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PESTS AND DISEASES MANAGEMENT AMONG GROUNDNUT FARMERS IN EDU LOCAL GOVERNMENT, KWARA STATE, NIGERIA

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ABSTRACT
Pest attack in agriculture is usually observed both on the field and during period of storage resulting in substantial crop losses of marketable yield. The study assessed the pests and diseases management among groundnut farmers in Edu LGA of Kwara State, Nigeria. The objectives of the study are to identify the common pests and diseases of groundnut, examine the effect of pests and diseases on groundnut farm among others. The study engaged 106 groundnut farmers that were randomly selected. Data collected were obtained with structured questionnaire administered to the groundnut farmers and were analyzed using descriptive and inferential statistics. Result of the analysis reveals that majority of the respondents were male (69.8%), married (88.7%) with average household size of 7 persons. Most of the respondents were in their average age of 35years. Result shows that pests and diseases of groundnut include red hairy caterpillar, leaf and pod rot and early and late leaf spot. The study identified the major effect of pest and diseases in the study area as reduce productivity and damage crops. Cultural methods of controlling pest and diseases were mostly used. The study identified the constraint to pest and diseases management as increase cost of production (95.3%) and labour intensive (93.4%). The study therefore recommended that, extension agency should embark on a progamme that will teach the farmer to use host resistance of controlling pest and diseases. Moreover, farmers should be encouraged to plant early to reduce pest infestation.
KEY WORDS:*pest, diseases, management, groundnut, farmer*

INTRODUCTION

Groundnut is the 13th most important cash crop and 4th oil seed crop of the world. Groundnut seeds (kernels) contain 40-50% fat, 20-50% protein and 10-20 carbohydrates (FAOSTAT, 2014). Nigeria is the largest groundnut producing country in West Africa, accounting for 51% of production in the region. The country contributes 10% of total global production and 39% that of Africa. Groundnut is a major source of edible oil as well as livelihoods for small-scale farmers in Northern Nigeria (Ajeigbe *et al.*, 2015). Groundnut is also one of the crops cultivated in Kwara state and remains the major source of livelihood for small scale farmers. Groundnut which is rated the third major oil seed is also referred to as women's crop because they

are mostly involved in the groundnut processing (Anchirinah *et al*, 2001). Pests are known to have negative impact on crop production as well as on human health (Tandi *et al*, 2014; Misca *et al*, 2014; Datcu *et al*, 2019). According to FAO (2017), pest control is important in the agricultural industry. Annually, it is estimated to cost farmers worldwide about 10 billion dollars to control pests (Van Lenteren, 2005). Crop pest and disease are major constraints to higher agricultural productivity, accounting for close to 50 percent total crop losses (Luchian *et al*, 2019). The losses are greatest in developing countries. Improving pre and post-harvest pest and diseases management can easily increase productivity**.** Insect pest can have adverse and damaging impacts on agricultural production, market access, the natural environment, and our lifestyle. Once a pest or disease has started to attack a crop, the damage cannot be repaired and control becomes increasingly difficult. It is equally important that as pests are being controlled on the farm, it must be done in such a way that the environment and ecosystem are not disturbed. Therefore, the study is out to assess the pests and diseases management among groundnut farmers. Therefore, the specific objectives of the study are to: describe the socio-economic characteristics of the groundnut farmers in the study area; identify the common pests and diseases management of groundnut in the study area; examine the effect of pests and diseases on groundnut farm; determine the various control measures of pest and disease of groundnut in the study area; identify the major constraints to pest and diseases in the study area.

Hypothesis of the study: Ho_1: There is no significant relationship between the socio-economic characteristics of the groundnut farmers and control measures of pest and diseases of groundnut.

MATERIALS AND METHODS

The study area for the research was Edu local government in Kwara State. Kwara state is situated between parallel 8 and 10 north latitudes and 3 and 6 east longitude 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 is a Yoruba speaking state in which Edu is one of them. The study was conducted in Edu Local Government Area of Kwara State Nigeria having its headquarters in Lafiagi. It has an area of 2,542km^2 and a population of 201,469 as of the 2006 census (NIPOST, 2009). Groundnut is widely grown in Edu local government because the soil and weather condition of the community is favourable for its growth.

Sampling procedure and sample size. A three-stage sampling procedure was employed. The first stage is purposive selection of Edu local government areas due to the high prevalence of groundnut farmers. The second stage is the purposive selection of Tsaragi and Zambufu because of the availability of registered groundnut farmers there. The third stage is random selection of sixty five percent (65%) of total registered groundnut farmers in each of the community selected. Tsaragi has one hundred and

two (102) registered groundnut farmers and the sixty-five percent (65%) is sixty-six (66). Zambufu has sixty-three (63) registered groundnut farmers and the sixty-five percent (65%) is forty (40). The total sample size was one-hundred and six (106) respondents.

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 groundnut farmers.

Table 1 showed that the mean score of the respondents' ages was 35 years. This implies that the respondents are still in their active age. Majority of the respondents (69.8%) were male and married (88.7%). This implies that there are more male farmers than the female farmers in the study area. Moreover, majority being married implies that they have family to cater for. 52.8% of the respondents had non-formal education. The implication of this is that the respondent may finds it difficult to use new management techniques to eradicate or reduce the pest and disease outbreak on their farm. The result is similar to the findings of Okpachu *et al,* (2013) that says one of the major problems facing Agricultural productivity in Nigeria is illiteracy. 52.8% of the respondents used hired labour on their farm and 50.7% of the farmer have 6-10 household size. This implies that the farmers have fairly large household size to work on their farm. Furthermore, Table 1 showed that 51.9% of the respondents have farming experience ranging from 11-20 years. The average year of experience is 18 years. The implication of this result is that the respondents in the study area had relatively high number of years of experience. This may enable them to be aware of the management practices to use in eliminating the pest and diseases on their various farms. Table 1 shows that 45.3% of the respondents had farm size ranging from 1-5 hectares. The average farm size used by respondents was 7 hectares. This implies the farmers have small farm holdings. These findings agrees with Onugu (2008) that reported that a number of studies have indicated that agricultural production in Nigeria is still characterized by small farm holders. Majority (95.4%) of respondents own the land they use by inheritance. In addition, table 1, shows that 57.5% of the respondents sourced their finance from personal saving and all (100%) of the respondents do not have any extension contact. This implies that there is no interaction what so ever between the extension agents and the farmers in the study area. Oyewole *et al* (2015) found that limited extension contact may reduce farmers' accessibility to information on improved farm technologies.

TABLE 1. Distribution of the respondents by their socio-economic characteristics (n=106) (Source: Field survey, 2019)

Variables	Frequency	Percentage (%)	Average
Age (years)			
15-25	30	28.5	**35 years**
26-35	37	34.9	
36-45	28	26.4	
≥ 46	11	10.4	
Sex			
Female	32	30.2	
Male	74	69.8	
Marital status			
Single	11	10.4	
Married	94	88.7	
Separated	1	0.9	
Religion			
Christianity	24	22.6	
Islam	82	77.4	
Level of Education			
Non formal	56	52.8	
Primary education	17	16.0	
Secondary education	13	12.3	
Tertiary education	20	18.9	
Source of labour			
Self	16	15.1	
Family labour	34	32.1	
Hired labour	56	52.8	
Household size			
1-5	38	35.8	**7 persons**
6-10	53	50.0	
≥ 11	15	14.2	
Primary occupation			
Farming	99	93.4	
Trading	5	4.7	
Artisan	2	1.9	
Farm experience (years)			
1-10	25	23.6	**18 years**
11-20	55	51.9	
21-30	18	16.9	
≥ 31	8	7.6	
Farm size (hectares)			
1-5	48	45.3	**7 hectares**
6-10	45	42.5	
≥ 11	13	12.2	
Land ownership			
Rent	1	0.9	
Inheritance	101	95.4	
Lease	3	2.8	

Purchase	1	0.9	
Annual income (#000)			
1-100	7	5.7	**#354,000**
101-200	6	4.9	
201-300	32	26.2	
300 and above	77	63.2	
Source of finance			
Personal saving	61	57.5	
Loan from friends	30	28.3	
Cooperative society	15	12.2	
Extension contact			
No contact	106	100	
Total	106	100	

Common pest of groundnut in the study areas.

Table 2 shows the distribution of the various common pests of groundnut in the study area. The result shows that all the respondent attest that thrips is a major pest on farm. Majority of the respondent reported the infestation of red hairy caterpillar (99.1%) and leaf miner (97.2%) on their farm. However, only few respondents reported the infestation of birds (2.8%) and squirrel (4.7%) on their farm. This finding is in line with Bajia *et al*, (2017) who found that red hairy caterpillar is a serious and devastating pest of rain fed groundnut crop.

Based on the level of infestation the result shows that leaf miner was ranked 1st ($\overline{x}$ = 2.73), red hairy caterpillar was ranked 2nd ($\overline{x}$ = 2.65). However, squirrel and bird were ranked 9th and 10th ($\overline{x}$ = 0.01 and 0.07) respectively. This result is in line with the study of Okello *et al.* (2016) who reported that Groundnut leaf miner (*Aproaerema modicella* Deventer) is a very serious pests of groundnuts both in the rainy and post rainy season crops and is regarded as the most important pest threatening groundnut production.

Common diseases of groundnut in the study area.

Table 3 shows the distribution of the various common diseases of groundnut in the study area. The result shows that the groundnut farmers attest to the infestation of all the diseases identified on their farm. Majority of them reported groundnut rosette diseases (99.1%), groundnut rust (97.2%) etc. According to Plantwise (2010) groundnut rosette disease is the most important of all diseases of crop which can be epidemic and result in devastating losses.

Based on the level of infestation the study reveals that early and late leave spot was ranked 1st ($\overline{x}$ = 2.70) and stem and pod rot was ranked 2nd ($\overline{x}$ = 2.05). According to Hasan *et al,* (2014) early and late leaf spot are most devastating and economically important foliar fungi disease and major yield reducing factors of groundnut worldwide.

TABLE 2. Distribution of the respondent by the common pests of groundnut and their level of infestation (Source: Field survey,2019)

Pests	Frequency	Percentage	Low (%)	Moderate (%)	High (%)	Mean	Rank
Leaf miner	103	97.2	5 (4.7)	10 (9.4)	88 (83.0)	2.73	1st
Red hairy caterpillar	105	99.1	5 (4.7)	24 (22.6)	76 (71.7)	2.65	2nd
Thrips	106	100	9 (8.5)	25 (23.4)	72 (67.9)	2.59	3rd
Termites	99	93.4	6 (5.6)	32 (30.2)	61 (57.5)	2.39	4th
Jassids	92	86.8	11 (10.4)	17 (16.0)	64 (60.4)	2.24	5th
Aphids	99	93.4	10 (9.4)	42 (37.6)	47 (44.3)	2.22	6th
Giant rat	94	88.7	1 (0.9)	44 (41.5)	48 (45.3)	2.21	7th
Rabbit	88	83.0	2 (1.9)	47 (44.3)	39 (36.8)	2.01	8th
Squirrel	5	4.7	1 (0.9)	2 (1.9)	2 (1.9)	0.10	9th
Birds	3	2.8	-	2 (1.9)	1 (0.9)	0.07	10th

*Multiple responses.

TABLE 3. Distribution of the respondent by the common diseases of groundnut and their level infestation (Source: Field survey, 2019)

Diseases	Frequency	Percentage (%)	Low (%)	Moderate	High (%)	Mean	Rank
Early and late leaf spot	105	99.1	6 (5.7)	17 (16.0)	82 (77.4)	2.70	1st
Stem and pod rot	105	99.1	6 (5.7)	22 (20.8)	77 (72.6)	2.65	2nd
Groundnut rust	103	97.2	4 (3.8)	21 (19.8)	78 (73.6)	2.64	3rd
Groundnut rosette disease	105	99.1	13 (12.3)	55 (51.9)	37 (34.9)	2.21	4th

*Multiple responses.

Effects of pests and diseases on groundnut production.

Table 4 shows the distribution of the respondents by the effect of pests and diseases on groundnut production in the study area. All the respondents (100%) accepted that pests and diseases reduce productivity and damage crop. 99.1% of the farmers reported that pests and diseases of groundnut reduce product quality and marketability. However, 38.9% of the farmers reported that pests and disease of groundnut retard growth. In many regions of the world, including Africa, rust can cause pod yield losses up to 40% when an epidemic occurs (Plantwise, 2010).

TABLE 4. Distribution of the respondent by the effect of pests and diseases on groundnut production (Source: Field survey, 2019)

Effect	Frequency	Percentage (%)
Reduce productivity	106	100
Reduce product quality	105	99.1
Damage crops	106	100
Reduce marketability	105	99.1
Causes retarded growth	41	38.7

Control measures of pests and diseases of groundnut and level of usage
Table 5 and 6 shows the distribution of the respondents by control measures of pests and diseases of groundnut and level of usage. The 1st control measures used is the cultural methods. All the cultural methods identified were frequently used except organic amendment (15.1%). Out of the biological methods identified only sowing of viable seed (98.1%) was used by majority of the farmers. However, this finding is in contrast with Manosalva *et al, (*2015) that says Host resistance is the most effective and convenient approach for plant disease management. Herbicides (79.2%) and pesticides (76.4%) were the chemical control measures used by many of the farmers. The last control measures is physical or mechanical methods, out of which weeding (95.3%), land preparation and proper planting space were carried out by farmers. This finding can be supported with Hamakareem *et al.,* (2016) who found out that if early weeding is done well, and crop spacing recommendations followed, then the weeds that come up later are smothered with the vigorous growth of the crop.

Based on the level of usage of control measures, sowing of viable seed ($\overline{x}$ = 2.65) was ranked 1st , planting early($\overline{x}$ = 1.86) was ranked 2nd, and land preparation ($\overline{x}$ = 1.82) was ranked 3rd. This validates the report of International Potato Center (2014) that says timing of operations such as pre-planting, planting and post planting plays a significant role and it is critical factor to farm success. Regular weeding ($\overline{x}$ = 1.81) was ranked 4th and intercropping ($\overline{x}$ = 1.73) was ranked 5th This findings is in line with Alizadeh *et al.* (2010) who states that intercropping plays an important role in increasing the productivity and stability of yield in order to improve resource utilization and environmental factors. However, Seed treatment ($\overline{x}$ = 0.28) was ranked 14th, organic amendments ($\overline{x}$ = 0.23) was ranked 15th, host resistant ($\overline{x}$ = 0.14) was ranked 16th and fungicides ($\overline{x}$ = 0.09) was ranked 17th. The least ranked control measures was nematicides ($\overline{x}$ = 0.05). Though chemical pesticides have played an important role in increasing groundnut production, their indiscriminate use for the control of pest has led to several environmental problems such as development of resistance in pests to pesticides, pesticides residue and the destruction of beneficial insects like parasites and predators.

TABLE 5. Distribution of the respondent by control measures of pests and diseases of groundnut (Source: Field survey, 2019)

Methods	Frequency	Percentage (%)
Cultural method		
Crop rotation	100	94.4
Intercropping	105	99.1
Planting Early	99	93.4
Organic amendments	16	15.1
Biological methods		
Seed treatment	25	22.6
Sowing of viable seed	104	98.1
Host resistance	12	11.3
Chemical methods		
Use of Insecticides	28	26.4
Herbicides	84	79.2
Fungicides	7	6.6
Nematicides	4	3.8
Pesticides	81	76.4
Physical /Mechanical methods		
Regular weeding	101	95.3
Proper cleaning of implement	40	37.7
Proper planting space	92	86.8
Hand picking	56	52.8
Land preparation	102	96.2
Setting of trap	87	82.1

TABLE 6. Distribution of the respondents level of usage of control measures of pests and diseases of groundnut (Source: Field survey, 2019)

Methods	Never (%)	Seldomly (%)	Always (%)	Mean score	Rank
Cultural method					
Crop rotation	6 (5.7)	51 (48.1)	49 (46.2)	1.41	8th
Intercropping	7 (6.6)	27 (25.5)	78 (73.6)	1.73	5th
Planting Early	7 (6.6)	1 (0.9)	98 (92.5)	1.86	2nd
Organic amendments	90 (84.9)	8 (7.5)	8 (7.5)	0.23	15th
Biological methods					
Seed treatment	83 (78.3)	16 (15.1)	7 (6.6)	0.28	14th
Sowing of viable seed	2 (1.9)	6 (5.7)	98 (92.5)	1.91	1st
Host resistance	94 (8.7)	9 (8.5)	3 (2.8)	0.14	16th
Chemical methods					
Use of Insecticides	78 (73.6)	16 (15.1)	12 (11.3)	0.38	13th
Herbicides	22 (20.8)	17 (16.0)	67 (63.2)	1.42	7th
Fungicides	99 (93.4)	4 (3.8)	3 (2.80)	0.09	17th
Nematicides	102 (96.2)	3 (2.80)	1 (0.9)	0.05	18th
Pesticides	25 (23.6)	22 (20.8)	59 (55.7)	1.32	10th
Physical /Mechanical methods					
Regular weeding	5 (4.7)	10 (9.4)	91 (85.9)	1.81	4th
Proper cleaning of implement	66 (62.2)	25 (23.6)	15 (14.2)	0.52	12th
Proper planting space	14 (13.2)	16 (15.1)	76 (71.7)	1.58	6th
Hand picking	50 (47.2)	22 (20.8)	34 (32.0)	0.85	11th
Land preparation	4 (3.8)	11 (10.4)	91 (85.8)	1.82	3rd
Setting of trap	19 (17.9)	29 (27.4)	58 (54.7)	1.37	9th

Constraints to control pests and diseases of groundnut.

Table 7 shows the distribution of the respondent by the constraints to control pests and diseases of groundnut. The constraints include increase cost of production (95.3%), time consuming (95. 3%), labour intensive (93.4%), pollution of water and the environment (68.8%), residual effect (60.3%) and slow action. This result goes in line with the study of Tsigbey *et al (*2003) and Angelucc & Bazzucchi (2013), who stated that both biotic (pests and diseases) and abiotic factors militate against increased crop production and sustainable production of the crop.

Based on the level of severity of constraints to control of pests and diseases of groundnut in the study area, it was observed that Labour intensive ($\overline{x}$ =2.31), increase cost of production ($\overline{x}$ =2.29), time consuming ($\overline{x}$ =2.25) were constraints to the control of pests and diseases of groundnut in the study area. Pollution of water and the environment ($\overline{x}$ =1.89), the residual effect ($\overline{x}$ =1.77), slow in action ($\overline{x}$ =1.33) were not constraints to the control of pest and disease of groundnut in the study area. This result is in contrast with the study of Ghewande and Nandagopal (1997), who stated that chemical pesticides have played an important role in increasing groundnut production, their indiscriminate use of pesticide to control pests has led to several environmental problems such as development of resistance in pests to pesticides, pesticides residue and the destruction of beneficial insects like parasites and predators.

TABLE 7: Distribution of the respondent by the constraints to control of pests and diseases of groundnut and their level of severity (Source: Field survey, 2019)

Constraints	Frequency	Percentage (%)	Not severe (%)	Severe (%)	Very severe (%)	Mean score	Remark
Increase cost of production	101	95.3	7(6.6)	59 (55.7)	40 (37.7)	2.31	Constraint
Time consuming	101	95.3	5 (4.7)	65 (61.3)	36 (34.0)	2.29	Constraint
Labour intensive	99	93.4	5(4.7)	69 (65.1)	32 (30.2)	2.25	Constraint
Pollution of water and the environment	73	68.8	33(31.1)	52 (49.1)	21 (19.8)	1.89	Not Constraint
Residual effect	64	60.3	42(39.6)	46 (43.4)	18 (17.0)	1.77	Not Constraint
Slow in action	28	26.4	75(70.8)	21(19.8)	7(6.6)	1.33	Not Constraint

*Multiple responses .Cut off point is 2, ≥ 2 is a constraint and < 2 is not a constraint.

Result of Pearson product moment correlation.

Result from table 8 shows the relationship between the socio-economic characteristics of the groundnut farmers and the control measure of pests and diseases. Age, marital status, level of education, source of labour, farming experience, farm size and annual income are significant to the control of pest and diseases of groundnut. This implies that increase in age will make groundnut farmer control pests and diseases

better, also the married respondents gives more attention to the control of pests and diseases than their single counterparts. The higher the level of education the better the control measures using on the farm. Alene and Manyong (2007) found significant positive effects between schooling and agricultural productivity. Source of labour has negative significant on the control measure of pest and disease of groundnut. This means that farmers will find all possible means to cost of production.

TABLE 8: Pearson product moment correlation between the socio-economic characteristics of the groundnut farmers and control measures of pest and diseases of groundnut ((Significance level of $p \leq 0.05$))

Variables	r-value	p-value	Remark
Age	0.022	0.243	Significant
Sex	0.126	0.123	Not significant
Marital status	0.029	0.106	Significant
Religion	0.463	0.322	Not significant
Level of education	0.019	0.185	Significant
Source of labour	- 0.048	0.279	Significant
Farming experience	0.030	0.130	Significant
Farm size	0.040	0.026	Significant
Annual income	0.011	0.230	Significant

CONCLUSIONS

The study concludes that leaf miner and red hairy caterpillar are the major pest affecting groundnut and early and late leaf spot and stem and pod rot are the major diseases of groundnut in the study area. Biological method of pest control (sowing of viable seed), cultural methods (planting early) and mechanical method (weeding and land preparation) were the control measures used by the respondents in the study area because cost implication is low. The study therefore recommends that extension agency embark on a progamme that will sensitize the farmers to use host resistance of controlling pest and diseases. Moreover, farmers should be taught how to treat seed with appropriate chemical in other to prevent pest and diseases incidence on farmland should be trained how to apply appropriate pesticide on their crop to prevent residual effect on crop, human and the environment.

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