AGRIEKONOMIKA
http://journal.trunojoyo.ac.id/agriekonomika
Volume 14, Nomor 1, 2025
DOI: https://doi.org/ 10.21107/agriekonomika.v14i1.27151

Agriekonomika has been accredited as a scientific journal by the Ministry of Research-Technology and Higher Education Republic of Indonesia: ***No. 23/E/KPT/2019*** *SINTA 2*

Analysis of Income and Added Value of Oil Palm and Sugar Palm Diversification in Bandar Sei Kijang District Pelalawan Regency

Yeni Kusumawaty[1*], Evy Maharani[1], Rindi Tiara[1], Susy Edwina[1], Sispa Pebrian[1]

[1]Agribusiness Department, Faculty of Agriculture, University of Riau, Pekanbaru, Indonesia

Received: November 2024; Accepted: March 2025; Published: April 2025

ABSTRACT

The fluctuating price of oil palm affects farmers' income, so that farmers carry out monoculture sugar palm farming and diversification with oil palm. This study aimed to analyze income, efficiency and added value of oil palm and sugar palm diversification and analyze income and efficiency of monoculture sugar palm farming in Bandar Sei Kijang District, Pelalawan Regency. The research applied a survey method. The results of the study showed that the income of oil palm farming is IDR 1,015,441.51/ha/month, income of sugar palm farming is IDR 2,658,468.89/month, income of sugar palm sap coffee business is IDR 5,646,855.65/month and income of sugar palm sap tea is IDR 139,019.83/month. Palm oil, sap coffee and tea, and sugar palm sap businesses are categorized as efficient and profitable and worth continuing because the R/C value is > 1. The added value of sap coffee and sap tea products is relatively high because the added value ratio is more than fifty percent. The income from monoculture sugar palm farming is IDR 375,081.83/month, monoculture sugar palm farming is categorized as efficient and profitable and worthy of being continued.

Keywords: Arenga pinnata Merr, diversification, income, oil palm, added value

INTRODUCTION

Oil palm is a very important crop for the economy of many countries including Indonesia, where its products such as oil are exported in large quantities (Murphy et al., 2021). One of the provinces in Indonesia that has extensive oil palm plantations is Riau Province with a total area of community plantations, PBN and PBS of 2.8 million hectares with a production of 8.9 million tons in 2022 (BPS Riau, 2023). Pelalawan Regency is the sixth largest oil palm producing district in Riau Province with an oil palm plantation area of 188,194 ha and a production of 447,610 tons. Pelalawan Regency consists of 12 sub-districts and all sub-districts are oil palm producers. One of the sub-districts that has quite extensive oil palm land is Bandar Sei Kijang District. In 2022, the area of oil palm plantations in Bandar Sei Kijang District was 11,056 ha with a production of 58,616 tons (BPS Pelalawan, 2023). Based on these data, it can be seen that most people in Bandar Sei Kijang District work as oil palm farmers and depend on oil palm for their livelihood.

Oil palm plays a very important role in the economy of the Bandar Sei Kijang community. However, the price of oil palm itself is sometimes unstable and tends to fluctuate. If the price of oil palm falls, it will certainly have a major impact on the economy and welfare of the community. For this reason, the alternative is that in addition to oil palm

*Corresponding author:
Email: yeni.kusumawaty@lecturer.unri.ac.id

p-ISSN 2301-9948 | e-ISSN 2407-6260

farming, the Bandar Sei Kijang community also farms other commodities. One of the commodities that has the potential to be developed is sugar palm. Sugar palm (*Arenga pinnata* Merr) is a type of palm plant that is widely distributed throughout the archipelago, especially in humid hilly areas (Wijaya, 2024). Sugar palm is a plantation commodity that has agroclimatic suitability to Indonesian conditions and has high economic value, which means that sugar palm trees have prospects and opportunities to be developed to improve the economy of a region (Nuraini & Atmaja, 2019). Sugar palm is a plant that produces many benefits. Almost all parts of the plant can be utilized and have commercial value (Azhar et al., 2019). The benefits of the sugar palm plant include sap that can be processed into sugar, the trunk can be processed into sugar palm flour, the fruit can be processed into sugar palm fruit, the leaves can be used as roofing and the ribs can be made into brooms, and the fibers can be processed into crafts (Ruslan et al., 2018). Sugar palm does not require too much land for planting. In addition, sugar palm has land conservation benefits because its wide roots can prevent soil erosion and the dense leaves and trunks covered with a layer of fibers can withstand the force of rainwater *(*Kusumawaty et al., 2020).

Some people in Bandar Sei Kijang District have cultivated sugar palm plants. Sugar palm cultivation is carried out as a monoculture and diversification with oil palm. Monoculture cultivation of sugar palm is planting sugar palm on a piece of land without any other plants. Meanwhile, diversification of oil palm and sugar palm is carried out with an intercropping system, namely by planting sugar palm in between and on the edge of oil palm plantations.

The intercropping system helps increase the diversity of soil and environmental microorganisms and can control pests (Treetaruyanont et al., 2014). Intercropping can encourage better land use and increase yields through cooperation between crops and intercrops (Sandra et al., 2021). Diversification of oil palm and other crops can reduce social and economic risks and can overcome unsuitable soil conditions, the presence of plants such as sugar palm which have a deeper root system than oil palm can maintain water content in the soil (Khasanah et al., 2020). Diversification of oil palm and sugar palm is carried out with the aim of obtaining added value from the land and optimizing land use so that farmers' income increases (Putri et al., 2022). Alansa et al. (2022) stated that diversification is one of the efforts made to reduce dependence on one type of crop and provide a more stable income for farmers.

By diversifying oil palm and sugar palm, farmers can obtain income from oil palm and sugar palm. Sugar palm produces sap that can be sold to increase farmers' income daily. In addition, there are farmers who sell sugar palm sap as sap-mixed coffee and sap-mixed tea which can provide added value for farmers. Added value is the addition of value contained in a product after undergoing further processing ((Hartin & Santoso, 2020).

When viewed from the potential of the palm plant, there are many benefits that farmers can get if farmers who have oil palm plantations diversify with palm plants. Therefore, this study aimed to analyze the income, efficiency and added value of oil palm and sugar palm diversification as well as the income and efficiency of sugar palm monoculture farming in Bandar Sei Kijang District, Pelalawan Regency.

METHODS

This research was conducted in Kiyap Jaya and Lubuk Ogung Villages,

Bandar Sei Kijang District, Pelalawan Regency, Riau Province. The location of this research was chosen intentionally (purposively) based on the consideration that there were farmers who had diversified oil palm and sugar palm as well as monoculture sugar palm farming in the location. The research was conducted from September 2023 to July 2024.

This research applied a survey method. The farmer sampling method used a purposive sampling technique. The number of respondents in this study were 6 farmers in Kiyap Jaya Village (diversification farming) and 1 farmer in Lubuk Ogung Village (monoculture sugar palm farming). Meanwhile, sampling for sugar palm processed sellers, namely sugar palm sap coffee and sugar palm sap tea, was carried out by census where all members of the population were sampled. The number of sugar palm sap processed seller respondents consisted of one person who was also a diversified oil palm and sugar palm farmer. Thus, the total respondents in this study were 7 people. The respondent selling processed sugar palm products was only 1 person because the person who runs the sugar palm coffee and sugar palm tea business in Bandar Sei Kijang District was only 1 person, namely Mr. Musa. This is because the sugar palm sap produced from Mr. Musa's sugar palm farming business is quite a lot so that it can be used as a processed product (sap cofee and tea), while the production of other farmers' sugar palm sap is still limited.

The types of data used in this study were primary and secondary data. The data analysis used in this study was quantitative analysis. Quantitative analysis is used to calculate income, efficiency and added value. Farming income is income obtained from the difference between total revenue and costs used to run a farming business in a certain period of time (Sari et al., 2018). To calculate income, the following formula is used (Soekartawi, 2016):

$$TC = FC + VC$$

Where **TC** is the total cost of oil palm farming (IDR/ha/month); sugar palm (IDR/month); processed products (IDR/month), **FC** is the fixed cost of oil palm farming (IDR/ha/month); sugar palm (IDR/month); processed products (IDR/month), and **VC** is the variable cost of oil palm farming (IDR/ha/month); sugar palm (IDR/month); processed products (IDR/month). Fixed costs are costs that are not affected by the amount of output, while variable costs always change according to the amount of output produced (Bakari, 2019).

$$TR = Y \times Py$$

Where **TR** is the total revenue of oil palm farming (IDR/ha/month); sugar palm (IDR/month); processed products (IDR/month), **Y** is the amount of oil palm production (kg/ha/month); sugar palm (liter/month); processed products (glass/month), and **Py** is the selling price of oil palm (IDR/kg); sugar palm (IDR/liter); processed products (IDR/glass).

$$Pd = TR - TC$$

Where **Pd** is the income of oil palm farming (IDR/ha/month); sugar palm (IDR/month); processed products (IDR/month), **TR** is the total revenue of oil palm farming (IDR/ha/month); sugar palm (IDR/month); processed products (IDR/month), and **TC** is the total cost of oil palm farming (IDR/ha/month); sugar palm (IDR/month); processed products (IDR/month).

Efficiency analysis uses the R/C formula as follows (Soekartawi, 2016):

$$R/C = TR/TC$$

The criteria used are if **R/C > 1**, it means that the business is said to be efficient and profitable and feasible to continue, if **R/C < 1**, it means that it is said to be inefficient and unprofitable and not feasible to continue, **R/C = 1** means that the business is at breakeven (neither profitable nor unprofitable). In general, a

business will make a profit if the income is greater than the business costs (Nugroho & Mas'ud, 2021).

Added value analysis used the calculation of gross and net added value as follows (Suryana, 1990):

Gross NT = NP – (NBB + NBP)

Net NT = NP – (NBB + NBP + NPP)

Where **gross NT** is the gross added value (IDR/L), **net NT** is the net added value (IDR/L), **NP** is the value of the sugar palm sap coffee product; sugar palm sap tea (IDR/L), **NBB** is the value of raw materials for sugar palm sap coffee; sugar palm sap tea (IDR/L), **NBP** is the value of supporting materials for sugar palm sap coffee; sugar palm sap tea (IDR/L), **NPP** is the value of equipment depreciation (IDR/L).

Added value Ratio = Net NT / NP x 100%

Where if the added value ratio is > 50% then the added value is classified as high, if the added value ratio is ≤ 50% then the added value is classified as low (Suryana, 1990).

RESULTS AND DISCUSSION

Oil Palm Farming

Cost of Oil Palm Farming

The total costs incurred by farmers in oil palm farming in Kiyap Jaya Village are IDR 1,145,388.46/ha/month consisting of fixed costs and variable costs which can be seen in Table 1. The total fixed costs incurred are IDR 255,018.76/ha/month. Fixed costs consist of investment costs of IDR 188,176.17/ha/month, equipment depreciation costs of IDR 52,953.70/ha/month and TKDK (family labor) costs, namely fertilization costs of IDR 13,888.89. Total variable costs amounted to IDR 890,369.70/ha/month consisting of fertilizer costs of IDR 510,900.00/ha/month, pesticide costs incurred of IDR 45,000.00/ha/month and TKLK (non-family labor) costs incurred of IDR 334,469.70/ha/month. Fertilizers consisted of Urea, TSP and KCl fertilizers of 262 kg/ha/month. Urea fertilizer costing IDR 139,733.33/ha/month, TSP of IDR 83,400.00/ha/month, KCL fertilizer costing IDR 187,766.67/ha/month. On average, farmers gave Urea, TSP and KCL fertilizers of 2 kg/tree/year each. The fertilizer dosage given by farmers was not in accordance with recommendations. According to the recommended dosage of PPKS (2020), the dosage of Urea fertilizer is 2.75 kg/tree/year, TSP is 1.75 kg/tree/year, MoP/KCl is 2.65 kg/tree/year (Ginting et al., 2021).

The pesticide used is gramoxone with an amount of 2.8 liters/ha. with a frequency of administration of 1 - 2 times a year. The dosage of this pesticide is appropriate because it does not exceed the maximum recommended dosage. According to the recommendations issued by PT Sygenta Indonesia (SI), the dosage of Gramoxone is 3 liters/ha dissolved in 306 L of water for all plant maintenance (Solfianti et al., 2021). The cost of non-family labor (TKLK) consists of fertilization costs incurred of IDR 26,111.11/ha/month, spraying costs incurred of IDR 51,666.67/ha/month, settlement costs incurred of IDR 54,583.33/ha/month and harvesting costs incurred of IDR 202,108.59/ha/month.

Revenue of Oil Palm Farming

Farmers in Kiyap Jaya Village, some use their own land and some use land with a profit-sharing system. Therefore, the revenue obtained by farmers also uses a profit-sharing system. There are 3 profit-sharing farmers and 3 farmers who have their own land. Profit-sharing farmers provide revenue of 0.5 to the landowner. The average revenue of farmers in oil palm farming is calculated for the last 3 months, namely September, October and November 2023. The average production

of fresh fruit bunches (FFB) is 1,186.46 kg/ha/month with an average price of FFB of IDR 2,363.33/kg. FFB production in Bandar Sei Kijang District is lower when compared to FFB production in Kerumutan District, Pelalawan Regency, which is 1,952.62 kg/ha/month (Tusdiansyah et al., 2020). This is because when the study was conducted, oil palm was experiencing a dry season so that FFB production was not optimal. The average revenue obtained by profit-sharing farmers is IDR 1,284,771.04/ha/month and the revenue of farmers on their own land is IDR 3,036,888.89/ha/month. Therefore, the average revenue of farmers in oil palm farming in Bandar Sei Kijang District is IDR 2,160,829.97/ha/month, which can be seen in Table 1.

Table 1
Average Cost, Revenue, Income and Efficiency of Oil Palm Farming in Bandar Sei Kijang District in 2023

No	Description	Total (IDR/Ha/Month)
1	Fixed Cost	
	Investment Cost	188,176.17
	Equipment Depreciation	52,953.70
	Family Labor	13,888.89
	Total Fixed Cost	255,018.76
2	Variable Cost	
	Fertilizer	510,900.00
	Pesticide	45,000.00
	Non-family Labor	334,469.70
	Total Variable Cost	890,369.70
3	Total Cost	1,145,388.46
4	Total Revenue	2,160,829.97
5	Income	1,015,441.51
6	Efficiency (R/C)	1.89

Source: Processed primary data, 2023

Income of Oil Palm Farming

Table 1 shows that the total costs incurred by farmers in oil palm farming in Bandar Sei Kijang District, Pelalawan Regency are IDR 1,145,388.46/ha/month. Meanwhile, the total revenue obtained by farmers from oil palm farming is IDR 2,160,829.97/ha/month, so the average income obtained by farmers is IDR 1,015,441.51/ha/month. The income of oil palm farming in Kiyap Jaya Village, Bandar Sei Kijang District is lower when compared to the income of oil palm farming in Kerumutan District, Pelalawan Regency, which is IDR 1,358,993.46/ha/month (Tusdiansyah et al., 2020). This is because the amount of production produced in Kerumutan District is much higher and the income of farmers in Bandar Sei Kijang District, some of whom use a profit-sharing system, which affects the income received by farmers. Production can affect the income earned by farmers. If production increases, farmers' income will also increase (Hamid et al., 2022).

Efficiency of Oil Palm Farming

The efficiency of oil palm farming in Bandar Sei Kijang District, Pelalawan Regency can be seen from the R/C value

in Table 1. The R/C value is obtained by comparing the total income and total costs incurred by oil palm farmers. Total revenue from oil palm farming in Bandar Sekijang District is IDR 2,160,829.97/ha/month and total costs incurred are IDR 1,145,388.46/ha/month. Based on the comparison of total revenue and total costs, the R/C value is 1.89, which means that oil palm farming is efficient and profitable and worth continuing because the R/C value is more than 1. The R/C value of 1.89 means that for every cost of IDR 1, farmers will receive an revenue of IDR 1.89. Oil palm farming in Bandar Sei Kijang District is said to be efficient because the total revenue obtained by farmers is greater than the total costs incurred by farmers.

Sugar Palm Farming

Cost of Sugar Palm Farming

The total cost incurred by farmers in sugar palm farming in Bandar Sei Kijang District is IDR 3,768,531.11/month consisting of fixed costs and variable costs as shown in Table 2. The calculation of this farming cost is adjusted to the number of trees tapped by farmers, which is an average of 6 sugar palm trees. The total fixed cost of sugar palm farming is IDR 2,968,531.11 consisting of investment costs of IDR 5,200.00/month, equipment depreciation costs of IDR 63,331.11/month and family labor costs (TKDK) of IDR 2,900,000.00/month. The total variable cost of sugar palm farming consists of labor costs outside the family (TKLK) of IDR 800,000.00/month. TKDK and TKLK consist of tapping labor. The wage for tapping activities is IDR 20,000.00/tree/day with a tapping time of around 10 minutes/day. Tapping is done twice a day, namely in the morning at 07.00 - 08.00 WIB and in the afternoon at 16.00 - 17.00 WIB.

Revenue of Sugar Palm Farming

The revenue obtained by farmers in sugar palm farming in Kiyap Jaya Village, Bandar Sei Kijang District is calculated for the last 3 months, namely September, October and November 2023. This is because one sugar palm tree can generally be tapped for 3 months. Sugar palm farmers in Bandar Sei Kijang District consist of sharecroppers and farmers who have their own land. Sharecroppers provide revenue of 0.5 to the landowner, while farmers who have their own land receive the full income. In sugar palm farming in Bandar Sei Kijang District, there are 3 sharecroppers and 3 farmers who have their own land. The revenue from the sugar palm farming business is calculated based on the average number of sugar palm trees tapped by farmers, which is 6 trees. The average production of palm sap by sharecroppers is 1,387.44 L/month and by farmers on their own land is 377.44 L/month. So, the average production of sugar palm sap is 882.44 L/month. The amount of palm sap produced by sharecroppers is higher than that of independent land farmers because the number of trees tapped by sharecroppers is greater than that of independent land farmers. The selling price of sugar palm sap is IDR 12,000.00/L, so the average revenue for farmers sharing the results of sugar palm farming is IDR 8,324,666.67/month and for farmers on their own land is IDR 4,529,333.33/month. Therefore, the average revenue of farmers in sugar palm farming in Bandar Sei Kijang District, Pelalawan Regency is IDR 6,427,000.00/month, which can be seen in Table 2.

The average production of sugar palm sap in Bandar Sei Kijang District is 4.67 L/tree/day. The type of sugar palm cultivated in Bandar Sei Kijang District is the genjah sugar palm type. According to Nurmayulis et al. (2021), the production of genjah sugar palm sap is 5-10

L/tree/day. It is known that the production of sugar palm sap in Bandar Sei Kijang District is still below the ideal production, so efforts are needed to increase the production of sugar palm sap by carrying out better maintenance. According to Dewi et al. (2022), in order for sugar palm production to be optimal, special treatments such as fertilization and pest and disease control are needed.

Table 1
Average Cost, Revenue, Income dan Efficiency of Sugar Palm Farming in Bandar Sei Kijang District in 2023

No	Description	Total (IDR/Month)
1	Fixed Cost	
	Investment Cost	5,200.00
	Equipment Depreciation	63,331.11
	Family Labor	2,900,000.00
	Total Fixed Cost	2,968,531.11
2	Variable Cost	
	Non-family Labor	800,000.00
	Total Variable Cost	800,000.00
3	Total Cost	3,768,531.11
4	Total Revenue	6,427,000.00
5	Income	2,658,468.89
6	Efficiency (R/C)	1.71

Source: Processed primary data, 2023

Income of Sugar Palm Farming

Sugar palm farming income is obtained from the difference between total revenue and total costs in sugar palm farming. The income of sugar palm farming in Bandar Sei Kijang District is calculated based on the average number of sugar palm trees tapped by farmers, which is 6 sugar palm trees. Table 2 shows that the total cost incurred by farmers in sugar palm farming is IDR 3,768,531.11/month. The average revenue received by farmers is IDR 6,427,000.00/month, so the average income of farmers in sugar palm farming in Kiyap Jaya Village, Bandar Sei Kijang District is IDR 2,658,468.89/month. The income of sugar palm farming of IDR 2,658,468.89/month is the income from the average number of trees tapped by farmers, which is 6 sugar palm trees. So, the income for each sugar palm tree is IDR 443,078.15/tree/month.

Efficiency of Sugar palm Farming

The efficiency of sugar palm farming in Bandar Sei Kijang District can be seen through the Return Cost Ratio (R/C) value. The R/C value is obtained from the comparison of total revenue and total costs. The R/C value of sugar palm farming in Kiyap Jaya Village, Bandar Sei Kijang District is 1.71 (Table 2), which means that the sugar palm farming is efficient and profitable and worth continuing. The R/C value of 1.71 means that for every cost of IDR 1, the farmer will receive IDR 1.71. The sugar palm farming in Bandar Sei Kijang District is said to be efficient because the total revenue obtained by the farmer is greater than the total costs incurred by the farmer.

Sugar Palm Sap Processed Product Business

The processed sugar palm sap product business is carried out in Kiyap Jaya

Village, Bandar Sei Kijang District. The processed sugar palm sap product business consists of sugar palm sap coffee and sugar palm sap tea businesses. This business is carried out by 1 seller who is also a diversified oil palm and sugar palm farmer, namely Mr. Musa. The sugar palm sap coffee and sugar palm sap tea business has been around since 2016.

Production Cost of Sugar Palm Sap Processed Product Business

The production cost of sugar palm sap processed product business can be seen in Table 3. Table 3 shows that the total cost incurred in processing sugar palm sap coffee is IDR 5,253,144.35/month and palm sap tea is IDR 110,980.17/month consisting of fixed costs and variable costs shown in Table 3. The total fixed costs incurred in the sugar palm sap coffee business is IDR 1,770,507.58/month and palm sap tea is IDR 40,616.94/month.

The fixed costs incurred in sugar palm sap processing consist of equipment depreciation costs and TKDK (family labor) costs. The depreciation cost of equipment in processing sugar palm sap coffee and palm sap tea is IDR 11,515.56/month. The use of equipment has a different percentage because the production results of sugar palm sap coffee and palm sap tea are not the same each month. The average production of palm sap coffee is 1,090 glasses/month, while palm sap tea is 25 glasses/month. So, the percentage of equipment usage for sugar palm sap coffee is 97.76% and sugar palm sap tea is 2.24%. So, the depreciation cost of equipment for sugar palm sap coffee is IDR 11,257.36/month and the depreciation cost of sugar palm sap tea equipment is IDR 258.20/month. TKDK costs consist of processing labor costs. The wages of sugar palm sap processing labor are IDR 60,000.00/day. The total cost of TKDK (family labor) in processing sugar palm sap coffee and palm sap tea is IDR 1,800,000.00/month. The percentage of labor usage for processing sugar palm sap coffee is 97.76% and sugar palm sap tea is 2.24%, so the labor cost for processing sugar palm sap coffee is IDR 1,759,641.26/month and sugar palm sap tea is IDR 40,358.74/month. The total variable cost in processing sugar palm sap coffee is IDR 3,482,636.77/month and palm sap tea is IDR 70,363.23/month. Variable costs consist of raw material costs, supporting costs and gas fuel costs. In processing sugar palm sap coffee, raw materials are needed in the form of palm sap as much as 218 L/month at a price of IDR 12,000.00/liter, with a cost of IDR 2,616,000.00/month. Supporting materials are coffee as much as 6 kg/month at a price of IDR 120,000.00/kg, with a cost of IDR 720,000.00/month. Therefore, the total cost of raw materials and supporting costs in processing sugar palm sap coffee is IDR 3,336,000.00/month.

In the processing of sugar palm sap tea, raw materials are required, namely sugar palm sap as much as 5 liters/month with a sap price of IDR 12,000.00/liter and supporting materials, namely tea as much as 1 box/month with a tea price of IDR 7,000.00/box. The cost of raw materials in the processing of palm sap tea, namely palm sap, is IDR 60,000.00/month and the cost of supporting materials, namely tea, is IDR 7,000.00/month. So, the total cost of raw materials and supporting materials in the processing of sugar palm sap tea is IDR 67,000.00/month. The gas fuel used in the processing of sugar palm sap coffee and sugar palm sap tea is 6 gas cylinders/month with a price of IDR 25,000/gas cylinder with a total cost of IDR 150,000.00/month. The cost of gas for sugar palm sap coffee is IDR 146,636.77/month and the cost of gas for palm sap tea is IDR 3,363.23/month.

Revenue from Processed Sugar Palm Sap Business

The average production of sugar palm sap coffee is 1,090 glasses/month. The selling price of 1 glass of sugar palm sap coffee is IDR 10,000.00, so the total revenue obtained from the sugar palm sap coffee business is IDR10,900,000.00/month. The average production of sugar palm sap tea is 25 glasses/month. The selling price of sugar palm sap tea is IDR 10,000.00/glass. So, the total revenue from the sugar palm sap tea business is IDR 250,000.00/month which can be seen in Table 3.

Sugar palm sap coffee and palm sap tea are quite popular with consumers because in addition to their delicious taste, these products are beneficial for body health because they contain palm sap. Palm sap contains sucrose, electrolytes and vitamins which are very useful for health (Andu et al., 2023). Palm sap is beneficial for health such as treating tuberculosis, canker sores, dysentery and hemorrhoids (Surya & Scabra, 2020). Palm sap can also cure kidney stones, diabetes, neutralize toxins in the body and make the heart and lungs healthy (Ridanti et al., 2022).

Table 2
Cost, Revenue, Income dan Efficiency Processed Sugar Palm Sap Business

No	Description	Total (IDR/Month)	
		Sugar Palm Sap Coffee	Sugar Palm Sap Tea
1	Fixed Cost		
	Equipment Depreciation	11,257.36	258.20
	Family Labor	1,759,641.26	40,358.74
	Total Fixed Cost	1,770,507.58	40,616.94
2	VariableCost		
	Raw Material and Supporting Material Cost	3,336,000.00	67,000.00
	Gas Fuel Cost	146,636.77	3,363.23
	Total Variable Cost	3,482,636.77	70,363.23
3	Total Cost	5,253,144.35	110,980.17
	Total Production (Glass/month)	1,090	25
	Production Cost (IDR/Glass)	4,819.40	4,439.21
	Selling Price (IDR/Glass)	10,000.00	10,000.00
	Profit (IDR/Glass)	5,180.60	5,560.79
4	Total Revenue	10,900,000.00	250,000.00
5	Income	5,646,855.65	139,019.83
6	Efficiency (R/C)	2.07	2.25

Source: Processed primary data, 2023

Income from Processed Sugar Palm Sap Business

Table 3 shows that the total cost incurred in processing sugar palm sap coffee is IDR 5,253,144.35/month. The amount of sugar palm sap coffee production is 1,090 glasses/month, so the production cost of sugar palm sap coffee is IDR 4,819.40/glass with the selling price of sugar palm sap coffee being IDR

10,000.00/glass so that the seller gets a profit from sugar palm sap coffee of IDR 5,180.60/glass. The total revenue generated from the sale of sugar palm sap coffee is IDR 10,900,000.00/month. So, the income from the sugar palm sap coffee business in Bandar Sei Kijang District is IDR 5,646,855.65/month.

In the processing of sugar palm sap tea, the total cost incurred is IDR 110,980.17/month. The amount of sugar palm sap tea production is 25 glasses/month, so the production cost of sugar palm sap tea is IDR 4,439.21/glass with the selling price of sugar palm sap tea is IDR 10,000.00/glass, so the profit received by the seller from sugar palm sap tea is IDR 5,560.79/glass. The total revenue generated from the sale of sugar palm sap tea is IDR 250,000.00/month. So, the income from the sugar palm sap tea business in Bandar Sei Kijang District is IDR 139,019.83/month.

Efficiency of Processed Sugar Palm Sap Business

The efficiency of processed sugar palm sap products business can be seen from the R/C value. Based on Table 3, it is known that the R/C value of the sugar palm sap coffee business is 2.07, which means that the sugar palm sap coffee business is efficient and profitable and worth continuing. The R/C value of 2.07 means that for every IDR 1 spent, the seller will receive IDR 2.07. Meanwhile, the R/C value of the sugar palm sap tea business is 2.25, which means that the sugar palm sap tea business is efficient and profitable and worth continuing. The R/C value of 2.25 means that for every IDR 1 spent, the seller will receive IDR 2.25. The sugar palm sap coffee and sugar palm sap tea businesses are said to be efficient because the total revenue received by the seller is greater than the total costs incurred by the seller.

Added value of Processed Sugar Palm Sap Business

The added value is the additional value contained in the sugar palm sap after being processed into sugar palm sap coffee and sugar palm sap tea. Every 1 liter of sugar palm sap will produce 5 glasses of sugar palm sap coffee or 5 glasses of sugar palm sap tea. The calculated added value consists of Gross added value, which is the added value that does not take into account depreciation costs, while net added value is the added value that takes into account depreciation costs. Table 4 shows that the gross added value generated from processing 1 liter of palm sap into sugar palm sap coffee is IDR 34,697.25/L, the net added value is IDR 34,645.61/L, and the ratio of the added value generated is 69.29%. Meanwhile, processing 1 liter of sugar palm sap into sugar palm sap tea provides a gross added value of IDR 36,600.00/L, a net added value of IDR 36,548.36/L, and the ratio of the added value generated is 73.10%. The ratio of the added value of sugar palm sap coffee and sugar palm sap tea is greater than 50%, which means that the added value generated by sugar palm sap coffee and sugar palm sap tea is relatively high. The gross added value, net added value, and ratio of added value of sugar palm sap tea are higher than sugar palm sap coffee because the cost of supporting materials incurred in processing sugar palm sap coffee is greater than sugar palm sap tea.

Monoculture Sugar Palm Farming

Cost of Monoculture Sugar Palm Farming

The total cost of farming incurred in monoculture sugar palm farming in Bandar Sei Kijang District is IDR 1,238,918.17/month which can be seen in Table 5. The costs incurred consist of fixed costs, namely investment costs, equipment depreciation costs and TKDK (family labor) costs. The costs incurred by farmers only consist of fixed costs and

there are no variable costs. The calculation of costs in monoculture farming is adjusted to the number of sugar palm trees tapped by farmers, which is 2 sugar palm trees.

The total fixed cost in monoculture sugar palm farming is IDR 1,238,918.17/month which consists of investment costs of IDR 6,264.83/month, equipment depreciation costs of IDR 32,653.33/month and TKDK (family labor) costs of IDR 1,200,000.00/month. TKDK costs consist of tapping labor costs with wages of IDR 20,000.00/tree/day with a tapping time of around 10 minutes/tree/day.

Table 3
Added value of Sugar Palm Sap Processed Product Business

No	Description	Sugar Palm Sap Coffee	Sugar Palm Sap Tea
1	Raw Material Value (IDR/L)	12,000.00	12,000.00
2	Supporting Material Value (IDR/L)	3,302.75	1,400.00
3	Equipment Depreciation Value (IDR/L)	51.64	51.64
4	Selling Price (IDR/Glass)	10,000.00	10,000.00
5	Product Value (IDR/L)	50,000.00	50,000.00
6	Gross Added value (IDR/L)	34,697.25	36,600.00
7	Net Added value (IDR/L)	34,645.61	36,548.36
8	Added value Ratio (%)	69.29	73.10

Source: Processed primary data, 2023

Revenue of Monoculture Sugar Palm Farming

The revenue from monoculture sugar palm farming is calculated based on the number of sugar palm trees tapped by farmers, which is 2 sugar palm trees. The average sugar palm sap production is 269 L/month produced from tapping 2 sugar palm trees with an average sap production of 4.43 L/tree/day. The selling price of sugar palm sap is IDR 12,000.00/liter. Farmers' revenue in monoculture sugar palm farming in Bandar Sei Kijang District is IDR 3,228,000.00/month with a profit sharing system of 0.5. So, farmers' revenue after profit sharing is IDR 1,614,000.00/month which can be seen in Table 5.

Income of Monoculture Sugar Palm Farming

The income from monoculture sugar palm farming is calculated based on the number of sugar palm trees tapped by farmers, which is 2 sugar palm trees. Based on Table 5, the total cost incurred by farmers in monoculture sugar palm farming in Bandar Sei Kijang District is IDR 1,238,918.17/month. The total revenue obtained by farmers is IDR 1,614,000.00/month, so the income of farmers in monoculture sugar palm farming in Bandar Sei Kijang District is IDR 375,081.83/month. The income is IDR 375,081.83/month from 2 sugar palm trees tapped by farmers. So, the income for each sugar palm tree in monoculture sugar palm farming is IDR 187,540.92/tree/month.

Efficiency of Monoculture Sugar Palm Farming

The efficiency of monoculture sugar palm farming in Bandar Sei Kijang District can be seen from the R/C value. The R/C value of monoculture sugar palm farming is 1.30 (Table 5) which means that monoculture sugar palm farming is efficient and profitable and worth continuing. The R/C value of 1.30 means

that for every cost of IDR 1, the farmer will receive a revenue of IDR 1.30. Monoculture sugar palm farming in Bandar Sei Kijang District is said to be efficient because the total revenue received by farmers is greater than the total costs incurred by sugar palm farmers.

Table 4
Cost, Revenue, Income, and Efficiency of Monoculture Sugar Palm Farming

No	Description	Total (IDR/Month)
1	Fixed Cost	
	Investment Cost	6,264.83
	Equipment Depreciation	32,653.33
	Family Labor	1,200,000.00
	Total Fixed Cost	1,238,918.17
2	Total Cost	1,238,918.17
3	Total Revenue	1,614,000.00
4	Income	375,081.83
5	Efficiency (R/C)	1.30

Source: Processed primary data, 2023

CONCLUSION

The income from oil palm and sugar palm diversification in Bandar Sei Kijang District consists of oil palm farming income of IDR 1,015,441.51/ha/month, sugar palm farming of IDR 2,658,468.89/month or IDR 443,078.15/tree/month, sugar palm sap coffee business of IDR 5,646,855.65/month and sugar palm sap tea business of IDR 139,019.83/month. Efficiency is seen from the R/C value > 1, meaning that oil palm farming, sugar palm farming, sugar palm sap coffee and sugar palm sap tea businesses are efficient and profitable and worth continuing. The added value of processing sugar palm sap into sugar palm sap coffee and sugar palm sap tea is relatively high because the added value ratio is more than 50%. The income obtained from monoculture sugar palm farming is IDR 375,081.83/month or IDR 187,540.92/tree/month. The efficiency of monoculture sugar palm farming can be seen from the R/C value > 1, which means that monoculture sugar palm farming is said to be efficient and profitable and worth continuing. In order to increase income, oil palm farmers should diversify oil palm and sugar palm, sugar palm productivity should be increased, and the government or related agencies should provide counseling and training to farmers regarding fertilization and tapping techniques and provide assistance for production facilities such as subsidized fertilizers.

ACKNOWLEDGEMENTS

The authors are grateful to the Institute for Research and Community Service (LPPM) of Riau University for providing the research fund.

REFERENCES

Alansa, F. L., Usman, M., & Widyawati, W. (2022). Analisis Perbedaan Pendapatan Petani Kopi (Pola Diversifikasi dan Non-Diversifikasi) di Kecamatan Atu Lintang Kabupaten Aceh Tengah. *Jurnal Ilmiah Mahasiswa Pertanian*, *7*(1), 131–140.

Andu, E. H. L., Adisetya, E., & Sunardi.

(2023). Pembuatan Minuman Isotonik dari Nira Aren (Arrenga pinnata) dengan Penambahan Sari Buah Semangka. *Agroforetech*, *1*(2), 1132–1138.

Azhar, I., Risnasari, I., Muhdi, Srena, M. F., & Riswan. (2019). The Utilization of Sugar Palm (*Arenga pinnata*) by the People Around Batang Gadis Nasional Park Area. *IOP Conference Series: Earth and Environmental Science*, *305*(1), 1–9. https://doi.org/10.1088/1755-1315/305/1/012016

Badan Pusat Statistik Kabupaten Pelalawan. (2023). *Kabupaten Pelalawan dalam Angka 2023*. Badan Pusat Statistik Kabupaten Pelalawan.

Badan Pusat Statistik Provinsi Riau. (2023). *Provinsi Riau dalam Angka 2023*. Badan Pusat Statistik Provinsi Riau.

Bakari, Y. (2019). Analisis Karakeristik Biaya dan Pendapatan Usahatani Padi Sawah. *Jurnal Sosial Ekonomi Pertanian*, *15*(3), 265–277. https://doi.org/10.20956/jsep.v15i3.7288

Dewi, I. K., Indriyanto, & Asmarahman, C. (2022). Produksi Nira Aren di Areal Garapan Kelompok Tani Hutan Harapan Baru I dalam Taman Hutan Raya Wan Abdul Rachman. *Wanamukti: Jurnal Penelitian Kehutanan*, *25*(1), 26–35. https://doi.org/10.35138/wanamukti.v25i1.381

Ginting, E. N., Rahutomo, S., & Sutarta, E. S. (2021). Efisiensi Relatif Pemupukan Metode Benam (Pocket) Terhadap Metode Tebar (Broadcast) di Perkebunan Kelapa Sawit. *Warta PPKS*, *26*(2), 81–92.

Hamid, E., Yanita, M., & Alamsyah, Z. (2022). Oil Palm Cultivation and Social Indicators of Independent Smallholders in Pompa Air: A Review. *Agriekonomika*, *11*(2), 98–105. https://doi.org/10.21107/agriekonomika.v11i2.11345

Hartin, A. G. S. P., & Santoso, E. B. (2020). Analisa Nilai Tambah Produk Olahan Susu Segar dalam Penentuan Produk Unggulan Lokal di Desa Sukorejo Kecamatan Musuk Kabupaten Boyolali. *Jurnal Teknik ITS*, *9*(2), 328–333.

Khasanah, N., van Noordwijk, M., Slingerland, M., Sofiyudin, M., Stomph, D., Migeon, A. F., & Hairiah, K. (2020). Oil Palm Agroforestry Can Achieve Economic and Environmental Gains as Indicated by Multifunctional Land Equivalent Ratios. *Frontiers in Sustainable Food Systems*, *3*, 1–13. https://doi.org/10.3389/fsufs.2019.00122

Kusumawaty, Y., Yulida, R., Rasyid, T. H., Armaini, A., Maharani, E., Edwina, S., & Rahmayuni, R. (2020). Pelatihan Budidaya Tanaman Aren Untuk Meningkatkan Kapasitas Masyarakat Desa Lubuk Ogung Kecamatan Bandar Sei Kijang Kabupaten Pelalawan Provinsi Riau. *PengabdianMu: Jurnal Ilmiah Pengabdian Kepada Masyarakat*, *5*(2), 138–145.

Murphy, D. J., Goggin, K., & Paterson, R. R. M. (2021). Oil palm in the 2020s and beyond: challenges and solutions. *CABI Agriculture and Bioscience*, *2*(39), 1–22. https://doi.org/10.1186/s43170-021-00058-3

Nugroho, A. Y., & Mas'ud, A. A. (2021). Proyeksi BEP, RC Ratio dan R/L Ratio Terhadap Kelayakan Usaha (Studi Kasus Pada Usaha Taoge di Desa Wonoagung Tirtoyudo Kabupaten Malang). *Journal Koperasi Dan Manajemen*, *2*(1), 26–37.

Nuraini, C., & Atmaja, U. (2019). Palm

Sugar Agribusiness Development Strategy In Tasikmalaya Regency. *Agriekonomika*, *8*(1), 62–69. https://doi.org/10.21107/agriekonomika.v8i1.5029

Nurmayulis, N., Susiyanti, S., Isminingsih, S., Muhammad, R. M., Saiful, S., Yulianti, S., & Sari, R. P. (2021). Identifikasi Morfologi Tanaman Aren Asal Kabupaten Lebak. *Jurnal Agroekotek*, *13*(2), 179–190. https://doi.org/10.33512/jur.agroekotetek.v13i2.13159

Putri, V. R., Yusmini, & Edwina, S. (2022). Analisis Kelayakan Finansial Diversifikasi Usahatani Kelapa Sawit dan Aren (Studi Kasus Desa Kiyap Jaya Kecamatan Bandar Sei Kijang Kabupaten Pelalawan). *Jurnal Ilmiah Mahasiswa AGROINFO GALUH*, *9*(2), 720–732.

Ridanti, C., Dharmono, D., & Riefani, M. K. (2022). Kajian Etnobotani Aren (*Arenga pinnata* Merr.) di Desa Sabuhur Kecamatan Jorong Kabupaten Tanah Laut. *JUPEIS : Jurnal Pendidikan dan Ilmu Sosial*, *1*(3), 200–215. https://doi.org/10.55784/jupeis.vol1.iss3.175

Ruslan, S. M., Baharuddin, B., & Taskirawati, I. (2018). Potensi dan Pemanfaatan Tanaman Aren (Arenga pinnata) dengan Pola Agroforestri di Desa Palakka Kecamatan Barru Kabupaten Barru. *Perennial*, *14*(1), 24–27.

Sandra, L., Souza, B. De, Maniçoba, A., Jardim, F., & Pinheiro, A. G. (2021). Agricultural Resilience in Palm-Sorghum Intercropping in a Semi-Arid Environment: a review. *Brazilian Magazine of Physical Geography*, *14*(7), 3932–3952.

Sari, P. N., Hilmi, Y. S., & Hariswanti, W. S. (2018). Kelayakan dan Nilai Tukar Petani Padi Organik di Kabupaten Sleman. *Agriekonomika*, *7*(2), 120–128. https://doi.org/10.21107/agriekonomika.v7i2.3928

Soekartawi. (2016). *Analisis Usahatani*. UI Press.

Solfianti, M., Maulana, A., Herviyanti, H., & Prasetyo, T. B. (2021). Pengaruh Aplikasi Herbisida Gromoxone 276 Sl (Larut) Terhadap Sifat Kimia Inceptisol. *Jurnal Tanah dan Sumberdaya Lahan*, *8*(2), 309–315. https://doi.org/10.21776/ub.jtsl.2021.008.2.1

Surya, L. P., & Scabra, A. R. (2020). Optimalisasi Aren Menjadi Produk Olahan Gula Semut Guna Meningkatkan Nilai Jual dan Pendapatan Masyarakat Desa Pusuk Lestari. *Jurnal PEPADU*, *1*(4), 515–522. https://doi.org/10.29303/jurnalpepadu.v1i4.144

Suryana, A. (1990). *Diversifikasi Pertanian dalam Proses Mempercepat Laju Pembangunan Nasional*. Pustaka Sinar Harapan.

Treetaruyanont, K., Suwannalert, S., Keaunkaub, N., & Saengpenk, T. (2014). Influence of Monocropping and Intercropping Systems Between Para Rubber and Oil Palm Plantation on Growth and Yield of Phlai. *Acta Horticulturae*, *1023*, 307–310. https://doi.org/10.17660/ActaHortic.2014.1023.45

Tusdiansyah, A., Yusri, J., & Dewi, N. (2020). Analisis Usahatani Kelapa Sawit yang Menggunakan Kombinasi Pupuk Organik dan Anorganik di Kecamatan Kerumutan Kabupaten Pelalawan. *Jurnal Sungkai*, *8*(1), 41–50.

Wijaya, W. D. (2024). Potensi Ekologi dan Ekonomi Tanaman Aren. *Warta BSIP Perkebunan*, *2*(1), 10–13.