POTENTIAL AND FEASIBILITY OF DEVELOPMENT OF COCONUT PRODUCT HILIRATION IN INDRAGIRI HILIR REGENCY, RIAU PROVINCE

Shinta Utiya Syah
BAPPEDALITBANG Provinsi Riau
shintautiya77@gmail.com

ABSTRACT

Indragiri Hilir has a coconut area of 351,526 Ha (BPS Riau, 2021). The coconut plantation commodity has become a development priority by placing it as a regional superior commodity. One of the efforts to increase the selling value of coconut products is in the context of increasing the acceptance of farmers or MSMEs in developing downstream products from coconut. The purpose of this activity is to calculate the potential and feasibility of developing downstream coconut products and developing technology for downstream coconut products. The area of smallholder coconut plantations in the identified Mandah sub-district is 35,304 ha spread over 17 villages with a production of 21,217.10 tons/year, Kuala Indragiri sub-district has been identified as covering an area of 36,673.79 ha, with a production of 19,943.6 tons/year, Kuala Enok is identified as an area of 38,244.73 ha with a production of 35,563.06 tons/year, Reteh District was identified with an area of 23,610.85 ha with a production of 25,405.18 tons/year. The superior products of coconut downstream in Indragiri Hilir Regency are coconut sugar (brown sugar), ant sugar, nata de coco, Virgin Coconut Oil (VCO), clear coconut oil while the feasibility of coconut downstream products that are feasible to develop for MSMEs in Indragiri Hilir district are MSMEs engaged in brown sugar, brown sugar and nata de coco products

Keywords: potential, downstream, production

INTRODUCTION

Coconut (Cocos nucifera L.) are two important commodities for people in Riau Province as a source of food and energy. This commodity has long been known and plays a very important role in people's lives both as a commodity and social culture. In 2019 Indragiri Hilir had a coconut area of 351,526 Ha (BPS Riau, 2021). The coconut plantation commodity has become a development priority by placing it as a regional superior commodity. This, of course, is inseparable from how the government's efforts to maintain plantation commodities as prima donna and are maintained as regional identity. Therefore the social activities of the community in Indragiri Hilir Regency are greatly influenced by the development of these commodities both on farm and off farm.

Coconut products, so far have been developed by the community and industry. However, the development of the downstream industry of coconut products carried out by the community is still very limited, both in terms of type and quality. Coconut products are still limited to copra and palm sugar. This condition causes the increase in the value of the product is still low that is accepted by the community. Meanwhile, there are many opportunities to increase the added value that can be obtained from coconut, considering that the industrial tree from coconut is so wide. One of the efforts to increase the selling value of coconut products in order to increase the income of farmers or MSMEs is the development of downstream products from coconut.

From coconut trees, apart from copra and oil, various other products can be obtained from coconut plants, both primary and secondary/processed products as well as handicrafts; starting from the leaves, flowers / mayang, fruit, stems to the roots. Coconut fruit consists of fruit flesh,

fruit juice, shell and coir. Apart from producing oil, the flesh of the fruit can also be processed into various products such as desiccated coconut, preserved coconut milk, cream, snacks and baby food. Apart from being a throat freshener, fruit juice can also be processed into nata de coco, soy sauce; the shell is processed into charcoal and activated charcoal; Coir is processed into fiber and coir ash.

RESEARCH METHOD

The data collection method is carried out through primary data collection activities and secondary data collection.

RESULTS AND DISCUSSION

Mapping the Potential and Feasibility of Developing Downstream Coconut Products

Area and condition of coconut plantations

Indragiri Hilir Regency is one of the regencies in Riau Province which is well-known as a coconut production center in Indonesia and most of the population works in the coconut sector as their main livelihood. the total area of coconut plantations in 2019 is 351,526 ha (BPS 2021). Of this area, only a small portion was managed by the company. Previously it was community-owned land with the types of coconut cultivated being coconut within 228 077 hectares and hybrid coconut 35 855 hectares.

Indragiri Hilir Regency has 11.46% percent of coconut plantations from the total area of smallholder coconut plantations nationally (Data from the Directorate General of Plantations for 2019). As a whole, Indragiri Hilir Regency is the largest coconut producer in Indonesia and the world. With such great potential, the Government of Indragiri Hilir Regency has made coconut plantations a superior product of the regency, has planned to revitalize and preserve them as the main source of the people's economy. The big problem faced in preserving the potential of coconut plants is the damage to coconut plants which causes a reduction in the area and productivity of coconut plants.

In the early stages of this activity, an investment was made in the area of coconut plantations in 4 sub-districts, namely Mandah District, Kuala Indragiri District, Enok District and Reteh District. Information obtained from the measurement results, it is known that 46.81% of the coconut plantation area in the four sub-districts was damaged.

Table 1.
Area and Distribution of Coconut Plants in the Study Location

No.	Subdistrict	Luas dan kondisiTanaman kelapa rakyat (Ha)		
		Baik	Rusak	Jumlah
1	Mandah	11,664.58	23,640.23	35,304.81
2	Kuala Indragiri	9,512.92	27,160.87	36,673.79
3	Enok	28,262.21	9,982.52	38,244.73
4	Reteh	21,733,60	1,877.25	23,610.85
	Jumlah	71,173.31	62,660.87	133,834.18

Source: Field Survey Results

Based on Table 1. it can be seen that some of the coconut plants in the current condition are damaged, and the Kuala Indragiri and Mandah sub-districts are locations where more than 65% of the coconut plants are damaged. Based on observations and information obtained from the community, the damage was caused by seawater intrusion due to high tides. Sea water

intrusion has caused inundation of the community's coconut plantations. besides that the cause of damage to coconut plants is caused by pests and diseases that attack their coconut plants.

Manda district

Mandah sub-district is one of the sub-districts in Indragiri Hilir Regency which is one of the coconut commodity centers, both hybrid and deep coconut. The area of the people's coconut gardens in the Mandah sub-district as a result of identification in the field is 35,304 ha spread over 17 villages. The condition of the people's coconut plants in Mandah Subdistrict was mostly damaged around 66.96% or 23,640.23 ha. The full extent and distribution of coconut plants in Mandah District can be seen in Table 2

Table 2.
Area and Distribution of Coconut Plants in Mandah District

No.	Village	Area and condition of smallholder coconut plantations (Ha)		Amount
		Good	Damaged	
1	Aceh mangrove village	3,598.32	1,379.01	4,977.33
2	Bantayan village	1,991.07	-	1,991.07
3	Batang Sari Village	-	3,026.12	3,026.12
4	Batang Tumu village	2,495.25	-	2,495.25
5	Bekawan village	-	3,732.16	3,732.16
6	Belas village	-	1,567.02	1,567.02
7	West belalas village	-	730.52	730.52
8	Bente village	-	403.80	403.80
9	Alternating village	-	400.15	400.15
10	New light village	-	1,451.66	1,451.66
11	Igal village	1,536.46	-	1,536.46
12	Peacock village	-	2,474.54	2,474.54
13	Grail Island Village	61.81	513.30	575.11
14	The village agreed victorious	449.97	-	1,536.46
15	Independent solar village	1,531.70	-	2,474.54
16	Tanjung Datuk Village	-	4,563.52	1,536.46
17	Kairi Village	-	3,398.43	2,474.54
	Amount	11,664.58	23.640.23	35,304.81

Source: Field Survey Results

Damage to coconut plants greatly affects the productivity of the coconut plants produced. Coconut productivity is strongly influenced by the condition of the coconut, if the conditions are good then the production will be high, and vice versa. The results of observations about this condition are caused by pests such as beetles and monkeys found in Belaras Barat Village. Damage to coconut plantations is divided into two parts, namely direct damage and indirect damage. Direct damage symptoms of visible damage to the outside of the plant, such as stems, leaves, flowers and fruit, indirect damage includes heat generation due to metabolism and the development of mold and other microbes

Kuala Indragiri District

The area of community coconut plantations in Kuala Indragiri District was identified as 36,673.79 ha, spread across eight villages, where Tanjung Lajau Village is the village with the largest coconut area, namely 24.88% of the total coconut area in Kuala Indragiri District. The complete spread of community coconuts in Kuala Indragiri District can be seen in Table 3.

Table 3.
Area and Distribution of People's Coconut Plants in Kuala Indragiri District

No.	Village	Area and condition of smallholder coconut plantations (Ha)		Amount
		Good	Damaged	
1	King's village	2,771.72	-	2,771.72
2	Sepat village	3,921.68	1,222.52	5,144.20
3	Split river village	-	8,833.44	8,833.44
4	Reed river village	-	5,293.44	5,293.44
5	Piyai river village	-	5,293.12	5,293.12
6	Cape lajau village	-	9,124.45	9,124.45
7	Tanjung Malay village	2,819.52	-	2,819.52
8	Deep bay village	-	1,459.05	1,459.05
	Amount	9,512.92	27,160.87	36,673.79

Source: Field Survey Results

Based on Table 3, it is known that the condition of coconut plantations in Kuala Indragiri District is currently dominated by damaged coconut plantations. Based on the results of measurements and observations in the field, 74.06% of the area of the people's coconut plantations in Kuala Indragiri District was damaged.

Enok District

Enok sub-district has the largest coconut plantation area compared to the other 3 sub-districts that are the focus of the study. The area of coconut plantations in Enok District was identified as 38,244.73 ha, spread across 14 villages. The condition of the coconut plants in Enok District is in good condition, namely 73.90% or an area of 28,262.21 ha, and the rest is damaged. The complete distribution of people's coconut plants in Enok District can be seen in Table 4.

Table 4.
Area and Distribution of People's Coconut Plants in Enok District

No.	Village	Area and condition of smallholder coconut plantations (Ha)		Amount
		Good	Damaged	
1	Bagan Jaya village	2,649.52	-	2,649.52
2	Jaya filial village	921.01	-	921.01
3	Diversion village	1,368.68	1,408.79	2,777.47
4	Whirlpool village	2,349.01	-	2,349.01
5	Long range village	1,412.51	1,211.93	2,624.44
6	Serang village is prosperous	3,491.17	-	3,491.17
7	Three-way village	180.94	798.71	979.65
8	The village of the intersection of three continents	4,264.73	-	4,264.73
9	Sohada village	-	2,646.89	2,646.89
10	Ambat river village	2,496.41	-	2,496.41
11	Lokan river village	959.66	1,214.71	2,174.37
12	Rukam river village	6,893.26	-	6,893.26
13	Medan bay village	-	2,701.49	2,701.49
14	enok village	1,275.31	-	1,275.31
	Amount	28,262.21	9,982.52	38,244.73

Source: Field Survey Results

Sungai Rukam Village is the village with the largest community coconut plantations in Enok District, which is 18.02% of the area of community coconut plantations in Enok District with all plantation conditions being good. The villages identified by their coconut areas as damaged were in Teluk Medan Village and Suhada Village. Most of the damage to coconut plantations is caused by intrusion of sea water and the rest is due to pest attacks.

Rete District

The results of identifying the area of coconut plantations in Reteh District, it is known that the area of coconut plantations is 23,610.85 ha. Compared to information on the area of coconut plantations in 2015, there was a decrease in the area of coconut plantations by 6.20% from the previous 25,172 ha.

Observations on the condition of the coconut plantations in the Reteh District showed that 1,877.25 ha or 7.95% were damaged. This condition occurred in three villages, namely Sungai Asam Village, Sungai Terap, and Tanjung Labu. The area and distribution as well as the condition of the plants in the Reteh District can be seen in Table 5.

Table 5.
Area and Distribution of People's Coconut Plants in Reteh District

No.	Village	Area and condition of smallholder coconut plantations (Ha)		Amount
		Good	Damaged	
1	Civil village	602.86	-	602.86
2	Blooms village	572.73	-	572.73
3	metro village	1,433.36	-	1,433.36
4	Small island village	3,987.77	-	3,987.77
5	Deer island village	847.16	-	847.16
6	sanglar village	1,204.86	-	1,204.86
7	Village across from Kijang Island	2,753.48	-	2,753.48
8	Seranglar village	3,809.53	-	3,809.53
9	Acid river village	3,544.94	-	3,544.94
10	Mahang river village	-	294.93	294.93
11	Terap river village	-	957.25	957.25
12	Udan river village	2,976.91	-	2,976.91
13	Cape pumpkin village	-	625.07	625.07
	Amount	21,733.60	1,877.25	23,610.85

Source: Field Survey Results

One of the causes of reduced coconut area is damage to coconut plants caused by seawater intrusion and pests. Coconut plants in Reteh District are spread over 13 villages, with some of the plants experiencing damage.

Productivity of Coconut Plants

As a multi-purpose plant, the entire plant structure is beneficial to human life (Setyamidjaja, 1984). The performance of coconut plantations shows (1) the area of ownership of coconut farming is an average of 1 ha/farmer family, (2) plantations are generally cultivated in the form of monocultures, (3) the adoption of cultivation technology has not been carried out properly, (4) the agricultural products produced still primary products in the form of coconut granules and copra, (5) the productivity of national coconut farming is still low, with an average of 1.1 tons of copra/ha/year (Taringan, 2012).

One of the products from coconut that has economic value is copra. For Indragiri Hilir district, the average production of copra is 760 kg of copra/ha/year (Indragiri Hilir Plantation

Office 2015). This productivity is low and one of the problems of coconuts in Indragiri Hilir. The low production of copra/ha/year is due to (1) the cultivation of coconut plants is still limited and without the addition of supporting materials for plants, (2) the composition of cultivated coconut plants is 60% less maintained, (3) the management of social, economic and cultural problems affect coconut development. All of this causes limited farmers' income, the coconut market is underdeveloped, unstable copra price fluctuations and the diversity of coconut crops.

Manda district

Mandah Subdistrict is one of the subdistricts in Indragiri Hilir Regency which is a center for coconut commodities, both hybrid coconut and deep coconut (for the coconut oil or coconut coir industry). The condition of the coconut plants which were mostly damaged has reduced the productivity of the plants. Production of coconut plants in Mandah District based on plant conditions and estimates in one year can be seen in Table 6.

Table 6.
Production of Coconut Plants in Mandah District

No.	Village	Coconut production (Tons/Year)		Amount
		Good	Damaged	
1	Aceh mangrove village	4,102.08	461.97	4,564.05
2	bantayan village	2,269.82	-	2,269.82
3	Batang Sari Village	-	1,013.75	1,013.75
4	Batang Tumu village	2,844.59	-	2,844.59
5	Bekawan village	-	1,250.27	1,250.27
6	Belas village	-	524.95	524.95
7	West belalas village	-	244.72	244.72
8	bente village	-	135.27	135.27
9	Alternating village	-	134.05	134.05
10	New light village	-	486.31	486.31
11	Igal village	1,751.56	-	1,751.56
12	Peacock village	-	828.97	828.97
13	Grail Island Village	70.46	171.96	252.42
14	The village agreed victorious	512.97	-	512.97
15	Independent solar village	1,746.14	-	1,746.14
16	Tanjung Datuk Village	-	1,528.78	1,528.78
17	Kairi Village	-	1,138.47	1,138.47
	Amount	13,297	7,919.48	21,217.10

Source: Interview Results (1 Year Estimation Calculation)

Based on Table 6. it can be seen that the production of coconut plants in Mandah District is 21,217.10 tons/year obtained from field data and projected results in one year. Based on the results of the average calculation, the productivity of coconut plants is 0.6 tons/ha. The low production of coconut plants is due to the low production of damaged coconut plants. Coconut plants that were damaged due to seawater intrusion produced a maximum of 2-3 eggs in one harvest, while plants that were damaged by beetles and other pests only produced 1 coconut per harvest and did not even bear fruit. Compared to the national coconut productivity, apart from the damage found in the field, it can be caused by several factors including sources of seeds that do not come from seed halls, maintenance that has not been maximized such as fertilization, weed control and pest and disease control, price fluctuations that are uncertain, profit sharing unnatural so that this makes coconut farmers not optimal in cultivating coconut.

Kuala Indragiri District

The area of coconut plantations in Kuala Indragiri District amounts to 36,673.79 Ha spread across 8 villages. As previously stated, about 74.06% of the plants in Kuala Indragiri District were damaged due to seawater intrusion and pest attacks. The high damage to coconut plants reduces the average productivity of coconut plants. The production of coconut plants in Kuala Indragiri Sub-District based on observations and estimated production for 1 year can be seen in Table 7.

Table 7.
Production of Coconut Plants in Kuala Indragiri Distric

No.	Village	Coconut plantation production (Tons/Year)		Amount
		Good	Damaged	
1	King's village	3,159.76	-	3,159.76
2	Sepat village	4,470.72	409.54	4,880.26
3	Split river village	-	2,959.20	2,959.20
4	Reed river village	-	1,773.20	1,773.20
5	Piyai river village	-	411.48	411.48
6	Cape lajau village	-	3,056.69	3,056.69
7	Tanjung Malay village	3,214.25	-	3,214.25
8	Deep bay village	-	488.78	488.78
	Amount	10,844.73	9,098.89	19,943.62

Source: Interview Results (1 Year Estimation Calculation)

The productivity of coconut plants in Kuala Indragiri District is very low at 0.54 tons/ha. The cause of low productivity is due to the large area of coconut plantations which are attacked by pests and the farmers' land which is affected by tidal intrusion. As a result of the plants being exposed to high tides containing high salt, plant roots will be disturbed in uptake of nutrients. Water is absorbed by plant roots through a process called osmosis, which involves the movement of water from an area with a low salt concentration (eg soil) to an area with a high salt concentration (eg the interior of the root cells). If the salt concentration in the soil is higher, the movement of water from the soil to the roots will slow down. If the salt concentration in the soil is higher than in the root cells, the soil will absorb water from the roots, and the plant will wither and die.

Enok District

The area of coconut plantations among the people in Enok District is spread over 14 villages with an area of 38,244.73 ha of coconut plantations. Based on information in the field, the production of deep coconut plants in Enok District is tons/ha/year. The production of coconut plants in Enok District, the results of observations and estimated production of 1 year can be seen in Table 8.

Table 8.
Production of Coconut Plants in Enok District

No.	Village	Coconut plantation production (Tons/year)		Amount
		Good	Damaged	
1	Bagan Jaya village	3,020.45	-	3,020.45
2	Jaya filial village	1,049.95	-	1,049.95
3	Diversion village	1,560.30	471.94	2,032.24
4	Whirlpool village	2,677.87	-	2,677.87
5	Long range village	1,610.26	406.00	2,016.26

6	Serang village is prosperous	3,979.93	-	3,979.93
7	Three-way village	206.27	267.57	473.84
8	The village of the intersection of three continents	4,861.79	-	4,861.79
9	Sohada village	-	886.71	886.71
10	Ambat river village	2,845.91	-	2,845.91
11	Lokan river village	1,094.01	406.93	1,500.94
12	Rukam river village	7,858.32	-	7,858.32
13	Medan bay village	-	905.00	905.00
14	enok village	1,453.85	-	1,453.85
	Amount	32,218.92	3,344.14	35,563.06

Source: Interview Results (1 Year Estimation Calculation)

Compared to Mandah and Kuindra sub-districts, the productivity of coconut plants in Enok sub-district is better, namely 0.9 tons/ha. This was due to the coconut plants that were damaged by 26.10% or an area of 9,982.52 ha. The low productivity of coconut plants in Enok District is partly due to less than optimal plant maintenance, both fertilization, weed control, pest and disease control is almost non-existent. Control of giulma is carried out when the plants are about to be harvested while fertilizing is only done by giving enough trus and salt.

Rete District

The area of coconut plantations among the people in the subdistrict is spread over 13 villages with an area of 23,610.85 ha of coconut plantations. The production of coconut plantations in the Reteh District, the results of observations and estimated 1 year production, can be seen in Table 9.

Table 9.
Production of Coconut Plants in Reteh District

No.	Village	Coconut plantation production (Tons/Year)		Amount
		Good	Damaged	
1	Civil village	687.26	-	687.26
2	Blooms village	652.91	-	652.91
3	metro village	1,634.03	-	1,634.03
4	Small island village	4,546.06	-	4,546.06
5	Deer island village	965.76	-	965.76
6	sanglar village	1,373.54	-	1,373.54
7	Village across from Kijang Island	3,138.97	-	3,138.97
8	Seranglar village	4,342.86	-	4,342.86
9	Acid river village	4,041.23	-	4,041.23
10	Mahang river village	-	98.80	98.80
11	Terap river village	-	320.68	320.68
12	Udan river village	3,393.68	-	3,393.68
13	Cape pumpkin village	-	209.40	209.40
	Amount	24,776.30	628.88	25,405.18

Source: Interview Results (1 Year Estimation Calculation)

Compared to the other three districts which were the focus of the study, the productivity of coconut plants in Reteh District was better, namely 1.08 tonnes/ha. This is because more than

90% of the plants in Reteh District are in good condition and only 7.95% or 1,877.25 ha are damaged. The greatest damage experienced by coconut plants was caused by sea water intrusion.

Damage to community coconut plantation land in Indragiri Hilir Regency was caused by sea water intrusion and pests. Sea water intrusion (encroachment) level of salt is usually reflected in the total dissolved solids content (total dissolved solids –TDS). Fresh groundwater has a TDS of less than 1000 mg/l. while the TDS of brackish/salty groundwater is more than 100 mg/l. high Cl- element content is generally found in saltwater. Salt water is the most common contamination into groundwater while pests are organisms that disturb plants or damage plants and cause economic losses which reduce the production of a plant and can also cause plant death. These pests damage the plant parts, so the plants will wither and even die. Based on the results of a field survey, damage to coconut plantations due to seawater intrusion in Indragiri Hilir Regency includes several sub-districts and several villages.

Table 10.
Village Locations, Causes and Areas of coconut plantations damaged by intrusion

Subdistrict	Village	Reason	Area (ha)
Mandah	Aceh mangrove village	Sea water instructions, Hama	1,379.01
Mandah	Batang Sari Village	Sea water instructions, Hama	3,026.12
Mandah	Bekawan village	Sea water instructions, Hama	3,732.16
Mandah	Belas village	Sea water instructions, Hama	1,567.02
Mandah	West belalas village	Sea water instructions, Hama	730.52
Mandah	bente village	Sea water instructions, Hama	403.80
Mandah	Alternating village	Sea water instructions, Hama	400.15
Mandah	New light village	Sea water instructions, Hama	1,451.66
Mandah	Peacock village	Sea water instructions, Hama	2,474.54
Mandah	Grail Island Village	Sea water instructions, Hama	513.30
Mandah	Tanjung Datuk Village	Sea water instructions, Hama	4,563.52
Mandah	Kairi Village	Sea water instructions, Hama	3,398.43
Kuala Indragiri	Sepat village	Sea water instructions, Hama	1,222.52
Kuala Indragiri	Split river village	Sea water instructions, Hama	8,833.44
Kuala Indragiri	Reed river village	Sea water instructions, Hama	5,293.12
Kuala Indragiri	Piyai river village	Sea water instructions, Hama	1,228.29
Kuala Indragiri	Cape lajau village	Sea water instructions, Hama	9,124.45
Kuala Indragiri	Deep bay village	Sea water instructions, Hama	1,459.05
Enok	Diversion village	Sea water instructions, Hama	1,408.79
Enok	Long range village	Sea water instructions, Hama	1,211.93
Enok	Three-way village	Sea water instructions, Hama	798.71
Enok	Sohada village	Sea water instructions, Hama	2,646.89
Enok	Lokan river village	Sea water instructions, Hama	1,214.71
Enok	Medan bay village	Sea water instructions, Hama	2,701.49
Reteh	Mahang river village	Sea water instructions, Hama	294.93
Reteh	Terap river village	Sea water instructions, Hama	957.25
Reteh	Cape pumpkin village	Sea water instructions, Hama	625.07
	Amount		62,660.87

Source: Field Survey Results

Based on the results of field surveys, damage to coconut plantations caused by seawater intrusion is caused by:

- The breach in the embankment caused sea water to continuously inundate the coconut plantations so that the coconut plants died.

- Human activities on land and water resources without considering natural conservation can certainly cause many environmental impacts. Forms of human activity that have an impact on water resources, especially seawater intrusion are excessive pumping of groundwater (pumping wells) and their proximity to the coast.
- The rock factor that makes up an aquifer in one place is different from another, if the constituent rock is sand, it will make it easier for seawater to enter the groundwater. This condition is offset by the ease of controlling seawater intrusion with many methods. The nature that is difficult to release water is clay so that seawater intrusion that has occurred will be difficult to control.
- Groundwater fluctuations in coastal areas are high, so seawater intrusion occurs more easily when groundwater is reduced. Cavities formed due to low groundwater, seawater will easily suppress groundwater and fill the groundwater cavities/cavities. If the fluctuation is constant, it will naturally form an interface whose existence is fixed

Table 11.

Village Locations, Causes and Areas of coconut plantations damaged by pests

No.	Subdistrict	Village	Reason
1	Reteh	Across sanglar	Beetle Pest, Monkey
2	Enok	Victory chart	Beetle Pest, Monkey
3	Enok	Suhada	Beetle Pest, Monkey
4	Enok	Rukam	Beetle Pest, Monkey
5	Kuala indragiri	Sungai buluh	Beetle Pest, Monkey
6	Kuala Indragiri	Sungai bela	Beetle Pest, Monkey
7	Kuala Indragiri	Tanjunga lajau	Beetle Pest, Monkey
8	Mandah	Belaras barat	Beetle Pest, Monkey

Source: Field Survey Results

Based on the results of field surveys, the damage to coconut plantations caused by pests is generally caused by insects which are divided into two parts, namely direct damage and indirect damage. Direct damage is a symptom of visible damage to the outside of the plant, such as stems, leaves, flowers and fruit. Indirect damage includes the generation of heat due to metabolism and the growth of mold and other microbes.

The results of observations and measurements show that the cause of damage to the community's coconut plantations in Indragiri Hilir Regency is caused by pests of the Order Celeoptera which belong to the Holometabola group. Some examples are rhinoceros beetle Oryctes rhinoceros L. coconut leaf beetle Brontispa longissima Gestr.

Development of Coconut Downstream Technology in Indragiri Hilir

There is a lot of potential for downstream coconut processing in Indragiri Hilir Regency which has not been optimally utilized and managed due to various problems, especially technology, capital, and uneven market absorption. Aside from being a source of vegetable oil, the coconut plant is also a source of income for farming families, it also plays a role as a driving force for the growth and development of the downstream MSME industry in Indragiri Hilir based on coconut and other products. Various products that have been developed include: Virgin Coconut Oil (VCO), healthy cooking oil, charcoal briquettes, nata de coco, various handicraft products from coconut shells and coir. All of these products can be processed by the community using various levels of technology, from traditional to those that have applied modern industrial principles.

When viewed from several applications of technology by MSMEs, it is natural to produce downstream coconut products in Indragiri Hilir Regency, such as the ant sugar business, which

has broad market prospects and is just starting to develop, the technology used is still traditional, both in processing and packaging for marketing.

As for the Nata de coco, VCO and brown sugar products, both in the production and packaging processes, they have applied modern industrial principles, so that they can produce products efficiently, although there are still things that need to be improved.

To be able to increase and expand market share, the technology development strategy that needs to be pursued includes:

- Packaging technology for products in both shape and size to meet demand and competitiveness in the modern market as well as the lifestyle needs of people who tend to prioritize practicality.
- Use/replace plastic equipment with non-corrosive equipment, namely aluminum.
- Heating system with gas fuel with other cheaper fuels with a boiler system

CONCLUSION

Mapping the potential and feasibility of developing coconut product downstream, Almost all sub-districts in Indragiri Hilir Regency have potential for coconut plantations and production. coconut plantation centers in Indragiri Hilir Regency, namely Mandah, Enok, Kuala Indragiri, Kateman, Reteh, and Gaung Districts. Other sub-districts support coconut production as well as centers for processing coconut products, The main and prospective types of downstream coconut products are coconut brown sugar and ant sugar, Nata de Coco, Virgin Coconut Oil (VCO), and clear (white) coconut oil, The feasibility of downstream sago products that are developed in accordance with the MSME business in Indragiri Hilir Regency are MSME engaged in brown sugar and ant sugar products, and MSME engaged in nata de coco processing, Coconut downstream products, The downstream coconut products currently being developed are: Virgin Coconut Oil (VCO), healthy cooking oil, charcoal briquettes, nata de coco, various handicraft products from coconut shells and coir. All of these products can be processed by the community using various levels of technology, from traditional to those that have applied modern industrial principles, When viewed from several applications of technology by MSMEs in producing downstream coconut products in Indragiri Hilir Regency, such as the ant sugar business, which has broad market prospects and is just starting to develop, the technology used is still traditional in both processing and packaging for marketing, For nata de coco, VCO and brown sugar products, the production process requires adequate production equipment and requires periodic maintenance and replacement so that the product remains hygienic, packaging requires design innovation and packaging diversity to meet consumer desires, The development and improvement of the quality of downstream coconut products can be carried out, namely, Use/replace plastic equipment with non-corrosive equipment, namely aluminum, or other materials that are resistant to acid conditions, Heating system with gas fuel with other cheaper fuels with a boiler system, Packaging technology for products in both shapes and sizes to meet demand and competitiveness in the modern market as well as people's lifestyle needs which tend to be more practical, Dissemination of Coconut Product Downstream Technology Development, Development of downstream technology for Nata de Coco products The shape and characteristics of the packaging to be applied are, Standing Packaging with Characteristics, Made from Teplon type plastic, Heat resistant 80-100 degrees Celsius, Packaging can stand in a shape like a cooking oil package, Bar code listed, The weight of the packaging is 360 gr, Bearing packaging, with characteristics, Made from Teplon type plastic, Heat resistant 80-100 degrees Celsius, Packaging in the form of a pillow, Bar code listed, 1000 gr packaging weight, Development of downstream technology for Ant Sugar products, In terms of technology, the production of ant sugar is still simple or traditional as well as packaging that is not yet feasible to

enter the modern market. Therefore, to support the utilization of market opportunities and potential for brown sugar, downstream technology development will be carried out at the MSME level. The downstream technology to be developed for ant sugar is packaging. The packaging will be made with the aim that the ant sugar can be used practically, especially for mixing drinks. Packaging will be made in the form of sachets in paper then wrapped in a box with contents in one box of 25 sachets.

REFERENCES

Bakce, Djaimi dan Syaiful Hadi. 2015. Model Pengembangan Agribisnis kelapa Terpadu di Kabupaten Indragiri Hilir. Makalah Pada Seminar Nasional dan Peluncuran Buku Memperingati 70 Tahun Prof. Bungaran Sarangih: Kristalisasi Paradigma Agribisnis dalam Pembangunan Ekonomi dan Pendidikan Tinggi. Diselenggarakan oleh PERHEPI Bekerjasama dengan Institut Pertanian Bogor pada tanggal 18 April 2015 di Bogor.

BPS Provinsi Riau. 2021. Provinsi Riau Dalam Angka, Tahun 2021. Badan Pusat Statistik Provinsi Riau.

BPS Kabupaten Indragiri Hilir. 2021. Kabupaten Indragiri Hilir Dalam Angka, Tahun 2021. Badan Pusat Statistik Kabupaten Indragiri Hilir.

Nazir, M. 1988. Metode Penelitian. Ghallia Indonesia, Jakarta.

Sutojo,1993. Studi Kelayakan Proyek, Teori dan Praktek. Gramedia, Jakarta.

Mukhtar. 2014. Optimalisasi Produktifitas Kebun Kelapa sebagai Upaya Mendukung Pelaksanaan Kluster Industri Kelapa dan Turunannya di Kabupaten Indragiri Hilir. Pekanbaru: Bahan Paparan pada Rapat Pembahasan Aksi Pengembangan Industri Kelapa Di Provinsi Riau yang Diselanggarakan oleh Dinas Perindustrian dan Perdagangan Provinsi Riau pada Tanggal 28 Agustus 2014.

Mulyadi, A. F. 2011. Design of Virgin Coconut Oil Processing Unit on Small Scale Industry Study on Planting Location and Delay Time of Coconut before Processig. Jurnal Teknologi Pertanian Vol. 12

Setyamidjaja, D. 1991. Bertanam Kelapa. Penarbit Kanisius. Edisi Baru. Yogyakarta.

SNI 01-3743-1995. Syarat Mutu Gula Merah

Sudiyanti, N. M. 2004. Pengaruh Jenis Konsenterasi Lemak Sebagai Bahan Edible Coating Terhadap Sifat Fisik, Kimia, Mikrobiologi dan Organoleptik Gula Merah Kelapa (Coconucifera L). Skripsi. Universitas Lampung.

Sudjarmokko, Beby. 2007. Analisis Efisiensi Relatif Komoditas Kelapa pada Lahan Pasang Surut dan Lahan Kering. Sekolah Pasca Sarjana Institut Pertanian Bogor. Bogor.

Suhardiyono, L. 1991. Tanaman Kelapa : Budidaya dan Pemanfaatannya. Kanikus. Yogyakarta.

Statistic Perkebunan Indonesia 2014-2016 Kelapa Coconut, 2015. Dirjen Perkebunan, Jakarta 2016.

Suhardiman, P. 1999. Bertanam Kelapa Hibrida. Penebar Swadaya. Jakarta.

Warisno.1998. Budi Daya kelapa Kopyor. Cetakan Kesatu. Kanisus: Yogyakarta, hal :29-33