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Relationship Factors Social Farmers on The Level Implementation Technology IPM of Rice Plants

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ABSTRACT
Sendangrejo Hamlet is one of the areas of Banjardowo Village, Jombang District which is the main rice producer. Based on the data obtained from the Association of Farmers in the Hamlet, farmers still carry out conventional and scheduled pest and disease control, it is necessary to implement Integrated Pest Management to get better quality and quantity of production. This study aims to determine the relationship between social factors of farmers on the implementation of integrated pest and disease management technology on rice plants in Sendangrejo Hamlet, Banjardowo Village, Jombang District. The research was carried out. The method in this study used a descriptive analysis method, with a variable consisting of 2 variables, namely the X variable including age, education, and length of farming while the Y variable consisted of the implementation of integrated pest control. Respondents were taken by 20 respondents from 154 farmer populations.Questionnaire data (questionnaire) was used with an ordinal scale. It is known that there is a significant relationship between social factors including age, education and duration of farming on the level of implementation of integrated pest control technology on rice plants in Sendangrejo Hamlet, Jombang District.

Keywords: *Social Factors; Implementation of Integrated Pest Control; Rice Plants.*

INTRODUCTION
The main food commodity that affects the welfare of the Indonesian people is rice (Septiadi, 2016 *in* Siswanto *et al.*, 2018). Indonesian population consumes rice as a staple food ranges Ninety-eight percent (Riyadi 2002, in Siswanto et al., 2018). However, in 2019, East Java province has a rice harvested area ranges from 1,702 million hectares, decreased 2.78% (48.766 thousand hectares) than in 2018 (Central Bureau of Statistics, 2019) . Meanwhile, the rice production in 2019 was around 9.58 million tons of GKG, a decrease of 6.10 % (622.28 thousand tons) from 2018. The result of the conversion was that rice production in East Java in 2019 was 5.50 million tons or decreased by 357,466 thousand tons (6.10%) compared to 2018 (Central Bureau of Statistics, 2019).

Constraints that affect the productivity of paddy, including attacks by Plant Pest Organisms (OPT). This can be detrimental to farmers even crop failure. Plant Pest Organisms in this case are diseases and pests. The disease could potentially reduce the production of rice such as dwarf grasses (*rice grassy stunt virus*) (Cabautan e *t al*, 2009 *in* Early, et al, 2015) and the attack of bacterial leaf blight the disease is important in a rice plant (Mahfud *et al.*, 2012 *in* Yanti, et al, 2018) , which infects from seed to grain growth in the generative phase (Herlina and Silitonga, 2011 *in* Yanti, et al, 2018) . In addition to disease, there are pests that also have the potential to reduce rice production, including the brown planthopper *(Nilaparvata lugens)* and rice stem-moving pests *(Scirpophaga innotata*) or farmers usually call them sundep pests.

Efforts to address damage from pests , farmers to control and eradicate it . So far, conventional pest and disease control by emphasizing the use of chemical pesticides is still carried out by farmers. It berd ampak losses, environmental, health, and economy of farmers resulting from the use of pesticides Excessive and improper target (Anonymous, 2004 *in* Dondo, et al, 2016).

Kraft controlling pests and diseases integrated (IPM) developed by the government to suppress the use of pesticides in agriculture through the Minister of Agriculture 48 / Permentan / OT.140 / 10/2009, impacting positively on pere konomi 's farmers being able to suppress the use of pesticides and indirectly advance the knowledge and skills of farmers. (Mariyono and Irham, 2001 *in* Prabowo, 2016).

Sendangrejo Hamlet is one of the areas of Banjardowo Village, Jombang District which is the main rice producer . Based on data obtained from the Association of Farmers Groups (GAPOKTAN) in the hamlet, farmers still carry out conventional and scheduled pest and disease control, it is necessary to implement Integrated Pest Management (IPM) to get better quality and quantity of production. Based on this background, it is necessary to conduct an assessment of the Relationship of Farmers' Social Factors with the Level of Implementation of Integrated Pest and Disease Control Technology (IPM) for Rice *(Oryza Sativa L.)* . The study aims u ntuk determine the relationship of age , education and length of attempted farmer with a level of implementation of integrated pest management (IPM) of rice crops in Hamlet Sendangrejo, District Jombang.

METHOD

This research was conducted in Sendangrejo Hamlet, Jombang District and the Laboratory of Agribusiness Study Program, KH.A University. Wahab Hasbullah, from April to June 2021, using a descriptive method. In this research, there are 3 X variables, namely age (X1), education (X2), length of farming (X3) and 6 Y variables, namely Y1 (land management), Y2 (nursery), Y3 (planting), Y4 (fertilization) Y5 (integrated pest and disease management), and Y6 (observation of pests and natural enemies). All indices which are social factors and the level of implementation of IPM are measured using a questionnaire measuring instrument and using an ordinal scale . The ordinal scale is the respondents' answers which are categorized into three types, namely high (score 3), medium (score 2) and low (score 1). The measurement of farmers' social factors and the level of application of IPM is in Table 1 below:

Table 1. Description of Variables and Criteria for Farmer Social Factors (Sugiyono, 2016a)

Variable (x)	Indicator	Criteria	Score
Age	The age of the farmer when examined	Low : < 40 years old Medium: 40-60 years old Height : >60 years old	1 2 3
Education	Farmer's Last Education	Low: ≤ SD Medium: Middle school-high school Height: >high school	1 2 3
Long time farming	How long does it take for farmers to cultivate rice	Low: <10 years Medium: 10-20 years old Height: >20 years	1 2 3

The population used was p Felling trees trimming logs in Hamlet Sendangrejo, District Jombang as many as 154 people. While the sample taken from the large population is as many as 20 people. Primary data is used from respondents with questionnaires. Primary data includes age, education , and duration of farming. data collection techniques using a questionnaire (questionnaire). The implementation is by collecting data by submitting questions or affirmations in the form of writing to respondents to be answered, to understand exactly the variables to be measured and the expectations of respondents. The influence of farmer's social factors with the level of IPM implementation of rice plants in Sendangrejo Hamlet, Banjardowo Village was tested using the *Spearman rank (r_s) test* . The formula is as follows (Sa'adah, 2017):

$$r_s = \frac{6\sum di^2}{n(n^2-1)}$$

Information :
r_s = Spearmen Rank Correlation Coefficient
N = Number of samples
di = The difference between the ranking of the variables

The assessment is the direction of the positive relationship , if the level of X increases then the level of Y increases and vice versa. The direction of the relationship is negative, when the level of X increases

then the level of Y decreases and vice versa. While k • • stronger h an association rated r_s. The correlation is perfect if r= +1 or -1. The interpretation of Rho values is shown in Table 2.

Table 2. The Formula for Finding The RHO Value Can Be Seen As Follows (Sugiyono, 2016b) :

The value of r	Interpretation
Between 0800 to 1.00	Tall
Between 0.600 to 0.800	High enough
Between 0.400 to 0.600	Slightly low
Between 0.200 to 0.400	Low
Between 0.000 to 0.200	Very low

The calculation of spearmen rank analysis is assisted by computer calculations using *IBM SPPS Version 24*. Testing the rs significance level using the student t test because the sample taken is more than ten (Siegel, 1994 *in* Maris, 2013):

$$t = r_s \sqrt{\frac{N-2}{1-r_s^2}}$$

Information :
N = number of samples
$\mathbf{r_s}$ = Spearmen Rank correlation coefficient

Decision making criteria:

- If t arithmetic ≥ t table (α = 0.05) then it is rejected, it means that there is real influence between social factors de with high levels of implementation of IPM in Sendangrejo Hamlet, Village Banjardowo District of Jombang.
- If t count < t table (α = 0.05) then it is accepted, meaning that there is no real influence between social factors and the level of IPM implementation in Sendangrejo Hamlet, Banjardowo Village, Jombang District.

RESULT AND DISCUSSION

Result

The results of the research in the field showed that the age of farmers in the Hamlet of Mediumrejo ranged from 30-70 years. Farmers who have an older age can be said to have more experience than farmers at a young age. According Badriyah and Wahyuning (2019) , farmers are productive age ber physical ability and Air pattern pik i r very nice to receive and absorb information and new innovations as well as easy to implement . Table 3 is the result of the distribution of respondents based on the age of the respondents, which is presented in.

Table 3. Distribution of Respondents Based on Age of Farmers

No.	Age (Years)	Category	Number of People	Percentage (%)
1.	< 40 years old	Low	1	5%
2.	40-60 Years	Currently	10	50%
3.	> 60 Years	Tall	9	45%
	Amount		20	100%

Source: *Primary Data Analysis 2021*

Table 3 shows that the dominant respondents are in the medium group, namely aged 40-60 years as many as 10 farmers. Where the farmers aged 40-60 years are able to have good performance. Farmers are able to work hard to provide for their families and are able to absorb various information about the IPM innovation program. so that they are able to apply the technology properly.

In the high category, there are 9 respondents aged >60 years. Where farmers over the age of 60 have more experience in farming. These farmers have been taught how to farm since childhood, but to get information about this IPM innovation program , they are still not well received.

While in the low category there is only 1 respondent aged <40 years. Where respondents aged 1 under 40 years are few compared to other categories. This is because many youths in Sendangrejo Hamlet are less interested in becoming farmers.

Education can influence farmers to innovate in crop cultivation. The level of formal and informal education has very broad knowledge in understanding the importance of productivity, this can foster

efforts to increase agricultural production (Mahendra, 2014) . The last formal education carried out by the respondents was the one used in this study . The h acyl p enyaluran respondents by level of education in Table 4.

Table 4. Distribution of Respondents Based on Farmers' Last Education.

No.	Level of Education	Category	Number of People	Percentage (%)
1.	< SD	Low	5	25%
2.	Middle School	Currently	11	55%
3.	> high school	Tall	4	20%
	Amount		20	100%

Source: *Primary Data Analysis 2021*

Table 4 shows the results that most of the education provided by farmers is at the junior-high school level, namely 11 respondents. These results are due to education began to receive attention and application as part of an important by communities S a t. In this low education or elementary school there are 5 respondents. In general, this condition is experienced by farmers who are old and constrained by costs at school , so they do not continue their education to the first level. While the high respondents, namely those with education above high school or undergraduate, there are only 4 respondents, this is because many scholars are not interested in going into agriculture.

The length of time in farming is related to the experience of the farmer. So that the longer farming, the easier it will be to accept new innovations to be applied and the higher the skill level of farmers. The h acyl p enyaluran respondents by duration in farming in Table 5 .

Table 5. Distribution of Respondents Based on Length of Farming.

No.	Length of Farming	Category	Number of People	Percentage (%)
1.	< 10 Years	Low	0	0%
2.	10-20 Years	Currently	13	65%
3.	> 20 Years	Tall	7	35%
	Amount		20	100%

Source: *Primary Data Analysis 2021*

Table 5 shows that the level of duration of farming there are 0 respondents in the low category. This shows that no farmer has been involved in agriculture for less than 10 years. K belonging to the selected medium contained 13 respondents who are experienced in farming ranges from 10-20 years .P Felling trees trimming logs majority were aged between 40-60 years have generally been air experience doing rice cultivation that is 10-20 years. While the respondents in the high category were only 7 farmers. This shows that these farmers have been cultivating rice plants for more than 20 years. The level of experience in a period of more than 20 years is generally found in farmers who are over 60 years old.

The level of implementation of IPM Rice is b anyaknya farmers who apply or implement IPM technology in action. Results p enyaluran details of the implementation level of farmers on IPM in Table 6.

Table 6. Results of Distribution of Respondents Based on Details of IPM Implementation Level

No.	Implementation Level		Number of Respondents		
		Indicator	Category		
			Low	Currently	Tall
1.	Nursery	Seed Treatment	1	10	9
2.	Land Management	Land Clearing	-	5	15
3.	Planting	Crop Rotation	5	11	4
4.	Fertilization	Fertilizer Type	-	2	18
5.	Integrated Pest and Disease Management	IPM and Natural Enemies	-	13	7
6.	Observation of Pests and Natural Enemies	Development of Pests and Natural Enemies	-	6	14

Source: *Primary Data Analysis 2021*

Selection of varieties as the initial application of IPM , then followed by soil management, seed preparation, planting, care to post-harvest handling needs to be cultivated properly, in order to

obtain healthy, strong and productive plants (Indiati and Marwoto, 2017) . Based on Table 6 above on p embibitan , j otal most respondents in the category that is 10, this indicates that farmers ter sometimes perform a seed treatment and nursery ..

In land management, it shows that 15 respondents who carry out land management are in the high category. This means that the farmers of Sendangrejo Hamlet always do land clearing before planting rice.

In planting, most of the farmers are in the moderate category, namely 11 respondents. This is due to the level of implementation of IPM on planting, farmers in Sendangrejo Hamlet know little and understand the benefits of crop rotation and rarely do it on their land.

Respondents in knowing the type of fertilizer are mostly in the high category totaling 18 people. This shows that most of the farmers in Sendangrejo Hamlet know the various kinds of fertilizers applied to rice cultivation . Balanced fertilizers are also generally known by farmers, namely the provision of organic fertilizers in addition to synthetic fertilizers. This is to suppress p ermasalahan arising about the dependence of farmers to inorganic fertilizers that have an impact on the use of excessive (Susanti, et al., 2020).

In Integrated Pest and Disease Management (IPM), most of the farmers are in the medium category, namely 13 people. This shows that farmers in Sendangrejo Hamlet know little about IPM and the use of natural enemies.

Be r ity of data on pest monitoring and Natural Enemies above respondents in the higher category ie 18 people. This means that farmers in Sendangrejo Hamlet often observe pests and natural enemies to determine the development of their plants. Pest attack constraints arise due to the influence of environmental factors that encourage population development . Routine land monitoring on the development of pest populations, natural enemy functions , and ecology must be carried out in an effort to determine the ecological condition of the land that continues to develop (Indiati and Marwoto, 2017)

The purpose of this study was to determine the relationship between social factors and the implementation of IPM for rice plants in Sendangrejo Hamlet, Jombang district. To find it, use *Rank Spearman (r_s) test*, significant level of the value obtained by taking the value of $t_{arithmetic}$ and $t_{table.}$ The results of the analysis of the relationship between social factors and the level of implementation can be seen in Table 7 below:

Table 7. Analysis of the Relationship of Social Factors with the Level of IPM Implementation of Rice Plants

**			X1	X2	X3	X total	Ytotal
Spearman	Correlation	X1	1,000	0 .114	0 .595*	0 .7 67 **	0 .594 **
Rho	Sig (2-tailed)		.	0 .633	0 .006	0.000	0 .006
	N		20	20	20	20	20
	Correlation	X2	0 .114	1,000	0 . 212	0 . 635 **	0 . 732 **
	Sig (2-tailed)		0 . 633	.	0 . 370	0 . 003	0.000
	N		20	20	20	20	20
	Correlation	X3	0 .595*	0 .212	1,000	0 . 776 **	0.674 **
	Sig (2-tailed)		0 .006	0 .370	.	0 .000	0 .001
	N		20	20	20	20	20
	Correlation	X	0 .767 **	0 . 635 **	0 .776 **	1,000	0 . 926 **
	Sig (2-tailed)	Total	0 000	0.003	0 .000	.	0 000
	N		20	20	20	20	20
	Correlation	Y	0 .594 **	0 .732**	0 0.674 **	0 . 926 **	1,000
	Sig (2-tailed)	Total	0 .006	0.000	0 .001	0.000	.
	N		20	20	20	20	20

Correlation is significant at the 0.01 level (2-tailed).

Information ** is Significant at = 0.01, X1 is the age of the respondent, X2 is the last education, X3 is the length of farming, X Total is a Social Factor and Y Total is IPM implementation. T abel 7d apat in mind that the acquisition of analysis that displays a significant relationship between variables X and Y. The relationship of age to the level of implementation of IPM can be presented in details Table 8.

Table 8. Age Relationship with The Level of IPM Implementation

Correlations			Age	Y Total
Spearman's rho	Age	Correlation coefficient Signification N	1,000 . 20	0.594 ** 0 .006 20
	Y Total	Correlation coefficient Signification N	0.594 ** 0 .006 20	1,000 . 20

Data source: *2012 primary data analysis*

Results Table 8 refers k an existence h ubunga n lower the age of the respondent at the implementation level with the direction of a positive relationship. This can be shown by looking at the acquisition of a correlation coefficient of 0 . 594 **. Korela the significant value for 0006 is smaller than 0. 01 as well as the two variables is positive (unidirectional). Based on the above observations with Spearman rank correlation test analysis that the age of the farmer is closely related to the level of IPM implementation in rice plants . Age is a factor in the implementation of IPM because a person's productive age can work optimally, and farmers easily receive information about IPM and apply it. Badriyah and Wahyuning, (2019) mentions that the productive age farmers ber ability minded and conditions of the physical and the views were excellent in penyerapam information and technology as well as easy to implement .

The relationship between farmer education and IPM implementation can be seen in the following table 9:

Table 9. Relationship Between Education Level and IPM Implementation

Correlations			Education	Y Total
Spearman's rho	Education	Correlation coefficient Signification N	1,000 . 20	0 .732** 0.000 20
	Y Total	Correlation coefficient Signification N	0 .732** 0.000 20	1,000 . 20

Data source: *2012 primary data analysis*

Table 9 designate k an association is quite an education to the level of implementation of IPM is scoring a correlation coefficient of 0 . 7 3 2** . K orelasi can significantly demonstrated by sig (2-tailed) yan g obtained 0.000 sig smaller than 0. 0 1 and both variables are positive and unidirectional . Based on the Spearman rank correlation test analysis, education is related to the implementation of IPM. This shows that education is a factor that has a very important relationship to implementation. The level of education affects respondents to be more productive in carrying out new innovations and easily absorb information and carry out its applications . Simanjuntak, et al, (2012) reported that education affects a farmer in receiving and absorbing useful information to improve the quality and quantity of production.

Table 10. The relationship between the length of farming and the level of IPM implementation

Correlations			Long	
			Farming	Y Total
Spearman's rho	Farming time	Correlation coefficient Signification N	1,000 . 20	0.674** 0 .001 20
	Y Total	Correlation coefficient Signification N	0.674 ** 0.001 20	1,000 . 20

Data source: *2012 primary data analysis*

Based on Table 10 d apat seen their farming length relationship with IPM implementation level sufficient to figures obtained coefficient of 0 .6 7 4 ** worth significantly smaller or 0. 0000 from 0 to 1 and is positive for the coefficient values are unidirectional . Based on the Spearman rank correlation test analysis, it was stated that the length of time in farming was very significantly related to the level of

IPM implementation. In Sendangrejo Hamlet, some farmers have long experience . It can be concluded that farmers who have more experience can think and implement new innovations to improve agriculture in their area. This is stated by Ismilaili, et al. (2015) that farmers who ber experince anluas, more able to forward thinking ways to improve farming with the air of technologies that can be done and find a solution to a problem 's facing.

Based on the observation of data in the field with the *Spearman rank test* that age, education and length of farming are very significant to the level of implementation. Thus all three of these factors can make toll o k measuring the importance of the implementation level.

CONCLUSION

Unut, education and length of farming related significantly to the level of implementation of IPM in Hamlet Sendangrejo, Banjardowo Village, District Jombang. So that these three factors can be used as benchmarks in the importance of the level of IPM implementation on farmers.

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