Proceeding of 2nd International Conference on Research and Development (ICORAD) 2022
Indonesia, November 05-06, 2022
ISSN:2828-4925
DOI: https://doi.org/10.47841/icorad.v1i2.33-
Page:110-115

EFFICIENCY OF USING PRODUCTION FACTORS IN SIAM ORANGES FARMING

Firna Varina[1], Sri Harimurti[2], Rusnani[3], Mirnaini[4], Muhamad Nasir[5]
[123]Universitas Graha Karya, Muara Bulian, Indonesia
[45]Alumni of STIP Graha Karya, Muara Bulian, Indonesia
Corresponding email: ***(firna.gani@gmail.com)***

Received: September, 11, 2022 Revised: October, 21, 2022 Accepted: November, 5, 2022

Abstract. This research's objective aims to determine the factors of production that influence siam oranges production and to analyze the efficiency of production factors on siam orange farming in Batang Hari Regency. The production factors in this research, were the productive trees, organic fertilizer, chemical fertilizers, pesticides, and labor. The research was conducted in Senaning Village, Pemayung District and Pompa Air Village, Bajubang District. The selection of location was purposive sampling and deliberately determined on the basis those villages were areas of siam oranges production in Batang Hari Regency. The functional form of production function was the Cobb-Douglas model and to see the level of efficiency of using production factors on siam oranges farming used allocative efficiency analysis. Based on the results of this study factors of organic fertilizers and labor, significantly affect siam oranges production. The use of factors production i.e., productive trees, organic fertilizer, and chemical fertilizers were relatively efficient but the pesticide and labor variable was not. There were productivity differences between siam orange in Senaning Village and Pompa Air Village. Government and societies should concern a suitable agroecological and skilled farmers to develop a new area production of siam oranges in Batang Hari Regency.

Keywords. Efficiency; Factors of Production; Siam Oranges

INTRODUCTION

Orange is one of the most requested fruits in Indonesia. In Indonesia, the majority planted oranges are siam oranges as much as 70%, tangerines 20%, and others 10% (Hanif, 2020). In addition to being generally liked by all levels of society, oranges also have economic value. This is in line with the research results of (Wanda, 2015), (Hutauruk et al., 2021), and (Mardalena et al., 2022) who analyzed the income from oranges farming had a Revenue per Cost ratio above 1 and the Net Present Values were positive.

The siam oranges have been developed since 2002 in Batang Hari Regency, Jambi Province and have reached a production of 1,270 tons in 2020 (BPS Kabupaten Batang Hari, 2022). The choice of this commodity as one of the leading commodities is based on strategic considerations such as the Batang Hari Regency area is located in the golden triangle of national trade, namely Jambi, Riau, and Batam. Besides that, Batang Hari Regency also has comparative advantages such as the availability and suitability of natural resources for the development of horticultural crops. Thus, siam oranges have good prospects and promise to be developed to increase the source of alternative income and welfare of farmers who they have been depending on rubber and oil palm plantations for their lives.

In the year 2009, the siam oranges areas were located in 4 villages at 4 districts, namely Muara Bulian Village, Muara Bulian District; Senaning Village, Pemayung District; Pompa Air Village, Bajubang District, and Bukit Harapan Village, Mersam District. All of siam orange farming in this area had received assistance from the government both production facilities and counseling. The first two areas were developed in watersheds while the last two were developed in relatively hilly areas. From the Agricultural Statistics data of Batang Hari

Proceeding of 2nd International Conference on Research and Development (ICORAD) 2022
Indonesia, November 05-06, 2022
ISSN:2828-4925
DOI: https://doi.org/10.47841/icorad.v1i2.33-
Page:110-115

Regency in 2015, it can be seen that the productivity between the two regions was relatively different where the average productivity in the watershed was 13.93 tons/ha while in the relatively higher area it was 12.12 tons/ha. Based on the Batang Hari Statistics in Figures 2022, siam oranges production fluctuated from 2015 to 2020. The success of siam oranges farming was still largely determined by natural factors, in addition to the availability of technology and supporting factors. The farmers must be able to make efficient use of production factors in their farming. Farming efficiency directly related to the production and income of farmers. Efficient farming will have a greater effect on farm income than farming which is less efficient in the use of production factors.

This study aims to determine the production factors that affect the production of siam oranges in Batang Hari Regency and analyze the level of efficiency of production factors used in siam orange farming.

METHOD

The research was carried out in the Pompa Air Village, Bajubang District and Senaning Village, Pemayung District. The location selection was purposive with the consideration that both villages were centers of siam oranges production in Batang Hari Regency.

To obtain information directly from farmers, 32 respondents were interviewed using a structured list of questions. Meanwhile, secondary data was obtained from the literature and related agencies in Batang Hari Regency.

The data collected was compiled in tabulation and then analyzed. To analyze the effect of various production factors on the production of siamese oranges, the Cobb-Douglas type production function was used. Assuming that f (Xi;β) takes the natural logarithmic form, then the production function is as follows:

$$\text{Ln } Y = \beta_0 + \beta_1 \ln X1 + \beta_2 \ln X2 + \beta_3 \ln X3 + \beta_4 \ln X4 + \beta_5 \ln X5 + \varepsilon$$

where Y is siam oranges production by the farmer (kg), X1 is productive trees (hectares), X2 is organic fertilizer/ manure (kg), X3 is chemical fertilizer (kg), X4 is pesticides (L) and X5 is labor (man-day). The estimator model was calculate using the Ordinary *Least Square method.*

To measure the efficiency of using production factors was an allocative efficiency approach. According to (Soekartawi, 2003), the efficiency of the use of production factors can occur if the value of the marginal product (VMP) is the same as the production factor price, so the following three measurement criteria are used:

VMPxi /Pxi = 1 : The factor production of Xi is efficient
VMPxi /Pxi <1 : The factor production of Xi is inefficient
VMPxi /Pxi > 1 : The factor production of Xi is not efficient.

The value of the statistical t for efficient hypothesis testing is determined based on the following formula (Semaoen, 1992):

$$t_s = \frac{\beta_i \frac{Y}{X_i}\frac{P_y}{P_x} - 1}{\frac{Y}{X_i}\frac{P_y}{P_x} Se(\beta_i)}$$

Proceeding of 2nd International Conference on Research and Development (ICORAD) 2022
Indonesia, November 05-06, 2022
ISSN:2828-4925
DOI: https://doi.org/10.47841/icorad.v1i2.33-
Page:110-115

To find out whether there is a difference in the productivity of siam oranges in the Two villages, the mean-comparison test is used.

RESULTS AND DISCUSSION

Model Estimation

The main problem of regression analysis using the OLS method is the violation of one or more of the classical assumptions. The four assumptions detected in this study were normality, autocorrelation, multicollinearity, and heteroscedasticity. To test these assumptions, we used Shapiro-Wilk, W test for normal data; Durbin-Watson test for autocorrelation, Variance Inflation Factors (VIF) approach for multicollinearity; and Breusch-Pagan/ Cook-Weisberg test for heteroskedasticity.

From the computer printout, the model showed normality data, no autocorrelation, no multicollinearity, and the residual has a homogeneous variance. Thus it can be concluded that the model is feasible to use. Based on the results of the regression analysis, a model of the Cobb-Douglas equation is obtained as follows:

$$Y=1.262X1^{0.084}X2^{0.290}X3^{0.044}X4^{0.003}X5^{0.676}$$

Production Function Analysis

In the previous section, it was mentioned that the model for the production of siam oranges as the dependent variable was limited to several production factors as independent variables, namely productive trees, organic fertilizers, chemical fertilizers, pesticides, and labor. These production factors were determined to affect the production of siam oranges at the level of 5 percent. In Table 1. the statistical performance of the estimation results of the Cobb-Douglas type production function model was presented which describes the relationship between production factors and siam oranges production.

Table 1. Estimated Regression Coefficient of Cobb Douglas Production Function

Variables	Coefficient
Intercept	1.262
Productive trees	0.084
Organic fertilizer	0.290 **
Chemical fertilizers	0.044
Pesticides	0.003
Labor	0.676 ***

***p<0.01 **p<0.05

The results of the regression analysis showed a positive relationship between the independent variables with dependent variable. This means that an increase in production factor will increase siam oranges production, ceteris paribus. Calculated F value was greater than F table, indicates that simultaneously production factors have a significant effect on production. Furthermore, partially organic fertilizers and labor variables have a significant effect on production at the level α of five percent and one percent respectively, while the

Proceeding of 2nd International Conference on Research and Development (ICORAD) 2022
Indonesia, November 05-06, 2022
ISSN:2828-4925
DOI: https://doi.org/10.47841/icorad.v1i2.33-
Page:110-115

variables of productive trees, chemical fertilizers, and labor affect the level of more than 60 percent.

From various research results regarding the efficiency of oranges production, there were varying results among researchers. Adar (2011) stated that the production of soe oranges in the highlands was influenced by the number of trees, compost, and seeds. Hutauruk et al., (2021) mentioned the productive trees, labor, and fertilizers take the significant effect to the risk of oranges production. Meanwhile, Sugara et al., (2021) said that oranges production was influenced by land and labor. Apart from the observed independent variables, production differences are also due to natural factors and the technology used.

The sum of the regression coefficient is equivalent to the elasticity of production. From the value of the elasticity of production, the production function was said to be in the area of *increasing return to scale,* where the addition of one percent of production factors in a fixed proportion will increase the output greater than one percent (1,1%).

The efficiency of Using Factors of Production

Allocative efficiency reflects the relative ability of farmers to use inputs in optimal proportions at each input price level and certain technology to produce maximum output and profit. The results of the allocative efficiency as follows:

Table 2. Efficiency Level of Production Factors Used

Production Factors	VMP	VMP/P_X	t value	Category
Productive trees,	4,885	0.65	0.72	Efficient
Organic fertilizer,	697	1.41	0.98	Efficient
Chemical fertilizers,	5,018	1.26	1.15	Efficient
Pesticides,	7,755	0.04	2.39	Not efficient
Labor	93,122	3.10	3.98	Not Efficient

The calculation results showed the ratio of the value of the marginal product of productive trees to its marginal cost of 0.65, and statistically not significant at the level of 5 percent so it can be said that partially the productive trees were already efficient. In other words, the average additional value of the productive trees used was relatively equal to the cost of production. The efficiency of productive trees does not mean that farmers cannot expand their farming. To carry out their farming, of course, they must have support from themselves in the form of capital and labor as well as from the government.

For organic fertilizer, chemical fertilizers, and labor variables, showed that the ratio of VMP and marginal cost was greater than one, respectively 1.41, 1.26. If further tested, it can be said that partially the use of each of these production factors has been efficient. From the research, the average of use organic fertilizer and chemical fertilizers were 19 kg and 1 kg per tree per year, respectively. These figures are almost in line with the recommendation for fertilization of siam oranges per tree per year as much as 20-40 kg for organic fertilizers and 2% of harvest weight for chemical fertilizers (Sutopo, 2009).

For pesticides and labor variables, the ratio between the value of the marginal product and marginal cost is significantly different with 1 at the level of 5 percent. These results indicate that the use of pesticide and labor were not efficient. The amount of pesticide usage

ISSN:2828-4925
DOI: https://doi.org/10.47841/icorad.v1i2.33-
Page:110-115

should be reduced and partially; the addition of labor will provide additional value to production that is greater than the additional production costs.

In general, from the description above, it can be seen that the use of production factors in study areas has been efficient. This is because in carrying out cultivation, farmers have followed the instructions for the use of production factors as recommended by the relevant government office.

Productivity Average Difference Test

To see whether the average productivity of siam oranges farming in Senaning Village was the same as that of Pompa Air Village, a variance ratio test was conducted. The result showed Pr(F<f) = 0.0353, which means the Two samples did not have the same variance. It was followed by the t-test, t-statistical value was 4.6967. It can be concluded that there was a difference in the average productivity of oranges between Senaning Village and Pompa Air village. The data showed, the average productivity of siam oranges in Senaning Village was 12.2 kg/trees/year, meanwhile in Bajubang Village was 6.2 kg/ trees/ year.

This is presumably because Senaning village, which is located in a watershed area has a soil structure that contains humus which is beneficial for crops compared to Pompa Air Village, which is located in a hilly area. Adar's research (2011) found that the production of soe oranges on the highland was different from the production on the lowlands.

CONCLUSION

The production factors that have a significant effect on the production of siam oranges were organic fertilizers and labor. The productive trees, organic fertilizer, and chemical fertilizers were relatively efficient while the use of pesticides and labor were not efficient. There was a difference in average productivity of siam oranges between Senaning Village and Pompa Air village.

The governments and societies had to do various efforts to increase the production of siam oranges with intensification and extensification. However, a suitable agroecological and skilled farmers are needed in the development of oranges farming, as an alternative promising income source in the future.

REFERENCES

Adar, D. (2011). *Keragaan usahatani dan efisiensi produksi jeruk keprok soe berdasarkan zona agroklimat di provinsi Nusa Tenggara Timur*. Institut Pertanian Bogor.

BPS Kabupaten Batang Hari. (2022). *Kabupaten Batang Hari Dalam Angka 2022: Vol. 1102001.15*. BPS Kabupaten Kerinci.

Hanif, Z. (2020). Pengembangan Agribisnis Jeruk Nusantara. *Iptek Hortikultura*, *November*, 27–30.

Hutauruk, J., Sihaloho, H., & Sitohang, M. (2021). Analisis Pendapatan dan Risiko Usahatani Jeruk Petani Jeruk di Desa Barusjulu, Kecamatan Barusjahe, Kabupaten Karo. *Jurnal Agriust*, *2*(1), 17–23.

Mardalena, R., Yusmini, Y., & Edwina, S. (2022). Analisis Kelayakan Finansial Usahatani Jeruk Siam (Citrus nobilis Lour.) Pada Usaha Yakin Maju Desa Pulau Jambu Kecamatan Kuok Kabupaten Kampar. *Jurnal Sosial Ekonomi Pertanian*, *18*(1), 67–78. https://doi.org/10.20956/jsep.v18i1.19133

Semaoen, I. (1992). *Ekonomi Produksi Pertanian : Teori dan Aplikasi*. Ikatan Sarjana Ekonomi

ISSN:2828-4925
DOI: https://doi.org/10.47841/icorad.v1i2.33-
Page:110-115

Indonesia.

Soekartawi. (2003). Teori Ekonomi Produksi dengan Pokok Bahasan Analisis Fungsi Cobb-Douglas. In *Edisi Revisi cetakan ketiga: Vol. PT Raja Gr*. PT Raja Grafindo Persada.

Sugara, A., Kurniati, D., & Suharyani, A. (2021). Efisiensi Alokatif Usahatani Jeruk Siam di Kabupaten Sambas. *Jurnal Galung Tropika*, *10*(2), 156–164.

Sutopo. (2009). *Rekomendasi Pemupukan untuk Tanaman Jeruk*. http://balitjestro.litbang.pertanian.go.id/rekomendasi-pemupukan-untuk-tanaman-jeruk/

Wanda, F. F. A. (2015). Analisis Pendapatan Usaha Tani Jeruk Siam (Studi Kasus di Desa Padang Pangrapat Kecamatan Tanah Grogot Kabupaten Paser). *Ilmu Administrsi Bisnis*, *3*(3), 600–611.