

Analysis of Oil Palm Nursery Business at PT. Merbau Jaya Indah Raya in Lerepako Village, Laeya District, South Konawe Regency, Southeast Sulawesi Province

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Abstract

This study aims to: (1) examine the cultivation techniques applied in oil palm seedling farming, and (2) identify the production factors utilized and analyze the production costs involved in the oil palm seedling farming activities at PT. Merbau Jaya Indah Raya, located in Lerepako Village, Laeya Subdistrict, South Konawe Regency, Southeast Sulawesi Province. The research was conducted from January to July 2025. The data used in this study consisted of primary data collected through direct interviews and secondary data obtained from related institutions or agencies. The data analysis method employed was quantitative analysis. The findings of the study revealed that: (1) the oil palm seedling process at PT. Merbau Jaya Indah Raya involves several stages, including the germination process, polybag stage, preparation of planting media, selection of the nursery site, preparation of the Pre-Nursery (PN) area, planting of germinated seeds, maintenance of the Pre-Nursery (PN), preparation of the Main Nursery (MN) area, transfer of seedlings to the Main Nursery (MN), maintenance of the Main Nursery (MN), and preparation for field planting; and (2) the total production cost of the oil palm seedling farming at PT. Merbau Jaya Indah Raya was IDR 322,922,311.90 per year or per production cycle, with an average seedling cost of IDR 16,146.12.

Keywords: Agribusiness, Farming costs, Seedling techniques, Oil palm

INTRODUCTION

Indonesia is an agrarian country, with the majority of the population relying on the agricultural sector, particularly food crops, for their livelihoods. This demonstrates its

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IJETER, Volume 03 Issue 04, 2025



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fundamental and strategic role. According to data from the Central Statistics Agency (BPS), the agricultural sector is one of the three sectors with the largest contribution to gross domestic product (GDP) (Mega, 2018). In 2019, the added value and production levels of the agriculture, forestry, and fisheries sectors reached 12.53% of the country's GDP (BPS Indonesia, 2024).

In the Indonesian economy, palm oil products (especially palm oil) play a very strategic role. This role includes, first, palm oil is the main ingredient in cooking oil, so a sustainable supply is needed to help stabilize cooking oil prices. This is very important because cooking oil is one of the nine basic commodities needed by the community, so the price must be affordable for all groups. Second, palm oil is one of the main agricultural products for non-oil and gas exports. This product has very good prospects as a source of foreign exchange and tax revenue. Third, the production and processing process also has the potential to create jobs, while improving community welfare (Muchsin,*et al.*, 2016).

Southeast Sulawesi province's leading commodities are the agriculture and services sectors. The leading agricultural sector is the oil palm plantation subsector. Southeast Sulawesi recorded a total area of oil palm plantations across all regencies, with a production of 122,094 tons (BPS Southeast Sulawesi Province, 2021).

South Konawe Regency is still dominated by the agricultural sector, where the agricultural sector's contribution to the Gross Regional Domestic Product (GRDP) in 2021 was 2.84% (BPS South Konawe Regency, 2021). Oil palm plantations in this area are still relatively new, as the crude palm oil processing plant, PT. Merbau Jaya Indah Raya, only started operating in 2019. The presence of PT. Merbau Jaya Indah Raya, which partners with oil palm farmers, has boosted the performance of the farmers' farming activities, which are their primary source of income.

Oil palm nursery farming requires significant capital to produce superior quality seedlings. The marketing of oil palm nursery businesses is quite extensive, both within the community and companies, so the business opportunity is quite high. Farming profits can be achieved by minimizing production costs. Production costs in managing oil palm seedlings include the costs of production facilities, labor, and other costs incurred from the start until the oil palm seedlings are ready to be transplanted into the field. The number of seedlings is directly proportional to the production costs incurred. The more seedlings to be planted, the greater the costs will be because the land area used increases, the labor and production facilities also increase, so that costs, revenues, and farm income can affect profits (Mariati,*et al.*, 2014).

Oil palm seedling management ensures the healthy growth and development of oil palm seedlings from the earliest stages. This management includes selecting high-quality seedlings,

transplanting them to the appropriate land, caring for the plants, and monitoring their growth. This is crucial for producing productive and high-quality oil palms.

METHOD

The location of this research was PT. Merbau Jaya Indah Raya, Lerepako Village, Laeya District, South Konawe Regency, Southeast Sulawesi Province. The location was determined based on the consideration that there are oil palm nursery businesses that are still actively producing oil palm seedlings. The research period will be from January to July 2025. The types of data used in this study are primary and secondary data. In this study, data collection methods used were interviews, recording, and participatory observation. The data analysis method used was quantitative by calculating fixed costs, variable costs, and total costs.

1. Fixed Costs

Fixed costs are costs that do not change even if the number of goods and services produced changes (Sukirno, 2006).

$$TC = TFC + TVC$$

1

Information:

TC = Total Cost (Rp/Ha/Year)

TFC = Total Fixed Costs (Rp/Ha/Year)

TVC = Total Variable Costs (Rp/Ha/Year)

2. Equipment Depreciation Expense

According to Kieso,*et al.* (2012) Equipment depreciation expense is the allocation of costs for the decline in value of a fixed asset (such as machinery, vehicles, or work equipment) used in the production or operational process, during its useful life. Depreciation occurs due to the use, wear, or obsolescence of fixed assets over time.

$$D = \frac{NB - NS}{MP}$$

2

Information:

D = Depreciation (Rp/Year)

NB = Purchase Value (Rp/Year)

NS = Residual Value (Rp/Year)

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MP = Usage Time (Years)

3. Variable Costs

Variable costs (*variable cost*) is a component of production costs that varies according to the amount of output produced. This means that the more goods produced, the greater the variable costs incurred, and vice versa. If production is stopped or output is zero, then the variable costs will also be zero. According to Sukirno (2006), variable costs are costs whose amount varies according to the level of output produced. The higher the output, the greater the variable costs, and if the output is zero, then the variable costs are also zero. Variable costs include elements such as raw material costs, direct labor costs, and electricity or energy costs used in the production process that depend on production volume. Mathematically, variable costs can be calculated using the formula:

$$VC = Q \times VC \text{ per unit}$$

3

Information:

VC = total variable costs (Rp/Year)

Q = Number of units produced (seeds)

VC per unit = Variable cost per unit (Rp)

RESULTS AND DISCUSSION

PT. Merbau Jaya Indah Raya's Nursery Techniques

Oil palm nursery techniques are a series of procedures or cultivation methods carried out to produce healthy, superior oil palm seedlings ready for planting on production land. These technical activities encompass all stages, from seed selection and sowing to seedling maintenance during the planting stage. *pre-nursery* And *main nursery*, to preparing seedlings for transplanting to permanent land. The goal of this nursery technique is to ensure plant quality from the start, thereby increasing the productivity and economic lifespan of oil palms during the planting period. According to the Directorate General of Plantations (2013), a good oil palm nursery must meet technical standards, starting from the use of certified seeds, intensive maintenance, pest and disease control, and proper fertilization. The oil palm nursery technique implemented at PT. Merbau Jaya Indah Raya consists of several stages, starting from the polybag process to planting in the field. The following is a complete explanation of the oil palm nursery technique in Figure 4.1.



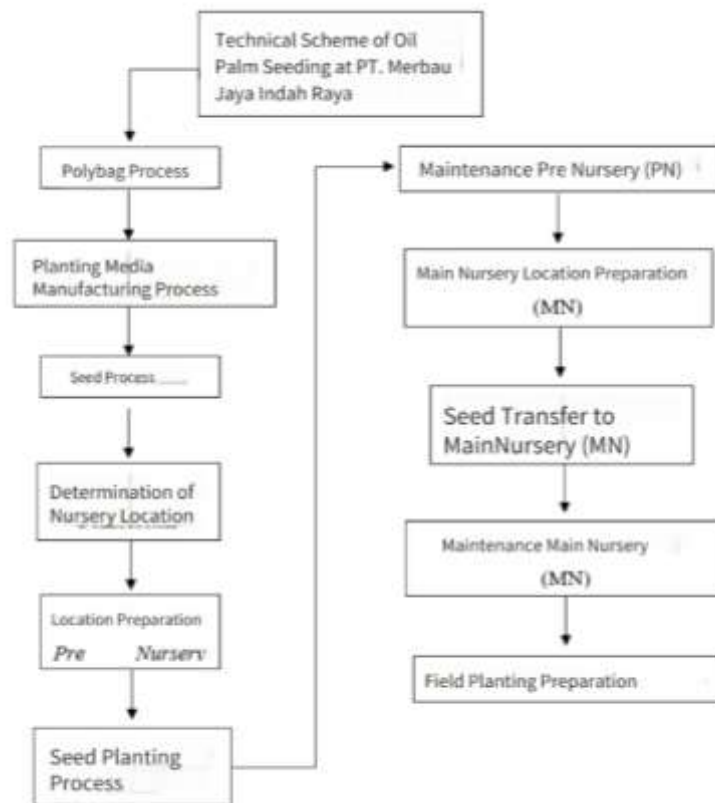


Figure 1 Scheme of oil palm nursery business at PT. Merbau Jaya Indah Raya

To better understand the technical aspects of the oil palm nursery business at PT. Merbau Jaya Indah Raya, please see the following explanation.

a. Polybag Process

The polybags used are black and weather-resistant, where the initial nursery polybag size is: 14 x 17 cm, 0.07 mm thick, with 0.3 cm holes, while the main nursery size is: 30 x 40 cm, 0.2 mm thick, with 0.5 cm holes as many as 60 mm with topsoil using topsoil filled with soil up to 2 cm from the edge of the polybag and watered every day.

b. Planting Media Making Process

Planting media uses loose top soil, less loose soil can be mixed with sand (3:1), free from pests and mixed with fertilizer (500 g SP36/10 liters of water) for every 1 m³ Fill the soil before filling it into the polybag then leave it for 1 month before planting the seeds.

c. Seed Process

The seeds to be planted must be kept cool, moist, and protected from direct sunlight until the planting process after arriving at the company and must not be stored for more than 5 days in a room with a temperature of 19-22°C.

What is immediately done is checking the number and type of crosses contained in the cross list with labels.

d. Determining the Location of the Nursery

The nursery location should be close to a planting area or garden with flat topography/slope <15° close to water sources and sources of soil for filling polybags that have good road access in all weather, protected from flooding, watertight conditions, strong winds, safe from pests, livestock and human disturbances.

e. location preparation *Pre Nursery* (PN)

Make a bed measuring 1.2 m x 10 m. The base of the bed is made higher than the surface with additional boards as a divider for crosses or growth groups.

f Seed Planting Process

When planting seeds, the polybag is opened and water is sprayed to provide moisture each time the seeds are planted. A planting hole is made 2 cm deep, planted in the polybag and leveled with soil around the seeds.

g Maintenance *Pre Nursery* (PN)

Pre nursery namely 3 months in small polybags, the sprouts are cared for in shaded beds with the following maintenance:

1. Watering

Rotate watering 2 times a day, each watering of the seedlings requires 0.1-0.25 liters of water

2. Weed control

Do manual weeding for grass or other weeds (once every 2 weeks)

3. Disease control

Herminthosporium, *anthracnose blast*, *corticum*, shoot rot, preventive spraying using fungicide is carried out when disease symptoms have appeared on the seedlings, followed by disease identification and watering is not carried out for 12 hours after spraying

4. Pest control

Control with chemical pesticides is carried out with extra care.

5. Fertilization

Urea fertilizer 2 grams/liter of water for 100 seedlings, frequency once a week (when the leaves have at least 4 leaves and do not apply foliar fertilizer when the air is hot or dry.

6. Seed selection 5-10%



During selection, it is important to avoid transporting abnormal seeds to the next stage because normal seeds at 3 months old already have 3-4 leaves.

h. Site Preparation *Main Nursery* (MN)

Main Nursery is continued until the seedlings reach planting age (3–12 months). Preparation of the cleared area is cleaned and leveled, then drainage is made following the secondary pipes and irrigation network, and staking is carried out when the irrigation installation has been completed with a planting distance of 90 x 90 x 90 cm. Each plot is arranged in 5 rows, 40 or 50 trees, the sixth row is left empty for the road.

i. Transferring seeds to *Main Nursery* (MN)

One day before transferring the soil to the polybag *Main Nursery* Water until the soil is saturated. The roots must be moist and not disturbed during the transfer. The seedlings must be watered immediately after the transfer is complete, where the planting hole is. *Main Nursery* made according to the size of small polybags and given NPK Mg 15-15-6-4 as much as 4 grams.

j. Maintenance *Main Nursery* (MN)

Main Nursery: 4 - 12 months until the seeds are ready to plant with the following maintenance:

1. Watering

Watering is done twice a day = 2 liters/day/polybag.

2. Weed control

Weeding in polybags and cleaning the watertight, control around the polybags can use herbicides with extra care, the nozzle must be adjusted so that it does not hit the seeds, if there is a danger of droplets due to the wind, spraying should be stopped immediately.

3. Pest and disease control

Can apply fungicides and pesticides as in *Pre Nursery* fungicides and pesticides are used responsibly and are only aimed at controlling pests and diseases

4. Fertilization

Fertilizer is sprinkled evenly in a circle around the seedlings, approximately 5 cm from the base of the seedling stem. Fertilizer should not touch the seedlings. Fertilization should be stopped one month before field planting. Applying small doses of fertilizer frequently is better than applying large doses of fertilizer infrequently.

5. Seed selection

At the seed selection stage, it is very important to avoid bringing abnormal seeds into the field.

k. Field Planting Preparation

Seedlings that are 10-12 months old are ready to be moved to the permanent planting





field about 3 or 4 weeks before planting. The polybags are rotated and watered first before being taken to the field. If the seedlings are taller than 1.5 m, they are pruned to 1.2 m. Oil palm nursery techniques are an important stage in determining the success of oil palm production in the field.

Oil palm nurseries are generally carried out in two stages, namely: *pre nursery* And *main nursery*, as part of a two-stage nursery system (*two-stage nursery*). *Pre Nursery* is the initial stage (0–3 months) in small polybags, used as a control environment for seedling selection, growth stabilization, and initial fertilization application at this stage using small polybags, seedling tools, sprayers, bags, hoes, shovels, hoses and knives while the materials include oil palm sprouts, planting media, base fertilizer, fungicides and insecticides. *Main Nursery* This stage continues until the seedlings reach planting age (3–12 months), using larger polybags, with a focus on further growth and adaptation before field planting. At this stage, the tools used include large polybags, sprayers, hoses, sickles, and hoes. The materials include the resulting seedlings. *pre nursery*, planting media, additional fertilizers, herbicides, and insecticides. According to Kurniawan, *et al.* (2023), quality management in oil palm nurseries needs to be implemented from the beginning, especially during the seedling selection and maintenance stages. This is in line with Siregar's (2023) opinion, which states that the right planting medium and consistent care are the keys to success in the seedling phase. *pre nursery*.

Furthermore, Ginting (2009) explained that the initial growth of seedlings is greatly influenced by the quality of the planting medium and the watering system used. In this regard, fertilizer use is also a crucial factor. Afrizon (2018) stated that the appropriate application of organic and inorganic fertilizers has been proven to significantly increase plant height and the number of leaves in seedlings. Similar support was expressed by Abadi and Nelvia (2019), who showed that the use of *ameliorate* on subsoil soil increases root development and growth power of oil palm seedlings.

The Palm Oil Research Center (2005) emphasized the importance of paying attention to seedling growth requirements, media selection, and maintenance techniques in obtaining superior seedlings. Darmosakoro (2008) added that appropriate polybag size and an efficient watering system significantly influence the success rate of seedling growth. Meanwhile, Iyung (2015) stated that the characteristics of good oil palm seedlings can be seen from the upright shape of the stem and fresh green leaves without any signs of disease. Gunturo and Wahyuni (2024) compiled the stages of the nursery, from germination to *main nursery*, requires specific management to produce quality seedlings. Furthermore, the Agricultural Development Polytechnic (2022) emphasized that an ideal nursery location, good drainage, and the quality



of planting material are critical factors in the overall success of oil palm nurseries.

Analysis of the Oil Palm Nursery Business at PT. Merbau Jaya Indah Raya

a. Variable Costs

Variable costs are costs that change proportionally with the level of activity or production volume. According to Mulyadi (2001), variable costs are costs that change in total in proportion to changes in activity volume. Variable cost data can be seen in Table 4.5.

Table 1 Variable Costs

No	Variable Input Types	Amount	Unit	Price	Variable Cost (Rp)
1	Oil Palm Sprouts	20.000	Seeds	10.000	200.000.000
2	Polybag	20.000	Fruit	200	4.000.000
3	NPK 12 Fertilizer	800	Kg	4.000	3.200.000
4	NPK 15 Fertilizer	2.000	Kg	16.000	32.000.000
5	Urea Fertilizer	1.200	Kg	9.000	10.800.000
6	Kieserite	1.000	Kg	6.000	6.000.000
7	Cooking oil	5	Liter	23.000	115.000
8	Dithane	5	Liter	50.000	250.000
9	Determined	2.5	Liter	35.000	87.000
10	Dense Fine	3	Liter	120.000	360.000
11	Labor	28	People	2.010.000	56.280.000
	Amount				314.154,000
	Rate-rate				28.558,545

Based on Table 4.5, the total variable costs in oil palm nurseries at PT. Merbau Raya Indah Jaya amounted to Rp. 314,154,000 with an average expenditure of Rp. 28,558,545 per production input item.

The largest input came from the purchase of 20,000 oil palm seedlings at a price of Rp 10,000 per seedling, bringing the total cost of the seedlings to Rp 200,000,000. Seedlings are a key component in the success of a nursery, with the quality and variety of the seedlings crucial for plant performance in the field. This aligns with research by Purba and Tarigan (2017), which found that certified superior seedlings from a trusted source can increase productivity by up to 30% compared to uncertified seedlings.

b. Fixed Costs

Fixed costs are costs that remain unchanged in total, even if there are changes in production volume or activity, at least in the short run. These costs must be paid even if the company produces no goods at all. According to Garrison, *et al.* (2010) fixed costs are costs that do not change in total within the relevant range of activity, even if production volume changes. Fixed costs in this study can be seen in Table 4.6.

Table 2 Fixed Costs

No	Type	Amount (Unit)	Unit	Purchase price (Rp)	Depreciation expense (Rp)
1	Hoe	20	Fruit	27.000	108.000,00
2	Shovel	24	Fruit	74.000	355.200,00
3	Fixed	25	Fruit	100.000	500.000,00
4	Tembilang	25	Fruit	75.000	375.000,00
5	Soil Sieve	3	Fruit	75.000	45.000,00
6	Water Machine	1	Fruit	1.600.000	320.000,00
7	Hoyu hose	100	Meter	17.000	340.000,00
8	Pipe	150	Meter	125.000	3.125.000,00
9	Electric Tank	8	Fruit	600.000	960.000,00
10	Water fountain	8	Fruit	20.000	32.000,00
11	Water reservoir	2	Fruit	4.000.000	1.142.857,14
12	See	8	Fruit	500.000	800.000,00
Amount					8.778.311,90
Rate-rate					675.254,76

Based on Table 4.6, the total depreciation cost of all tools and infrastructure used in the nursery process is Rp8,778,311.90 with an average depreciation cost per type of tool of Rp675,254.76. Fixed costs for conducting oil palm nursery business at PT. Merbau Jaya Indah Raya such as hoes (20 units), shovels (24 units), sickles (25 units), and tembilang (25 units) are used in the process of land preparation and seedling planting. The depreciation cost of each tool shows that even though the value is small per unit, the accumulation of the large number of tools still has a significant impact on the total cost.

c. Total Cost

Total costs are the combination of fixed and variable costs in a given production period. In other words, total costs represent the total expenditure required to produce a certain number of units of goods. According to Supriyono (1990), total costs are the sum of fixed and variable costs for a given level of output. These total costs are important for calculating the cost of goods manufactured and making efficient business decisions. In this study, total costs can be seen in Table 3.

Table 3 Total Production Costs

No	Type of Fee	Percentage	Amount (Rp)
1	Variable Costs		
	a. Procurement of Seeds	63.67%	200.000.000,00
	Total Variable Costs		314.154.000,00
2	Fixed Costs		
	a. Pipe Shrinkage	38.57%	3.125.000,00
	Total Fixed Costs		8.103.057,00
	Total Production Cost	100%	322.257.057,00
	Variable Costs	97.49%	314.154.000,00
	Fixed Costs	2.51%	8.103.057,00
	Rate-Rate		16.112,85

Based on Table 3. data obtained from the research location at PT. Merbau Indah Raya, it is known that the total variable costs in the nursery process reached Rp. 314,154,000, with the largest cost being the procurement of seeds amounting to Rp. 200,000,000 or 63.67% while the rest includes the purchase of sprouts, the purchase of polybags, fertilizers (NPK 12, NPK 15, Urea, and Kieserite), pesticides (Dense Fine, Dithane, Decis), and labor costs of 28 people for one year of production.

CONCLUSION

Based on the research that has been conducted regarding the Analysis of Oil Palm Nursery Farming at PT. Merbau Jaya Indah Raya in Lerepako Village, Laeya District, South Konawe Regency, Southeast Sulawesi Province, it can be concluded that:



1. PT. Merbau Jaya Indah Raya's nursery technique consists of several processes, starting with the polybag process, planting media preparation process, seed process, nursery location determination, and location preparation. *Pre Nursery*(PN), Seedling planting process, Pre-Nursery Maintenance (PN), Preparation of Main Nursery Location (MN), Transferring seedlings to *Main Nursery*(MN), Maintenance *Main Nursery*(MN), and Field Planting Preparation
2. The total cost of the Oil Palm Nursery business at PT. Merbau Jaya Indah Raya in Lerepako Village, Laeya District, South Konawe Regency, Southeast Sulawesi Province is Rp. 322,257,057 per year or per production with an average nursery cost per seedling of Rp. 16,112.85, with the highest variable cost being the procurement of seedlings of Rp. 200,000,000.00, or 63.67% while the highest fixed cost is the cost of pipe depreciation of Rp. 3,125,000.00 or 38.57%.

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