Innovation level of onion commodity management in Galung Lombok Village, West Sulawesi, Indonesia

Akhsan[1]*, Nurlaela[2], and Astina[2]

[1]Department of Agricultural Social Economics, Faculty of Agriculture, Hasanuddin University, Indonesia
[2]Agribusiness Department, Universitas Sulawesi Barat, Indonesia

*Corresponding author's e-mail: accang.dj@gmail.com

ABSTRACT

Beetroot is a food source that is rich in nutrient value, including carbohydrates, minerals, vitamin C and betalains as a source of, to secure the supply of shallots (bamer) is to encourage the use of True Seed Shallots (TSS) seeds for higher productivity. This research was conducted in Galung Village, Lombok, Tinambung District, Polewali Mandar Regency, using 38 respondents or farmers selected by simple random sampling, considering that the characteristics of shallot farming are homogeneous. Data processing was done using Descriptive Quantitative Analysis using the IBM Statistics SPSS Version 25 application to obtain correlation test results and Scatter Plots. This study aims (1) to determine the distribution of innovation adoption rates and (2) to determine the relationship between innovation adoption rates on the dependent and independent variables of the shallot commodity. The results of this study show the results of the distribution of innovation adoption rates, namely there are 16 farmers with high and low categories, respectively, and as many as six farmers in the medium category, and the results on the Spearman's rank correlation test obtained a value of 0.319, and it is stated that there is a relationship between the level variables of adoption of innovation and productivity. The Scatter Plot graph shows that in quadrant III, it is noted that the value of the level of innovation adoption and productivity has a tendency together to obtain a high value of the distribution.

1. Introduction

Diffusion is one of the extension models that was first introduced and widely accepted by experts in the process of agricultural development. In its application, the diffusion of innovation, which is still linear or top down, is a conventional extension model, namely from the source through several series before arriving at the intermediate target (extensionees) and then finally arriving at the final target (farmers) [1]. Counseling is a follow-up activity of disseminating information aimed at changing the attitudes and behavior of the surrounding community to accept and implement the new ideas that have been presented. Changes in attitudes and behavior of farmers in adopting the innovations presented are expected to increase the ability of farmers so that the quality and quantity of production increases, to improve their standard of living [2].

Based on the release of the Ministry of Agriculture Number: 673/R-KEMENTAN/7/2021, regarding the strategy used to secure the supply of shallots (bamer) is to encourage the use of True Seed Shallots (TSS) seeds for higher quality. So that the 2021 State Budget is allocated to support bamer production in 3,900 hectares throughout Indonesia. The shallot

commodity is one of the considerations in this study, then this can maintain supply for national needs. To be able to find out the occurrence of shallot productivity in farmers in Galung Lombok Village.

The adoption process involves the introduction of an innovation to society, then a mental process occurs to accept or reject the innovation. If the result of this mental process is a decision to accept an innovation, then adoption will occur [3]. Diffusion of innovation in agriculture occurs when the spread of innovation or new ideas to farmers, through processes or stages that direct an innovation to be adopted by farmers. Innovation is also one of the factors that determine business performance, improving product quality which affects business performance, namely market share, sales, prices, and profitability [4].

An innovation is useless without adoption. However, not all innovations can be accepted and adopted by every individual. In the perspective of receiving new ideas, individual changes and system changes can be seen. Changes at the individual level where a person acts as an individual in a social system that accepts or rejects innovation. Changes at this level are called by various terms, including diffusion, adoption, modernization, acculturation, learning or socialization or also known as micro changes. Meanwhile, changes at the level of the social system are often termed development, socialization, integration, adaptation or also known as macro changes [5].

The implementation of agricultural extension will run well if there is a common perception between extension agents and farmers and interested parties [6]. The social function of counseling is to seek easy access for key actors and business actors to sources of information, technology, and other resources so that they can develop their businesses [7]. Basri [8] mentions the five stages of the flow of innovation acceptance, namely the introduction stage, persuasion, decision, implementation, and confirmation stage. In cultivating farmers, facilities and infrastructure are needed as a source of agricultural innovation. Innovations needed by farmers are innovations that suit their needs and are fast in nature. Group communication has a central role in communicating the latest innovations, the term key farmer as an opinion leader whose role and function is to transfer knowledge through farmer group learning [9]. So, a message proposed by the communicator will be accepted by farmers if farmers think there is hope and benefits to be gained. So, it is necessary to know the level of innovation adoption in shallot farmers, through the level of innovation adoption whether it can increase the profitability of the farming being run.

Shallot is a horticultural commodity that plays an important role in the economy, namely as a source of income and foreign exchange for the country, a product to support the taste of food, and a provider of employment. In the last 5 years shallot production has continued to fluctuate with an increasing trend. Shallot production in 2017 in Tinambung District only reached 17.4 tons and at the end of 2020 it was able to produce 81.9 tons [10]. There is a behavior that is owned by shallot farmers in Galung Lombok, Tinambung District in carrying out their farming while receiving assistance from Field Agricultural Extension (PPL). So, we want to know the relationship between the level of adoption of innovation on farmer behavior. Based on this description, the objectives of this study are (1) to determine the distribution of innovation adoption rates and (2) to determine the relationship between variables that influence the rate of innovation adoption, namely the dependent and independent variables on shallots in Galung Village, Lombok District. Tinambung, Polewali Mandar Regency.

2. Methods

The research was carried out from August to September 2022 in Galung Village, Lombok, Tinambung District, Polewali Mandar Regency. Galung Village, Lombok, was chosen as the research location with the consideration that this area is a red onion production center. The primary data collection technique was carried out by means of observation, filling out questionnaires and interviews. The research population is all farmers who work on shallot farming in Galung Village, Lombok, namely there are 126 farmers [10] and as many as 40 farmers were selected as respondents in this study who were selected through the Simple random sampling technique with the consideration that the characteristics of farmers are homogeneous.

The methods used to analyze the data in this study are descriptive analysis methods and non-parametric analysis. The variables in this study are categorical, namely coded (1, 2, and 3) or high, medium, and low. The value of the innovation adoption rate is obtained from the sum of all the results of the farmers' answers. As for measuring the level of adoption of innovation on shallot farmers using the Scatter plot technique or also called the distribution chart or Lowes graph (locally weighted scatterplot smoothing). The Lowes graph is the distribution of the points to represent the values of different numerical variables in the quadrant region. The position of each point on the horizontal and vertical axes indicates the value for that point for the individual data. Scatter plot graphs are used to observe the relationship between variables. Then use interval and ratio scales so that in a nutshell it will show the existence of positive, low, and negative closeness relationships, furthermore, it will be known the number or distribution of farmers who adopt innovations in their farming activities. Primary data analysis was carried out using descriptive quantitative analysis using data processing with the help of the SPSS application so that the results of correlation statistical analysis and the distribution of farmers in accessing innovation adoption rates were known.

Analysis of the characteristics of the respondents included age, education, length of farming, land area, and frequency of obtaining counseling. Age of farmers ranges from 20–65 years, for productive age 25–55 years. Productive age has a better ability to accept innovation and new technology. In line in research of Rahmadona et al. [11] that the age range of 15-55 years is included in the productive age category.

3. Results and Discussion

3.1. Characteristics of Respondents

According to Rogers [12], the adoption of an innovation is a mental process from the time a person learns of an innovation to the point of deciding to accept or reject and then confirming it. In more detail, the adoption process can be divided into five stages, namely introduction, persuasion, decision, implementation, and confirmation. In addition, sufficient information is needed in the innovation adoption process, potential adopters usually look for relevant sources of information [13]. There are three things that are needed for potential adopters related to the innovation process, namely (a) the existence of another party who has carried out the innovation adoption and was successful, this party includes criteria for relevant sources of information, (b) the existence of an ongoing innovation adoption process systematically so that potential adopters can easily follow it, and (c) there are successful innovation adoption results in the sense that it has been able

to provide benefits, thus this information will encourage potential adopters to adopt innovations.

The results showed that all farmers received formal education. Table 1 shows that most of the respondents have been educated for six years or the equivalent of graduating from elementary school (SD) with a percentage rate of 47.37 percent. So that it causes farmers to experience difficulties in implementing the innovation adoption process, and there are delays in accessing information facilities, but there are also farmers who apply the innovation adoption rate and get high scores. According to Astuti et al. [14], the level of education is low can make farmers have insight into technology is also low. But in their research Widodo et al. [15] stated that the level of farmer knowledge is one of the factors a farmer conducts a treatment experiment on his farm by seeing other farmers succeed with their crops.

Table 1. Data on the characteristics of shallot respondents

Characteristics of Respondents	Number of people)	Percent (%)
Age of Farmer (Years)		
Score1 (53-65)	12	31.58
Score2 (36-52)	15	39,48
Score3 (20-35)	11	28.94
Education (Year)		
Score1 (6)	18	47,37
Score2 (9-12)	16	42,10
Score3 (16)	4	10.53
Land Area (Hectares)		
Score1 (0.1-0.2)	23	60,51
Score2 (0.3-0.4)	10	26,32
Score3 (>0.5)	5	13,17
Frequency of receiving counseling		
Score1 (0)	7	18,42
Score2 (1x)	3	7.90
Score3 (>2x)	28	73,68
Productivity (Kilograms)		
Score1 (760-1200)	22	57,91
Score2 (1250-1690)	10	26,32
Score3 (>1700-2100)	5	13,17
Income (IDR)		
Score1 (7,000,000, - 12,000,000)	19	50
Score2 (13,000,000, - 19,000,000)	16	42.10
Score3 (>20,000,000, - 26,000,000)	3	7.90

Source: Primary data after processing, 2022

The land area is the shallot plantation area which is controlled or managed by Shallot respondents in Galung Village, Lombok. The results showed that the level of land ownership with an area of 0.1–0.5 hectares, with this area made it easier for respondents to manage their farming activities and to maintain cropping patterns as recommended.

Based on research results of Theresia et al. [16], the production activities in agriculture are in conditions of uncertainty with various possibilities that can occur which causes farmers to have thoughts and choices in adopting new innovations. So that in this study farmers who have land area in the high category, have the ability and willingness to adopt innovations or can choose to maintain or change spacing, to make decisions in the farming activities carried out. In line with research of Ukrita et al. [17], that the management of farmer's land with ownership status will make it much easier for farmers to make decisions at every process and stage of farming so that it will make it easier for farmers to adopt technology.

The frequency of obtaining counseling is one of a series of farmer processes in accessing information from the information channel, namely Agricultural Field Extension (PPL). Extension officers become guides in the field and act as actors in conveying information with the aim of increasing knowledge, changing or being able to shape the attitudes and behavior of business actors. Based on the results of observations and research it was found that there were 73.68 percent of shallot farmers who attended counseling with a maximum number of > 2 times per month, thus the frequency of counseling had a positive impact on farmers because counseling could increase farmers' interest in adopting innovations. As well as the results of observations it was also found that farmers who attended counseling during field visits by PPL had a higher adoption rate score.

The results of research on the productivity variable or the final yield of the shallot commodity by respondents varied, one of which was due to differences in land area, the use of production facilities such as the use of different varieties and the adoption of innovations regarding technical guidelines for shallot cultivation as recommended had not been carried out. Table 1 shows that the productivity with the highest score is 5 farmers or 13.17 percent. The high productivity is in the range of >1700–2100 kilograms of shallots produced.

### 3.2. Shallot Commodity Management Innovation Adoption Rate

When this research plan was started until it was carried out, there were 40 respondents who had been observed, but in the data processing process there were 2 data that were outliers and were then removed. So that the respondents in this study were 38 shallot farmers. In this study there are 12 sections suggesting the adoption rate of shallot farmer innovations.

The level of innovation adoption is a process of acceptance or rejection in decision-making taken by business actors (farmers). The level of innovation adoption in the implementation of shallot cultivation by farmers in Galung Village, Lombok, Tinambung District, Polewali Mandar district, based on the results of observations, interviews and data processing, found that as many as 16 people or 42.10 percent of farmers or a score of 31-36, adopted innovations. with the highest score, even though the value is classified as high but based on the calculation of the percentage not exceeding 50 percent, of the 4 points on the adoption rate variable there are 6 adoption points with low values, namely the treatment of soaking the seeds, the frequency of watering, the time of harvest, and the use of the height of the ditch or answer scores in the range of 1.22 to 2.12 points.

Figure 1 shows that the distribution of the normal curve produced in this study is in the Low and High intervals, there are 16 farmers with a percentage of 42.12 percent each, or with an average score of 1 and 3 for the innovation adoption rate of shallot farmers, and 6 farmers with a moderate score or at a score of 2. Based on the research results, it is known

that the behavior shown by farmers in their farming activities is different and not all of them do as recommend, there are 16 farmers with high and low adoption rates, while others have moderate category adoption rates. There are interesting things found in these farmers, namely they only apply fertilizer and harvest at the right time to get better production. The condition of the farmers was found based on interview results, that there were several assessment indicators at the adoption rate with low tabulation results including the length of time the seeds were soaked, the height of the ditches, the frequency of watering, weeding and the right harvest time.

In the Spearman's rank correlation test, results were obtained with a significance level of 0.05, so that a positive correlation value was obtained, which means that there is a relationship between the level of innovation adoption in the education variable (0.021), income (0.031), and frequency of obtaining counseling (0.114), while for the variable farming experience, age of the respondent and distance to the land there is no correlation or it is also called a negative correlation and has no relationship. Based on the correlation test in Table 2 obtained through the analysis of the IBM SPSS statistics program version 25. The results of a correlation coefficient of 0.319 are obtained, which means that there is a relationship between the productivity variable and the adoption rate based on implementation and confirmation.
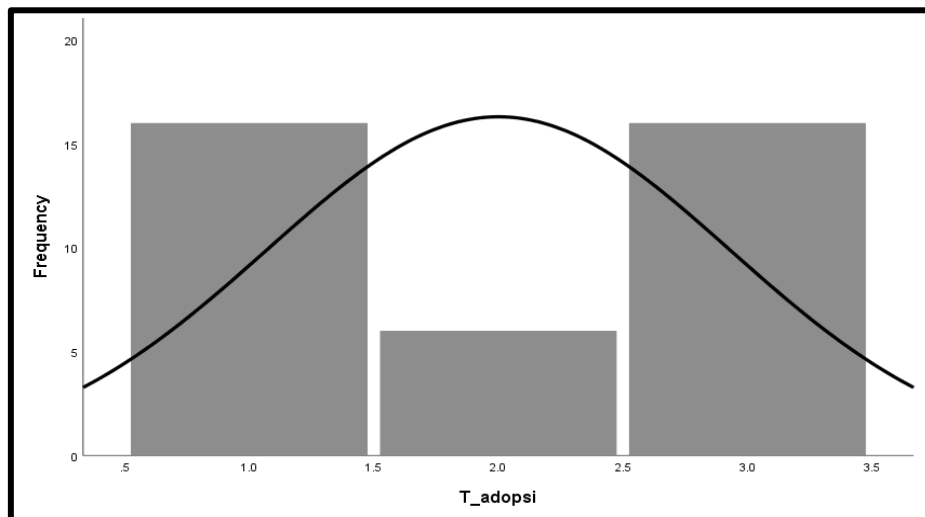
Figure 1. Adoption rate normal distribution curve

To see the strength of the productivity effect caused by the Adoption Rate on Shallot farming activities in Galung Village, Lombok, Tinambung District, Polewali Mandar Regency, the formula used is:

$$Pd = (rs)^2 \times 100 \qquad\qquad (1)$$

$$= (0.319)^2 \times 100$$

$$= 10.17\%$$

So, it can be concluded that the magnitude of the power of influence between the two variables is 10.17 percent.

Table 2. Correlation test of shallot farmer innovation adoption rate

Correlation[c]

			T_ADOPTION	Educat-ion	Experien-ce	Counsel-ing	Income	Productiv-ity
Spear man's rho	T_ADOPTION	Correlation Coefficient	1	-.374*	-0.149	-0.26	-.350*	0.319
		Sig. (2-tailed)	.	0.021	0.372	0.114	0.031	0.051
	Education	Correlation Coefficient	-.374*	1	.732**	.760**	.824**	-0.265
		Sig. (2-tailed)	0.021	.	0	0	0	0.108
	Experience	Correlation Coefficient	-0.149	.732**	1	.802**	.661**	0.062
		Sig. (2-tailed)	0.372	0	.	0	0	0.712
	Counseling	Correlation Coefficient	-0.26	.760**	.802**	1	.698**	-0.036
		Sig. (2-tailed)	0.114	0	0	.	0	0.832
	Income	Correlation Coefficient	-.350*	.824**	.661**	.698**	1	-0.206
		Sig. (2-tailed)	0.031	0	0	0	.	0.214
	productivity	Correlation Coefficient	0.319	-0.265	0.062	-0.036	-0.206	1
		Sig. (2-tailed)	0.051	0.108	0.712	0.832	0.214	.

Source: Primary data after processing, 2022
* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)
c. Listwise N = 38

The results showed that the level of adoption of farmer innovation in the exploitation of shallots in Galung Village, Lombok, Tinambung District, Polewali Mandar Regency, was included in the high category based on the results of statistical analysis on the Sperman's rank correlation test. The results showed that education, farming experience, and frequency of obtaining counseling had a significant relationship. positively with the adoption of innovations. In accordance with the findings of Pratiwi et al. [18], that the level of farmer knowledge is one of the factors a farmer conducts treatment experiments on his farming by seeing other farmers succeed with their crops. Furthermore, the higher the interaction level of farmers, the faster farmers will adopt new innovations [19]. The results of the observation found that farmers who attended counseling during field visits by PPL had a higher adoption rate score. Onion commodity management, with the results shown in Table 2 Correlation test of the adoption rate of shallot farmer innovations. In line with Kaimuddin's et al. [20] research which states that in the hazton planting system for the cocoa commodity, it was found that age and education level did not have a significant relationship to the level of farmer adoption.

On this indicator it was found that the value obtained was quite low based on the score results, which means that shallot farmers have the ability to adopt innovation at a moderate level or it can also be interpreted as a later adopter action that is not maximally carried out but obtains productivity which is on the fifth score. 1 and 2 or in the range of 760 to 1600 kilograms. And it can also be known by means of the scatter plot in Figure 2.

To find out the relationship between the adoption rate in the management of the shallot commodity, it is also shown on the Lowess chart (locally weighted scatterplot smoothing), by showing the relationship between the two variables that are connected so that it is stated that there is a relationship in the two variables. The adoption rate variable (X) and red onion productivity are variables (Y). The plot distribution model or the number of farmers using the adoption rate can be seen based on the distribution pattern created and can be seen in Figure 2.
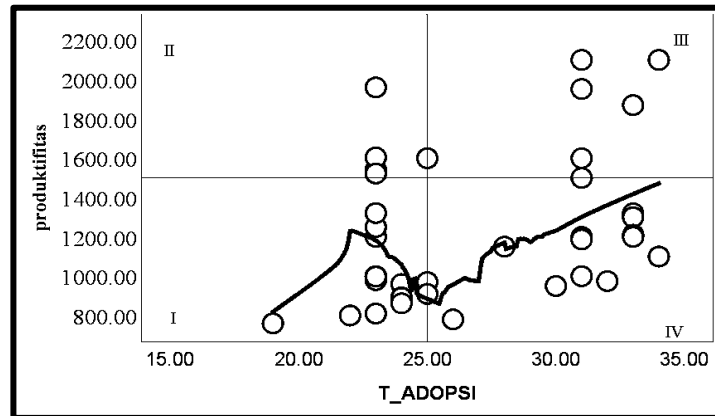
Figure 2. Curve of relationship between innovation adoption rate and productivity

Figure 2 shows the relationship between adoption rates and productivity. Based on the results of the Scatter Plot test, the results of the dot scatter images are obtained in each quadrant (I, II, III and IV). In quadrant I, 12 respondents had a low adoption rate, in quadrant II, 4 respondents still had a low adoption rate but indicated high productivity, in quadrant III there were 6 respondents with high adoption and productivity rates and in quadrant IV, 11 respondents had high adoption rate but low productivity. This figure shows that there are 6 farmers who have the ability to adopt innovation and high productivity. So, it can be concluded that there is a tendency that a high level of innovation can increase farmer productivity. So that in this case a transition and consistency is needed for shallot farmers as well as the willingness and courage to make decisions in selecting superior seeds, one of which is using True Seed Shallots (TSS) seeds recommended by the government and applying information from agricultural extension workers.

4. Conclusion

Based on the results of the description above, the following conclusions can be drawn: (1) the distribution of innovation adoption rates of shallot farmers is known to be 16 farmers with high and low categories respectively and as many as 6 farmers in the medium category. (2) The relationship between the adoption rate of farmer innovation and productivity has a correlation with a degree of less than 5 percent or with a significance value of Spearman's rank of 0.319. (3) The adoption rate of innovation in the shallot commodity tends to increase the adoption rate of innovation by farmers which will influence increasing shallot productivity.

The community is expected to be able to properly implement all the management of shallot farming activities to produce optimally. It is hoped that field agricultural extension agents can provide intensive guidance so that farmers can better understand and understand the management of shallot farming. Further similar research was carried out to examine how high the level and relationship of adoption of Shallot farming

management innovations was. So that in this case a transition and consistency is needed for shallot farmers as well as the willingness and courage to make decisions in selecting superior seeds, one of which is using True Seed Shallots (TSS) seeds recommended by the government and applying information from agricultural extension workers.

References

1. Indraningsih KS. Strategi diseminasi inovasi pertanian dalam mendukung pembangunan pertanian. Forum Penelit Agro Ekon. 2017;35:107–23.
2. Puspitasari L, Hafiar H, Anwar RK. Literasi informasi media: Studi kasus manfaat media massa terhadap difusi inovasi pertanian di Kecamatan Singaparna Kabupaten Tasikmalaya. Edulib. Universitas Pendidikan Indonesia (UPI); 2014;4:16–34.
3. Asnamawati L. Strategi percepatan adopsi dan difusi inovasi dalam pemanfaatan mesin tanam padi indojarwo transplanter di Kabupaten Bengkulu Utara Provinsi Bengkulu. Pros Semin Nas FMIPA-UT. 2015.
4. Hartini S. Peran inovasi: Pengembangan kualitas produk dan kinerja bisnis. J Manaj dan Kewirausahaan. 2012;14:82–8.
5. Suwardi S. Penerapan teori difusi inovasi dalam penguatan kapasitas kelompok tani. J Agriekstensia. 2018;17:98–106.
6. Sundari S, A. Yusra AH, Nurliza N. Peran penyuluh pertanian terhadap peningkatan produksi usahatani di Kabupaten Pontianak. J Soc Econ Agric. 2015;4:26–31.
7. Elian N, Lubis DP, Rangkuti PA. Internet ussage and agricultural information utilization by agricultural extension staff in Bogor District. J Komun Pembang. 2014;12:104–9.
8. Basri H. Analisis persepsi petani terhadap pemanfaatan bokashi pada pertanaman padi sawah. AGRISEP. Badan Penerbitan Fakultas Pertanian (BPFP) Universitas Bengkulu; 2016;15:135–42.
9. Bahfiarti T. Peran 'key farmer' sebagai 'opinion leader' melalui komunikasi kelompok dalam penerimaan inovasi petani di sentra pertanaman kakao Sulawesi Selatan. J Pekommas. Sekolah Tinggi Multi Media Yogyakarta; 2016;1:197–206.
10. BPS Polewali Mandar. Polewali Mandar dalam angka [Internet]. BPS Polewali Mandar. 2021 [cited 2023 May 20]. Available from: https://polewalimandarkab.bps.go.id/
11. Rahmadona L, Fariyanti A, Burhanuddin B. Analisis pendapatan usahatani bawang merah di Kabupaten Majalengka. AGRISE. 2015;15:72–84.
12. Rogers, E.M. Difussion of innovations. New York: Free Press; 2003.
13. Soekartawi. Agribisnis teori dan aplikasinya. Jakarta: PT Raja Grafindo Persada; 2005.
14. Astuti UP, Sugandi D, Purwaningsih H. Factors that influence farmer's adoption of citrus gergalebong technology in Bengkulu Indonesia. Adv Nutr Food Sci. 2018;2018:1–12.
15. Widodo, Kamardiani DR, Pratiwi DF. Partnership between sugar company and small farmer on sugar cane farming in dry climate area of Dompu District, West Nusa Tenggara Province, Indonesia. IOP Conf Ser Earth Environ Sci. IOP Publishing; 2020;423:012029.
16. Theresia V, Fariyanti A, Tinaprilla N. Pengambilan keputusan petani terhadap penggunaan benih bawang merah lokal dan impor di Kabupaten Cirebon, Jawa Barat. Agrar J Agribus Rural Dev Res. 2016;2:50–60.
17. Ukrita I, Musharyadi F. Analisa prilaku petani dalam penerapan penanaman padi metode SRI (The System Rice of Intensification) (Kasus: Kelompok Tani Sawah Bandang di Kanagarian Koto Tuo Kecamatan Harau Kabupaten Limapuluh Kota).

LUMBUNG. 2011;10:119–27.

18. Pratiwi PR, Santoso SI, Roessali W. Tingkat adopsi teknologi true shallot seed di Kecamatan Klambu, Kabupaten Grobogan. Agrar J Agribus Rural Dev Res. 2018;4:9–18.

19. Narti S. Hubungan karateristik petani dengan efektivitas komunikasi penyuluhan pertanian dalam program SL-PTT (kasus kelompok tani di Kec. Kerkap Kab. Bengkulu Utara. 2015;2(2):40–52.

20. Kaimuddin, Nasaruddin, Darwis D. Effect of soil management and biofertilizer application on cocoa's flower and fruit development. IOP Conf Ser Earth Environ Sci. IOP Publishing; 2020. p. 012150.