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Relationship between Attitude Oil Palm Smallholders Towards Ganoderma Disease and their Socio-Economic Characteristics

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Abstract: This cross-sectional survey study has focused on the statistical techniques using factor analysis in identifying the attitude of oil palm smallholders towards Ganoderma disease. Comparison test was done to determine the relationship between smallholder's socio-economic characteristics and their attitude towards the disease. The data were collected through face-to-face interview by using structured questionnaire. A total of 620 oil palm smallholders have been interviewed during the data collection. The data collected was analyzed by using descriptive analysis, factor analysis and non-parametric techniques using Mann-Whitney U test and Kruskal-Wallis test. The findings show that there were two main components of attitude, namely difficult to manage ganoderma disease and difficult to get information and lack of exposure. Comparison test using non-parametric tests show there were no significant differences across the categories of the selected socio-economic characteristics except experience in oil palm cultivation and category of smallholders. But all of the respondents did not agree with both components except the respondents who are categorized as independent smallholders.

Key words: Oil palm, smallholder, Ganoderma, attitude, independent, respondents

INTRODUCTION

The oil palm tree (*Elaeis guineensis*) is an ancient plant originates from West Africa where it grows in the mild and later was developed into an agricultural crop. Malaysia is one of the largest producers and exporters of palm oil in the world. Malaysia currently account for 39% of world palm oil production and 44% of world exports. If taken into account of others oils and fats produced in the country, Malaysia accounts for 12 and 27% of the world's total production and exports of oils and fats. But the oil palm industry in the country is now facing many issues and problems. One of the issues is Ganoderma Basal Stem Rot disease or also known as Ganoderma disease (Aderungboye, 1977). This disease is caused by a fungus called as Ganoderma boninense. This disease is lethal with the fungus gradually colonizing the lower 4-5 feet of the trunk of the palm tree. It makes the palm tree rotting from the inside (Hushiarian *et al*., 2013).

Ganoderma disease has the ability to cause significant yield losses before it has actually killed the host which is the oil palm tree. The disease can be spread to other palm trees through water, wind as well as root contact. Currently, there are many methods available to detect and also to control the infection of the disease. But none of the methods can effectively cure the infected palms in the commercial oil palm field. Most of the method can only delay the dead of the infected palms in order to minimize the yield losses. In Malaysia, the oil palm planters are divided into two, namely estate management system and smallholder schemes (Hameed *et al*., 2009).

Smallholders are defined as farmers growing oil palm, sometimes along with subsistence production of other crops. Majority of labor are provided by the family while the farm provides the principle source of income. People in this smallholder category are often also holders of customary rights (Field, 2009). At present, the main types of arrangements for smallholders are independent smallholders and organized smallholders (Ismail *et al*., 2013). Farmers who cultivate palm oil without direct assistance from government or any private companies are known as independent smallholders while government agency provides agriculture inputs, technical assistance and sometimes partially subsidized are known as

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organized smallholders. Given its small size of plantation, smallholders typically have limited access to certain resources such as capital, marketing information and technical expertise.

The 41% of the 4.5 million hectares of palm oil planted in Malaysia are cultivated by oil palm smallholders (Azmi and Nagiah, 2012). However, many smallholders did not realize that their fields were infected with Ganoderma Basal Stem Root (BSR) (Diana, 2012). Even if they know about this fatal disease, many of them did not know how serious this plant disease can affect the production. The disease has caused economic losses of oil palm in various regions around the world including Southeast Asia (Hushiarian *et al*., 2013). The objectives of this study are:

- To identify the main components of attitude of oil palm smallholders towards Ganoderma disease
- To measure the relationship between the oil palm smallholder's socioeconomic characteristics and their attitude towards Ganoderma disease

MATERIALS AND METHODS

This cross-sectional survey covers 620 oil palm smallholders sampled from Sabah and Peninsular Malaysia. The data has been collected using structured questionnaire through face-to-face interview with the oil palm smallholders which include organized and independent oil palm smallholders. A multistage sampling method has been used in selecting the respondents. The attitude of respondents towards Ganoderma disease was measured by eight Likert scale's items. All these eight individual items had six response alternatives which are 1 = not sure, 2 = strongly disagree, 3 = disagree, 4 = somewhat disagree, 5 = agree and 6 = strongly agree. Factor analysis by using principle component analysis as extraction method and varimax with kaiser normalization as rotation method was used to identify the main components of attitude. The summated scores which were derived from Likert-type scales were used for comparison test (Clason and Dormody, 1994; Warmbrod, 2014). Mann-Whitney U test and Kruskal Wallis test were used to compare the attitude of respondents across their socioeconomic characteristics.

RESULTS AND DISCUSSION

Table 1 shows the socio-economic characteristics of the respondents which include gender, age category, education level, experience in oil palm cultivation and category of smallholder.

Table 1: Socio-economic characteristics of the respondents

Variables	Count	Percentage
Gender		
Male	459	74.0
Female	161	26.0
Age category		
20-40 years old	155	25.0
41-60 years old	338	54.5
>60 years old	127	20.5
Education level		
Never attended any formal education school	89	14.4
Primary school	235	37.9
Secondary school and above	296	47.7
Experience in oil palm cultivation		
1-15 years	370	59.7
16-30 years	191	30.8
>30 years	59	9.5
Category of smallholder		
Organized smallholder	184	29.7
Independent smallholder	436	70.3

Kaiser-Meyer-Olkin (KMO) and Bartlett's test were used to check the suitability of factor analysis on the eight attitude's items in terms of sampling adequacy and sphericity. The value of KMO is 0.822 which falls into the range of great which is close to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors.

Bartlett's test tells us whether our correlation matrix is significantly different from an identity matrix. The result shows that the correlations between variables are (overall) significantly different from zero ($p<0.05$). Both Kaiser-Meyer-Olkin (KMO) and Bartlett's test show that factor analysis is appropriate to conduct in this study (Field, 2009). Factor analysis revealed that there were two main components of attitude of the respondents towards Ganoderma disease which component 1 and 2 explain 47.449 and 18.031% of the total variance, respectively. There were five items categorized under component 1 and three items under component 2 as shown in Table 2. The component 1 is more to the attitude of difficult to manage the disease management and the component 2 is more to the attitude of difficult to get information and lack of exposure. The reliability analysis by using Cronbach's aplha also shows that both components are reliable.

The mean summed score for component 1 and component 2 are 19.85 and 13.52, respectively. The higher the mean summed score, the higher the agreement of respondents towards component. Based on the mean summed score, the average score per item (i.e., mean score divided by number of items in the component) in component 1 and 2 are $3.97\approx4$ (this code refers to somewhat disagree) and $4.51\approx5$ (this code refers to agree), respectively. On average, the respondents did

Table 2: Factor analysis on the attitude of smallholders towards ganoderma disease

Variables	Factor loadings 1	2
Difficult to detect the disease	0.664	-
The disease affects the income of oil palm smallholders	0.722	-
Difficult to control the disease	0.791	-
The cost to treat the infected palm is too expensive	0.661	-
Difficult to detect the symptoms of the infection	0.705	-
Difficult to get the information about the disease	-	0.821
Smallholders are not exposed to the curative control of the disease	-	0.934
Smallholders arenot exposed to the preventive control of the disease	-	0.912
Cronbach's alpha	0.782	0.899
Variance explained (%)	47.449	18.031

Table 3: Comparison of summed score of component 1

Variables	Summed score of component 1 Median	Mean	SD
Gender[a]			
Male	22	19.78	6.31
Female	22	20.04	6.61
Age category[b]			
20-40 years old	21	19.57	5.72
41-60 years old	22	19.69	6.74
>60 years old	23	20.62	6.18
Education level[b]			
Never attended any formal education school	21	18.45	7.60
Primary school	23	20.71	6.03
Secondary school and above	21	19.59	6.19
Experience in oil palm cultivation[b*]			
1-15 years	21	18.95	6.81
16-30 years	23	21.34	4.99
>30 years	23	20.68	6.76
Category of smallholder[a]			
Organized smallholder	21	19.24	6.68
Independent smallholder	22	20.11	6.25

[a]The comparison test used was Mann-Whitney U test; [b]The comparison test used was Kruskal-Wallis test; [*]There is a significant difference across categories at 5% level of significance

not agree with the attitude that difficult to manage Ganoderma disease but they agreed that there was difficult to get information and lack of exposure about Ganoderma disease.

Further analysis which is comparison test was performed to test if there is a significant difference between the attitude of the respondents towards Ganoderma disease according to their socioeconomic characteristics. The normality test results using kolmogorov-smirnov show that both of the components are not normally distributed ($p<0.05$). Since, both components were not normally distributed, the non-parametric comparison tests, namely Mann-Whitney U test for two group's comparison and Kruskal-Wallis test for more than two group's comparison were used for comparison analysis.

Table 4: Comparison of summed score of component 2

Variables	Summed score of component 2 Median	Mean	SD
Gender[a]			
Male	15	13.62	3.79
Female	15	13.22	4.49
Age category[b]			
20-40 years old	15	13.23	4.07
41-60 years old	15	13.46	4.05
>60 years old	15	14.02	3.68
Education level[b]			
Never attended any formal education school	15	12.96	4.98
Primary school	14	13.65	3.64
Secondary school and above	15	13.59	3.91
Experience in oil palm cultivation[b*]			
1-15 years	15	13.10	4.50
16-30 years	15	13.98	2.74
>30 years	15	14.66	3.55
Category of smallholder[a*]			
Organized smallholder	14	12.58	4.52
Independent smallholder	15	13.92	3.67

[a]The comparison test used was Mann-Whitney U test; [b]The comparison test used was Kruskal-Wallis test; [*]There is a significant difference across categories at 5% level of significance

The results of comparison tests show that there were no significant differences in the summed score of component 1 across all the categories of the selected socioeconomic characteristics except the experience in oil palm cultivation (χ^2 = 13.060, df = 2, p = 0.001) (Table 3). That means all of the respondents have the same attitude towards difficult to manage Ganoderma disease regardless of their gender, age, education and smallholder category. But the respondents who had <15 years experience in oil palm cultivation (mean summed score = 18.95 or equivalent to 3.79≈4 which refers to some what disagree) have higher disagreement with attitude of component 1 as compared to those respondents who had experience 16-30 and (mean summed score = 21.34 or equivalent to 4.27≈4 which refers to somewhat disagree) >30 years (mean summed score = 20.68 or equivalent to 4.14≈4 which refers to some what disagree). But based on the mean score per item, all of the respondents did not agree with the attitude of component 1 which is difficult to manage Ganoderma disease regardless of their experience in oil palm cultivation. This could be due to the fact that the occurrence and severity of pests and diseases in smallholder's plantation are still not serious and under control (Nkongho *et al*., 2014). That means there is no issue of disease management, since the disease incidence is still not give a significant impact to the income of smallholders.

The results of comparison tests show that there were no significant differences in the summed score of component 2 across all the categories of the selected socioeconomic characteristics except the experience in oil palm cultivation ($\chi^2 = 8.051$, df = 2, p = 0.018) and category of smallholder (p = 0.001) (Table 4). That means all of the respondents have the same attitude towards the statement that difficult to get information and lack of exposure regardless of their gender, age and education.

But the respondents who had <15 years experience in oil palm cultivation (mean summed score = 13.10 or equivalent to 4.37≈4 which refers to somewhat disagree) have higher disagreement with attitude of component 2 as compared to those respondents who had experience 16-30 (mean summed score = 13.98 or equivalent to 4.66≈5 which refers to agree) and >30 years (mean summed score = 14.66 or equivalent to 4.89≈5 which refers to agree). This shows that the respondents who had >15 years experience agreed with the statement that difficult to get information and lack of exposure about Ganoderma disease. But for those who had <15 years experience disagreed with the statement. In terms of category of smallholders, the organized smallholders did not agree (mean summed score = 12.58 or equivalent to 4.19≈4 which refers to somewhat disagree) with statements in component 2 as compared to the independent smallholders where they feel that the statements in component 2 are true (mean summed score = 13.92 or equivalent to 4.64≈5 which refers to agree). This finding supports the fact that organized smallholders always receive continuous monitoring from their responsible agencies as compared to the independent smallholders whereby they have to depend on their own effort to get information and exposure about Ganoderma disease.

The relevant authorities should plan a good program like the supervised fertilizer cluster program conducted by Malaysian palm oil board in 2003 which had increased the knowledge of the smallholders in many aspect including disease control (Roslan *et al*., 2010).

CONCLUSION

This study was conducted to identify the attitude of oil palm smallholders in Malaysia towards Ganoderma disease and to relate their attitude with the selected socioeconomic characteristics. The findings show that there were two main components of attitude, namely difficult to manage Ganoderma disease and difficult to get information and lack of exposure. Comparison test using non-parametric tests show there were no significant differences across the categories of the selected socio-economic characteristics except experience in oil palm cultivation and category of smallholders. But all of the respondents did not agree with both components except the respondents who are categorized as independent smallholders. It is clear that the main issue here is the difficulty in getting the information as well as the lack of exposure about Ganoderma disease. The relevant parties could use the findings of this study to plan their strategic program to improve the knowledge as well as the skills of oil palm smallholders in managing Ganoderma disease.

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