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Analysis of Production Factors that Influence the Production of Red Chili Farming in Taraju District, Tasikmalaya Regency

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A R T I C L E I N F O

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A B S T R A C T

This aims to analyze the factors used in red chili farming activities and the factors that influence red chili production in Banyuasih Village, Taraju District, Tasikmalaya Regency. Research method with a survey approach. The research was conducted in Banyuasih Village, Taraju District, Tasikmalaya Regency—location determination technique using purposive sampling. The essential consideration is that this location is a red chili center. The data used are primary and secondary. The population in this study were sizeable red chili farmers in Banyuasih Village, totaling 210 farmers and members of 6 farmer groups. So that the determination of respondents or research samples is carried out using proportional random sampling. The analytical method used to determine the influence of production factors on production uses a regression equation with the Cobb-Douglas function model and classical assumption testing with Eviews software. Overall (simultaneously) production factor variables: seeds (X1), land area (X2), labor (X3), Urea (X4), Phonska (X5), compost (X6), KCL Fertilizer (X7), Manure (X8), Insecticide (X9), Herbicide (X10), Fungicide (X11), Dolomite (X12) simultaneously influence red chili production at a 95% confidence level. According to the results of the t-test analysis, the variables that had a significant effect were seeds, labor, and phosca. Meanwhile, the variables of land area, compost, KCl fertilizer, urea fertilizer, manure, insecticides, herbicides, fungicides, and dolomite had no significant effect on red chili production.

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INTRODUCTION

The agricultural sector is a sector that drives the economy in Indonesia; the people generally work as farmers because they are rich in natural conditions that encourage national economic development, one of which is being able to produce quality agricultural products that are known as an agricultural country (Manggala & Boedi, 2018). Agricultural products have an essential role in the Indonesian economy, namely providing employment opportunities, providing a variety of food menus, reducing poverty rates, and as a foreign exchange earner for the country (Siswanto et al., 2020). One of the agricultural subsectors that has an important role is the horticultural crops subsector (Deviani et al., 2019).

Horticulture is one of the plants used as food, which is essential for society's needs, so its production needs to be increased to meet national needs. The level of consumption of horticultural products continues to grow in line with population growth, increased income, and public knowledge of nutrition and health.(Andayani, 2018). Red chili is a horticultural plant often used as a complementary ingredient in cooking spices and makes chili plants one of the main crops. Therefore, the demand for chilies can only be met during the year, so demand continues to increase (Fadlan et al., 2019).

Tasikmalaya Regency is one of the regions that contributes to red chili production in West Java, and West Java contributes 25,21% to the total national chili production (Pusdatin, 2021). So red chilies have become one of the leading commodities in Tasikmalaya Regency, especially in Taraju District, one of the red chili centers. Banyuasih Village is the village that produces the most superior chilies compared to other villages. In 2020, Banyuasih Village had an area of 20 ha of chili agricultural land and a production of 234,000 kg (Taraju et al. Center, 2021). However, red chili production experiences fluctuations in production, so optimization is needed in farming activities, which is supported by the region's potential for development as a superior commodity. Because it has high productivity and selling value, it contributes significantly to the people's economy in Tasikmalaya Regency. In order to develop red chilies as a superior commodity, studies are needed. So, this study aims to analyze the factors used in red chili farming activities and the factors that influence red chili production in Banyuasih Village, Taraju District, Tasikmalaya Regency.

THEORETICAL REVIEW

In production or farming activities, various production variables are needed, such as labor, capital, land, and agricultural management, which are required in the agricultural production process. Workers, both from within and outside the family, constitute the workforce. Capital is sometimes characterized as all commodities and services purchased as medicines, seeds, agricultural equipment, and other goods. The nutrients in the soil determine the fertility of a type of soil. Therefore, soil production variables are essential in the agricultural production process. Agrarian management, which coordinates other production variables to produce output effectively, is a production factor that is no less important in agricultural production (Tohir, 1991).

The production Function is the relationship between production factors and the level of production they create. Production activities aim to maximize the number of variables explained (output) with a certain number of variables that explain (input) (Mahendra, 2014). Fixed input factors consist of machines and equipment, while variable input factors consist of raw materials and labor.
The relationship between variables Y and X can be resolved using regression where the variation of X will influence the variation of Y. Thus, the rules for the regression line also apply to the Cobb-Douglas function. These exponential production functions can differ from each other depending on the characteristics of the existing data. Still, in general, this exponential production function is written in equation (1) as follows: $Y = aX^b$ (Sriwana, 2019)

METHODOLOGY

Research method with a survey approach. The survey method is a quantitative research method used to obtain data that occurred in the past or currently about beliefs, opinions, characteristics, behavior, and variable relationships and to test several hypotheses about sociological and psychological variables from the sample.(Sugiyono, 2019).

The research was conducted in Banyuasih Village, Taraju District, Tasikmalaya Regency—location determination technique using purposive sampling. The essential consideration is that this location is a red chili center. The data used are primary and secondary. The direct data collection technique uses interviews with respondents. Meanwhile, secondary data was obtained from related agencies, including BPS, Agriculture Service, and BPP.

The population in this study were sizeable red chili farmers in Banyuasih Village, totaling 210 farmers and members of 6 farmer groups. So that the determination of respondents or research samples is carried out using proportional random sampling. The random sampling system is a technique for obtaining samples directly at the sampling unit. Determining the number of samples or respondents used the Slovin formula, with a standard error of 15 percent, so the number of respondents was determined at 37 people. The Slovin method is a method for calculating the minimum number of samples if a sample is not known for sure.

The analytical method used to determine the influence of production factors on production uses a regression equation with the Cobb-Douglas function model and classical assumption testing with Eviews software. Considerations: The Cobb-Douglas function model is commonly used in agricultural economics research because it is practical and easy to transform into a linear form (Soekartawi, 2004). The structure of the Cobb-Douglas production function is as follows:

$$Y = a\, X1^{b1}\, X2^{b2}\, X3^{b3} \ldots Xn^{bn}\, e\, u$$

If the model is transformed into linear form, then the mathematical formulation will take the form:

$$\text{Log } Y = \text{Log } a + b1\text{Log}X1 + b2\text{Log}X2 + b3\text{Log } X3 + b4\text{Log}X4 + \ldots\ldots\ldots\ldots \ldots\ldots\ldots\ldots\ldots\ldots + b12\text{Log}X12 + e$$

Where: Y :
Y Chili production (kg)
X1: Number of seeds (kg)
X2: land area (ha)
X3: Number of workers (HOK)
X4: Urea Fertilizer (kg)
X5: Phonska Fertilizer (kg)
X6: Compost (kg)
X7: KCl Fertilizer (kg)
X8: Manure (kg)
X9: Insecticide (lt)
X10: Herbicide (lt)
X11: Fungicide (lt)
X12: Dolomite (kg)
ε: error

The equation that has been obtained is continued with statistical tests consisting of the coefficient of determination test, simultaneous F test, and partial T-test. The accuracy of the equation model is measured by the coefficient of multiple determination (R2). In research or observation, it is necessary to see how far the model formed can explain the actual conditions. The formula used is:

$$R2 \quad = \frac{regression\ sum\ of\ squares}{The\ sum\ of\ total\ squares}$$

If the coefficient of determination is closer to 1, the better the model because other variables outside the model explain the less diversity in the dependent variable.

The F test determines the influence of input production on production simultaneously or together. The formula used is:

$$\mathrm{F} = \frac{mean\ squares\ regression}{remaining\ middle\ square}$$

The t-test shows how much influence one production factor can individually explain production variations.

RESULTS

Factors that influence red chili production include seeds (X1), land area (X2), labor (X3), Urea (X4), Phonska (X5), compost (X6), KCL Fertilizer (X7), Manure (X8), Insecticide (X9), Herbicide (X10), Fungicide (X11), Dolomite (X12) on red chili production (Y). The results of multiple linear regression analysis can be seen in Table 1.

Table 1. The Results of Multiple Linier Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.800665	2.089441	0.861793	0.3973
Seed	0.857176	0.211799	4.047123	0.0005
LAND AREA	0.176461	0.105805	1.667797	0.1084
LABOR	0.995035	0.471945	2.108371	0.0456
UREA	0.070713	0.050715	1.394323	0.1760
PHONSKA	0.101178	0.043348	2.334102	0.0283
KOMPOS	-0.069794	0.037524	-1.859978	0.0752
KCL	0.009932	0.103637	0.095831	0.9245
MANURE	0.054033	0.061831	0.873880	0.3908
Insecticide	0.146064	0.128860	1.133516	0.2682
Herbicide	-0.142276	0.240805	-0.590834	0.5602
Fungicide	-0.136113	0.135838	-1.002027	0.3263
DOLOMIT	-0.006440	0.078377	-0.082172	0.9352

R-squared	0.902747	Mean dependent var	8.028730
Adjusted R-squared	0.854120	S.D. dependent var	1.118255
S.E. of regression	0.427110	Akaike info criterion	1.406286
Sum squared resid	4.378141	Schwarz criterion	1.972284
Log likelihood	-13.01629	Hannan-Quinn criter.	1.605827
F-statistic	18.56481	Durbin-Watson stat	2.222253
Prob(F-statistic)	0.000000		

DISCUSSION

Based on the results of the F test analysis, the calculated F value is 18.56 and the significant value is 0.000** the significance value is smaller than 0.05 (α = 5%), thus the use of seed production factors (X1), land area (X2), labor (X3), Urea (X4), Phonska (X5), compost (X6), KCL Fertilizer (X7), Manure (X8), Insecticide (X9), Herbicide (X10), Fungicide (X11), Dolomite (X12) simultaneously influences red chili production at a 95% confidence level.

This research's coefficient of determination test (R2) was 0.902 or 90.2%. This figure shows that the ability of the independent variable to provide information to explain the diversity of the dependent variable is relatively high. These results can be concluded that the independent variable has an influence of 90.2 percent on the increase or decrease in red chili production, and other factors outside the model explain the remaining 9.8 percent. The coefficient of determination test shows how well the independent variables explain the results (multiple correlation coefficient). The R-value range is 0 to 1 (one). The closer the R-value is to 1 (one), the stronger the independent variables predict the dependent variable.

Regression Coefficient Analysis (t-Test)

In the regression equation of a study, the coefficient value for each independent variable (seed, land area, labor, Phonska, compost, KCL Fertilizer, Manure, Insecticide, Herbicide, Fungicide, and Dolomite must be tested one by one. This test aims to determine which independent variables significantly influence the dependent variable, namely production.

Based on the results of the t-test analysis, it can be seen that the significant value of the seed, labor, and phonska factors has a value smaller than 0.05 (α = 5%); thus, partially, the seed, work, and phonska factors, respectively significant effect on red chili production. Meanwhile, the variables of land area, compost, KCl fertilizer, urea fertilizer, manure, insecticides, herbicides, fungicides, and dolomite have no significant effect on red chili production.

a) Seed (X2)

The seed variable (X2) significantly affects spinach production with a calculated t value of 4.047, which is greater than the 5 percent table of 2.024. The seed regression coefficient (X2) value of 0.857 indicates that each additional 1 (one) percent of the number of seeds will increase production by 0.857 percent, assuming other variables are considered constant. The greater the number of seeds used, the higher the production. However, this condition must be adjusted to the existing land conditions and the farming inputs. The regression coefficient also describes the production elasticity value (Ep), so the seed production elasticity value (X2) is 0.857.

b) Land Area (X2)

The land area variable (X2) has an insignificant effect on red chili production with a t-count of 1.67, which is smaller than the 5 percent t table of 2.024. The land area variable has no significant effect because the chili planting area in the research location is relatively small. The Land Area Regression coefficient value (X1) is 0.176, meaning that every additional 1 (one) percent of the land area will increase production by 0.176 percent, assuming other variables are considered constant. The regression coefficient on the production factor of land area also describes the production elasticity (Ep) so that the production elasticity value of land area (X1) is 0.176.

c) Labor (X3)

The labor variable (X5) significantly affects red chili production with a calculated t-value of 2.108. This value is greater than the t-table value of 5 percent, 2.024. The regression coefficient value of labor (X) is 0.995. This means that for every 1 (one) percent increase in the number of workers, production can increase by 0.995 percent, assuming other variables are considered constant. The greater the number of workers used, the higher the production. The regression coefficient also describes the production elasticity value (Ep), so the labor production elasticity value (X3) is 0.995.

d) Urea Fertilizer (X4)

The urea fertilizer variable (X4) has no significant effect on production with a calculated t value of 1.39. This value is smaller than the t table of 5 percent, namely 2.024. The urea fertilizer variable has no significant effect, presumably because the use of urea fertilizer is less than optimal, while urea fertilizer is a hygroscopic fertilizer (easily attracts water vapor); besides that, urea fertilizer can burn plants. So, urea fertilizer is used sparingly. This result is reinforced by Santana's research, which showed that using inorganic fertilizer does not affect increasing production (Saptana et al., 2011). The regression coefficient value for urea fertilizer (X4) is 0.07, which means that every addition of 1 (one) percent of urea fertilizer can increase production by 0.07 percent, assuming other variables are considered constant. The regression coefficient is also the value of Production Elasticity (Ep), so the elasticity value of urea fertilizer production (X4) is 0.07.

e) Phonska Fertilizer (X5)

The Fonseka fertilizer variable (X5) significantly affects production with a calculated t of 2.33. This value is smaller than the 5 percent t table value of 2.024. so phoska fertilizer has no significant effect on red chili production. The regression coefficient value for Phonska fertilizer (X5) is 0.1. This value means that every addition of 1 (one) percent of Phonska fertilizer will increase production by 0.1 percent, assuming other variables are considered constant. The regression coefficient is also the Production Elasticity value (Ep), so the production elasticity value of Phonska fertilizer (X3) is 0.1.

f).Compost Fertilizer (X6)

The manure variable (X6) has no significant effect on production. This is because the calculated t value (1.87) is smaller than the t table value of 5 percent, namely 2.024. The compost fertilizer variable has no significant effect on red chili production because the use of compost fertilizer is less than optimal. However, the regression coefficient for manure (X4) is -0.166, which means that every addition of 1 (one) percent of waste can reduce production by 0.166 percent, assuming other variables are considered constant. The regression coefficient is also the production elasticity value, so the manure production elasticity value (X4) is 0.16

g) KCl Fertilizer (X7)

The KCl fertilizer variable (X7) has no significant effect on production with a calculated t value of 0.09. This value is smaller than the 5 percent t table of 2.024. The KCl fertilizer variable has no significant effect, presumably because the use of KCl fertilizer is less than optimal because the main element in KCl fertilizer is potassium. The potassium element in fertilizing chili plants has essential nutrients for growth and development. Potassium chloride contains potassium that is easy for roots to absorb to maintain water balance in plant cells, activate enzymes, and increase the quality and quantity of chilies. This is the following research results (Sevy Virgundari, 2013).

The regression coefficient value for KCl fertilizer (X7) is 0.01, which means the tendency is that every addition of 1 (one) percent of urea fertilizer will increase production by 0.01 percent, assuming other variables are considered constant. The regression coefficient is also the Production Elasticity value (Ep), so the production elasticity value of KCl fertilizer (X4) is 0.01.

h) Manure (X8)

The manure variable (X8) has no significant effect on production with a calculated t of 0.83, which is smaller than the 5 percent t table of 2,030. The manure variable has no significant impact on chili production because the use of manure is less than optimal. However, the regression coefficient for waste (X8) is 0.05, which means that every addition of 1 (one) percent of manure will increase production by 0.05 percent, assuming other variables are considered constant. The regression coefficient is also the production elasticity value so that the elasticity value of manure production (X8) is 0.05

i) Insecticide (X9)

The insecticide variable (X9) has no significant effect on production with a calculated t value of 1.13. This value is smaller than the T table value (5 percent) of 2.024. The insecticide variable has no significant effect on chili production because insecticide use is less than optimal. This condition is due to using insecticides only when pest attacks occur. However, the insecticide regression coefficient (X9) is 0.15, meaning that every addition of 1 (one) percent of insecticide can increase red chili production by 0.15 percent, assuming other variables are constant. So, the more insecticides used, the more production will decrease. The regression coefficient is also the production elasticity value so that the insecticide production elasticity value (X9) is 1.13

j) Herbicide (X10)

The herbicide variable (X10) has an insignificant effect on production with a calculated t of 0.59, smaller than the 5 percent t table of 2.024. The insecticide variable has no significant impact on chili production because the use of herbicides is less than optimal. This condition is due to using insecticides only when pest attacks occur. However, the herbicide regression coefficient (X10) is -0.142, which means that every addition of 1 (one) percent of herbicide can reduce production by 0.142 percent, assuming other variables are considered constant. The regression coefficient is also the production elasticity value, so the herbicide production elasticity value (X10) is 0.142.

k) Fungicide (X11)

The fungicide variable (X11) has no significant effect on production with a calculated t of 1.00, which is smaller than the t table of 5 percent of 2.024. The insecticide variable has no significant impact on chili production because insecticide use is less than optimal. This condition is due to using fungicides only when pest attacks occur. The insecticide regression coefficient (X11) is -0.136, which means that every addition of 1 (one) percent of fungicide will reduce production by 0.136 percent, assuming other variables are considered constant. The regression coefficient is also the production elasticity value, so the insecticide production elasticity value (X9) is 1.13.

l) Dolomite (X12)

The Dolomite variable (X12) has no significant effect on production with a calculated t of 0.08, which is smaller than the t table of 5 percent of 2.024. The insecticide variable has no significant impact on chili production because insecticide use is less than optimal. This condition is due to using fungicides only when pest attacks occur. The dolomite regression coefficient (X12) is -0.01, which means that every addition of 1 (one) percent of dolomite will reduce production by 0.01 percent, assuming other variables are considered constant. So, the more use of dolomite, the more production will decrease. The regression coefficient is also the production elasticity value so that the dolomite production elasticity value (X12) is 0.01

CONCLUSIONS AND RECOMMENDATIONS

Overall (simultaneously) production factor variables: seeds (X1), land area (X2), labor (X3), Urea (X4), Phonska (X5), compost (X6), KCL Fertilizer (X7), Manure (X8), Insecticide (X9), Herbicide (X10), Fungicide (X11), Dolomite (X12) simultaneously influence red chili production at a 95% confidence level. According to the results of the t-test analysis, the variables that had a significant effect were seeds, labor, and phosca. Meanwhile, the variables of land area, compost, KCl fertilizer, urea fertilizer, manure, insecticides, herbicides, fungicides, and dolomite had no significant effect on red chili production.

Farmers are expected to be able to optimize the use of production factors (land area variables, compost, KCl fertilizer, urea fertilizer, manure, insecticides, herbicides, fungicides, and dolomite) to produce maximum production. Meanwhile, the Government in the agricultural sector can further improve strategies for developing and increasing red chili production.

FURTHER STUDY

Further research can be carried out to calculate allocative, economic, and price efficiency so that farming performance can be known more completely.

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