4	D3	42,00

Main effect of biocompost dose

Main effect of biocompost dose	45,31	47,17	43,56
A	A	A	A

Different letters show the highly significant

($p < 0,05$) From Table 1 it can be seen that the type of bio-compost and bio-compost dose have no significant effect on the plant height of ginger aged 60 days after planting. The best plant height on ginger occurs in the treatment of tithonia bio-compost at a dose of 3 tons/ha, higher than without bio-compost treatment. This is due to the nutrient elements contained in organic fertilizer that are given in the soil are not available yet, and food reserves contained in the rhizome were little. Ginger plant height in the treatment of bio-compost with a dose of 3 tons/ha or 50 grams/plant is higher than that obtained by Sulistianingrum and Chalimah (2013), which is 43.66 cm in the treatment of 150 grams of organic fertilizer and 6 grams of biological fertilizer at the same age. Meanwhile, according to Rizqullah, Sunaryo and Wardiyati (2018), the height of the ginger plant in the application of several types of manure without biological fertilizer at 2 months after planting ranged between 27.61-29.22 cm. It is seen that the application of bio-compost can increase the growth of ginger plants.

4 b. Number of Tillers Tabel 2 The average of tillers (stem) of ginger aged 1 60 days after planting

Kind of Bio-compost	Bio-compost Dose	Main effect of bio-compost dose	D1	D2	D3	K1	K2	K3	K4	
			2,89	2,45	2,67	2,67	2,78	2,67	1,89	2,44
			2,22	2,22	1,89	2,11	2,45	1,78	2,55	2,26
Main effect of kind of bio-compost			2,58	2,28	2,25					

Different letters show the highly significant ($p < 0,05$)

From Table 2, it can be seen that the type of bio-compost and bio-compost dosage do not significantly affect the number of tillers of ginger 1 at the age of 60 days after planting. The best number of tillers was in the bio-compost treatment of livestock manure at a dose of 3 tons/ha. This is due to the nutrient elements contained in organic fertilizer that are given in the soil are not available yet, and food reserves contained in the rhizome are little. According to Rizqullah, Sunaryo and Wardiyati (2018), the number of stems per clump of ginger plants by applying cow manure, goat manure and chicken manure for 2 months is 2.75 stems. It is seen that the number of tillers of ginger plant by applying 1 bio-compost of livestock manure at a dose of 3 tons/ha is better than just applying compost.

3. Conclusion From this study it can be concluded that the kind of bio-compost and biocompost dose do not significantly affect the growth of height and the number of tillers of ginger at the age of 60 days after planting.

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