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Analysis of Oil Palm Seedling Farming Bussiness (Case Study of Tridian Nursery and Sumber Makmur)

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A B S T R A C T

This study aims to 1) describe the oil palm seedling farming practices of Tridian Nursery IPN and Sumber Makmur, 2) analyze the income from oil palm seedling farming at Tridian Nursery IPN and Sumber Makmur in Batanghari Regency, and 3) analyze the income differences between the oil palm seedling farms of Tridian Nursery IPN and Sumber Makmur. The analysis method used in this research is farm income analysis. The data sources used in this study are primary data obtained from interviews and questionnaires from respondents selected through purposive sampling. The results of this study are: 1) Both Tridian Nursery IPN and Sumber Makmur utilize a double-stage nursery method, consisting of pre-nursery and main nursery stages. A notable difference between the two is that Tridian Nursery employs IPN technology with temperature control devices to ensure optimal growth conditions during the pre-nursery stage. 2) The income from Tridian Nursery IPN's oil palm seedling farming is Rp. 109,527,333.33, while the income from Sumber Makmur is Rp. 63,367,533.33. 3) The income difference between the two nurseries is attributed to the higher production output of Tridian Nursery, with 5,200 seedlings compared to Sumber Makmur's 4,550 seedlings. Additionally, the selling price per seedling is higher at Tridian Nursery IPN, at Rp. 45,000, compared to Rp. 40,000 at Sumber Makmur.

1. INTRODUCTION

1.1. Research Background

Agricultural development aims to continuously increase production while enhancing income by effectively leveraging production factors to improve living standards in rural areas. A key challenge is finding effective farming methods and solutions. Additionally, identifying opportunities for more productive utilization and creating resources such as education, agricultural machinery, credit, and marketing channels are crucial for boosting agricultural production.

The agricultural sector plays a vital and strategic role in national development, significantly contributing to the economy. It serves as the primary supplier of national food and raw materials, supporting industrial growth. Moreover, the agricultural sector's interconnection with other activities makes it a crucial driver of economic development.

Business activities in the agricultural sector must advance through increasingly integrated planning and implementation tailored to local environmental conditions. To promote production diversity and increase added value and economic competitiveness, the management capabilities of agricultural businesses, particularly in the plantation sub-sector, will be strengthened.

To ensure the sustainability of agricultural development, ongoing research and advancements in agricultural technology must be continuously conducted to meet farmers' needs. Plantations, a strategic sub-sector in agriculture, significantly contribute to economic development. The growth of the plantation sector will have broad impacts, including job creation and increased regional income.

Palm oil is one of the most valuable commodities in Jambi, with widespread cultivation bringing both positive and negative impacts. The expansion of oil palm plantations has driven economic development across various regions of Jambi Province, particularly in the agricultural sector.

Jambi Province has grown significantly recently as one of Indonesia's leading palm oil producers. This is evidenced by the increasing acreage of oil palm plantations each year. Favorable climate conditions and the availability of suitable land have contributed to making Jambi Province a prime area for oil palm plantation development.

The growth of oil palm plantations depends on a sufficient supply of seedlings to meet demand. Consequently, many households have entered the oil palm seedling farming business. Some households and farmers cultivate seedlings as a full-time job, while others do it part-time. Most seedling nurseries are situated on private land near their homes, although some use rented land shared with others.

According to the Batanghari Regency government website, the government has developed 22,000 Simalungun variety seedlings and 19,000 Yangaambi variety seedlings. Of the 139,000 seedlings developed in Batanghari Regency, only 41,000, or 29.4%, are managed by the government. This indicates a high self-reliant oil palm seedling cultivation in Batanghari Regency.

The cost of purchasing high-quality seed varieties is also quite high. Oil palm cultivation requires significant capital but can be widely marketed to the public and local businesses. Therefore, there is great potential for oil palm cultivation in Batanghari Regency.

One of the nurseries employs a new seedling method called the Integrated Pre Nursery (IPN) method, which aims to increase production. This approach significantly differs at the pre-nursery stage, focusing on maintaining stable temperature and humidity levels and ensuring adequate sunlight distribution, thereby reducing the death ratio and increasing the likelihood of double-tone seedlings.

The Tridian Nursery's Integrated Pre Nursery is believed to enhance agricultural profitability. By focusing on the pre-nursery stage, this technology aims to stabilize temperature and humidity and ensure sufficient sunlight distribution, which reduces the mortality rate and increases the chances of double-tone seedlings. The Tridian Nursery is being developed and implemented in one of the oil palm seedling farms in Batanghari Regency. During its development, it was found that using Tridian Nursery increased farm income by up to 60% compared to before its implementation.

The application and development of Tridian Nursery in self-reliant oil palm seedling farming have been ongoing for approximately three years. Seedlings from the first batch using this technology have already produced fruits at two and seven months old.

Based on the findings from the development phase of Tridian Nursery, this study aims to validate its effectiveness by comparing the processes, expenses, and incomes of farms using Tridian Nursery with those of Sumber Makmur farms in Batanghari Regency.

1.2. Literature Review

Oil palm plants originate from Africa and South America, particularly Brazil. In Brazil, these plants grow wild or semi-wild along riverbanks. The oil palm belongs to the subfamily Cocodea, native to South America, including the species E. oleifera and E. odora. However, the subfamily Cocoideae originates from Africa [1]

Nursery cultivation is the process of growing and developing seeds into transplant-ready seedlings. The initial step determines the success of planting in open fields. You can obtain superior seedlings from this nursery cultivation, which are the foundational assets for high productivity and quality palm oil [2]

Agricultural science studies how farmers manage inputs or production factors (land, labor, capital, technology, fertilizers, seeds, and pesticides) effectively, efficiently, and sustainably to achieve high yields and increase their agricultural income. Other definitions of agriculture can be seen in the following comments:

Ref. [3] argues that agriculture is a research-based discipline that can be used to manage farming to maximize income. According Ref. [4], agriculture is the science of how farmers combine and exploit various production factors (land, labor, capital, and management), and how farmers choose the types and scales of enterprises, such as crops or livestock, to achieve maximum and sustainable income.

Ref. [5] defines agriculture more generally as the science of how humans allocate available resources effectively and efficiently to achieve high profits at a given time. It is considered effective if farmers can allocate resources accurately and possess the best knowledge, and it is considered efficient if the use of resources yields results. The availability of means or production factors (inputs) does not necessarily lead to high productivity for farmers. However, how farmers run their businesses effectively is crucial. Technical efficiency is achieved if farmers can allocate production factors in a way that results in high output. If farmers gain substantial profits from their farming activities, allocating production factors is considered allocatively efficient. This can be done by purchasing production factors at low prices and selling the products at relatively high prices. If farmers can increase production while keeping production costs low and selling prices high, they achieve technical efficiency and price efficiency, or economic efficiency.

According to Ref. [6], several factors are required to calculate agricultural costs and income: total income or income derived from agriculture over a period, calculated from sales results. Factors needed to calculate costs include (a) external equipment costs, (b) cultivation costs, (c) production costs, (d) net income received, (e) farmer's income, (f) labor income dynamics, and (g) profits and losses incurred by farmers.

According to Ref. [5], agricultural costs encompass all expenses incurred in farming. These costs are divided into two categories: (a) fixed costs and (b) variable costs. Fixed costs are defined as relatively constant expenses that continue to accrue regardless of the output produced. Therefore, the fixed costs do not depend on the quantity of the product obtained. The higher the volume of operations, the lower the cost per unit; conversely, the lower the volume of operations, the higher the cost per unit. Examples of fixed costs include land rent, taxes, agricultural equipment, and irrigation costs. Variable costs, on the other hand, are those influenced by the level of output, such as labor and fertilizer.

The most commonly used nursery systems today are one-stage or two-stage nurseries, where seedlings are directly planted into large plastic bags. In the two-stage nursery system, seedlings are first planted and kept in small plastic bags for 3 months, known as the pre-nursery stage. Then, the seedlings are

transferred to large plastic bags (polybags) for 9 months. This final stage is ***called*** the main nursery ***[7].***

Research Objective

The objectives of this study are as follows: 1) To know the description of oil palm nursery farming, Tridian Nursery, and Sumber Makmur; 2) Analyze the income of oil palm nursery farmers Tridian Nursery and Sumber Makmur. 3) Analyze the difference in income of oil palm nursery farmers Tridian Nursery and Sumber Makmur.

2. MATERIALS AND METHODS

2.1. Place and Time

This research was conducted in 2 different nurseries: Tridian Nursery, located in Lotus Village, Muara Bulian District, Batanghari Regency, and Sumber Makmur Nursery, located in Sungai Buluh Village, Muara Bulian District, Batanghari Regency.

2.2. Object of Research

The object of this research is oil palm seed farmers at Tridian Nursery and Sumber Makmur located in Muara Bulian District, Batanghari Regency.

2.3. Tools and Materials

The materials used in this study were questionnaires listing expenditures and incomes and selling prices of oil palm seeds ready for planting adjusted to current market prices. The tools used in this study are: stationery, used to record the results of the necessary data. calculators, used to calculate results obtained from the field; cameras, used to take documentation in the field

2.4. Data Retrieval Methods

The procedure and method of data collection used in this study consists of the following steps: Data Collection Method The method used in this study is the Purposive Sampling method. In the oil palm seedlings group in the Batanghari Regency nursery, where all 5,000 plant seeds as research objects are found in the nursery in Teratai Village and Sungai Buluh Village, Muara Bulian District, Batanghari Regency.

2.5. Data Analysis

Descriptive analysis was conducted to explain the general picture of oil palm seed breeding and other additional data related to observations based on questionnaires, reports, and data analysis obtained through questions, observations, conditions, and situations in the search area. The identity of oil palm seed producers includes age, education level, number of family members, and farming experience.

Quantitative analysis is used to solve the problem, and the first goal is to calculate the income obtained from the captive breeding of oil palm seedlings. Revenue can be calculated as total income earned and total income minus expenses [5**].** To calculate income from captive breeding of oil palm seedlings, use the following formula:

Pd = TR – TC

where:

Pd = Income of Oil Palm Seed Farmer

TR = Total Receipts

TC = Total Expenses

To calculate the total revenue (TR) of oil palm breeding farming, the formula is used:

TR = Y . Py

where:

TR = Total Receipts

Y = Production (Stem)

Py = Price (Rp/stem)

Meanwhile, to calculate the total cost (TC) of oil palm breeding farming, the formula is used:

TC = FC + VC

where:

TC = Total cost

FC = Fixed cost

VC = Variable cost

3. RESULT AND DISCUSSION

3.1. Farm Overview

3.1.1. Land

Agricultural land is the most important element in farming because if farmers rent land, it will impact the size and size of the services issued to farming. Land needs in oil palm nursery farming will not be as large as those in oil palm plantations because, during the nursery period, the planting distance between polybags is 60 x 60 cm at the main nursery stage and 5 x 5 at the pre-nursery cm stage, according to the manual book of the Medan Oil Palm Nursery Center (PPKS).

The land area owned by the Tridian Nursery IPN Tridian Nursery is 1,642 m^2 and the Sumber Makmur Sumber Makmur nursery is 1,556 m^2. Quoted from Ref. [5], the wider the arable land cultivated by farmers, the greater the production will be, and income can be obtained if followed by good processing methods. In this study, the land area owned by the Tridian Nursery IPN Tridian Nursery and Sumber Makmur Sumber Makmur Nursery is almost the same, with a difference of 86 m^2 larger than the land area owned by the Tridian Nursery IPN.

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3.1.2. Pest

Pesticides are divided into insecticides, fungicides, herbicides, nematicides, rodenticides, and so on based on their function. The

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use of pesticides is expected to suppress attacks from Plant-Disturbing Organisms (OPT) so that losses caused by these pests can be minimized. OPT in oil palm nursery farming is generally in the form of weed control and pest and disease attacks.

3.1.3. Application of Tridian Nursery

1. Pre nursery

A. Pre-nursery land preparation

At this stage, this is the first activity carried out to prepare oil palm nursery land, which aims to optimize the growth of seedlings. The area needed must meet several criteria, such as an area that is flat with the aim of not standing water, free from livestock, close to water sources, free from flooding, and free from weeds.

B. Making pre-nursery beds

Beds are made for placing polybags as a place for planted camps. This bed is made higher than the surface with the hope that when watering and rain is not exposed to splashes from the ground surface and can also avoid puddles when flooded. There are real differences between Sumber Makmur Nursery and Tridian Nursery nursery are very visible at this pre-nursery stage.

At the pre-nursery stage, the Tridian Nursery is equipped with a foldable hut shelter, which is useful for covering direct sunlight to the seedlings if the seedlings in the shelter exceed the moist threshold in the closed model. This foldable shelter can also be opened to provide direct sun if the temperature and air temperature inside the shelter are too humid or cold. Apart from a foldable hut shelter, Tridian Nursery is equipped with a water discharge meter and temperature monitor that aims to monitor temperature and measure water discharge entering the shelter. Differences in the completeness of oil palm nursery beds in the pre-nursery stage can be seen in the Table. 1

Table 1. Completeness of pre-nursery beds at Sumber Makmur

Tridian Nursery	**Sumber Makmur**
Paranet 70%	Wire mesh
Paranet 80%	Tiang pancang
Pengukur Kelembaban	
Pengukur suhu	
Pengukur debit air	
Tiang pancang	
Orbit Monitor	

In Table 1, it can be seen that the equipment contained in the pre-nursery stage at the Tridian Nursery IPN oil palm nursery is more and uses double paranets, paranets with a density of 70% are used to cover the circumference of the beds in order to maintain temperature and humidity in the beds, while paranets with a density of 80% are used to cover the top of the beds with foldable models so that they can be adjusted to the needs of the temperature in the beds.

C. Polybag Filling at pre-nursery

The polybag used is black and weatherproof. Polybags used by Tridian Nursery oil palm nurseries are polybags with a size of 18x18 cm with a thickness of 0.7 mm can accommodate a weight of 2 Kg, and Sumber Makmur uses polybags measuring 25x25 cm with a thickness of 0.7 mm that can accommodate a weight of 3 Kg. The planting media used is top soil mixed with manure. Polybags must be filled with planting media up to 2 cm from the end of the polybag. After filling the planting media, polybags are arranged on the prepared beds.

The ratio of manure mixing in Tridian Nursery and Sumber Makmur nurseries is different; in oil palm, Tridian Nursery IPN uses a ratio of 75% soil and 25% manure, while for Sumber Makmur oil palm nursery uses 2 bags of 100 Kg of manure and 2 bags of 100 Kg of burnt rice husks for 1 truck loaded with soil. It can be seen The comparison of planting media for Tridian Nursery and Sumber Makmur oil palm nurseries for 1 truck of soil with a load of 2 m^3 or 2,000 Kg as follows:

Table. 2 Comparison of filling nursery polybags between Tridian Nursery and Sumber Makmur at the stage of pre-nursery

Detail	TopSoil (Kg)	Manure (Kg)	Rice Husk (Kg)	Polybag
Tridian Nursery	2.000	500	-	1.250
Sumber Makmur	2.000	200	200	834

It can be seen that in 1 truck of soil loaded with 2 m^3 can produce 834 planting media for Tridian Nursery and 480 planting media for Sumber Makmur Nursery. So the needs of Topsoil, manure, burnt rice husks, and polybags for per planting cycle of Tridian Nursery oil palm nursery are as follows

Table. 3. Comparison of planting media needs

	Top Soil (Kg)	Manure (Kg)	Rice Husk (Kg)	Polybag
Tridian Nursery	8.000	2.000	-	5.000
Sumber Makmur	12.000	1.500	1.500	5.000

It can be seen that there is a difference in the amount of use of topsoil, manure, and rice husks between Tridian Nursery and Sumber Makmur nurseries. This difference occurs due to the different weights of polybag containers used by IPN and Sumber Makmur Tridian Nursery nurseries, where the weight capacity of Tridian Nursery polybags is 2 Kg while the polybags used in Sumber Makmur nurseries are 3 Kg, besides the ratio of planting media used by technology nurseries and Sumber Makmur is also different where the ratio of topsoil and manure by technology nurseries is 75% topsoil and 25% manure, while Sumber Makmur nursery added 200 Kg of manure and 200 Kg of burnt rice husks for 1 truck of soil.

b. Chemical Control

Chemical control is carried out by the method of spraying chemicals, which is carried out once every 2 weeks. Insecticide spraying using the royal cyper trademark, which contains the active ingredient cypermethrin is very effective in eradicating insects. The dosage of insecticide use is as follows:

In the planting stage, 3 processes must be done: hollowing, putting sprouts, and closing holes. 1 worker carries out each stage from each of these processes. The depth of the hole is a maximum of 2cm; the plumula should face toward the top of the ground level, And the radicles face down. In the process of planting seeds is recommended to be done in the morning or evening because

temperatures that tend to be stable can reduce the level of stress on seeds so as to reduce the risk of seeds not growing or rotting.

E. Pre-nursery maintenance

In the pre-nursery stage, several activities are carried out in the care of oil palm seedlings, namely pest and disease control, watering, and fertilization, for pest and disease control using 2 ways, namely mechanical and manual. Mechanically, usually to spray using chemicals and manually, usually using hands directly, for example, such as weeding weeds. Watering is carried out daily with the need for 0.5 liters/day for 1 seed. As for Fertilizing is carried out after the seedlings are at least 4 weeks old. The dose of fertilizer application in the Tridian Nursery oil palm nursery is as follows:

Table 4. Dose of Maintenance Fertilizer Application in Pre-Nursery Stage at Tridian Nursery

Age (week)	NPK 15:15:15:6:4 (Kg)
14 - 15	12.5
16 – 17	25.0
18 – 20	37.5
22 - 24	50.0
Total	**125**

The use of fertilizer in IPN Tridian Nursery increases according to the age of the seedlings (Table 4). The dose of fertilizer application at Sumber Makmur Nursery is different from the dose of fertilizer at Tridian Nursery IPN; the dose of fertilizer at Sumber Makmur Nursery is as follows:

Table. 5 Dose of Maintenance Fertilizer Application in the Pre-Nursery Stage at the Sumber Makmur

Age (week)	NPK 16:16:16 (Kg)
14 - 15	50
16 – 17	50
18 – 20	50
22 - 24	50
Total	**200**

It can be seen that the dose of fertilizer application in Sumber Makmur nursery is the same every time, namely by dissolving 50 kg of NPK 16:16:16 in water and distributing for each seed (Table 5).

In the Pre Nursery stage, pest control is carried out in 2 ways, namely manually and chemically.

a.Manual control

Manual control is usually used when the pest population is not large. For example, caterpillar pests that have not been so many can be taken using hands covered with gloves. Manual control methods also carry out weed cleaning.

b. Chemical Control

Chemical control is carried out by the method of spraying chemicals, which is carried out once every 2 weeks. Insecticide spraying using the royal cyper trademark, which contains the active ingredient cypermethrin, is very effective in eradicating insects. The dosage of insecticide use is as follows:

Table. 6 Dosages of pesticide spraying

Age (week)	Insecticide (Ml)	Fungicide (G)
14 – 15	125	100
16 – 17	125	100
18 – 20	125	100
22 - 24	125	100
Total	**500**	**400**

It takes 125 Ml of Insecticide or half a bottle of insecticide packaging with the trademark royal cyper Table 6). For 1 harvest period, 500 ml or 2 bottles of insecticide packaging with the royal cyper trademark. While spraying fungicides using the trademarks antracol and dithane containing active ingredients propineb and mancozeb serves to eradicate fungi. can be seen in Table 14. It takes 100 grams of fungicide under the trademark Dithane or Antracol. For 1 harvest period, 400 grams of fungicide are needed.

2. Main Nursery

A. Land Preparation

At this stage, the initial activities carried out to prepare the main nursery seedling land aim to maximize seedling growth. The area needed must meet several criteria, such as being flat, free from livestock, close to water sources, free from flooding, and free from weeds.

At the land preparation stage, the main nursery of the oil palm nursery Tridian Nursery bulks the soil that the main nursery polybag will occupy to reduce weed growth and stabilize the polybag's location. Meanwhile, Sumber Makmur only cleans weeds where the main nursery polybag will occupy without bulking.

B. Polybag Filling

A polybag is a container used to be filled by the planting media used. The polybag used at this stage is 40x50 cm with a thickness of 0.2mm and can accommodate a weight of 5 Kg. The planting media used is topsoil mixed with shrimp fertilizer. For mixing top soil with shrimp fertilizer, it is carried out using large-scale calibration work techniques so that the mixing of topsoil and kendang fertilizer does not occur repeatedly.

The ratio of manure mixing in Tridian Nursery and Sumber Makmur nurseries is different; in oil palm Tridian Nursery IPN uses a ratio of 75% soil and 25% manure, while for Sumber Makmur oil palm nursery uses 2 bags of 100 Kg of manure and 2 bags of 100 Kg of burnt rice husks for 1 truck loaded with soil. It can be seen The comparison of planting media for Tridian Nursery and Sumber Makmur oil palm nurseries for 1 truck of soil with a load of 2 m^3 or 2,000 Kg as follows:

Table. 7 Comparison of Main Nursery Polybag Filling

Detail	Topsoil (Kg)	Manure (Kg)	Rice Husk (Kg)	Polybag (piece)
Tridian Nursery	2.000	500	-	500
Sumber Makmur	2.000	200	200	480

It can be seen that 1 truck of soil loaded with 2 m^3 can produce 500 planting media for Tridian Nursery and 480 planting media for Sumber Makmur Nursery.

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C. Seed Transfer to Main Nursery

The day before the process of transferring seedlings to the Main nursery, Polybags that have been filled with planting media must be watered until saturated. Seeds that are ready to be moved are seedlings that are already 3 months old. The transfer of seedlings is also accompanied by the selection of seedlings at the pre-nursery stage. Seedlings that are considered unkind and stunted will not be transplanted. The technicalities in transferring and planting seedlings from pre-nursery to the main nursery are as follows

1) Using Hands, Polybags in the pre-nursery are torn but the soil and roots must not be destroyed

2) Transplanting and planting are carried out in the morning simultaneously with compaction

3) Seeds should not hang and should not exceed 14 cm into the ground pit.

4) The planting pit should be in the Center, and the plant should stand upright

D. Watering

Newly transplanted seedlings should be watered immediately. Seeds are watered 2 times a day, namely in the morning and evening, with water needs of 2 liters/day for 1 plant.

E. Treatment

In this treatment stage, several activities are carried out to maintain the growth of oil palm seedlings. At this stage of treatment, there are several processes carried out at the Tridian Nursery oil palm nursery but not carried out at the Sumber Makmur oil palm nursery:

1)Fertilization

A fertilizer is a substance that contains one or more nutrients and organic and inorganic components given to plants to support the maximum and optimal growth process. Fertilization itself means providing substances that contain nutrients plants need to support their growth process optimally. Several types of fertilizers are used at the main nursery stage depending on the situation and circumstances of the oil palm seedlings themselves.

• Pupuk NPK dan Kieserite

At the Main Nursery stage, the earliest fertilizer applied to plants is NPK fertilizer. Distribution of this fertilizer by dissolving it into water. In applying NPK fertilizer must be careful so that the fertilizer does not touch the plant, because the area affected by the fertilizer will dry out like burning. Kieserite fertilizer is used situationally. Kieserite fertilizer is used if, when sampling high soil pH, kieserite fertilizer will be used with the aim of stabilizing soil PH in the planting medium. The dosage given by the Tridian Nursery oil palm nursery can be seen in the Table. 8

Table. 8 Doses of Fertilization at Tridian Nursery

Age (week)	NPK 12:12:17:2(G)	Kieserite(G)
26	10	-
28	10	5
30	10	-
32	10	5
34	15	-
36	15	7.5
38	15	-
40	15	7.5
42	20	-
44	20	10
46	20	-
48	20	10
50	25	-
52	25	10

The dose of fertilizer by the Tridian Nursery oil palm nursery will increase every 8 weeks. Then the need for fertilizer from the beginning of the transfer to the main nursery is as follows

Table 9. Fertilizer Dosage at Sumber Makmur

Age (week)	NPK 16:16:16 (Kg)
26	100
28	100
30	100
32	100
34	100
36	100
38	100
40	100
42	100
44	100
46	100
48	100
50	100
52	100

It can be seen in Table 9 that fertilizer application in Sumber Makmur nursery will remain the same from the beginning of moving seedlings to the main nursery until the harvest period and fertilizer requirements for Sumber Makmur oil palm nursery are 1,400 kg

- Urea

In fertilizing urea, Tridian Nursery and Sumber Makmur oil palm nurseries use the same method, which uses the *cocor system* fertilization method combined with NPK fertilizer. The goal is that plants quickly absorb the fertilizer applied. The doses given by Tridian Nursery and Sumber Makmur oil palm nurseries are the same; here are the doses of urea fertilizer given by Tridian Nursery and Sumber Makmur oil palm nurseries

Table 10. The Dosage of Urea Application at Tridian Nursery dan Sumber Makmur

Age (Week)	Urea (Gram)
26	5
28	5
30	5
32	5
34	5
36	5
38	5
40	5
42	5
44	5
46	5
48	5
50	5
52	5

The use of urea fertilizer in oil palm nurseries, Tridian Nursery, IPN, and Sumber Makmur is the same, as shown in Table 10.

F. Pest and Disease Control

Pest control is carried out in the main nursery stage in two ways: manual and chemical.

a.Manual control

Manual control is usually used when the pest population is not large. Like caterpillar pests that have not been so many can be taken using hands covered with gloves. Manual control methods also carry out weed cleaning.

b. Chemical Control

Chemical control is carried out by the method of spraying chemicals, which is carried out once every 2 weeks. Insecticide spraying using the royal cyper trademark, which contains the active ingredient cypermethrin, is very effective in eradicating insects. The dosage of insecticide use can be seen in the Table. 11

Table 11. Pesticide dosage in Main Nursery

Age (Week)	Insecticide (Ml)	Fungicide (G)
26	250	200
28	250	200
30	250	200
32	250	200
34	250	200
36	250	200
38	250	200
40	250	200
42	250	200
44	250	200
46	250	200
48	250	200
50	250	200
52	250	200
Total	**3.500**	**2.800**

‘

It can be seen that 250 Ml of Insecticide and 200 grams of fungicide are needed per spraying. For one harvest period, 2,800 grams or 2.8 Kg of fungicide and 3,500 Ml or 3.5 L of insecticide are needed.

c. Harvesting or Sale

The production of seedlings in the Tridian Nursery and Sumber Makmur Nurseries is different. This is influenced by the natural condition of seedling resilience and the level of seedling care during the seedling period to make the number of ready-to-sell seed production different from Tridian Nursery and Sumber Makmur nurseries, as can be seen in Table 12.

Table. 12 Production in oil palm nurseries

Method	Number of seeds	Double tone	Seed failure	Production
Tridian Nursery	5.000	350	150	5.200
Sumber Makmur	5.000	150	600	4.550

It can be seen in Table 12 that, with 5,000 seeds, the Tridian Nursery IPN can produce 5,200 stems, while the Sumber Makmur Nursery is only able to produce 4,550 stems. The difference in the amount of production is influenced by the mortality rate in the large Sumber Makmur nursery, which is 12% - 15%, while the IPN Tridian Nursery oil palm nursery has a seedling mortality rate of 3% - 5%; another factor is the high double tone rate in Tridian Nursery oil palm nursery seeds which is 7% - 10% while in Sumber Makmur oil palm nursery it is only 3% - 5%.

3.3.4 Labour

Labor is one of the main determining elements for farming, Suratiyah (2009). There are 2 types of labor: Labor Within the Family (TKDK) and Labor Outside the Family (TKLK). Energy consumption in oil palm nurseries, Tridian Nursery, IPN, and Sumber Makmur can be seen in Table 27. In Table 27, it can be seen that the use of Extra-Family Labor (TKLK) is the only source of labor for oil palm nursery farming, Tridian Nursery, IPN, and Sumber Makmur. In Tridian Nursery, labor requirements are greater than conventions, where Tridian Nursery requires 165.7 HOK while Sumber Makmur oil palm nursery only requires 132.7

In Table 13, it can be seen that the use of Extra-Family Labor (TKLK) is the only source of labor for oil palm nursery farming, Tridian Nursery, IPN, and Sumber Makmur. In Tridian Nursery, labor requirements are greater than conventions, where Tridian Nursery requires 165.7 HOK while Sumber Makmur oil palm nursery only requires 132.7

Table 13. Labor Needs at Nurseries

Activities	Tridian Nursery				Sumber Makmur			
	TKDK (HOK)		TKLK (HOK)		TKDK (HOK)		TKLK (HOK)	
	M	F	M	F	M	F	M	F
Pre Nursery	-	-		-	-	-		
1. Land preparation	-	-	3.4	-	-	-	3	
2. Bedding	-	-	9.5	-	-	-	2	
3. Polybag Filling	-	-	4.5	-	-	-	5	
4. Seed planting	-	-	4	-	-	-	4.5	
5. Maintenance	-	-		-	-	-		
A. Fertilization	-	-	12	-	-	-	12.8	
B. Insecticide Spraying	-	-	12	-	-	-	12.8	
C. Fungicide Spraying	-	-	12	-	-	-	-	
D. Plant watering	-	-	18.5	-	-	-	14	
Main Nursery	-	-		-	-	-		
1. Land Preparation	-	-	6.8	-	-	-	4	
2. Polybag Filling	-	-	9	-	-	-	11	
3. Seed Transfer	-	-	11	-	-	-	14	
4. Maintenance	-	-		-	-	-		
A. Fertilization	-	-	12	-	-	-	12.8	
B. Insecticide Spraying	-	-	12	-	-	-	12.8	
C. Fungicide Spraying	-	-	12	-	-	-	-	
D. Plant watering	-	-	21	-	-	-	18	
5. Harvesting	-	-	6	-	-	-	6	
Total	-	-	**165.7**	-	-	-	**132.7**	

The revenue received by Tridian Nursery and Sumber Makmur oil palm nurseries is different because the selling price

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of Tridian Nursery oil palm nursery is higher than Sumber Makmur, where the selling price of Tridian Nursery is Rp. 45,000 per stick, while Sumber Makmur Nursery is Rp. 40,000 per stem. based on the calculation of oil palm breeding business Tridian Nursery and Sumber Makmur, According to Ref. [5] are as follows:

TR = P x Q

The use of Male Outside Family Labor is carried out because the availability of human resources in the Tridian Nursery IPN or Sumber Makmur oil palm nursery locations is greater, and it is considered more effective in doing heavy work. The standard labor wage is the same, which is 8 hours of work and includes 1 hour of rest, meaning that effective work in 1 HOK is 7 hours/day.

:

Table. 14 Income of Oil Palm Nursery

Method	Production Quantity (stem)	Selling Price	Income (Rp)
Tridian Nursery	5.200	45.000	234.000.000
Sumber Makmur	4.550	40.000	182.000.000

The revenue received by Tridian Nursery and Sumber Makmur oil palm nurseries is different because the selling price of Tridian Nursery oil palm nursery is higher than Sumber Makmur, where the selling price of Tridian Nursery is Rp. 45,000 per stick, while Sumber Makmur Nursery is Rp. 40,000 per stem. based on the calculation of oil palm breeding business Tridian Nursery and Sumber Makmur, According to Ref. [5]. are as follows:

TR = P x Q

Where

TR = Total revenue

P = Production Price

Q = Production Quantity

Therefore, the reception received by Tridian Nursery differs from Sumber Makmur Nursery.

Therefore, the reception received by Tridian Nursery is different from Sumber Makmur nursery.

a. Revenue at Tridian Nursery

TR = P x Q

TR = 45.000 x 5.200

TR = 225.000.000

So the total revenue from the Tridian Nursery nursery is Rp. 234,000,000

b. Sumber Makmur Nursery Revenua

TR = P x Q

TR = 40,000 x 4,550

TR = 182,000,000

So the total revenue from Sumber Makmur Nursery is Rp. 182,000,000

3.3.2 Farming Cost

Total farming costs result from total variable and fixed costs, Trisman (2017). The variable cost itself consists of the cost of raw materials, seeds, fertilizers, drugs, equipment purchases, labor, and fuel. Fixed costs consist of depreciation costs of agricultural equipment. Depreciation costs are calculated using the straight-line method, this thinking is based on the use of objects in farming shrinking by the same amount every year [6] . Therefore, the fixed costs of tridian Nursery and Sumber Makmur oil palm nursery farming costs are as follows:

BP = BPA ÷ MMA

where :

BP = Depreciation

BPA Tool Acquisition Cost

MMA = Asset Useful Life

Therefore, the depreciation cost of tools incurred by the "Tridian Nursery" nursery differs from that of "Sumber Makmur" tools.

a. Tools Depreciation Cost at Tridian Nursery

BP = BPA ÷ MMA

BP = 10.196.000 ÷ 3

BP = 3.398.666

So the total depreciation cost of Tridian Nursery oil palm nursery equipment is Rp. 3,398,666.

b. Tools Depreciation Cost at Sumber Makmur

BP = BPA ÷ MMA

BP = 3.598.000.00 ÷ 3

BP = 1.199.333

The total depreciation cost of Sumber Makmur oil palm nursery equipment is Rp. 1,199,333. Therefore, Tridian Nursery and Sumber Makmur oil palm nurseries require total production costs (Table 15).

Table. 15 Total production costs of oil palm nursery farming

Detail	**Sumber Makmur**	**Tridian Nursery**
Variable Cost	117.147.800.00	121.074.000.00
Fixed Cost	1.056.666.67	3.398.666.67
Total Cost	**118.204.466.67**	**124.472.666.67**

In Table 15 it can be seen that the total cost of farming Tridian Nursery oil palm nursery is greater than Sumber Makmur oil palm nursery, in Tridian Nursery IPN oil palm nursery requires Rp. 124,472,666 while Sumber Makmur oil palm nursery requires Rp. 118,204,466. The cost difference between Tridian Nursery and Sumber Makmur oil palm nursery is Rp. 7,268,200. The difference in total farming costs is due to the completeness of tools needed to implement IPN-based oil palm nurseries more than Sumber Makmur, and the labor needs of Tridian Nursery oil palm nurseries are greater than Sumber Makmur oil palm nurseries.

Overview of farm analysis in the form of farm costs, revenues, and income. These farming costs consist of variable costs and fixed costs. Variable costs consist of the cost of production facilities, labor costs, as well as costs when farming oil palm nurseries. Farm revenue is the calculation of production multiplied by the price

Table 16. Analysis of oil palm nursery farming at Tridian Nursery dan Sumber Makmur

No	Detail	Sumber Makmur	Tridian Nursery
		Jumlah	Jumlah
1	Farm Costs		
	A. Variable Cost		
	a. Cost of Production Facilities		
	1. Seeds	40.000.000	40.000.000
	2. Stuffing soil	3.840.000	3.600.000
	3. Polybag	5.888.000	4.864.000
	4. Diesel/Gasoline Water Engine	8.700.000	6.500.000
	4. Pupuk		
	- Pupuk Kandang	2.867.200	5.600.000
	- Sekam Padi Bakar	1.433.600	
	- Pupuk Kieserite		3.575.000.00
	- Pupuk NPK	35.200.000	28.050.000
	- Pupuk Urea	4.025.000	4.025.000
	4. Pestisida		
	- Insektisida	960.000	960.000
	- Fungisida	448.000	448.000
	B. Biaya Tenaga Kerja		
	1. Biaya Tenaga Kerja Luar Keluarga		
	- Pria	10.616.000	13.256.000
	- Wanita	-	-
	2. Labor costs in the family		
	- Pria	-	-
	- Wanita	-	-
	C. Pembelian Peralatan		
	1. Mesin Air	1.600.000	4.500.000
	2. Hand Cart	430.000	860.000
	3. Selang Benang	360.000	540.000
	4. Electrical Sprayer	428.000	856.000
	5. Paranet	525.000	1.350.000
	6. Water Machine	90.000	180.000
	7. Cangkul	165.000	220.000
	8. Orbit Monitor	-	1.200.000
	9. Water Gauge Level	-	280.000
	8. Motion Temperature	-	210.000
	Amount of Variable Costs (A)	117.575.800	121.074.000
	B. Fixed Cost		
	a. Depreciation value of agricultural equipment	1.056.666	3.398.666
	Fixed Cost Total (B)	1.056.666	3.398.666
	Total Farm Cost (A+B)	118.632.466	124.472.666
2	Farm Revenue	182.000.000	234.000.000
3	Farm Income (2-1)	63.367.533	109.527.333

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Farm income can be calculated by subtracting total revenue from total farm costs incurred, Soekartawi [5]. There are several measures to calculate farm income, namely 1) farm income obtained by calculating all receipts minus all income, 2) farm family income obtained from tethering family labor income with own capital interest and rental value, and 3) farmer income obtained from adding labor income, own capital costs and depreciation of tools [8].

The farm income component consists of cash income and calculated / total income. Cash income is revenue minus costs incurred in cash by farmers without including TKDK costs and depreciation costs of agricultural equipment, while revenue is calculated as receipts minus total costs both incurred in cash by farmers and not in cash (TKDK costs and depreciation costs of tools). The income of oil palm nursery Tridian Nursery IPN and Sumber Makmur can be seen in Table 16.

Based on Table 16. The income of the Tridian Nursery IPN oil palm nursery reaches Rp. 109,527,333, while the income of the Sumber Makmur oil palm nursery is Rp. 63,367,533 per 1 harvest cycle. The difference in income between Tridian Nursery and Sumber Makmur oil palm nurseries reaches Rp. 46,159,800, the income of oil palm nursery Tridian Nursery IPN farmers because the amount of production produced is greater than Sumber Makmur oil palm nursery and the price priced by Tridian Nursery IPN oil palm nursery is more expensive than Sumber Makmur, where the price of seeds in Tridian Nursery oil palm nursery is Rp. 45,000 per stem, while in nurseries, Sumber Makmur is only Rp. 40,000 per stick.

3.2. One Sample T-test

Significant testing (Test – t) was carried out to determine whether there were differences in operational costs, revenues, and revenues for oil palm nursery Tridian Nursery IPN and Sumber Makmur with the following statistical hypothesis formula:

$H_0 : \mu_1 = \mu_2$

$H_1 : \mu_1 = \mu_2$

Table. 17 Analysis Sample t-Test

Detail	t-Count	Sig. (2 tailed)	Mean difference	Kesimpulan
Farm costs	32.734	.019	5.66960E7	H0 Rejected H1 Accepted
Farm Revenue	8.000	.079	2.08000E8	H0 Rejected H1 Accepted
Farm Income	3.746	.066	8.64474E7	H0 Rejected H1 Accepted

Based on Table 17, the results of the one-sample t-test indicate significant differences in farming costs, farm revenues, and incomes among the oil palm nurseries: Tridian Nursery, IPN, and Sumber Makmur. The income of IPN's Tridian Nursery is higher than that of Sumber Makmur's oil palm nursery. This disparity is attributed to differences in the amount of seed production, fertilizer usage, planting media, and labor. Consequently, the income of farmers at VPN's Tridian Nursery is significantly higher than that at Sumber makmur's oil palm Nursery

CONCLUSION

The palm oil seedling farming activities at Tridian Nursery and Sumber Makmur use the same method, the double-stage method, which separates the process into pre-nursery and main nursery stages. The pre-nursery is the first stage of palm oil seedling cultivation, occurring when the seeds are 1 to 3 months old. This stage includes land preparation, bed construction, polybag filling, and seedling care. The main nursery stage follows the pre-nursery and occurs when the seedlings are 3 to 12 months old. This stage involves land preparation, bed construction, polybag filling, seedling transfer, and maintenance. Based on research and data analysis, a comparison of the income from palm oil seedling farming at Tridian Nursery and Sumber Makmur in Batanghari Regency, Jambi Province, shows that Tridian Nursery's income is Rp. 109,527,333.33, while Sumber Makmur's income is Rp. 63,367,533.33. The total production costs for Tridian Nursery are Rp. 124,472,666.67, whereas Sumber Makmur's costs are Rp. 118,632,466.67. Tridian Nursery's income is higher than Sumber Makmur's due to its greater production volume and higher selling prices for palm oil seedlings.

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