



The Adaptation of Some Varieties of Rice (*Oryza sativa* L.) with a Liquid Bioorganic Fertilizer (Pomi) in the Acid Soil

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Received: February 16, 2023

Revised: May 19, 2023

Accepted: May 25, 2023

Published: May 31, 2023

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DOI: [10.29303/jppipa.v9i5.3210](https://doi.org/10.29303/jppipa.v9i5.3210)

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Abstract: The aims of the study were to obtain appropriate doses of bioorganic fertilizers (POMI) for the growth and production of several rice varieties and to obtain superior rice varieties that are adaptive to acid soils. The research was conducted in Mariah Bandar Village, Pematang Bandar District. The experimental design used was a Factorial Randomized Block Design (RBD) with two factors and three replications. The first factor was a variety consisting of 3 varieties, namely Inpago 12 Agritan (V1), Galur Nusantara (V2), Inpago Unsoed (V3). The second factor was the dose of bioorganic fertilizer 5 ml, 10 ml and 15 ml/plot with a plot size of 1x 2m. Parameters observed were plant height (cm), number of productive tillers, panicle length (cm), grain weight/clump (g) and grain weight/plot (kg). The results showed that the Inpago Unsoed variety and the Nusantara line were adaptive varieties to acid soils and the application of bioorganic plus fertilizer (Pomi) at a dose of 75 liters/ha or 15 ml/plot.

Keywords: Acid Soil; Fertilizer (Pomi); Liquid Bioorganic; *Oryza Sativa*; Varieties of Rice

Introduction

The paddy (*Oryza sativa* L.) and those who are often called of the rice is one of the strategic prime food and commodity for the people of Indonesia (Noviyanti et al., 2020; Syaifudin & Nofa, 2020). Rice production nationally fails to fulfill the needs of the population with a number of policies such as using superior varieties, irrigation infrastructure development, seed subsidy, fertilizer, and the use of a pesticide in increase domestic rice production national (Alavan et al., 2015)

One of the most important role to increase production and productivity of rice are varieties of superior (Yu et al., 2020). Several varieties superior rice have been produced and be removed, and there were some to choose to farmers choose varieties appropriate for the conditions in agro-climatic (Choudhary et al., 2023). Various types of rice having the character and productivity is different (Hambali & Lubis, 2015).

Fulfilling the request or rice need could be done through intensification of agriculture. The intensification agriculture is improving rice production

per hectare. The use of varieties superior is one intensification of agriculture. The agricultural research and development, department of agriculture has generated many new varieties (Nazirah & Damanik, 2015)

Aside from the varieties superior used, factors fertilizing doses well as the environment and also play an important role in the increase and productivity rice (Murtado & Marlina, 2019; Verma et al., 2020). Fertilization is the way to improve the availability of organic element in the ground (Fadlilla et al., 2023; Shaji et al., 2021). The fertilizer that can be used is organic and inorganic fertilizer. The use of inorganic fertilizer can improve the availability of organic element in the ground quickly so a growth and expansion plants, increase the resistant to pest attacks and improve the quality and quantity of the results, but can be destructive soil texture (Yulianto et al., 2021).

Liquid bioorganic fertilizer (Pomi) is liquid organic fertilizer that had a lot of excellence, among others capable of reducing the use of inorganic fertilizer up to 50 %, organic components macro and micro nutrients

How to Cite:

Sihaloho, A.N., Sitinjak, W., Purba, R., Sinaga, R., & Meriaty, M. (2023). The Adaptation of Some Varieties of Rice (*Oryza sativa* L.) with a Liquid Bioorganic Fertilizer (Pomi) in the Acid Soil. *Jurnal Penelitian Pendidikan IPA*, 9(5), 2590–2594. <https://doi.org/10.29303/jppipa.v9i5.3210>

needed to sustain the growth of plants, parser bacteria, any fastening nitrogen, a solvent phosphor, a solvent potassium, vitamin, an antibody, and must be accompanied by officers growing natural with enzymes. Pomi had a composition of C organic 28.53 % that have the potential to increase crop yield up to 50 % (Syarif et al., 2019).

The research use of some varieties of rice and dosage of bioorganic fertilizer (Pomi) done aims to get doses bioorganic fertilizer (Pomi) appropriate for growth and the production of some varieties of rice and get variety superior rice who adaptive in acid soil.

Method

Research carried out in village Mariah Bandar, Pematang Bandar Subdistrict in May to August 2022 in high place ± 410 m above from sea. The experiment design was Factorial Randomized Block design (FRB) with two factors and three replications. The first factor was varieties consist of 3 varieties are Inpago 12 Agritan (V1), Galur Nusantara (V2), Inpago Unsoed (V3). The second factor was bioorganic fertilizer doses C1=25liter/ha=5ml/plot, C2=50liter/ha=10ml/ plot, C3=75liter/ha=15ml/plot with the size of a plot 1x 2m.

Pest and disease control conducted when there an indication the attack by spraying insecticides Decis 25 EC and Dithane M-45. Fertilizing done at the time of transplanting with a dose of 50kg Urea, 100kg SP36 and 75kg KCl/ha, as primary fertilizer while treatment for

spraying bioorganic fertilizer (Pomi) done at the time of the rice have grown 14 days dan 30 days with a dose appropriate of treatment.

Maintenance of covering the irrigation system, weeding, pest and disease control conducted optimally according to needs. Observed parameters were plant height (cm), the number of saplings productive, long panicles (cm), weight of grain/clumps (g) and weight of grain/plot (kg).

Result and Discussion

The Component Growth Some Varieties of Rice by The Application of Various Doses Bioorganic Fertilizer (Pomi)

Table 1. The Result of The Analysis of Variance the Affect of The Application of Bioorganic Fertilizer (Pomi) to Character Of Growth and Yield of Rice.

Observed Parameter	Varieties (V)	Bioorganic Fertilizer (Pomi = C)	Interaction V x C
Plant Height (cm)	4.57 ^s	0.41 ^{ns}	2.28 ^{ns}
The Number of Saplings Productive	0.96 ^{ns}	0.14 ^{ns}	0.27 ^{ns}
Long Panicles (cm)	0.76 ^{ns}	0.04 ^{ns}	0.90 ^{ns}
Weight of Grain/clumps (g)	11.36 ^s	4.23 ^s	1.07 ^{ns}
Weight of Grain/plot (kg)	13.01 ^s	6.13 ^s	0.77 ^{ns}

Note: s = significant and ns= not significant on p = 0.05.

Table 2. The Result of The Analysis of Variance the Effect of The Application of Bioorganic Fertilizer (Pomi) to Character of Growth and Yield of Some Varieties of Rice

Treatment Varieties	Doses Bioorganic	Plant Height (cm)	The Number of Saplings Productive	Long Panicles (cm)	Weight of Grain/clumps (g)	Weight of Grain/plot (kg)
Inpago 12 Agritan	5 ml/plot	189.36 b	26.00	69.50	160.06 d	3.24 c
	10 ml/plot	171.10 c	27.00	69.60	172.61 c	3.98 b
	15 ml/plot	186.60 b	28.00	70.00	179.93 c	4.63 b
Galur Nusantara	5 ml/plot	190.10 ab	27.00	69.40	171.94 c	3.03 d
	10 ml/plot	195.00 ab	28.00	70.20	191.37 a	3.21 c
	15 ml/plot	196.24 a	30.00	72.60	199.12 a	3.64 c
Inpago Unsoed	5 ml/plot	186.10 b	27.00	68.90	186.44 b	4.59 b
	10 ml/plot	199.70 a	29.00	69.60	189.88 b	4.28 b
	15 ml/plot	200.20 a	30.00	70.00	199.51 a	5.54 a

Note: The number followed by the same notation in the same treatment and column are not significant according to Duncan test on p = 0.05.

Table 1 shows that the results of the analysis of variance of treatment the application of doses bioorganic fertilizer (Pomi) against some varieties of rice to character plant height, weight of grain/clumps and weight of grain/plot affected significant, while the number of saplings productive and long panicles show not significant. Genetic factors affected to the quality of life of the rice and its ability to survive in the ability of

the plants absorb soil nutrients required by plants and it will impact the low level of growth (Kusumawardani et al., 2022).

Based on Table 2 can be seen that interaction between varieties rice with bioorganic fertilizer (Pomi) was not significant for all of parameters observed. The result of the research Arifin & Susilowati (2020), show that input bioorganic fertilizer contain of macro and

micro nutrient able to provide nutrient required variety of rice higher and more complete than provided by inorganic fertilizer with 100% measure recommendations (Hafez et al., 2021; Naher et al., 2019).

Treatment of some varieties of rice by application the bioorganic fertilizer (Pomi) shows that varieties of Inpago Unsoed is varieties having the highest of plant height on dose 50 liter/ha (15 ml/plot) but plant height is decrease by increase of doses of bioorganic fertilizer (Pomi), while in varieties of Galur Nusantara and Inpago 12 Agritan increased doses bio organic fertilizer applicated so the more plant height obtained. Organic fertilizers to plants not only as contributor of nutrient, but could also help improve the condition of the structure of the soil become looser and loose, and also improve activity microorganisms in the ground (Lim et al., 2015; Liu et al., 2021; Michael, 2021; Shang et al., 2020).

Table 2 shows that character vegetative growth of some varieties of rice will be increase by the increasing dose of the application of bioorganic fertilizer (Pomi). Varieties of Inpago Unsoed had the highest of plant height (15 ml/plot) that significant to the both other varieties but the number of saplings productive not significant with both other varieties.

The Component of Generative Growth Some Varieties of Rice by The Application of Various Doses Bioorganic Fertilizer (Pomi)

The generative (yield) character of some varieties of rice by the application of various doses of bioorganic fertilizer (Pomi) in Table 2 shows that increasing doses of bioorganic fertilizer (Pomi) given, will increasing long panicles but not significant with the both other varieties, while the weight grain/clumps and weight grain/plot was significant with the both other varieties. Inpago Unsoed varieties is the best variety of rice because can production 5.54 kg/plot that significant to the both other varieties.

Syarif et al. (2019) indicates that liquid bioorganic fertilizer contain complete nutrient that serves organic in any process of metabolism, plant especially for the synthesis of proteins from amino acids and ions ammonium (Li et al., 2023) and play a role in maintaining pressure turgor and allow the smooth metabolic processes and ensuring continuity of lengthening cells and improve crop production.

Based on Table 3 it can be seen that the bioorganic fertilizer (Pomi) contains higher phosfat that weight grain/clumps and weight grain/plot was significant between varieties. In addition, also influenced by the nature of the production of each variety of genetic and environmental influences. Varieties are used different genetic has the ability to produce size and weight seeds

formed without depending on environmental conditions.

Table 3. Contain of Nutrient of Bioorganic Fertilizer (Pomi)

Nutrient	Contain
N (%)	5.09
P ₂ O ₅	4.3
K ₂ O	5.46
Fe (ppm)	410
Mn (ppm)	737
Cu (ppm)	440
Zn (ppm)	354
B (ppm)	260
Co (ppm)	12
Mo (ppm)	3
C-organik (%)	15
pH	4.5

(Sari, 2019)

Phosfat nutrient role when the generative and formation of the seeds of plants especially in plants and generally phosphate serelia absorbed by generative of plants mostly in phase which is about 90% of given to soil. In addition bioorganic fertilizer serves to fix the physical properties, chemical and agrobiology (Silva et al., 2020)

Bioorganic plus is liquid organic fertilizer required for the growth of plants because of containing bacteria solvent organic matter, organic element, the micro and macro nutrient, vitamin, P solvent, fastening N, K solvent, and equipped in growing natural (Siregar et al., 2022).

Disturbances according to fulfill their required in the growth of plants account the process of metabolism in the plant body will run well and processes photosynthesis will run well, thus asimilat material generated the more will be transfered into an organ in crop yield rice examle seeds (Winarni et al., 2018).

Conclusion

The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Acknowledgments

Place acknowledgments, including information on grants received, before the references, in a separate section, and not as a footnote on the title page.

Author Contributions

Conceptualization Arvita Netti Sihaloho; methodology Arvita Netti Sihaloho and Rosmadelina Purba.; formal analysis Arvita Netti Sihaloho; data curation Wahyunita Sitinjak and Roeskani

Sinaga; supervision Meriaty; All authors have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest.

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