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TERMITE CONSERVATION AND MAIZE PRODUCTION IN NAGOJJE SUB COUNTY, BUIKWE DISTRICT

Tukamushaba John Wence*, Kucha Antipas

* Department of Agriculture, Faculty of Agriculture, Science & Technology Busoga University, P.O. Box 154, Iganga-Uganda

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ABSTRACT

Termites are in a serious economic war with human beings. They are social insects which feed and degrade organic matter and growing plants if organic residues are in short supply. Most farmers in Buikwe District use inorganic pesticides to counteract termites, burn bushes and destroy mounds to harvest termites for consumption purposes, greatly reducing their population numbers. .A study of 42 household respondents sampled out of 6,996 households in Nagojje Sub County, Buikwe District was used to determine termite conservation measures and maize production. The findings of the study indicated that most farmers use inorganic insecticides to kill termites (Table 2) because of their nuisance in destroying maize gardens most especially in the dry season (Table 4). This reveals that, farmers are ignorant about the benefits of conserving termites. Researchers therefore recommend sensitization farmers about conservation and sustainable measures of termite control that enable high maize production.

INTRODUCTION

Termites are social insects which feed on a variety of organic substances like dry grass, wood, animal litter and growing plant tissues. Various studies have shown that termites help to create soil structure, influence aeration, water infiltration and nutrient cycling in natural ecosystems (Evans, Dawes, Ward, & Lo, 2011). As ecosystem engineers termites help in decomposition of the Soil Organic Matter(SOM), for instance crop residues in a given crop field can be acted upon by termites, eventually addition of humus into the soil and hence promoting soil fertility (Maayiem, Bernard, & Irunuoh, 2012; Mutsamba & Nyagumbo, 2010). Termites provide plants additional nutrients because they increase the amount of nitrogen contained in soil, (Africa & Africa, n.d.). They also dig and build tunnels on the soil surface that allow plants greater access to water and boost the entire soil aeration in the farm lands (Nyagumbo et al., 2015).

However, if termites are not managed well, they become important maize pests noticeably during drought seasons or in areas with erratic rainfall (FAO, 2011; Mphosi, 2017).

Termite Conservation is the practice of managing and protecting termites while ensuring that they are controlled and maintained sustainably in the farmland in order to conserve them in the soil.

Provision of soil cover through crop residues, among other benefits, ultimately results in increased termite activity measured through surface area covered by termite galleries; a more favourable environment beneficial to soil important fauna like termites which in turn enhances soil fertility (Maayiem et al., 2012).

Maize is the most important cereal crop in Uganda providing over 40% of the calories consumed in both rural and urban areas (FAO, 2011; MAAIF & SAA, 2000; MOFA/CRI/SARI, 2005). The crop has increasingly become a staple food in many parts of the country due to changes in peoples eating habits. Termites (Isoptera: Termitidae) are one of the most important maize production constraints in Uganda. They damage roots, stem bases and leaves resulting in plant lodging and damage cobs to cause yield losses (Sekamatte, Ogenga-Latigo, & Russell-Smith, 2003). Farmers in Buikwe control termites with inorganic insecticides. This disregards their long term economic benefits of decomposing organic matter and nutrient recycling (Tukamushaba, Otieno, Bugenyi, & Kibikyo, 2017). It has been determined that intercropping reduces termite attack and loss in grain yield of maize for instance, soya bean and groundnut are more effective in suppressing termite attack in maize(Sekamatte et al., 2003).

Chemical control of termites is expensive and require skilled labour. The excessive application of termiticides causes environmental pollution which may result in the death of non-target organisms (Tukamushaba, Otieno, & Bugenyi, 2017). Termite conservation as far as maize production is concerned is very important in Buikwe District simply because majority of the people there are Smallholder farmers. Most of them cannot afford to buy fertilizers to meet their needs of soil fertility. Since termites become active towards the dry season and work on mulches, it is apparent that early planting, timely harvesting and field sanitation could reduce the impact of termite damage (FAO, 2011; Mphosi, 2017; Tukamushaba, Otieno, Bugenyi, et al., 2017)

The researchers' specific objectives to this study were:

- To determine termite management practices by the farmers in Nagojje Sub County, Buikwe District.
- To assess the level of maize production in Nagojje Sub County, Buikwe District.
- To establish the relationship between termite conservation and maize production in Nagojje Sub County, Buikwe District.

Description of study area: This study was conducted in Nagojje Sub County, Buikwe District of Central Uganda and it mainly focused on the farmlands that were dominated with termite mounds and a lot of maize fields in Nagojje Sub County for the period between April and May 2017.The land area of Buikwe District is 1,244.7 km2 (480.6 sq mi). Buikwe District borders Mukono District in the West, Jinja District in the East, L. Victoria in the South and Kayunga District in the North. Some parts of Buikwe District are covered by Mabira Forest. Majority of the people there are smallholder farmers much as there are few large scale plantations. Therefore, it makes farming a dominant economic activity there.

MATERIALS AND METHODS

This was a case study conducted through a descriptive survey research design. It was concerned with determining termite conservation and maize production in Nagojje Sub County in Buikwe District.

Descriptive approach was used in order to gather information about the present existing condition and utilize observations in the study (Creswell, 2003). The research study partially based its findings through both quantitative research methods in order to permit a flexible and iterative approach. It also employed qualitative research method in order to find and build theories that would explain the relationship of one variable with another variable through qualitative elements in research (Atomica, 2010). A total of 42 respondents were randomly determined using a probabilistic sampling design specifically simple random sampling (Strydom and De Vos, 1998).

Researchers used both administered questionnaire, interviews, observations and documentary analysis as the main tools for collecting data. They were concerned with views, perceptions, opinions, attitudes and behaviours of the respondents (Otieno, Buyinza, Kapiyo, & Oindo, 2013). Questionnaires were administered by the interviewer especially where concepts were difficult to interpret by farmer respondents. The data obtained through a questionnaire was similar to that obtained through an interview because of the open ended questions (Burns & Grove 1993).

Descriptive statistics for the survey items was summarized in the text and reported in tabular and chart forms. Frequencies analyses were conducted to identify valid percent for responses to all the questions in the survey. To determine factors that could enhance adoption of soil biodiversity conservation measures, a binary logit model was run using statistical package for social sciences (SPSS) version 21.0

RESULTS AND DISCUSSIONS

Socio- demographic characteristics of respondents

Most farmers (71.4%) were females indicating that farming in most communities is left for the women majorly because men engage in other activities. Most of them were aged between 20 and 50 years implying that the responses given were from reliable adult Ugandans. More than a half (62%) of the respondents were married indicating that farming is done to sustain their households for food security and to perform their responsibilities (Tukamushaba, Otieno, & Bugenyi, 2017). Over ¾ of the respondents were educated with at least primary

education demonstrating the ability to read and interpret. Most respondents have been farming (64.3%) for over 10 years hence the major economic activity in the area (Table 1)

Table 1: Socio-Demographic Characteristics of Respondents (N=42)

Sex	**Frequency**	**Percentage**
Male	12	28.6
Female	30	71.4
Age in Years		
10-19	3	7.1
20-30	11	26.2
31-40	7	16.7
41-50	10	23.8
51-60	5	11.9
Above 60	6	14.3
Marital status		
Single	16	38.1
Married	26	62
Separated	0	0.0
Widowed	0	0.0
Education level		
Degree	1	2.4
Diploma/A' Level	2	4.8
Certificate/O' Level	18	42.9
Primary	14	33
No qualification	7	16.7
The occupation		
Farmer	27	64.3
Civil servant	3	7.1
Student	5	11.9
Business Person	7	16.7
Parish		
Namataba	3	7.1
Wagala	1	2.4
Nakibano	2	4.8
Kyajja	1	2.4
Nagojje	35	83
Farming Experience in Years		
10-20	25	59.5
21-30	12	28.6
31-40	3	7.1
41-50	2	4.8
51-60	0	0.0
Above 60 Years	0	0.0

Table 2: Management Practices of Termites in Nagojje Sub County (N=42)

Variable	Strongly agree (×5)	Agree (×4)	Not sure (×3)	Disagree (×2)	Strongly disagree (×1)
Mulching	19(95)	5(20)	3(9)	4(8)	11(11)
Crop rotation	33(165)	3(12)	1(3)	2(4)	3(3)
Extracts, i.e. Organic solution from the plants	21(105)	6(24)	2(6)	3(6)	10(10)
Early planting	5(25)	6(24)	3(9)	18(36)	10(10)
Wood ash application	21(105)	7(28)	2(6)	2(4)	10(10)
Poisoning them with chemicals	33(165)	2(8)	0(0)	1(2)	6(6)

Termite Management Practices

The management of termites was analyzed using a 5 score Likert scale as shown in table 2. Majority of the respondents strongly agreed that crop rotation (165), plant extracts (105), wood ash application (105) and poisoning them with chemicals constituted (165) would effectively manage termites in Nagojje Sub County. However, they disregarded the contribution of early planting and mulching possibly because of their ignorance. Instead majority strongly agreed that the use of inorganic chemicals (165) would quickly eliminate termites from their gardens (Table 2)

The Level of Maize Production in Nagojje Sub County:

More than three quarters (97.6%) of the respondents were in agreement that maize is commonly grown in their locality which implies that maize crop is the major crop grown for household food security and income generation in Nagojje Sub County. More than a half (64.3%) of respondents grew maize on piece of land ranging from 1-3 acres meaning that most of the people in Nagojje Sub County are small scale farmers who grow crops purposely for home consumption.

Less is sold to get income and cater for their basic needs in their families. The maize yields is about 1 ton which is far below the recommended average of 2.5 tons per acre. This implies that even though, farmers kill termites with chemicals, their production targets are not met hence not the limiting factor as claimed by the majority 71.4% .

The other crops commonly grown beans (81%), ground nuts (57%), banana (62), Sweet potatoes (76.2) and cassava (59.5). This implies that termites could be pests of maize but beneficial to other crops grown, something farmers do not think about (Table 3).

Table 3: The level of maize production in Nagojje Sub County(N=42)

Variable	Frequency	Percentage
Maize grown?		
Yes	41	97.6
No	1	2.4
Acre(s) of land for maize production		
Less than an acre	5	11.9
1-3	27	64.3
4-7	6	14.3
8-10	4	9.5
Crops grown in Nagojje Sub County		
Sugarcane	15	35.7
Cassava	25	59.5
Irish Potatoes	1	2.4
Cabbage	1	2.4

Sweet Potatoes	32	76.2
Coffee	9	21.4
Bananas	26	62
Yams	14	33
Beans	34	81
Eggplants	1	2.4
Pumpkins	1	2.4
Millet	1	2.4
Rice	1	2.4
Cucumber	1	2.4
Groundnuts	24	57
Maize Yield in bag(s)		
1-10	32	76.2
11-20	2	4.8
21-30	1	2.4
Not sure	7	16.7
Termites as a factor for low maize production		
Yes	30	71.4
No	8	19.1
Not sure	4	9.5

The Relationship between Termite Conservation and Maize Production in Nagojje Sub County:
The effects of termites on maize yield and production was tested using a 5 point Likert Scale. Most of them have seen termites in their maize garden (170) but claimed that they are a nuisance mostly in the dry season (190), so then should be poisoned (135).

Table 4: The effects of termites on maize yield and production in Nagojje Sub County (N=42)

Variable	*Strongly agree (×5)*	*Agree (×4)*	*Not sure (×3)*	*Disagree (×2)*	*Strongly disagree (×1)*
Termites are commonly seen in maize gardens	***34(170)***	***5(20)***	***2(6)***	***1(2)***	***0(0)***
Termites benefit maize production	***21(105)***	***13(52)***	***7(21)***	***1(2)***	***0(0)***
Areas with high termite density produce less maize	***9(45)***	***30(120)***	***3(9)***	***0(0)***	***0(0)***
Termites are a nuisance so should be poisoned	***27(135)***	***6(24)***	***2(6)***	***4(8)***	***3(3)***
Termites attack maize mostly in wet season	***9(45)***	***28(112)***	***3(9)***	***0(0)***	***2(2)***
Termites attack maize mostly in dry season	***38(190)***	***3(12)***	***1(3)***	***0(0)***	***0(0)***
Termites can be avoided without poisoning them	***6(24)***	***1(4)***	***11(33)***	***9(18)***	***15(15)***

This manifests that most of the farmers opt for poisonous chemicals without investigating other alternative measures.

Farmer's Knowledge about Termite Conservation Measures in Nagojje Sub County
In table 5, farmer respondents were investigated about the best termite management measure that would conserve termites with less damage to maize production.

Table 5: Farmer's knowledge about termite conservation measures and increased maize production in Nagojje Sub County (N=42)

Conservation variable	Frequency	Percentage
Mulch reduction in maize field	27	64.3
Poisoning them with chemicals	34	80.9
Early planting	16	38
Wood ash application	05	11.9
Plant extracts	10	23.8
Not sure	20	47.6

More than a half supported mulching (64.3%) and poisoning them with inorganic insecticides (80.9%). The inadequate knowledge about other measures like early planting (38%), application of wood ash (11.9%) and use of plant extracts (23.8%) demonstrated the need for intervention (table 5)

CONCLUSION

The findings revealed that termites are potential pests that can lower maize production (71.4%). Farmers have been counteracting termites by poisoning them with insecticides (Table 2) which not only degrade the environmental ecosystem most especially lowering the termite population but are also expensive to a small scale farmer. It has been clearly demonstrated that farmers need literacy about the ecosystem benefits of termites and conservation management measures that could enhance increased maize production.

RECOMMENDATIONS

There is a need to sensitize farmers about the dangers of insecticide application to control termites. Other mitigation measure that control termites in maize gardens without endangering their populations exist. Early planting, mulching, use of plant extracts and ash could escape the maize garden from the attack of these termites. Appropriate policies regarding agrochemicals effects on our environment and farming activity should be carefully addressed.

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