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INDEPENDENT OIL PALM SMALLHOLDER INCOME BASED TYPOLOGY OF LAND IN JAMBI, INDONESIA

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Abstract. Oil palm is the main commodity that plays a very important role in economic development in some rural areas of Jambi Province. The main objective of the study was to compare the income of independent oil palm smallholders by type of land in Jambi Province. The secondary data was applied to 1,587 selected independent oil palm farmers from the results of the 2014 Estate Cultivation Household Survey by Statistics Indonesia. The analytical tool used in this study was farming income and comparative analysis. The result provided empirical evidence that there was a difference in income between farmers who cultivated oil palm on mineral land and those who cultivated on peat land. The income of independent farmers on mineral land was greater than those on peat land. The analysis of a Revenue Cost ratio showed that the value of R/C ratio was greater than one for two of them, but no difference between them. The results may provide support for the development policy of oil palm smallholders according to land suitability**.**

Keywords. Independent farmer; Income; Oil Palm Smallholder.

INTRODUCTION

Oil palm plantations in Indonesia have grown rapidly in the last four decades in response to global demand for Crude Palm Oil (CPO) and its derivatives. Indonesia, as the world's largest CPO-producing country, was recorded as having an oil palm area of more than 16 million hectares in 2021 with CPO production of 45 million tons, involving 4.3 million workers (Ditjenbun, 2023). Of this area, 35.8% was operated by smallholders, the rest was cultivated by large plantations, the state and the private plantations

The largest oil palm smallholder center was on the Sumatra' island with an area proportion reaching 73.9% of the area of Indonesian oil palm smallholder plantations. Jambi Province is one of the central areas for smallholder oil palm production in Sumatera with large areas of oil palm reaching 772 thousand hectares in 2021 with CPO production of 1.5 million tons (Ditjenbun, 2023). Oil palm is a major source of income for rural communities in Jambi Province. Oil palm smallholders have an impact on the income of the people of the village, where any increase in oil palm revenue amounts to IDR 1, -it will be able to increase the income of the village as a whole amounted to1.4107 times (Mara & Fitri, 2013). Lee et al. (2014) argued that the mean percentage contribution to total income from oil palm in their study at Sumatra was 77%.

Types of smallholders related to the production and marketing of fresh fruit bunches (FFB), according to management patterns, independent smallholders, and partnership/supported farmers (IFC, 2013; Jelsma et al., 2017). In the beginning, smallholder oil palm farming was encouraged and supported through specific government policies, but, since these policies were phased out, smallholders have established and managed their oil palm plantations independently (Euler et al., 2016). Independent smallholders are not tied or contractually bound to an estate or CPO mill (IFC, 2013).

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The rapid development of oil palm plantation areas in Indonesia by independent smallholders, which was originally directed at mineral land, has shifted to sub-optimal land use, including peat land which is fragile and poses a risk to the preservation of natural resources and the environment (Las et al., 2016). In Sumatra, the widest distribution of peatlands is along the eastern coast, namely in the provinces of Riau, South Sumatra, Jambi, and Aceh. Peatlands in Jambi Province in 2011 were 621,089 (Ha) covering 9.65% of the area of Jambi Province (Wahyunto et al., 2016).

The use of peat land for agriculture faces a dilemma, on the one hand, peat land is needed to meet food needs and security, bioenergy development, and economic growth, especially the development of export commodities (Las et al., 2016). However, good management of peat land through the application of technology that is appropriate to the characteristics of peat land can provide crop yields equivalent to production on mineral land (Maftu'ah et al., 2016). Farming of oil palm on peat land requires higher investment costs (Irawan et al., 2016). Thus, land typology is thought to cause differences in farmer income due to differences in costs.

Agricultural yield and income generated from agricultural production are often key indicators of a farms' well-being and economic performance (Qaim et al., 2020). There has been a lot of research done to analyze oil palm smallholder income in Indonesia. However, research that investigates the independent oil palm smallholder income using big data that involves farmers whose cultivated oil palm in mineral land and peat land is still very rare. It is necessary to study the differences in farming income of independent oil palm farmers in terms of the cultivated land type, in this case, mineral land and peat land.

METHOD

The data used in this research was the cross-section data from the results of the 2014 Estate Cultivation Household Survey (SKB ST2013) conducted by Statistics Indonesia. The analysis was carried out on 1,587 selected independent oil palm smallholder farmers in Jambi Province, where 243 farmers cultivated oil palm on peat land, while the remaining 1,344 were on mineral land. The selected farmers had a monoculture cropping system with a minimum planted area of 0.5 hectares, and the age of the plants in the production period of 4-25 years.

The data obtained were tabulated and analyzed descriptively by analyzing the income per hectare of oil palm smallholder plantations as follows:

$$In = TR - TC$$

where,

In = Income (IDR)
TR = Total Revenue; obtained from the amount of FFB production (Kg) multiplied by the price of FFB (IDR)
TC = Total cost; is the sum of all inputs value expended by the farmer in oil palm farming (IDR)

Return Cost Ratio commonly known as R/C ratio is a comparison between revenue and costs. R/C ratio analysis aims to determine whether farming is profitable or not (Soekartawi, 2011). The greater the value of the R/C ratio, the more profitable farming is to be carried out by farmers.

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The mean comparison test was done by the U Mann-Whitney test. The U Mann-Whitney test is an alternative to the t-test. The U test does not require assumptions of normal distribution and homogeneity of variance. The U test in its application, tests the hypothesis regarding the medians of two independent populations by ranking them. The hypothesis for the U Mann-Whitney test is:

$H0: \mu_1 = \mu_2$

$H1: \mu_1 \neq \mu_2$

The income variables for oil palm farming on mineral land (1) are different from those on peat land (2). The decision rule is if $|z| > z\alpha$ then reject H0 at the level α 0.05.

RESULTS AND DISCUSSION

Farm performance provides an overview of oil palm farming carried out by independent farmers who cultivated on mineral land (1,344 farmers) and on peat land (234 farmers). Farmers on mineral land had less cultivated area than farmers on peat land but they had higher yields (Table 1). The use of various production inputs in these two fields was not the same, therefore the resulting production will also be affected. The average yield of FFB on mineral land and peat land had a difference of 2.3 tons/ha/year, where the yield of palm oil on mineral land was 13.67± 8.17 tons FFB/ha/year and on peat land was 11.34 ± 8.33 tons FFB/ha/year. The yields were in the range of oil palm yields of independent smallholders as reported by (Euler et al., 2016) which was 12.7 ± 8.4 tons FFB/ha at Jambi Province and (Zendrato et al., 2022) in Dumai, where the yield of oil palm on mineral land at 16.18±2.21 tons/ha and on peat land at 12.04±0.48 tons/ha.

This difference was quite large because the age of oil palms on mineral land and peat land was still in the period of peak oil production, years 8 -16 after plantation establishment (Euler et al., 2016). The yield values of the two types of land were lower than potential oil palm yields average annual production between years 3-25 after plantation establishment which reached 25 tons/ha (Sutarta & Rahutomo, 2013). The results show that it was possible to cultivate oil palm on peat land. Ritung & Sukarman (2016) said that the key criteria for peatland suitability are peat land characteristics, plant growth requirements, and management associated with the use of appropriate and applicable technology.

Table 1 : Performances of Independent Oil Palm Farming in Jambi Provinces in 2013

No	Characteristics	Peat Land	Mineral Land	|t|-test
1	Area cultivated (Ha)	3.82	2.09	2.54 **
2	Age of oil palms (years)	8.66	10.84	6.31 ***
3	Yield of FFB (tons/ha)	11.34	13.67	4.10 ***
4	Chemical fertilizer used (kg/ha)	398.56	532.77	2.41 **
	- Urea	114.67	161.39	3.09 ***
	- SP36	61.33	112.99	2.85 ***
	- ZA	37.28	15.70	2.33 **
	- KCl	53.98	90.13	2.59 ***
	- NPK	131.30	152.56	1.10
5	Organic fertilizer used (kg/ha)	52.47	225.09	3.80 ***
6	Pesticides used (L/ha)	4.71	5.67	1.34
7	Labor (Man Day/ ha)	122.44	123.51	0.08

Independent samples t-test: *** significantat 1%level, ** significant 5% level

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Concerning agronomic management practices, farmers on mineral land apply significantly more chemical fertilizer (Except NPK not significant) and organic fertilizer. Although they also invested more labor and used more pesticides, it was not significant, no differences of pesticides and labor used between independent farmers on mineral land and peat land.

Research by Euler et al. (2016) found fertilizer use by independent oil palm smallholders in Jambi was 306 kg/ha and herbicide use 5.9 liter/ha. It was different from Zendrato et al. (2022) result, which found fertilizer use by farmers on mineral land 366 kg/ ha and 377 kg/ha on peat land, and herbicide use at 12.1 l/ha on mineral land and 11.6. l/ ha on peat land. The fertilizer use by both farmers was lower than the Good Agricultural Practices (GAP) recommendation. Implementation of GAP by independent smallholders was limited (Jelsma et al., 2019), whereas GAP has a positive and direct significant effect on farm performances of peat land oil palm farmers (Awang et al., 2021).

The differences in yields and management practices were also looked the same in oil palm smallholder' economic performances. Table 2 compares the mean values of revenues, input cost, and income between farmers on peat land and mineral land. The revenues of oil palm smallholders on mineral land were significantly higher due to higher yields. A similar result has been reported by Zendrato et al. (2022).

Table 2. Average Value of Production and Cost of Production per hectare of oil palm smallholder by type of land in Jambi Province in 2013

No	Descrption	Peat Land		Mineral Land	
		Values IDR(000)	*PC	Values IDR(000)	*PC
1	Revenue (Value of Production)	14,264		19,133	
2	Total Cost	10,939		13,342	
	Seed	91	0.84	139	1.04
	Chemical fertilizers	1,430	13.08	2,129	15.96
	Organic fertilizers	35	0.32	127	0.96
	Wages	5,234	47.85	5,324	39.90
	Pesticides	259	2.37	258	1.93
	Other expenditure	3,889		5,365	
	- Estimated rent of land	2,814	25.73	3,492	26.17
	- Cultivation tools	245	2.24	313	2.34
	- Transportation cost	211	1.93	319	2.39
	- Fuels	180	1.65	352	2.63
	- Others	438	4.00	890	6.67
3	Income	3,325		5,790	
4	R/C Ratio	1.82		2.00	

Source: The 2014 Estate Cultivation Household Survey, BPS (Processed data)
* PC: The Percentage of cost to total expenditure

From Table 1. the average yield of oil palm smallholders on mineral land was 13.67 tons FFB/ha, higher than the average yield on peat land 11.34 tons FFB/ha. The average

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price of FFB per kilogram received by independent smallholders on mineral land was IDR 1,380 meanwhile by independent smallholders on peat land was IDR 1,274. So, revenues earned by independent smallholder on mineral land was greater than those on peat land.

Judging from the total cost, independent smallholders on mineral land spent more money than those on peat land. The components for labor wages, land, and chemical fertilizers were the largest portions that must be spent by farmers, both of them (Table 2). The components of labor wages for independent smallholders on peat land was 47,85% of the total cost, while those on mineral land reached 39,9%. The results from (Zendrato et al., 2022) and (Patra et al., 2019) showed that labor wages were the highest component that expended by farmers. The high percentage of the labor wages cost compared to other capital showed that the oil palm industry is a labor-intensive industry (PASPI, 2022).

The average income per hectare of oil palm smallholders on mineral land was higher than those on peat land, where the difference at IDR 2,465,000. The economic performance of independent smallholders on mineral land was still better than those on peat land. This was indicated by the R/C ratio, where the R/C ratio of independent smallholders on mineral land was 2,00 and on peat land 1,82. Figures 2,00 mean an expenditure of IDR 1,00 will generate revenue of IDR 2,00.

Table-3: Hypotheses Test Results

No	Hypotheses for	z statistics	Prob > |z|	Decision
1	Revenues	6.914	0.0000	Reject H0
2	Cost	4.079	0.0000	Reject H0
3	Income	4.517	0.0000	Reject H0
4	R/C Ratio	1.874	0.0609	Accept H0

The U test was conducted to know the difference in average revenues, cost, income, and R/C ratio between independent smallholders on mineral land and peat land (Table 3). The |z| values for three variables (revenues, cost, and income) were greater than the critical values, and the |z| value of the R/C ratio was lower than the critical values. It can be concluded that there were significant differences in average revenues, cost, and income between independent smallholders on mineral land and those on peat land. The relatively high difference in oil palm smallholder income by typology of land showed the importance of land suitability for oil palm cultivation.

It was no significant differences between the R/C ratio of independent smallholder on mineral land with those on peat land. The results show that oil palm farming on mineral land and peat land, both are profitable to work on.

CONCLUSION

The mean of production FFB values, total cost, and income of independent oil palm smallholders on mineral land were greater than those on peat land. The costs incurred for labor wages, land, and chemical fertilizers were the largest component that must be spent by farmers, both farmers on mineral land and peat land. There was a difference in income

between independent smallholders on mineral land and peat land, but no difference in R/C values, for both of them.

The result shows that economically the use of peat land was still profitable. Peatlands that have been managed as oil palm plantations should be managed well by conservation principles to achieve high production and maintain environmental sustainability. The farmers who cultivate oil palm in peat land should have guidance to operate their farming based on GAP and adopt ecologically friendly practices in sustainability peat land.

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