

FEASIBILITY STUDY OF UTILIZING SOYBEAN AS AN INTERCROP PLANT IN IMMATURE OIL PALM AS AN EFFORT TO INCREASE THE INCOME OF OIL PALM FARMERS

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Abstract

Land utilization in immature palm oil is very helpful for oil palm farmers to get a source of income when their palm oil crops is still immature. In addition, these intercrops can also be used as ground cover plants, which can prevent erosion and evaporation of the soil. The research was conducted in the experimental garden of the Institut Teknologi Sawit Indonesia (ITSI). The research time was 3 months. The purpose of this research is to determine the feasibility study of soybean business as an intercrop in immature crop land whether or not this soybean crop is profitable. If it is profitable then farmers can receive income from this soybean intercrop before the palm oil plants can be harvested. The results of the research conducted are the production of soybean crops on immature palm oil land with a distance of 20 cm x 20 cm on 2 beds with a bed size of 4 m x 1 m is 10 kg. The total production cost of soybean intercrops in immature palm oil is Rp.86,861. Income on soybean crops in immature palm oil is Rp.130,000. The profit on soybean intercrops in immature oil palm is Rp.43,139. Soybean crops (Grobogan variety) in immature palm oil are financially and economically feasible, with an R/C value > 1, so the farming business is profitable. Break Event Point of soybean intercrops at immature oil palm, BEP production 6.68 kg BEP price Rp.8,686.

Keywords: *Immature Palm Oil, Income, Intercropping, Soybean*

1. INTRODUCTION

The oil palm (*Elaeis guineensis* Jacq.) is one of the most important vegetable oil producing crops. Nowadays, oil palm is grown as a cultivated plant spread in various tropical and even near subtropical countries in Asia, South America and Africa. Plant maintenance in plantation commodities that are annual, usually grouped into immature plants or abbreviated and producing plants abbreviated (TM). Immature plant in oil palm is the period before harvest (starting from the time of planting until the first harvest) which lasts 0-36 months. In 2018, the total area of oil palm plantations reached 14,326,350 hectares. Of this area, most of it was cultivated by Large Private Companies, which amounted to 55.09% or an area of 7,892,706 hectares. The area of palm oil plantations in 2018 reached 3,417,951 hectares, of which about 99% or an area of 3,385,085 hectares. Smallholder's plantations occupy the second position in its contribution to the total area of Indonesia's oil palm plantations, which is 5,818,888 hectares or 40.62%, while a small portion is cultivated by Large State Plantations, namely 614,756 hectares or 4.29% (Ditjenbun, 2019).

One of the main problems of the Indonesian oil palm commodity is the low productivity of the crop, especially for the smallholder's Plantation business form. The current productivity of oil palm plants in smallholder plantations is 5 tons of FFB/ha/year, while in Large Plantations it has reached >20 tons of FFB/ha/year. The level of productivity achieved by Indonesian oil palm

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plantations is still below its potential productivity which can produce 25-30 tons of FFB/ha/year. One of the efforts to increase the productivity of Indonesian oil palm plantations is through replanting. Part of the replanted land will be open and get full sunlight so that it can be utilized for intercropping in an intercropping pattern, this pattern allows additional income for farmers while oil palm is not yet producing. One of the breakthroughs to carry out the program to increase pajale production is the utilization of oil palm immature crop areas for pajale production with intercropping systems. Intercropping in oil palm plantations is a system of planting annuals (including pajale) in rows between oil palm lines to utilize vacant areas in the immature plant period of 1 and 2 years of age (Winarna, 2015). Utilization of land potential, among others, utilizes the land between oil palm rows. Opportunities for intercropping oil palm during the immature plant period with food crops are still open, for example with field rice or soybeans. Through this intercropping, oil palm plantations are expected to make a real contribution by supporting national food security (PPKS, 2007). Thus, through the utilization of soybean intercropping, it is hoped that it can help oil palm farmers in adding a source of income when the oil palm is still immature plant.

2. RESEARCH METHODS

The research was conducted in the practice field of the College of Agriculture Agribusiness Plantation (STIP-AP) Medan. The research time was 3 months from February to May 2021. This research was conducted with Descriptive method, by collecting and calculating data from each variable then analyzing the business feasibility of the cost component of income and profit in the implementation of the use of soybean as an intercrop.

The materials used for this research are

1. Soybean seeds 250 gr
2. Dolomite fertilizer 2 kg
3. NPK fertilizer 432 g
4. Decis poison 50 ml

The tools used for this research are

1. Hoe
2. Rake
3. Embor
4. Meter
5. Hand Sprayer

The technique of soybean cultivation is as follows.

2.1 Bed Preparation and Planting Hole Making

1. Measure the distance from the oil palm plant to the bed.
2. Make 4 x 1 m² beds with a distance of 3m from the oil palm plants, the distance between beds is 30 cm.
3. Loosening the soil.
4. Dolomite sowing.
5. Measuring the planting distance with a size of 20cm x 20 cm.
6. Making planting holes with tugal/wood 3cm deep.

2.2 Planting

1. Each planting hole is inserted with 3 soybean seeds.
2. After the seeds are inserted, the hole is then covered with loose soil and not compacted.

2.3 Fertilization

The fertilizer used in this study is NPK fertilizer given to plants aged 10 days after planting, no later than 14 days after planting. The second fertilization was given when the plants were 60 days old, the dose of NPK fertilizer was given as much as 1.5 grams.

2.4 Watering and Maintenance

When the plants are 0-14 days old, watering is done every day and when the plants are 15-79 days old, watering is done twice a day. Pest spraying and weeding are done twice a week.

2.5 Harvesting

Harvesting is done when the plants are 80 days old, the leaves have turned yellow and the pod skin has turned yellow and dried up.

Observations in this study are:

A. Business Analysis

To assess the level of costs, revenues and financial returns and capital efficiency of Soybean intercrops in immature oil palm plants are as follows:

1. Production Costs

Production costs are all economic expenses that must be incurred to produce an item. According to Soekartawi (2006) to determine the Total Cost using the following formula:

$$TC = TFC + TVC$$

Description:

TC = Total Cost

TFC = Total Fixed Cost (Total Fixed Cost)

TVC = Total Variable Cost (Total Variable Cost)

2. Revenue

Revenue is the value of production sold at a certain price level. According to Soekartawi (2006), the following formula is used:

$$TR = P \times Q$$

Description:

TR = Total Revenue

P = Price

Q = Quantity

3. Profit

Profit is the net return on some of the costs that have been incurred. According to Rahim and Hastuti (2007) the following formula is used:

$$P = TR - TC$$

Description:

P = Profit

TR = Total Revenue

TC = Total Cost

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B. Business Feasibility Analysis

Business feasibility analysis is an activity to determine whether a business is feasible to run or not in addition to its continuous operational activities. According to Rukmana and Yudirachman (2013), the assessment of a business feasibility can be done in the following ways:

1. Revenue Cost Ratio (R/C)

Revenue cost ratio R/C ratio is a value obtained from the division between total revenue and farming costs. According to Soekartawi (2006) to find out whether the farm is profitable or detrimental can use the following formula:

$$R/C = \frac{\text{Total Revenue}}{\text{Total Cost}}$$

With the condition if:

$R/C > 1$, then the farm is profitable.

$R / C = 1$, then the farm breaks even

$R / C < 1$, then the farm is a loss

2. BEP (Break Event Point)

It is the break-even point of a business or return of capital or the meeting point between total costs and total output (revenue). BEP calculation consists of production BEP and product selling price BEP. According to Soekartawi (2006) the formula for calculating BEP is as follows:

$$\begin{aligned} \text{a. } \text{Production BEP (Kg)} &= \frac{\text{Total Cost}}{\text{Price}} \\ \text{b. } \text{Price BEP (Rp)} &= \frac{\text{Total Biaya}}{\text{Total Produksi}} \end{aligned}$$

3. RESULTS AND DISCUSSION

3.1 Cost Analysis

Table 1 Assumptions

No	Assumptions	Description
1	Experimental Area	2 Beds (in one bed measuring 4 x 1 meter)
2	Soil Type	Mineral
3	Number of seeds	144 seeds
4	Age of oil palm	34 months
5	Labor wage	Rp.50,000/HK based on daily labor wage in North Sumatra
6	Intercropping cycle	3 months

Source : Research Result

3.2 Tool Costs

The cost of equipment is the cost of equipment to carry out work, and also the cost of tools will later be calculated for depreciation costs so that it can find out how much production costs are incurred. Tool costs can be seen in table 2 as follows:

Table 2 Tool Costs

No	Tools	Price (Rp)
1	Hoe	65.000
2	Hand sprayer	35.000
3	Gembor	40.000
4	Garu	35.000
5	Meter	48.000

Total of Tool Costs 223.000

Source : Research Result

3.3 Depreciation Costs

According to Sondik (2013), depreciation is a systematic and rational allocation of acquisition prices and costs throughout the useful life of the fixed activity concerned. Tool depreciation costs can be seen in table 3 as follows.

Table 3 Depreciation Costs

No	Tools	Item Life	Price (Rp)	Price (Rp)
1	Hoe	5 years	65.000	1.083
2	Hand sprayer	2 years	35.000	1.458
3	Gembor	2 years	40.000	1.667
4	Garu	5 years	35.000	583
5	Meter	5 years	48.000	800
Total of Depreciation Costs				5.591

Source : Research Result

From table 3, the depreciation cost of the tools used in this study is the price of goods shared with how many years the item can be used (in units of months), so the total depreciation cost of the tools from this study is Rp.5,591.

3.4 Material Costs

The cost of materials is the cost incurred to buy the materials needed for the process of planting intercropping in oil palm TBMs. The cost of this material is later to find out how much production costs are incurred in the process of planting soybean intercropping at the oil palm TBM. Material costs can be seen in table 4 as follows.

Table 4 Material Costs

No	Material	Unit	Volume	Unit Price (Rp)	Total Price
1	Soybean seeds	Kg	0.25	25.000	6.250
2	Dolomite Fertilizer	Kg	2	4.000	8.000
3	NPK Fertilizer	Gram	432	10.000	4.320
4	Decis Poison	Liter	0.05	400.000	20.000
Total Material Costs					38.750

Source : Research Result

From table 4, the cost of materials needed in this study amounted to Rp.38,750. The cost includes the purchase of seeds until harvest.

3.5 Labor Costs

Labor costs are the costs we incur to pay wages for labor, of course, through the HK norm that we have calculated in advance before we pay the worker.

HK = HKP x Number of Working Days

Description:

HK: Working days

HKP: Male Working Days

3.6 Profit and Loss Analysis

To find out the income and expenses of the business for budget purposes, so that we can find out how much profit we get from the business. Profit and loss analysis can be seen in table 5 as follows:

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Table 5 Profit and Cost Analysis

No	Description	Unit	Volume	Unit Price (Rp)	Total Nilai (Rp)
1	Soybean Revenue	Kg	10	13.000	130.000
2	Input Cost				
	Seeds	Kg	0,25		6.250
	Insecticides	Liter	0,05	400.000	20.000
	NPKFertilizers	Gram	432	10.000	4.320
	Dolomit Fertilizers	Kg	2	4.000	8.000
	Total of Input Cost				38.570
3	Labor Cost				42.700
4	Depreciation Cost				5.591
	Total Cost (2 + 3 + 4)				86.861
	Total Revenue				130.000
	R/C				1,49

Source : Research Result

Based on table 5, it can be seen that the business of soybean crops in between oil palm TBM plants is feasible to do because it can provide benefits, where the R / C ratio reaches 1.54 and an income of Rp.130,000 with a planting distance of 20cm x 20cm with a bed area of 4 x 1 m2 as many as 2 beds, with a total of 144 plants.

3.7 Analysis of Farming

To assess the level of costs, revenues and financial returns and capital efficiency of soybean intercrops in immature oil palm plants are as follows:

a. Soybean Production

Soybean production obtained with a planting distance of 20cm x 20cm with a bed area of 4 x 1 m2 as many as 2 beds with a total of 144 plants is 10 kg.

b. Production Cost

Production costs are all economic expenses that must be incurred to produce an item. According to Soekartawi (2006) to determine the TC Cost of Production using the following formula:

$$TC = TFC + TVC$$

$$TC = Rp.38,570 + Rp.5,591 + Rp.42,700$$

$$TC = Rp.86,861$$

Description:

TC = Total Cost

TFC = Total Fixed Cost

TVC = Total Variable Cost

c. Revenue

Income is the value of production sold at a certain price level. According to Soekartawi (2006), the following formula is used:

$$TR = P \times Q$$

$$TR = Rp.13,000 / kg \times 10 Kg$$

$$TR = Rp.130,000$$

Description:

TR = Total Revenue

P = Price

Q = Quantity

d. Profit

Profit is the net return on a number of costs that have been incurred. According to Rahim and Hastuti (2007) the following formula is used:

$$P = TR - TC$$

$$P = \text{Rp.}130,000 - \text{Rp.}86,861$$

$$P = \text{Rp.}43,139$$

Description:

$$P = \text{Profit}$$

3.8 Business Feasibility Analysis

a. Revenue Cost Ratio (R/C)

Revenue cost ratio R/C ratio is a value obtained from the division between total revenue and farming costs. According to Soekartawi (2006), it uses the following formula:

$$\begin{aligned} R/C &= \frac{\text{Total Revenue}}{\text{Total Cost}} \\ &= \frac{\text{Rp } 130.000}{\text{Rp } 86.861} \\ &= 1.49 \end{aligned}$$

It is said that $R/C > 1$ then the farming business is profitable, and obtained $R/C = 1.49$ then the business of utilizing soybeans as intercropping in oil palm TBM land is feasible to implement.

b. BEP (Break Event Point)

Break Event Point is the break-even point or the turning point of the farm. According to Soekartawi (2006) using the following formula:

$$\begin{aligned} 1. \text{ Production BEP (Kg)} &= \frac{\text{Total Cost}}{\text{Price}} \\ &= \frac{\text{Rp.}86.861}{\text{Rp.}13.000} \\ &= 6,68 \text{ Kg} \\ 2. \text{ Price BEP (Rp)} &= \frac{\text{Total Biaya}}{\text{Total Produksi}} \\ &= \frac{\text{Rp.}86.861}{10 \text{ kg}} \\ &= \text{Rp.}8.686 \end{aligned}$$

This means that the break-even point or the payback point of the business of growing soybeans in oil palm TBMs is achieved when the production produced reaches 6.49 kg or at the selling price point of Rp. 8,686.

4. CONCLUSION

From the research, it can be concluded that the farming business of soybean intercropping (Grobogan variety) at immature oil palm is financially and economically feasible, with an R/C value > 1 , so the farming business is profitable. Break Event Point of soybean intercropping at TBM oil palm, BEP production of 6.68 kg, BEP price of Rp.8,686.

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