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THE EFFECT OF BIOFERTILIZER CONCENTRATION ON GROWTH AND YIELD OF THREE LOCAL SUMEDANG VARIETIES OF RICE (*ORYZA SATIVA L.*) IN DRYLAND

PENGARUH KONSENTRASI PUPUK HAYATI TERHADAP PERTUMBUHAN DAN HASIL TIGA VARIETAS PADI SAWAH LOKAL SUMEDANG (*ORYZA SATIVA* L.) DI LAHAN KERING

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Abstract

Biofertilizer is a product that contains living substances consisting of microorganisms that are useful for plants. The role of microorganisms contained in biofertilizers is to function as a fixer and nutrient provider for plants. Local rice varieties varieties have been adapted and have location-specific characteristics. Drylands have the potential to increase agricultural production. This research aims to study the interaction between the concentration of biofertilizer and varieties on the growth and yield of local Sumedang varieties of rice planted in dry land. The experimental method used a Factorial Randomized Group Design. The first factor is the concentration of biological fertilizer consisting of three levels, namely p_1 = 0 ml L^{-1} of water p_2 = 3 ml L^{-1} of water, p_3 = 6 ml L^{-1} of water while the second factor is the local Sumedang varieties of rice consisting of three types of varieties, such as v1 = Gemah, v2 = Gede Wangi, v3 = Trisakti. The results showed that the concentration of biofertilizer ..... showed the highest production of.....

Keywords: *Biofertilizers, Local Varieties, Dryland, Production*

Abstrak

Pupuk Hayati merupakan suatu produk yang mengandung substansi-substansi hidup yang terdiri dari mikroorganisme yang berguna bagi tanaman. Peran mikroorganisme yang terdapat dalam pupuk hayati berfungsi sebagai penambat dan penyedia hara bagi tanaman. Varietas padi lokal merupakan varietas yang telah beradaptasi dan mempunyai karakteristik spesifik lokasi di daerah tersebut. Lahan kering mempunyai potensi untuk meningkatkan produksi pertanian. Penelitian ini bertujuan untuk mempelajari interaksi antara konsentrasi pupuk hayati dan varietas terhadap pertumbuhan dan hasil padi sawah lokal Sumedang yang ditanam di lahan kering. Metode percobaan menggunakan Rancangan Acak Kelompok Faktorial. Faktor pertama adalah konsentrasi pupuk hayati yang terdiri dari tiga taraf yaitu p_1 = 0 ml L^{-1}, p_2 = 3 ml L^{-1}, p_3 = 6 ml L^{-1}, sedangkan faktor kedua adalah varietas padi lokal Sumedang yang terdiri dari tiga jenis varietas yaitu v_1 = Gemah, v_2 = Gede Wangi, v_3 = Trisakti. Hasil penelitian menunjukkan bahwa konsentrasi pupuk hayati 6 ml L^{-1} memperlihatkan hasil produksi tertinggi pada varietas Trisakti dengan bobot 573 gram per petak.

Kata kunci : Pupuk Hayati, Varietas Lokal, Lahan Kering, Produksi

INTRODUCTION

To increase the productivity of agricultural products and restore soil fertility due to the use of chemical fertilizers which hurt agricultural land, biological fertilizers have become the focus of attention of researchers and farmers. The availability of nutrients in rice plants is one of the things that must be considered to produce optimal growth. Biofertilizers are components containing live microorganisms that are applied to the soil as an inoculant to help provide certain nutrients for plants. According to the Indonesian Minister of Agriculture (2019), biofertilizer is an active biological product consisting of microbes that can increase fertilization efficiency, fertility, and soil health. The content of biological fertilizers are microorganisms that have a positive role for plants. The groups of microbes that are often used are microbes that fix N from the air and microbes that stimulate plant growth. The biological fertilizer used in this research is an inoculant made from active living organisms which functions to fix certain nutrients or facilitate the availability of nutrients in the soil for plants. The microorganisms contained in it are *Bacillus sp, Azotobacter sp, Azospirillum sp, Actinomycetes sp,* and *Lactobacillus sp.*

Apart from increasing nutrients in the soil, it is also important to pay attention to the use of rice varieties in this research. Rice is an annual plant belonging to the grass group, with more than 25 species spread across tropical and sub-tropical areas such as Asia, Africa, America, and Australia. Rice is a food crop that can be planted on various types of land, namely paddy fields, swamps, and dry/moor/rain-fed lands. Rice varieties in Indonesia are grouped into three types, namely hybrid rice varieties, superior rice varieties, and local rice varieties (Anggi Muhammad Yusri, 2019). Local rice varieties are varieties that have existed and been cultivated for generations by farmers belong to the community and are controlled by the state (Satoto *et al* in Supangkat Samidjo, 2017). This rice variety has long been adapted to certain areas, so this variety has location-specific characteristics in that area.

Sumedang Regency is one of the districts in Jawa Barat which has quite good agricultural potential, including rice cultivation. Like other agricultural areas, agriculture in Sumedang faces challenges such as fluctuations in commodity prices, climate change, availability of agricultural facilities and infrastructure, limited information and technology, and shortage of water during the dry season. However, rice cultivation remains one of the main commodities in Sumedang. Of the many introduced rice varieties planted in Sumedang, there are still some farmers who plant local Sumedang varieties. In Sumedang, it is predicted that there will be local varieties of rice that are still cultivated by local farmers, including Sertani, Gede Wangi, Bagendit, Gading, Jablay, Patenggang, Godang, Hawara Salak, Omas Genteng, Tri Sakti, Jalan, Sri Dewi, Egypt Super, Gemah, Masreum, and Mareum (Lia Amalia *et al.*, 2022; Nazirah *et al*., 2023; Hariyati *et al*., 2024)). The local rice varieties planted above are wetland rice varieties or are usually cultivated in wetlands. However, in lowland rice cultivation there are currently several obstacles, changes in rain patterns are one of the big threats for lowland rice farmers who rely directly on rain. Agriculture that relies on rain is very vulnerable to climate change. Water is a basic need for plants to grow, develop, and produce well. Therefore, it is necessary to develop rice with little water that can produce high production. According to research, local rice varieties will be better

able to adapt to climate changes that occur compared to introduced varieties (Supangkat Samidjo, 2017; Subekti and Umar, 2022). Local rice varieties are also considered more resistant to several pests and diseases that commonly attack rice plants (Ridlo Susanto, 2019). Apart from that, several local rice varieties have unique characteristics and high nutritional value compared to breeding rice (Fanata and Husna, 2021; Fitri and Handoyo, 2019). From the results of these studies, it is hoped that the use of local rice varieties can become an alternative for rice production.

RESEARCH METHODS

This research was carried out in the experimental fields of Winaya Mukti University, Tanjungsari Village, Tanjungsari District, Sumedang Regency, Jawa Barat from August to November 2023. The materials used in this experiment were local Sumedang rice varieties originating from Tanjungsari District consisting of the Gemah Variety, the Gede Wangi Variety, Tri Sakti varieties, and Extragen Biological Fertilizer while other means are sheep manure, NPK fertilizer, urea fertilizer and pesticides if necessary. The experimental approach in this research used a Randomized Group Design (RGD) field experiment with a factorial pattern. The first factor is the concentration of biological fertilizer which consists of three levels, namely p_1 = 0 ml L^{-1} water, p_2 = 3 ml L^{-1} water, p_3 = 6 ml L^{-1} water, while the second factor is variety Sumedang local rice consists of three types of varieties, namely v_1 = Gemah, v_2 = Gede Wangi, v_3 = Trisakti. The parameters observed included: plant height (5 WAP, 6 WAP, 7 WAP, and 8 WAP), number of tillers, number of productive tillers, number of grains per panicle, weight of 1000 grains, weight of harvested dry grain, weight of milled dry grain, WAP (weeks after planting). Data processing from observations uses Analysis of Variance (ANOVA), if there is significant variation, then to determine the differences between each treatment, the analysis is continued using Duncan's Multiple Ranges Test at a significance level of 5 percent.

RESULTS AND DISCUSSION

Plant height

The application of biological fertilizer to various varieties when observing plant height at 45 DAP (Days after Planting), 55 DAP, and 65 DAP showed that there was no interaction, then the independent effects of the analysis results are presented in Table 1.

Table 1. Effect of Biological Fertilizer Concentration and Varieties on Plant Height at 45, 55, and 65 DAP

Treatment	Plant height		
	45	55	65
Biological Fertilizer Concentration (H)			
0 ml L^{-1}	51 a	63 b	73 b
3 ml L^{-1}	62 a	71 ab	84.6 c
6 ml L^{-1}	57 a	68 b	80.6 b
Rice Varieties (V)			
Gemah	58 a	69 a	83.3 b
Big Wangi	46 a	55 a	65 a
Tri Sakti	77 a	78 a	89.6 b

Note: The average number followed by the same letter in the direction of the column indicates a difference that is not significant based on Duncan's multiple range test at a significance level of 5%.

In terms of independent effects, the application of biological fertilizer at 55 DAP and 65 DAP provides better plant height compared to without the use of biological fertilizer. Observations at 65 DAP at the 3 ml L^{-1} treatment level gave the best plant height. The differences in varieties at 45 DAP and 55 DAP showed that all varieties gave the same plant height. Observations at the age of 65 DAP showed that the Gemah and Tri Sakti varieties had the best plant height compared to the Gede Wangi varieties.

Number of Productive Tillers

Table 2. Effect of Biological Fertilizer Concentration and Variety on the Number of Productive Tillers

Treatment	Number of Productive Tillers
Biological Fertilizer Concentration (H)	
0 ml L^{-1}	19 a
3 ml L^{-1}	35.3 b
6 ml L^{-1}	38 b
Rice Varieties	
Gemah	28.6 a
Big Wangi	33 a
Tri Sakti	30 a

Note: The average number followed by the same letter in the direction of the column indicates a difference that is not significant based on Duncan's multiple range test at a significance level of 5%.

The results of observations and analysis of data on the number of productive tillers presented in Table 2 show that the application of biofertilizer concentrations of 3 ml L^{-1} and 6 ml L^{-1} provides a significant interaction on the number of productive tillers compared to without the application of biofertilizer. Meanwhile, in terms of independent effects, the differences in varieties do not show any real differences. The differences in varieties showed that all levels of treatment did not make a significant difference in the number of productive tillers.

Panicle Length

Table 3. Effect of Biological Fertilizer Concentration and Variety on Panicle Length

Treatment	Panicle Length (cm)
Biological Fertilizer Concentration (H)	
0 ml L^{-1}	23 a
3 ml L^{-1}	26.3 b
6 ml L^{-1}	26.3 b
Rice Varieties	
Gemah	27 b
Big Wangi	23.6 a
Tri Sakti	25 a

Note: The average number followed by the same letter in the direction of the column indicates a difference that is not significant based on Duncan's multiple range test at a significance level of 5%.

The results of observations and analysis of panicle length data presented in Table 3 show that the application of biofertilizer concentrations of 3 ml L^{-1} and 6 ml L^{-1} provides a significant interaction on the number of productive tillers compared to without the application of biofertilizer. Meanwhile, in terms of independent effects, the Gemah variety showed significant differences compared to the Gede Wangi and Tri Sakti varieties.

Harvested Dry Grain Weight

Table 4. Effect of Biological Fertilizer Concentration and Varieties on Harvested Dry Grain Weight

Treatment	Harvested Dry Grain Weight (Grams)
Biological Fertilizer Concentration (H)	
0 ml L^{-1}	443.3 a
3 ml L^{-1}	546.6 ab
6 ml L^{-1}	588 b
Rice Varieties	
Gemah	526 b
Big Wangi	479 a
Tri Sakti	573 c

Note: The average number followed by the same letter in the direction of the column indicates a difference that is not significant based on Duncan's multiple range test at a significance level of 5%.

CONCLUSION

Fertilizer application can increase plant height and number of tillers per hill as well as increase panicle length. The concentration that had a significant effect on the growth of local rice varieties was a concentration of 6 ml L^{-1} on the Trisakti variety, however on the Gemah variety and the Gede Wangi variety the concentration of 3 ml L^{-1} affected the GKG yield.

REFERENCES

Anggi Muhammad Yusri, S. P. (2019). *Varietas Padi*. Cyber Extension. http://cybex.pertanian.go.id/mobile/artikel/69940/VARIETAS-PADI.

Fanata, W. I. D., & Husna, S. F. (2021). Penentuan Sifat Aromatik Beberapa Varietas Padi Lokal berdasarkan Analisis Fenotip dan DNA Molekuler. *Jurnal Ilmu Dasar*, *22*(2), 111.

Fitri, I. G. S., & Handoyo, T. (2019). Identifikasi Karakteristik Morfologi Dan Molekuler 21 Varietas Padi Aromatik (Oryza sativa L.) Berdasarkan Penanda RAPD (Random Amplified Polymorphic DNA). *Berkala Ilmiah Pertanian*, *2*(2), 72-76.

Hariyati, T., Putra, M. U., & Zakaria, Z. (2024). Morphology Characteristics of Local Rice (Oryza Sativa L.) Rice Lands of Long Tebulo Village, North Kalimantan. *Journal of Agriculture*, *3*(01), 24-29.

Lia Amalia, Nunung, S., & Deti, S. (2022). *Eksplorasi dan Identifikasi Padi Lokal Di Kabupaten*

Sumedang.

Menteri Pertanian RI. (2019). *Permentan RI Nomor 01* (pp. 1–47).

Nazirah, L., Fuady, Z., & Satriawan, H. (2023). The Diversity of Agronomic Characteristics of Several Local Aceh Rice Germplasm. *Journal of Agriculture and Crops*, *9*(2), 148-155.

Ridlo Susanto. (2019). *Varietas Padi Lokal Dinilai Lebih Resisten Pnyakit*. Gatracom. https://www.gatra.com/news-463105-ekonomi-varietas-padi-lokal-dinilai-lebih-resisten-penyakit.html.

Subekti, A., & Umar, A. (2022). Keragaan Dua Belas Varietas Unggul Baru Padi pada Agroekosistem Lahan Pasang Surut di Kalimantan Barat. *Agrica Ekstensia*, *16*(1), 8-13.

Supangkat Samidjo, G. (2017). Eksistensi Varietas Padi Lokal pada Berbagai Ekosistem Sawah Irigasi: Studi di Daerah Istimewa Yogyakarta. *Planta Tropika: Journal of Agro Science*, *5*(1), 34–41. https://doi.org/10.18196/pt.2017.069.34-41.