



Investigating, Determining Morphological Features, Development and Producing Capacity, and Linking Local Rice (*Oryza Sativa* L.) in Sumedang District

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Abstract. In order to create future superior varieties, local rice (*Oryza sativa* L.) is a source of germplasm. In Sumengang Regency, conservation efforts are required to prevent the extinction of native rice genotypes. This study attempts to investigate native rice in Sumedang Regency, identifying morphological characteristics, studying growth and yield, and family links. The study's sites included greenhouses and experimental paddy fields at Winaya Mukti University's Faculty of Agriculture in Tanjungsari, Sumedang Regency, and the Sumedang Regency area. A survey method, descriptive qualitative analysis, and an experimental methodology employing a Randomized Block Design (RBD) with 18 treatments of local rice cultivars and two repetitions were used to conduct the research from May 2022 to December 2022. Sixteen local rice cultivars from Sumedang and two local rice cultivars from Tuban and Probolinggo were discovered as a result of research in the form of exploration; morphological characters were identified using the UPOV criteria (2020); growth characters with high yields were discovered in Gemah and Tri Sakti cultivars, whereas Bagendit cultivars tended to have low growth but high fruitfulness. All 18 of the examined cultivars showed variations in growth and yield. The dendrogram that resulted from the phenetic analysis split the eighteen rice cultivars into two groups: Group I was made up of local rice cultivars, namely Sertani, Bagendit, Masreum, Gading, Jablay, Patenggang, Gede Wangi, Hawara salak, Mentik Susu A, Godang, and Omas Genteng; group II was made up of local rice cultivars, namely Jalur, Gemah, Mesir Super, Sri Dewi, Tri Sakti, Mentik Susu B, and Mareum. There is a 56.16% similarity between each distinct rice variety. Many Sumedang local rice cultivars, such as Gading, Jablay, and Patenggang, share morphological characteristics. The morphological character data shows a 90% similarity coefficient amongst the cultivars.

Keywords: Exploration, Family Relationships, Identification, Morphological Characters, Rice

INTRODUCTION

For over one billion households worldwide, rice (*Oryza sativa* L.) provides calories, income, and a means of subsistence. Rice is a staple meal for over half of the world's population. According to Rice and Grains (2020), rice has been a major crop worldwide for generations. Finding rice cultivars resistant to drought is critical as the world climate improves. Low evaporation and high temperatures characterize summertime in tropical regions. Produced rice is

more drought-tolerant under these environmental conditions than subtropical ones. Anticipating, adjusting to, and mitigating droughts from scarce water supplies are urgent tasks prompted by climate change (Mabrouka Oustani et al., 2023; Kusumaningrum H et al., 2015). Of particular importance is the investigation of indigenous rice breeds. Because native rice is resistant to extreme heat, drought, and environmental stress, all local seeds can be used as essential for rice development. In order to improve rice's genetic makeup through tolerance to environmental stresses and resilience to diseases and pests, local rice contains many critical genes.

Rembang (2018) claims that genetic material collection and conservation are becoming more and more crucial due to genetic deterioration brought on by contemporary farming methods. In order to improve cultivars that are better suited for the "environment," West Java is home to a wealth of native rice cultivars, particularly in the Sumedang region. These cultivars should be protected and used to develop rice genetic resources. For plant breeding efforts, it is helpful to investigate and identify each local rice cultivar's morphological traits and prospective yields. Links between regional rice cultivars can be used to establish whether local rice cultivar names vary among Sumedang district regions, or they can be used as a starting point for figuring out the parents' genotype to create a baseline population.

METHOD

Cow dung manure, NPK fertilizer, Bioconversion Biofertilizer, and 16 local rice cultivars from Sumedang (Sertani, Gede Wangi, Bagendit, Gading, Jablay, Patenggang, Godang, Hawara Salak, Omas Genteng, Tri Sakti, Jalur, Sri Dewi, Mesir Super, Gemah, Masreum, Mareum) were used as comparison materials in this experiment.

The study was conducted with utmost precision, employing a wide array of tools, including hand tractors, ticks, hoes, hand sprayers, plastic bags, pegs, mushrooms, hoes, hand sprayers, gembor, ticks, stakes, leaf color chart (BWD), digital calipers, name signs, plant labels, digital scales, tape measure, seed containers, seeding containers, buckets, sprayers, cameras, and stationery. A Simple Randomized Block Design with 18 treatments of regional rice cultivars was the meticulously chosen methodology for the two-times-repeated experiment conducted in teak fields and greenhouses. A combination of qualitative and quantitative descriptive methodologies was used to perform the research from May 2022 to December 2022, ensuring the validity and reliability of the results.

The research results were analyzed statistically using a linear model as follows:

$$X_{ij} = \mu + \tau_i + \beta_j + \epsilon_{ij}$$

Information:

X_{ij} = Observation results in the j th treatment and i th replication

μ = General average value

τ_i = Effect of the i -th repetition

β_j = Effect of the j th treatment

ϵ_{ij} = The effect of random factors from the j th treatment and the i th replication

DISCUSSION

Exploration

Sixteen native rice cultivars from Sumedang Regency were discovered based on the exploration results (Table 1) in four sub-district locations: Jatigede District (Karedok Village), Rancakalong District (Rancakalong Village), Tanjung Sari District (Tanjungsari Village), and Sukasari District (Genteng Village). Two comparative cultivars were also discovered, from Tuban (Mentik Susu A) and Probolinggo (Mentik Susu B). It is the best local rice cultivar in Tuban district, East Java province, and has the advantages of being resistant to lodging, fragrant pandan rice, a textured rice that is fluffier and more white than other varieties, and a color that is similar to milk; this rice is used.

Table 1. Location of Origin of Local Rice Seeds in Sumedang Regency and Two Comparative Cultivars (Mentik Susu A and B)

No	Cultivar Name	Location of Seed Origin
1.	Sertani (A)	Karedok village – Jatigede district
2.	Gede wangi (B)	Karedok village – Jatigede district
3.	Bagendit (C)	Karedok village – Jatigede district
4.	Gading (D)	Karedok village – Jatigede district
5.	Jablay (E)	Karedok village – Jatigede district
6.	Patenggang (F)	Karedok village – Jatigede district
7.	Godang (G)	Tanjungsari village – Tanjungsari district
8.	Hawara salak (H)	Ranca Kalong village – Ranca Kalong district
9.	Omas genteng (I)	Genteng village – Sukasari district
10.	Tri sakti (J)	Tanjungsari village – Tanjungsari district
11.	Jalur (K)	Ranca Kalong village – Ranca Kalong district
12.	Sri dewi (L)	Ranca Kalong village – Ranca Kalong district
13.	Mesir super (M)	Tanjungsari village – Tanjungsari district
14.	Gemah (N)	Tanjungsari village – Tanjungsari district
15.	Masreum (O)	Genteng village – Sukasari district
16.	Mareum (P)	Genteng village – Sukasari district
17.	Mentik susu A (Q)	Tuban (comparison)
18.	Mentik susu B (R)	Probolinggo (comparison)

Identification

The results of the identification of 18 local rice cultivars grown in the Greenhouse of the Tanjungsari Faculty of Agriculture have similarities in leaf color, stem color, grain color, growth habit, ligule shape, ligule color, node color, and flag leaf position for all rice cultivars.

1. Leaves

The bush rice has distinct leaf sections, content, and shape. Scales and leaf spines are two characteristics that set rice leaves apart. Though the cultivars Gading, Jablay, Tri Sakti, Jalan, Egypt Super, Gemah, Masreum, and Mareum have dark green leaf color, the cultivars Sertani, Gede Wangi, Bagendit, Patenggang, Godang, Hawara Salak, Omas, and Sri Dewi all have the same leaf color (Table 2).



Figure 1. Godang rice cultivar leaves (green)
(Personal Documentation, 2022)



Figure 2. Mareum cultivar rice leaves (dark green color)
(Personal Documentation, 2022)

Table 2. Identification of Morphological Characteristics of Local Rice Leaves in Sumedang Regency

Cultivar Name	Leaf Color	Flag Leaf Position	Distal Leaf Sheath	Basal Leaf Sheath	Flag Leaf Width
Sertani	green	upright	moderate	moderate	1,6 cm
Gede Wangi	green	upright	absent	moderate	1,6 cm
Bagendit	green	rather upright	moderate	moderate	1,7 cm
Gading	dark green	rather upright	moderate	moderate	1,7 cm
Jablay	dark green	rather upright	moderate	moderate	1,7 cm
Patenggang	green	upright	moderate	moderate	1,9 cm
Godang	green	rather upright	moderate	strong	1,9 cm
Hawara Salak	green	rather upright	moderate	moderate	1,6 cm
Omas Genteng	green	rather upright	Semi erect	moderate	1,9 cm
Tri Sakti	dark green	rather upright	moderate	moderate	0,7 cm
Jalur	Light green	rather upright	moderate	moderate	0,7 cm
Sri Dewi	green	Horizontal	moderate	moderate	3.0 cm
Mesir Super	dark green	rather upright	moderate	moderate	3.0 cm
Gemah	dark green	Horizontal	moderate	moderate	3.0 cm
Masreum	dark green	rather upright	moderate	moderate	2,4 cm

Cultivar Name	Leaf Color	Flag Leaf Position	Distal Leaf Sheath	Basal Leaf Sheath	Flag Leaf Width
Mareum	dark green	rather upright	moderate	moderate	2,0 cm
Mentik Susu A	green	rather upright	weak	moderate	1,9 cm
Mentik Susu B	green	rather upright	moderate	moderate	2,2 cm

2. Stem

With numerous segmented stems and books covering both ends, rice belongs to the grass family. Segments one, two, three, and so on are longer than the preceding segment, with the shortest segment located at the base of the stem. Sertani, Gading, Jablay, Patenggang, Godang, Omas, and other Gemah cultivars (Figure 3) have semi-upright plant growth habits; Bagendit, Gede Wangi, Hawara Salak, Chanel, Sri Dewi, and Mesir Super, Trisakti cultivars (Figure 4), have moderate/slightly upright plant growth habits; and Mareum, Mentik Susu A, an upright cultivar (Figure 5).

strong



Figure 3. Semi-erect growth habit (gemah cultivar)
Personal documentation, 2022



Figure 4. Slightly Upright Growth Habit (Tri Sakti)
Personal documentation, 2022



Figure 5. Upright Growth Habit (Mareum cultivar)
Personal documentation, 2022

The length, thickness and color of the stem nodes of the 18 local rice cultivars observed can be seen in Table 3.

Table 3. Stem Length and Thickness of Local Rice along with Stem Node Color

Cultivar Name	Stem Length (cm)	Stem thickness (cm)	Stem node Color
Sertani	50	0,8	Light green
Gede wangi	69	0,7	Light green
Bagendit	50	0,6	Light green
Gading	40	0,6	Light green
Jablay	51	0,5	Light green
Patenggang	47	0,6	Light green

Godang	80	0,6	green
Hawara salak	60	2,6	green
Omas genteng	81	2,9	Dark green
Tri sakti	110	0,5	green
Jalur	79	0,9	green
Sri dewi	67	0,5	green
Mesir super	68	0,6	green
Gemah	73	0,8	green
Masreum	53	0,4	violet
Mareum	64	0,5	violet
Mentik susu A	47	0,6	green
Mentik susu B	26	0,9	green

Average Plant Height, Age at Harvest, Panicle Length and Weight of 100 Grains (Table 4), Characteristics of Panicles, Branches and Time of Panicle Aging (Table 5), all observed local rice cultivars.

3. Average Plant Height, Harvest Age, Panicle Length and Weight of 100 Grains

Table 4. Plant Height, Age at Harvest, and Weight of 100 Local Rice Grains

Cultivar Name	Plant height (cm)	Harvest Age (HST)	Weight of 100 grains (g)
Sertani	50	116	2,46
Gede wangi	69	95	2,56
Bagendit	50	110	2,12
Gading	40	117	2,82
Jablay	51	95	2,38
Patenggang	47	97	2,36
Godang	80	116	2,54
Hawara salak	60	95	2,50
Omas genteng	81	117	2,04
Tri sakti	110	116	2,21
Jalur	79	109	2,89
Sri dewi	67	106	2,67
Mesir super	73	115	2,62
Gemah	73	110	2,55
Masreum	53	108	2,76
Mareum	64	95	2,54
Mentik susu A	47	113	2,71
Mentik susu B	56	113	2,07

4. Panicle Characteristics, Branches and Panicle Aging Time

Table 5. Characteristics of Local Rice Panicles in Sumedang Regency

Cultivar Name	Number of Panicle	Panicle Length	Panicle Density	Panicle Attitude	Panicle Branch Attitude	Number of Secondary Branch Panicles	Panicle Senescence Time
Sertani	19	20,80	medium	duck	very upright	much	late
Gede wangi	29	22,40	medium	duck	very upright	moderate	late
Bagendit	14	20,60	medium	duck	very upright	moderate	late
Gading	11	20,70	loose	duck	very upright	little	late
Jablay	8	19,30	loose	duck	very upright	little	late
Patenggang	13	19,40	dense	duck	very upright	little	late
Godang	18	22,60	medium	duck	very upright	moderate	late
Hawara salak	15	21,30	medium	duck	very upright	little	late
Omas genteng	11	28,60	medium	duck	very upright	moderate	late
Tri sakti	17	28,20	medium	duck	very upright	much	late
Jalur	8	25,90	medium	duck	very upright	much	late
Sri dewi	11	27,30	medium	duck	upright	much	late
Mesir super	24	28,10	dense	Semi duck	upright	much	late
Gemah	14	27,80	dense	Semi duck	very upright	much	late
Masreum	16	20,80	medium	duck	very upright	moderate	late
Mareum	6	23,70	loose	duck	very upright	little	late
Mentik susu A	8	23,10	medium	duck	very upright	much	late
Mentik susu B	33	34,10	dense	duck	very upright	much	late

5. Grain

Godang, Hawara Salak, Omas Genteng, Tri Sakti, Jalan Sri Dewi, Egypt Super, Gemah, Masreum, and Mareum are brown-colored cultivars; Bagendit is a yellow-colored cultivar. The Sertani, Gede Wangi, Gading, and Jablay Patenggang cultivars have light brown grain color characteristics. Table 6 and Figure 6 show the grain's color and form features.



Figure 6. Shape of Grain
(Personal Documentation, 2022)

Table 6. Characteristics of Local Rice Grain

Cultivar Name	Grain Color/Lemma	Grain Tail Length	Tail Color Grain	Weight 100 Grains	Grain Length	Grain Width
Sertani	green	upright	Light brown	2,46	9,45	2,48
Gede wangi	green	upright	Light brown	2,56	10,33	2,76
Bagendit	green	Semi upright	Light brown	2,61	9,39	3,09
Gading	dark green	Semi upright	Light brown	2,82	10,09	2,97
Jablay	dark green	Semi upright	Light brown	2,38	9,51	2,81
Patenggang	green	upright	Light brown	2,36	10,20	3,01
Godang	green	Semi upright	brown	2,54	10,28	2,77
Hawara salak	green	Semi upright	brown	2,50	7,20	3,24
Omas genteng	green	Semi upright	brown	2,04	7,51	2,95
Tri sakti	dark green	Semi upright	brown	2,21	7,14	2,76
Jalur	Light green	Semi upright	brown	2,89	8,56	3,04
Sri dewi	green	Horizontal	brown	2,67	10,12	3,55
Mesir super	dark green	Semi upright	yellowish	2,62	8,54	3,34
Gemah	dark green	Horizontal	brown	2,55	8,28	3,10
Masreum	dark green	Semi upright	brown	2,76	9,54	3,12
Mareum	dark green	Semi upright	brown	2,54	9,44	2,72
Mentik susu A	green	Semi upright	brown	2,71	8,77	3,36
Mentik susu B	green	Semi upright	brown	2,07	8,56	2,77

Plant Growth and Yield

Growth characteristics (Table 7-9) and Plant Yields (Table 10) of local rice planted in the paddy fields of the Faculty of Agriculture, Winayamukti University, Tanjungsari Sumedang are:

a) Plant Height

Table 7. Average Height of Local Rice Plants Age 15 HST-75 HST

Treatment	Average Plant Height				
	15 HST	30 HST	45 HST	60 HST	75 HST
A = Sertani	20,71 a	30,06 a	41,59 a	61,83 b	62,76 a
B = Gede Wangi	21,03 a	29,75 a	44,59 a	53,01 a	70,71 b
C = Bagendit	21,44 a	32,13 a	45,29 a	54,59 a	62,59 a
D = Gading	20,09 a	28,25 a	42,88 a	60,01 b	62,53 a
E = Jablay	19,41 a	29,44 a	42,35 a	55,15 a	64,24 a
F = Patenggang	19,18 a	28,94 a	43,16 a	59,16 b	66,96 b
G = Godang	19,36 a	31,20 a	46,88 a	59,15 b	68,70 b
H = Hawara Salak	21,68 a	31,94 a	53,55 c	70,98 c	77,63 c
I = Omas	22,19 a	33,66 b	54,28 c	68,09 c	79,85 c
J = Tri Sakti	21,24 a	30,25 a	51,54 b	75,59 d	81,30 c
K = Jalur	20,91 a	29,50 a	44,14 a	66,76 c	70,50 b
L = Sri Dewi	23,36 a	38,19 b	54,66 c	70,70 c	79,93 c
M = Mesir Super	21,43 a	35,63 b	44,96 a	58,61 b	62,66 a
N = Gemah	22,56 a	35,88 b	55,05 c	76,65 d	79,38 c
O = Masreum	22,48 a	35,25 b	50,35 b	61,73 b	71,21 b
P = Mareum	21,19 a	30,44 a	48,25 a	64,23 b	69,89 b
Q = Mentik Susu A	19,49 a	31,88 a	50,03 b	62,81 b	67,50 b
R = Mentik Susu B	18,46 a	29,03 a	43,41 a	53,54 a	59,18 a

Note:

The average number marked with the same letter in each of the same column is not significantly different according to the Skott-Knott test at the 5% level of significance.

From Table 7 it can be seen that the cultivars of Hawara Salak, Omas, tri sakti, sri Dewi, Gemah have the highest plant height compared to other cultivars.

b) Number of tillers per clump

Table 8. Average number of tillers per clump
Treatment Average Number of Puppies

Treatment	Average number of offspring		
	45 HST	60 HST	75 HST
A = Sertani	9,63 a	18,50 b	18,50 a
B = Gede Wangi	14,38 a	16,00 a	17,13 a
C = Bagendit	10,50 a	15,75 a	16,88 a
D = Gading	8,13 a	15,88 a	16,13 a
E = Jablay	7,00 a	18,50 b	18,75 a
F = Patenggang	7,25 a	10,50 a	17,13 a
G = Godang	9,13 a	11,48 a	17,75 a
H = Hawara Salak	11,38 a	21,38 b	21,63 a
I = Omas	10,50 a	13,88 a	15,25 a
J = Tri Sakti	7,25 a	14,13 a	14,63 a
K = Jalur	9,63 a	19,75 b	19,88 a
L = Sri Dewi	10,88 a	16,00 a	16,25 a
M = Mesir Super	9,63 a	20,88 b	21,13 a
N = Gemah	7,88 a	14,75 a	15,38 a
O = Masreum	11,63 a	16,38 a	18,63 a
P = Mareum	10,13 a	17,50 b	17,63 a
Q = Mentik Susu A	9,00 a	13,13 a	16,00 a
R = Mentik Susu B	10,00 a	17,75 b	18,88 a

Note:

The average number marked with the same letter in each of the same column is not significantly different according to the Skott-Knott test at the 5% level of significance.

c) Length and Number of Panicles

Table 9. Panicle Length and Number of Panicles

Treatment	Panicle Length (cm)	Number of Panicles (fruit)
A = Sertani	21,15 a	21,75 c
B = Gede Wangi	21,05 a	18,00 b
C = Bagendit	20,50 a	19,50 c
D = Gading	19,10 a	10,38 a
E = Jablay	19,25 a	22,75 c
F = Patenggang	22,25 a	14,88 b
G = Godang	23,55 a	17,13 b
H = Hawara Salak	22,30 a	15,75 b
I = Omas	26,50 b	11,75 a
J = Tri Sakti	27,80 b	16,38 b
K = Jalur	25,30 b	20,00 c
L = Sri Dewi	26,20 b	15,00 b

Treatment	Panicle Length (cm)	Number of Panicles (fruit)
M = Mesir Super	25,00 b	21,50 c
N = Gemah	28,35 b	15,38 b
O = Masreum	20,35 a	20,75 c
P = Mareum	23,40 a	16,88 b
Q = Mentik Susu A	22,75 a	16,25 b
R = Mentik Susu B	24,10 b	29,50 d

Note:

The average number marked with the same letter in each of the same column is not significantly different according to the Skott-Knott test at the 5% level of significance.

Based on Table 10. the results of the analysis of panicle length observations on the cultivars Omas (I), Tri Sakti (J), Jalur (K), Sri Dewi (L), Mesir Super (M), Gemah (N) and Mentik Susu B (R) longer than other treatments. The highest number of panicles was obtained from the comparison cultivar, namely Mentik Susu B.

d) Harvested Dry Grain Weight and Milled Dry Grain Weight

Table 10. Potential Yield Test on Harvested Dry Grain Weight and Milled Dry Grain Weight

Treatment	Average Harvested Dry Grain Weight per Plot (kg)	Average Milled Dry Grain Weight per Plot (kg)
A = Sertani	5,90 a	4,90 a
B = Gede Wangi	6,15 a	5,16 a
C = Bagendit	9,25 b	7,72 b
D = Gading	1,65 a	1,18 a
E = Jablay	3,20 a	2,41 a
F = Patenggang	4,20 a	3,19 a
G = Godang	5,50 a	4,41 a
H = Hawara Salak	3,05 a	2,16 a
I = Omas	4,55 a	3,42 a
J = Tri Sakti	9,60 b	8,55 b
K = Jalur	3,60 a	2,86 a
L = Sri Dewi	3,85 a	2,83 a
M = Mesir Super	5,40 a	4,23 a
N = Gemah	7,90 b	6,82 b
O = Masreum	5,25 a	4,05 a
P = Mareum	4,85 a	3,76 a
Q = Mentik Susu A	3,75 a	3,03 a
R = Mentik Susu B	8,95 b	7,91 b

Note:

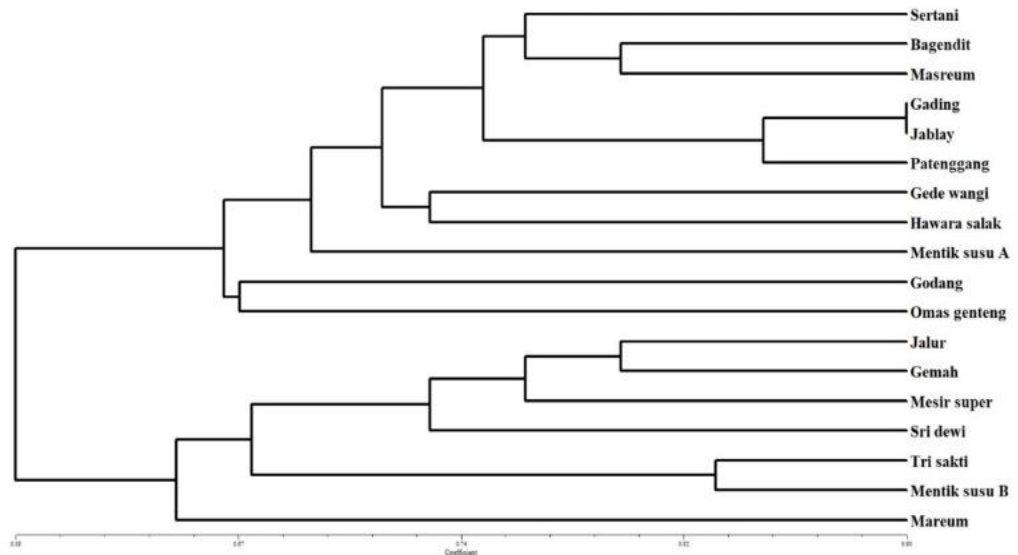
The average numbers marked with the same letter in each column are not significantly different according to the Skott-Knott test at the 5% significance level.

From Table 10 it can be seen that the cultivars Bagendit, Tri Sakti, Gemah and Mentik Susu B have the highest harvested dry grain weight (GKP) and milled dry grain weight (GKG) compared to other cultivars.

Phenetic Analysis

Including morphological characters based on the 2020 UPOV table, 30 characters/characters were chosen. The acquired characters were assigned a numerical code corresponding to the 2020 UPOV table. Morphological descriptions of local rice cultivars in the Sumedang area were used as research data and organized in a data matrix table for easy analysis. Afterward, a dendro program that separated the regional rice cultivars into two significant groups was created by importing the feature coding results into the NTSYS-pc version 2.11a program. A dendro program was developed due to this fantastic study, which split 18 local rice varieties into two branches (Figure 7).

Figure 7. Dendrogram of Relationships between Local Rice Cultivars Based on Morphological Characteristics



Regarding adaptation to its growing environment, each cultivar possesses unique traits. According to Hadi Alipour et al. (2021), Castillo Aguilar et al. (2021), and Chao Wu (2021), the maintenance of productivity is highly dependent on distinct genetic variety. Indigenous plants serve distinct agroecological and social purposes and provide valuable genetic resources for plant breeding (Julian et al., 2022; Qiang He, 2023; Manfred Mayer et al., 2020).

Plant height, branch count, panicle length, panicle count, weight of harvested dry grain, and weight of milled dry grain are a few of the factors that show this. Two causes, internal and external, are to blame for this. Exogenous variables include soil, water, sunlight, humidity, nutrients, and the planted seed or cultivar.

Plant growth and yield depend highly on how well a particular plant is suited to its growing environment. The features of each cultivar and the environmental circumstances in which it grows vary, resulting in variations in the components of growth and yields. A complicated combination of cumulative, duplicate, dominant, and/or extremely dominant genes, as well as environmental influences, governs this feature.

According to the analysis's findings, both qualitative and quantitative attributes exhibit a diversity of expressions in each cultivar. According to Agata Rascio et al. (2023), multiple genes regulate quantitative traits. The environment significantly influences them, while one or two genes regulate qualitative traits and are very little influenced by the environment. Phenotypic traits are specific to individuals.

Each indigenous Sumedang Regency rice cultivar varies in its ability to adapt in terms of output and growth. According to the abovementioned observations on rice growth characteristics, the Bagendit cultivar has the lowest plant height. In contrast, the Trisakti and Gemah cultivars have considerably higher plant heights than others.

According to the data analysis and cultivar identification, Gemah, Tri Sakti, and Bagendit cultivars have the best potential yields compared to other cultivars. In Tanjungsari Sumedang, the rice cultivar Gemah has a potential yield of 10.46 tonnes/ha; however, its actual yield of 4.85 tonnes/ha has been identified; this discrepancy may be attributed to variances in climate.

Based on observations made on plants that were 15 days old, there were no discernible differences between the plant height parameters of any cultivar. Differences in attributes start to show between the ages of 45 and 75 HST. Because of each genotype's unique traits, Tri Sakti is the tallest plant. Plant height varied according to the diversity of genotypes tested. Growth is also influenced by variations in plant height brought about by varying cultivars' absorption of nutrients.

The findings demonstrated that the number of grains per panicle, healthy grains per panicle, and empty grains per panicle would vary depending on the respective panicle lengths of each local rice cultivar in the Sumedang region. Following threshing and dirt removal, the harvested dry grain weight is measured, converted to kg/plot, and recorded. Cultivars of Tri Sakti and Gemah show the best prospective results from all observed variables. Because of its limited growth potential, the Bagendit cultivar was left out.

According to Jiqiong Ma (2020), the study's results indicate low yields because the local rice's productivity is low due to its low productivity. However, the rice can be used as germplasm to develop resistance to diseases, pests, and environmental stress. Although the experimental site

experiences an average daily temperature of 25.32°C, the Tanjungsari area is a highland area, where producing rice plants requires temperatures between 19°C and 23°C. Varieties of plants with high environmental adaptation are needed due to global climate change (Leilei Qiu, 2021).

The local Sumedang rice cultivars are divided into two groups of similar characters after a phenetic analysis based on morphological characters was conducted using the NTSYS-pc version 2.11a program to produce a dendrogram and calculate the degree of similarity coefficient of local rice morphological characteristics. The dendrogram (Figure 7) illustrates the closeness of the familial linkages between sixteen local rice cultivars in Sumedang Regency and two local rice variants based on their morphology.

The morphological characteristics of several local Sumedang rice cultivars, such as the Gading, Jablay, and Patenggang cultivars, are similar, with a similarity coefficient level of 90% based on the morphological character data based on the UVOP 2020 table. These similarities include the following:

- The shape of the flag leaf, the length of the stem, the color of the light green stem node, the color of the lemma tip, the attitude of the flag leaf, the slight uprightness, and the number of secondary branches are small.
- The lemma and grain glume are brown.
- The color of the grain is yellow.
- The height of the plant is nearly the same.

In addition, the cultivars originate from the exact location, specifically in Kampung Karedok Village Jatigede District, Sumedang Regency. Human attempts to grow or create new, superior varieties of a plant can limit the genetic diversity of that species of plant, pushing aside or even destroying very beneficial local varieties.

Reducing genotypic diversity, crucial for plant propagation, makes this scenario a severe concern (Rembang et al., 2018). Plants' range of morphological features is a valuable resource for breeding operations. Morphological and anatomical characteristics are the most straightforward markers for plant identification, and they can also be used to establish species affiliation.

Understanding the morphological traits of the local rice can help preserve its genetic resources, given its numerous benefits and significance. When choosing rice plants, it can be helpful to be aware of the morphological characteristics and relatives of the local rice.

CONCLUSION

1. Gemah and Tri Sakti are two local rice plants with significant growth and output features. The growth and output of the 18 examined rice cultivars varied, while the Bagendit cultivar tended to proliferate while maintaining a high production level. Compared to the control cultivar, Mentik Susu B, the Tri Sakti cultivar generated the most significant weight of dry-milled grain per plot of the other cultivars, indicating that it was the cultivar with the highest yield.
2. A dendrogram resulting from the phenetic analysis separated the eighteen rice cultivars into two groups: Group I was composed of local rice cultivars, namely Sertani, Bagendit, Masreum, Gading, Jablay, Patenggang, Gede Wangi, Hawara salak, Mentik Susu A, Godang, and Omas Genteng; group II was composed of local rice cultivars, namely Chanel, Gemah, Mesir Super, Sri Dewi, Tri Sakti, Mentik Susu B, and Mareum. There is a 56.16% similarity between each distinct rice variety. Morphological character data based on the UVOP 2020 table shows similarities in the morphological characteristics of various Sumedang local rice cultivars, including the Gading, Jablay, and Patenggang cultivars, with a 90% similarity coefficient.

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BIBLIOGRAPHY

- Agata Rascio, Fabrizio Fiorillo, Silvana Paone, Gluditta De Santis dan Giuseppe Sorrentino. 2023. Quantitative botanical characterization of Saragolla wheat landraces from Abruzzo and Puglia Regions of Italy. *Plant Genetik Resources : Characterization and Utilization* 20 :434-441. <https://doi.org/10.1017/S1479262123000345> . Published online by Cambridge University Press
- Castillo-Aguilar, L. C. López Castilla,, N. Pacheco, J. C. Cuevas-Bernardino, R. Garruña5and R. H. Andueza-Noh. 2021. Phenotypic diversity and capsaicinoid content of chilli pepper landraces (*Capsicum* spp.) from the Yucatan Peninsula. *Plant Genetik Resources: Characterization and Utilization* :19(20: 159-166. ISSN 1479-2621.[https:// doi:10.1017/S1479262121000204](https://doi.org/10.1017/S1479262121000204). Published online by Cambridge University Press

- Chao Wu, Kehui Cui, Qian Li, Liuyong L, , Wencheng Wang, , Qiuqian Hu, Yanfeng Ding, Ganghua Li, Shah Fahad, Jianliang Huang, Lixiao Nie, dan Shaobing Peng. 2021. Estimating the yield stability of heat-tolerant rice genotypes under various heat conditions across reproductive stages : a 5-year case study. *Scientific reports* (11). Nature portfolio. www.nature.com/scientificreports. | <https://doi.org/10.1038/s41598-021-93079-x>
- Hadi Alipour, Hossein Abdi, Yousef Rahimi, dan Mohammad Reza Bihamta. 2021. Dissection of the genetic basis of genotype-by-environment interactions for grain yield and main agronomic traits in Iranian bread wheat landraces and cultivars. *Scientific Reports* 11-1742. www.nature.com/scientificreports. Articles <https://doi.org/10.1038/s43016-021-00280-2>. <https://doi.org/10.1038/s41598-021-96576-1>
- Irawan, B., and K. Purbayanti. 2008. Characterization and Relationships of Local Rice Varieties in Rancakalong Village, Rancakalong District, Sumedang Regency. Monday. Nas. PTTI: 0–31. https://pustaka.unpad.ac.id/wp-content/uploads/2010/05/characteristic_and_local_rice_cultivar_kinship.pdf
- Jiqiong Ma, Yiding Sun, Yi Yang, Cuifeng Tang, Xinxiang A dan Minghui Xu. 2020. Molecular analysis of five rice blast resistant genes in landraces from Myanmar and Laos. *Plant Genetic Resources : Characterization and Utilization* 18(4): 287-293. Cambridge University Press. ISSN 1479-2621. <https://doi.org/10.1038/s41598-021-96576-1>.
- Julian Ramirez-Villegas, Colin K. Khoury, Harold A. Achicanoy, Maria Victoria Diaz, Andres C. Mendez, Chrystian C. Sosa, Zakaria Kehel, Luigi Guarino, Michael Abberton, Jorrel Aunario, Bashir Al Awar, Juan Carlos Alarcon, Ahmed Amri, Noelle L. Anglin, Vania Azevedo, Khadija Aziz, Grace Lee Capilit, Oswaldo Chavez, Dmytro Chebotarov, Denise E. Costich, Daniel G. Debouck, David Ellis, Hamidou Falalou, Albert Fiu, Michel Edmond Ghanem, Peter Giovannini, Alphonse J. Goungoulou,
- Badara Gueye, Amal Ibn El Hobyb, Ramni Jamnadass, Chris S. Jones, Bienvenu Kpeki, Jae-Sung Lee, Kenneth L. McNally, Alice Muchugi, Marie-Noelle Ndjiondjop, Olaniyi Oyatomi, , Thomas S. Payne, Senthil Ramachandran, Genoveva Rossel, Nicolas Roux, Max Ruas, Carolina Sansaloni, Julie Sardos, Tri Deri Setiyono, Marimagne Tchamba, Ines van den Houwe, J. Alejandro Velazquez, Ramaiah Venuprasad, Peter Wenz, Mariana Yazbek and Cristian Zavala. State of ex situ conservation of landrace groups of 25 major crops. *Nature plants* Vol. 8 (491-499). www.nature.com/natureplants. Articles <https://doi.org/10.1038/s41477-022-01144-8>
- Kusumaningrum, HP. 2015. Local Rice Island of Java: An Anticipation of Climate Change. Diponegoro University. Ministry of Law and Human Rights . <http://eprints.undip.ac.id/66883/>

- Leilei Qiu, Qinqin Wu, Xiaoying Wang, Jiupan Han, Gui Zhuang, Hao Wang, Zhiyun Shang, Wei Tian,, Zhuo Chen, Zechuan Lin, Hang He, Jie Hu,, Qiming, Juansheng, Jun Xu, Chen Li, Xiangfeng Wang, Yang Li, Shaohua Li, Rongyu Huang, Xu Chen, Cheng Zhang, Ming Lu, Chengzhi Liang, Peng Qin, Xi Huang, Shigui Li, and Xinhao Ouyang. 2021. Forecasting rice latitude adaptation through a daylength-sensing-based environment adaptation simulator. *Nature Food* Vol. 2 : 348-362. <https://www.nature.com/articles/s43016-021-00280-2>. Articles <https://doi.org/10.1038/s43016-021-00280-2>
- Mabrouka Oustani, Smail Mehda, Mohammed Tahar Halilat dan Haroun Chenchouni. 2023. Yield, growth development and grain characteristics of seven Quinoa (*Chenopodium quinoa* Wild.) genotypes grown in open-field production systems under hot arid climatic conditions. *Scientific reports*. (2023) 13-1991. *Nature portofolia*. <https://doi.org/10.1038/s41598-023-29039-4>
- Manfred Mayer, , Armin C. Hölker, , Eric González-Segovia, , Eva Bauer, Thomas Presterl, Milena Ouzunova, Albrecht E. Melchinger dan Chris-Carolin Schön. 2020. Discovery of beneficial haplotypes for complex traits in maize landraces. *Nature Communications*: 1-10. | <https://doi.org/10.1038/s41467-020-18683-3> | www.nature.com/naturecommunications
- Prabhandaru, I., dan T.S. ITS. 2017. Respon perkecambah benih padi (*Oryza sativa* L.) varietas lokal sigadis hasil iradiasi sinar gamma. *ejurnal.its.ac.id*. http://ejurnal.its.ac.id/index.php/sains_seni/article/view/25544 (accessed 22 Juni 2022).
- Qiang He 1, Sha Tang, Hui Zhi, Jinfeng Chen, Jun Zhang, Hongkai Liang, Ornob Alam, , Hongbo Li, , Hui Zhang, Lihe Xing, Xukai Li, Wei Zhang, , Hailong Wang, , Junpeng Shi, , Huilong Du, Hongpo Wu,
- Liwei Wang, , Ping Yang, Lu Xing, , Hongshan Yan, , Zhongqiang Song, Jinrong Liu, , Haigang Wang, Xiang Tian, Zhijun Qiao, Guojun Feng, Ruifeng Guo, Wenjuan Zhu, Yuemei Ren, Hongbo Hao, Mingzhe Li, Aiying Zhang, Erhu Guo, Feng Yan, Qingquan Li, Yanli Liu, Bohong Tian, Xiaoqin Zhao, Ruiling Jia, Baili Feng, , Jiewei Zhang, Jianhua Wei, Jinsheng Lai, , Guanqing Jia, Michael Purugganan dan Xianmin Diao. 2023. A graph-based genome and pan-genome variation of the model plant *Setaria*. 2023. *Nature genetiks* (55) : 1232-1242. <https://doi.org/10.1038/s41588-023-01423-w>
- Rembang, J.H.W., A.W. Rauf, and J.O.M. Sondakh. 2018. Morphological characteristics of local lowland rice on farmers' land in North Sulawesi. *Bul. Germplasm*. 24(1): 1–8. *BB Biogen*. <https://repository.pertanian.go.id/server/api/core/bitstreams/8999ad43-9d26-4bc5-a4ac-70a9581376de/content>
- Riadi, M., Kasmianti, I. Saputra, R. Sjahlil, dan Rafiuddin. 2019. Lokal Rice Genotypes of Tana Toraja and North Toraja Regencies: Kinship Relations and Character Interaction. *IOP Conf. Ser. Earth Environ. Sci.* 270(1): 012039. doi: 10.1088/1755-1315/270/1/012039.
- Rice, W., dan U. Grains. 2020. The 21st Century Agriculture : When Rice Research. *MDPI J. plants* 9(365): 2–15

UPOV. 2020. International Union For The Protection of New Varieties of Plants. Rice, UPOV Code(s): Oryza sativa L. Guidelines for The Conduct of Tests for Distinctness, Uniformity and Stability. <https://www.upov.int/edocs/tgdocs/en/tg016.pdf>