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ASSESSMENT OF RODENT CONTROL STRATEGIES AMONG YAM FARMERS IN BARUTEN LOCAL GOVERNMENT, KWARA STATE, NIGERIA

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ABSTRACT

Yam is attacked by several species of foliage-feeding and stem-boring insects as well as rodents majorly on the field. The objectives of the study are to identify common rodents in yam plantation, examine damages caused to yam by rodents among others. The study engaged 110 yam farmers that were randomly selected. Data collected were obtained with structured questionnaire administered to the yam farmers and were analyzed using descriptive and inferential statistics. Result of the analysis reveals that majority of the respondents were male ((96.4%), Muslim (97.3%), have household size of 6 people (93.6%) and 47.27% of the respondents had secondary education. Result shows that common rodent identified in yam plantation include bush rat, pouch rat and grass cutter. The study identified the major damage caused by rodents as bruising, rupture and tissue degradation. Sanitation, rodents trap and use of dogs were the major control measures used. The study identified the constraint to rodent management as 'climatic conditions on control' and Setting of traps limits movement around the farm. The study concluded that rodents pose serious threat to yam production. The study therefore recommended that, extension workers with the help of the research institute should initiate innovation on control strategies to control rodents on yam farms.

KEY WORDS: *rodents, damage, control, yam, farmer*

INTRODUCTION

Yam is one of the major staple food in Nigeria and has potential for livestock feed and industrial starch production (Ayanwuyi, 2011). It is one of the principal tuber crops in the Nigerian economy, in terms of land under cultivation and in the volume and value of production. According to Ekenwe *et al* (2008), yam contains a high value of protein (2.4%) and substantial amount of vitamins and minerals than some other common tuber crops. It is also comparable to any starchy root crops in energy and the fleshy tuber is one of the main sources of carbohydrates in the diet of most Nigerians. Yam also plays vital roles in Nigeria culture especially during payment of bride price,

rituals and religion; as well as local commerce of African people (Izekor, 2010). Yam tubers are used for various traditional medicines in China, Korea and Japan (United State Department of Agriculture, 2009). It contributes more than 200 dietary calories per capita daily for more than 150 million people in West Africa and also an important source of income generation and trade (Reuben & Barau, 2012). There has, however, been a general decline in yam production in Nigeria over the years. This declining trend may be associated with inefficiency of resource use and allocation, high labour requirement, and low yield production per hectare compared to cassava and potato and pest and diseases invasion (Nwosu, 2010). Moreover, Yam is attacked by several species of foliage-feeding and stem-boring insects as well as rodents majorly on the field. With few literatures and research available for consultation on the more efficient ways of controlling as well as managing these rodents on the farm, a void has been created and it is that void that this study wishes to fill by assessing the rodent control strategies among Yam farmers in Baruten Local Government Area of Kwara State, Nigeria. Therefore, the specific objectives of the study are to: describe the socio-economic characteristics of yam farmers in the study area; identify the common rodent in the study area; examine the damages caused by rodents in the study area; determine control measures used in controlling rodent in the study area; and identify the major constraints faced by yam farmers in controlling rodents in the study area. **Hypothesis of the study. Ho_1:** There is no significant relationship between the socio-economic characteristics of the yam farmer and the rodent control strategies

MATERIALS AND METHODS

Kwara State is a state in western Nigeria which was created on 27^{th} May 1967 having Ilorin as the state capital. At its creation, the state was made up of the farmers in Ilorin and Kabba provinces of the northern region and was initially named the west central state but later changed to Kwara a local name for the river Niger. Kwara state is located within the north central geopolitical zone, commonly referred to as the middle belt, situated between latitude 8^0 North and longitude 5^0 East with Niger state in the north, Kogi state in the east, oyo, Ekiti and Osun State in the south and an international boundary with the republic of Benin in the west. Kwara state is known to be the ninth-largest Nigerian state by area with 36,825km^2 (14,218 sq mi) the 2006 census puts the population of the state at 2,371,089 million (kwarastate.gov.ng, 2017).

Sampling procedure and sample size. A three-stage sampling procedure was employed. The first stage is purposive selection of Baruten local government areas due to the high prevalence of yam farmers. The second stage is the purposive selection of

five communities because of the size of the town and availability of many yam farmers groups there. These are Okuta, Boriya, Shiya, Kosubosu and Yanri. The third stage is random selection of 22 respondents each from the 5 locations give a total sample size of 110 respondents used for the study.

Data analysis. The data was analysed using both descriptive and inferential statistics. Descriptive statistics like the use of tables, percentage, mean and frequency tables was used. Pearson Product Moment Correlation was used to test the hypothesis.

RESULTS AND DISCUSSIONS

Socio-economic characteristic of yam farmers. The result in table 1 shows that majority of the farmers were male (98.18%), married (90.9%), have household size of 10 and below (93.6%) and had farming as their primary occupation (83.7%). This implies that men are more into yam cultivation may be because it is labour intensive. The farmers having fairly a large household size may have opportunity to family labour on the farm. The table further shows that the average age of the farmers was 43 years. This implies that the yam farmers were in their productive age. This finding is similar to Ezeh (2013) who found that found out that majority of the farming household in the east were male, married, with large household size and having primary education.

The average experience of the farmers was 19 years. This implies that the farmers have been in yam cultivation for quite sometimes and can readily identify the presence and activities of rodents on the farm. 47. 27% of the respondents had secondary education. This implies that the yam farmers were fairly educated and can understand innovation in rodent control if such is made available to them. The table shows that 56.4% of the farmers have a farm size of 1-3 hectare. This implies that the respondents have small holdings. The result revealed that 68.18% of the farmers do not have contact with extension agents. This implies that farmers must have depended on their indigenous knowledge in rodent control.

Common Rodents in Yam Plantation. Table 2 reveals the common rodents found in yam plantation. The table shows that bush rat is the major rodent of yam found in the study area (77.30%). This is followed by pouch rat (68.20%) and grass cutter (58.20). These are common rodents causing damage on yam plantation. Various studies confirm the fact that some rodents causes economic losses to agriculture and are therefore considers as pest (Makundi *et al.*, 1999, Mulungu *et al.*, 2002, Magige 2012). Furthermore, Akinbo & Opara, (2019) found out that yam tubers is easily wounded by rodents, nematodes and man during field operation including weeding, harvesting and post-harvest handling.

TABLE 1. Distribution of the respondents by their socio-economic characteristics (n=110) (Source: Field survey, 2019)

Variables	Frequency	Percentage (%)	Average
Age (years)			
21-30	14	12.7	
31-40	34	30.9	
41-50	30	27.3	43 years
≥51	32	29.10	
Sex			
Female	2	1.82	
Male	108	98.18	
Marital status			
Single	3	2.7	
Married	100	90.9	
Separated	7	6.4	
Religion			
Christianity	3	2.7	
Islam	107	97.3	
Level of Education			
Non formal	1	0.91	
Primary education	22	20.0	
Secondary education	52	47.27.	
Tertiary education	35	31.82	
Source of labour			
Self	34	30.9	
Family labour	32	29.1	
Hired labour	44	40.0	
Household size			
1-10	103	93.6	6 people
11-20	7	6.4	
Primary occupation			
Farming	91	82.7	
Civil servant	19	17.3	
Farm experience (years)			
1-20	64	58.2	19 years
21-40	46	41.8	
Farm size (hectares)			
1-3	62	56.4	
4-6	43	39.1	3.4 hectares
7-9	4	3.6	
10-12	1	0.9	
Extension contact			
Yes	35	31.8	
No	75	68.18	

Damages caused by rodents to yam tubers. The result in table 2 shows the damages caused by rodents on the farm. These include bruising (90%) Rupturing of the structure of yam (83.6%), tissue degradation (54.5%) among others. The implication of these damages is that it will reduce the economic value of the yam tubers. The consumer will not buy such tubers with good price. Moreover, such yam tubers that have been damage in one way or the other can easily get spoilt because of the activities of microorganism that will feed on the exposed surfaces, thereby reducing the farmers' profit. Several studies have reported the losses incurred by farmers to rodents activities. Mulungu *et al.* (2003), Makundi *et al.* (2005) and Mwanjabe & Leirs (1997) reported that farmer lose 20 – 80% of their maize produce due to rodent damage in Tanzania. Brown et al. (2008) also reported regular rat damages of 84.6% (farmer's response) of rice crop in Myanmar. According to Mulungu *et al.* (2013), these observations call for extra efforts in controlling rodents in order to keep their populations at minimum levels and consequently avoid losses.

TABLE 2. Distribution of the respondent by the common rodents identified on yam plantation Source: Field survey,2019) (*Multiple responses)

Rodents	Frequency	Percentage	Rank
Bush rat	85	77.3	1st
Pouch rat	75	68.2	2nd
Grass cutter	64	58.2	3rd
Squirrel	55	50.0	4th
Rabbit	52	47.3	5th

TABLE 3. Distribution of the respondent by damages caused by rodents Source: Field survey,2019) (*Multiple responses)

Damages	Frequency	Percentage	Rank
Bruising	99	90.0	1st
Rupture	92	83.6	2nd
Tissue degradation	60	54.5	3rd
Sun scotch	54	49.1	4th
Crushing	50	45.5	5th
Sprouting	32	29.1	6th
Respiration	22	20.0	7th
Transpiration	18	16.4	8th
Greening	18	16.4	9th

Control Measures used by the Farmers in the Study Area. Table 4 shows the control measured applied in controlling the activities of rodent by the yam farmers. Sanitation (X=1. 28) was ranked 1st, use of rodent trap (x= 1.23) was ranked 2nd and use of dogs was ranked 3rd. This implies that the farmers ensure that the farms are kept tidy to reduce rodent activities. Moreover, traps were also set at strategic places to get the

rodent alive or to kill them. Besides, the farmers use dogs to chase and kill some the rodents. This result explains why farmers tend to keep dogs not only as pets but also to fight against rodent invasion on their farms. This result is in line with the report of Mulungu et al, (2015) that found out that farmers were responsible for control of rodents and were using rodenticides and physical trapping killing methods respectively. Other methods used in the study area include burning (x=0.88) and hunting (x=0.83). These methods is commonly used by hunters on the yam farms to get rodents which they considered as bush meats and are usually sell as special delicacies. The hunter will raise fires at different points on the farms and this will scare the rodents out from their different holes, as they ran out to escape, the hunters would have set out to kill them.

TABLE 4. Distribution of the respondent by control measures used for rodents Source: Field survey,2019)

Control measures	Always	Sometimes	Not used	Mean	Rank
Sanitation	48 (43.6)	45 (40.9)	17 (15.5)	1.28	1st
Rodent trap	49 (44.5)	37 (33.5)	24 (21.8)	1.23	2nd
Use of dog	26 (23.6)	60 (54.5)	24 (21.8)	1.02	3rd
Burning	3(2.7)	91(82.7)	16 (14.5)	0.88	4th
Hunting	8(7.3)	73(66.4)	29(26.4)	0.81	5th
Use of cat	7 (6.4)	35 (31.8)	68 (61.8)	0.45	6th
Flushing	3 (2.7)	33 (30.0)	74 (67.3)	0.35	7th
Rodenticides	0(0.0)	25(22.7)	85(77.3)	0.22	8th
Rodent guard	1 (0.9)	21 (19.1)	88 (80.0)	0.21	9th
Predation	0(0.0)	22 (20.0)	88(80.0)	0.20	10th
Cage	0(0.0)	18(16.4)	92(83.6)	0.16	11th
Contact dust	0 (0.0)	13 (11.8)	97 (88.2)	0.12	12th
Fumigation	0 (0.0)	12 (10.9)	98 (89.1)	0.11	13th

Cut-off point is 1, ≥ 1 is a major control measure and ≤ 1 is not a major control measure

Constraints Faced by Yam Farmers. Table 5 indicates the constraints faced by farmers in controlling the rodents' activities on the yam farms. Climatic conditions on controls (x=1.47) was ranked 1st, application of rodenticides can result in food poisoning (x=1.04) was ranked 2nd and Setting of traps limits movement around the farm (x=1.02) was ranked 3rd. This implies that climatic condition in season most times favours the activities of rodents. It was reported that the activities of rodents were severe in harvest and postharvest seasons. Brown *et al.* (2008) found out that the severe losses of farm produce occur before and after harvest. The result further implies that the farmers in the study area do not use rodenticides because of fear of food poisoning. Moreover, the farmers reported that setting of traps limit movement on the farm. This may be because the trap set for rodents can injure man if not careful in the environment.

TABLE 5. Distribution of the respondent by constraint to rodents control Source: Field survey,2019)

Constraints	Not a constraint	Not severe	Severe	Very severe	Mean	Rank
Climatic conditions on controls	19 (17.3)	24 (21.8)	63 (57.3)	4 (3.6)	1.47	1st
Application of rodenticide can result in food poisoning	41 (37.3)	31 (28.2)	31 (28.2)	7 (6.4)	1.04	2nd
Setting of traps limits movement around the farm	43(39.1)	27 (24.5)	35 (31.8)	5 (4.5)	1.02	3rd
Control measures takes a long time to eliminate rodents	51 (46.4)	26 (23.6)	25 (22.7)	8 (7.3)	0.99	4th
Setting rodent trap is labour intensive	54 (49.1)	25 (22.7)	24 (21.8)	7 (6.4)	0.85	5th
Control measures pose threat during harvest	59 (53.6)	34 (30.9)	12 (10.9)	5 (4.5)	0.66	6th
Control measures used is a barrier to mixed cropping	65 (59.1)	24 (21.8)	16 (14.5)	5 (4.5)	0.65	7th
Rodent trap has low efficiency	92 (83.6)	11 (10.0)	6 (5.5)	1 (0.9)	0.24	8th
Religion/superstition against control strategies	105 (95.5)	1 (0.9)	1 (0.9)	3 (2.7)	0.11	9th

Cut-off point is 1.5

Result of Pearson product moment correlation. Table 6 shows result of Pearson product moment correlation. Out of seven variables used for the analysis, five were significant. Age (p-value= 0.041, r-value= -3.59), sex (p-value= 0.023, r-value= 1.20 marital status (p-value= 0.025, r-value= 2.46), level of education (p-value= 0.042, r-value= 1.86), and farming experience (p-value= 0.033, r-value= -3.43). This implies that the younger the farmer, the more eagerness to control rodents activities on the farm. Moreover, the male farmers are proactive to control rodents infestation on the farms. The result further implies that farmers that are married control rodent activities and those who are educated and experienced are more likely to control rodents invasion than those who are otherwise.

Table 6: Pearson product moment correlation between the socio-economic characteristics of the yam farmers and control measures of rodents in yam farms ((Significance level of $p \leq 0.05$))

Variables	p-value	r-value	Remark
Age	0.041	-3.59	Significant
Sex	0.023	1.20	Significant
Marital status	0.025	2.46	Significant
Religion	0.380	1.18	Not Significant
Level of education	0.042	1.86	Significant
Farming experience	0.033	-3.43	Significant
Household size	0.012	2.06	Not Significant

CONCLUSIONS

The study concluded that rodents' activities cause a lot of damage to the yam tubers some of which include bruising, rupturing and tissue degradation. Some of the control measures used by the farmers include sanitation, use of trap and use of dogs among others. The study therefore recommended that research institutes, extension agencies and NGO should come up with improved methods of controlling rodents'

activities on the farm. Also, training on the application of rodenticides should be organized for the yam farmers to avoid inappropriate application that can lead to food poisoning.

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