

EFFECT OF BOKASHI BANANA PEEL AND IMPERATA MULCH APPLICATION ON GROWTH AND PRODUCTION OF MAIZE (*Zea mays* L.)

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Abstract: The research was conducted at the Experimental Garden University of Asahan, Faculty of Agriculture, Kisaran Timur Subdistrict, Asahan Regency, with flat topography, type C climate according to Oldeman and place height \pm 20 m asl. The research was conducted from June to August 2018. The research was conducted using factorial randomized block design (RBD) consisting of bokashi banana peel fertilizer as the first factor with 3 treatment levels, namely: P0 = 0 kg/plot, P1 = 3 kg/plot, P2 = 6 kg/plot and imperata mulch as the second factor with 4 levels, namely: A0 = 0 kg/plot, A1 = 0.8 kg/plot, A2 = 1.6 kg/plot, A3 = 2.4 kg/plot. The best dose bokashi banana peel is given in 6 kg/plot (P2) which produces 142.28 cm plant height, 845.49 cm² leaf area, 1.75 kg production per sample plant, and 8.71 kg production per plot. While for production per hectare is 21 tons. Imperata mulch application has no effect on plant height and leaf area. However, it has a significant effect on the parameters of production per sample plant of 1.71 kg and production per plot of 8.38 kg with treatment of 2.4 kg/plot (A3). The interaction of bokashi banana peel and imperata mulch application showed no significant effect on all observed parameters.

Keyword: bokashi banana peel, imperata mulch, maize (*Zea mays*).

INTRODUCTION

Maize (*Zea mays* L.) is one of the most important carbohydrate-producing food plants in the world, besides wheat and rice. Maize grains are staple food, several regions in Indonesia. At present, maize is an important component of animal feed. Other uses are as a source of food oil and basic ingredients of cornstarch. Various maize derivative products are the raw material for various industrial products, such as bioenergy, chemical, cosmetics, and pharmaceutical industries (Rukmana, 2008).

With the low production of maize, there is a need for efforts to increase production by developing planting areas and using organic fertilizers as sources of nutrients. This can reduce operational costs on maize plants (Barchia, 2006).

Bokashi organic fertilizer is the result of fermentation of organic materials from agricultural waste (livestock manure, rice straw, rice husk, sawdust, garbage, grass etc.) which are processed using activators Effective Microorganisms 4 (Setyamidjaja, 2006).

Bokashi fertilizer from banana peels is a potential source of potassium fertilizer with K₂O levels of 46-57% dry basis. Besides containing 12% Phosphorus, and also containing Magnesium 18%, Sulfur 10%, and Potassium 15% (Herviyanti, 2006).

Mulch is a cover crop material that is used to maintain soil moisture and suppress weed growth and disease, making plants grow well. Mulch can be permanent like wood chips, or temporary like plastic mulch. Mulch can be applied before planting begins or after the plant appears. Organic mulch will naturally blend with the soil due to natural processes involving soil organisms and non-biological weathering. Mulch is used in various agricultural activities, ranging from subsistence agriculture, gardening, to industrial agriculture (Setyamidjaja, 2006).

The results of the study on swamp land showed the results obtained from the three mulch materials used and the best were those derived from pulverized crops with yields reaching 23.6 tons per hectare. Mulch from imperata yielded 19.0 tons per hectare, plastic mulch 15.9 tons per hectare, while without mulch it only produces 12.3 tons (Indonesia Agricultural Research and Development, 2013).

MATERIAL AND METHOD

The research was conducted at the Experimental Garden University of Asahan, Faculty of Agriculture, Kisaran Timur Subdistrict, Asahan Regency, with flat topography, type C climate according to Oldeman and place height ± 20 m asl. The research was conducted from June to August 2018.

The materials used in this study were Bissi 2 varieties of maize seeds, bokashi banana peel fertilizer, imperata mulch (wet + dry), biopesticides to control pests and diseases in plants, and other materials that support the implementation of this research. The tools used in this study were hoes, knuckles, knives, meters, handsprayers, scales, raffia ropes, writing instruments and other tools that support the implementation of this research.

The research was conducted using factorial randomized block design (RBD) consisting of bokashi banana peel fertilizer as the first factor with 3 treatment levels, namely: P0 = 0 kg/plot, P1 = 3 kg/plot, P2 = 6 kg/plot and imperata mulch as the second factor with 4 levels, namely: A0 = 0 kg/plot, A1 = 0.8 kg/plot, A2 = 1.6 kg/plot, A3 = 2.4 kg/plot.

RESULTS AND DISCUSSIONS

Plant Height (cm)

From Table 1, it can be seen that bokashi banana peel application with 6 kg/plot (P2) has the best plant height of 142.28 cm, not significantly different from the treatment of 3 kg/plot (P1) which is 140.44 cm but significantly different from control 0 kg/plot (P0) which is 138.11 cm, while P1 and P0 are not significantly different.

Imperata mulch giving showed no significant effect on plant height at all age observations. The interaction of bokashi banana peel and imperata mulch showed no significant effect on plant height at all age observations.

Leaf Area (cm²)

Based on analysis of variance, it can be seen that the bokashi banana peel application shows a significant effect on leaf area on all leaf observations. Imperata

mulch giving showed no significant effect on leaf area on all leaf observations. The interaction of bokashi banana peel and imperata mulch showed no significant effect on leaf area on all leaf observations.

Table 1.
Effect of Bokashi Banana Peel and Imperata Mulch Against Plant Height (cm) Maize Age 6 Weeks After Planting

Treatment	Imperata Mulch 0 kg/plot (A ₀)	Imperata Mulch 0,8 kg/plot (A ₁)	Imperata Mulch 1,6 kg/plot (A ₂)	Imperata Mulch 2,4 kg/plot (A ₃)	Average
Bokashi Banana Peel 0 kg/plot	134.89 a	139.67 a	139.78 a	138.11 a	138.11b
Bokashi Banana Peel 3 kg/plot	137.00 a	141.44 a	140.67 a	142.67 a	140.44ab
Bokashi Banana Peel 6 kg/plot	141.11 a	141.00 a	143.22 a	143.78 a	142.28a
average	137.67 a	140.70 a	141.22 a	141.52 a	140.28

Explanation: The numbers followed by the same letters in the same row or column show no significant difference at the level of 5% using the Least Significant Difference Test. CV: 2.31%.

Table 2.
Effect of Bokashi Banana Peel and Imperata Mulch Against Leaf Area (cm²) of 9th Leaf

Treatment	Imperata Mulch 0 kg/plot (A ₀)	Imperata Mulch 0,8 kg/plot (A ₁)	Imperata Mulch 1,6 kg/plot (A ₂)	Imperata Mulch 2,4 kg/plot (A ₃)	Average
Bokashi Banana Peel 0 kg/plot	700.90 a	790.35 a	784.42 a	751.25 a	756.73b
Bokashi Banana Peel 3 kg/plot	740.02 a	820.79 a	815.89 a	853.28 a	807.49ab
Bokashi Banana Peel 6 kg/plot	830.72 a	808.16 a	868.39 a	874.68 a	845.49a
average	757.21 a	806.43 a	822.90 a	826.40 a	803,24

Explanation: The numbers followed by the same letters in the same row or column show no significant difference at the level of 5% using the Least Significant Difference Test. CV: 8.38%.

Production per sample plant (kg)

Based on analysis of variance, it was seen that the bokashi banana peel application showed a significant effect on production per sample plant. The giving of imperata mulch shows a significant effect on production per sample plant. From Table 3 it can be seen that bokashi banana peel application with 6 kg/plot (P2) has the best

production per sample plants that is 1.75 kg, not significantly different from the treatment of 3 kg/plot (P1) which is 1.65 kg, but significant different with control 0 kg/plot (P0) is 1.50 kg, while P1 and P0 are not significantly different. Giving of Imperata mulch with treatment of 2.4 kg/plot (A3) has the best production per plant samples, namely 1.71 kg kg, not significantly different from the treatment of 1.8 kg/plot (A2) which is 1.70 kg, but significantly different with treatment of 0.6 kg/plot (A1) which is 1.68 kg and control 0 kg/plot (A0) which is 1.45 kg/plot, while treatment A2 is not significantly different from A1 but is significantly different from A0, and A1 significantly different from A0.

Table 3
Effect of Bokashi Banana Peel and Imperata Mulch on Production Per Sample Plant (kg)

Treatment	Imperata Mulch 0 kg/plot (A ₀)	Imperata Mulch 0,8 kg/plot (A ₁)	Imperata Mulch 1,6 kg/plot (A ₂)	Imperata Mulch 2,4 kg/plot (A ₃)	Average
Bokashi Banana Peel 0 kg/plot	1.30 a	1.63 a	1.61 a	1.48 a	1.50 b
Bokashi Banana Peel 3 kg/plot	1.43 a	1.72 a	1.67 a	1.78 a	1.65ab
Bokashi Banana Peel 6 kg/plot	1.63 a	1.69 a	1.81 a	1.86 a	1.75 a
Average	1.45 c	1.68 b	1.70 ab	1.71 a	1.63

Explanation: The numbers followed by the same letters in the same row or column show no significant difference at the level of 5% using the Least Significant Difference Test. CV: 11.75%.

Table 4.
Effect of Bokashi Banana Peel and Imperata Mulch Against Production per Plot (kg)

Treatment	Imperata Mulch 0 kg/plot (A ₀)	Imperata Mulch 0,8 kg/plot (A ₁)	Imperata Mulch 1,6 kg/plot (A ₂)	Imperata Mulch 2,4 kg/plot (A ₃)	Average
Bokashi Banana Peel 0 kg/plot	6.45 a	7.63 a	7.90 a	7.25 a	7.31 b
Bokashi Banana Peel 3 kg/plot	7.15 a	8.45 a	8.20 a	8.75 a	8.14 a
Bokashi Banana Peel 6 kg/plot	8.03 a	8.62 a	9.05 a	9.15 a	8.71 a
Average	7.21 b	8.23 ab	8.38 a	8.38 a	8.05

Explanation: The numbers followed by the same letters in the same row or column show no significant difference at the level of 5% using the Least Significant Difference Test. CV: 11,97%.

Production per Plot (kg)

Based on analysis of variance, it can be seen that giving of bokashi banana peel shows a very significant effect on production per plot. The application of Imperata mulch shows a significant effect on production per plot. The interaction of bokashi banana peel and imperata mulch showed no significant effect on production per plot

From Table 4 it can be seen that bokashi banana peel treatment with 6 kg/plot (P2) has the best production per plot of 8.71 kg, not significantly different from the treatment of 3 kg/plot (P1) which is 8.14 kg, but significantly different with control 0 kg/plot (P0) is 7.31 kg, while P1 and P0 are significantly different. The giving of Imperata mulch with treatment of 2.4 kg/plot (A3) and 1.8 kg/plot (A2) has the best production per plot of 8.38 kg, not significantly different from the treatment of 0.6 kg/plot (A1) which is 8.23 kg, but significantly different from the control treatment 0 kg/plot (A0) which is 7.21 kg/plot, while treatment A1 is not significantly different from A0.

CONCLUSIONS

1. The best dose bokashi banana peel is given in 6 kg/plot (P2) which produces 142.28 cm plant height, 845.49 cm² leaf area, 1.75 kg production per sample plant, and 8.71 kg production per plot. While for production per hectare is 21 tons.

2. Imperata mulch application has no effect on plant height and leaf area. However, it has a significant effect on the parameters of production per sample plant of 1.71 kg and production per plot of 8.38 kg with treatment of 2.4 kg/plot (A3).

3. The interaction of bokashi banana peel and imperata mulch application showed no significant effect on all observed parameters.

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