Name	Counterpart	Title
Mirawati Yanita	**C01**	Economic production model of independent smallholder oil palm cultivation in Batanghari Regency

Background and Objectives

Oil palm is the most important commercial crop worldwide (Byerlee, 2017; Qaim *et al.*, 2020). Many agricultural and nonagricultural households in the tropics depend on oil palm cultivation and employment for their livelihoods. Oil palm has significantly improved rural poverty and malnutrition (Qaim *et al.*, 2020). The introduction of oil palm allowed these rural households to have a good income independent of the seasons. The many benefits of palm oil make the demand for palm oil to increase. Therefore, efforts to increase oil palm production are continuing to increase the area under cultivation. Thus, oil palm cultivation is developing quite rapidly, and oil palm production is continuously increasing yearly. The development of oil palm production also extends to the island of Sumatra, especially Jambi Province. The development of oil palm in Jambi Province has continued to increase over the past five years (2014–2018) with an average growth of 3.78 % per year and an average growth of oil palm production of 4.17 %. As a result, oil palm plantations are one of the leading plantation sectors in the Batanghari Regency. Muara Tembesi District has the lowest productivity among other districts, 3.06 tons/ha (Plantation Division, 2018) It is believed that the low productivity due to the influence of production factors used by farmers. Therefore, this study aims to: 1) Know the description of independent Oil Palm cultivation in Muara Tembesi District, Batanghari Regency 2) Analyze the effect of production factors (land area, number of stems, plant age, fertilizers, herbicides, and labor) on production yields.

Methods

The number of research samples obtained is 54 people with a proportional distribution of 23 people in Jebak Village, 20 in Ampelu villages, and 11 in Ampelu Mudo villages (Picture 1). The method of data analysis used is descriptive and quantitative. The picture of independent smallholders farmers cultivate oil palm in Muara Tembesi Subdistrict is explained descriptively. Quantitative analysis is used to analyze the influence of palm oil production factors. Regression analysis is used to predict causal relationships between independent and dependent variables. Furthermore, regression analysis can be used to build a model of production functions that can be mathematically described: Where: Y is Palm oil production (Kg/Year), A is Constanta, X_1 is Land Area (Ha/Year), X_2 = Number of Plant (stems). Next, X_3 is Age of the Plant (Year), X_4 is fertilizer (Kg/Year), X_5 is Herbicides (Liter/Year), X_6 is Manpower (HOK/Year), $b_1 \ldots b_6$ = Variable regression coefficient X_1-X_6, and e is an error term (2,71828). To examine whether the factors of production used simultaneously affect oil palm production, an F- test and a partial test using the T-test are used.

Picture 1a-c. Overview of Palm Oil Cultivation in Research Areas (a), and Interview process (b and c)

Results and Conclusion

The respondents in this study were smallholders farmers who worked on oil palm cultivation in Jebak Village, Ampelu, and Ampelu Mudo Muara Tembesi Subdistrict, with a sample size of 54 farmers. The identity of the farmers interviewed is described in table 1.

The implementation of the mature crop in the research area is carried out in several stages, ranging from maintenance, fertilization, spraying and harvesting. The first stage of soil maintenance consist of cleaning the plates and gates. Farmers routinely perform this maintenance activity at least once a month. Next, farmers must perform fertilization activities. This activity is usually performed 1-3 times a year, with urea fertilizer oftenly used by farmers. Spraying or administering herbicides, including activities that farmers rarely do, is usually done only 1-2 times per year. Finally, harvesting activity includes fruit harvesting, fruit transportation, and pruning (cutting). Smallholders usually harvest within 14-20 days, depending on the condition of the fruit.

Analysis using factors of production to determine the extent of the influence of the use of factors of production can be seen in table 2.

Table 1. Average Identity of Oil Palm Smallholders in Research Area

No	Identity of smallholders	Amount/degree
1	Age of the Farmer (tear)	47
2	Level of Education)	Junior High School
3	Number of Family Members	5
4	Experience of cultivation (year)	19

Source: Primary data processed.

Table 2. Results of Estimated Production Function of Cobb-Douglas Oil Oil palm cultivation in Research Area

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_X1_Land	0.502649	0.203522	2.469752	0.0172
LN_X2_Number of Bars	-0.152788	0.177118	0.862634	0.3927
LN_X3_Age of plants	0.095015	0.030081	3.158636	0.0028
LN_X4_Fertilizer	0.112097	0.034057	3.291494	0.0019
LN_X5_Herbicides	0.087406	0.041618	2.100220	0.0411
LN_X6_ labor	0.466680	0.167341	2.788797	0.0076
C	7.350125	1.181233	6.222416	0.0000
R-squared	0.985835	Mean dependent var		10.56661
Adjusted R-squared	0.984026	S.D. dependent var		0.419677
S.E. of regression	0.053042	Akaike info criterion		-2.915060
Sum squared resid	0.132230	Schwarz criterion		-2.657229
Log likelihood	85.70661	Hannan-Quinn criter.		-2.815624
F-statistic	545.1634	Durbin-Watson stat		1.844974
Prob(F-statistic)	0.000000			

Source: Eviews 8, 2021

The simultaneous use of the production factors of land, age of crop, fertilizers, herbicides and labour has a real effect on oil palm production with an Adjusted R-squared value of 0.984026. While for the production factor of the number of stems simultaneously has no real effect on palm oil production. Partially, the production factor has a real effect on oil palm production with a sign of 10%. Therefore, oil palm smallholders in Muara Tembesi District are expected to pay more attention to the existing production factors to optimize their production. The local government is expected to provide incentives in the form of fertilizer subsidies to smallholder farmers by both the provincial government and the regency government to help farmers in conducting their oil palm cultivation activities and capital formation.

References

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