

Termites Control / Management Techniques used Among Farmers in Akwa Ibom State, Nigeria

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Abstract

The study assessed the control/ management technique of termites used among farmers in Akwa Ibom State, Nigeria. The specific objectives were to identify the socio-economic characteristics of farmers and to assess the various methods of control/ management techniques used by farmers in the area. Primary data were collected using structured questionnaire and focus group discussion. A total of 120 farmers were selected for the study using multi-stage sampling technique, descriptive, inferential statistics (Logit regression analysis) and 4-point Likert scale techniques were used to analyse the data. Finding revealed that out of the nine (9) control and management techniques sampled, only five (5) of the techniques were adopted by the farmers, these include destroyed ant- hills ($\bar{x} = 3.4$), adoption of seed treatment before planting ($\bar{x} = 3.2$), introduction of natural enemies ($\bar{x} = 3.0$), use of resistant varieties ($\bar{x} = 2.9$), termites repelling crops ($\bar{x} = 2.8$). Logit regression analysis revealed that the Nekelkerte coefficient for the control methods was 85.2% and the likelihood ratio chi-squared was significant at 5% level. The study recommends that Government agencies should start mounting campaign as well as organized workshop and seminar on the adverse effect of termite infestation on agricultural produce and its control measures.

Keywords: Control/ Management Technique, Termites Among Farmers

Introduction

Agriculture plays important role in shaping the economy of many countries. In Nigeria, it is the highest employer of labour and serves as a major means of livelihood to about 70% of its population (World Bank, 2001). Agriculture provides over 90% of the food consumed locally and contributes about 41.5% of the Gross Domestic Product (GDP) of Nigeria (Oluigbo, 2012). It is a major source of household income and provides raw materials for agro-based industries. Agriculture enhances food security and impacts on the overall economic growth of the country. It also provides feed for domestic animals and most of its by-products are of economic importance.

Termites (*Isoptera Termitidae*) are problematic insects due to their threat in agricultural fields and human settlements. They cause a significant loss to food and cash crops, wooden components in buildings and trees of economic importance, especially in warm environments of subtropical and tropical regions. For a long time, termite attack has been controlled using different chemical methods, though they cause human health and environmental problems.

Termites cause extensive damage to agricultural and horticultural crops, agroforestry, stored timbers, books and records, woodworks in buildings and stored products containing cellulose (Rashmi & Sundararaj, 2013). In an estimate it was found that in Australia, 20% of homes are infested by termites. In China 90% of homes in south of Yangtze River are affected by termites (GEI, 2005; MRP, 2010). Annual losses caused by termites in the USA and Japan are 1000 and 800 M US\$. In India the losses have been estimated around 35.12 M US\$. Globally, the estimated loss due to termite damage is about 50 billion US\$ annually (Subekti *et al.*, 2015), although estimates vary considerably by the cropping systems followed in different geographical regions. Globally, the annual economic cost of termite damage and termite prevention is estimated in billions. Harmon *et al.* (1986); Evans (2011) observed that termite - mediated decomposition of standing dead trees and stumps can influence the population dynamics and distribution of birds, bats, mammals, and arthropods including tree seedlings. This damage will eventually lead to deforestation and environmental degradation in addition to its economic impact and spread of the termites. Poor crop performance in the region is linked to biotic and abiotic constraints such as soil infertility, weed infestation, soil acidity, insect pest attack, disease infestation, poor seed system and drought (Otieno *et al.*, 2018). Drought alone is predicted to reduce crop productivity by 50% by 2020 (Boko *et al.*, 2007) the effect of drought is diverse as it also aggravates the impacts of other constraints such as insect pests and diseases attacks. Termites are increasingly becoming important with various countries reporting significant yield losses on food crops. For instance, termites have been reported to cause maize yield losses in affected fields of 10-30% in Kenya, Uganda and Tanzania, and above 50% in Ethiopia and Nigeria (Selamatte *et al.*, 2003).

Several studies have focused on the effect of diseases on crops, but little attention was paid to the effect of termites on agricultural produce. Therefore, this study evaluates the detrimental effect of the termite and its control methods. Hence the objectives of this paper are:

- i. identify the socio-economic characteristics of farmers in the area
- ii. assess the various methods of control of termite infestation

Hypothesis of the study

H_0 : There is no significant relationship between socio-economic characteristics of farmers and the control techniques adopted in the eradication of termites

Methodology

Study Area

The study was carried out in Akwa Ibom State, which formed a part of the core States of the Niger Delta region of Nigeria. The State is located at latitude $4^{\circ}33'$ and $5^{\circ}53'$ North and longitude $7^{\circ}25'$ and $8^{\circ}25'$ East and occupies a total land area of 8,421 square kilometres. There are two distinct seasons – rainy and dry seasons, with the rain evenly distributed throughout the year and decreasing from over 3,000mm in the south to about 2700mm in the North. It has an estimated total population of 3,920,203 people. The predominant occupation of the people in the study area is farming where the major land use pattern is rain fed tree and food crop production including oil palm and livestock rearing while fishing is conducted in the riverine areas of the state.

Sampling Technique/ Analytical Technique

A multi-stage sampling technique was adopted in the study. At the first stage, a simple random sampling technique was used to select three (3) agricultural zones from Akwa Ibom

State out of her six (6) ADP zones; at the second stage simple random sampling technique was used to select 12 extension blocks from each of the zones, the third stage was a purposive selection of two (2) cells from each of the selected 12 blocks giving a total of 24 cells. Finally, five (5) farmers were randomly selected from each of the cells, giving a total of 120 farmers as the respondents which served as the sample size.

In order to measure respondents' control/management techniques, nine (9) variables were presented. In the analysis, using a four-point likert - type scale of – highly severe (4), fairly severe (3) severe (2) and not severe (1) variables with mean scores of 2.5 and above were adjudged severe while mean score below 2.5 were adjudged not severe. Each of the frequency was multiplied with the number of categorization code.

$$X = \Sigma f_n / nr$$

Where:

Σ = Summation

f = Frequency of each of the response made

n = Likert value

nr = number of respondents

(\bar{x}) = mean

$$(F * 1) + (F * 2) + (F * 3) + (f * 4) = T$$

Result and Discussions

Socio-economic characteristics of farmers in Akwa Ibom State represented in Table 1 showed that a greater per-cent (61.8%) of the respondents fell within the age bracket of 41-50 years, followed by 16.5% representing farmers in the age bracket of 31-40 years. About 10.7% of the respondents were between the age bracket of 21-30 years and 51-60% age bracket was 11.0%. The mean age for the farmers in the study area was 40 years.

Regarding gender the result of the study revealed that about 62.5% of the respondents were female while 37.5% were male. This indicated that agricultural production in Akwa Ibom State is dominated by the female gender. This finding collaborates with that of Olayemi et al. (2011) who posited that women are known to be actively involved in agricultural activities than men in the Sub-Saharan African Countries which Nigeria is one of them upon which this study was carried out. Beyond this plus to the female, the activities of the male gender cannot be underestimated. A large proportion (55.70%) of the respondents were married while (30%) were single, (3.80%) and only 4.8% were widowed. This is an indication of the possibilities of having more children and farm labour that will aid in the farming activities. Also married people dominated the agricultural production ventures since it was intended for income generation, employment creation and provision of food for their people. The result also shows that would be greater family cohesion in taking decisions on agricultural activities. This finding collaborates with Udousung *et al.* (2015) that most poultry farmers in Akwa Ibom and Cross River State were married.

Regarding education, a negligible number (19.2%) of the respondents had primary education, while 46.7% had secondary education and 20.8% had tertiary education while 13.3% had no formal education. In all, a greater proportion of (86.7%) had a formal education which suggested that, farming activities in Akwa Ibom State are handled by enlightened persons. This finding agrees with that of (Oyekanmi & Okeleye, 2007) who posited that high percentage of farmers in the South-South region are literate. Also, a study carried out by

(Ajala, 1992) has revealed that, there is a positive correlation between level of education and acceptance of ideas by farmers as literate individuals are keen to get information and use it. Thus, the literacy level of farmers in Akwa Ibom State could afford them the opportunity of learning new things about termite's attack in their farms and how to control them in order to possibly increase their production.

It is important to assess family labour as a major source of farm labour. Table1 showed that majority of the respondents (61.2%) had family size that fell within 4-5 bracket. 20.8% fell within 1-3 bracket, 12.5% fell within 6-10 bracket and 5.5% fell within the bracket of 10 and above. The mean household size was 4 persons per farm family. This finding is in line with the work of Akpanudo *et al.* (2017), who posited that the mean farm family size of farmers in Akpabuyo of Cross River State was 4 persons per household.

A greater proportion (62.7%) of the respondents had 6-10 years farming experience followed by 14.5% respondents that had 1-5 years, 6.3% had 11-15 years, 4.7% had 16-20 years while 11.8% had above 20 years of farming experience. The mean experience was 10 years and it is also in line with the work of Akpanudo *et al.* (2017), who posited that the mean farming experience of farmers in Akpabuyo of Cross River State stood at 10 years.

A higher proportion of (83.3%) of the farmers in Akwa Ibom State had no contact with the extension agents, who were supposed to teach them about termite incidences, their effects and how to control them. About 12.0% of the respondents were visited once, 2.4% were visited twice while about (2.3%) were visited more than twice while 83.3% were not visited at all, this probably suggested that the extension outreach to these farmers was highly minimal. Hence the level of awareness of innovation would be relatively affected.

According to Ali *et al.* (2008), agricultural extension primarily deals with human resources development and transfer of technology and knowledge of agricultural research centers to farmers. Extension workers are professionals in the extension system responsible developing individuals in the community. Since they are constantly and consistently in touch with the farmers as well as the rural dwellers, it becomes necessary that their campaign should include proper education as their clientele on the danger of termite on agricultural produce. This can be done by encouraging the farmers to join cooperative societies, because more would be aware of pattern of handling agricultural produce before planting as well as acquiring information on the control methods. Extension education remains the best strategy used to reach farmers using the appropriate teaching method to create a suitable learning environment and condition (Anaeto *et al.*, 2008).

Incomes generated by the respondent were tools that could help farmers improve their yields and outputs, while at the same time help expand their farming businesses. In this regard the study examined the income per month of the respondent from the various agricultural produce. Revealed that most (64.7%) of the respondents earned between ₦31,000 – ₦50,000; 15.5% earned within the income bracket of ₦10,000 – ₦30,000; also 10.6% earned within the income bracket of ₦51,000 – ₦60,000 while 9.2% of the respondent's earned income that was above ₦60,000. The mean monthly income was ₦37,673.45 which implied a higher level of poverty incidence among the rural dwellers.

Table 1: Socio-economic Characteristics of Farmers in Akwa Ibom State. (n=120).

Variables	Frequencies	Percentages	Means
Age			
21-30	13	10.7	40
31-40	20	16.5	
41-50	74	61.8	
51-60	15	11.0	
Gender			
Male	45	37.5	
Female	75	62.5	
Marital status			
Single	36	30.0	
Married	67	55.7	
Divorced	5	3.8	
Widow	6	4.8	
Widower	7	5.7	
Level of Education			
No formal Education	16	13.3	
Primary Education	23	19.2	
Secondary Education	56	46.7	
Tertiary Education	25	20.8	
Household size			
1-3	25	20.8	4
4-5	73	61.2	
6-10	15	12.5	
Above 10	7	5.5	
Farming experience			
Less than five years	17	14.5	10
6-10years	75	62.7	
11-15years	8	6.3	
16-20years	6	4.7	
Above 20years	14	11.8	
Contact with extension agents			
Not at all	100	83.3	
Once	14	12	
Twice	3	2.4	
More than twice	3	2.3	
Membership of cooperative			
Yes	39	32.5	
No	81	67.5	
Monthly Income			
₦10,000 – ₦30,000	19	15.5	37,673,45
₦31,000 – ₦50,000	78	64.7	
₦51,000 – ₦60,000	13	10.6	
₦61,000 and above	11	9.2	

Source: Field survey 2022

Control Methods of Termites in the Study Area

Table 2 showed that out of the nine (9) control/ management techniques sampled, only five (5) techniques were adopted by the farmers with mean scores as follows; destroyed ant hills ($\bar{X} = 3.4$), adoption of seed treatment before planting ($\bar{X} = 3.2$), introduction of natural enemies ($\bar{X} = 3.0$), use of resistant varieties ($\bar{X} = 2.9$), termites repelling crops/ plants ($\bar{X} = 2.8$). The possible reasons for the high level of adoption of these five (5) control/ management techniques could be attributed to their level of educational attainment, as a good number (20.8%) of the respondents had tertiary educational qualification. The result suggest that awareness of any innovation could be higher with literate people of high social class because of their ability to read newspaper, magazine, bulletins and interaction with fellow farmers, educated farmers may realize that termites are heavily involved in churning of soil and creation of several tunnels leading to improved soil structure, aeration, water infiltration (Mujinya *et al.*, 2010). Such increased levels in soil organic matter, soil aeration and water infiltration consequently resulting in improved yields of crops (ASW, 2018). Another possible explanation may be years of farming experience, majority (62.7%) of the respondents had 6 - 10 years of farming experience. The implication of this is that being experienced farmers, they may better appreciate the negative effect of termites and will be more careful to prevent them. Uwakah (2005) opined that the years of farming experience is one of the factors that aid the adoption of innovation. Also, finding from FGD revealed that in the case of severe attack by termites a good number of respondents consented to spraying of omo/ kerosine mixture for the control of termites in the study area.

Table 2: Control/Management Techniques of Termites

S/N	Control methods	Strongly Disagreed		Strongly Agreed		Mean	Rank
		Disagreed	Agreed	Agreed	Disagreed		
1	Destroyed ant hills	85	11	6	18	3.4	1 st
2	Seed treatment before planting	39	67	8	6	3.2	2 nd
3	Introduction of natural enemies	14	96	7	3	3.0	3 rd
4	Use of resistant varieties	19	79	18	4	2.9	4 th
5	Termites repelling crops.	25	64	20	11	2.8	5 th
6	Fumigation	26	26	41	27	2.41	6 th
7	Use of chemical (dictdrin or Aldrin dust)	6	12	95	7	2.2	7 th
8	Omo/Kerosine mixture	18	5	68	29	2.1	8 th
9	Use of condemned oil	9	3	91	17	2.0	9 th
Grand Mean							2.7

Source: *Field survey*. (2022).

Hypothesis Testing

H_0 : There is no significant relationship between socio-economic characteristics of farmers and the control techniques adopted in the eradication of termites

Some socio-economic factors influencing the various control and management techniques adopted for the control and eradication of termites in the study area was presented in Table 3. The logit regression model was used, and the regression classification table revealed that the binary logistic model predicted 87.82% of the regression correctly. The model fits the data at ($P<0.001$) as indicated by the chi-square goodness of fit statistic (24.12). The goodness of fit of the model proved that the variables tested in this study were valid to explain the control measures of termites in the study area. Besides, the Nagelkerte R^2 value (0.852) shows that

about 85.2% of the outcome can be explained by the selected independent variables captured in the model.

The marginal effect coefficient of gender was negatively related to the control techniques and insignificant. Meaning that gender does not really show any significant effect on the control and management techniques adopted for the eradication of termites in the study area. Education was positively related to control measures and significant at 1% level of significance indicating that education was a major factor in the control and management techniques adopted in the eradication of termites in the study area. It also means that the log likelihood of a farmer in the control and management of termites in the study area would increase as at the time of this study. Income was also positively related to control and management techniques of termites' eradication and also significant at 10% level implying that the higher the income of a farmer, the higher he/she will be willing and ready to purchase more chemicals for the eradication of termites in order to minimize any loss. Experience was positively related to control and management techniques of termite's eradication and also significant at 1% level implying that the more time spent by a farmer in his/her farming business, the higher the log likelihood of his exposure to the various control and management techniques available in the study area.

Finally, since four socio-economic variables are significant (as shown in Table 3) showing that there is a significant relationship between socio-economic characteristics of farmers and the control techniques adopted in the eradication of termites. Therefore, the null hypothesis is rejected.

Table 3: Hypothesis Testing

Variables	Marginal Effect Exponential		
	EXP(B)	Std Error	p-values
Constant	1.6996	1.1402	1.6152
Age	1.4692	0.7728	0.0028***
Gender	-0.0707	-0.2975	0.2833
Education	0.4425	0.2634	0.0118**
Income	0.0161	0.1349	0.0968*
Experience	0.2389	0.1911	0.0023***
Marital Status	0.0567	0.0341	0.2375
Percentage Prediction	87.82%		
Goodness of fit Chi-square (df=18)	24.12(P<0.001)		
Negelkerte R ²	0.852		

Source: *Field survey*. (2022).

*** 1% Significance

** 5% significance

*10% significance

Conclusion/Recommendations

Most farmers in the study area are married with formal education. Major control/management technique used in area include destruction of ant hills, seed treatment before planting, introduction of natural enemies, use of resistant varieties and termites repelling

crop/ plants eg. Neem and garlic. Farmers in the area are knowledgeable of some management techniques used for the control of termites. Finding from FGD revealed that a good number of respondents consented to the fact that in case of severe attack by termite omo/kerosine mixture is effective control. The logit regression model was used and the regression classification revealed that the binary logistic model predicted 87.82% of the regression correctly. The model fits the data at ($P<0.001$) as indicated by the chi-square goodness of fit statistic (24.12). The goodness of fit of the model proved that the variables tested in this study were valid to explain the control measures of termites in the study area. Besides, the Nagelkerte R^2 value (0.852) shows that about 85.2% of the outcome can be explained by the selected independent variables captured in the model.

Based on the findings of the study it is recommended.

- ❖ Government agencies should start mounting campaign as well as organized workshop and seminar on the adverse effect of termite infestation on agricultural produce and its control measures.
- ❖ Introduction of ants (*Crematogaster spp.*) to termite colony will eliminate termite completely.
- ❖ Destruction of ant-hill e.g. physical destruction of the mound and removal of the queen
- ❖ Non-chemical practices which have significant benefit should be encourage e.g. introduction of termite-repelling crops and plants in the farms like neem, garlic etc
- ❖ Extension and farmers organization should work towards increasing farmers knowledge on management techniques of controlling termites attack on agricultural produce.

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