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The Effect of Giving a Mixture of Banana Peel and Pineapple Peel Loc on the Growth and Yield of Soybean Plants (*Glycine max* L.)

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Abstract:
Liquid Organic Fertilizer (LOC) Mixture of Banana Peel and Pineapple Peel that can provide nutrients and nutrition needed by soybean plants. The purpose of this study is to determine the growth response and yield of soybean production through the application of LOC Mixture of Banana Peel and Pineapple Peel. This research was conducted in agricultural land of Antirogo Village, Jember Regency from June 2024 to September 2024 in the land of Kaliurang Village, Sumbersari District, Jember Regency, East Java. This research was designed using a non-factorial Randomized Block Design (RAK) with 7 treatment levels, namely: Control, LOC Mixture of Banana Peel and Pineapple Peel 15 ml/l, LOC Mixture of Banana Peel and Pineapple Peel 30 ml/l, LOC Mixture of Banana Peel and Pineapple Peeincluding/l, LOC Mixture of Banana Peel and Pineapple Peel 60 ml/l, POC Mixture of Banana Peel and Pineapple Peel 75 ml/l, LOC Mixture of Banana Peel and Pineapple Peel 90ml/l. The administration of a mixture of banana peel and pineapple peel LOC concentrations showed no significant effect on the parameters of plant height, number of nodes per segment, dry seed weight per plot and biomass weight.

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INTRODUCTION

Soybean (Glycine max L.) is one of the most important food crops after rice and corn. It plays a crucial role as a primary source of plant-based protein for the Indonesian population and as a raw material for various food industries. However, the productivity of soybeans in Indonesia remains suboptimal, partly due to declining soil fertility and improper cultivation practices. According to the Agricultural Instrument Standardization Agency (2023), national soybean production reached only 555,000 tons as of December 2023, while national demand amounted to approximately 2.7 million tons. This significant gap between production and demand underscores the need for effective and sustainable solutions to boost soybean yields.

Fertilization is a crucial practice that helps fulfill the nutritional needs of plants. The use of inorganic fertilizers has been a common approach to rapidly increase crop yields. Nevertheless, the excessive and continuous application of inorganic fertilizers can lead to the accumulation of soil residues, resulting in reduced soil fertility, decreased biological activity, and long-term environmental degradation. Over time, these effects can cause poor plant growth and even plant mortality.

One sustainable alternative to overcome these issues is the application of organic fertilizers, particularly liquid organic fertilizers (LOF). LOF is known to contain beneficial microorganisms,

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including nitrogen-fixing bacteria, phosphate- and potassium-solubilizing microbes, and various macro- and micronutrients that support plant growth. Additionally, it often includes plant growth regulators that stimulate vegetative and generative development (Achadi et al., 2017).

Banana peels and pineapple peels are examples of agricultural and household organic waste that can be utilized as raw materials for LOF. Both materials are rich in essential nutrients such as potassium, phosphorus, and carbohydrates, which can promote plant growth when properly processed. The combination of these organic materials may enhance nutrient availability and soil fertility while supporting sustainable agricultural practices.

This study aims to determine the effect of applying a mixture of banana peel and pineapple peel liquid organic fertilizer (LOF) on the growth and yield of soybean plants (Glycine max L.).

METHOD

This research was conducted from July to October 2024 in agricultural land in Kaliurang Village, Sumbersari District, Jember Regency, East Java. The elevation is 146 meters above sea level, with an average temperature of 23°C to 32°C.

The tools used in this study included a hand sprayer, a fermenter, a blender, a meter, a hoe, a shovel, a sickle, a digger, a bucket, a watering can, a scale, stationery, paper, and a camera. The materials used in this study were soybean seeds of the DETAP1 variety, carbofuran, Diafentiuron, Propineb, 1kg of kepok banana peel, 1kg of pineapple peel, rice washing water, brown sugar, water, chicken manure, and compound NPK fertilizer 16:16:16.

The research design used was a non-factorial Randomized Block Design (RAK), factor: Concentration of Liquid Organic Fertilizer from Banana and Pineapple Peels (P) consisting of 7 treatments as follows: P0 (no treatment), P1 (15 ml/liter), P2 (30 ml/liter), P3 (45 ml/liter), P4 (60 ml/liter), P5 (75 ml/liter), P6 (90 ml/liter). Each treatment was repeated three times, resulting in 21 experimental units.

Research activities were carried out, starting from land preparation, planting, and maintenance, including replanting, thinning, watering, weeding, hilling, fertilization, and controlling attacks by plant pests. Treatment applications were carried out at planting ages of 14, 21, 35, and 42 days after planting.

Observation variables included plant height, number of nodes per node, dry seed weight per plot, and the weight of 100 seeds. Analysis of variance (ANOVA) was used; if significant differences were found, Dunnett's test was used.

RESULTS

The results of this study are presented in Table 1.

Table 1. Summary of the Results of Various Observation Parameter Screenings

No.	Observation Parameters	Treatment
		POC Mixture of Banana Peel and Pineapple Peel
1	Plant height (cm)	ns
2	Number of books per section	ns
3	Dry seed weight per plot	ns
4	Biomass weight	ns

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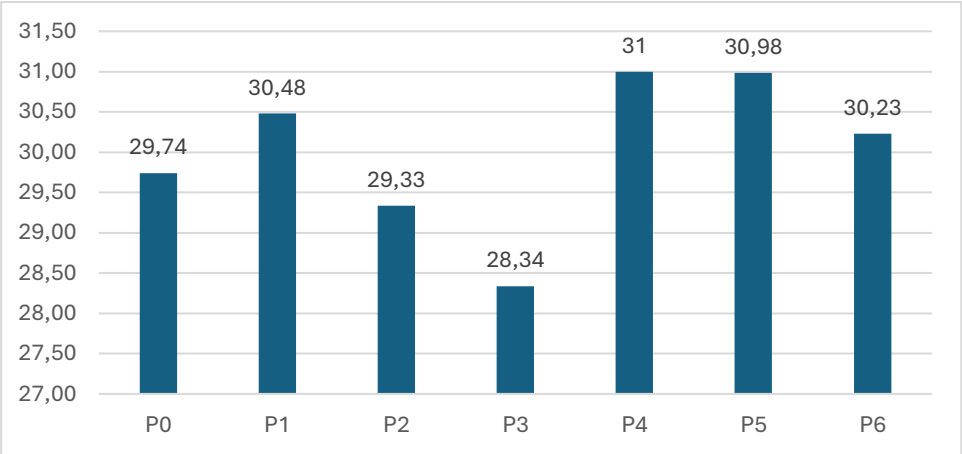
Based on the results of Table 1, the application of a mixture of banana peel and pineapple peel poc has no significant effect on the variables of plant height, number of nodes per segment, dry seed weight per plot, and dry biomass weight of soybean plants.

Plant Height

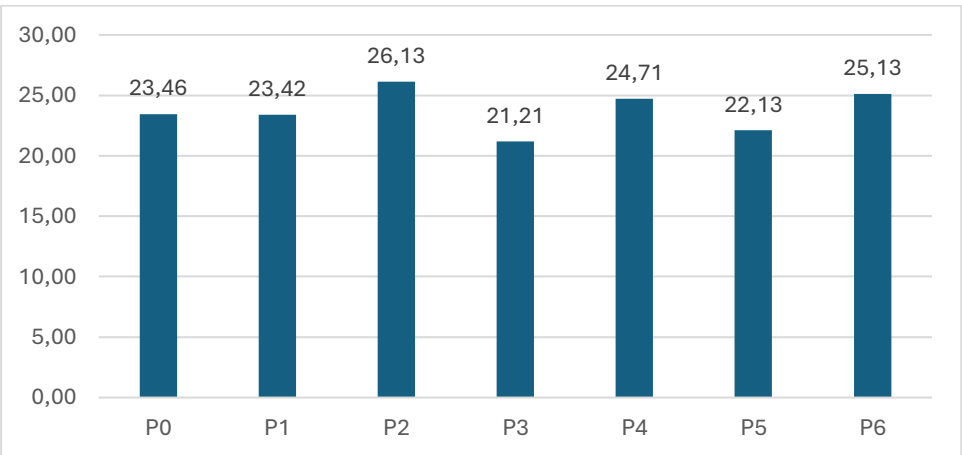
Observations of plant height were carried out on plants aged 84 days after planting, showing that the administration of a mixture of banana peel and pineapple peel at a concentration of 45 ml/l (P5) did not increase plant height, reaching only 28.34 cm, whereas without treatment or control it could reach 29.74 cm.



Graph 1. Plant Height

Number of Books Per Section

Observations on the number of nodes per segment were conducted at 84 days after planting. The results of the diagram table show that the application of a mixture of banana peel and pineapple peel powder at a concentration of 45 ml/l (P3) produced the lowest number of nodes with an average of 21.21. Without treatment or control, the average number of nodes per segment was 23.46, which was higher than the treatment with a mixture of banana peel and pineapple peel at a concentration of 45 ml/L (P3).



Graph 2. Number of Books per Section

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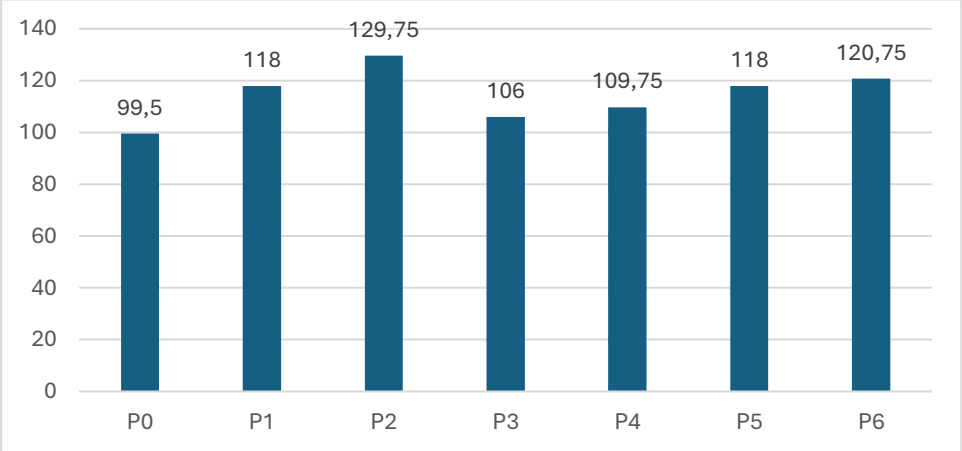
Dry Seed Weight Per Plot

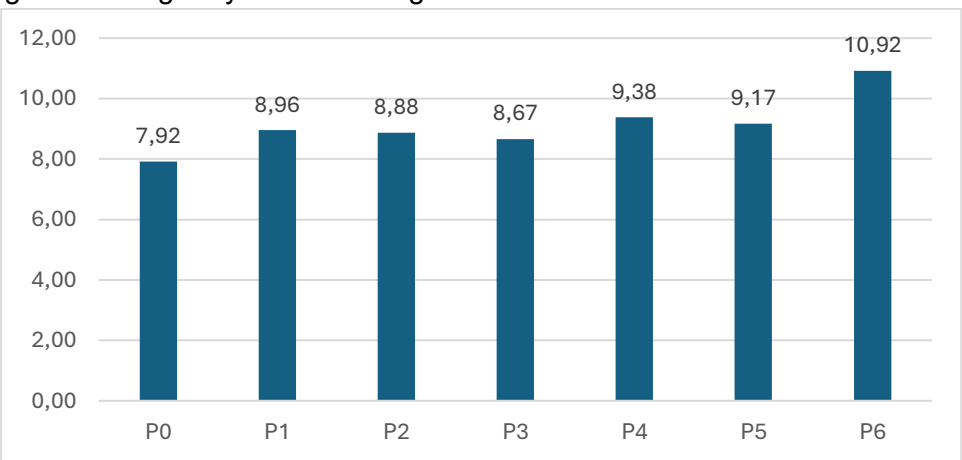
Observations of dry seed weight per plot were carried out after harvest. The results of the diagram table show that the application of a mixture of banana peel and pineapple peel powder at a concentration of 30 ml/l (P2), with an average dry seed weight per plot reaching 129.75 grams. The concentration of 30 ml/L (P2) corresponds to the highest average dry seed weight among all treatments.



Graph 3. Dry Seed Weight Per Plot.

Dry Biomass Weight

Biomass weight observation was carried out after harvest. The results of the diagram table show that the application of a mixture of banana peel and pineapple peel powder at a concentration of 90 ml/l (P6) with an average biomass weight reaching 10.92 grams. The concentration of 90 ml/l (P6) is the highest average dry biomass weight result of each treatment.



Graph 4. Dry Biomass Weight

DISCUSSION

Plant height is a crucial phase in the plant's development, leading to the next growth stage. Nitrogen requirements are used to regulate overall plant growth, both from absorption in the form of nitrate ions and ammonium cations, as well as other complex materials needed by plants for growth

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(Khairuna, 2019). However, seen from the diagram table, it can be concluded that the provision of a mixture of banana peel and pineapple peel POC has not increased nutrient availability. According to Sutanto (2019), soil with a high C/N ratio will result in a faster rate of microorganism proliferation, as nitrogen serves as an energy source for reproduction and leads to changes in the C and N balance in the soil. The variable number of internodes shows an insignificant difference because the number of nodes in soybean plant stems is influenced by the type of stem growth and the length of daylight. Internodes are formed from the differentiation of intercalary meristems, where the more developed the intercalary meristem, the more internodes are formed (Hindriana and Handayani, 2023).

The results of the observation table diagram of seed weight per plot indicate a slight increase in nutrient availability and also a slight decrease in nutrient absorption in the soil. According to research by Adelusi and Oseni (2015), optimal nitrogen availability can increase chlorophyll content and photosynthesis rates. Optimal phosphorus availability leads to earlier and more uniform ripening, as well as increased nitrogen-fixing capacity (Khan et al., 2020). This implies that nitrogen and phosphorus requirements can increase photosynthesis rates.

This is also related to biomass weight, where the plant translocation process transports photosynthates, nutrients, and minerals throughout the plant. The greater the availability of nutrients underground, the more optimal plant growth and yield. Plants with optimal nutrient availability will produce more photosynthates, which can be translocated to other plant organs, resulting in better growth (Saputrian, 2023). However, observations of the diagram table show that the average for the control treatment and the POC treatment did not differ significantly. According to Lakitan (2018), nutrient deficiencies can disrupt plant metabolic processes, which are visually evident in the growth of roots, stems, and leaves. It can be concluded that the application of a mixture of banana peel and pineapple peel POC has not been able to affect plant biomass weight. Further research is needed to investigate the effect of the time interval and the application of a mixture of banana peel and pineapple peel POC on soybean plants, with the goal of achieving optimal and sustainable soybean yields.

CONCLUSION

This study concluded that the application of a mixture of banana peel and pineapple peel to soybean plants produced insignificant or non-significant increases in yield. A concentration of 45 ml/L, for the observed variables of plant height and number of nodes per segment, yielded lower results than the control treatment. This is because the mixture of banana peel and pineapple peel was less effective in providing additional nutrients to soybean plants.

REFERENCES

Achadi, T., U., Haikal, L., Angraini, M., Al Ghifari, Yakup, Marlina, & Warsito. (2023). Pertumbuhan dan Hasil Tanaman Kacang-kacangan dengan Pupuk Organik Cair berbagai Sisa Buahan. *Seminar Nasional Lahan Suboptimal,* 10(1), 217-225.

Adelusi, A. A., & O., M., Oseni. (2015). Effects of nitrogen nutrients on the photosynthetic pigments accumulation and yield of Solanum lycopersicum. *Annals of West University of Timişoara, Ser. Biology, 18*(2), 131–138.

Badan Standardisasi Instrumen pertanian. (2023). *BSIP Aneka Kacang Siap Dukung Peningkatan Produktivitas Kedelai di Jawa Timur*. https://anekakacang.bsip.pertanian.go.id/berita/bsipanekakacangsiapdukungpeningkatanprodukti

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e-ISSN: 0000-0000

vitaskedelaidijawatimur#:~:text=Kedelai%20sampai%20saat%20ini%20masih,mencapai%202%2C7%20juta%20ton. Diakses pada 6 Desember 2023

Hindriana, A. F. & H. Handayani. (2023). *Anatomi Tumbuhan*. PT. Literasi Nusantara Abadi Grup.

Khairuna, K. (2019). *Diktat Fisiologi Tumbuhan*. Universitas Islam Negeri Sumatera Utara.

Khan, B. A., Hussain, A., Elahi, A., Adnan, M., Amin, M. M., Toor, M. D., Aziz, A., Sohail, M. K., Wahab, A., & Ahmad, R. (2020). Effect of phosphorus on growth, yield, and quality of soybean (Glycine max L.). *Review International Journal of Applied Research, 6*(7), 540–545.

Lakitan, B. (2018). *Dasar-dasar fisiologi tumbuhan* (14th ed.). Rajawali Pers.

Saputrian, D., (2023). *Respon Pertumbuhan dan Produksi Kedelai (Glycine max* L.*) Terhadap Kombinasi Pupuk Anorganik dan Pupuk Organik Cair (Poc).* Fakultas Sains dan Teknologi UIN Syarif Hidayatullah Jakarta.

Sutanto, R., (2019). *Penerapan Pertanian Organik: Pemasyarakatan dan Pengembangannya*. Kanisius.