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GRAIN QUALITY ASSESSMENT OF RICE GROWN IN MERAUKE, INDONESIA

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SUMMARY

Merauke is a national rice storage extremely fundamental to ensuring food security in Indonesia. For improved rice (*Oryza sativa* L.) grain quality and harvest and postharvest activities, a physical grain characteristic assessment took place according to the national standardization of rice in Indonesia (SNI). Among five district sampling areas, the trait moisture content was below the SNI maximum standard, while both impurities-foreign matter and immature-chalky kernels met the SNI quality II. For the features of damage and yellow kernels, they passed the SNI quality III, and red-streaked kernels met the SNI quality II. Based on physical grain quality traits, categorizing 28 samples resulted in three groups through a principal component analysis (PCA), with a variability value of 30.87% (PC1) and a cumulative variance of 56.20%. A biplot of grain quality showed that samples Pan-M, Cem-J, Inp43-J, and Inp43-K were the outlier samples as influenced by certain characteristics, such as Pan-M having the highest immature-chalky kernels with a value of 7.54% and impurities-foreign matter with a value of 5.60%. Moreover, the sample Cem-J had the highest red-streaked kernels, with a value of 19.59%, and two other samples (Inp43-K and Inp43-J) had damage-yellow kernel values of 19.98% and 19.56%, respectively.

Keywords: Rice (*O. sativa* L.), cultivars, plant genetic resources, PCA, biplot analysis, physical grain quality

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Key findings: Rice (*O. sativa* L.) genotypes grown in Merauke varied based on their physical grain characteristics. For grain quality, five characteristics met the SNI standard, while the moisture content was below the SNI maximum standard and still requires special attention. Proper harvest and post-harvest practices considerably improved the grain quality, positively impacting the market value.

INTRODUCTION

Merauke is one of Indonesia's national food storages and has a natural resource potential suitable for developing food crops, particularly rice. Rice (*O. sativa* L.) is the dominant food crop in Merauke, accounting for a substantial 327,877.71 tons in 2019–2020 (BPS, 2020). Merauke has a total potential land area of 4,469,841 ha, wherein the paddy field includes 1.9 million ha, with 0.5 million ha of dry land (Subiksa, 2008; Manikmas, 2010). Rice production gradually increased, reaching 327,877.71 tons in 2019, covering a paddy field area of 58,874.25 hectares. Merauke has several rice planting district centers, including Kurik, with a harvest area of 17,247 ha, Tanah Miring (17,569 ha), and two other districts, Semangga (9,614 ha) and Malind (8,186 ha) (BPS, 2020).

According to the Indonesia Statistics Agency, Merauke (BPS, 2023) reported a 9.23% decrease in its harvested area from 2022 to 2023, falling from 54,610 to 49,570 hectares. Conversely, rice production increased by 7.97% during the same period, rising from 219,040 to 235,500 tons. However, poor harvest and postharvest handling are some crop constraints in Merauke Regency (Tarigan *et al*., 2015). Nahumury (2012) stated that one of the limitations in Merauke rice farming is the lack of human resources, specifically the difficulty in finding labor because farmers carried out planting and harvesting activities at nearly the same time. Achieving high-quality rice yields requires support through proper harvest timing, correct harvesting methods, and effective postharvest handling.

Rice production for food in 2024 gave an estimated 30.34 million tons, which decreased by 757,130 tons, or 2.43% from 2023, which was 31.10 million tons (BPS, 2024). As one of the Indonesian national rice storages becoming the target of large-scale agriculture since 2005 with the Merauke Integrated Rice Estate (MIRE) and Merauke Integrated Food and Energy Estate (MIFEE) Programs (Widiastuti *et al*., 2023), Merauke could contribute to a more accurate estimation of national rice production.

Grain quality is a set of physical properties that make up the grains. The grain quality's physical traits include moisture content, impurities and foreign matter (IFM), immature and chalky kernels (ICK), damaged and yellow kernels (DYK), and red-streaked kernels (RSK) (Hasbullah and Dewi, 2012). According to Presidential Instruction No. 5 of 2015, for determining grain quality, the criteria comprised moisture content and impurities and foreign matter (IFM) (Setiawati, 2020). The rice produced with high grain quality results from well-managed harvest and postharvest handling (Asni and Novalinda, 2010). Hasbullah and Dewi (2012) mentioned that increasing rice production is not limited to the pre-harvest stages but can also be attainable by improving harvest handling. Nahumury (2012) reported a high-quality rice yield is achievable with the right harvest timing, proper harvesting methods, and well-managed postharvest handling.

Harvest and postharvest activities are strategic stages in reducing yield losses, comprising activities such as harvesting, drying, packaging, storage, and processing rice into marketable products (Somantri *et al*., 2016; Swastika, 2016). Improper harvest and postharvest handling result in poor rice quality, eventually affecting its market value (Munandar *et al*., 2020). Guswita *et al*. (2020) stated that improved harvest and postharvest handling activities can reduce yield losses and enhance rice production. Physical grain quality assessments are crucial for evaluating harvest and postharvest handling pursuits, where such studies have been notably absent in Merauke Regency, Indonesia. Research conducted in

Merauke has focused on other aspects of rice production, including soil quality in paddy fields (Supriyadi *et al*., 2017), sensorial properties of cooked rice (Devi *et al*., 2023), and rice farming production (Widyantari *et al*., 2023). Merauke's agroecological conditions and its role as a national rice storage region underscore the necessity for localized evaluations. This study would help provide baseline data specific to Merauke and guide targeted improvements in the harvest and postharvest practices in Merauke. Furthermore, the study aimed to assess the physical quality of 28 rice genotypes from five districts in Merauke Regency, Indonesia. The findings will serve as a foundation for improving harvest and postharvest handling practices, ensuring better grain quality in rice mills.

MATERIALS AND METHODS

Experimental site

The research commenced in 2019 at the Research Center for Genetic Engineering, National Research and Innovation Agency (BRIN), West Java, and the Regional Planning and Development Agency, Merauke Research and Development, Papua, Indonesia.

Procedure

Grain sampling proceeded in the region with the largest rice production in Merauke. Samples' random collection came from rice mills located in five districts (Jagebob, Kurik, Malind, Tanah Miring, and Semangga). Sampling and solid sample collection followed the SNI 19-0428-1998 standard (SNI, 1998). Physical grain quality analysis continued based on the SNI 01-0224-1987 standard (SNI, 1987), including moisture content, impurities and foreign matter (IFM), immature and chalky kernels (ICK), damaged and yellow kernels (DYK), and red-streaked kernels (RSK). Additionally, supporting parameters such as 1000-grain weight, bulk density, brown rice yield, and milled rice yield reached calculations.

Moisture content determination used a grain moisture tester (TA-5, Crown, Japan). Impurities and foreign matter (IFM) separation employed a grain-cleaning device. Immature and chalky kernels (ICK), damaged and yellow kernels (DYK), and red-streaked kernels (RSK) underwent visual assessment in brown rice. The IFM trait in this study primarily consisted of husks, with possible minor materials like soil, stones, weed seeds, rice stalk fragments, dust, and dead insects. For each category—IFM, ICK, DYK, and RSK—separating approximately 100 g of grains incurred weighing. Then, calculating the percentage of each category applied the equation for total weight in each category, as follows:

$$IFM\ (\%) = \frac{Impurities\ and\ foreign\ matter}{100\ g} x\ 100\%$$

$$ICK\ (\%) = \frac{Green\ grains}{100\ g} x\ 100\%$$

$$DYK\ (\%) = \frac{Damage\ and\ yellow\ kernels}{100\ g} x\ 100\%$$

$$RSK\ (\%) = \frac{Red - streaked\ kernels}{100\ g} x\ 100\%$$

Using the automatic seed counter helped calculate the 1000-grain weight, and the bulk density, as estimated, used the following formula:

$$Bulk\ density = \frac{Bulk\ mass}{Tank\ volume\ (\frac{1}{4}\pi d^2 t)}$$

Brown rice, obtained by dehusking the grains, utilized a Satake rice dehusker. Subsequently, milled rice production resulted in polishing the brown rice for three minutes using a Satake Grain Mill rice polisher. The percentage of brown rice yield and milled rice yield, when calculating, used the following formula:

$$Brown\ rice\ yield = \frac{Brown\ rice\ mass}{Rough\ rice\ mass} x\ 100\%$$

$$Milled\ rice\ yield = \frac{Milled\ rice\ mass}{Rough\ rice\ mass} x\ 100\%$$

Data analysis

Data analysis succeeded in using XLSTAT version 2023.1.2.1406 software (Addinsoft, New York, NY, USA), an add-on for Microsoft Excel (Microsoft, Redmond, WA, USA). The analysis included dendrogram construction, principal component analysis, and classification of 28 rice genotypes based on nine-grain quality characteristics.

RESULTS AND DISCUSSION

This study utilized samples of 28 rice genotypes collected from five different districts in Merauke Regency, Indonesia, four of which are the major rice-producing centers (Table 1). According to BPS (2020), annual rice production in these districts, in descending order, is as follows: Tanah Miring (102,778.65 tons), Kurik (100,722.48 tons), Semangga (55,184.36 tons), Malind (45,023 tons), and Jagebob (6,492.15 tons). Rice genotype samples collected, totaling 28, came from these five districts, encompassing 13 cultivars, i.e., Inpari 43, Cigeulis, Inpari 32, IR64, Ciherang, Inpago 8, IPB3S, Mekongga, Membramo, Sertani 13, Inpari 42, Cempo Laut, and Pandan Wangi. Consistent with previous research in the Merauke Region, the farming community mostly favors and cultivates newly developed rice cultivars such as Ciherang, Mekongga, Inpari, and Membramo (Nahumury, 2012; Malik, 2012). These cultivars are favorable for their desirable characteristics, including fluffier taste, early maturity, and resistance to tungro disease (Tarigan *et al*., 2015).

Table 1. Grain samples used in this research.

No.	Cultivars	Districts	Codes
1	Cempo Laut	Jagebob	Cem-J
2	Pandan Wangi	Jagebob	Pan-J
3	Inpari 43	Jagebob	Inp43-J
4	Cigeulis	Kurik	Cig-K
5	Inpari 32	Kurik	Inp32-K
6	Inpari 43	Kurik	Inp43-K
7	IR 64	Kurik	IR64-K
8	Cigeulis	Malind	Cig-M
9	Ciherang	Malind	Cih-M
10	Inpago 8	Malind	Inp8-M
11	Inpari 32	Malind	Inp32-M
12	Inpari 42	Malind	Inp42-M
13	IPB 3S	Malind	IPB3-M
14	Mekongga	Malind	Mek-M
15	Pandan Wangi	Malind	Pan-M
16	Cigeulis	Tanah miring	Cig-T
17	Inpago 8	Tanah miring	Inp8-T
18	Inpari 32	Tanah miring	Inp32-T
19	Inpari 43	Tanah miring	Inp43-T
20	Mekongga	Tanah miring	Mek-T
21	Membramo	Tanah miring	Mem-T
22	Sertani 13	Tanah miring	Ser13-T
23	Inpari 32	Semangga	Inp32-S
24	Inpari 42	Semangga	Inp42-S
25	Inpari 43	Semangga	Inp43-S
26	IPB 3S	Semangga	IPB3-S
27	Membramo	Semangga	Mem-S
28	Sertani 13	Semangga	Ser13-S

The 28 rice genotype samples sustained analysis and summarization for their grain quality characteristics (Table 2). On average and among all the rice genotypes, the 1000-grain weight ranged from 18.73 to 30.10 g, while grain density varied between 505 and 580 g cm^{-3}. Imansyah and Andreyuni's (2020) findings showed that both density and 1000-grain weight received considerable influences from the interactions between rice cultivars and environmental factors. Grain yield represents the amount of rice obtained after the milling process. In this study, the brown rice and milled rice yields incurred differentiation. On average, the brown rice yield was 79.25%, while the milled rice yield was 66.88%. Milled rice yield serves as an indicator of milling efficiency, and the lower yield signifies greater weight loss during the milling process (Kalsum *et al*., 2020). The cultivar Inpari-32 from Malindi District exhibited the highest milled rice yield (70.34%), signifying minimal weight loss. Conversely, the cultivar Sertani-13 from Semangga displayed the lowest milled rice yield (60.59%).

Table 2. Grain quality testing results from 28 rice samples used in this research.

No.	Cultivar code	Trait observations								
		a	b	c	d	e	f	g	h	i
1	Cem-J	13.1	5.38	580.0	19.22	0.97	1.30	19.59	76.51	65.12
2	Pan-J	9.8	0.86	531.5	30.10	1.27	9.58	2.11	82.33	68.78
3	Inp43-J	10.0	2.80	510.0	20.54	1.82	19.56	0.54	79.40	69.57
4	Cig-K	11.7	2.45	537.0	25.46	3.28	4.86	2.77	80.09	66.44
5	Inp32-K	12.4	1.46	557.5	26.83	1.91	3.97	0.23	80.42	69.22
6	Inp43-K	12.7	1.88	505.5	18.73	1.89	19.98	0.37	77.82	68.17
7	IR64-K	13.4	1.09	541.5	25.51	0.26	5.31	0.04	77.91	62.55
8	Cig-M	10.8	1.17	538.0	24.44	1.03	2.56	0.08	80.67	65.83
9	Cih-M	12.8	0.41	552.0	25.09	0.97	3.88	0.03	80.96	68.16
10	Inp8-M	13.3	2.96	551.0	28.97	1.09	3.79	0.49	78.23	64.94
11	Inp32-M	9.8	0.41	571.0	26.46	0.36	3.60	0.09	81.21	70.34
12	Inp42-M	9.9	1.39	527.0	21.72	0.49	4.92	0.00	79.38	70.26
13	IPB3-M	11.3	0.57	530.0	27.05	0.34	8.00	0.02	77.91	68.13
14	Mek-M	12.3	1.15	549.5	26.22	0.96	5.07	0.00	80.28	66.17
15	Pan-M	14.2	5.60	517.5	25.58	7.54	5.11	3.19	77.16	63.41
16	Cig-T	14.4	2.32	552.0	25.62	0.93	6.92	0.14	79.13	66.74
17	Inp8-T	12.5	0.75	551.0	27.44	1.25	3.11	0.42	79.62	66.95
18	Inp32-T	13.6	0.89	561.0	26.88	0.66	1.41	0.03	78.99	65.98
19	Inp43-T	11.4	0.92	531.5	20.63	0.65	8.03	0.15	76.31	66.58
20	Mek-T	13.0	1.24	534.0	23.86	3.10	4.33	0.02	80.15	67.32
21	Mem-T	10.9	1.72	526.0	24.96	5.01	6.33	2.85	79.28	68.67
22	Ser13-T	13.9	1.37	538.0	29.29	2.96	5.10	0.56	79.09	63.11
23	Inp32-S	12.5	0.26	577.0	27.92	0.29	4.74	0.02	81.09	69.41
24	Inp42-S	12.9	0.98	528.9	21.08	0.37	6.61	0.03	78.35	67.13
25	Inp43-S	14.2	3.49	558.0	21.03	4.81	7.22	0.06	79.41	69.20
26	IPB3-S	13.2	1.35	564.0	28.70	0.66	2.98	1.87	79.13	65.08
27	Mem-S	13.7	1.54	510.5	25.21	2.54	0.89	1.73	78.69	68.92
28	Ser13-S	12.7	1.05	558.0	27.64	0.96	5.32	2.00	79.48	60.59
Average		12.4	1.70	542.5	25.08	1.73	5.87	1.41	79.25	66.88
SNI		*	MII			MII	MIII	MII		

Note: a: Moisture content; b: Impurities-foreign matter (%); c: Bulk density; d: 1000-grain weight; e: Immature and chalky kernels (%); f: Damage and yellow kernels (%); g: Red-streaked kernels (%); h: Brown rice yield (%); and i: Milled rice yield. *: Below the SNI maximum standard; MII: SNI quality II; and MIII: SNI quality III

The moisture content of Ser13-S was 12.7%, above the average moisture content of all grain samples, which suggests the low yield of Ser-13 was possibly due to other factors than moisture loss. Mihretu (2025) and Da (2021) stated that influences on rice milling come from numerous factors, including crop, environmental and agronomic, postharvest management, and operational factors (machine and operator skill). Notably, Sertani-13 grown in Tanah Miring showed a milled rice yield of 63.11%, the third lowest after IR64 (62.55%) grown in Kurik. Factors contributing to low milled rice yield include cultivation practices, grain moisture content at the time of milling, milling techniques and equipment, rice purity, and overall milling procedures (David and Kartinaty, 2019; Kalsum *et al*., 2020).

The rice genotype samples exhibited significant variability for physical grain quality parameters, including moisture content, IFM, ICK, DYK, and RSK. On average, the moisture content ranged from 9.8% to 14.4% in all rice samples. However, according to SNI 1987, the maximum permissible moisture content is 14%. Moisture content is a critical factor significantly influencing the grain quality (Lestari and Kurniawan, 2021). Milling conducted at low moisture levels can lead to an increased percentage of broken rice, groats, and bran, consequently reducing the milled rice yield. The grain quality traits IFM, ICK, DYK, and RSK were the byproducts of the brown rice milling process and revealed distinct color characteristics. The trait ICK appears white or greenish, DYK exhibits a yellow, brown, and yellowish-brown shade, and RSK gave characteristics of a reddish hue due to the presence of the epidermis on the rice surface (Sarastuti *et al*., 2018). Among the 28 rice genotype samples collected from the five districts, the estimated ranges for ICK, DYK, and RSK were 0.26% to 7.54%, 0.89% to 19.98%, and 0.00% to 19.59%, respectively.

According to SNI 01-0224-1987, the key indicators of physical grain quality traits include moisture content, IFM, DYK, ICK, and RSK. Analysis of the 28 rice samples revealed five components met the SNI standards, i.e., IFM (1.70%, meeting SNI Quality II), ICK (1.73%, meeting SNI Quality II), DYK (5.87%, meeting SNI Quality III), and RSK (1.41%, meeting SNI Quality II). However, the average moisture content of the samples was 12.4%, below the SNI maximum standard. During harvest, grain moisture content serves as a chief marker of the appropriate harvest period (Yang *et al*., 2021). Researchers Teng *et al*. (2024) demonstrated that timely harvesting and appropriate accumulated temperature could increase 1000-grain weight and rice yield, reduce the immature grain rate, and improve gelatinization characteristics. Xangsayasane *et al*. (2019) further emphasized that harvest time significantly affected head rice recovery. Therefore, delaying harvest increased broken rice and reduced head rice recovery, which had a linkage to reduced grain moisture content.

Conversely, harvesting grains too early resulted in immature grains and diminished yield. In postharvest processing, grain moisture content impacts milling quality. Truong *et al*. (2012) stated that proper drying techniques to reduce moisture content in rough rice were key factors in improving milling quality. Moreover, final moisture content plays a crucial role during grain storage. High grain moisture content promotes pest and disease attacks (Sarastuti *et al*., 2018). In contrast, excessively low grain moisture content renders grains fragile during milling, resulting in a higher fraction of broken kernels. Maintaining grains at an acceptable moisture content prolongs storage time and prevents mold growth. Therefore, the recommended moisture content for grain storage is typically 13% to 14% and 10% to 13% for grain milling (Narmilan *et al*., 2021). Moisture content is a critical factor influencing grain quality and significantly impacting its market value (Utami and Ulfa, 2022).

The distribution of physical grain quality characteristics across the samples (Table 2) showed in the District Jagebob, where the cultivar Pandan Wangi exhibited the highest 1000-grain weight and brown rice yield, while cultivar Cempo Laut had the heaviest level of bulk density and RSK. In the District Kurik, cultivar Inpari-43 had the premier level of DYK and the lowest level of 1000-grain weight. The cultivar IR64 demonstrated the lowest level of ICK. The other three districts also displayed considerable variations among the rice genotypes for physical grain quality traits. In

District Malind, cultivar Inpari-32 had the lowest level of moisture content. Rice genotype Pandan Wangi exhibited the supreme levels of IFM and ICK, while cultivar Inpari-42 and cultivar Mekongga demonstrated the lowest level of RSK.

In Tanah Miring District, rice genotype Cigeulis had the maximum level of moisture content, while cultivar Inpari-43 showed the minimum level of brown rice yield. In District Semangga, cultivar Inpari-32 demonstrated the lowest IFM, and cultivar Serani-13 provided the lowermost levels of milled rice yield. The observed variations among the 28 rice genotypes for grain quality traits across the five districts in Merauke Regency gained influences from a multitude of factors. According to Lestari and Kurniawan's (2021) findings, major factors influencing grain quality include the growing environment, cultivation practices, harvest and postharvest handling techniques, and genetic variability among the rice genotypes.

In postharvest rice practices, the main problem mostly experienced by the farmers is the maximum yield loss during harvesting, storage, threshing, drying, and milling activities (Lestari and Kurniawan, 2021). A comparison of nine-grain quality characters in five districts (Figure 1) showed that obtaining the highest average value resulted in the grain moisture content of 13.2% (Semangga), the 1000-grain weight was 25.7 g (Malind), and the highest average DYK was 10.1% (Jagebob). The supreme average values for the bulk density, brown rice yield, and milled rice emerged in Districts Semangga (549.4), Malind (79.5%), and Jagebob (67.8%). However, for parameters IFM, ICK, and RSK, the highest average values appeared in Districts Jagebob (3.0%), Tanah Miring (2.1%), and Jagebob (7.4%), respectively.

Based on nine physical grain quality variables, the 28 rice genotype samples collected from five rice-producing districts in the Merauke Region received grouping into three distinct clusters (Figure 2). Group 1 has the rice genotypes Pan-M and Cem-J, while group 2 consists of the genotypes Inp32-K, Cih-M, Mek-M, Inp8-T, Cig-M, Inp32-S, Inp32-M, Pan-J, Ser13-S, IR64-K, Ser13-T, Inp8-M, Cig-T, IPB3-S, and Inp32-T. Group 3 comprises the genotypes. Mek-T, Cig-K, Mem-T, Mem-S, Inp43-S, Inp43-T, Inp42-S, IPB3-M, Inp42-M, Inp43-K, and Inp43-J. The cluster analysis revealed significant variability among the rice genotypes, with each group containing samples originating from multiple districts. The biplot analysis visualized the 28 rice samples based on the nine-grain quality characteristics (Figure 3). The distribution of all rice genotypes was widespread across the four quadrants of the biplot, with most genotypes clustered in the central region. Four genotypes, Pan-M, Cem-J, Inp43-K, and Inp43-J, were identifiable as outliers. The outlier samples exhibited distinct characteristics, i.e., rice genotype Pan-M with characteristics of the highest level of ICK (7.54%) and IFM (5.60%); Cem-J was distinct with the ultimate RSK (19.59%), and two other genotypes, Inp43-K and Inp43-J, were notable with the maximum levels of damaged-yellow kernels (19.98% and 19.56%, respectively).

Principal component analysis (PCA) (Table 3) identified two principal components with eigenvalues greater than two, viz., PC1 (2.78) and PC2 (2.28). PC1 explained 30.87% of the total variation, while PC2 explained 25.33%, resulting in a cumulative variance of 56.20% for the first two principal components. The variable that contributed most to the variation in PC1 was IFM (0.53). In PC2, the key contributing variables were DYK (0.54) and bulk density (-0.51). Higher levels of impurities and damaged yellow kernels generally resulted in lower milled rice yields. Figure 3 illustrates the distribution of the nine-grain quality characteristics across the four quadrants. All the rice quality traits were spread across four different quadrants. Notably, the traits bulk density and 1000-grain weight were in the same quadrant and exhibited proximity, suggesting a positive correlation between these two variables.

This study provides valuable insights into the physical grain characteristics of rice genotypes in Merauke. Nevertheless, it is important to acknowledge specific limitations.

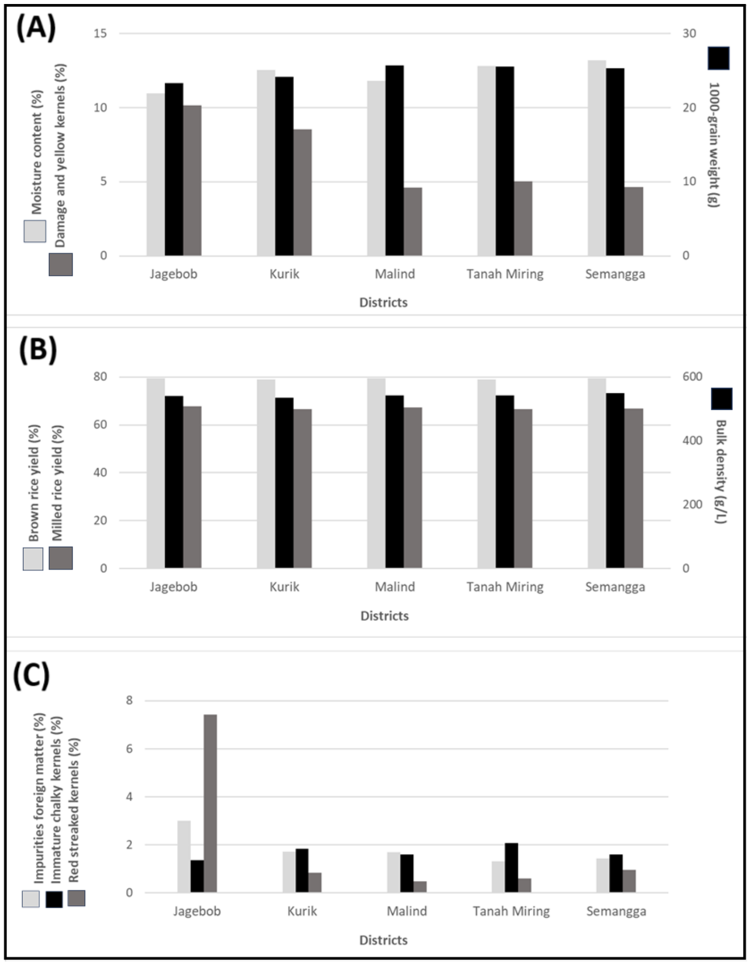

Figure 1. Bar chart for the average of nine characteristics of grain quality observations from five districts in Merauke Regency.

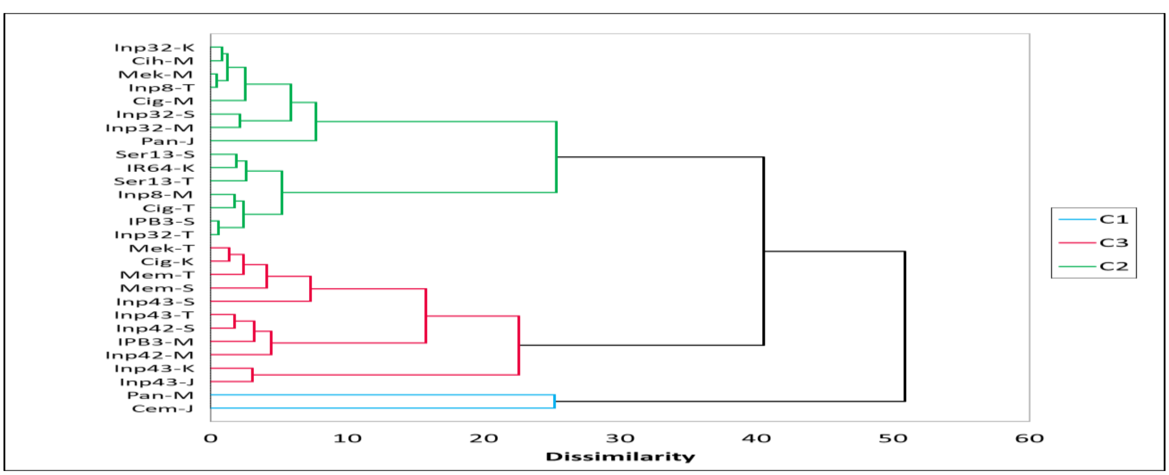

Figure 2. Grouping dendrogram of 28 samples using hierarchical cluster analysis following Ward's method.

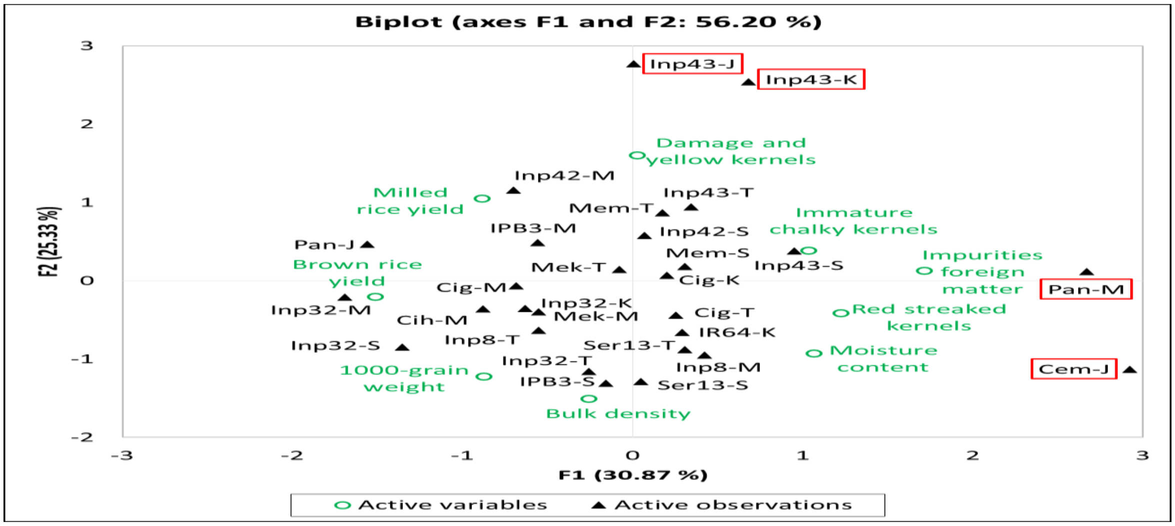

Figure 3. PCA-biplot of 28 samples based on nine characteristics of grain quality observation. Samples with red borders indicate outliers.

Table 3. PCA of nine observed characteristics.

No.	Characteristics	F1	F2
1	Moisture content	0.33	-0.32
2	Impurities and foreign matter	0.53	0.04
3	Bulk density	-0.08	-0.51
4	1000-grain weight	-0.27	-0.42
5	Immature and chalky kernels	0.32	0.13
6	Damage and yellow kernels	0.01	0.54
7	Red streaked kernels	0.38	-0.14
8	Brown rice yield	-0.47	-0.07
9	Milled rice yield	-0.27	0.36
10	Eigenvalue	2.78	2.28
11	Variability (%)	30.87	25.33
12	Cumulative (%)	30.87	56.20

Firstly, the conduct of the study transpired within a single year, potentially limiting the generalizability of research findings due to potential seasonal variability in rainfall, temperatures, and soil conditions. Secondly, the geographic scope of this research only included five districts in Merauke, possibly limiting the applicability of conclusions to other regions with different soil types and climates. Future research should aim to address these limitations by conducting multi-year studies, expanding geographic sampling, and incorporating environmental data.

CONCLUSIONS

The rice genotypes grown in Merauke Regency, Indonesia, exhibited significant variability in grain quality traits. The observed characteristics, including moisture content, IFM, bulk density, 1000-grain weight, ICK, DYK, RSK, brown rice yield, and milled rice yield, demonstrated considerable variations. Cultivation of rice cultivars totaled 13 across the five districts (Jagebob, Kurik, Malind, Tanah Miring, and Semangga). Overall, grain quality in the five districts was generally good.

For grain quality, five observed characteristics met the SNI standard. However, moisture content required special attention. Proper harvest and postharvest practices are crucial for enhancing the grain quality and improving the market value.

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