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Comparison of Preferences and Risk Levels of Shallot (*Allium ascallonicum L.*) Farming in the Highlands and Mediumlands

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ABSTRACT

Shallots are one of the horticultural commodities which are the same as other commodities. This study aims to find out the comparison of the level of business risk and farmers' preferences for risk in the highlands represented by Purworejo Village, Ngantang District, Malang Regency and in the medium plains represented by Tawangargo Village, Karangploso District, Malang Regency. This research was determined by purposive sampling using simple random sampling method using 66 samples of shallot farmers. Analysis of the data used is farming analysis, analysis of production factors of cobb-douglass, analysis of coefficient of variation (CV) and Likert scale. Based on the results of this study indicate that the production factors that significantly influence the shallot farming are seeds, NPK fertilizers, ZA fertilizers, and labor. While the level of risk of farming in the highlands, namely Purworejo Village, Ngantang District, Malang Regency, is lower than the level of risk in the Medium plains, namely Tawangargo Village, Karangploso District, Malang Regency. In addition, farmers' preferences for sources of risk in the highlands tend to be more daring to face risks, while the preferences of farmers in the lowlands are more neutral in facing risks.

Keywords: Risk, preference, shallot

1. INTRODUCTION

Shallots are one of the leading vegetable commodities that farmers have intensively cultivated for a long time. The need for shallots in Indonesia year to year for consumption has increased. In 2011-2015, the average growth of shallot harvested area was 7.16% per year, higher than the previous year. The average growth of shallot gathered area outside Java is higher than that of Java. Production development outside Java is also higher than in Java, namely 1.88% (Java) and 11.71% (Outside Java) (Pusdatin, 2016).

Malang Regency is one of the third largest shallot-producing districts in East Java. While the district with the most considerable contribution was still generated by Nganjuk Regency, which amounted to 38,051 tons, followed by Probolinggo Regency at 6,046 tons, then Malang Regency at 2,597 tons, and Kediri Regency at 1,162 tons (Kurnia Adhiwibowo & Annisa Ramadhanty, 2019). Two shallot production centers in Malang Regency are Purworejo Village, Ngantang Subdistrict, and Tawangargo Village, Karangploso Subdistrict, areas with extensive land tenure for shallots and two shallot production centers in Malang Regency.

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Purworejo Village, Ngantang District, has an altitude between 700 M above sea level, which causes the area to be classified as a Highland. In contrast, Tawanagrgo Village, Karangploso District, has an altitude between 500 M above sea level, which causes the area to be classified as a medium land.

Farmers are generally faced with various risks in their farming activities, ranging from production, cost, income, market, financial, and policy risks. This level of risk will affect farmers' decisions in determining the commodities to be cultivated (Mutisari, 2019). Lawalata (2017) added that onion farmers, like other farmers, often face problems such as risk. High failure, low productivity, and efficiency. The low level of productivity shows that the management of shallot farming is not efficient. That is coupled with the fact that the shallot commodity is a plant with a high risk of failure. The success of onion farming carried out by a farmer is determined by the amount of income, risks, and efficiency levels that farmers will face.

Based on this description, researchers are interested in knowing the factors that affect the production of shallot farming in the highlands and medium lands. Second, determine the differences in the level of risk along with the farmers' preferences for the sources of risk between the highlands and the medium lands.

2. RESEARCH METHOD

This research was conducted in Purworejo Village, Ngantang District, which represents the highlands, and Tawangargo Village, Karangploso District, which represents the moderate plains. The selection of research locations was carried out purposively. The sampling method used was solving and simple random sampling, so that onion farmers were determined as samples. Simple random sampling is a method to select sample members denoted 'n' from population members denoted 'N' so that members of the population have the same opportunity to become members of the sample. There is no discrimination against members of the population. (Masyhuri and Zainuddin, 2008).

The data analysis used in this research is a qualitative and quantitative analysis based on primary and secondary data from the research results. The qualitative analysis explains the research location's general description and respondent farmers' characteristics. Meanwhile, quantitative analysis was carried out using farming analysis, production function analysis of cobb-Douglass, analysis of the coefficient of variation (CV), and Likert scale. The analysis was carried out with the help of a calculator, Microsoft Excel, and the Minitab Statistics program.

Farming Analysis

The amount of income received by farmers is the amount of income and expenditure during the production process. Several factors can affect the size of the income received by farmers,

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Agricultural Science

including business scale, availability of capital, output price level, availability of labor, transportation facilities, and marketing system (Faisal, 2015).

The amount of farm income can be calculated using the following formula:

$$\pi = TR - TC$$

Information:

π : Income per hectare (Rp/ha)

TR: Revenue per hectare (Rp/ha)

TC: Total Cost per hectare (Rp/ha)

Cobb-douglass Production Function Analysis

The Cobb-Douglas production function can be written in quadratic form and processed using multiple linear regression. Then the onion production function model can be written as follows:

$$Y = aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}X_6^{b6}X_7^{b7}$$

Where:

Y: Production of shallots (kg/ha)

a: Constant value

b: regression coefficient

X1: Seeds (Kg/Ha)

X2: TSP Fertilizer(Kg/Ha)

X3: NPK Fertilizer(Kg/Ha)

X4: Urea Fertilizer(Kg/Ha)

X5: ZA Fertilizer (Kg/Ha)

X6: Medicines (Liters/Ha)

X7: Labor Cost (HOK/ha)

Coefficient of Variation Analysis

Knowing the level of risk is done by calculating the value of the coefficient of variation with the formula:

a. Cost risk : CV=S/c
b. Production risk : CV=S/Q
c. Income risk : CV=S/Y

Information:

CV = Coefficient of Variation

S = Standard Deviation

C = average cost (Rp)

Q = average production (kg)

Y = average income (Rp)

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The greater the value of the coefficient of variation (CV), the greater the risk that shallot farmers must bear. The lower production limit, cost, and income (L) show the lowest value that big red chili farmers can accept. The formula for the lower bounds of production, costs, and revenues is:

a. Production lower limit

$L = Q - 2V$

b. Cost the lower limit

$L = C - 2V$

c. Lower limit of income

$L = Y - 2V$

Based on the above formula, a relationship between the lower limit of production, costs, and income (L) with the coefficient of variation can be obtained. If the CV value 0.5 then the L value 0, as well as if $CV > 0.5$ then the L value < 0. This shows:

a) If CV 0.5, then farmers avoid the risk of carrying out sizeable red chili farming

b) If $CV > 0.5$, then there is a risk opportunity for farmers to carry out large red chili farming

Table 1. Indicators of Farmers' Perceptions of Farming Risk Sources

	Indikator Presepsi Petani	Min Score	Max Score
1	**Risks originating from production**		
A	Climate change/extreme weather	1	3
B	Natural disasters (floods, landslides, and droughts)	1	3
C	Disturbance of plant-disturbing organisms	1	3
2	**Risk originating from the market/price**		
A	The selling price of shallot fluctuates/up and down	1	3
B	The price of inputs (seeds, fertilizers, pesticides) is high	1	3
C	Decreased market demand for rice	1	3
3	**Human-sourced risk**		
A	Damage to production equipment due to continuous use	1	3
B	The health of farmers is disturbed so that their farm production becomes slow/abandoned	1	3
C	Loss of agricultural production equipment due to theft or fire	1	3
D	Reduced labor in production activities such as planting, harvesting, etc	1	3
4	**Risks originating from institutions**		
A	There are no agricultural extension workers on duty in Tawangargo Village	1	3
B	Government policies that are less in favor of small farmers/people.	1	3
C	Slow development/facilitation of agriculture	1	3
5	**Risks originating from finance**		
A	The capital owned for farming shallots is small	1	3
B	There are no cooperatives that provide capital loans for farming/farmers	1	3

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C	Expenditures for household needs are large, which makes it difficult to do farming	1	3
D	Loans at the bank are difficult due to (high loan interest rates)	1	3
	Total score	**17**	**51**

Source: Primary Data 2021

Farmer Preference Analysis

Sugiyono (2014) states that the Likert scale measures attitudes, opinions, and perceptions of a person or group of people about a social phenomenon or a problem. The answer to each instrument item that uses a Likert scale has a gradation from very positive to very negative, which can be in the form of words, including:

a. Agree
b. Neutral
c. Do not agree

The answer choices Yes/agree were given a score of 1, while Neutral and No answers scored 2 and 3. The following are the details of the question indicators to measure farmers' perceptions of farming risk in Purworejo Village and Tawangargo Village:

The maximum score for the nineteen questions in Table 7, the highest score, is 51, and the minimum score is 17. The number of categories determined is three classes, namely agree, neutral, and disagree, then the class interval can be determined as follows:

$$\text{Interval} = \frac{skor\ tertinggi - skor\ terendah}{jumlah\ kategori}$$

$$= \frac{51-17}{3}$$

$$= \frac{34}{3}$$

$$= 11{,}3$$

$$= 11$$

The results of these calculations to determine the category of farmers' perceptions can be seen in Table 2.

Table 2. Onion Farmers' Perceptions of Risk in Purworejo Village and Tawangargo Village

No	Interval Value	Farmer Preference
1	17-28	Risk Lover
2	29-40	Risk Neutral
3	41-52	Risk Averter

Source: Primary Data 2021

3. RESULTS AND DISCUSSION

The results showed that comparing the average income of onion farming in Purworejo Village, Ngantang District, Malang Regency, with Tawangargo Village, Karangploso District, Malang Regency, per one planting season is presented in Table 2.

Table 3. Analysis of shallot farming in Purworejo Village, Ngantang District, and Tawangargo Village, Karangploso District, Malang Regency

Uraian	Purworejo Village	Tawangargo Village
Fixed Cost (average/Ha)	Rp 5.052.200,57	Rp. 6.001.732,36
Variable Cost (average/Ha)	Rp 46.196.269,23	Rp. 167,794,074.54
Total Revenue (average/Ha)	Rp 371.862.241,77	Rp. 274.375.776,78
Total Income (average/Ha)	Rp 320.613.771,97	Rp. 100.320.311,76
R/C ratio	6,4	4.1

(Source: Primary Data 2021)

Based on table 3, the variable costs of onion farming in Tawangargo Village are more significant than the costs of farming in Purworejo Village. That is due to the high use of production facilities such as seeds, fertilizers, and pesticides. In Tawangargo Village, heavy rains and erratic weather often occur during the planting season, resulting in high seed use because many planted seeds will die after submerging in water. Farmers need to do embroidery and even replanting, so it is calculated that farmers use onion seeds twice and fertilizers. Both chemical and organic fertilizers are also high. Often farmers have to re-fertilize because of heavy rains because heavy rains cause nutrient content and minerals from soluble fertilizers will be lost in the water currents.

In contrast to farming in Purworejo Village, the use of production facilities is lower when compared to farming in Tawangargo Village, especially at lower labor costs. The total costs incurred by farmers in Tawangargo Village are more significant, but the income and income of Purworejo Village are higher. That is strongly influenced by the abilities and skills of the perpetrators of their farming. Farmers in Purworejo village have better skills and abilities than farmers in Tawangargo village. That can be seen from the cultivation method. Most of the farmers in Purworejo Village use mulch and seeds one by one in planting holes, while farmers in Tawangargo Village still use conventional cultivation methods.

The R/C ratio in Tawangargo Village is smaller than the R/C ratio in Purworejo Village. Although it is said to be still feasible because the R/C value is more than one, the profit from farming in Tawangargo Village is only 4.1 rupiah for every 1 rupiah unit of costs incurred. In comparison, the R/C in Purworejo Village has an R/C of 6.4, which means that for every additional 1 rupiah issued, you will get a profit of 6.4 rupiahs. The high R/C ratio in Purworejo Village is due to high farm production. From the R/C value obtained in onion farming in Tawangargo Village and

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Purworejo Village, it can be concluded that the farming is feasible because the R/C value is more than one.

Table 4. Results of multiple regression analysis of Cobb-Douglas

Variabel	Coef. Reg.	SE Coef	T	P	VIF
Constanta	4.2247	0.7877	5.36	0.000	
Seed (Ln. X1)**	0.54612	0.08488	6.43	0,000	2.517
TSP (Ln. X2)	0.03073	0.09506	0.32	0.748	1.304
P. Kandang (Ln. X3)	-0.07926	0.06278	-1.26	0.212	1.521
NPK (Ln. X4)**	-0.33118	0.08096	-4.09	0.000	2.544
ZA (Ln. X5)**	0.29739	0.09265	3.21	0.002	1.428
Pestiside (Ln. X6)	-0.03452	0.09005	-0.38	0.703	3.340
Labour (Ln. X7)**	0.22092	0.09679	2.28	0.026	3.834
S = 0.47944 Sign **95%		R-sq = 60.0%			R-sq(adj) = 55.1%

(Source: Primary Data 2021)

Table 4 shows that the coefficient of determination (R2) using seven independent variables is 60 percent. That shows that 60 percent of the variation in onion production in Purworejo Village, Ngantang District, and Tawangargo Village, Karangploso District can be explained by variations in seed production factors (X1), TSP fertilizer (X2), Manure (X3), NPK fertilizer (X4). , ZA fertilizer (X5), Medicines (X6), and Labor (X7). The remaining 40 percent explained that production variation is influenced by factors not included in the production function estimation model, such as price, weather, pests, and diseases.

a. Seed (X1)

Based on multiple linear regression analysis, it shows that the input of seed production has a positive effect on the production of shallots and is very significant, with a probability value of 0.000 (less than 0.05) the production of shallots. The seed (X1) has a positive regression coefficient value of 0.54612, meaning that every 1 percent increase in the number of shallot seeds will increase the production of shallot produced by 0.54612 percent.

Shallot farmers in Tawangargo Village and Purworejo Village still use a lot of local seeds, so their production results are less than optimal compared to farmers who use superior seeds. That means that by increasing the use of seeds, shallot farmers have the opportunity to increase their shallot production per hectare. That is in line with the research of Junaidi et al. (2020) and Nurjati et al. (2018) that the use of seeds has a significant and positive effect on the production of shallots.

b. TSP Fertilizer

TSP fertilizer (X3) positively affects the production of shallots with a probability value of 0.748 (greater than 0.05), meaning that it is not significant to the production of shallots. The coefficient value is 0.03073, which means that every time there is an increase in the amount of

TSP fertilizer, it will not affect the production of shallots. That is in line with research conducted by Fauzan (2016) that TSP fertilizer (SP in his research) has a significant (significant) effect on the production of shallots.

c. Manure

Manure harms shallot production with a probability value of 0.212 (greater than 0.05), meaning that Manure has no significant effect on shallot production. Manure (X3) has a negative regression coefficient of -0.07926, meaning that every 1 percent increase in the amount of Manure in shallots will not affect the production of shallots. That is in line with Astuti et al. (2019) that the use of kendang fertilizer (in their research, organic fertilizer) has no significant effect on the production of shallots.

d. NPK Fertilizer

NPK fertilizer harms onion production with a probability value of 0.000 (less than 0.05), meaning that NPK fertilizer significantly affects onion production. NPK fertilizer (X4) has a negative regression coefficient value of -0.33118, meaning that every 1 percent increase in the amount of NPK fertilizer in shallots will decrease the production of shallots by -0.33118 percent. That is in line with Mutisari's research (2019) that the use of NPK fertilizer significantly affects shallot production.

e. ZA Fertilizer

NPK fertilizer has a positive effect on shallot production with a probability value of 0.002 (less than 0.05), meaning that ZA fertilizer significantly affects shallot production. ZA fertilizer (X5) has a positive regression coefficient value of 0.29739, meaning that every 1 percent increase in the amount of ZA fertilizer in shallots will increase the production of shallots by 0.29739 percent. That is not in line with Minarsih & Waluyati's (2019) research that the use of ZA fertilizer has no significant effect on shallots.

f. Pesticides

Pesticides harm shallot production with a probability value of 0.703 (greater than 0.05), meaning that drugs have no significant effect on shallot production. Pesticides (X_6) have a negative regression coefficient value of -0.03452, meaning that every 1 percent increase in the amount of pesticides in shallots will not affect the production of shallots. That is not in line with the research conducted by Febriyanto (2021) that Pesticides or pesticides/drugs have a significant effect on the production of shallots.

g. Labor

Labor (X_7) positively affects shallot production with a probability value of 0.026 (less than 0.05) and a significant effect on shallot production at a 95 percent confidence level. Labor (X_7) has a positive regression coefficient value of 0.22092 means that every increase in the number

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Agricultural Science

of workers (HOK) by 1 percent will increase the production of shallots produced by 0.22092 percent.

That is in line with research conducted by, Sholeh et al. (2013) that labor has a significant (significant) effect on the production of shallots. Based on the value of the coefficient of variation, the risk of onion farming in the highlands represented by Purworejo Village has a lower risk value than the risk value of medium land farming represented by Tawanagargo Village, Karangploso District, Malang Regency. That can be seen in table 5.

Table 5. Amount of Production Risk, Cost, and Income of Shallot Farming in Tawangargo Village, Karangploso District, Malang Regency

Risk	CV Value Purworejo Village	CV Value Tawangargo Village
Risk Production	0,25	1,21
Risk Cost	0.8	4.1
Risk Income	1.6	4.1

(Source: Primary Data 2021)

Table 5 shows that the production risk of Purworejo Village is lower and categorized as safe from risk compared to the production risk of Tawangargo Village. The value of the coefficient of variation in Purworejo Village is 0.25, meaning that the opportunity for losses that shallot farmers in Purworejo Village must bear is 0.25 Kg/Ha. While the value of the coefficient of variation in Tawangargo Village is 1.21, the opportunities for losses that must be borne by the shallot farmers in the village of Purworejo are 0.25. Tawangargo is 1.21 Kg/Ha. The production risk of Tawangargo village is higher than the production risk of Purworejo village. The high risk of red onion farming production in Tawangargo village is caused by high rainfall followed by a relatively high intensity of pest attacks, causing production failure. In line with the results of research conducted by Budiningsih & Pujiharto (2006), the highest production cost of shallots after seed costs is the cost of pesticides. Because, in general, shallot plants are prone to pest and disease attacks, control measures with pesticides are one way for farmers to reduce the risk—of crop failure. Likewise, according to Horowitz (1994), excessive use of pesticides tends to be carried out by farmers to reduce the risk of yield loss due to pests and diseases.

The cost risk experienced by shallot farmers in Purworejo Village is lower than that of Tawanagrgo Village. The cost KV value of red onion farming in Purworejo Village is 0.8, which means that the opportunity for losses that shallot farmers in Purworejo Village must bear is 0.8 rupiah/ha. At the same time, the KV value of shallot farming in Tawangargo Village is 4.1, which means that the opportunity for losses that shallot farmers in Tawangargo Village must bear is 4.1 Rp/Ha. That indicates an opportunity for the risk of significant costs carried out by shallot farmers in the village. Tawangargo. The cause of this risk is the large number of costs incurred by farmers in terms of the use of inputs such as seeds, fertilizers, plant nutrients, pesticides, and labor which is quite expensive. That is supported by the research of Kurniati et al. (2015), which states that the amount of use of production facilities will undoubtedly be related to the amount of sacrifice in obtaining these production facilities. The greater the use of production facilities, the higher the value of the sacrifice.

Table 4 shows that shallot farmers in Purworejo village face lower income risk than shallot farmers in Tawangargo village. The VK value on farming in Purworejo Village is 1.6, meaning that the opportunity for losses that shallot farmers in Purworejo Village must bear is 1.6 Rp/ha. While the KV value in farming in Tawangargo Village is 4.1, the opportunity for losses that shallot farmers in Tawangargo Village must bear is 4.1 Rp/ha. That is not in line with the research of Hindarti et al. (2021) that the risk of shallot farming income in the Ngantang sub-district, Malang Regency, is categorized as high, reaching 79.72%.

A comparison of whether or not farmers' preferences are brave for the risk of shallot farming in Purworejo Village and Tawangargo Village can be seen in Table 6.

Table 6. Comparison of farmers' preferences on sources of risk for onion farming in Purworejo Village and Tawangargo Village

No	Interval	Category	Purworejo Farmer's	%	Tawangargo Farmer's	%
1	17-28	Risk Lover	14	53,8	9	35,0
2	29-40	Risk Neutral	7	26,9	17	42,5
3	41-52	Risk Averter	5	19,2	14	22,5
Total			26	100	40	100
Total Score			817		1.318	
Average			31,4		32,5	

(Source: Primary Data 2021)

In Table 6, in Purworejo Village, most respondent farmers behaved as Risk Lovers (brave) towards risk. The indicator, in this case, is the number of farmers who behave bravely to face risks, as many as 53.8% or 14 people, while those who behave in a neutral face risk (risk-neutral) as many as 26.9% or seven people, and the remaining 19.2% or five people. Behave in fear of taking risks (risk Averter). The table also shows that the average value of farmers' preferences for risk sources is 31.2, with a total score of 817. Meanwhile, in Tawangargo Village, most of the respondent farmers are risk-neutral. The indicator, in this case, is the number of farmers who behave neutrally in facing risks, as much as 42.5% or 17 people, while those who behave bravely to face risks (risk lovers) are 35.5% or 14 people, and the remaining 22.5% or nine people behave in fear. Face risk (risk Averter). The minimum score obtained by farmers is 17, while the maximum score is 51. The table also shows that the average value of farmer risk behavior is 32.5, with a total score of 1.318.

This is in line with Fajri & Fauziyah's research (2019) on shallot farming of a wide variety in the Pamekasan Regency. The analysis results show that most farmers are risk-averter risk-neutral. The sources of risk that influence shallot farming most greatly include harvest prices, raw material prices, drought, pest and disease attacks, and capital.

The preference of shallot farmers towards sources of risk in Purworejo village tends to be brave even in the highland geographical conditions. This is because the farmers in Purworejo village can adopt the technology provided by the agricultural extension workers. One of the technologies applied by farmers in Purworejo village is when planting shallots. Shallot farmers will use production inputs that are adjusted to the growing season.

In line with the research of Windani et al. (2016), The sources of risk in farming activities are categorized into several groups. Including climate and weather changes that are not by the needs of plants, attacks by plant-disturbing organisms, high production prices, low output prices, limited capital availability, low mastery of technology, and low managerial skills of farmers.

Farmers' preferences for risk sources in Tawangargo Village tend to be neutral. This means they are typical of the source of risk. This is because the farmers' shallot farming is a hereditary business, so shallot farming is considered to be able to provide benefits. Risk-neutral farmers also consider the obstacles faced during the cultivation process to make the right decisions in their farming. This is in line with Apriyani and Unteawati's research (2019) on corn farming in the South Lampung Regency, where out of 50 respondent farmers, there are 44 risk-neutral farmers. Farmers who are neutral to risk are a group of rational farmers looking at risk, namely that in every effort they make, there is a possibility to make a profit or face a loss.

4. CONCLUSIONS

Production factors that have a significant effect on shallot farming are seeds, NPK fertilizers, ZA fertilizers, and labor. While the level of risk of farming in the highlands, namely Purworejo Village, Ngantang District, Malang Regency, is lower than the level of risk in the Medium plains, namely Tawangargo Village, Karangploso District, Malang Regency. In addition, farmers' preferences for sources of risk in the highlands tend to be more daring to face risks, while the preferences of farmers in the lowlands are more neutral in facing risks.

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