Agro farmer’s implementation towards the application of kitosanplus in Terengganu

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Abstract. Agriculture sector remains as one of the important sectors that contribute to Malaysia’s economy. The usage of Kitosanplus could represent an innovative eco-friendly strategy for managing plant diseased and replacing copper as it is consisting with an active molecule which could provide variety of application towards agriculture sector. The Kitosanplus is an active molecule that finds many possible applications in agriculture to reduce or replace more environmentally damaging chemical pesticides. The purpose of this study is to determine the most influential factor of agrofarmer towards Kitosanplus applications in Terengganu, Malaysia. The most popular agriculture activities in this area are paddy plantation followed by chilies. A survey conducted towards 50 respondent by distributing the questionnaires using purposive sampling technique which have the background of agrofarmer including the owner and the manager of the farms. The data then were analysed using SPSS Software. Based on the result, the implementation of agrofarmers towards Kitosanplus applications are influenced by their attitude.

1. Introduction
Agriculture is one of the sectors which has been providing for food supply as well as material to the country by exercising activities such as cultivating soil, planting plants and rearing livestock. Agriculture has contributed to Malaysia economy since in between 1970 to early 21st century. In 1970, the agriculture contribution has been decreasing yearly from 29.9% to 8.4% in 2000 [1]. Other than due to the rapid changes in environment climates, the soil infertility may be occurred due to the number of pesticides used to crops. Soil infertility is the condition where the quantities of the nutrients used by the plants exceed the amount of nutrient provided by the soil [2].

Due to the low cost and easy application of pesticide to crops, pesticide has been commonly used by the farmers to kill pest and weeds to the soil which has affected the soil fertility. Pesticide has been showing positive results as it helps contributing to the higher production and quality of crops but has been mishandling by certain farmers. When the pesticide is use excessively due to the mishandling, the excess pesticide would contaminate the environment. This may eventually lead to the problem in human health. With the current technology, many organizations have tried to produce a solution in order to help providing the plants sufficient amount of nutrients with supplements without contaminating the environment. This study helps in understanding the type of supplement available in the current technology and its application in crops.
Kitosanplus is one of the supplements produced with the current technology in order to protect and stimulate the crops’ growth by providing nutrient to the crops. Kitosanplus is made from the chitin shells of shrimp and other crustaceans with an alkaline substance, like sodium hydroxide. Agro farmer applied the Kitosanplus, as a plant booster to enhance the soil fertility to increase crops yield in agriculture. Instead of using pesticides to avoid pest attacked, which affect the plant and gives a negative impact on human consumptions. Other than providing nutrient to the plant, the supplement also helps in reducing the amount of waste disposal to the environment [3]. Kitosanplus also possesses a large number of advantages which can be used to the crops such as antimicrobial activity and plant resistance elicitation.

The intention of applying Kitosanplus towards the crops may be influenced by the attitude of the farmer. Certain researcher has also claimed that both knowledge and attitude are interlinked to each other. For instance, if the farmer has knowledge about the advantage of the Kitosanplus, the attitude and behaviour that would be shown may have been different from the attitude of farmer without knowing the advantage of Kitosanplus.

Chemical has always been an option for the farmers in order to reduce the number of pests and reducing the possibility of crop disease. The prolong usage of chemical as pesticide for crops has also appear to give bad effect to the human, the crop and also the environment. With the usage of pesticides, the leftover of the pesticides may flow into nearby lakes or river which would be consumed by the aquatic plants such as seaweed. The polluted plant then would be consumed by fishes and other aquatic organisms which later be caught by human and eaten. This would indirectly make human sick and may be die. For this reason, the farmers have tried to find an alternative which can both helps the crop to grow better as well as does not polluting the environment.

Many approaches have been done in order to use more natural substance to fill in as pesticide substitute such as plant extract and its active compound as they possessed certain distinct properties of antifungal, antibacterial and antioxidant. Animal derived compound such as chitosan also shows similar result which deliberately continue to the production of Kitosanplus [4]. Kitosanplus are able to inhibit the growth of fungi as well as able to trigger the plant defence mechanism in plant.

Although Kitosan plus has possessed many benefits, it has been used only by certain amount of agrofarmers in Malaysia. Thus, this case study would help us in order to know the awareness of the agrofarmers about Kitosanplus as well as their intention about the application of Kitosan plus on their crops. Our case study has been focusing on the agrofarmers of Terengganu, Malaysia. Some of the agrofarmers may not be exposed to the application of Kitosanplus and its benefit which explain why only certain amount of agrofarmers use the product. Despite the benefits of the Kitosanplus, the agrofarmers may not be able to use Kitosanplus due to some reasons. One of the reasons may be the price of the Kitosanplus is not affordable to some agrobusiness. This may result in agrofarmers deciding to use the regular pesticide and would lead to the attitude of farmer to not use the product. Since the agrofarmers attitude affecting the agrofarmer choice of using Kitosanplus, thus the seller would have a hard time in order to attract the agrofarmer to sell the product.

Although Kitosanplus possess many advantages, the amount of Kitosanplus being applied to the crops are generally not quite common in Terengganu. According to our objective, the intention of the agro farmers towards the Kitosanplus application is ambiguous as the application of the Kitosanplus towards the crops is low. This may occur due to the lack of information available for the agro farmer to know about the Kitosanplus. This would eventually be causing the agro farmer to choose pesticide instead of Kitosanplus. The knowledge about the Kitosanplus may and may not related to the age of the farmer itself to the behaviour of the agrofarmers towards the Kitosanplus application. As the intention of the agro farmer itself is ambiguous, it is important to identify the factor which affect the intention of the farmers towards the Kitosanplus application.
2. Methodology

2.1. Conceptual framework
The Theory of Planned Behaviour (TPB) is a continuation of Theory of Reasoned Action 1980 which is used to predict the intention of individual behaviour in a certain location and period. The example of behaviour that can be predicted using the TPB is drinking and smoking [5]. Figure 1 shows the shifting process from the Theory of Reasoned Action to the TPB. There is 6 point that need to be highlighted. The first one is attitudes in which the evaluation by the person based on its interest. The second one is behavioral intention in which the motivation of the person plays important roles in performing the decision based on its strength of intention. Next is subjective norm in which the person behavior is depends on the approval from environment such as family and friends. The fourth is social norms which the behaviour of the person influenced by the cultural norm of the society. The fifth is perceived power in which the interpretation of factor that control the behaviour of the person. Lastly is perceived behavioral control that refers to the perception of person whether the behaviour is easy or hard to be performs. By using this TPB, the correlation between the intention and the behavior of the farmer toward using the application of Kitosanplus in the crops will be able to be deduced.

Based on the Figure 1, The TPB is adjusted to which consist of independent and dependent variables. The inclusion of the implementation of agro farmer toward the application of Kitosanplus as dependent variables is to gain understanding between the Kitosanplus knowledge and the farmers.

![Figure 1. Modified Theory of Planned Behavior adapted from [6].](image)

2.2. Research design
This study is to determine the intention of agrofarmers toward the application of Kitosanplus in the Terengganu. A survey questionnaire is used to study the factor that influence the agrofarmer on application of Kitosanplus of their crops. The survey involved 50 respondent which have the background of agrofarmer including the owner and the manager of the farms. The study is focusing on descriptive research which is the data is collected through survey and being analyze.

The data that obtained from the survey is analyze using SPSS 21 to gain the result of the research. The demographic of the farmer was analyzed. This include the variables which is dependent and independent variable of the data. The next test is factor analysis that is used to analyze the factor of the variables.

3. Results and Discussion

3.1. Demographic background of agrofarmers
Based on the Table 1, the respondent which age 50 years old above is 22 while 41-50 years old is 18, 31-40 years old is 6 and 21-30 years old is 4. The percentage for the age is 44%, 36%, 12% and 8 respectively. For gender, the majority of respondent is male which is 92% (42 respondent) while female only 8% (4 respondent). The race of the respondent is mainly Malay which 46 respondent
while Indian and Chinese both have 2 respondents. Malay respondent percentage is 92% while both Indian and Chinese is 4%. Most of the respondent is self-employed (32 respondent) which they have their own company. The number of respondents which is employed is 12 while unemployed is 4 and student is 2. The percentage of respondent based on the employment is 64%, 24%, 8% and 4% respectively. Next, the monthly income of the respondent is analysed. The respondent income above RM5000 is 4 while RM2500-RM5000 is 24 respondent, RM1000-RM2500 is 12 and below RM1000 is 10. The percentage of monthly income of the respondent is 8%, 48%, 24% and 20% respectively.

The marital status of the respondent shows 46 which is 92% of the respondent have married while 4 which is 8% is single. Next, the table shows 64% which is 32 respondents already have exposure toward Kitosanplus while 32% which is 16 respondents does not have known about Kitosanplus. Other than that, 2 respondent which present 4% confused on the exposure of Kitosanplus. For the period of use of the Kitosanplus, 18 respondents have use it for 1 year while 6 have use for 2 years and 8 have use for 3 years. 18 respondents never use Kitosanplus on their crops. The percentage for the period of Kitosanplus usage is 36%, 12%, 16% and 36% respectively. Lastly, the analysis shows that 80% which is 40 respondents is working on paddy while for chili 4 respondent which is 8% is working on it and 6 respondents is working on other crops.

| Table 1. Demographic profile of agro-farmer. |
|---------------------------------------------|
| Respondent background | Variable | Frequency | Percent (%) | Valid percent | Cumulative percent |
|------------------------|----------|-----------|-------------|---------------|--------------------|
| Age                    | > 50 years old | 22          | 44.0        | 44.0          | 44                 |
|                        | 41-50 years old | 18          | 36.0        | 36.0          | 80                 |
|                        | 31-40 years old | 6           | 12.0        | 12.0          | 92                 |
|                        | 21-30 years old | 4           | 8.0         | 8.0           | 100                |
| Gender                 | Female     | 4          | 8.0         | 8.0           | 8.0                |
|                        | male       | 46         | 92.0        | 92.0          | 100.0              |
| Race                   | Chinese    | 2          | 4.0         | 4.0           | 4.0                |
|                        | Indian     | 2          | 4.0         | 4.0           | 8.0                |
|                        | Malay      | 46         | 92.0        | 92.0          | 100.0              |
| Occupation             | employed   | 12         | 24.0        | 24.0          | 24.0               |
|                        | Self-employed | 32        | 64.0        | 64.0          | 88.0               |
|                        | student    | 2          | 4.0         | 4.0           | 92.0               |
|                        | unemployed | 4          | 8.0         | 8.0           | 100.0              |
| Monthly income         | > RM 5000  | 4          | 8.0         | 8.0           | 8.0                |
|                        | RM 2500-RM5000 | 24       | 48.0        | 48.0          | 56.0               |
|                        | RM1000-RM2500 | 12      | 24.0        | 24.0          | 80.0               |
|                        | < RM1000   | 10         | 20.0        | 20.0          | 100.0              |
| Marital status         | married    | 46         | 92.0        | 92.0          | 92.0               |
|                        | single     | 4          | 8.0         | 8.0           | 100.0              |
| Have you been exposed to Kitosanplus | Maybe | 2          | 4.0         | 4.0           | 4.0                |
|                        | No         | 16         | 32.0        | 32.0          | 36.0               |
|                        | Yes        | 32         | 64.0        | 64.0          | 100.0              |
| How long has you use Kitosanplus to your crops? | 1 year | 18         | 36.0        | 36.0          | 36.0               |
|                        | 2 years    | 6          | 12.0        | 12.0          | 48.0               |
|                        | 3 years    | 8          | 16.0        | 16.0          | 64.0               |
|                        | None       | 18         | 36.0        | 36.0          | 100.0              |
| What type of crops do you working on now? | chili | 4          | 8.0         | 8.0           | 8.0                |
|                        | paddy      | 40         | 80.0        | 80.0          | 88.0               |
|                        | others     | 6          | 12.0        | 12.0          | 100.0              |

(Source: Survey 20 November 2020)
3.2. The most influential factor among the agrofarmer’s implementation towards the application of Kitosanplus

For this part, factor analysis was applied to determine the most influential factor among the agrofarmer’s implementation towards the application of Kitosanplus. Firstly, Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy test is done in order to measure the sampling adequacy for each variable available. The KMO test is in the range value of 0 to 1. KMO value that near to 0 means the correlations are in wide range. KMO value less than 0.6 means that the sampling is less adequate and KMO values between 0.8 to 1 indicate the sample is adequate. According to Table 2, the samplings are in value of 0.842, 0.830 and 0.821 which shows that the sampling is adequate.

Bartlett’s test of Sphericity is done to test if the samples have equal variance which also known as homogenous variance. The significance value which less than 0.5 (<0.5) indicates the factor analysis is correlated with the data. According to Table 2, the significance value for all variables of attitudes, subjective norms and perceived behaviour are lower than 0.5 which indicates that the analysis are inter-correlated. As both KMO test and Bartlett’s test shown positive result, thus the variables have the ability to influence the implementation of the agro farmers toward the application of Kitosanplus to their crops.

Table 2. KMO and Bartlett’s test.

|                      | Attitude | Subjective norms | Perceived behaviour |
|----------------------|----------|------------------|---------------------|
| Kaiser-Meyer-Olkin   | 0.842    | 0.830            | 0.821               |
| Measure of Sampling  |          |                  |                     |
| Adequacy.            |          |                  |                     |
| Bartlett's Test of   |          |                  |                     |
| Sphericity           | 590.569  | 538.921          | 343.181             |
| Approx. Chi-Square   |          |                  |                     |
| Df                   | 36       | 45               | 28                  |
| Sig.                 | .000     | <.001            | <.001               |

(Source: Survey 20 November 2020)

Next, variances of explained were extracted from factor analysis to get the most influential factor of agrofarmer’s implementation toward the application of Kitosanplus. According to the Table 3, the highest variance percentage is from the attitude of agrofarmers which in value of 78.039% followed by perceived behaviour of agrofarmers (71.29%) and social norms (62.043%). This indicates that the attitude of agrofarmers towards the application of Kitosanplus affect the behaviour of the farmers towards Kitosanplus applications the most.

Table 3. Variance of attitude, social norm and perceive bahavior towards the application of Kitosanplus.

| Factors                                      | Variance (%) |
|----------------------------------------------|--------------|
| Attitude of agrofarmers towards the application of Kitosanplus | 78.039%      |
| Subjective norm which influences of agro farmer towards the application of Kitosanplus | 62.043%      |
| Perceive behaviour of agro farmer towards the application of Kitosanplus | 71.290%      |

(Source: Survey 20 November 2020)
4. Conclusion

This survey covers the factor that influences the agro farmer’s implementation towards the application of Kitosanplus in Terengganu which cover three aspect which were attitude, subjective norms and perceived behavioural control towards the application of Kitosanplus. The survey was distributed to almost 80 respondent and receive 50 responding respondents through the questionnaires. The attitude of agrofarmer towards the application of Kitosanplus affect the behavior of the farmer towards Kitosanplus as shown the highest variance score in the result.

Based on the survey, most of the farmers in Terengganu doesn’t know about the Kitosanplus, they instead used other kind of fertilizer that most familiar to them. The introduction of Kitosanplus towards the society need to be improved. The government mostly the Department of Agriculture need to promote the usage of organic fertilizer which is Kitosanplus among the farmers so that they are being exposed towards it. Ministry of Agriculture and Agro-based Industries also can expose the usage of Kitosanplus towards the farmers during their annual Farmers’ Organization Authority meeting. Mass media also can be one of the important platforms to introduce Kitosanplus towards the farmers as nowadays most people tend to watch television, social media and hearing a radio. Hence, this alternative could increase the knowledge of Kitosanplus towards the farmers and consumers.

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