# Feasibility of Dry Land Red Rice Farming in Gunungkidul Regency

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**Abstract.** Gunungkidul Regency is one of the districts that developed dry land red rice farming. Semin and Panggang sub-districts are sub-districts that develop red rice varieties at Inpari 24 and Segreng. This study aims to determine the costs, income, profits, and feasibility of dry land red rice farming of Segreng variety and Inpari 24 variety in Gunungkidul Regency. The number of respondents in this study were 250 respondents using the Simple Random Sampling technique, consisting of 150 respondents from Inpari 24 red rice farmers and 100 respondents from Segreng red rice farmers. Data was collected through survey which were then analyzed descriptively and feasibility analysis using the Revenue Cost ratio. The results showed that red rice farming with a land area of 1000 m2 on the Inpari 24 variety required a higher cost of IDR 2,353,064, Inpari 24 red rice earned. of IDR 2,935,438 and a profit of IDR 1,398,537. Meanwhile, Segreng red rice earned an income of IDR. 2,157,547 and a profit of IDR. 913,428. The R/C value for Inpari 24 red rice farming is 1.59 and Segreng red rice is 1.45. Inpari 24 red rice farming, although classified as irrigated rice, can also adapt to rainfed dry land so that it can be taken into consideration for dry land farmers in choosing seed varieties.

## 1 Introduction

The agricultural sector until now is a considerable contributor to the national economy. Therefore, the agricultural sector has great potential to be developed and improved. Increasing agricultural income requires efforts that can be made, namely maximizing agricultural commodities that have economic value and high market potential abroad and domestically [1] Agricultural commodities that have economic value and high market potential, one of which is rice.

Rice is a staple food in supporting the living needs of all Indonesian people. This commodity is almost found in all parts of Indonesia. Therefore, special attention is needed for the development of rice commodity. Black rice (*Oryza sativa* L. indica), white rice (*Oryza sativa*), red rice (*Oryza glaberrima*) are three types of rice commonly consumed by the

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Indonesian people. One of the rice commodities that has profitable prospects for development is red rice [2].

Red rice is rice type that has a high nutritional content and therefore it is much loved by the public. Red rice contains an antioxidant in the form of phenolic compounds which are classified as flavonoids. [3] Flavonoid content can cure heart disease, cancer and is able to prevent free radicals from entering the body. In another study, it was mentioned that red rice contains nutrients, namely beta sterol, unsaturated fatty acids, Zn, protein, isoflavones, saponins, and mevinolin-HMG-CoA [4]. The high nutritional content possessed by red rice aims to meet the needs in the body and support public health programs so that there is a potential for wider development of red rice [5].

Red rice is a type of rice grown by farmers because of the high needs and interests of consumers. Gunungkidul Regency is a red rice germplasm area with the famous varieties being Segreng and Mendel. Gunungkidul Regency is one of the regencies in Yogyakarta Province that carries out red rice farming on dry land covered by rain. It was recorded that Gunungkidul Regency in 2020 produced rain-fed dryland rice with an area of 40,008 hectares or equivalent to 72.79% of the total area (Central Statistics Agency of Gunungkidul Regency, 2021). Farming in Semin and Panggang Subdistricts is mostly carried out by rain-fed dry land farming. Rainfed dryland is agricultural land that is not waterlogged for most of the time in a one-year period. One type of rice grown on dry rainfed land is red rice [6].

Based on the presentation from the Employees of the Seed and Horticulture Center, the Mendel variety of red rice is less in demand by farmers because of the long planting period requiring a longer harvest time. Therefore, farmers began to abandon the Mendel variety and began to grow rice varieties that had a short lifespan and high productivity. As a result, Mendel variety red rice in Semin and Panggang sub-districts is not cultivated by farmers. The variety that is still being developed by farmers is the Segreng variety. This variety of Segreng has a short growing period and its productivity is quite good. The following is a table of the productivity of red rice farming in Semin and Panggang Districts which is included in the gogo rice farming business in Gunungkidul Regency, DIY.

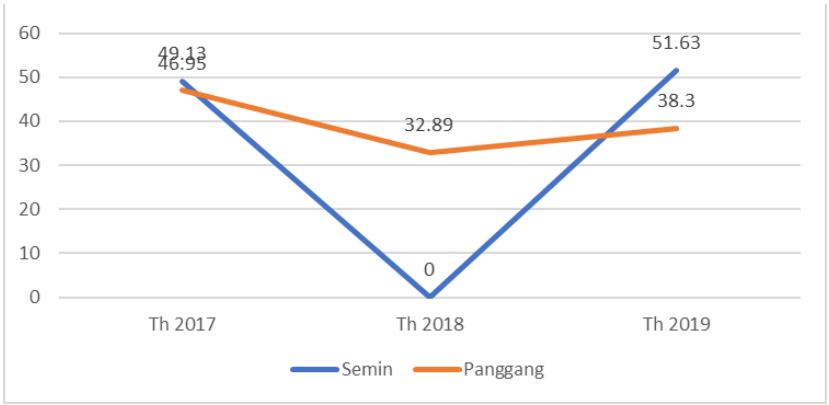


**Fig. 1.** Red Rice productivity in Gunungkidul Regency

Based on Figure 1, it shows that the productivity of red rice in Baked District with Segreng variety red rice has low productivity and tends to be unstable. Meanwhile, at the Semin District, it was shown that the productivity of red rice with the Segreng red rice variety has increased after a vacuum in farming in 2018. The Segreng variety is grown in Semin, and Panggang Subdistricts is a local variety in Gunungkidul Regency that can survive even in a lack of water. Hence. it is suitable for dry land conditions and a short harvest life of less than 100 days of harvest. Based on the potential yield of Segreng red rice, it can produce 5.4 tons per hectare [7]. However, the rice produced by Segreng red rice is less fluffy and thus, it is

less in demand by consumers. As a result, the harvest of this Segreng variety is only sold to bird feed traders.

In 2020, the Agriculture and Food Security Service of the Yogyakarta Special Region (DIY) conducted an experiment to plant a new variety, namely the Inpari 24 variety in Semin District in the hope of increasing the productivity of farming businesses. It was explained that the Inpari 24 variety can produce 7.7 tons / ha with an average yield of 6.7 tons / ha, the potential yield of the Inpari 24 variety is greater when compared to the Segreng variety (Rice Plant Research Center, 2013). However, in Semin District, it is a rainfed dry land while Inpari 24 red rice is a variety that is suitable for planting on paddy fields because Inpari itself stands for Irrigation Rice Inbrida. The Inpari 24 red rice planting experiment conducted in Semin District is expected to have greater results than the Segreng variety even though it is planted on dry rain-fed land [8].

The Inpari 24 variety red rice farming business has high prospects in terms of the superiority of productivity potential. However, in terms of feasibility, the rice variety is not yet known. In addition, how the feasibility of Inpari 24 red rice compares is seen from the R/C among other varieties of rice cultivated in Panggang District, namely Segreng red rice.

## 2 Research Method

Panggang Subdistrict is a sub-district that has low red rice productivity Semin District is a sub-district that receives Inpari 24 variety from the Agriculture and Food Security Service (DPKP) of the Yogyakarta Special Region (DIY). The total respondents taken in Semin District were 150 farmers and 100 farmers is from Panggang District using the simple random sampling (Table 1).

**Table 1.** Data on the Number of Farmers Respondent to Red Rice.

| **Inpari Red Rice Farmer 24** | | | **Segreng Red Rice Farmers** | | |
|---|---|---|---|---|---|
| **Village** | **Population** | **Number of respondents** | **Village** | **Population** | **Number of respondents** |
| Caliper | 105 | 72 | Girisekar | 27 | 13 |
| Sumberejo | 55 | 37 | Girikarto | 73 | 37 |
| Semin | 29 | 20 | Girimulyo | 74 | 37 |
| Candirejo | 31 | 21 | Giriwungu | 25 | 13 |
| | 220 | 150 | | 199 | 100 |

To analyze the feasibility of farming, the following analytical techniques are needed:

1. **Total cost**
   TC = TEC + TIC
   Information:
   TC = Total cost
   TEC = Total explicit cost
   TIC = Total implicit cost
2. **Revenue**
   TR = P x Q
   Information:
   TR = Total revenue (IDR)
   P = Price of each unit of product (IDR/kg)
   Q = Total production (Kg)
3. **Income**
   NR = TR –TEC
   Information:

NR= Net Revenue
TR = Total Revenue
TEC = Total explicit cost

4. **Profit**
   Π = TR –TC
   Information:
   Π = Profit (IDR)
   TR = Total revenue (IDR)
   TC = Total cost (IDR)
5. **R/C**
   Information:
   R/C = Revenue Cost Ratio
   TR = Total revenue (IDR)
   TC= Total cost (IDR)

Conditions:
R/C < 1, rice farming is not feasible to run
R/C > 1, rice farming business is feasible to run
R/C = 1, rice farming is at breakeven

# 3 Results and Discussion

## 3.1 Identity of Rice Farmers

The findings of the study showed that, based on age, 28% of Inpari 24 farmers are categorised as old but are still working on red rice farming. This means that these farmers are entering an unproductive age and the physical strength to cultivate land is reduced. However, they have a lot of farming experience. In Segreng, the data shows that there are still many young farmers with a percentage of 16%, which means that these farmers are still relatively new and only have minimal experience. Although there are many old farmers in rice with Inpari 24 seeds, farmers can accept new innovations by using Inpari 24 seeds because farmers also want their productivity to be higher than the previous harvest.

Based on the level of education, the percentage results of the two are not much different but the results at the level of junior and senior high school education are higher in Inpari 24 red rice farmers. So, it can be concluded that the level of education in farmers who use Inpari 24 seeds is higher than using Segreng red rice seeds. This is proven that farmers who use Inpari 24 seeds will easily accept a new technology as well as new information. This information will certainly affect farmers' farming businesses, making it easier for them to develop farming businesses compared to Inpari 24 seeds.

By gender, Inpari 24 red rice farmers are predominantly male. Women who do farming also work as housewives and traders. However, they also assisted her husband in managing the land. In male farmers who tend to have a strong physique compared to women. [9] Usually, female farmers do light farming work such as planting, weeding, harvesting, and post-harvest. Meanwhile, male farmers work on land processing processes such as plowing, grafting, and fertilization. Meanwhile, the largest number of Segreng red rice farmers are female farmers. This is because in Panggang District there are many Women's Farmer Groups (KWT), besides that, many men in Panggang District have other basic jobs such as civil servants and building workers.

Based on the land area, Inpari 24 red rice farmers dominate the land area more than1000 $m^2$ and Segreng red rice is the dominating land area is 101-300 m2. The smallest land area is in the Segreng red rice farmer, which is 60 m2 and the largest area is the Inpari 24 red rice

land area, which is 5000 m2. The land is a land area that is fully used in the cultivation of rain-fed dry land red rice. Segreng variety rice farmers and Inpari 24 most of the land status is own land. The more farmers who own their own land, the greater the income obtained, on the other hand, if the farmer has land with rental status or profit sharing, the income obtained will be less because he must pay land rent or profit sharing with the landowner. The use of production factors will affect the yield of farming, and the level of efficiency. The number of *inputs* calculated in this study is the use of *inputs* used in one growing season or one planting period in 2019. The *inputs* used by red rice farmers are seeds, phonska fertilizer, urea fertilizer, manure, liquid pesticides, and labor.[10][11]

## 3.2 Analysis of Costs, Revenues, Revenues, and Profits of Farming

### *3.2.1 Explicit Costs*

Explicit costs are costs that are manifestly incurred by farmers in farming activities. Costs that are included in explicit costs include the cost of seeds, fertilizers, pesticides, labor, depreciation of tools, land rental costs, and other costs

Based on the results of the study, in Table 2, it shows that the average total cost in the Inpari 24 rice farming business is higher than the average total cost in the Segreng red rice farming business. The highest usage is on labor outside the family and labor in the family costs on Inpari 24 red rice. The amount of seed use in the Inpari 24 red rice farming business is at least 3.0 kg. Meanwhile, the use of seeds in the Segreng red rice farming business is 4.3 kg. The government aids farmers in the form of Inpari 24 seeds through farmer groups, so that farmers get a fee waiver in obtaining the seeds.

**Table 2**. Average Explicit Cost of Rice Farming per 1,000 $m^2$

| **Explicit charges** | | **Inpari 24** | **Segreng (IDR)** |
|---|---|---|---|
| 1 | Land rental costs | 7,556 | 500 |
| 2 | Tool depreciation costs | 5,461 | 7,976 |
| 3 | Seed | 36,059 | 21,810 |
| 4 | Fertilizer | 360,363 | 407,461 |
| 5 | Pesticides | 2,132 | 23,281 |
| 6 | Labor outside family | 307,524 | 172,220 |
| 7 | Other fees | 93,068 | 148,661 |
| **Explicit total cost** | | **816,463** | **781,908** |

The use of solid fertilizer in the Segreng red rice farming business is more than in the Inpari 24 farming business, which is IDR 407,461. The use of solid fertilizer in Segreng and Inpari 24 red rice farming businesses is 608.32 kg and 592.94 kg, respectively. Segreng's red rice farming business uses more chemical fertilizers, so the costs incurred are higher. The average cost of pesticides used in The Inpari 24 red rice farming business is lower than the cost of pesticides in Segreng red rice farming. Farmers who use pesticides in the Inpari 24 red rice farming business are relatively few, so the average cost of using pesticides is relatively smaller [12].

The low cost of pesticides does not have a significant effect on the costs incurred, so it does not affect the income received by farmers. In addition, the amount of pesticide use is also not a factor that greatly affects the increase in production in farming [13] .

The average use of labor in Inpari 24 red rice and Segreng red rice is 5.23 HKO and 3.43 HKO, respectively. The number of HKO labor for red rice farming in Inpari 24 is higher than that of HKO labor for Segreng red rice farming. So that the labor cost of Inpari 24 red rice farming is higher than the labor cost of Segreng red rice farming. This is because the

wholesale wages paid by respondent farmers to labor vary. The wages paid range from IDR. 45,000 – IDR. 70,000 per day.

How to calculate the depreciation cost, namely the division of the purchase price of the tool minus the residual value, then divided by the economic life of the tool [13]. The average depreciation cost of equipment in the Segreng farming business is greater than that of the Inpari 24 red rice farm, which is IDR 7,976. However, the costs incurred tend not to differ much from the Segreng red rice farming business. The tools used by farmers for red rice farming are hoes, sickles, bulges, hand sprayers, buckets, and rakes. The tool with the highest depreciation cost in the Segreng red rice farming business is a hoe. The amount of depreciation costs depends on the number of tools owned by farmers.

The average cost of renting land on Inpari 24 red rice is IDR 7,556 and the average cost of renting Segreng red rice land is IDR 500. This shows that the average cost of renting one's own land in Inpari 24 red rice is higher than that of Segreng red rice. The high cost of land rent depends on the condition of the land and road access to the land. If the location of the land is difficult to reach and has poor road access, usually the rental price is relatively cheap.

The average cost of miscellaneous in Segreng red rice farming is higher than the average cost of Inpari 24 red rice farming, which is IDR 145,115. Costs that have a high percentage are the costs of taxes and gasoline. The cost of gasoline is the cost of purchasing gasoline, which is to transport the harvest, farmers usually transport it by private farmer's vehicle. Meanwhile, the tax cost of farmers is adjusted to the area of farmers' land. The cost of transportation by car, farmers provide wages according to the distance between the land and the house, the price range ranges from IDR. 60,000 - IDR. 100,000. Other costs with the lowest percentage are group contribution fees because usually group contributions are only IDR 1000 – IDR 2000, and not all farmer groups have group dues

### *3.2.2 Implicit Costs*

Implicit costs are those costs that are not manifestly incurred by the farmer. However, implicit costs are still considered in the activities of a farming business. The implicit costs in this study include the cost of Labor in The Family the rental value of one's own land, and the cost of interest on one's own capital.

**Table 3.** Implicit Cost of Rice Farming per 1,000 $m^2$

| Details (IDR) | | Inpari 24 (IDR) | Segreng (IDR) |
|---|---|---|---|
| 1 | Rent your own land | 294,000 | 297,000 |
| 2 | Labor in the family | 1,226,578 | 931,481 |
| 3 | Own capital interest | 16,323 | 15,638 |
| **Total implicit cost** | | **1,536,901** | **1,244,119** |

The cost of renting land in Gunungkidul Regency is IDR 300,000/growing season per 1000 $m^2$. Table 3 shows that the average cost incurred by farmers of Inpari 24 red rice and Segreng red rice is IDR. 294,000 and IDR. 297,000, respectively. The cost of renting one's own land in the Segreng red rice farming business is higher than that of Inpari 24 red rice. This is because the number of rental farmers in the Segreng red rice farming business is less than that of the rent farmers in the Inpari 24 red rice farming business. The average cost of labor and the use of labor in the Inpari 24 red rice farming business is higher than that of the Segreng red rice farming business, which is IDR 1,226,578 and 23.44 HKO. The energy in the family on the Inpari 24 costs a lot compared to Segreng. This is because farmers employ their children and wives in helping with the harvest and post-harvest processes to reduce labor costs outside the family. Average cost of owned capital in Inpari 24 and Segreng farming businesses per 1000 m2 / growing season, which is IDR 16,323 and IDR15,638,

respectively. The percentage of own capital interest is 2% per rice growing season or using a loan interest rate of 6% per year this loan interest rate refers to the interest rate on bank BRI loans in Gunungkidul Regency

### *3.2.3 Total Costs, Receipts, Revenues, and Profits*

The total cost is the sum of the explicit costs plus the implicit costs.

**Table 4.** Average Total Cost, Revenue, Income, and Profit of Farming Business Red Rice per 1,000 $m^2$

| Description | Rice Varieties | |
|---|---|---|
| | ***Inpari 24*** | ***Segreng*** |
| Explicit Cost (IDR) | 816,463 | 781,908 |
| Implicit Cost (IDR) | 1,536,901 | 1,244,119 |
| Total Cost (IDR) | 2,353,064 | 2,026,027 |
| Total Production (kg) | 602,57 | 518,88 |
| Selling Price (IDR/kg) | 6.226 | 5,665 |
| Admission (IDR) | 3,751,601 | 2,939,455 |
| Revenue (IDR) | 2,935,438 | 2,157,547 |
| Profit (IDR) | 1,398,537 | 913,428 |
| R/C | 1.59 | 1.45 |

In Table 4, the highest total cost in the Inpari 24 red farm was 2,353,064. The highest revenue in the Inpari 24 red rice farming business was IDR 3,751. 601. Meanwhile, the lowest revenue in Segreng's farming business was IDR 2,939. 455. The income and profit of Inpari 24 red rice is also greater than that of Segreng red rice. This is because the total production of Inpari 24 is greater than that of Segreng red rice, which is 602.57 kg.

This is in line with the research of [14] that rice production is related to many factors, one of which is the use of new high-yielding varieties issued by the government. The selection of superior varieties that are suitable for the environment and the land to be planted plays an important role in the productivity and quality of the rice produced so that production using new superior seeds, namely Inpari 24, is higher than the local seeds of Segreng red ric**e.**

The feasibility of Inpari 24 red rice farming is higher than the feasibility of Segreng red rice farming in terms of R/C, land productivity, labor productivity, and capital productivity. However, the R/C in the rice farming business of the two varieties is said to be worthy of effort. This is because the R/C yield is greater than one. This means that the results obtained by farmers are greater than the costs incurred by farmers in farming.[15]

## 4 Conclusion

Rainfed dry land red rice farming in Gunungkidul Regency with an area of 1000 m2, it can be concluded that the cost of rice farming using Inpari 24 red rice is higher than Segreng. This is due to the use of labor within the family and labor outside the family more than Segreng red rice. The costs incurred by Inpari 24 red rice farmers are IDR 2,353,064 and Segreng red rice farmers are IDR 2,026,027. The income obtained by the Inpari 24 red rice farmers was higher at IDR. 3,751,601 while the Segreng red rice received an income of IDR. 2,939,455. The income and profits obtained by Inpari 24 red rice farmers are higher than Segreng red rice farmers. The highest income and profit were obtained in Inpari 24 red rice farming of IDR. 2,935,438 and a profit of IDR. 1,398,537. Meanwhile, in Segreng red rice farming, the income is IDR. 2,157,547 and the profit is IDR. 913,428. The feasibility analysis of rice farming using Inpari 24 red rice is also higher than Segreng red rice in terms of R/C.

The R/C value in Inpari 24 red rice farming is 1.59 and Segreng red rice is 1.45. Farming using Inpari 24 red rice seeds is more profitable than using Segreng red rice seeds, thus it should be a consideration for farmers in choosing seed varieties. In addition, Inpari 24 red rice farming, although classified as irrigated rice, can also adapt to rainfed dry land

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