



Farmers' Motivation in Controlling White Tip Disease (*Phytopthora porri*) of Shallot (*Allium cepa*) in Onanrunggu District, Samosir Regency, Indonesia

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Abstract. The shallot is the beneficial plantation for future in our community. This extension study aims to find out; (1) the motivation of farmers in controlling white tip disease (*Phytopthora porri*) of shallot (*Allium cepa*); (2) to examine the factors that influence farmers' motivation in controlling white tip disease (*P. porri*) of shallot (*Allium cepa*). This extension study was carried out in Onanrunggu District, Samosir Regency from March to July 2021. The extension assessment method used was descriptive analysis, then to determine the level of motivation of farmers used the Likert model scoring technique, and to determine the factors that influence the motivation of farmers used multiple linear analysis models with equation result $Y = 33,387 - 0,108 X_1 - 0,031 X_2 + 0,695 X_3$.

Keywords: Farmers' motivation · White tip disease · Shallot

1 Introduction

Shallots (*Allium cepa*) are one of the agricultural commodities that are widely consumed by the people of Indonesia as a cooking spice. Indonesian people's demand for shallots in the period 2007 to 2010 increased from 901,102 tons to 1,116,275 tons, which was followed by an increase in shallot production from 802,827 tons to 1,046,325 tons [1]. Even so, the increase in shallot production has not been able to keep up with the increase in public demand.

One of the areas in North Sumatra which a fairly large contributor to the shallots is Onanrunggu District, Samosir Regency. This district is in the Central Mountains region of North Sumatra with an altitude of 700–1,700 m above sea level. This area is an agricultural area that relies heavily on rainfall for its agricultural success, with the name of the local variety Samosir which has the characteristics of a brighter color, lower water content and a spicier taste with a high selling price in the market [2]. Between 2000–2005, there was a crop failure which resulted in a decrease in shallot production. In 2006 replanting was carried out, but it was still in a small area so that there was no data on

land area and the amount of shallot production at the district level until 2010. In 2013, data obtained from the [3] showed that the total production of shallots was 1,679 tons, 1,504 tons, and 1,114 tons, and there was still a decrease in production, namely 0.175 tons and 0.390 tons, respectively.

Data from the Onanrunggu District Extension Agency (DEA) shows that one of the obstacles in the production of shallots is the presence of white tip disease (*Phytophthora porri*). The potential for yield loss caused by disease in young and old plant stages can reach 20–100% depending on the management of shallot cultivation during the rainy season. In addition to getting profits or meeting income for farming families, shallot farmers have high hopes for developing, increasing production, by controlling white tip disease (*P. porri*) [4].

The motivation of farmers in cultivating environmentally friendly shallots in the Onanrunggu sub-district is interesting to discuss because of the determination of the farmers who persist in cultivating environmentally friendly shallots even though there are various choices of commodities and other more promising farming such as corn and other horticultural crops. Apart from the success of cultivation that has been done for a long time, farmers have experienced obstacles, namely pests, diseases, and erratic weather changes.

Therefore, it is considered strategic to research on shallots to determine the motivation of farmers in controlling white tip disease (*P. porri*) of shallots in Onanrunggu District, Samosir Regency? Then what are the factors that influence the motivation of farmers in controlling white tip disease (*P. porri*) of shallots in Onanrunggu District, Samosir Regency?

2 Methods

The study was conducted from 29 March to 23 July 2021 in Onanrunggu District, Samosir Regency, North Sumatera. The selection of the location for this study was carried out descriptively [5] with purposive sampling intentionally, using observations, interviews, and distributing questionnaires [6] to thirty respondents in 4 villages (Onanrunggu, Pakpahan, Sitingjak, Harian) in Onanrunggu District. The measurement of variables in this study uses a Likert scale, consisting of a score of 1–5 with the criteria of strongly disagree, disagree, undecided, agree, and strongly agree. Then to determine the factors that influence the motivation of farmers used multiple linear analysis models with equations were:

$$Y = +1X_1 + 2X_2 + 3X_3 + 4X_4 + 5X_5$$

The observed factors include ages, income, knowledge, Social Community, and modal. Furthermore, the data were tested for validity (T-test, ANOVA), reliability test, and testing the hypothesis of farmers' interest in controlling white tip disease of shallots.

3 Results and Discussions

From the results of the description of the characteristics of the respondents, it shows that the comparison of male farmers' (21 respondents = 70%) comparison to female farmers

Table 1. Total sample based on ages

No	Ages of respondent	Total sample (individuals)	Percentages (%)
1	31–40	7	23,34
2	41–50	12	40
3	51–60	10	33,33
4	61–70	1	3,33
Total		30	100

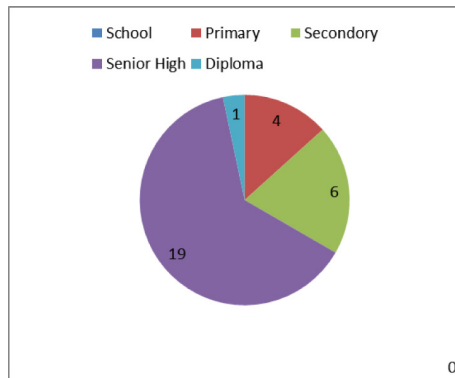


Fig. 1. Education level of farmers shallots.

(9 respondents = 30%) for controlling white tip disease of shallots. Meanwhile, Table 1 showed the ages of farmers, consisting of 31–70 years old.

Based on Table 1 showed all respondents are in the category of productive age (31–70 years). The age of respondent farmers is dominated by farmers of productive age, aged 41–50 years with a percentage of 40% of the total respondents. According to Lailani [5], states that at a young age a person usually has a good ability to work and knows what is not yet known about new things in business development to be more advanced. The current age of farmers with reduced physical abilities will not reduce the enthusiasm of farmers in farming by implementing dead shoot disease control on shallots.

Figure 1 shows that formal education dominates, namely: high school (19 people, 63.33%), followed by junior high school (6 people, 20%), elementary school (4 people, 13.33%), while the lowest is at the D3 level (1 person, 3.33%). This condition shows that all the farmers who were sampled in this study felt that their willingness to implement the control of dead shoot disease was due to their own will and desire.

Based on the questionnaires collected, the experience of the respondents in growing onions was categorized into 2 groups, namely: 16 people aged 9–24 years (53.33%) followed by 25–40 years (14 people, 46.66%). The distribution of farming experience in the sample can be seen that most farmers have experience in farming since childhood,

inherited from the experience of their parents. Supported by the opinion of Suhendrik et al. [6], respondents who have longer farming experience tend to have better skills.

Based on the calculation, it can be seen that the coefficient is a constant value of Y (if the value of the variable X = 1) because the lowest value in the data measurement is 1 and the values of the regression coefficient of the X variable which show an increase or decrease in the Y variable based on the X variable and the values entered into the multiple linear regression equation [5, 6] as for the equations, namely:

$$Y = +1X1 + 2X2 + 3X3 + 4X4 + 5X5$$

$$Y = 33,387 - 0.108 X1 - 0.031 X2 + 0.695 X3 + 0.579 X4 + 0.641 X.$$

The meaning of formulas was:

1. The constant value (α) is 33,387. This means that if the variables of age (X1), income (X2), knowledge (X3), social environment (X4), and capital (X5), are 0 then the motivation of farmers (Y) is positive, which is 33,387.
2. The regression coefficient of the age variable (β_1) is -0.108 ; This means that if the other independent variables have a fixed value and age increases by 1 point, then the motivation of farmers will decrease by 0.108. The coefficient is negative, meaning that there is an inverse relationship between the age variable and the motivation of farmers. The age factor did not significantly affect the motivation of farmers in the application of white tip disease control because $t \text{ count} -882 < t \text{ table } 2,068$ with a significance level of 5%. This is because: 1) The older the age, the higher the experience in implementing white tip control. 2) In controlling white tip death, an electric hand sprayer has been used. 3) Farmers are still adaptive in controlling white tip disease on shallots.
3. The income variable regression coefficient (β_2) is -0.031 ; This means that if the other independent variables have a fixed value and income increases by 1 point, then the motivation of farmers will decrease by 0.031. The coefficient is negative, meaning that there is an inverse relationship between the income variable and the motivation of farmers in the application of the control of white tip disease (*P. porri*) on shallots. This is because: 1) White tip disease in shallots is not one of the deadliest and main diseases in shallot cultivation. 2) Farmers remain consistent in cultivating shallots every certain period.
4. The knowledge variable regression coefficient (β_3) is 0.695; This means that if the other independent variables have a fixed value and knowledge increases by 1 point, then the motivation of farmers will decrease by 0.695. The coefficient is positive, meaning that there is a positive relationship between the knowledge variable and the motivation of farmers, the more knowledge there is, the more motivated the farmers are in implementing the control of white tip disease (*P. porri*) on shallots. This is because: 1) Farmers understand the types of active ingredients contained in fungicides so that they are effective in controlling the disease. 2) Farmers review the right type of spraying, the right method, right time, and right dose. 3) Farmers understand the development time of shoot death in shallots.

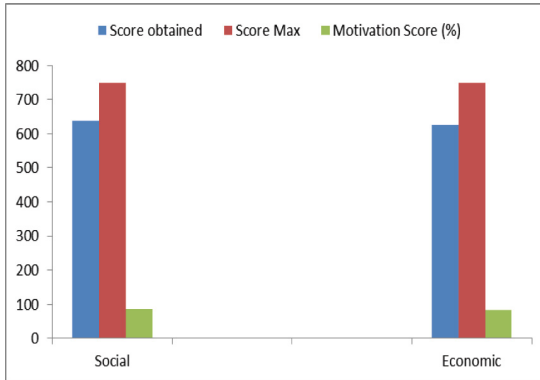


Fig. 2. Level of social and economic motivation of shallots farmers. Source: Primary Data Assessment (2021).

5. The social environment variable regression coefficient (variable 4) is 0.579; This means that if the other independent variables have a fixed value and the social environment increases by 1 point, then the motivation of farmers will increase by 0.579. The coefficient is positive, meaning that there is a positive relationship between the social environment variables and the motivation of farmers, the more the social environment, the more motivated the farmers in the application of controlling white tip disease (*P. porri*) on shallots. This is because 1) Farmers hold small meetings with fellow farmers who have adjacent land or one stretch of land. 2) Farmers carry out field schools to gain knowledge and exchange information about white tip disease control. 3) Farmers often consult with self-help extension workers who have succeeded in controlling white tip disease to be used as role models.
6. The regression coefficient of the capital variable (β_5) is 0.641; This means that if the other independent variables have a fixed value and capital increases by 1 point, then the motivation of farmers will increase by 0.641. The coefficient is positive, meaning that there is a positive relationship between the social environment variables and the motivation of farmers, the more the social environment, the more motivated the farmers in the application of controlling white tip disease (*P. porri*) on shallots. This is because: 1) The supply of shallot seeds comes from the related agricultural office. 2) Because the capital used is from private capital, the use of production facilities becomes more efficient and effective. 3) Farmers take precautions in controlling white tip disease death.

The results of the study of the overall extension of the level of motivation of farmers in the control of white tip disease (*P. porri*) of shallots were very highly (82.8%). In detail, the level of farmer motivation which includes social motivation (82.13%), and economic motivation (83.46%) is classified as very high described in Fig. 2.

The level of motivation of farmers in the social sub-variables is 85.06% which is classified as a very high category, it is assumed that 1) Farmers hold open discussions with other farmers, 2) Implement cooperation to control shoot death. 3) Follow the

example of farmers who have succeeded in controlling shoot death as a reference for action.

Based on the results of the questionnaire in the field, farmers who have difficulty controlling shoot death often gather, discuss, and find joint solutions to increase the motivation and knowledge of farmers in controlling shoot death. This is supported by the opinion of Annajah and Falah [7], the social community is the environment and other people that can affect a person, either directly or indirectly.

Cooperation activities are a habit that is often carried out both in traditional activities and in group activities so that in controlling pests and diseases of onion plants, deliberation is often carried out in decision making, such as when to schedule in spraying, the use of the type of pesticide used. This is in line with the spirit of 'gotong royong' that needs to be instilled in each group member so that the group can work effectively. The spirit of 'gotong royong' can be formed through several activities, such as forming farmer groups (farmer grouping), group identity, and group cheers.

In controlling pests and diseases, farmers often observe shallot plants that are not affected by shoot death so that they want to interact with farmers who are successful in controlling shoot dead. According to Nurullah [8] which states that social interaction is where individuals and other individuals influence each other to achieve certain goals.

The level of motivation of farmers in the economic sub-variable has a percentage of 83.46% which is classified as a very high category, it is assumed because: 1) Profits obtained after successfully controlling white tip disease. 2) Can improve the standard of living of shallot farmers. 3) High demand and selling price as well as a market niche that is always there.

Based on the assessment of the results of the questionnaire, it was found that the application of white tip disease control increased the motivation of farmers to apply white tip disease control (*P. porri*) on shallots so that higher onion prices were supported by market demand. Price is one of the important factors in increasing the motivation of farmers in farming, related to price fluctuations and Lagebada prices [9, 10].

The factors studied influenced the motivation of farmers to the application of white tip disease control (*P. porri*) on shallots in the Onanrunggu District, including age, income, knowledge, social community, and capital. Furthermore, two stages of testing were carried out, simultaneously or as a whole (F-test) and partial testing (t-test) with Multiple Linear Regression test with 95% confidence level ($\alpha = 0.05$). The results of the assessment of these influencing factors measured can be seen in Table 2.

The regression model can be explained by using the coefficient of determination ($CD = R \text{ Square} \times 100$). R is multiple correlations, namely the correlation between two or more independent variables on the dependent variable. The R-value ranges from 0 to 1. If it is close to one then the influence is getting closer, but if it is close to 0 then the influence is getting weaker [9]. Based on Table 2, the R-value is 0.901, meaning that the influence between the independent variables (ages, income, knowledge, social community, and capital) and the dependent variable (farmers' motivation) is 0.901. This means that there is a close relationship because it is close to the value of 1. R Square (R^2) or the square of R, which shows the coefficient of determination, and this number will be converted into percent. This means that it shows the influence of the independent variable on the dependent variable. So, the value of R^2 is equal to 0.813. This shows

Table 2. The assessment of influencing factors measured

Variable	Coefficient	t Calculated	Sig	Noted
Ages	-0,108	-882	0,386	No significant
Income	-0,031	-192	0,850	No significant
Knowledge	0,695	3.262	0,003*	Significant
Social Community	0,579	3.099	0,005*	Significant
Modal	0,641	3.012	0,006*	Significant
R: 0,901 R Square:0,813 Constanta: 33.387 F table: 2,06 F cal.: 20,824 T table: 2,068 (sig 5%)				

Sources: Data Primer Result (2021)

that the percentage of the contribution of the variables of age, income, knowledge, social community, and capital to the motivation of farmers in the application of control of dead shoot disease (*P. porri*) on shallots is 81.3% while the remaining 18.7% is influenced by other variables which were not used in this study.

4 Conclusions

The conclusions gathered from the researchers are:

- The level of motivation of farmers in the control of white tip disease (*P. porri*) of shallots cultivation is in the control of white tip disease (*P. porri*) of shallots were very highly (84.26%). In detail, the level of farmer motivation which includes social motivation (85.06%), and economic motivation (83.46%) is classified as very high.
- Simultaneously, the characteristics of age (X1), income (X2), knowledge (X3), social community (X4), and capital (X5) simultaneously affect the motivation of farmers in controlling white tip disease (*P. porri*) of onion cultivation. red in Onan Runggu District, Samosir Regency.
- Partially the factors that have a significant effect on farmer motivation in controlling white tip disease (*P. porri*) shallot cultivation, namely knowledge, social community, and capital which have a very significant effect, while age and income have no significant effect on farmers' motivation in controlling white tip disease (*P. porri*) shallot cultivation.

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