

Economic Aspects Comparison Of Using Juhar Organic Fertilizer And Npk Fertilizer In Palm Oil Plantation

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Abstract: The aim of the research is to find out the comparison level of production, production costs, reception and the income on the agricultural of palm oil pnenuership and to analyze the level of economic efficiency. This research is conducted with a purposive sampling method. The research result shows that the production is using the juice of Juhar is 70.792 kg. With the use of NPK thatis 604 kg. But from the data above can be found that the production of the palm oil is higher using the Juhar fertilizer than NPK fertilizer. The cultivation of the palm oil which using Juhar fertilizer is better than using the NPK fertilizer

Index Terms: Economic Aspects, Juhar Fertilizer, Npk Fertilizer, Palm Oil

1 INTRODUCTION

Palm oil (*Elaeis guineensis* Jacq), originates from West Africa, is a major producer of vegetable oil with higher productivity than other vegetable oil-producing plants (Sihotang in Adnan et al, 2015: 69). Oil palm plant is a type of plantation that occupies an important position in the agricultural sector in general, particularly the plantation sector. This is because of the many plants that produce oil or fat, oil palm produces the greatest economic value per hectare in the world (Khaswarina in Nasution et al., 2014). Fertilizers contain nutrients that are needed for plant growth and development, while supplements such as plant hormones help smooth the metabolic process. Nonetheless, into fertilizers, especially artificial fertilizers, a number of supplement ingredients can be added. In providing fertilizer, it is necessary to pay attention to nutrient requirements for these plants so that plants can grow well. Limited or excessive nutrient conditions is not good for plant growth. Based on the origin, fertilizer can be divided into organic fertilizer (for example compost, guano, green manure and P fertilizer) and inorganic fertilizers, for example, TSP, urea, rustika and nitrophoska (Marsono and Paulus, 2001: 41). JUHAR organic fertilizer is a semi-compound fertilizer specially formulated and in its application mixed with Urea/ZA. When applied with the appropriate protocol (dose and time), it turns out that the fertilizer is able to spur growth, improve plant health and quality. In that way, the TBM (Tanaman Belum Menghasilkan or Immature Plant) period is shorter while the quality of the plant is the same or better than conventional managed plants. Thus, productivity is higher. For immature plant (TBM), application of doses and costs of JUHAR & urea organic fertilizers is more efficient (1.50 kg/principal equivalent to Rp 900/principal/ yr) than conventional fertilizer doses (8.00 kg/principal/year equivalent to Rp 3,600/ principal/year). In this case, the comparison of the cost of JUHAR & Urea and conventional for TBM is 1: 4. For Tanaman Menghasilkan (TM or producing plant), application of JUHAR & Urea organic fertilizer dosage is also more efficient (3.00 kg/principal equivalent to Rp. 18,000/principal) compared to conventional fertilizer dosage (10 kg/principal equivalent to Rp 42,500/principal) or 1: 2 with the same or more plant quality. In this case, the comparison of the costs of JUHAR & Urea and conventional organic fertilizers for TM is 1: 2.

Table 1.
Effect of Using JUHAR Fertilizer

No.	Description	the month	4 th the month	7 th the month	10 th the month
1.	Seedling height, (cm)	25,00	55,81	109,33	
2.	Stem diameter, (cm)	1,50	3,50	6,80	
3.	Number of midribs, (cm)	5,12	10,44	15,52	
4.	trunk, (cm)	4,46	10,80	21,39	

Source: *Cv. Ruthani Mandiri, North Sumatra, 2010*

Based on the above explanation, there are differences in the growth of oil palm plants from both types of fertilizers, namely NPK fertilizer and JUHAR organic fertilizer. Will the existence of these two types of fertilizer will affect production costs, income and the level of economic efficiency in oil palm.

2. Research Methode

This research was conducted at PT. Sri Rahayu Agung, Jln. Raya Utama Kotarih, Kotarih Baru Village, Kotarih District, Serdang Bedagai Regency. The Kotarih Plantation has 298 Ha for Oil Palm Plantations. The choice of the location as a place of research is because Perkebunan Sri Rahayu Agung has applied JUHAR organic fertilizer. The study was conducted for 48 weeks: from July 25, 2017, to August 21, 2017. Determination of the sample was carried out by using purposive sampling taken 1 threath harvesting at the application of JUHAR Organic Fertilizer (420 principles) and 1 harvesting effect on the application of NPK Fertilizer (420 principles). Followed by an observation of palm oil production at the application of JUHAR organic fertilizer and NPK fertilizer in the 1999 planting year. The samples taken in this study were carried out by finding out, in advance, the information about the area of the plant and the number of trees per unit area. The total area of this study was 6 ha with the planting year in 1999. Analysis of the data to discuss the economic aspects of palm oil plants is as follows:

Palm oil production is calculated using the formula: $Q = f(K, L, R, T)$

The cost of producing palm oil is calculated using the formula:
 $TC = FC + VC$

Palm oil income is calculated using the formula: $\Pi = TR - TC$

The efficiency level of palm oil is calculated using the formula:
 $NPMx = Px$

3 RESULTS AND DISCUSSION

Comparison of palm oil production using JUHAR organic fertilizer and NPK fertilizer is carried out 2 times a year.

Table 2.

Comparison of Palm Oil Production using NPK and JUHAR Organic Fertilizers

Month	Palm Oil Production(kg)	
	Fertilization application using NPK fertilizer (Method 1)	Fertilization application using JUHAR organic fertilizer (Method 2)
January 2015	3331	3787
February 2015	4008	3993
March 2015	5341	6487
April 2015	5628	6456
May 2015	6762	7594
June 2015	5646	6725
July 2015	5176	6723
August 2015	5120	7042
September 2015	5287	6029
October 2015	6184	7444
November 2015	5475	6187
December 2015	2216	2325
TOTAL	60.174	70.792
Total average	5470	6435

Data source: PT. Sri Rahayu Agung Plantation, 2017

The production of oil palm using JUHAR organic fertilizer is 70,792 kg, the average production is 6435 kg/month. Meanwhile, the production of oil palm plants using NPK fertilizer produces 60,174 kg and the average production is 5470 kg/plant/month (Table 2)

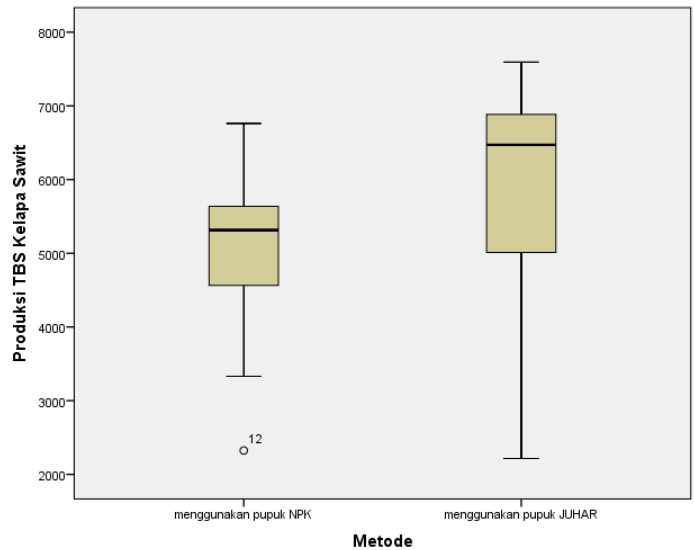
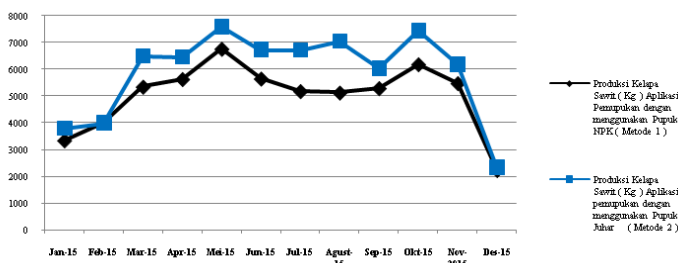


Figure 1.

Graph of Comparison of Palm Oil Production using JUHAR organic fertilizer and NPK fertilizer

Figure 1 shows that the production of oil palm using JUHAR organic fertilizer is more varied than NPK fertilizer. According to the diagram, the production of oil palm using JUHAR organic fertilizer is greater than using NPK fertilizer. Based on these results it can be seen that the data on palm oil production using NPK fertilizer and palm oil production using JUHAR organic fertilizers are asymmetrical.

Table 3.

Palm oil production cost using NPK and JUHAR organic fertilizer from January to December 2015

Production cost using NPK fertilizer/month		Production cost using JUHAR organic fertilizer/month	
Month	production cost	Month	production cost
January	2.675.075	January	3.935.075
February	2.675.075	February	3.935.075
March	3.153.802	March	4.413.802
April	2.675.075	April	3.935.075
May	3.153.802	May	4.413.802
June	2.675.075	June	3.935.075
July	2.675.075	July	3.935.075
August	3.153.802	August	4.413.802
September	2.675.075	September	3.935.075
October	3.153.802	October	4.413.802
November	2.675.075	November	3.935.075
December	2.557.621	December	3.817.621
Total	49.022.854		33.898.354
Total Average	4.085.238		2.824.863

Data Source: PT. Sri Rahayu Agung plantation, 2017

Furthermore, the cost of producing oil palm plants using NPK fertilizer in method 1 is Rp. 49,022,854 with a total average production cost of Rp. 4,085,238/month (Table 3). The cost of producing oil palm plants using organic fertilizer JUHAR in method 2 is R.p. 33,898,354 with a total average production cost of Rp. 2,824,863/month (Table 3)

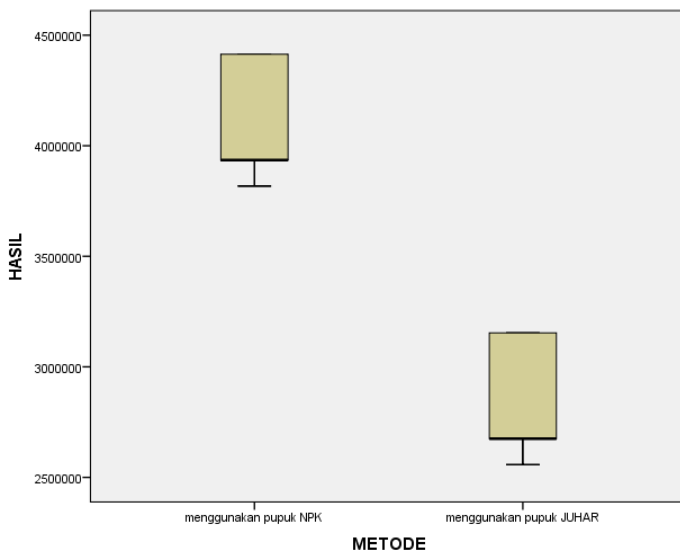
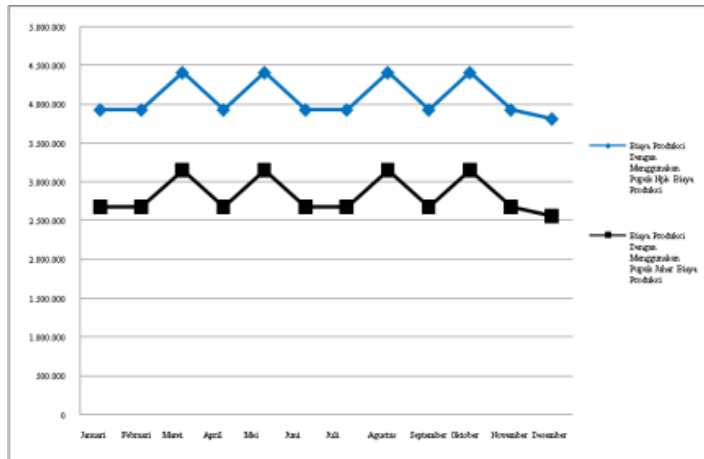


FIGURE 2.

GRAPHIC OF PRODUCTION COST USING NPK AND JUHAR ORGANIC FERTILIZERS FROM JANUARY TO DECEMBER 2015.

The picture above shows that the production costs using JUHAR organic fertilizer are less than using NPK fertilizer. The Q2 value is above the Q1 line so that a lot of data has the same value in one year, causing the value of Q1 to be equal to the value of Q2 (median). The boxplot shows the production cost using NPK fertilizer higher than using JUHAR, that is 3,800,000 – 4,400,000, while the cost of using JUHAR organic fertilizer is 2,600,000 - 3,300,000. The production cost using NPK fertilizer and organic fertilizer JUHAR has a whisker positioned at the bottom part of the boxplot, which means negative skewness (leaning left).

Table 4

Revenue of Palm Oil Farmers Using NPK and JUHAR Organic Fertilizers

TBS Revenue Using NPK Fertilizer/month		TBS Revenue Using JUHAR Organic Fertilizer/month	
Month	Income	Month	Income
January	2.160.655	January	4.255.135
February	3.912.589	February	5.143.219
March	6.294.903	March	9.852.633
April	5.856.745	April	8.558.365
May	7.521.128	May	10.249.608
June	5.775.145	June	8.891.925
July	3.895.313	July	7.498.824
August	2.037.398	August	5.719.118
September	5.993.011	September	8.647.387
October	5.882.558	October	9.240.458
November	4.977.325	November	7.397.361
December	176.729	December	1.247.749
Total	54.483.499	Total	86.699.782

Data source: PT. Sri Rahayu Agung plantation, 2017

Palm oil revenues from January - December 2015 using NPK fertilizer is amounting to Rp. 54,483,499, while using JUHAR organic fertilizer is Rp. 86,699,782. Here we can see a comparison obtained from Oil Palm FFB between NPK fertilizer and JUHAR organic fertilizer usage. By comparing the two fertilizers, we can see 1 : 2.

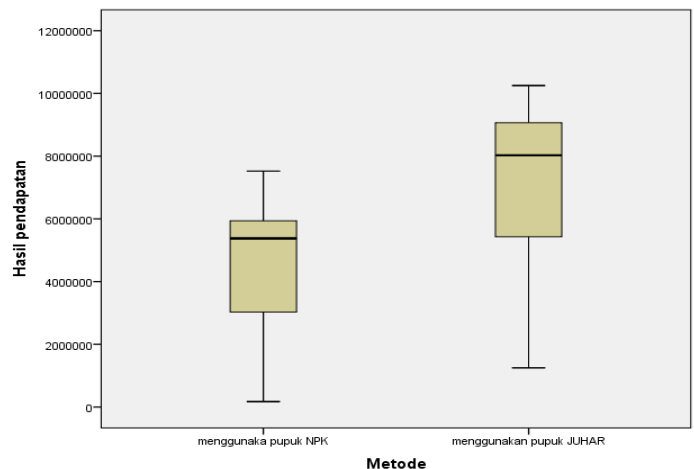
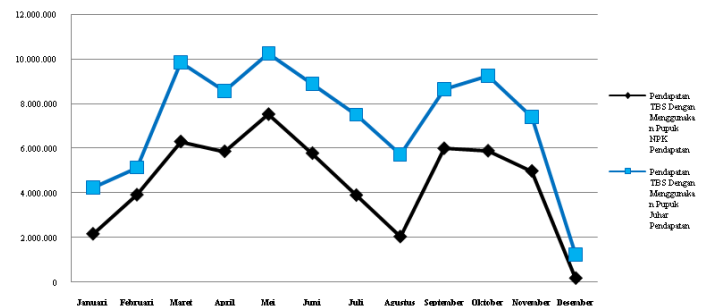


Figure 3.

Graphic and Box Plot of Palm Oil Plantation Revenue Using NPK and JUHAR Organic Fertilizers

Figure 3 shows that the use of JUHAR organic fertilizer is higher than NPK fertilizer. Based on these results, the revenue of oil palm using NPK fertilizer and JUHAR organic fertilizer is

Table 5.

Economic Efficiency Level of Palm Oil Plantation Using NPK Fertilizer (1st Method) & JUHAR Organic Fertilizer (2nd Method).

c			JUHAR Organic Fertilizer (2 nd Method)			Production Efficiency	Production Efficiency
Month	1 st Method NPK Fertilizer	Production Difference each month	Month	2 nd Method JUHAR Fertilizer	Production Difference each month	1 st Method NPK Fertilizer	2 nd Method JUHAR Fertilizer
January	3331	677	January	3787	-206	1,939	2,204
February	4008		February	3993		2,047	2,039
March	5341	-287	March	6487	31	2,664	3,235
April	5628		April	6456		3,234	3,710
May	6762	1116	May	7594	869	3,831	4,303
Jun	5646		Jun	6725		3,283	3,910
July	5176	56	July	6723	-317	3,421	4,443
Augus	5120	-897	Augus	7042	-1415	4,063	5,589
September	5287		September	6029		2,815	3,210
October	6184	3151	October	7444	3972	3,714	4,471
November	5475		November	6187		3,363	3,800
December	2324		December	2215		1,270	1,210
Total	60282			70682		35,645	42,126
Total Average	5024			5890		2,970	3,511

Source: Processed Secondary Data, 2018.

Furthermore, the level of economic efficiency in oil palm plantation using NPK fertilizer and JUHAR organic fertilizer has a difference of 1: 2 in production. The difference in production divided by the selling price has the difference between using NPK fertilizer and JUHAR organic fertilizer. The difference between NPK fertilizer is 35,634 while organic fertilizer JUHAR is 42,126. There is a difference between NPK fertilizer and JUHAR organic fertilizer. The total average using NPK fertilizer is 2,970 while the average total using JUHAR organic fertilizer is 3,511. The research of Vira Irma Sari, Sudradjat, and Sugiyanta (2015): Role of Organic Fertilizers in Increasing the Effectiveness of NPK Fertilizers and Palm Oil Seedlings in Main Nurseries, showed that the provision of organic fertilizers may increase the effectiveness and substitute NPK fertilizers in oil palm seedlings. The best treatment combination is 2: 6 (organic fertilizer: topsoil) and NPK dose of 382.5 gr plant with the value of effectiveness for plant height, the number of leaves and stem diameter are 158.9.0, 209.1 and 170.1%. The efficiency of NPK fertilization for each nutrient element of N, P, and K is 56.2, 11.1, and 29.0%. The optimum dose of NPK 15-15-15 fertilizer is based on plant morphology of about 396.05 gr per seed for eight months with the following monthly doses: 7.00, 12.59, 37.58, 56.41, 36.74, 87.00, 86.60, and 72.97 gr per seed. The data analysis shows the production of oil palm using JUHAR organic fertilizer is higher than using NPK fertilizer. There is no significant effect on JUHAR organic fertilizer but the rate of oil palm productivity is higher than that of NPK fertilizer. Palm oil productivity is higher and production costs are lower. The

comparison between JUHAR organic fertilizer and NPK fertilizer can be seen from the graph. The value of production and production costs using JUHAR organic fertilizer is higher than using NPK fertilizer, while production costs using JUHAR organic fertilizer is less than NPK fertilizer. TBS palm oil acquisition using JUHAR organic fertilizer is higher than NPK fertilizer. The results of JUHAR organic fertilizer analysis are better than NPK fertilizers. Besides, palm oil revenue using JUHAR organic fertilizer. The difference value obtained shows the level of economic efficiency is better when using JUHAR organic fertilizer. The economic aspects of using JUHAR organic fertilizer is the productivity results and the maximum level of efficiency of palm oil plantation of PT. Sri Rahayu Agung as well as the low production costs.

4 CONCLUSION

The economic aspect comparison study of using JUHAR organic fertilizer and NPK fertilizer on oil palm plants (*Elaeis guineensis* jacq) gives several conclusions: the use of JUHAR organic fertilizer shows significant result while using NPK fertilizer is otherwise. However, from the above data, it can be concluded that the value of palm oil production is higher by using JUHAR organic fertilizer than NPK. Palm oil productivity using JUHAR organic fertilizer is better than using NPK fertilizer. Production costs os using JUHAR organic fertilizer are still more economical compared to NPK fertilizer. It can be seen from the results of data analysis that the data analysis that it is more efficient using JUHAR organic fertilizer than NPK fertilizer. Economic efficiency level by using JUHAR

organic fertilizer is more efficient and effective than NPK fertilizer. That is because, in higher productivity, production costs are lower, TBS acceptance is higher, and so the revenue is higher.

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