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Economic Benefit Analysis of Sorghum Crop Aid for Farmers in Tinondo District, East Kolaka Regency

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Abstract

This research is based on the fact that there are still many people who have not cultivated sorghum plants. In fact, sorghum plants are among the easiest carbohydrate-producing plants to cultivate.Sorghum has great potential to be developed in Indonesia because it has broad adaptability, especially on dry land and produces quite high productivity. Sorghum has characteristics that are closer to wheat, so it has the potential to replace wheat and can produce sugar.The aim of this research is to find out the reasons why farmers receive sorghum crop assistance from the government in Tinondo District, East Kolaka Regency and to find out the economic benefits of sorghum plants on the income of sorghum farmers in Tinondo District, East Kolaka Regency.The data used was primary data sourced from questionnaires distributed to respondents and secondary data from related agencies, literature and reports or results of previous research. The research method used was a qualitative and quantitative research method used analysis of farming income and the R/C ratio. The research results showed that the reasons why farmers received sorghum plant assistance from the Government in Tinondo District, East Kolaka Regency were that the soil conditions were suitable for planting sorghum, there was a lot of vacant land in the community, farmers did not need to buy sorghum seeds, the quality of the seeds was good, maintenance costs were cheap, and the plants Sorghum is more profitable than corn. The R/C value for total costs is 1.68 and the results of the income analysis of sorghum farming can be said clearly that sorghum farming is very profitable to run.

Keywords: sorghum crop, income, R/C ratio

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INTRODUCTION

Indonesia as an agricultural country has a diverse biodiversity of food sources. According to Sunarmi (2017) , biodiversity is a term related to the variety of life on earth. Biodiversity is the wealth of life on earth, millions of plants, animals, and microorganisms, the genetics they contain, and the ecosystems in which they live. Indonesia's staple food consumption patterns in the past were full of diversity, based on the wealth of local biodiversity, such as rice, sago, corn, sweet potatoes, and others (Kehati, 2020) . However, there is still a lot of biodiversity that has not been further developed by the community, one of which is the sorghum plant.

Sorghum belongs to the grass family just like rice, corn, wheat and sugarcane. The stem of sorghum has fibers similar to sugarcane, but is smaller with a diameter of 2 cm. The plant height of old varieties can reach 2.5 m but the newer, superior varieties can only be 1.5 m tall. Sorghum leaves are ribbon-shaped, similar to corn leaves and sugarcane leaves. The panicle grows at the tip of the plant just like rice. Sorghum seeds are also contained in a hard seed coat (husk), harder than rice husk. Sorghum can be cultivated in tropical, munson, savanna, desert and subtropical regions. Sorghum plants have been known and cultivated for a long time in several regions such as Central Java, Yogyakarta, East Java, parts of NTB and NTT (Sirappa, 2003) . Sorghum has great potential to be developed in Indonesia because it has wide adaptability, especially on dry land and produces quite high productivity. Sorghum has characteristics that are closer to wheat so that it has the potential to replace wheat and can produce sugar.

Southeast Sulawesi is one of the provinces that has extensive agricultural land and is also one of the areas that has dry land and has the potential to be utilized for the development of various types of food crops, including in East Kolaka Regency. The East Kolaka District Government developed 1,200 hectares of sorghum, this development was used to support and encourage farmers to develop sorghum crops so that East Kolaka became a sorghum granary. Sorghum plants can be used as food, animal feed, industrial raw materials, so that they will be able to become the forerunner of the regional economic driver (Ministry of Agriculture, 2020) .

In 2017 the sorghum crop began to enter Tinondo Sub-district, precisely in Lamunde Village, which was first brought by a self-help extension worker who at that time was carrying out a technical training to Bogor. Initially the extension worker brought 15 sorghum seeds and planted them on land that only produced 8 trees. Then it was developed to reach 30 areas which were donated to the local community to try consuming sorghum. At that time the government and the local community were very enthusiastic about the development of sorghum until now sorghum planting has been carried out once with three harvests. The potential of sorghum plants in Lamunde Village in terms of price is very high compared to other commodities, the

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price of sorghum in Lamunde Village is Rp20,000.00 - Rp25,000.00 / kg compared to the price of rice starting from Rp9,000.00 / liter. In terms of sorghum crop production, the first harvest produced 40 tons / ha in 2017, the second harvest produced 7 tons / ha, and the third harvest± 3.5 tons / ha. In terms of production, sorghum can be harvested up to 3x without on one tree, but in the 3rd harvest the production starts to decline so that farmers usually use it for animal feed (Kolaka Regency Profile, 2022).

According to Hermawan (2018), the age of the sorghum plant is relatively short (100 to 110 days). In Lamunde Village, one planting produces up to 3 times so that each harvest requires different costs. Based on the research results obtained in Lamunde Village, the average business costs incurred by sorghum farmers in one crop up to 3 harvests is IDR 20,000,000.00 per ha. In harvest 1, it produces 3.5 tons / ha (3 months of harvest I) with the selling price of sorghum IDR 20,000.00 / kg so that the income obtained by farmers is IDR 70,000,000.00 per ha. In harvest II, it produces seven tons per ha, the income obtained by farmers is IDR 114,000,000.00 per ha within two to three months. Harvest III produces 2 tons per ha, the income obtained by farmers is IDR 52,000,000.00 per ha within two to three months of harvest III. The farmer's income per year for 3 harvests is Rp216,000,000.00 per ha. From the above income can be seen that sorghum cultivation can increase the income of community farmers because the planting time is not too long and the harvest can be up to three harvests in one planting.

Based on the description above, the researcher is interested in conducting research on the Analysis of Economic Benefits, Sorghum Crop Aid for Farmers in Tinondo District, East Kolaka Regency.

METHOD

This research was conducted in the vicinity of Tinondo District, East Kolaka Regency in June 2023 until completion. The selection of the research location was chosen deliberately because Tinondo District is one of the sorghum producing areas in East Kolaka Regency so it has good sorghum potential. The population of this study were all sorghum farmers in Tinondo District, East Kolaka Regency. The number of sorghum farmers in Tinondo District, East Kolaka Regency is 25 people. Sampling is done by using the *Non Probability Sampling* technique chosen, namely saturated sampling (census) because the population is relatively small, the entire population will be sampled. The number of samples in this study were 25 samples.

Data collection techniques in this study were carried out using observation, interview and recording methods. Data analysis used to find out the reasons farmers receive sorghum crop assistance from the government in Lamunde village, Tinondo sub-district, East Kolaka Regency,

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is used with qualitative descriptive data analysis, namely to explain the characteristics of the phenomenon under study. To find out how the economic benefits of sorghum crops on farmers' income are used with qualitative descriptive analysis, namely by presenting data in accordance with data in the field. Then analyzed by tabulation which includes farm income and R / C (Ratio). The analysis of the economic benefits of sorghum crops on farmers' income is as follows:

1. Farm Income

   $I = TR - TC \longrightarrow TR = Y \times P$

   Description:

   I = *Income*

   TR = *Total Revenue* / Total (Rp)

   TC = *Total Cost* (Rp)

2. R/C (Ratio)

   $$RC\ Ratio = \frac{Total\ revenue}{Total\ cost}$$

   Description:

   RC Ratio = Ratio of revenue and cost

   Total *Revenue* = Total Revenue (IDR)

   Total *Cost* = Total Cost (Rp)

   There are three criteria in the calculation, namely:

   - If R/C > 1 means that the farm is profitable
   - If R/C = 1, it means that the farm breaks even.
   - If R/C < 1, it means that the farm is losing money.

RESULTS AND DISCUSSION

Reasons Farmers Accept Sorghum Crop Assistance from the Government

Agriculture is one of the spearheads of the economic sector and includes efforts for food security in East Kolaka Regency including in Tinondo District. The East Kolaka government through the Agriculture and Plantation Office is trying to provide 300 kg of sorghum seeds for farmers in Tinondo Subdistrict, represented by the heads of farmer groups in Tinondo Subdistrict. The sorghum plant assistance is expected to optimize sorghum farming. To increase production, the government encourages farmers to be interested in planting sorghum.The farmers welcomed the assistance.Here are some reasons why farmers received sorghum seed assistance from the government.

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1. Land Conditions Suitable for Sorghum Cultivation

Sorghum is a commodity that is able to grow well in drylands and does not require much water during its growth period. Its ability to adapt to various types of soil, both marginal and fertile land, makes sorghum suitable for cultivation in various regional conditions, including in Tinondo District. According to farmers in the region, sorghum is very suitable for planting on their land, even from the experience of the previous year, sorghum production can reach two to three tons per hectare. Khaerati (2016) mentioned that the agroecology of Tinondo District has cool and humid temperatures, as well as mountainous and hilly topography with soil types of Hepluduits, Hepludalfs, Dystrudelps, Eutrudepts, and Udothents. Effendi et al. (2014) also revealed that most of East Kolaka is acid dry land with soil pH below 6 and low fertility, but sorghum can still grow well. In addition, the presence of lebak swamp land in Tinondo Sub-district also shows that this region has a diversity of land suitable for various commodities, including sorghum which is tolerant of drought and waterlogging, especially if planted in the dry season when sunlight is optimally available.

Land utilization by the people of Tinondo Sub-district for agriculture, especially sorghum, is still not optimal, even though this crop has considerable opportunities to be developed. With the availability of vast vacant land, sorghum is a promising alternative cultivation in supporting local food security. Many communities are starting to get involved in sorghum cultivation, which is expected to increase productivity and diversify food sources. Farmers recognize that sorghum is suitable to be planted on their land due to its tolerance to local soil and environmental conditions. In addition, they can also apply cultivation technology that suits the characteristics of their respective land. This research is in line with the findings of Susilo et al. (2021) which stated that sorghum has the ability to tolerate dry, acidic, and saline environments, and has high resistance to drought stress, so it is very potential to be developed on suboptimal land such as in Tinondo District.

2. Assistance from the Government

One of the main reasons farmers in Tinondo sub-district accepted the sorghum seed assistance from the government was because the seeds were provided free of charge, so they did not need to pay for the purchase of seeds. The government of Kabupaten Kolaka Timur tried to optimize the development of sorghum farming by providing seed assistance to farmers as part of the sorghum farming development program. This assistance helped encourage the development of sorghum farming in the region. According to the Tinondo District Agricultural Extension Coordinator, the assistance provided included 10 kg of sorghum seeds per hectare for 30 hectares of land, bringing the total assistance to 300 kg of seeds. With this assistance, farmers

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can reduce their expenses because they do not need to buy seeds, and only need to cover other costs such as fertilizers, herbicides, and operations.

In addition to seed assistance, the government also provides education to the community to utilize uncultivated land (idle land) so that it can be used as productive land for sorghum farming. This shows that there is comprehensive support from the government, not only in the form of physical assistance, but also in increasing the capacity of farmers. Research conducted by Syafruddin et al. (2015) supports this, stating that farmers need to be more active in responding to government programs and make maximum use of the available assistance. In the context of sorghum commodity development, the availability of assistance from the government is a great opportunity that must be followed by the active involvement of farmers so that the development of sorghum crops can run optimally and sustainably.

3. High Economic Value and Advantages over Other Food Crops

The sorghum plant is a pilot crop that is considered a healthy food alternative to rice and corn. This crop does not require special technology or care like other crops, because it is able to grow with little water and fertilizer, making it very suitable as an agricultural solution in the dry season. Its resistance to dry land conditions makes sorghum very potential to be optimally utilized in Tinondo Sub-district, especially for lands that have not been cultivated productively. In addition to being easily adaptable to minimal water, sorghum plants still have high productivity and good resistance to pests and diseases. Although fertilization and watering are still recommended for maximum yield, sorghum is still able to grow well in limited conditions. Furthermore, sorghum has various potential uses, ranging from staple food, animal feed, to raw materials for the food, beverage and bioethanol industries. Its nutritional content is also not inferior compared to rice and corn, because it has a low fat content and a higher protein content than corn.

According to the head of a farmer group in Tinondo subdistrict, sorghum is even considered more profitable than maize in terms of cost efficiency and environmental adaptability. The selling price of sorghum, which reaches Rp7,000 per kg, is much higher than maize, which only ranges from Rp2,500 to Rp4,000 per kg. Although the tonnage yield of maize is greater, the operational costs are much higher because it requires intensive fertilization and irrigation. On the other hand, sorghum requires lower costs and more flexibility in land management, as it does not need to clear the grass completely as in maize cultivation. In addition, another reason that encourages farmers to accept assistance from the government is that the quality of the seeds provided is very good, so they feel confident about the results of

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their crops. All these advantages make sorghum a strategic choice in the development of sustainable agriculture, especially in areas with limited water resources and soil fertility.

Economic Benefits of Sorghum Farming Business on Farmer Income

The economic benefits of sorghum farming can be seen by using farm income analysis and R/C ratio analysis. Income analysis here is the price obtained from resource utilization minus the costs used in producing these resources. This analysis calculates by detailing the revenue and cost structure of a scope, namely from the production of sorghum crops in Tinondo District, East Kolaka Regency.

Table 1 Farm Business Revenue of Sorghum Farmers in Tinondo District, East Kolaka Regency in 2023

No.	Description	Unit	Average
1.	Production (P)	Kg	2.000
2.	Price (Q)	Rp/Kg	7.000
3.	Total Revenue (TR)	Rp	14.000.000

Source: Primary data processed, 2023

Based on Table 1, it shows that the average amount of sorghum crop production obtained by 25 sorghum farmer respondents in Tinondo District, East Kolaka Regency is 2,000 kg or 2 tons per harvest season with the sorghum crop land area of each respondent is one hectare. The unit price of sorghum plants that prevailed on that day was IDR 7,000.00 / kg. So that the average production value of sorghum crop farming per one harvest obtained by respondents or sorghum crop farmers is IDR 14,000,000.00.

The production of sorghum crop farmers is sold to intermediary traders and intermediary traders themselves who come directly to the sorghum crop collection points. Sorghum plants that have been sold by collecting traders will be resold and processed into drinks, industrial raw materials, animal feed ingredients, food raw materials and so on.

Table 2 Farming Costs of Sorghum Crop Farmers in Tinondo District, East Kolaka Regency in 2023.

No.	Description	Value (Rp)
1.	Fixed cost	
	Total tool depreciation cost	17.879

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2.	Non-fixed costs	
	a. NPK fertilizer cost	360.000
	b. Rambo herbicide cost	130.000
	c. Gasoline cost	130.000
	d. Labor cost	7.680.000
Total cost		8.317.879

Source: Primary data processed, 2023

Table 2 explains that farmers incur fixed costs and non-fixed costs (variable costs). Fixed costs are those incurred by farmers are the cost of tool depreciation which includes the cost of machete depreciation, the cost of tripe machine depreciation, and the cost of spraying depreciation. Depreciation costs of tools incurred by farmers each harvest season amounted to Rp17,879.00. Then the non-fixed costs (variable costs) incurred by sorghum farmers are fertilizer costs, herbicide costs, gasoline costs, and labor costs. Fertilizer purchases amounted to Rp360,000.00, rambo herbicide and gasoline purchases amounted to Rp130,000.00 and labor costs or labor were Rp100,000.00 per day or the total cost in each harvest season averaged Rp7,680,000.00. So that the total non-fixed costs (variable costs) incurred by sorghum farmers each harvest season amounted to Rp8,300,000.00.

If sorghum farmers want to know the total costs incurred each harvest season, the way to do it is to add up the total fixed costs with the total non-fixed or variable costs. The total fixed costs amounted to Rp17,879.00 while the total non-fixed costs amounted to Rp8,300,000.00. So, the total cost incurred by sorghum farmers each harvest season is IDR 8,317,879.00.

Table 3 Farm Income and R/C Ratio of Sorghum Farmers in Tinondo District, East Kolaka Regency in 2023

No.	Description	Unit	Value
1.	Reception		
	Price	Rp/kg	7.000
	Production	Kg	2.000
	Total Revenue	Rp	14.000.000
2.	Cost		
	Fixed Cost	Rp	17.879
	Non-Fixed Costs	Rp	8.300.000
	Total Cost	Rp	8.317.879

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3.	Revenue	Rp	5.682.121
4.	R/C Ratio		1,68

Source: Primary data processed, 2023

Table 3 shows that the average revenue of sorghum farmers in Tinondo District is Rp14,000,000.00 with costs of Rp8,317,879.00, resulting in a net income of Rp5,682,121.00 or around Rp1,894,040.33 per month, which is still lower than the Kolaka Timur MSE in 2023 of Rp2,758,948.00. The R/C value of total costs of 1.68 indicates that every Rp1 invested will produce Rp1.68, so that every Rp100,000.00 of farming costs will provide production results worth Rp168,300.00, indicating that sorghum farming is still classified as profitable. From the results of the analysis of the income of sorghum farming in Tinondo District, East Kolaka Regency, it can be said clearly that sorghum farming is profitable to run or feasible to develop because the R/C ratio is worth more than one (R/C> 1) and the income obtained is greater than the Minimum Wage of East Kolaka Regency.

Meanwhile, if sorghum farmers do not receive assistance from the government, they will buy sorghum seeds at a price of Rp20,000/kg so that the R/C value of total costs can be seen in Table 4 below.

Table 4 R/C Ratio of Sorghum Farmers in Tinondo District, East Kolaka Regency in 2023

No.	Description	Unit	Value
1.	Total revenue (R)	Rp	14.000.000
2.	Total cost (C)	Rp	8.362.879
R/C			1,67

Source: Primary data processed, 2024

The R/C value of total costs if farmers buy sorghum seeds is 1.67. This means that for every Rp1 of total costs incurred to cultivate sorghum plants, farmers will get a revenue of 1.67. This shows that every Rp100,000.00 invested in sorghum in Lamunde Village, Tinondo District, East Kolaka Regency will produce a sorghum production value of Rp167,406.46. So that sorghum farming is still feasible to develop because the R/C ratio is more than one (R/C> 1).

Increased agricultural production from the application of sorghum crop farming provides economic benefits in the form of increased farm income or net profit of Rp5,682,121.00. The increase in income was due to an increase in sorghum crop production by an average of two

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tons or 2,000 kg of sorghum crops per harvest season. This means that sorghum farming can provide economic benefits for sorghum farmers in Tinondo District, East Kolaka Regency.

CONCLUSION

Based on the results of research and discussion regarding the analysis of the economic benefits of sorghum crop assistance for farmers in Tinondo District, East Kolaka Regency, it can be concluded that some of the reasons farmers receive sorghum crop assistance from the Government in Tinondo District, East Kolaka Regency are suitable soil conditions for planting sorghum, assistance from the government, high economic value and has advantages over other food crops.

The R/C value of total costs is 1.68 and the results of the analysis of sorghum farming income can be clearly said that sorghum farming is very profitable to run because the R/C ratio is more than one (R/C> 1). This means that sorghum farming can provide economic benefits for sorghum farmers in Tinondo District, East Kolaka Regency.

Based on the results of this research and discussion, several things can be suggested, namely: For sorghum farmers in Tinondo Subdistrict, it is hoped that they will be able to develop sorghum farming and increase their production yields in order to increase income and introduce sorghum cultivation to the wider community; for agricultural extension, it is hoped that they can provide intensive assistance and guidance to farmers and establish coordination with the local BPSDMP to organize training on the development of sorghum cultivation so that seed needs can be met in-situ; and for the Government of East Kolaka Regency, it is expected that the assistance provided to farmers is not only in the form of seeds, but also other production facilities such as fertilizers and herbicides so that sorghum production can increase, and it is expected to socialize the benefits of sorghum plants evenly in various regions so that the benefits can be felt by the entire community.

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