

# EFFECTIVENESS AND EFFICIENCY OF WEED CONTROL ON IMATURE PLANTS (TBM) II AT PT. SOCFINDO KEBUN SEUANGAN AFDILLING 1

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## Abstract

There are so many problems found in the process of maintaining and increasing the production of oil palm plants. That is the benchmark for the success or failure of these plants. So far weeds are one of the most important problems because weeds interfere with the main crops during their growth and development. Many problems and losses are caused by the presence of weeds in an area if allowed to grow uncontrollably. Therefore, so that these weeds do not cause more serious problems, it is necessary to control weeds. This research is carried out. Every research is expected to be useful for all parties who read it and those who are directly involved in it. This study aims to determine the Effectiveness and Efficiency of weed control on immature plants both manually and chemically as seen from the comparison of control time, cost analysis, work performance, weed mortality rate and regrowth rate from manual and chemical weed control. The method used in this study is to use descriptive analysis method. From The results of this study indicate that chemical weed control is more effective and manual weed control is more efficient.

**Keywords:** *weeds, control, chemistry, manual.*

## 1. INTRODUCTION

There are so many problems found in the process of maintaining and increasing the production of oil palm plants. That is the benchmark for the success or failure of these plants. So far weeds are one of the most important problems because weeds interfere with the main crops during their growth and development. Weeds are plants that do not grow in their place and have a negative effect on plant growth and development. Weeds cause losses due to competition with cultivated plants, as hosts for pests and diseases, produce allelopathic compounds which will inhibit plant growth, disrupt agricultural activities, and reduce the quality and quantity of crop yields (Paiman, 2020).

Many problems and losses are caused by the presence of weeds in an area if allowed to grow uncontrollably. Therefore, so that these weeds do not cause more serious problems, it is necessary to control weeds. Weed control aims to control weed growth in an area in such a way that it is not detrimental. Weed control must be carried out properly and precisely and planned so that losses due to weeds can be minimized, and on plantation land production can be obtained in accordance with the potential and results. The aim of weed control is to control weeds so as to create a certain environmental balance between weeds and plants, its resistance to weeds increases (high crop competition). In other words, weed control is carried out with the aim of controlling the growth of weeds in such a way that their growth is more controlled to the tolerance limit of plants, the competitiveness of weeds against plants is low so that the main crops can grow well and provide maximum yields. Therefore weed control is needed so that the competitiveness of staple crops increases and can compete with weeds.

With the development of agricultural technology, there are also more ways to stimulate the presence of weeds, both directly and indirectly, for example planting in rows, wide spacing between rows of plants, monocultures, fertilization, the use of large mechanized tools, irrigation and so on, so that with more The incentives for planting and advances in technology do not mean

that budget problems will become lighter but tend to get worse. In general, most of the time and costs in plantation business are used to deal with weeds, either directly or indirectly, including land preparation, weeding and controlling. weeds. Every plantation generally applies two ways to control weeds, namely manually and also by chemical means. Manual weed control is by using tools and energy directly while chemical weed control is by using suitable herbicides so that weeds that grow can be controlled (dead).The implementation of manual or chemical weed control on immature plants (TBM) is bound to involve costs that must be incurred by the company.

The research conducted was limited to an afdeling area which had an area of 1,942.74 Ha. The object of this study was manual and chemical weed control activities applied to PT. Socfindo Afdiling 1 seunagan gardens, focused on immature plantations located in block 28 with an area of 52.13 Ha. Therefore this study aims to determine the effectiveness and efficiency of weed control in immature plants both manually and chemically as seen from the comparison of control time, cost analysis, work performance, weed mortality rate as well as the advantages and disadvantages of manual and chemical weed control. Effectiveness is the desired goal or getting the desired results (Kotler and Rosmaniar, 2012). Effectiveness comes from the word effective, namely the type of work that is called effective if the type of work can provide an initial expenditure (output) compared to income (input). Work is called effective if the work can be completed on time according to a predetermined plan. The effectiveness of a thing means like success in achieving the specified target or goal (Steers in Siswanto, 2015). Efficiency is a comparison between activities with results that are interrelated to one another, in order to improve the quality of business efficiency can be used as a parameter for the work of institutions or organizations.

## 2. RESEARCH METHODS

### Place and time of research

This research was carried out at PT Socfindo, Kebun Seunagan, Afdiling 1, Nagan Raya district, Aceh Province along with internships from August to November 2022

### Data Type

a) Primary data

Primary data is data obtained directly from the source, namely by means of interviews or direct observation

b) Secondary Data

Secondary data, namely data obtained from a second source, through written sources or which have already become records or archives from the company.

### Method of collecting data

The method used in this study consists of several methods, namely:

1. Field Observations are carried out directly in the field by means of collect data through activities in the field in the form of conditionthe field, the process of work activities and the results of activities
2. Direct observation of spaciousness, namely data collection by doing Weed control by manual and chemical means
3. Interviews are data and information collection techniques through question and answer directly with the workers in the spraying and wood saplings (manual).

## Research stages

The stages of the research to be carried out are

### 1. Area Preparation

Determine the plot of the area overgrown with weeds, namely in the area where the plants have not produced level II, namely in block 28. The types of weeds found in both blocks are broadleaf weeds (*Melastroma malabatricum*, *Mikania micrantha*, *Borreria Latifolia*), narrow leaved (*Pennisetum polystaction*), and wire fern (*Gleichenia linearis*).

### 2. Preparation of Tools and Materials

Things that need to be considered before carrying out weed control are the preparation of tools and materials, for chemical control, namely knapsack sprayers with conus or deff 02 nozzles, roundup herbicides, dacomín, water as a solvent, buckets, jerry cans, filtered plastic funnels, measuring cups and protective equipment yourself (apron, safety shoes, goggles, rubber gloves, mask). Tools and materials for manual weed control, namely sickles or machetes and personal protective equipment (safety shoes and gloves). Then tools for observation, namely stationery, cameras and stopwatches.

### 3. Implementation of Weed Control

- a. Manual Weed Control. The implementation of manual weed control starts from the distribution of TPH to each worker by the foreman, after which the workers immediately disperse to each TPH respectively. The control stage is by clearing or slashing weeds around the weeds, saplings and oil palm disks. If the results of the clearing are not good, then in the next rotation the weeds will grow along half of the oil palm trunk.
- b. Chemical weed control. The implementation of chemical weed control is the implementation of spraying using a knapsack sprayer with a conus nozzle starting by diluting 120 ml of roundup herbicide with 15 liters of water. After the solution dissolves, spraying is carried out by pumping 8 times with the aim of applying air pressure to the faucet so that the tool can expel the solution from the knapsack sprayer's target noz, namely the main road and main disk so as to facilitate road access. The spraying pattern is a figure eight pattern with the aim that the weeds can be affected by the solution evenly.

## 3. OBSERVATION PARAMETERS

### 1. Control Time

Control time from morning based on working hours in the field, calculating the spraying timeknapsack sprayercalculated from the start of adding water, then for manual control it is calculated in advance from the entry of workers to the pilot until the completion of 1 Ha

### 2. Cost Analysis

Cost analysis is calculated based on the cost requirements in weed control activities, these costs include the price of tools, labor costs and the price of materials needed in weed control.

### 3. Weed Mortality Rate

Knowing the speed of weed death on the first day of control until the 4th day after control is carried out by controlling it daily.

### 4. Regrowth

MenFind out how long it will take for weeds to grow back after controlling each method of weed control, to be used as a consideration between manual weed control and chemical weed control.

**4. RESEARCH RESULT**

PT Socfin Indonesia (SOCFINDO) is a leading Palm Oil and Rubber Plantation Company operating in North Sumatra and Aceh Provinces and headquartered in Medan, North Sumatra, Indonesia. By 2022, Socfindo has more than 4369.39 Ha of planted area with about 10,000 employees. PT Socfin Indonesia's plantation, which is domiciled in Medan, has two large areas, namely in the two provinces of North Sumatra and Nangroe Aceh Darussalam. PT Socfin Indonesia has been established since 1930 under the name Socfindo Medan SA (Societe Financiere Des Caulthous Medan Societe Anoyme) was founded based on Notary Deed of William Leo No.45 dated December 7, 1930 and is a company that manages plantation companies in North Sumatra, South Aceh and East aceh. In 1965 based on Presidential Decree No. 6 of 1965, Decree of the President of the Dwikora Cabinet No. A/d/50/1965, Instruction of the Minister of Plantations No.20/MPR/M.Perk/65 and No. 29/MPR/M. Perk/65. No. SK100/M.Perk/1965, the plantation managed by PT Socfindo Medan SA is under the supervision of the Government of Indonesia. In 1966 a handover of company property rights was held by the leadership of PT. Socfindo Medan SA To the Government of the Republic of Indonesia according to the handover text dated 11 January 1960 No. 1/Dept/66 and the basis for the sale of plantations and assets of PT. Socfindo Medan SA. On April 29, 1968 an agreement was reached between the Indonesian government (Represented by the Minister of Plantations) and Plantation Nort Sumatra SA (shareholder of PT Socfindo SA) with the aim of establishing a Belgian plantation company with a capital composition of 40% and 60%.

Weed control with herbicides in plantations can be done using knapsack sprayer. The use of a knapsack sprayer requires a lot of energy to pull the pump and the presentation of weed exposure to the solution is uneven because the solution released is unstable (Aspar, 2012). The knapsack sprayer is a sprayer with a capacity of four gallons (15 liters) with a tank shape like a kidney and made of steel, galvanized sheet or yellow sheet which can be carried on the operator's shoulder and shoulder. The neck of the handle is at the bottom of the tank which makes it easy for the operator to pump. A little pumping creates pressure in the air chamber so that when the nozzle opens, a strong stream of liquid can blow (Pramuhadi, 2012)

**Weed Control Timing**

Control time for each tool is carried out on the day at 07:00-10:30 WIB, with each workforce having the same age, sex and balanced workforce so that there is no difference in terms of workforce. Each worker completes spraying 1 Ha. The time for carrying out manual and chemical weed control can be seen in table 1. The results of the time information obtained in this weed control were obtained by means of time calibration, which measures how much time is obtained for weed control in one hectare of plants. In carrying out time calibration, the tools needed are a stopwatch and a writing instrument, namely to measure and write down how much time it takes from the start of the activity to the completion of the activity. completed 1 ha of plants. 1 Ha of oil palm plants is the same as 3 TPH, 1 TPH has 3 saplings and 1 stub has 16 stalks of oil palm. So in 1 hectare there are 144 oil palm stems. Time measurements were carried out 3 times to find the average final time.

**Table.1 . Manual and chemical weed control time**

	Work item	Time (minutes)/Ha	
		Manuals	Chemistry
1	Dissolve water and herbicide to enter into the tank	0	9
2.	Weed control applications	57,69	66,96
	Total Time	57,69	75.96

The total time for manual weed control using sickles/machetes for 1 ha is 57.69 minutes/ha, while for chemical weed control or by using a knapsack sprayer for 1 ha is 75.96 minutes/ha. So there is a time difference of 18.27 minutes/ha.

### Weed Control Cost Analysis

Comparative analysis of the costs of manual weed control and chemical weed control can be seen in table 2. Based on the data shown in table 2, it can be explained that in manual weed control activities from September 2022 to October 2022 requires a workforce of 5 people per 4 times control in one block at a cost of IDR 3,540,000, where each HK requires a fee of IDR. 177,000 for working 7 hours a day. The use of machetes as many as 5 units and requires a fee of Rp. 16.111. The use of tools, namely machetes, has an economic life of 1 year.

**Table 2. Cost of manual weed control in TBM II (Block 28)**

No	Cost component	Unit	Amount	Frequency	Quantity/unit (RP)	The amount of costs (RP)
1.	Labor					
	1.1 Wages	Person	5	4	Rp. 177,000	Rp. 3,540,000
	Sub-Total					Rp. 3,540,000
2.	Tool					
	2.1 Machete	units	5	4	Rp. 805.55	Rp. 16,111
	Sub-Total					Rp. 16,111
	Amount					Rp. 3,556,111

**Table 3 Cost of Chemical Weed Control (Knapsack sprayer) at TBM II (block 28)**

No	Cost component	Unit	Amount	Frequency	Quantity/unit (RP)	The amount of costs (RP)
1.	Labor					
	1.1 Wages	Person	5	4	Rp. 177,000	Rp. 3,540,000
	Sub-Total					Rp. 3,540,000
2.	Tool					
	2.1 Knapsack sprayer	units	5	4	Rp. 777.77	IDR 15,555
	Sub-Total					Rp. 15,555
3.	Material					
	3.1 Roundup Herbicide	Liter kg	4 2.5	4 4	Rp. 90,000 IDR 135,000	IDR 1,440,000 IDR 1,350,000
	3.2 Gulmaron					
	Sub-Total					IDR 2,790,000
	Amount					Rp. 6,345,555

Based on the data shown in table 2, it can be explained that chemical weed control activities from September to October 2022 require a workforce of 5 people with 4 times control in one block, with a cost of IDR 3,540,000, where each HK requires a fee of Rp. 177,000 for working 7 hours a day. Using a knapsack sprayer costs Rp. 15,555 with an economic life of 5 years, then for herbicides and roundup it costs Rp. 1,440,000 and for lemurrion it costs Rp. 1,350,500.

**Table 4 the cost of manual and chemical weed control per hectare**

No	Type of activity	Ha	Block 28
1	Manual weed control	52.13	
	a. Wages		Rp. 3,540,000
	b. Tool		Rp. 16.111
	Total		Rp. 3,556,111
	Cost Per Hectare		Rp. 68,216
2.	Chemical Weed Control	52.13	
	a. Wages		Rp. 3,540,000
	b. Tool		Rp. 15,555
	c. Material		Rp. 2,790,000
	Total		Rp. 6,345,555
	Cost Per Hectare		Rp. 121,725

Based on table 4 above, it is explained that the price for manual weed control is IDR 68,216/Ha. while for chemical weed control is Rp. 121,725/Ha. So there is a cost difference of Rp. 53.509/h.

**Weed Mortality Rate**

**Table.5 the percentage of weed death rate**

Weed control treatment	Observation time			
	1st day (%)	Day 2 (%)	3rd day (%)	4th day (%)
Chemistry	90	92	95	97
manuals	90	90	90	90

The data in table 5 above shows that the death rate for chemical weed control was 90% from the first day after control, the second day was 92%, the third day was 95%, then on the fourth day of observation it was 97% after control. Weeds that were controlled manually on the first day of observation after control had a mortality rate of 90%, on observation after the 2nd day it was 90%, and on the 3rd and 4th day of observation the death rate was also uneven or with a percentage of 90%. The observational data above shows that chemical weed control is more effective than manual weed control.

**Regrowth**

**Table 6. Observation of weed growth rate after control**

Weed control treatment	Observation time					
	1st week	2nd week	3rd week	4th week	5th week	6th week
Chemistry	-	-	-	-	-	√
manuals	-	-	-	√	√	√

The table above explains that after controlling weeds, observations are made to see how fast the weeds regrow that have been controlled either manually or chemically. Observations were made by visiting blocks that have been routinely controlled every week to see the condition of the land that has been controlled by weeds. From the results of observations, it was shown that manually controlled weeds had grown back in the 4th (fourth) week after control, while chemically controlled weeds had grown back longer, namely in the 6th (sixth) week. This shows the difference in weed control that is done manually grows back 2 weeks faster than weed control that is done chemically.

**Weed Control advantages and disadvantages**

**Table.7 Strengths and weaknesses**

Type of activity	Excess	Lack
Manual weed control	<ol style="list-style-type: none"> <li>Does not cause environmental pollution</li> <li>Can be combined with other control methods</li> </ol>	<ol style="list-style-type: none"> <li>Requires a lot of energy</li> <li>Not applicable for large locations continuously</li> </ol>
Chemical Weed Control (Herbicides)	<ol style="list-style-type: none"> <li>Death is quicker and more even</li> <li>Effective for large areas</li> </ol>	<ol style="list-style-type: none"> <li>the danger of plant poisoning</li> <li>has a residual effect on environmental pollution</li> </ol>

In weed control activities, both manually and chemically, each has its own advantages and disadvantages. For manual weed control, the advantages are firstly that it does not pollute the environment, that is because there is no use of materials that can damage or disturb the plants and the environment from oil palm plants. The disadvantages of manual weed control are that first it requires a lot of energy, this is because clearing using sickles or machetes is not an easy thing, the workers have to cut the weeds down to the roots, the second cannot be done for large areas continuously continuously, this is because more energy is needed and in larger quantities. For chemical weed control activities, the advantage is the even death rate, this is because the herbicide works immediately and the application of the tool, namely the knapsack sprayer, makes it very suitable for larger areas. The lack of chemical weed control is the danger of plant poisoning

because the materials used are chemicals which we know can damage plants and also cause environmental pollution.

## 5. CONCLUSION

From the description above it can be concluded that the time for manual weed control is 57.69 minutes/Ha while chemical control is 75.96 minutes/Ha. The total cost of manual weed control is Rp.68,216/ha, and the total cost of chemical weed control is Rp.121,725/ha, so there is a difference in weed control costs of Rp.53,509/ha. The weed mortality rate in manual weed control is less even, only 90%, while for chemical it is more even, namely 97%. Weed regrowth after manual control was 2 weeks faster than chemical control. So weed control on immature plants (TBM) II is more effective with chemical means because the death rate is more even and the weed growth takes longer after being controlled. The efficiency results in this study are weed control which is done manually because the price is cheaper and the time required is less.

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