KNOWLEDGE AND PRACTICES OF OIL PALM SMALLHOLDERS IN EAST COAST MALAYSIA TOWARD BASAL STEM ROT DISEASE (GANODERMA BONINENSE) OF OIL PALM

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ABSTRACT

Basal stem rot disease (Ganoderma boninense) has been a disruptive disease in oil palm industry of Malaysia and it was first detected in the year 1931. This disease had caused a massive economic losses to the country, reported that annual loss is between RM225 million to RM1.5 billion (Arif et al., 2011). In oil palm industry, oil palm smallholders sector play an important role being part of the supply chain, is positioned at the upstream level, responsible for producing quality fresh fruit bunches (FFB) for the mills as a way of helping the economic development (Rahman and Shariff, 2008). However, smallholders also facing some problems to control the disease spread as such lack of information, inaccessibility and financial constraint in practicing the right agriculture practice in the oil palm cultivation. This paper is to identify and determine the knowledge and practices of oil palm smallholders towards basal stem rot disease (Ganoderma boninense) and also the socio-economic status that influenced their knowledge and practices in oil palm industry. Face to face interview was conducted using a structured questionnaire with a total of 84 respondents among the oil palm smallholders in east coast area of Malaysia. The results indicated that the knowledge of oil palm smallholders towards basal stem rot disease (Ganoderma boninense) is still low and having a good knowledge about a particular subject does not necessarily lead to practice. The relevant parties should involve directly in solving this problem especially in improving the awareness of oil palm smallholders towards the disease.

Key words: Knowledge, practices, oil palm smallholders, *Ganoderma* disease

Introduction

The oil palm smallholders sector has played an important role in contributing to the development of the Malaysian oil palm industry and it have become increasingly significant for global agricultural value chain over the years (Dradjat, 2012). Oil palm smallholders in Malaysia were defined as those cultivating oil palm less than 100 acres (40.46 hectares) of oil and they were categorized according to organization of their lands either as organized or independent smallholders (Rahman *et al.,* 2008). However, oil palm industry has gone through a major drawback since recent years pertaining to an incurable disease in the oil palm cultivation, Basal Stem Rot (BSR) disease. This disease has caused by a white rot fungus scientific namely as *Ganoderma boninense*. The fungi have high ability to spread the disease through dissemination agents causing a serious threat in the industry (Paterson, 2007). The oil palm smallholding was also severely affected which 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). This has also resulting in economic losses due to the decline of fresh fruit bunch (FFB) production and the death of oil palm trees (Susanto, 2011). Despite of the non-existence cure for the disease, it is important for the smallholders to minimize the disease spread by having good knowledge and awareness about the disease and also apply good agriculture practices in their cultivating land. Other oil palm industry stakeholders must also take precaution and mitigation measures to minimise the disease from separated and the government agencies need to monitor the smallholders in oil palm industry due to this group represent 13.58 % or 0.69 million hectares out of 5.08 million hectares (Iqlima et al., 2014).

Objectives

To identify the knowledge and practices of oil palm smallholders towards basal stem rot disease (*Ganoderma boninense*) and also to determine the socio-economic status that have influenced the oil palm smallholders' knowledge and practices in oil palm industry.

Materials & Method

This study was conducted in the east coast area of Malaysia which included the state of Kelantan, Terengganu and Pahang. A cross-sectional survey method was used which a total of 84 oil palm smallholders were interviewed personally using a comprehensive structured questionnaire as instrument. This was to obtain responses and data needed in this study. Respondents were selected through multistage sampling which on the first stage, using stratified sampling and second stage was simple random sampling. Majority of the smallholders interviewed were categorised under organised smallholders as they were guided and monitored by *Federal Land Development Authority* (FELDA) in their respective state. Meanwhile the minority was independent smallholders, whom did not receive guidance or monitored by any agency. Factor analysis was used to identify the number of factors affecting the knowledge and practices of oil palm smallholders toward Basal stem rot disease (*Ganoderma boninense*). The relationships between the respondents' socioeconomic background and their knowledge and practices were tested by using Mann-Whitney U Test and Kruskal-Wallis Test.

Results & Discussion

Socio economic background:

A total of 84 oil palm smallholders from three states of east coast Malaysia were interviewed. There were 32 (38.1%) smallholders interviewed in Pahang, 28 (33.3%) in Kelantan and 24 (28.6%) in Terengganu. The details information of the respondents according to their socio-economics background is as shown in Table 1.

Table 1: Socio-economic background (N=84)

		N=84	(%)
Types of smallholders	Organised smallholders	77	91.6
	Independent smallholders	7	8.4
Gender	Male	63	75.0
	Female	21	25.0
Age categories	≤40	5	6.0
	41-60	35	41.7
	>60	44	52.4
Education level	Never attend formal school	1	1.2
	Primary school	60	71.4
	Secondary school	22	26.2
	STPM/Higher education level	1	1.2

Knowledge:

Six items related to knowledge of oil palm smallholders towards Basal stem rot disease (*Ganoderma boninense*) were analysed using factorial analysis to simplify the main information contained in the variables. The items were as shown in Table 2. In Table 2, also shown to us the frequency analysis of the 84 cases answering the six items of knowledge variable in the questionnaire. The suitability of the data for factor analysis was accepted when Kaiser-Meyer-Olkin (KMO) showed value of 0.809 which exceeded the recommended value of .6 and Bartlett's test was highly significant (p=0.000, p< 0.05).

Table 2: Frequency analysis of 'knowledge' items

		N=84	%
Have you ever heard about *Ganoderma* disease or also known as basal stem root disease?	Yes	71	84.5
	No	13	15.5
Do you know that the disease is caused by fungus called as *Ganoderma*?	Yes	52	61.9
	No	32	38.1
Do you know any symptoms of the disease?	Yes	52	61.9
	No	32	38.1
Do you know that the disease can be transferred from palm to palm?	Yes	56	66.7
	No	28	33.3
Do you know that the infection of the disease can occur through root contact?	Yes	48	57.1
	No	36	42.9
Do you know that the disease can also attack young palm as yearly as nursery stage?	Yes	31	36.9
	No	53	63.1

The result of factorial analysis of 'knowledge' variables with varimax rotation shown in Table 3. The rotated solution revealed that there was only one factor extracted. The six items related to the disease knowledge were strongly loaded on Factor 1 with total variance explained of 69.32%.

Table 3: Result of factorial analysis of 'knowledge' variables (N=84)

Factor and variable	Factor loading	% variance
Factor 1: Disease knowledge		69.32
Have you ever heard about *Ganoderma* disease or also known as basal stem root disease?	.572	
Do you know that the disease is caused by fungus called as *Ganoderma*?	.856	
Do you know any symptoms of the disease?	.941	
Do you know that the disease can be transferred from palm to palm?	.940	
Do you know that the infection of the disease can occur through root contact?	.926	
Do you know that the disease can also attack young palm as yearly as nursery stage?	.688	

Normality test on the one factor from knowledge variables indicated that non-parametric test i.e Kruskal-wallis test seemed appropriate for the comparison analysis as the data for the factor were not normally distributed. The socio-economic characteristics analysed using Kruskal-wallis test were age categories of smallholder. Table 4 shown to us the mean rank between age categories of smallholders on Factor 1 with significant difference of x^2=3.892, p<0.05, p=0.042. The highest mean rank between the age categories of smallholders on Factor 1 was smallholders that categorised under >60 of age. This means the highest age category of smallholders know better about the disease while the other two age categories of smallholders have less knowledge about the disease as the mean ranks are lower.

Table 4: Mean Rank between age categories of smallholders on Factor 1

Factor	Age categories	N	Mean rank
1	≤40	5	31.60
	41-60	35	38.20
	>60	44	47.16

Practices:

Factorial analysis was also conducted upon six practices items related to Basal stem rot disease (*Ganoderma* boninense) to simplify the variables. Table 5 shown us the frequency analysis of the six items on 84 cases selected in east coast Malaysia. From the factorial analysis, Kaiser-Meyer-Olkin (KMO) showed value of 0.653 which also exceeded the recommended value of .6 and Bartlett's test was highly significant (p=0.000, p< 0.05).

Table 5: Frequency analysis of 'practices' items (N=84)

		N=84	%
Have you been to any courses related to *Ganoderma* disease?	Yes	3	3.6
	No	81	96.4
Have you ever checked whether your field infected with *Ganoderma* disease or not?	Yes	20	23.8
	No	64	76.2
What did you do to the infected palms?	Treatment	22	26.2
	Nothing	62	73.8
In order to prevent your field from being infected by the disease, what did you do?	Yes	10	11.9
	No	74	88.1
Who did the labour work in your field?	Self-service	17	20.2
	Contract	67	79.8
Did you apply cover cropping in your field?	Yes	26	31.0
	No	58	69.0

Factorial analysis of 'practices' variables with varimax rotation results shown in Table 6. The rotated solution revealed that there were two factors extracted. The three items related to the preparation practices encountering Basal stem rot disease (*Ganoderma boninense*) were strongly loaded on Factor 1 with total variance explained of 38.77% and the other three items related to prevention and cure practices towards Basal stem rot disease (*Ganoderma boninense*) were strongly loaded on Factor 2 with total variance explained 25.60%.

Table 6: Result of factorial analysis of 'practices' variables (N=84)

Factor and variable	Factor loading	% variance
Factor 1: Preparation practices encountering Basal stem rot disease (*Ganoderma boninese*)		38.77
Have you been to any courses related to *Ganoderma* disease?	.524	
Did you apply cover cropping in your field?	.532	
Who did the labour work in your field?	.704	
Factor 2: Prevention and cure practices towards Basal stem rot disease (Ganoderma boninense)		25.60
Have you ever checked whether your field infected with *Ganoderma* disease or not?	.614	
In order to prevent your field from being infected by the disease, what did you do?	.711	
What did you do to the infected palms?	.860	
Total of variance explained		**64.37**

Normality test also conducted on the two factors from practices variables and the result indicated that non-parametric test i.e Kruskal-wallis and Mann-whitney test seemed appropriate for the comparison analysis as the data for the factor were not normally distributed. Kruskal-wallis test used to compare the scores on some continuous variables for three or more groups and while Mann-whitney test used to compare between two independent groups on continuous measure (Pallant, 2002). The socio-economic characteristics analysed using Kruskal-wallis test was conducted on education level of oil palm smallholders as it has more than three groups of education level while Mann-whitney test was conducted on types of smallholders and gender of smallholders.

Table 7 shown the mean rank between education levels of smallholders on Factor 2 with significant difference of x^2=8.121, p<0.05, p=0.044. The highest mean rank between education levels on Factor 2 was secondary school, followed through with primary school, STPM/Higher education level and never attends formal school. This shows that prevention and cure practices towards Basal stem rot disease (*Ganoderma boninense*) were practised more by the smallholders with secondary school level of education.

Table 7: Mean Rank between education levels of smallholders on Factor 2

Factor	Education level	N	Mean rank
2	Never attend formal school	1	4.00
	Primary school	60	40.90
	Secondary school	22	50.16
	STPM/Higher education level	1	8.50

Mean Rank between types of smallholders on Factor 1 was shown in Table 8 with significant difference of z=9.517, p<0.05, p=0.02. As shown in the table, independent smallholders have higher mean rank than organised smallholders which means the reparation practices encountering Basal stem rot disease (*Ganoderma boninese*) was practised more by the independent smallholders.

Table 8: Mean Rank between types of smallholders on Factor 1

Factor	Type of smallholders	N	Mean rank
1	Organised smallholders	77	44.08
	Independent smallholders	7	25.07

Table 9 shown the mean rank between gender of smallholders on Factor 2 with significant difference of z=4.614, p<0.05, p=0.032. As shown in the table, mean rank of female is higher than male on Factor 2. This indicated that female smallholders applied prevention and cure practices towards Basal stem rot disease (*Ganoderma boninense*) more than male smallholders.

Table 9: Mean Rank between gender of smallholders on Factor 2

Factor	Gender	N	Mean rank
2	Male	63	38.14
	Female	21	55.57

Conclusion

Based on this study, it has shown that the socio-economic characteristics of oil palm smallholders such as type of smallholders, gender, age category and education levels have significantly influenced the knowledge and practises of oil palm smallholders towards Basal stem rot disease (*Ganoderma boninense*) in east coast Malaysia. Study also indicates that overall smallholders are aware and knowledgeable about the disease however, still need guidance and assistance from particular authorised parties. Smallholders also applied preparation practices encountering Basal stem rot disease (*Ganoderma boninese*) and prevention and

cure practices towards Basal stem rot disease (*Ganoderma boninense*). These practices are very important and helpful in dealing and minimizing the impact of the disease in oil palm cultivation.

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