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Provision of POC Banana Peel with the Addition of Moringa Leaves to the Growth and Production of Glutinous Corn (*Zea mays Ceratina*)

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Abstract:
Optimizing the use of inorganic fertilizers through the manufacture of liquid organic fertilizers for the growth and production of glutinous corn. This study aims to analyze the effect of the application and concentration of banana peel POC on the growth and production of glutinous corn (Zea mays Caratina) plants. This research was carried out on the cultivation land of the Jember State Polytechnic, Sumbersari District, Jember Regency from August to October 2024. This study used Randomized Group Design (RAK) which consisted of 6 treatments, namely P0: No Liquid Organic Fertilizer, P1: POC banana peel with the addition of moringa leaves 40 ml/l water, P2: POC of banana peel with the addition of moringa leaves 50 ml/l of water, P3: POC of banana peel with the addition of moringa leaves of 60 ml/l of water, P4: POC of banana peel with the addition of moringa leaves of 70 ml/l of water, P5: POC banana peel with the addition of moringa leaves 80 ml/l of water. The results of the study show that the application of Liquid Organic Fertilizer can optimize the use of inorganic fertilizers. The effect of giving POC banana peel with the addition of moringa leaves did not show a significant effect on the parameters of plant height, cob diameter, cob weight, cob weight without cob, cob length, dry pruning weight.

Keywords:
glutinous corn, POC banana peel, moringa leaves

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INTRODUCTION

Corn (Zea mays L.) is one of the world's major food crops, serving as an important source of carbohydrates, after rice and wheat. In Indonesia, glutinous corn (Zea mays var. Ceratina) is widely cultivated and valued for its distinctive texture and flavor, making it a popular raw material for traditional food products. However, glutinous corn productivity in Indonesia remains relatively low, averaging only 2–3 tons per hectare (Suarni et al., 2019). One of the primary causes of this low productivity is the excessive use of inorganic fertilizers, which, over time, contributes to soil degradation and declining soil fertility. Prolonged reliance on chemical fertilizers reduces soil organic matter and adversely affects soil physical, biological, and chemical properties (Kartikasari et al., 2022).

To overcome these challenges, efforts to restore soil fertility and maintain sustainable agricultural production are essential. One of the most promising approaches is the use of organic fertilizers. Organic fertilizers enhance soil structure, stimulate microbial activity, and supply essential macro- and micronutrients that promote plant growth and productivity. In particular, liquid organic fertilizers (LOF) have gained attention as an eco-friendly alternative to inorganic fertilizers, due to their ease of application and faster nutrient absorption by plants.

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Banana peel is one of the potential organic materials that can be used as the main ingredient in LOF production. It contains important macro- and micronutrients, such as potassium, calcium, phosphorus, and magnesium, which play a crucial role in plant metabolism and productivity (Susanti, 2016; Prastajaya, 2021). However, banana peel alone may not provide all the nutrients required for optimal plant growth. Therefore, it can be combined with other organic materials rich in nitrogen and growth-promoting compounds, such as moringa leaves (Moringa oleifera). Moringa leaves are known to contain nitrogen, potassium, and natural plant growth hormones such as cytokinin and zeatin, which stimulate cell division, delay leaf senescence, and enhance overall plant growth (Junaidi, 2021).

The combination of banana peel and moringa leaves in the preparation of liquid organic fertilizer is expected to improve nutrient balance, increase soil fertility, and promote the growth and yield of glutinous corn. This approach aligns with sustainable agricultural practices that aim to reduce chemical fertilizer dependency while maintaining productivity and environmental quality.

This study aims to determine the effect of applying liquid organic fertilizer (LOF) made from banana peel with the addition of moringa leaves on the growth and production of glutinous corn (*Zea mays Ceratina*).

METHOD

This research was conducted from August to October 2024 on the cultivation land of Jember State Polytechnic, Sumbersari District, Jember Regency, East Java, with an altitude of 133 meters above sea level. The average temperature ranged from 23°C to 33°C, and the rainfall varied from 1,969 mm to 3,394 mm. Soil pH 6-6.5.

The tools used include tractors, sickles, hoes, meters, *kenco tugal,* knapsacks, sprayers, calipers, swings, scales, buckets, sacks, strainers, measuring cups, raffia ropes, and a description board or name stationery. These ingredients include arumba glutinous corn seeds, banana peel POC with moringa leaf naming, EM4, cow manure, urea fertilizer, SP36, KCL, carboforan, and liquid smoke.

The research design used was Randomized Group Design (RAK), factor: the dose of POC banana peel with the addition of moringa leaves consisted of 6 treatments, as follows: P0 (Without Liquid Organic Fertilizer), P1 (POC banana peel with the addition of moringa leaves 40 ml/l water), P2 (POC of banana peel with the addition of moringa leaves 50 ml/l of water), P3 (POC of banana peel with the addition of moringa leaves 60 ml/l of water), P4 (POC banana peel with the addition of moringa leaves 70 ml/l of water, P5 (POC of banana peel with the addition of moringa leaves of 80 ml/water).

The research activities were carried out sequentially, starting from seed preparation, POC making, land tillage, planting, watering, thinning, embroidery, weeding, seasoning, fertilizing, OPT control, harvesting, and application of POC treatment at 14 HST, 21 HST, 28 HST, 35 HST, and 42 HST.

Observation of variable plant height at ages (2 MST, 3 MST, 4 MST, 5 MST, 6 MST), cob diameter, cob weight, cob weight without cob, cob length, and dry pruning weight. Variance analysis uses Analysis of Variance (ANOVA). If the results are highly significant, further testing is carried out using BNT (Least Significant Difference) at the 5% level.

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RESULTS

The results of this study are presented in Table 1.

Table 1. Recapitulation of Fingerprint Results from Various Observation Parameters

Yes	Observation Variables	Notation
1.	Plant Height	ns
2.	Diameter Tongkol	ns
3.	Weight of the Cob Rolled	ns
4.	Weight of Cob Without Sludge	ns
5.	Cob Length	ns
6.	Weight of Dry Cuttings	ns

Based on the results of data analysis in Table 1 above, it can be seen that the administration of POC of banana peel with moringa leaf (Moringa oleifera) naming on glutinous corn plants (Zea mays Ceratina) shows different intangible effects (ns) on the parameters of plant height, cob diameter, cob weight, cob weight without cob, cob length, dry cutting.

Plant Height

Observation of plant height was carried out once every 1 week from the second week to the 6th week after planting, observation did not show a significant difference in the treatment of giving POC of banana peel with the addition of moringa leaves (Moringa oleifera), highest in the P1 treatment (50 ml/l water) 4, 5, 6 with the highest average of 56 cm, 74 cm, 87 cm.

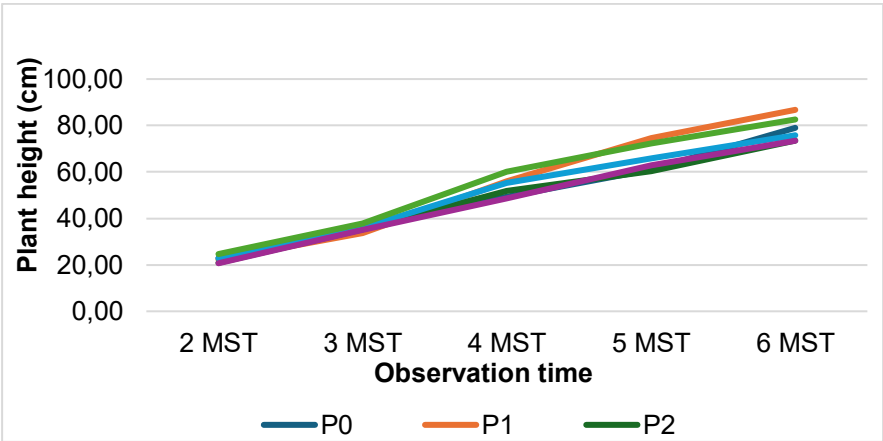

Figure 1. The Difference in Plant Height in Treatment of Giving POC of Banana Peel with Moringa Leaves

Cob Diameter

The results of the observation of the diameter of the cob were carried out at the time of harvest. A single-factor statistical test revealed that the addition of moringa leaves to POC banana peel did not have a significant effect on the diameter of the cob.

Cob Weight

The results of observation of the weight of the cob with a loaf and the weight of the cob without a cob were carried out at the time of harvest. A single-factor statistical test found that POC banana

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peel with the addition of moringa leaves did not have a significant effect on the weight of the cob with the cob of moringa leaves and the weight of the cob without the cob.

Cob Length

The results of the observation of the length of the cob were carried out at the time of harvest. A statistically single-factor test found that the addition of moringa leaves to POC banana peel did not have a significant effect on the length of the cob.

Weight of Dry Cuttings

The results of the observation of the weight of dry prunes were carried out at the time of harvest. A single-factor statistical test revealed that the addition of moringa leaves to POC banana peel did not have a significant effect on the weight of dried beans.

DISCUSSION

The results of this study showed that the application of liquid organic fertilizer (POC) made from banana peel with the addition of moringa leaves had no significant effect on the growth and production of glutinous corn (Zea mays var. Ceratina). This finding suggests that the application of the POC was unable to sufficiently increase the availability of organic nutrients in the planting medium. According to Puspadewi (2016), the effectiveness of POC largely depends on the concentration and frequency of application. When applied in low concentrations, nutrient absorption by plants becomes less efficient, resulting in limited growth responses. Similarly, Jumini (2016) emphasized that plants cannot achieve maximum productivity if the essential nutrients required for growth are not adequately available.

The limited impact observed in this study may also be attributed to the unbalanced nutrient composition of the banana peel and moringa leaf POC. As stated by Sukartaatmadja (2016), plant growth and yield are highly dependent on the availability and balance of the three main macronutrients: nitrogen (N), phosphorus (P), and potassium (K). When any of these nutrients are deficient or unavailable in sufficient quantities, plant physiological processes such as photosynthesis, cell division, and reproductive development are disrupted, resulting in reduced productivity.

Furthermore, the interaction between nutrient availability and environmental factors plays a crucial role in determining plant growth performance. McWilliams et al. (2017) and Lee (2017) explained that plants are highly sensitive to water and nutrient deficiencies. Drought stress and limited nutrient availability restrict cell expansion and disrupt the translocation of photosynthates to developing organs such as the cob. Consequently, cob length and cob diameter fail to develop optimally, as was observed in this study.

Another possible explanation for the non-significant results is that the decomposition and mineralization of organic matter from the banana peel and moringa leaf POC may have been incomplete during the experimental period. The process of organic matter breakdown and nutrient release is gradual and influenced by microbial activity, temperature, and soil moisture. Thus, the nutrients contained in the POC might not have been available in sufficient amounts at the critical growth stages of glutinous corn.

Despite the lack of significant differences, the application of POC from banana peel and moringa leaves remains a promising practice for sustainable agriculture. With proper formulation, balanced nutrient composition, and appropriate application frequency, such organic fertilizers could

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gradually improve soil health and enhance plant productivity over time. Future studies are recommended to explore variations in concentration, application intervals, and fermentation duration to optimize the effectiveness of banana peel and moringa leaf POC in corn cultivation.

CONCLUSION

This study concluded that the administration of POC banana peel with the addition of moringa leaves had no effect on the vegetative phase (plant height) and crop components (cob diameter, cob weight, cob weight without cob, length of cob, and weight of dry cuttings).

Based on the results of this study, further research is needed on more effective POC formulations, as well as combination testing with other organic materials, and paying attention to environmental conditions in order to show significantly different results.

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