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Socio-Economic Factors Influencing Attitude of Sabah's Oil Palm Smallholders in dealing with Ganoderma Basal Stem Rot Disease

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ABSTRACT

The main focus of this paper was to determine the relationships between the socio-economic background of Sabah's oil palm smallholders and their attitude in dealing with Ganoderma Basal Stem Rot (BSR) disease. A multistage random sampling using a structured questionnaire was used to obtain the data from 500 oil palm smallholders in nineteen different districts in Sabah. Based on the factor analysis on the attitude towards Ganoderma disease, respondents indicated that they knew the causes of the disease infection. But in terms of disease management, such as, treatment and preventive measures, their exposure to information was limited, while at the same time they were facing constraints in dealing with the disease. The study findings showed that there were significant relationships between socio-economic background and attitude of the oil palm smallholders in terms of category of smallholders, gender, level of education and years of experience in oil palm cultivation. The existing relevant agencies in Sabah, such as, the Malaysia Palm Oil Board (MPOB), Sabah State Department of Agriculture and Former Association should step up their efforts to provide better information and create more awareness among oil palm smallholders about the disease, and to really convince them about its devastating economic and social impacts. Comprehensive trainings in managing the disease should be conducted, giving priorities to controlling the disease through more affordable and less burdensome, but more effective methods.

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INTRODUCTION

Smallholders have become increasingly significant for global agricultural value chain. As for oil palm smallholders, they were a part of the sustainable development of the oil palm industry (Dradjat, 2012). Oil palm smallholders in Malaysia were defined as those cultivating less than 100 acres (40.46 hectares) of oil palm land, and often categorized according to organization of their lands either as organized or independent smallholders (Rahman *et al*., 2008). One of the major drawbacks faced by oil palm industry in Malaysia since recent years had been the Basal Stem Rot (BSR) disease. BSR, a fungal disease caused by the white rot fungus, *Ganoderma* species, has been becoming a serious threat to the industry (Paterson, 2007). At the early stage of infection, the disease symptoms of BSR were difficult to detect and identify through naked eye observation (Susanto, 2009). This fungi also had high ability to spread the disease through root-to-root contact, basidiospore and soil inoculum assisted by dissemination agents, such as, water, wind and soil. The disease caused severe economic losses in oil palm producing countries, such as, Malaysia and Indonesia resulting in the decline of fresh fruit bunch (FFB) production and the death of oil palm trees (Roslan and Idris, 2012; Susanto, 2012). However, there is still no effective control measure to eradicate this devastating disease. Implementation of good agricultural practices, integrated sanitation, biological and chemical control measures in the field were considered as the best options in order to minimise disease incidence and slow down the progress of *Ganoderma* infection (Hushiarian *et al*., 2013).

Besides the major plantations, oil palm smallholdings could also be seriously affected. In

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2013, the incidence of BSR disease on the selected oil palm smallholders in Malaysia was eight percent covering the 2744.96 hectares of oil palm planted areas (Idris *et al*., 2014). Due to the limited knowledge and awareness about the disease, however, most of the oil palm smallholders did not realize of the existence of the disease in their land holdings (Assis *et al*., 2014). This scenario existed in a situation where the oil palm smallholders made up a vital component of the national palm oil industry, and controlling more than 40 percent of the total 5.12 million hectares of oil palm in the country (May *et al*., 2014). Smallholders were often facing constraints and limitations to achieve the high yield oil palm production besides the limited access to technical support and lack of knowledge in oil palm management (Iqlima *et al*., 2015).

Objective:

To determine the relationships between socio-economic background and attitude of oil palm smallholders in Sabah, Malaysia in dealing with Ganoderma Basal Stem Rot disease.

Research Methodology:

The research area was conducted in the State of Sabah. Sabah is Malaysia's largest crude palm oil producing state with 1.55 million hectares of oil palm planted area and accounted for the highest fresh fruit bunches yield, producing an average of 21.34 tonnes per hectare (MPOB, 2015). A cross-sectional survey method was used to obtain the data through personal interview with the selected oil palm smallholders. A comprehensive structure questionnaire was used as an instrument to acquire responses from the respondents who were selected through multistage random sampling method. Factor analysis was used to identify the number of factors affecting the attitude of oil palm smallholders in dealing with the *Ganoderma* disease. The relationships between the respondents' socioeconomic background and their attitude was tested by using Mann-Whitney U Test and Kruskal-Wallis Test.

RESULTS AND DISCUSSION

Focussing on districts with high concentrations of oil palm smallholders in the State of Sabah, Malaysia, a total of 500 oil palm smallholders was selected in the study. The districts involved and the percentage of respondents from each district were Tawau (11.6 percent), Sandakan (10.2 percent), Keningau (10 percent), Lahad Datu (8.2 percent), Beluran (7.2 percent), Pitas (6.8 percent), Kinabatangan (6.6 percent), Semporna (6 percent), Tongod (5.6 percent), Beaufort (5 percent), Kunak (3.8 percent) and others (19 percent).

Socio-economic Background:

Table 1 summarized the socio-economic background of the respondents selected in terms of category of smallholder, gender, age, educational level and experience in oil palm cultivation.

Table 1: Socio-economic background.

		N	(%)
Category of smallholder	Organized smallholder	162	32.4
	Independent smallholder	338	67.6
Gender	Male	352	70.4
	Female	148	29.6
Category of age	≤40 years	138	27.6
	40-60 years	271	54.2
	> 60 years	91	18.2
Educational level	Never attend any formal school	86	17.2
	Primary school	159	31.8
	Secondary school	209	41.8
	STPM/Higher education institute	46	9.2
Experience in oil palm cultivation	≤ 10 years	264	52.8
	11-20 years	129	25.8
	> 20 years	107	21.4

Attitude:

Seventeen items related to the attitude of respondents in dealing with *Ganoderma* disease were analysed using factor analysis to simplify the main information contained in the variables. The suitability of the data for factor analysis was accepted when Kaiser-Meyer-Olkin (KMO) showed value of 0.898 which exceeded the recommended value of .6 and Bartlett's test was highly significant ($p=0.000$, $p< 0.05$). The extraction method using Principle Component Analysis (PCA) revealed the existence of three factors with eigenvalue greater than 1, explaining 37.09%, 16.14% and 7.41% of variance, respectively. Table 2 shows the results of rotated matrix using Varimax method with Kaiser Normalization. The rotated solution revealed there were three factors extracted. The eight items related to having knowledge on causes of disease infection were loaded strongly on Factor 1, while the three items related to lacking of exposure on disease management were loaded strongly on Factor 2 and the four items related to having constraint in dealing with disease were loaded on Factor 3.

Table 2: Results of Factor analysis with Varimax rotation.

Factor and variable	Factor loading	% variance
Factor 1: Having knowledge on causes of disease infection		37.09
Frequent rains also affect the spread of this disease	.804	
Planting density is important in reducing the spread of this disease	.773	
The disease is also affected by soil condition	.760	
The disease incidence is high at hilly area as compared to the flat area	.746	
The disease incidence could be reduced by practicing good replanting method	.730	
The area which is previously planted with cocoa is more risky being infected by the disease	.699	
The disease occurs is due to not practicing good agricultural practices	.646	
There is still no effective control measure available for the disease	.626	
Factor 2: Lacking of exposure on disease management		16.14
The oil palm smallholders were not exposed how to treat the infected palms	.932	
The oil palm smallholders were not exposed how to prevent the disease	.904	
Difficult to get information about the disease	.822	
Factor 3: Having constrain in dealing with the disease		7.41
Difficult to detect whether the palm infected or not	.759	
The disease affects the income of oil palm smallholders	.725	
Difficult to control the disease	.690	
Not many oil palm smallholders aware about the disease	.557	
Total of variance explained (%)		60.64

Relationships between Socio-Economic Background and Attitude:

The normality test results using Kolmogorov-Smirnov showed that the normality assumption for the three new factors did not fulfil the normality assumption since the p-value was less than 0.05 ($p=0.000$, $p<0.05$). Since data for all the factors were not normally distributed, the tests seemed appropriate for comparison analysis were Mann-Whitney Test and Kruskal-Wallis U Test. The socio-economic characteristics analyzed using Mann-Whitney U Test were category of smallholder and gender, while Kruskal-Wallis Test was conducted on a socio-economic characteristics, such as, educational level and years of experience in oil palm cultivation.

a. Category of smallholder:

The results showed that there was a significant difference between category of smallholder for Factor 1 ($Z=-2.5$, $p<0.05$) and Factor 2 ($Z=-4.2$, $p<0.05$). The mean rank of organized smallholders for Factor 1 was 273.74 compared to independent smallholders which was only 239.36 (Table 3). This indicated that organized smallholders were having more or better knowledge on causes of *Ganoderma* disease infection compared to that of independent smallholders. For Factor 2, independent smallholders had the higher mean rank indicating that they were more lacking of exposure on disease management compared to that of organized smallholders. These results supported the findings of previous studies indicating that the organized smallholders who always received guidance and exposure through training and advisory were found to be more knowledgeable towards *Ganoderma* disease compared to the independent smallholders, who depended on their own initiatives to learn and reach information about the disease (Assis *et al*., 2014).

Table 3: Mean Rank between category of smallholder on Factor 1 and Factor 2.

Factor	Category of smallholder	N	Mean Rank
1	Organized smallholders	162	273.74
	Independent smallholders	338	239.36
2	Organized smallholders	162	210.86
	Independent smallholders	338	269.50

b. Gender:

Based on these research findings, there was a significant difference between gender for Factor 1 ($Z=-2.8$, $p<0.05$) and Factor 3, ($Z=-3.1$, $p<0.05$). Table 4 below shows that the mean rank of male for Factor 1 was 262.40, much higher compared to that of female which was only 222.20. Therefore, male respondents could be assumed to having more knowledge on causes of *Ganoderma* disease infection compared to that of female respondents. Meanwhile, the mean rank of male for Factor 3 was only 237.55 and this was lower than mean rank of female which was 281.3. The results showed that male respondents in the overall were more knowledgeable than the female respondents about causes of *Ganoderma* disease, and female respondents were not exposed, as much as, male respondents about the disease. Based on Watson (2008), female farmers who played a critical role in agriculture in most developing countries must be empowered. This is to ensure gender equity. This statement also proved that most female farmers could be less knowledgeable compared to male farmers. Being less knowledgeable would contribute to constraints faced by female farmers in dealing with the *Ganoderma* disease.

Table 4: Mean Rank between genders of smallholders on Factor 1 and Factor 3.

Factor	Gender	N	Mean Rank
1	Male	352	262.40
	Female	148	222.20
3	Male	352	237.55
	Female	148	281.31

c. Level of education:

The study results indicated a significant difference between the levels of education of smallholders on Factor 3 (χ^2=10.888, p<0.05, p=0.012). Among the four educational levels, primary school accounted for the highest mean rank which is 276.59 compared with others (Table 5). Smallholders with primary school education were having more constraints in dealing with the *Ganoderma* disease. A recent study by Iqlima *et al*. (2015) found that low educational level could lead to the average knowledge among oil palm smallholders regarding *Ganoderma* disease especially in terms of identification and preventive measures. Another research by Khoram *et al*. (2006) also exposed that level of literacy had great influence on a farmer's attitude and practice towards implementation of sustainable agriculture. If we are to relate this situation to this study, we can conclude that the low educational level of the oil palm smallholders would contribute to them a limited access to information and hence contribute to their difficulties in managing the *Ganoderma* disease.

Table 5: Mean Rank between educational levels of smallholders on Factor 3.

Factor	Level of Education	N	Mean Rank
3	Never Attend Formal School	86	236.20
	Primary School	159	276.59
	Secondary School	210	231.49
	STPM/Diploma/Higher Education Institute	45	274.34

d. Experience in oil palm cultivation:

There was a significant difference between the experiences in oil palm cultivation of smallholders on Factor 2 (χ^2=10.096, p<0.05, p=0.006) and Factor 3 (χ^2=10.469, p<0.05, p=0.005). The highest mean rank for both factors for respondents with experience of more than 20 years which were 285.27 and 286.18, respectively (Table 6). These findings indicated that even though the smallholders had been involved in oil palm cultivation for more than 20 years, they were still getting little exposure or information about the *Ganoderma* disease management, thus making them face many constraints in dealing with the disease. These findings were somewhat similar to that of Ani *et al*. (2004) which found that the length of farming experience was not an important determinant in the adoption of technologies.

Table 6: Mean Rank between experiences in oil palm cultivation of smallholders on Factor 2 and Factor 3.

Factor	Experiences in oil palm cultivation	N	Mean Rank
2	≤ 10 years	264	233.46
	11-20 years	129	256.54
	> 20 years	107	285.27
3	≤ 10 years	264	233.29
	11-20 years	129	256.14
	> 20 years	107	286.18

Conclusion And Recommendations:

The findings of this study indicated that socio-economic factors, such as, category of oil palm smallholders, gender, level of education and years of experience in oil palm cultivation had significant influence on the attitude of the oil palm smallholders in Sabah, Malaysia towards the *Ganoderma* Basal Stem Rot (BSR) disease. The findings also indicated that the oil palm smallholders in the overall were having good knowledge on the causes of disease infection. However, they were still not getting adequate access to information or adequate exposure. This contributed to constraints encountered in overcoming or dealing with the devastating disease. Such a situation contributed to high operation costs in managing the disease.

It needs to be realized there are relevant agencies in the State of Sabah involved in various aspects of oil palm cultivation and production, particularly in dealing with the oil palm smallholders. These agencies included the Malaysian Palm Oil Board (MPOB), Sabah State Department of Agriculture and the Farmer Associations. One of the services founded by these agencies or association is extension or advisory service to farmers including the oil palm smallholders. Though the existence of the disease in the State of Sabah has not reached a critical stage as yet, it is only appropriate if these agencies or association take immediate actions to step up their extension efforts not only to create awareness, but to really convince the oil palm smallholders about the real danger, including the devastating economic consequence of the disease. Comprehensive trainings

should be provided to the oil palm smallholders in aspects of managing the disease. Priorities should be on training in controlling the disease through more affordable and less burdensome, but more effective methods to the smallholders

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