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Effect of Several Doses of Bioamelioran Plus Indigenous Mycorrhizae on Growth and Yield of Glutinous Corn (*Zea mays* var. ceratina)

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Abstract:- Application of bioameliorants with various formulations can increase nutrient concentration, growth and yield of corn glutinous. However, how much increase in nutrient concentration, growth and yield in sandy soils has not been revealed. The experimental design used was a randomized block design consisting of five treatments for the bioameliorant formulation, namely F0: no bioameliorant, F1: with bioameliorant 10% compost + 10% manure + 10% husk charcoal + 70% mycorrhizal biofertilizer, F2: with bioameliorant 15% compost+15% manure+ 15% husk charcoal + 55% mycorrhizal biofertilizer, F3 : with bioameliorant 20% compost+20% manure+ 20% husk charcoal + 40% mycorrhizal biofertilizer, F4 : with bioameliorant 25% compost+25% manure + 25% husk charcoal + 25% mycorrhizal biofertilizer. The variables observed in this study were: (1) soil nutrient concentration variables and plant nutrient uptake (N and P) at 42 days after planting (DAP), (2) growth variables included: plant height and number of leaves at 14, 28, 42 and 56 DAP, and weight of wet and dry biomass of roots and shoots at 42 DAP, (3) mycorrhizal population variables included: number of spores and percentage of root infection at 42 DAP, and (4) yield variables were: wet ear weight per plot, weight wet biomass per plot, dry cob weight per plant and seed weight per plant. The results showed that the application of bioameliorants with the formulation of 25% compost + 25% manure + 25% husk charcoal + 25% mycorrhizal biofertilizer in corn glutinous gave the best concentrations of N, P nutrients for plant growth and yield glutinous corn.

Keywords:- *Bioameliorant, Glutinous Corn, Mycorrhizae.*

I. INTRODUCTION

Glutinous corn is also known as pulut corn. Glutinous corn was released in 2013 and was given the name "Pulut URI" (For the People of Indonesia) which can be used to meet the demand for corn-based processing industries (Balitbang, 2013). Glutinous corn has the same starch content in the endosperm as the tapioca starch produced by the cassava plant so that it can be used as a substitute plant. Glutinous corn can also be used as a mixture of raw materials for paper, textile and adhesive industries. Processed corn including glutinous corn can be used as a substitute for rice consumption from rice and other food needs. Another added value that can be obtained is getting profits because it provides additional income so that it is feasible to be developed (Syuryawati, Margaretha and Hadijah, 2010). Glutinous corn can also be used to improve the smoothness and creaminess of canned food, as an adhesive for bottle labels and to strengthen paper (Hamzah, Utami and Cholik, 2011). Glutinous corn contains starch in the form of 100% amylopectin which has a sweet taste, fluffier and attractive appearance (Tengah et al, 2016). Glutinous corn is widely grown in the Northeast of Thailand which is consumed as corn on the cob because of its delicious sticky texture. Glutinous corn seeds generally belong to traditional cultivars and are known throughout the world while purple glutinous corn seeds are an important source of anthocyanins with characteristics of food coloring and bio-functional components (Yang and Zhai, 2010).

The varieties of glutinous corn in Indonesia are still in local form, such as local Sulawesi, local Jember, local Kediri, local ciamis and others. This research resulted in hybrid glutinous corn when it was carried out by government research institutes and seed companies (Rifianto, 2010).

In 2013 the Cereal Crops Research Institute made a number of efforts to increase the productivity of glutinous rice/pulut, regardless of the advantages, glutinous rice/pulut corn has weaknesses, one of which is the low productivity level, between 2-2.5 t/ha. One of the efforts to increase productivity is crossbreeding with local germplasm which has high yield potential and produces new varieties of corn rice with productivity reaching 6 t/ha or three times higher than local corn rice. In addition, the amylopectin content is also high up to 90% so that it gives a savory taste. The new corn is named "Pulut URI" (Untuk Rakyat Indonesia). Pulut URI-1 and Pulut URI-2. can be used to meet the demand for corn-based processed industries such as “marning” corn (Nuha et al, 2022).

The increase in glutinous corn yields needs to be done in line with the increasing demand for glutinous corn. However, there are several obstacles to the yield of glutinous corn that are faced, namely the continuous planting of local varieties, fertilization that does not match the dose, and cultivation techniques that are less than optimal. Corn is a plant that really needs nutrients. Efforts to increase corn yields are carried out, among others, by fertilization. Fertilization is a process to improve or provide additional nutrients to the soil, so that it can meet the needs of plant growth. Application of organic matter will improve soil

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structure, increase water holding capacity (Riley *et al.*, 2008), and increase soil biological life (Dinesh *et al.*, 2010). However, excessive use of organic fertilizers in a long period of time will certainly result in soil degradation and nutrients cannot be fully utilized by plants. In addition, excessive application of inorganic fertilizers in the long term will increase soil acidity which has a negative impact on microorganisms in the soil (Yusnaini, 2009).

Organic ameliorant is a soil improvement agent derived from organic materials that can improve the physical, chemical, and biological properties of the soil. The use of organic ameliorants can improve soil aggregation, infiltration and permeability; increase the cation exchange capacity (CEC) of soil and some nutrients; as well as increasing soil organic C which is a source of nutrients for soil biota (Sudaryono, 2009).

Organic ameliorants that can be used to improve soil quality are chicken manure compost, municipal waste compost, and coconut shell biochar. Chicken manure compost can improve the physical, biological and especially chemical properties of the soil (Afandi et al, 2017). Municipal waste compost applied with organic fertilizer is able to provide the same results as the application of 100% organic fertilizer (Hartatik and Setyorini., 2012). Coconut shell biochar is able to increase the C-organic status of the soil (Sukartono and Utomo, 2012).

Ameliorant material that is often used in the cultivation of plants in dry land is dolomite (containing elements of Ca by 32.0% and Mg by 4.03%) which can improve soil physical properties, improve soil granulation so that aeration is better, improve soil chemical properties, namely reduce the concentration of H ions, decrease the solubility of Fe, Al and Mn, increase the availability of C, Mg, P and Mo as well as increase base saturation, improve soil biological properties, namely increasing soil micro-service activities (Harsono *et al.*, 2011).

Organic ameliorants that can be used to improve soil quality are chicken manure compost, municipal waste compost, and coconut shell biochar. Chicken manure compost can improve the physical, biological and chemical properties of the soil (Taufaila et al, 2014).

Therefore, efforts are made to increase soil fertility and increase production in glutinous corn plants using natural ingredients. The way to be taken is by using organic fertilizers. However, how much influence the dose of bioamelioran has on the growth and yield of corn has not been revealed. For this reason, it is necessary to conduct research on "The Effect of Several Doses of Bioamelioran Plus Indigenous Mycorrhizae on the Growth and Yield of Glutinous Corn (*Zea mays var. ceratina*)

II. MATERIALS AND METHODS

A. Materials and Research Tools

The materials used in this experiment were corn seeds of Pulut Putih variety, urea fertilizer, Phonska fertilizer, cow manure, mycorrhizal biofertilizer, OrgaNeem pesticide, soybean varieties, raffia, plastic bags, tissue, label paper, soil samples, root samples, methylene blue, 10% KOH, sucrose, distilled water, filter paper, and tools write. The tools used in this experiment are oven, scales, binocular microscope, magnetic stirrer, beaker, tweezers, graded sieve, centrifugation, funnel, petri, shovel, hoe, sickle and hand counter.

B. Place and design of the experiment

This research was conducted in Muncuk Hamlet, Rembiga Village, Mataram from May to August 2022. The experimental design used was a randomized block design with four replications and six treatments of bioameliorant dose, namely D0: Control (without bioameliorant), D1: bioameliorant dose 5 ton ha^{-1}, D2: dose of bioameliorant 10 tons ha^{-1}, D3: dose of bioameliorant 15 tons ha^{-1}, D4: dose of bioameliorant 20 tons ha^{-1}, D5: dose of bioameliorant 25 tons ha^{-1} (Gomez *et al*, 1984).

C. Implementation of the experiment

The land used was first cleaned of weeds and then plots were made as a place for treatment of amelioran dose with the size of each experimental plot of 3 mx 2.6 m then the soil was processed using a hoe, irrigation channels were made between plots with a width of 50 cm and a height of the beds. 25 cm high.

Propagation of mycorrhizal isolates in culture pots was carried out using a corn host plant with a mixture of soil and sterile cow manure (50%: 50%) as much as 5 kg. Mycorrhizal inoculation was carried out using a mixture of soil, roots, spores and mycorrhizal hyphae. Inoculation was carried out using *the funnel method,* isolate $_{MAA}$ was placed and the host plant was placed on the filter paper. The filter paper is then covered with soil and the plants are allowed to grow (Sastrahidayat, 2011, Simarmata, 2017). After 50 days, the soil in the culture pots was harvested by cutting the plant roots, then blended until smooth. The results of this blender are then mixed homogeneously with the soil of the culture pot media. This mixture was then filtered through a 2 mm diameter sieve. The mycorrhizal inoculants were then mixed homogeneously with cow manure, rice husk charcoal and compost in a ratio of 25%: 25%: 25%: 25%. This ameliorant mixture is then sieved through a 2 mm diameter sieve and the final product of this ameliorant is in the form of flour.

Bioameliorant plus mycorrhiza was given at the time of planting. Bioameliorant plus mycorrhiza in the form of flour is placed at a depth of ± 10 cm evenly to form a layer. The bioameliorant plus mycorrhizae used was a mixture of root cuttings, fungal spores, fungal hyphae and pot culture medium which was already in powder form with doses according to treatment. The type of indigenous mycorrhizal from North Lombok used is a private collection of Dr. Ir. Wahyu Astiko, MP (Astiko, 2015; Astiko *et al*, 2016b).

Corn seeds are planted by ditugal method. Each hole was filled with 2 corn seeds with a spacing of 60 x 40 cm corn. Embroidery is done by replanting corn seedlings at the age of 7 days after planting to replace dead plants or grow abnormally. After the plants grew, thinning was carried out leaving one plant at the age of 14 days after planting.

Fertilization is done by applying inorganic basic fertilizers with the application of half the recommended dose of urea 175 kg ha^{-1} and Phonska 125 kg ha^{-1} (Astiko *et al*, 2016c). Inorganic fertilizers as basic fertilizers were given 1/2 dose at the age of 7 days after planting and the remaining 1/2 dose was given at 14 days after planting. Spacing for sweet corn 40 x 20 cm with 2 seeds per planting hole.

Plant maintenance includes weeding any weeds that grow by pulling them out. Irrigation of plants is carried out depending on rainfall in the field and watered using a water sprinkler ("gembor").

Plant maintenance includes weeding any weeds that grow by pulling them out. Irrigation of crops is carried out depending on rainfall in the field and irrigation.

D. Variable Observations

The variables observed in this study were: (1) soil nutrient concentration and plant nutrient uptake (N and P) variables at 42 days after planting, (2) growth variables were: plant height and number of leaves at 14, 28, and 42 days after planting, and the weight of wet and dry biomass of roots and shoots at the age of 42 days after planting, (3) mycorrhizal population variables were: the number of spores and the percentage of root infection at 42 days after planting and (4) the yield variables were: wet ear weight per plot, weight wet biomass per plot, dry cob weight per plant and seed weight per plant.

E. Data Analysis

The results of observational data and analysis of variance by the Honestly Significant Difference (HSD) test at a 5% significance level using the Costat for Windows program

III. RESULT AND DISCUSSION

A. Height and Number of Leaves

The result of the analysis of variance showed that the treatment dose of bioameliorant 25 t ha^{-1} gave a significant difference in plant height compared to other bioameliorant dosage treatments at the age of 14-42 DAP. The same results were also seen in the number of leaves, the treatment dose of bioameliorant 25 t ha^{-1} gave a significant difference in the 5% HSD test when the plants were 14–42 DAP. At the age of 14 - 28 DAP, the height and number of leaves of corn plants gave the highest height and number of leaves and was significantly different compared to other varieties (Table 1).

Treatment Dose	Plant Height			Number of leaves		
	14	28	42	14	28	42
D0:Without bioameliorant	15.39^{f}	39.16^{f}	75.75^{f}	5.07^{d}	6.25^{d}	9.00^{b}
D1: Bioameliorant dose 5 t ha^{-1}	18.26^{e}	56.55^{e}	125.42^{e}	5.22^{cd}	7.07^{cd}	9.07^{b}
D2: Bioameliorant dose 10 t ha^{-1}	19.38^{d}	67.75^{d}	144.37^{d}	5.52^{bc}	7.22^{c}	9.15^{b}
D3: Bioameliorant dose 15 t ha^{-1}	20.57^{bc}	76.18^{c}	153.85^{c}	5.70^{b}	7.50^{c}	9.37^{b}
D4: Bioameliorant dose 20 t ha^{-1}	21.90^{b}	82.93^{b}	167.77^{b}	5.70^{b}	8.52^{b}	9.45^{b}
D5: Bioameliorant dose 25 t ha^{-1}	23.80^{a}	95.44^{a}	178.13^{a}	6.00^{a}	9.45^{a}	10.10^{a}
HSD 5%	0.90	3.03	4.17	0.28	0.60	0.32

Table 1:- The average plant height and number of leaves at the age of 14, 28 and 42 DAP in the treatment of bioameliorant doses (Note: The mean value followed by the same letter in the same column was not significantly different according to the 5% HSD test)

Bioameliorant treatment with a dose of 25 t ha^{-1} had a significant effect on the height and number of leaves of corn plants. This can be seen from the effect on the treatment of the bioameliorant dose which shows that there are significantly different plant heights.of bioameliorant treatment^{-1} so as to produce the highest number of leaves. This is due to differences in the nutritional content they contain. In the treatment, higher doses of bioameliorant gave better plant growth. This indicates that the treatment with a higher dose of bioameliorant provides sufficient availability of high nutrients used by plants for their growth process (Syahrullah and Rachmat, 2017). This situation causes plants to obtain sufficient nutrients so that the increase in cell size can reach optimal levels and allows an increase in the optimal height and number of leaves as well. According to Loveless (2007), most plant growth is influenced by soil water content. Furthermore, according to Gardner *et al.*, (2005), plant growth generally fluctuates greatly, depending on the state of plant moisture. Meanwhile, according to Jumin (2006), explains that the amount of water demand for each growth phase is directly related to physiological processes, morphology and environmental factors.

B. Soil Nutrient Concentration and Plant Nutrient Uptake The

Results of the analysis of varianceshowed that the treatment dose of bioameliorant 25 t ha^{-1} had a significant effect compared to other doses on changes in soil nutrient concentration and nutrient uptake by plants (Table 2). The results of the HSD test at the 5% level showed that the treatment dose of bioameliorant 25 t ha^{-1} could increase the total N and P concentrations of available soil (1.83 g.kg^{-1} and 70.15 mg.kg^{-1}) as well as plant nutrient uptake of N. and P (38.385 g.kg^{-1} and 3.127 g.kg^{-1}) at 42 DAP. The highest and significantly different increase occurred in the 25 t ha^{-1}.

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Treatment Dose	Soil nutrient concentration		Plant nutrient uptake	
	N total(g.kg^{-1})	P available P (mg.kg^{-1})	N uptake (g kg^{-1})	P uptake (g kg^{-1})
D0: Without bioameliorant)	0.895^{d}	16,037^{e}	23,255^{d}	2,195^{f}
D1: Bioameliorant dose 5 t ha^{-1}	1,055^{c}	17,240^{d}	28,240^{c}	2,295^{e}
D2: Bioameliorant dose 10 t ha^{-1}	1,057^{c}	17,272^{d}	32,610^{bc}	2,395^{d}
D3: Bioameliorant dose 15 t ha^{-1}	1,102^{c}	33,422^{c}	32,977^{b}	2,562^{c}
D4: Bioameliorant dose 20 t ha^{-1}	1,625^{b}	59,502^{b}	35,635^{ab}	2,680^{b}
D5: Bioameliorant dose 25 t ha^{-1}	1,830^{a}	70,155^{a}	38,385^{a}	3,127^{a}
HSD 5%	0.043	0.137	3.081	0,017

Table 2:- The average concentration of nutrients and uptake of N and P at the treatment dose of bioameliorants aged 42 DAP (Note: The mean value followed by the same letter in the same column is not significantly different according to the 5% HSD test)

Bioameliorant treatment with a dose of 25 t ha^{-1} will increase the availability of total N and P nutrient concentrations available in the soil and nutrient uptake by plants. In addition to the availability of nutrient concentrations in the soil, the air structure and soil air system also greatly affect the growth and development of plant roots. The development of a good plant root system greatly determines the uptake of plant nutrients which will ultimately determine the vegetative growth of plants. With the treatment of bioameliorants containing mycorrhizae, the available P of the soil tends to show an increase. This indicates that there is an ability of mycorrhizae in releasing soil P from a poorly soluble form to a soluble form so that the available P increases. Mycorrhiza contained in bioameliorant is thought to be able to absorb P from mineral sources of P which is difficult to dissolve because it produces organic acids and phosphatase enzymes. This compound is able to release P bonds that are difficult to dissolve, such as Al-P and Fe-P so that the availability of P increases (Sufardi et al, 2013). The highest availability of P was obtained in the bioameliorant treatment at a dose of 25 t ha^{-1}. The increased availability of P indicated that the ameliorant dose treatment was able to release more P in the soil, thereby increasing its availability. The higher the P availability index means the higher the ratio of P released (Afif *et al*. 1993). The results of this experiment are in line with the results of research by Sufardi (2001) who found that organic matter treatment was able to increase the P availability index in Ultisol soils.

C. Development of mycorrhizae

The results of the analysis of varianceshowed that the effect of treatment with a dose of bioameliorant 25 t ha^{-1} was significantly different according to the 5% HSD test compared to other bioameliorant doses on the parameters of the number of mycorrhizal spores and the percentage of root colonization at 42 DAP (Table 3). The value of the number of spores and the highest percentage of colonization was found in the treatment of 25 t ha-1 bioameliorant dose, which was 2824.25 spores per 100 g of soil and 75 percent of colonization. The value of the number of spores and the lowest percentage of colonization was found in the control treatment (without bioameliorant), which was 505.75 spores/100 g soil and 50 percent colonization.

Treatment Dose	Number of spores	Colonization
D0: Without bioameliorant	505.75^{f}	50.00^{e}
D1: Bioameliorant dose 5 t ha^{-1}	904.50^{e}	55.00^{d}
D2: Bioameliorant dose 10 t ha^{-1}	964.25^{d}	60, 00^{c}
D3: Bioameliorant dose 15 t ha^{-1}	1106.50^{c}	62.50^{c}
D4: Bioameliorant dose 20 t ha^{-1}	1285.50^{b}	70.00^{b}
D5: Bioameliorant dose 25 t ha^{-1}	2824.25^{a}	75 ,00^{a}
HSD 5%	4,919	1,776

Table 3:- Average number of spores (spores per 100 g of soil) and value of colonization (%-colonization) at 42 DAP for each dose of bioameliorant (Note: The mean value followed by the same letter in the same column was not significantly different according to the 5% HSD test.)

Biomeliorant treatment on corn plants contains microorganisms that can ferment organic matter so as to produce compounds that can be absorbed directly by plants. In other words, microorganisms inoculated in the base material work together to improve soil fertility by binding nitrogen from the air, consuming toxic gases. The results of the fermentation of these materials into organic compounds that can be absorbed by plants, produce antibiotic compounds that are toxic to disease and dissolve phosphate ions and other micro ions (Sirappa and Titahena, 2015). Furthermore, Oades (1993) stated that well-structured soil, which contains lots of soil microorganisms and is not dense, can support root growth through the soil through the pores of the soil so that it can absorb water and dissolved nutrients. Another result is the development of soil microorganisms is also getting better. This indication was seen in the bioameliorant treatment at a dose of 25 t ha^{-1} of mycorrhizal development which was indicated by the number of spores per 100 g of soil and the higher percentage of root colonization (2824 spores and 75%) compared to the control, without bioameliorant (505 spores and 50 spores). %).

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D. Wet and Dry Biomass Weight of Plants

The results of the analysis of varianceshowed that the treatment dose of bioameliorant 25 t ha^{-1} had a significant effect on the increase in wet and dry biomass weight of roots and plant crowns compared to no bioameliorant treatment (Table 4). The results of the HSD test at the 5% level showed that the treatment with a dose of 25 t ha^{-1} compared to the control (without bioameliorant) could increase the wet biomass weight of roots and plant shoots from 16.82 and 140.10 g/plant to 24.17 and 271. ,77 g/plant. Meanwhile, the increase in dry biomass weight of roots and shoots from 3.89 and 19.83 g/plant to 10.27 and 62.47 g/plant, respectively. The highest increase in wet and dry biomass weight of roots and plant shoots occurred at a dose of t ha^{-1} of bioameliorant treatment.

Treatment Dose	Wet biomass		Dry biomass	
	Roots	shoot	Roots	shoot
D0: Without bioameliorants	16.82^{e}	140.10^{e}	3.89^{e}	19.83^{e}
D1: Bioameliorant dose 5 t ha^{-1}	18.35^{d}	152.26^{e}	6, 18^{d}	34.29^{d}
D2: Bioameliorant dose 10 t ha^{-1}	20.18^{c}	166.66^{d}	7.26^{c}	41.43^{c}
D3: Bioameliorant dose 15 t ha^{-1}	22.22^{b}	188.06^{c}	8.47^{b}	55.11^{b}
D4: Bioameliorant dose 20 t ha^{-1}	23.51^{ab}	238.59^{b}	9.06^{b}	61.65^{a}
D5: Bioameliorant dose 25 t ha^{-1}	24.17^{a}	271.77^{a}	10. 27^{a}	62.47^{a}
HSD 5%	0.95	9.42	0.62	1.97

Table 4:- Average weight of wet and dry biomass of roots and shoots (g/plant) at 42 DAP for each dose bioameliorant (Note: Value The mean followed by the same letter in the same column was not significantly different according to the 5% HSD test.

Treatment with a dose of bioameliorant fertilization at a dose of 25 t ha^{-1} showed the results of wet and dry biomass weight of roots and shoots the highest per plant, namely an average of 24.17 g, 271.77 g and 10.27 g, 62.47 g, compared to the control, without bioameliorant treatment, which averaged only 16.82 g, 140.10 g and 3.89 g, 19.83 g only. The higher the wet biomass weight, the higher the dry biomass weight per corn plant. The dry biomass weight per plant indicated a good response of the plant to the bioameliorant dosage treatment. This is indicated by the increasing weight of wet and dry biomass of plant roots and shoots because it is suspected that higher doses of bioameliorant treatment can improve the physical, chemical and biological conditions of the soil for the better (Maftu'ah *et al*, 2013). The increase in wet weight and dry weight of root and shoot stover in the bioameliorant treatment with higher doses is thought to undergo decomposition process more quickly, so that nutrients can be directly utilized by plants. In addition, plants that were given bioameliorant containing mycorrhizae grew better than plants without bioameliorant treatment and without mycorrhizae (control). The main cause is that mycorrhizae can effectively increase the absorption of nutrients, both macro and micro nutrients. In addition, mycorrhizal roots can absorb nutrients in bound form and which are not available to plants (Anas, 1997).

E. Crop Yield

The results of the analysis of variance showed that the treatment dose of bioameliorant 25 t ha^{-1} significantly affected the increase in wet yield per plot and dry yield per plant compared to the control treatment (Table 5). The results of the HSD test at the 5% level showed that the treatment with a dose of 25 t ha^{-1} compared to the control (without bioameliorant) could increase the yield of wet cobs per plot from 2.55 kg per plot to 10.50 kg per plot, as well as the yield. wet biomass per plot increased from 7.025 kg per plot to 17.25 kg per plot. While the increase in dry cobs yield per plant increased from 19.68 g per plant to 82.15 g per plant, as well as the dry grain yield per plant increased from 15.36 g per plant to 58.70 g per plant. The highest increase in wet yield per plot and dry yield per plant was obtained at a dose of 25 t ha^{-1} of bioameliorant treatment.

Treatment Dose	Wet yield per plot		Dry yield per plant	
	Cob	Biomass	Cob	Seed
D0: No bioameliorant	2.55^{f}	7.025^{f}	19.68^{f}	15.36^{f}
D1: Bioameliorant dose 5 t ha^{-1}	5.50^{e}	10.01^{e}	45.64^{e}	32.45^{e}
D2: Bioameliorant dose 10 t ha^{-1}	7.37^{d}	11.03^{d}	53.53^{d}	40.28^{d}
D3: Bioameliorant dose 15 t ha^{-1}	8.50^{c}	12.01^{c}	67.36^{c}	48.57^{c}
D4: Bioameliorant dose 20 t ha^{-1}	9.37^{b}	14.02^{b}	77.61^{b}	51.05^{b}
D5: Bioameliorant dose 25 t ha^{-1}	10.50^{a}	17.25^{a}	82.15^{a}	58.70^{a}
HSD 5%	0.11	0.30	0.48	0.76

Table 5:- Average wet yield per plot (kg) and dry yield per plant (g) at each dose of bioameliorant (Note: The mean value followed by the same letter in the same column is not significantly different according to the 5% HSD test.

In Table 5 it can be seen that the higher the dose of bioameliorant, the higher the wet yield and the dry yield. This is due to the fulfillment of nutritional needs for plants in sufficient quantities so that the results of photosynthesis will be formed optimally. Photosynthate formed will be stored for the formation of seeds and cobs. According to Bastiana et al. (2013) that the availability of nutrients in sufficient quantities can increase the metabolic activity of plants so that they are more active in supporting the process of cob enlargement.availabilityof phosphorus for plants can help the process of cob formation and enlargement, phosphorus as an ATP-forming material will ensure the readiness of energy for growth so that the preparation of assimilate and the process of transporting it to the storage network can run optimally. This results in high cobs and seeds produced. The same opinion was expressed by According to Yetti et al. (2012), phosphorus can help in increasing the development of cob and seed size. Santosa et al. (2016) that increasing total P uptake by plants can increase the weight of corn cobs.

IV. CONCLUSIONS

Bioameliorant treatment with dose 25 tons ha^{-1} was able to increase soil fertility as indicated by increasing concentrations of total N and available soil P and increasing plant N and P uptake, number of mycorrhizal spores, percentage of root colonization, plant growth and yield glutinous corn.

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