

# Comparison of the Application of Local and Superior Rice Varieties in Terraced Rice Fields and their Implications for Farmers' Income

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Received February 20, 2023; Revised April 14, 2023; Accepted May 9, 2023

## Cite This Paper in the Following Citation Styles

(a): [1] Nixia Tenriawaru, Muslim Salam, Muhammad Ridwan, Sitti Nurani Sirajuddin, Abdel Razzaq M. Al -Tawaha, Siti Hardiyanti Syam, "Comparison of the Application of Local and Superior Rice Varieties in Terraced Rice Fields and their Implications for Farmers' Income," *Universal Journal of Agricultural Research*, Vol. 11, No. 3, pp. 537 - 546, 2023. DOI: 10.13189/ujar.2023.110304.

(b): Nixia Tenriawaru, Muslim Salam, Muhammad Ridwan, Sitti Nurani Sirajuddin, Abdel Razzaq M. Al -Tawaha, Siti Hardiyanti Syam (2023). *Comparison of the Application of Local and Superior Rice Varieties in Terraced Rice Fields and their Implications for Farmers' Income*. *Universal Journal of Agricultural Research*, 11(3), 537 - 546. DOI: 10.13189/ujar.2023.110304.

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**Abstract** Using local and superior rice seed varieties is one of the factors in increasing farmers' production and income. Therefore, in making decisions, farmers need to choose which seed varieties are the most profitable and high quality. This study compared the use of local and superior rice varieties on terraced land and its implications for farmers' income from both varieties. The samples of this study were 30 farmers using local rice seed varieties and 30 farmers using superior varieties. Data were analyzed using descriptive analysis, R/C ratio analysis, and independent sample t-test analysis. The results showed that in terms of consumers, rice derived from local rice varieties is more desirable, although it is sold at a relatively higher price than superior varieties. As consumer demand is relatively high, farmers as producers tend to plant local varieties even though superior varieties are more efficient and there is seed assistance (subsidy) from the government. The independent sample t-test analysis showed a significant difference between farmers' income using local and superior rice varieties ( $0.000 < 0.005$ ), with an R/C ratio value of local varieties 3.46 and superior varieties 2.71.

**Keywords** Local Rice, Superior Rice, Varieties,

Farmers' Income

## 1. Introduction

Agriculture is one of the sectors that must be considered because it is the sector most engaged by the Indonesian population. The agricultural sector has proven to be the key and leading sector in reducing poverty in the aggregate, considering that the most significant poverty is found in rural areas [1], [2]. The agricultural sector is the center of attention in national development, especially regarding managing and utilizing strategic products, especially food commodities [3].

Rice as a food crop sub-sector commodity is vital for Indonesia. This is because over 95 percent of Indonesians choose rice as a staple [4]. Based on data from the National Bureau of Statistics [5], in 2019, national rice consumption of all types, including local, superior quality, and imported rice, averaged 1,374 kg per capita per week, then in 2020, it increased to 1,379 kg per capita per week. In 2021, rice

consumption will continue to grow, reaching 1,451 kg per capita per week. The high rice consumption rate will impact the demand for rice which continues to increase in quantity and quality. One of the steps the government takes to meet the current domestic demand for rice is to increase rice production by using quality rice seeds with high economic value so that farmers' income will increase.

South Sulawesi is one of eastern Indonesia's largest rice production centers and suppliers. Data from the Central Bureau of Statistics of South Sulawesi [6] showed that rice production in 2022 for the population's food consumption was estimated at around 3.06 million tons, an increase of 144 thousand tons or 4.92 % compared to rice production in 2021 which amounted to 2.92 million tons. This indicates the high number of farmers in South Sulawesi who cultivate rice plants as a source of income. In line with research [7], most of South Sulawesi's population works in the agricultural sector, with agricultural products as the largest source of regional income.

North Toraja Regency is one of the areas where the majority of the population works as farmers and is dominated by wet-rice farming. The harvest area of paddy rice will continue to increase by 21,165 ha in 2021 [8]. The increase in harvest area is followed by an increase in rice production from 66,750 tons in 2019 to 95,885 tons in 2021. The uniqueness of the rice farming area in North Toraja is that the land is terraced with a terraced farming pattern to prevent soil erosion because most of the site is hilly and prone to landslides.

Research conducted [9] showed that Southeast Yunnan, a Hani minority region in China, has unique agroecosystems with significant economic, ecological, and aesthetic values. Yunnan Province in China has reported persistent vibration of paddy fields for over 1300 years. Over a thousand years have passed since the Yuanyang paddy fields in southern Yunnan, China, were first established. They look at the aspects under their control to manage and maintain local rice and the best practices. Leveraging the unique qualities of traditional rice to attract local and international organizations and increase the socio-economic value of high-quality and terraced rice farmers' income [10]. Yunnan's rice cropping system shows that mixing modern and traditional rice types can effectively control blast disease, produce good crop productivity, provide high-quality food to the population, and increase farmers' income [11].

Rice is ideally grown on flat, well-watered land. However, most rice-producing areas in the country are hilly or mountainous. The sloping land has been transformed into profitable terraced farming by smart and savvy local farming communities [12]. Environmental, biological, sociocultural, economic, and policy considerations influence farmers' decisions to select and replace or maintain a particular type at a given time [13].

Liu's [14] research mentioned that the local rice variety Kam Sweet Rice (KSR) cultivated by the Dong people in southeastern Guizhou has qualities such as good taste,

special biological characteristics of cold resistance, disease, and insect resistance, and high utilization in the traditional culture of the Dong people. These historic rice paddies and fields are valuable to agricultural species due to their distinctive and irreplaceable properties [15]. Farmers make essential decisions that have long-term impacts on the genetic diversity of crop populations during the planting, management, and harvesting processes, as well as seed selection [16]. Agricultural methods are traditionally used by small, underprivileged farmers, especially in the highlands and mountains. In addition, according to [17], when there is a shortage of agricultural land, especially in hilly and mountainous areas, the double cropping approach on terrace land can be an alternative as it can increase agricultural productivity. Furthermore, the findings of this study showed that the maximum soil conservation content was found in terraced rice fields. In contrast to other upland crops, experimental results showed that terraced rice fields retained the most clay, silt, and organic matter content [18].

The level of rice productivity of farmers in the North Toraja district has increased in recent years, inseparable from the use of high-quality seeds of both superior and local varieties. Rice varieties are one reliable plant breeding technology component that can increase national productivity by about 56 percent and increase world productivity [19]. However, Laborte [20] showed that farmers' considerations in choosing rice varieties depend on characteristics other than yield, such as the percentage of empty grains, disease resistance, and demand conditions from end consumers (type of rice). Although the government continues encouraging superior seeds by providing subsidies for purchasing superior varieties, not all farmers use them.

Facts in the field show that many farmers in North Toraja District still choose to use local varieties of rice seeds from seed sources, have used them several times, and set aside the harvest to be used as a seed source in the next crop. According to Wahdah [21] and Rina [22], farmers plant local rice because it is easy to cultivate, the price is high, and consumers like the taste of the rice. In addition, farmers have limited capital to provide other production facilities such as fertilizers, pesticides, land rent, and labor. Recently, the prices of these production facilities have increased, making farmers incur higher production costs. Therefore, one way for farmers to reduce production costs is to provide seeds independently (local variety seeds) without buying superior seeds.

Furthermore, Limbongan [23] showed that local rice in North Toraja is unique and has various advantages, including a sharp and distinctive aroma, fluffy rice taste, resistance to pests, good adaptation to the highlands (700-2,000 masl), high protein content, low fiber and glucose content, high vitamin B content, and high production. Thus, the diversity of local rice in Toraja has many advantages and is a potential asset to be utilized and preserved.

Many studies have compared the use of local and superior rice varieties, which concluded that superior rice

varieties are of higher quality [24]–[29]. However, few studies still discuss and prove that using local rice varieties also has major implications, especially for farmers' income. For this reason, this study aims to analyze the differences in the use of local and superior rice varieties on terraced rice fields and their implications for farmers' income.

## 2. Materials and Methods

This research was conducted in March-April 2022 in North Toraja District, South Sulawesi Province. The research site was purposively selected because North Toraja District is one of five rice-producing areas with a terraced system in South Sulawesi Province. In addition, North Toraja District has rice farmers who use local variety seeds and farmers who use superior variety seeds. The types of local variety seeds chosen by farmers include; Pare Ambo', Pare Lea, Pare Bau, Pare Lallodo, and Pare Kombong, while the superior variety seeds chosen by farmers have; Cisadane, Cigeulis, Cisantana, Ciliwung, and Membramo [8]. The population of this study was a community of 138 terraced rice farmers who used 55 seeds of local varieties and 83 seeds of superior varieties. A simple random sampling technique was used to determine a sample of 30 farmers who use local varieties and 30 farmers who use superior varieties to be used as respondents.

Descriptive analysis was used to determine why farmers chose one of the varieties. While analyzing the comparison of income from the use of the two seed varieties used income analysis, R/C ratio farm feasibility test, and Independent Sample t-test. Income analysis is an analytical process related to the details of farm income activities that show evidence related to the fact of expenditure and receipt of costs during farming activities [30]. R/C ratio analysis is a comparison between revenue and costs. R/C value shows whether the business is profitable or lost so that it is known that a business is feasible to run [31]. Farmers' income is analyzed by R/C analysis which shows the balance between

farming costs and revenue generated in units of Rupiah (Rp) [32]. The formula is as follows:

$$R/C = TR/TC \tag{1}$$

Description:

TR = Total Revenue (IDR/Hectare)

TC = Total Cost (IDR/Hectare)

With decision-making:

- (a) If the  $R/C > 1$ , then the farm business is profitable because the income is higher than the total cost.
- (b) If the  $R/C < 1$ , the farm business is unprofitable because the income is less than the total cost.
- (c) (c) If  $R / C = 1$ , then the pond business is not profitable and also not detrimental because the total revenue is equal to the total cost or at the break-even point.

Furthermore, to determine the significance of the difference between the two varieties, an independent sample t-test was used. According to [33] the independent sample t-test is a test used to test the comparative hypothesis of two independent samples and to determine the existence of a real difference in farmers' farm income statistically. The decision-making basis of this test is:

- If the 2-tiled sig value  $< 0.05$ , then  $H_0$  is accepted.
- If the 2 tiled sig value  $> 0.05$ , then  $H_0$  is rejected

## 3. Results

Table 1 shows that the use of local varieties and superior varieties impacts rice farming management. Farmers who persist with local varieties are seen using simple farming tools such as hoes for tillage, transplanting systems, jajar legowo systems, limited use of pesticides for pest and disease control, and harvesting with ani-ani. In contrast, farmers who choose improved varieties are relatively more advanced in using farming tools and methods. For example, the land is cultivated with a hand tractor, planted by sowing seeds directly, maintained with various pest and disease controls and harvested with a sickle.

**Table 1.** Comparison of Management of Local and Superior Varieties of Rice Farming in North Toraja Regency, 2022.

No.	Stages of Activity	Local Varieties	High Yielding Varieties
1.	Land Processing	The land is plowed in a simple way using a hoe.	The land is plowed with hand tractor technology.
2.	Seed Preparation	Carried out seeding for planting preparation with a transplanting system.	Soaking is carried out for later planting with a direct seed-sowing system.
3.	Planting	Legowo 2:1 jajar planting system	Direct seed sowing system
4.	Maintenance and Control of Plant Pests and Diseases	Maintenance without the use of many pesticides (furan and klensect)	Maintenance using several pesticides (Dursban, spontaneous, gramaxone, caprocide, and klensect)
5.	Harvest	Using ani-ani (ketam)	Using a sickle.

Currently, local rice varieties are still an option for some farmers in North Toraja District, with several considerations listed in Table 2. The main consideration is the high consumer demand for rice sourced from local rice varieties (30%) compared to superior rice varieties (3.33%). According to farmers, local people still prefer local rice compared to new rice varieties. There is still a distinctive taste and aroma that they do not find in improved rice varieties.

In addition to the relatively high consumer demand for local rice varieties, the next consideration is the high and relatively stable selling price of the rice (27.27%).

According to farmers, the selling price of local rice is relatively higher (IDR 4,260/kg) than that of rice from improved varieties (IDR 3,700/kg). Therefore, the social value of local rice to the community is still relatively high as the upper middle class consumes local rice at a relatively higher price than improved rice. Meanwhile, the economic value of cultivating local rice varieties will certainly increase farmers' income due to high demand and better selling prices compared to superior rice varieties. While the total costs incurred are relatively less compared to superior varieties.

**Table 2.** Farmers' Considerations in the Application of Local and Superior Rice Varieties in North Toraja Regency, 2022.

No.	Types of Considerations	Local Varieties		Superior Varieties	
		Number (Persons)	Percentage (%)	Number (Persons)	Percentage (%)
1.	Adapts well to the environment	5	16,67	3	10,00
2.	Seedlings are an aid	2	6,66	8	26,67
3.	Small production capital	6	20,00	6	20,00
4.	Time efficiency	0	0,00	9	30,00
5.	Consumer Demand	9	30,00	1	3,33
6.	The selling price is quite high and relatively stable	8	26,67	3	10,00
<b>Sum</b>		<b>30</b>	<b>100</b>	<b>30</b>	<b>100,00</b>

**Table 3.** Comparative Analysis of the Average Income of Farmers Using Local Varieties of Rice with High-Yielding Rice in North Toraja Regency, 2022

No.	Description of Farming	Local Varieties	High Yielding Varieties
1	<b>Production (Kg/Ha)</b>	<b>3.468,52</b>	<b>5.106,01</b>
2	<b>Rice Price (IDR/Kg)</b>	<b>4.260,00</b>	<b>3.700,00</b>
3	<b>Production Value (IDR)</b>	<b>14.775.895,20</b>	<b>18.892.237,00</b>
4	<b>Variable Costs</b>		
	a. Seed (Kg)	-	167.372,71
	b. Urea Fertilizer (Kg)	227.399,00	264.149,09
	c. Fertilizer SP-36 (Kg)	-	51.809,07
	d. Za Fertilizer (Kg)	10.533,33	14.362,80
	e. Phonska Fertilizer (Kg)	20.487,34	37.335,22
	f. Gramaxone (l)	-	16.311,80
	g. Dursban (l)	-	6.168,78
	h. Spontaneous (l)	-	439,35
	i. Klensect (l)	8.430,49	16.912,80
	j. Cuprocide (l)	-	2.953,59
	k. Labor		
	Land Processing (HOK)	1.410.642,46	1.573.373,72
	Seeding (HOK)	27.094,53	27.711,99

Table 3 continued.

	Planting (HOK)	446.009,31	975.502,50
	Fertilization (HOK)	229.837,18	220.966,12
	Weeding (HOK)	39.352,67	56.706,51
	Spraying (HOK)	73.927,30	1.192.330,37
	Harvesting (HOK)	1.122.317,55	1.523.591,53
	Tractor Operations	400.000,00	800.000,00
	Solar Cost	19.331,94	56.580,18
	<b>Total Variable Costs</b>	<b>4.035.363,10</b>	<b>7.004.578,13</b>
5	<b>Fixed Costs</b>		
	a. Land Tax (IDR)	70.000,00	70.000,00
	b. Depreciation of Tools		
	Ani'-Ani'	16.083,81	-
	Hoe	27.701,74	27.701,74
	Machete	13.500,12	13.500,12
	Sickle	14.456,72	13.457,14
	<i>Sprayer</i>	18.768,54	19.078,13
	Tractor	65.977,00	480.961,84
	Cart	5.876,34	9.709,60
	<b>Total Fixed Costs</b>	<b>232.364,26</b>	<b>634.408,57</b>
6	<b>Total Cost (2+3)</b>	<b>4.264.727,36</b>	<b>7.638.986,70</b>
7	<b>Farm Income (1-4)</b>	<b>10.511.167,80</b>	<b>11.253.250,3</b>

**Table 4.** Feasibility Analysis of Farmers and Independent Sample T-test of Income of Farmers Using Local and Superior Varieties of Rice in North Toraja Regency, 2022

Description	Revenue	Total Cost	Results	
Users of Local Varieties	14.775.895,20	4.264.727,36	Mean	3.46
			Std. Dev	.64384
			Std. Error Mean	.11755
Superior Varieties of Rice Users	18.892.237,00	7.638.986,70	Mean	2.47
			Std. Dev	.42856
			Std. Error Mean	.07824
Significant (2-tailed)			Equal variances assumed	0.000
			Equal variances not assumed	0.000

Table 3, the yield of improved varieties is 5,106.01 kg/ha, which is higher than the yield of local varieties. However, most of the production is sold at a relatively lower price than local rice varieties, which is IDR 3,700/kg. Farmers' total income was IDR 18,892,237 and with total costs of IDR 7,638,986.70/ha, the income was IDR 11,253,250/ha. It appears that rice cultivation using improved varieties provides more significant profits than local varieties. However, the selling price of rice from these varieties is lower with production costs that are also higher than the

production costs of local varieties because seeds are still purchased, and the use of fertilizers and pesticides is more complete than local varieties.

The R/C ratio value of local rice varieties at 3.46 is higher than the R/C ratio value of superior varieties at 2.47 (Table 4, Figure 1). However, both varieties show an R/C ratio value greater than 1. Therefore, the R/C ratio value of local rice varieties of 3.46 can be interpreted that for every 100 rupiahs of total costs incurred, the revenue is IDR 346, and the R/C ratio value obtained is 2.47 for superior rice

varieties, meaning that for every 100 rupiahs of total costs incurred, the revenue is IDR 247.

This value also shows that the more costs incurred in cultivating local rice varieties, the farmers will get a higher income than superior rice varieties. The value of this ratio also proves that both varieties are feasible to cultivate because they will provide a profit. Each dollar value spent in production will provide a profit from the value of income obtained [34].

The Average Difference Test Analysis using the SPSS Application is useful for knowing whether there is a difference in the average of two unpaired samples. The use of the independent T-test requires the assumption that the data is normally distributed with independent and identical properties. The purpose of this test is to compare the means of two groups that are not related to one another, whether significantly the two groups have the same average or not. The results of this test can be seen in Table 4.

Based on Table 4, it can be seen that the average R/C Ratio value of the two samples is 3.46 and 2.71 with a total sample size of 60 farmers. The hypothesis proposed in this study is that there is a difference between farmers' pendapatan using local and superior rice varieties. In deciding on a hypothesis, the consideration is the value of sig. (2-tailed). Table 4 shows that the sig. (2-tailed) is 0.000. The value of 0.000 is smaller than 0.05, it can be concluded that "H<sub>0</sub> is accepted". This means there is a difference between the average R/C ratio of farmers using local and superior rice varieties. It can also be concluded that farmers' decision to continue using local varieties affects the increase in farmers' income in North Toraja Regency. Furthermore, the t-count value (5.257) is higher than the t-table value (1.671) at a significant level of 0.05. This is in accordance with the opinion of Magdalena [35] which states that if the sig value is <0.5, the hypothesis is accepted, which means that there is an average difference between the two data tested.

Basically, before conducting the t-test, it has been seen that the R/C Ratio value of local varieties is higher at 3.46 compared to superior varieties at 2.47. Thus it can be concluded that based on the average difference test using SPSS, it shows a significant difference between the income of farmers who use local and superior varieties of rice.

## 4. Discussions

### 4.1. Comparison of the Use of Seeds of Local Rice Varieties and Superior Varieties in the Management of Rice Farming on Terraced Land

North Toraja District stretches from KM 280 to 355 from the capital of South Sulawesi Province, Makassar. The area of Toraja is 3,205.77 KM or about 5% of the area of South Sulawesi Province, located between 119-120 degrees East and 02-03 degrees West. The topography consists of mountains, about 40% highlands, about 20% lowlands,

about 38% swamps, and about 2% rivers. Tana Toraja is located at an altitude between 600m - 2800 m above sea level.

The agricultural sector is one of the highest potentials that contribute to the economy of North Toraja Regency. Suitable climatic conditions and existing land resources support this condition. Agricultural land in North Toraja has its uniqueness, from its mountainous and hilly geographical conditions, making the layout of terraced rice fields, known by the general public as swales. Terraced rice fields are rice fields that are terraced on sloping land to avoid erosion. Terraced rice fields can store water in puddles in a large enough volume. Excess irrigation water and rainwater will seep into the soil to replenish groundwater reserves. The capacity of terraced rice fields varies greatly depending on the nature and characteristics of the soil [35].

Rice productivity on terraced rice fields is proven to give different results from rice productivity on land that is not terraced. Research results [36] showed that in Samosir Regency, productivity on terraced rice fields was divided into three categories, namely; upper terrace with a productivity of 5.91 tons/ha, middle terrace with a productivity of 5.62 tons/ha, and lower terrace with a productivity of 5.56 tons/ha. Meanwhile, the productivity of rice fields without terraces only reached a 4.50 tons/ha yield. Rice fields managed with terraces contribute to food security, increase farmers' income, and create a better environment [36].

In addition to the unique layout of terraced rice fields in this area, another uniqueness is the type of seeds used by farmers not only superior varieties but many farmers still use local varieties. The types of local varieties chosen by farmers include; Pare Ambo', Pare Lea, Pare Bau, Pare Lallodo, and Pare Kombong. Meanwhile, farmers' superior seed varieties include Cisadane, Cigeulis, Cisantana, Ciliwung, and Membramo. Many farming communities still use local varieties because North Toraja Regency is one of the highland areas in South Sulawesi with a diversity of local rice germplasm. In addition, rice germplasm in the form of local varieties has certain genetic advantages [37]. Although local varieties of rice seeds are not popular at present, they have several advantages regarding farmers' interests, including; easy to obtain, minimal maintenance, and tall stems, so there is no need to bend over when harvesting. In addition, local varieties have stable yields, low inputs, and small and slender grain shapes that are favored by consumer farmers [38]. According to [39], varieties can adapt to the environment, tolerate stressful environments, resist pests and diseases, and increase production stability.

Varieties that farmers favor are adaptive, have high yield potential, and have good yield quality [22]. Production costs are also a consideration for farmers to continue planting local rice varieties when compared to superior varieties (20%). The total production costs incurred for local variety rice cultivation amounted to Rp 4,264,727.36

per hectare lower than the total cost of rice cultivation of superior varieties of Rp 7,638,986.70 per hectare. The low cost of production in local rice cultivation is due to the resistance of local varieties to pests and plant diseases and not many types of pesticides used by farmers (see Table 3). Furthermore, compared to improved varieties, local varieties can adapt well to the natural environment and climate in North Toraja Regency (16.67%) (Figure 1).

The results of research [40] showed that local rice varieties are the leading commodity of rice farmers in the Tamban Catur Subdistrict because local farmers have been accustomed to cultivating these varieties for a long time. Farmers like to cultivate local rice varieties because they do not require special treatment. In addition, local rice is more resistant to soil conditions containing acidity, pests and diseases, and drought. Some local rice varieties used in Tamban Catur Sub-district include the varieties Siam Karangdukuh, Siam Mutiara, Siam Mayang, and Siam Unus. However, the dominant variety planted is the Siam Karangdukuh variety. Local rice varieties, especially the Siam Karang Dukuh variety, are highly demanded and favored by consumers in Kalimantan, especially the Kapuas community because this local rice variety has a better taste when compared to other types of local rice varieties. Although the price of local rice of the Siam Karang Dukuh variety is slightly higher than that of other Siamese rice due to its fluffy, non-sticky, and better taste,

it is still favored by the people of Kalimantan. In addition, marketing is easy, and the selling price is relatively high so that it can provide good results and income for local rice farmers as the main actors in farming. Syamsiah [41] stated that potential yields and sales positively impact farmers' choice of seeds.

However, although there are still farmers who persist in using local varieties of rice seeds, not a few farmers in this area who previously used local varieties of rice switched to using superior varieties with various considerations. Seeds are a determining factor in increasing productivity in addition to using fertilizers, the environment and socio-economic factors of the local community [28]. The highest consideration in switching farmers to improved varieties is time efficiency (30%). According to farmers, improved varieties only take 3-4 months from planting, which is faster than local varieties that take up to 6 months to harvest. A total of eight people or 26.67% (Figure 1) stated that the reason for choosing to use superior rice varieties was because of regular seed assistance or subsidies from the government. According to the farmers, the seed subsidy helps them by reducing the capital to buy seeds. Rice seed subsidy activities are carried out to increase rice productivity and production by providing certified superior varieties that meet the quality and quantity aspects [29]. The use of subsidized seeds causes many farmers to plant the same variety in one farmer group.

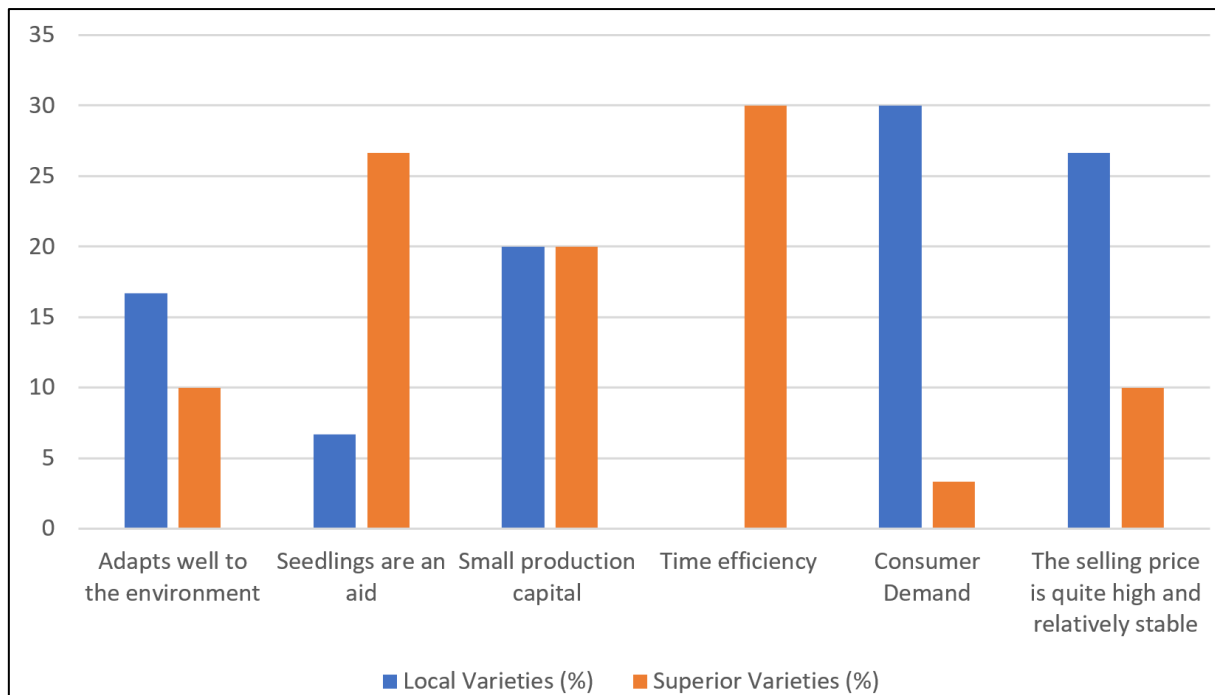
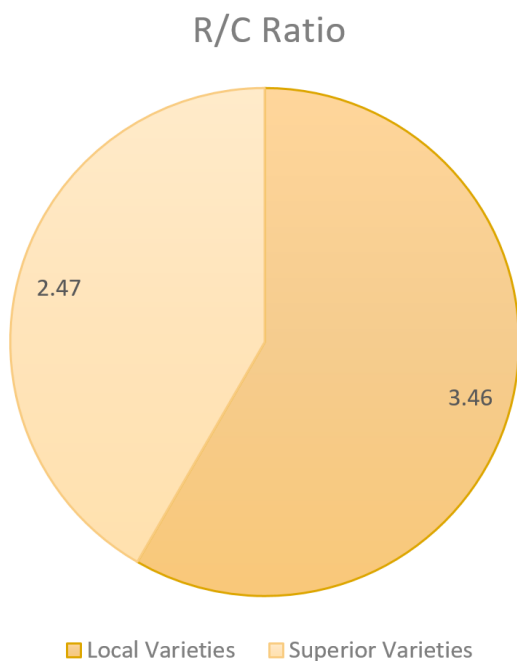


Figure 1. Farmers' Considerations in the Application of Local and Superior Rice Varieties in North Toraja Regency

#### 4.2. Income Comparison, Difference Test, and Feasibility of Local and Superior Variety Rice Farms

One factor that is quite important to see the economic development of a community group is to know the level of income, including farmers' income. In the agricultural sector, especially on-farm, the increase in income is strongly influenced by the level of productivity, where a high level of productivity will generate a high income for farmers (assuming stable production prices) and allow farmers to save and accumulate capital. Improving living standards through increasing farmers' income can be done by developing other possible agricultural commodities (farm diversification) that are economically profitable if agricultural land allows. The development of off-farm income will also greatly help improve welfare if the potential for agricultural land is limited [44].

The average production of paddy rice using local rice seed varieties (Table 3) from farmers was 3,468.52 kg/ha. The harvest is partly self-consumed by farmers and partly sold. The average total cost incurred in the cultivation of local varieties of rice is IDR 4,264,727.36/ha, with a revenue of IDR 14,775,895.20, then the average net income obtained from 30 farmers is IDR 10,511,167.80. Rice cultivation using local varieties is still profitable because the revenue is still greater than the expenses or production costs. Low production costs can be saved because rice cultivation using local varieties does not use superior seeds (which are purchased even at subsidized prices), *SP-36*, *gramaxone*, *Dursban*, *Spontaneous*, and *Suprocicide*.



**Figure 2.** Diagram of R/C Ratio of Farmers Using Local and Superior Varieties

According to [31] of the many high-yielding varieties that have been released, only a few have been widely developed. It was a long time ago, some developed on a small scale, and some did not develop or were not accepted by farmers. Only now is there much attention and research on the efficiency and development of the superior rice varieties produced.

Comparison of the feasibility level of local rice varieties with superior rice varieties used the analysis of revenue and cost ratio (R/C Ratio) (Figure 2). The analysis was conducted to provide an overview of the benefits of cultivating both varieties. The results of the feasibility analysis of the two varieties can be seen in Table 4. In addition, the independent sample t-test showed a significant difference from the average R/C ratio or the feasibility of cultivation with local varieties and superior varieties.

The results of research [46] comparing the analysis of lowland rice farming of local varieties and improved varieties in Banjar District, showed that the R/C ratio of local varieties was 1.22, higher than the R/C ratio of improved varieties of 1.11. The results of the analysis of lowland rice farming in Banjar District, found differences in behavior between farmers in Keliling Banteng Ulu Village who planted more superior varieties of rice compared to local varieties, while in Penggalaman Village, farmers planted more local varieties of rice compared to superior varieties.

## 5. Conclusions

Rice farmers in North Toraja District with terraced land characteristics persist in cultivating rice using local varieties, considering that rice from local varieties is more desirable to consumers even though it is sold at a relatively higher price compared to rice from superior varieties. In addition, local varieties have a relatively high resistance to pests and plant diseases as well as a taste that is more desirable to consumers and more efficient in cultivation. Although the government has encouraged the cultivation of improved varieties, even with a seed subsidy mechanism, not all farmers have been encouraged to use improved varieties. The results of the R/C ratio analysis also showed that the R/C ratio value on local rice varieties was relatively higher than the R/C ratio value on superior rice varieties, and the independent sample t-test showed a significant difference in the average R/C ratio of the two varieties ( $p < 0.05$ ).

## Conflict of Interest

The authors declare that there is no conflict of interest in this research.

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