

Morphological Characteristics Of Rice Panicles Of Mentik Susu Under Different Proportions Of Vermicompost Raw Materials In The Growing Medium

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ABSTRACT

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Rice (Oryza sativa L.) is a strategic food commodity in Indonesia, making sustainable productivity increases important. One approach is the use of organic fertilizers in an organic farming system, including of vermicompost. This study examines the morphological characteristics of Mentik Susu rice panicles at various proportions of vermicompost raw materials in the planting medium. The study was conducted from September–December 2025 in the Subak Tangsub rice fields, Gianyar, Bali, with vermicompost production carried out at the Soka Campus Laboratory of Mahasaraswati University, Denpasar. The experiment used a one-factor randomized block design with seven treatments of vermicompost raw material proportions, namely baglog, rice straw, coffee husk, a combination of the two materials, and a control, each replicated five times. Observed variables included panicle length and number of primary and secondary panicle branches. Data were analyzed and the Duncan test was applied at the 5% level. The results showed that no differences in the proportion of vermicompost raw materials affected the morphological characteristics of Mentik Susu rice panicles. These results indicate that rice yield is influenced by the variety and the differences in the proportion of vermicompost raw materials through their role in nutrient availability for the plant. This study emphasizes the importance of selecting the right varieties and the right vermicompost raw materials to support the sustainable increase in organic rice production.

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1. Introduction

Rice (*Oryza sativa* L.) is plant cultivation that has role strategic as source food main for more from half world population . In Indonesia, rice become material food staple food consumed by almost

all over population, so that paddy own very position important. Not only from aspect food, but also from side social, cultural, economic, to politics. Humaerah (2013) reported that around 95% of the Indonesian population makes rice as source food main. In addition, rice contribute big to fulfillment need nutrition society, namely 63 % of the need energy, 38% of protein requirements, and 21.5% of requirements substance iron (Indrasari & Adnyana, 2007). Based on data from the Central Statistics Agency (BPS) in 2024, iron production rice national estimated reached 55.42 million tons, an increase compared to production in 2023 amounting to 54.5 million tons (BPS, 2024).

Planting paddy organic is one of the system increasing cultivation. Lots applied by farmers. Agriculture organic emphasize subtraction use fertilizer synthetic and pesticides chemistry through management friendly soil, plants and water environment based wisdom local (Hidayat & Lesmana, 2011). Provision of fertilizer organic reported capable repair characteristic physical and chemical land as well as increase results rice in season plant next (Liao et al., 2023; Zhao et al., 2024). In addition, the use of fertilizer cages and fertilizers organic liquid can increase growth and development roots plant rice (Isnawan et al., 2023). System agriculture organic is also considered more efficient in a way economy so that can implemented in a way widely by society (Tarbiah et al., 2010).

Vermicomposting is a composting process that utilizes activity worm land, which comes from the words *vermes* (worms) and *composting* (composting) (Sucipto, 2012). This process produce two product main, namely biomass worms and vermicompost that come from from dirt worms. One of them type common worms used is *Lumbricus rubella*. Because own ability develop fast breeding as well as effective in to describe material organic become vermicompost which is rich in nutrients and plays a role in increase fertility land.

Characteristics varieties paddy show difference characteristics and characteristics influenced by factors genetics compiler (Yulina et al., 2021). Rice local own various advantages, including the ability adapt to stress abiotic, resilience to pests and diseases, as well as character potential specifics utilized as source genetics in assembly varieties superior. Research This aim For learn character morphology panicle paddy varieties Milk Ticks in various proportion material standard vermicompost in planting media. Character common morphology used in identification varieties covering stem (number tillers), leaves (length and color of ligule, length auricle, size and color strands leaves), flowers (long panicle, number grains, shape, size, texture, and color), grain (shape, size, texture, color surface, tip rice, and long and hair loss stalk), and rice (shape, size, and color) (Irawan & Purbayanti, 2008).

2. Method

1. Research Time and Location

Study will implemented with plant Rice in a bucket in the Subak Tangsub Rice Field Area in Br. Cemenggaon, Celuk Village, District Sukawati, Regency Gianyar and manufacturing vermicompost carried out in the laboratory Soka Campus, Mahasaraswati University, Denpasar. Research time This ongoing from September to December 2025.

2. Implementation Study

Seeds paddy varieties Mentik Susu which has been 14 days old moved to in an 8 liter bucket pot, 2 seeds per bucket. The planting medium used in study This is paddy soil and vermicompost with various proportion material. One bucket contains 5 kg of paddy soil and 45 grams of fertilizer vermicompost with various proportion material standard. Giving fertilizer in research This use fertilizer inorganic Urea and Phonska. Giving fertilizer done as much as three times with different doses and intervals, namely at 7, 15, and 35 days of age after planting (HST). Fertilization first and second given with dose of 100 kg ha⁻¹ urea and 150 kg ha⁻¹ phonska, equivalent with 0.25 g urea and 0.375 g phonska per bucket, while fertilization third use dose of 50 kg ha⁻¹ urea and 150 kg ha⁻¹ phonska or equivalent with 0.125 g urea and 0.375 g phonska per bucket. Fertilizer applied with method dissolved in 1,750 mL of water and administered in a way leak as much as 50 mL per bucket. Irrigation done start age 15 HST with tall 3–5 cm of waterlogging. Control

pests and diseases done with pesticide vegetable extract leaf neem applied 1 week once . The harvest is done when $\pm 95\%$ panicles has yellowing .

3. Design Test

Study This use design random group (RAK) one factor in the form of difference proportion material standard vermicompost with seven Treatment : P1 = Baglog , P2 = Straw, P3 = Coffee Husk, P4 = Baglog + Straw, P5 = Baglog + Coffee Husk , P6 = Straw + Coffee Husk , and P7 = Control . Each treatment repeated five times so that obtained 35 units experiment. Observed variables covering character morphology panicle, namely long panicle, number primary and secondary branches. Data analyzed using SAS OnDemand for Academics, and Duncan's further test was performed if the F test shows influence real at the 5% level .

3. Results and Discussion

Analysis results variety show that all over treatment given No give significant influence to character long panicle, number primary branches, as well as amount branch secondary (Table 1).



In other words, variation proportion material standard vermicompost in the planting medium Not yet capable trigger difference morphology panicle observed rice. In the study here , there is seven treatment vermicompost based on difference composition material standard, namely baglog, straw, coffee skin, combination baglog and straw, combination coffee bags and skin, as well as combination coffee skin and straw. Although every treatment own composition material different organic responses morphology panicle rice produced relatively uniform throughout treatment .

Table 1. Recapitulation fingerprints variety character panicle plant rice in cultivation organic

Mean Square			
SK	PM (cm)	JCP	JCS
test	8.618 *	2.614 ns	18,458 ns
treatment	1.317 ns	0.723 ns	23.123 ns
Family Card (%)	7.57	12.69	22.23

Description : PM = length panicle , JCP= number primary branch , JCS= number branch secondary . SK = source diversity , KK= Coefficient diversity , *= different real in the F test at 5% level , **= different real very real in the F test at 1% level , ns= no different real .

Based on Table 2, all treatment show results that are not different real to long panicle, number primary branches, and the number branch secondary. This is show that giving vermicompost with various proportion material standard not yet capable influence character branching panicle paddy in a way significant . Tested treatments covering vermicompost made from baglog, straw, coffee skin, mixture baglog and straw, mixture coffee beans and skin, mix straw and coffee skin, as well as

control. Although each treatment use composition material different organic responses morphology panicles produced relatively uniform throughout treatment.

Table 2. Median character values morphology panicles of five varieties in cultivation organic

Treatment	Average		
	PM (cm)	JCP	JCS
P1	21.80 a	8.60 a	17.40 a
P2	22.80 a	9.00 a	22.80 a
P3	23.00 a	9.20 a	23.40 a
P4	21.90 a	9.60 a	22.40 a
P5	21.90 a	9.40 a	20.40 a
P6	22.60 a	8.60 a	19.40 a
P7	22.80 a	9.20 a	22.00 a

Description : PM = length panicle , JCP= number primary branch , JCS= number branch secondary . The number that follows the same letter in the same column show No different real based on Duncan's test at the 5% level .

A number of study previously show that difference character morphology panicle paddy more Lots determined by factors genetics than treatment fertilization. Research conducted by Rahayu et al. (2018) stated that that variation genotype give influence more big to length and branching panicle compared to improvement dose nitrogen fertilizer. Similar results were also reported by Hastini et al. (2019), which showed that giving fertilizer phosphorus no become factor main in determine difference morphology panicle. Findings the confirm that varieties used play a role important in form character panicle, so that election suitable varieties become step strategic in support success cultivation paddy .

4. Conclusion

Research result show that use vermicompost with various proportion material standard No give significant difference to long panicle, number primary branches , as well as amount branch secondary in rice varieties Mentik Susu. All treatment , good use baglog, straw, coffee skin, combination materials, as well as without treatment (control), resulting in character morphology relative panicle same. Findings This indicates that difference composition material standard vermicompost in the planting medium Not yet capable influence branching panicle in a way real. With this, the formation of character morphology panicles on varieties Milk Tick in study This more reflect influence factor genetics compared to treatment vermicompost given .

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Data and Software Availability Statements

The data supporting this research are available from the authors; no software was developed for this research. Statistical analyses were performed using SAS OnDemand for Academics software. All data were analyzed in accordance with established experimental design procedures to ensure the scientific validity of the results.

- [1] Humaerah , AD 2013. Cultivation Rice (*Oryza sativa*) in a container with Different Types of Fertilizers in Different Planting Systems . Journal Agribusiness . 7(2), 199–210.
- [2] Indrasari , DS, and MO Adnyana ., 2007. Consumer Preferences for Brown Rice as a Functional Food Sources . Science and Technology Food Crops . 2(2): 227–241.
- [3] Central Statistics Agency (BPS). 2024. Summary Executive Harvest Area and Production Rice in Indonesia 2023 (Fixed Figures). Jakarta.
- [4] Hidayat AS, Lesmana T. 2011. The Development of Organic Rice Farming in Indonesia. Economic Research Center, Indonesian Institute of Sciences (LIPI).
- [5] Liao, B., Cai T., Wu Journal of Environmental Management 344: 118372.
- [6] Zhao T., He A., Khan MN, Yin Q., Song S., Nie L. 2024. Coupling of Reduced Inorganic Fertilizer with Plant-Based Organic Fertilizer as a Promising Fertilizer Management Strategy for Colored Rice in Tropical Regions. Journal of Integrative Agriculture 23(1): 93-107.
- [7] Isnawan , BH, Aini LN, Hanudin E., Basanti VZP 2023. Rice (*Oryza sativa* L.) Response with The Application of Manure and Liquid Organic Fertilizer. IOP Conference Series: Earth and Environmental Science, 1287, 012017. <https://doi.org/10.1088/1755-1315/1287/1/012017>
- [8] Tarbiah S., Raharja S., Purwanto B. 2010. Study of Income Levels Irrigated Rice Farmers with Diversification of Cropping Patterns in the Regency Karawang , West Java. (Thesis , Institute Agriculture <http://repository.ipb.ac.id:8080/handle/123456789/52117> Bogor).
- [9] Sucipto, CD 2012. Technology Recycling Processing Garbage . Yogyakarta: Gosyen Publishing.
- [10] Yulina , N., Ezward , C. And Haitami , A. 2021 ' Characteristics of Plant Height , Harvest Age , Number of Tillers and Harvest Weight in 14 Genotypes Local Rice ', Journal Agroscience and Technology , 6(1), Pp. 15–24.
- [11] Irawan. 2013. Agriculture friendly environment : indicators and methods measurement aspect socio - economic . In Sulaeman (Ed.), National Seminar on Environmentally Friendly Agriculture (pp. 659–674). Bogor: Research and Development Agency Agriculture , Ministry of Agriculture .
- [12] Rahayu S., Ghulamahdi M., Suwarno WB, & Aswidinnoor H. 2018. Morphology of Rice Panicles (*Oryza sativa* L.) in Various Application Nitrogen Fertilizer . Journal Indonesian Agronomy , 46(2):145-152.
- [13] Hastini T., Suwarno WB, Ghulamahdi M., Aswidinnoor H. 2019. Character Genotype Panicle Branching Paddy Fields at Various Dosage Levels Phosphorus . Journal Indonesian Agronomy <https://dx.doi.org/10.24831/jai.v47i2.19445>.