Attitude of Oil Palm Smallholders towards *Ganoderma* Disease

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ABSTRACT

This study was conducted to identify the attitude of oil palm smallholders towards *Ganoderma* disease. The data for this cross-sectional survey were collected through face-to-face interview by using structured questionnaire. A total of 1010 oil palm smallholders have been interviewed during the data collection. The data collected was analyzed by using descriptive analysis, factor analysis, and comparison test using non-parametric tests. The results of factor analysis show that there were three main components of attitude, namely lack of exposure towards the disease (Component 1), difficult to detect the disease (Component 2), and negative effect of the disease on the net profit (Component 3). Comparison test using non-parametric tests show there were significant differences in the summed score of all the components across the categories of the selected socioeconomic characteristics The findings of this study may useful to the relevant authorities in identifying strategic programs to improve the knowledge as well as the skills of oil palm smallholders in managing *Ganoderma* disease.

Keywords: Smallholders, Attitude, Oil Palm, *Ganoderma*
JEL Classifications: Q1, P32

1. INTRODUCTION

The oil palm tree or scientifically known as *Elaeis guineensis* is an ancient plant originates from West Africa where it grows in the mild and later was developed into an agricultural crop. This crop is considered as the golden crop in Malaysia. But the oil palm industry in the country is now facing a devastating disease which is called as *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. In Malaysia, the

oil palm planters are divided into two, namely estate management system and smallholder schemes (Amna Awad and Fatimah, 2007).

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 (Vermeulen and Goad, 2006). At present, the main types of arrangements for smallholders are independent smallholders and organized smallholders (Azman et al., 2003). 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 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 (Nagiah and Azmi, 2012). However, many smallholders did not realize that their fields were infected with *Ganoderma* basal stem root (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:

i. To identify the main components of attitude of oil palm smallholders towards *Ganoderma* disease; and
ii. To measure the relationship between the oil palm smallholders' socioeconomic characteristics and their attitude towards *Ganoderma* disease.

2. MATERIALS AND METHODS

This cross-sectional survey covers 1010 oil palm smallholders sampled from the state of 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 = Strongly disagree, 2 = Disagree, 3 = Not sure, 4 = Agree, and 5 = 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 summated scores of attitude of respondents across their socioeconomic characteristics.

3. RESULTS AND DISCUSSION

Table 1 shows the socioeconomic characteristics of the respondents which include gender, age category, education level, experience in oil palm cultivation, and category of smallholder. 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 0.756, 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 KMO and Bartlett's test show that factor analysis is appropriate to conduct in this study (Field, 2009).

Factor analysis revealed that there were three main components of attitude of the respondents towards *Ganoderma* disease which Component 1, Component 2, and Component 3 explain 41.852%, 15.891%, and 13.867% of the total variance respectively. There were two items categorized under Component 1 and three items under Component 2 and also Component 3 as shown in Table 2. The Component 1 is more to the lack of exposure towards the disease, while the Component 2 is more to the difficult to detect the disease, and the Component 3 is more to the negative effect of the disease on the net profit. The reliability analysis by using Cronbach's Aplha also shows that three components are reliable (Table 2).

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, Component 2, and Component 3 are 3.77 ≈ 4 (this code refers to agree), 3.23 ≈ 3 (this code refers to not sure), and 3.79 ≈ 4 (this code refers to agree) respectively. On average,

Table 1: Socioeconomic characteristics of the respondents

Characteristics	Count (%)
Gender	
Male	807 (79.9)
Female	203 (20.1)
Age category (years old)	
20-40	171 (16.9)
41-60	594 (58.8)
>60	245 (24.3)
Education level	
Never attended any formal education school	116 (11.5)
Primary school	504 (49.9)
Secondary school and above	390 (38.6)
Experience in oil palm cultivation (years)	
1-10	367 (36.3)
11-20	274 (27.1)
>20	369 (36.5)
Category of smallholder	
Organized smallholder	463 (45.8)
Independent smallholder	547 (54.2)

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

Factors	Factor loadings		
	1	2	3
Difficult to detect the disease		0.867	
The disease affects the income of oil palm smallholders			0.667
Difficult to control the disease			0.800
The cost to treat the infected palm is too expensive			0.787
Difficult to detect the symptoms of the infection		0.844	
Difficult to get the information about the disease		0.615	
Smallholders are not exposed to the curative control of the disease	0.894		
Smallholders are not exposed to the preventive control of the disease	0.834		
Cronbach's alpha	0.797	0.778	0.673
Percentage of variance explained	41.852	15.891	13.867

the respondents agreed that less exposure on *Ganoderma* disease and the disease gives negative impact on their net profit. But they did not sure about the detection of the disease either difficult or not. Further analysis which is comparison test was performed to test if there is a significant difference between the attitudes of the respondents towards *Ganoderma* disease according to their socioeconomic characteristics. The normality test results using Kolmogorov-Smirnov show that all of the components are not normally distributed ($P < 0.05$). Therefore, the non-parametric comparison tests, namely Mann-Whitney U-test for two groups' comparison and Kruskal-Wallis test for more than two groups' comparison were used for comparison analysis.

Table 3 shows that the comparison of the Component 1's summed score by gender, age, education, experience, and category of smallholder. 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 category of smallholder. That means all of the respondents have the same attitude that smallholders are lacking of exposure on *Ganoderma* disease regardless of their gender, age, education, and experience. But the respondents who are independent smallholders (mean summed score = 7.70 or equivalent to 3.85 ≈ 4 which refers to Agree) have higher agreement with attitude of Component 1 as compared to those respondents who are organized smallholders (mean summed score = 7.35 or equivalent to 3.68 ≈ 4 which refers to agree). This is due to the fact that the organized smallholders always receive continuous advice and guidance from their respective agencies. 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).

Table 4 shows that the comparison of the Component 2's summed score by gender, age, education, experience, and category of smallholder. The results of comparison tests show that there were significant differences in the summed score of Component 2 across gender, education level, and experience in oil palm cultivation. The female respondents have higher agreement on the difficulty in detecting the disease as compared to the male respondents. The respondents who never attended any formal education school have higher agreement on Component 2 as compared to those respondents who have attended at least primary school. In terms of experience in oil palm cultivation, those respondents who have 10 years or less experience have felt more difficulties in detecting the disease as compared to the respondents who have experience more than 10 years. This shows that the experience plays very important role in helping the oil palm smallholders in managing the disease.

Table 5 shows that the comparison of the Component 3's summed score by gender, age, education, experience, and category of smallholder. The results of comparison tests show that there were significant differences in the summed score of Component 3 across age category, education level, experience in oil palm cultivation, and category of smallholder. The older respondents

Table 3: Comparison of summed score of Component 1

Characteristics	Summed score of Component 1		
	Median	Mean	Standard deviation
Gender[a]			
Male	8.00	7.55	1.56
Female	8.00	7.48	1.79
Age category[b] (years old)			
20-40	8.00	7.29	1.82
41-60	8.00	7.54	1.61
>60	8.00	7.69	1.43
Education level[b]			
Never attended any formal education school	8.00	7.63	1.61
Primary school	8.00	7.48	1.54
Secondary school and above	8.00	7.58	1.70
Experience in oil palm cultivation[b] (years)			
1-10	8.00	7.44	1.78
11-20	8.00	7.54	1.54
>20	8.00	7.63	1.47
Category of smallholder[a]*			
Organized smallholder	8.00	7.35	1.53
Independent smallholder	8.00	7.70	1.66

[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

Table 4: Comparison of summed score of Component 2

Characteristics	Summed score of Component 2		
	Median	Mean	Standard deviation
Gender[a]*			
Male	10.00	9.48	2.63
Female	11.00	10.47	2.38
Age category[b] (years old)			
20-40	10.00	9.82	2.25
41-60	10.00	9.61	2.71
>60	10.00	9.73	2.61
Education level[b]*			
Never attended any formal education school	11.00	10.51	2.26
Primary school	9.00	9.26	2.74
Secondary school and above	10.00	9.97	2.44
Experience in oil palm cultivation[b]* (years)			
1-10	10.00	10.01	2.37
11-20	10.00	9.51	2.72
>20	10.00	9.47	2.73
Category of smallholder[a]			
Organized smallholder	10.00	9.81	2.65
Independent smallholder	10.00	9.56	2.57

[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

(i.e., >60 years old) have higher agreement on the negative effect of the disease on the net profit as compared to the respondents who <60 years old. In terms of experience in oil palm cultivation, those respondents who have more than 20 years' experience have higher agreement on the Component 3 as compared to the respondents who have experience less than 20 years. The respondents who are categorized as organized smallholders have higher agreement on this component than the respondents which are categorized as

Table 5: Comparison of summed score of Component 3

Characteristics	Summed score of Component 3		
	Median	Mean	Standard deviation
Gender[a]			
Male	12.00	11.39	1.95
Female	12.00	11.33	2.06
Age category[b]* (years old)			
20-40	11.00	10.82	2.01
41-60	12.00	11.49	1.96
>60	12.00	11.51	1.90
Education level[b]*			
Never attended any formal education school	12.00	11.16	2.04
Primary school	12.00	11.54	1.96
Secondary school and above	12.00	11.24	1.96
Experience in oil palm cultivation[b]* (years)			
1-10	11.00	11.10	1.92
11-20	12.00	11.31	2.01
>20	12.00	11.72	1.95
Category of smallholder[a]*			
Organized smallholder	12.00	11.57	2.09
Independent smallholder	12.00	11.22	1.85

[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

independent smallholders. Independent oil palm smallholders receive limited institutional, technical and financial support and lack knowledge regarding best practices and new technologies especially on the disease management (Nagiah and Azmi, 2012). This could be the factor that differentiates their knowledge on the impact of *Ganoderma* disease.

4. CONCLUSIONS

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 three main components of attitude, namely lack of exposure towards the disease, difficult to detect the disease, and negative effect of the disease on the net profit. Comparison test using non-parametric tests show there were significant differences across the categories of the selected socioeconomic characteristics. 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.

5. ACKNOWLEDGMENTS

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