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Activities Of Wood Pests On Roof Structures Of Educational Buildings And Their Effects On Teaching And Learning In Yobe State

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ABSTRACT
This study was on the activities of wood pests on roofs structures of educational buildings and their effects on teaching and learning in Yobe States, The study employed a two-pronged approach of descriptive survey and experimental research design. Three research questions and two null hypotheses were formulated to guide the study. The area of the study was Yobe State of Nigeria while, the population of the study consist of all Headmasters in the 1262 schools, all the 442 Local Government Maintenance Officers and all the 172 state maintenance officers in Yobe State. Ten percent of all these three sub=groups made-up the sample for this study. The data for this study were collected in two phases. The laboratory experiment provided the data for research question 1, while a 33 item questionnaire was used to collect response to research questions 2 and 3. Simple statistical mean and standard deviation were adopted in analyzing the data resulting from the research questions 2 and 3 while laboratory analysis was used to identify types of wood pests in the study area. The Analysis of Variance (ANOVA) was employed in the test of the hypotheses at 0.05 percent level of significance. Based on the data analysis the findings of the study showed that; i) Many of the school buildings in Yobe State are commonly attacked by wood pests such as; subterranean termites, Dry wood termites, Damp wood termites, Pinhole borers and Lyctidae powder post beetle. ii) The common types of timber used in constructing the Educational Buildings in Yobe State includes, Mahogany, Obeche, Melina, Apple, Achuwele, Arere, Akwamiri, Doka, Marke, Iroko, Black Afara, Mansonia and Agba. iii) The extent of damage on roofs of educational building affecting teaching and learning includes: sagging of ceiling, collapsed roofs, frequent maintenance, classrooms without roofs and ceiling are factors affect teaching and learning in Yobe State. Therefore the study recommends proper selection of species of timber for construction of roof structures of educational buildings e.g abura and acasia who have straight grain pattern and are strong. The study recommends the use of enhanced control methods against wood pests in construction of roofs of educational buildings such as vacuum pressure impregnation method that allows deep penetration of preservatives to guard against wood pests attack.
Keywords: wood pests, educational buildings, timber, roofs structures

INTRODUCTION

Termites are small bodied lightly pigmented insects usually confused to be the white ants. (Inward, Vogler & Eggleton, 2017). Although termites are everywhere worldwide, Africa is the richest in the number of termite species known and identified. The species richness is as a result of the friendly climatic

conditions in Africa (Creffied, 2019). Nigeria and Yobe State in particular is located within the favourable climate condition for the termites. Termites' activities targets timber structures in buildings like the roof structures of educational buildings and go even deeper into other things within the building such as furniture, clothing and books (Schabel, 2020).

Termites according to Kirt and Culen (2015) are classified according to their living and feeding habits, e.g. damp wood, subterranean and dry wood termites. Damp wood termites as the name suggests, will only infest wood with high moisture content, whereas the subterranean termites live largely underground, building their nest in old trees, stumps and root systems and frequently move outside to search for foods, while dry wood termites, as their name suggests are capable of infesting dry, sound wood. They can infest wood structures that are not in contact with the ground. They do not require continuous contact with the ground to obtain moisture as they can obtain moisture from the wood in which they feed and live (Highley, 2013).

Another class of insects that attack wood are the borers popularly known as powder post beetles. They are so called because of the powdery frass produced by adults boring into the wood. Powder post beetles are capable of attacking dry timbers and their attack is confined to sapwood since the starch constitutes an essential element in their diet (Cookson, 2004 & Liu, 2008). There are a number of beetles that produce 'powder post' defects in wood. These include small wood boring beetles of at least three families; the lyctidae or true powder post beetles, the anobiidae or death watch beetles and the bostrichidae or branch or twig borers sometimes called false powder post beetles (Sittichaya & Beaver, 2009).

The lavae of these beetles feed on cellulose in wood and they can cause extensive damage to wood structures in schools and at home if conditions are suitable to them. Moisture plays a key role in attack from these insects. Losses are often heaviest in warm humid climates (Eaton & Hale, 1993). In their feeding, they reduce the wood to a fine powder, not unlike talcum powder in consistency. Holes left by emerging beetles are about 3.2mm in diameter and round (Tanis & McCullough, 2012). They are sometimes called "Shot holes". Depending on the type of wood pest and their species, their life cycle may range from 3 months to 2 or more years. Some species are specific as to the types of wood they infest, while others are general feeders. However, they are either hardwood feeders or soft wood feeders. (Gerberg, 2017). These classes of wood which powder post beetles infest are the timber used for construction of roof structures in educational buildings. Roofing structures in educational building includes, the strut, tie beam, wall plate, king post, ceiling joist, purlin and rafter (Whiting, 2013). A rafter which is the main component of a roof structure can be explained as one of a series of sloped structural members (beams) that extend from the ridge or hip to the wall plate, down slope perimeter or cave. Rafters are designed to support the roof deck and its associated loads (Leet, Uang, & Gilbert, 2012). Components for a rafter assembly include a glazing having a main support member and a cap engaging member. The cap engaging member has a detented portion extending from an edge region back towards an opposite edge region (Lehr & Nunley, 2018). It is the cap engaging member and other associated parts of roof structures that gave shelter to enable teaching and learning to take place in educational building.

Educational building structures for academic and non-academic activities in primary schools includes classrooms, laboratories, libraries, offices, staffrooms, stores and toilets. These Educational building structures in primary schools incorporate roof structures that is made up of rafters, noggins, purlins, king post and trusses which are mostly timber products processed from a tree (Wolfe, 2015). It is the felled tree that is referred to as wood. Wood is one of the most adaptable and earliest basic materials in human use. It is the material that forms the trunk and branches of a standing tree. It can be called timber when processed to smaller sizes for use. Wood has a remarkably diverse range of applications: it is one of the most versatile building materials; used in the manufacturing of furniture, decorative materials, sports equipment, musical instruments, and for construction purposes (Kollmann, Kuenzi & Stamm, 2012). The woods for construction purpose are classified for commercial purposes as either hardwoods or softwoods. The hard woods and soft woods are the tree product used for construction of roof structures of educational buildings. These buildings are provided for teachers and pupils to optimize their productivity in the teaching and learning process that takes place in the school.

The school is also a critical focus for pupils' inter-personal and educational development (Durlak, Weissberg, Dymnicki, Taylor & Schellinger, 2011). Evidence from research findings showed that educational building structures have a powerful influence on how well pupils achieve a wide range of educational outcomes. According to Owoeye and Yara (2010), many school children in Nigeria learn under the shade of trees, some occupy dilapidated classrooms, while many learn in classrooms without ceilings.

A study conducted by Umar and Abdullahi, (2013) also indicates that continued attack by wood pests was because of the quality of wood used during construction, but this claim has not been ascertained as there are different types of wood pests and the type of wood they attack and survive on are different. Hence, the need for the study on the activities of wood pests on roof structures educational building and their effects on teaching and learning in Yobe States

Purpose of the Study

The purpose of this study will be to identify the activities of wood pests on roofs of educational buildings and how these activities will affect teaching and learning in Yobe States. Specifically, the study intends to;

1. Identify the types of wood pests that attack roofs of educational buildings in Yobe State.
2. Identify the types of timber used for construction of roofs of educational buildings in Yobe State.
3. Determine how activities of wood pests on roofs members of educational buildings affect teaching and learning in Yobe State.

Research Questions

The following questions will guide the researcher in carrying out this study:

1. What are the common types of wood pests that attack roofs of educational buildings in Yobe State?
2. What are the common types of Timber used for construction of roofs of educational Buildings in Yobe State?
3. In which way do common wood pests activities on roofs structure of educational buildings affect teaching and learning in Yobe State?

Hypotheses of the Study

The following null hypotheses were formulated to guide this study and will be tested at 0.05 level of significance.

HO_1. There is no significant difference in the mean response of LMO and SMO on the common types of wood pests that attack roof structures of educational buildings in the 3 senatorial zones of Yobe State

HO_2. There is no significant difference in the mean response of Headmasters, LMO and SMO on how activities on roof structures of educational buildings affecting teaching and learning in the 3 senatorial zones of Yobe State

METHODOLOGY

The study employed descriptive survey and experimental research design. The area of study was Yobe State of Nigeria and the population consists of all Head masters in 1262 schools, all the 442 Local Government Maintenance Officers and all the 172 state maintenance officers in Yobe State. Random sampling technique was used to select 10 % of the total population therefore, the samples for the study was 126 Head masters, 44 Local Government Maintenance Officers and 17 state maintenance officers making the total sample of 187 respondents

The instrument for data collection in this study was a questionnaire consisting of 33 items which will be used to answer research questions 2 and 3. While, research question 1 was a microscopic examination to identify the species of wood pests that attack roofs of educational buildings in various locations in the state. Research question 1 and 2 was administered to local government maintenance officers and state maintenance officers. Research question 3 was answered by headmasters of the schools. The response

categories on the questionnaire for Research questions 1, 2 and 3 were, Strongly Disagree (SA), Disagree (D), Agree (A),Strongly Disagreed (SD) with assigned values of 4, 3, 2 and 1 respectively.

A monocular electric microscope in Entomology laboratory university of Maiduguri was used to identify the types of wood pest species in various schools in the study area. The instrument was selected because it has a variable lens that can be adjusted to give a clear vision of the wood pests. The laboratory procedure involved collecting samples from sampled primary school building in the state. The samples will be gathered through physical inspection of the school building to identify where the activities of wood pests are prevalent.

The instrument was validated by 3 experts in the Department of Technology Education, Abubakar Tafawa University of Technology, Bauchi. Pearson's Product Moment Correlation Co-efficient was computed to establish the correlation co-efficient of the instrument. A correlation co-efficient of 0.76 was found thus considered reliable for data collection. Trained research Assistants were used for distribution and collection of data. The data collected for research question 1 was by microscopic analysis while, research questions 2 and 3 was answered using means and standard deviation. For this study, analysis of variance (ANOVA) was used to test the 2 null hypotheses at 0.05 per cent level of significance.

RESULTS

Research Question 1: *What are the common types of wood pest that attack Roofs of Educational Buildings in Yobe State?*

The data collected on the common types of wood pests attacking educational buildings in Yobe State is presented in table 1. Table 1 clearly shows that different types of wood pests that are found on the buildings.

Table 1: Laboratory Identification of Wood Pests that Attack Roofs of Educational Buildings in Yobe State

S/N	L.G.	No of Samples/L G	Wood pests Species Identified					
		SUB	DRY	DAMP	PIN	LYC	LHORN	TOTAL
1.	Bade	3	1	-	-	3	-	7
2.	Bursari	3	1	1	2	1	-	8
3.	Damaturu	2	1	-	2	1	-	6
4.	Fika	5	2	1	3	2	-	13
5.	Fune	5	3	-	4	1	-	13
6.	Geidam	3	-	-	2	-	-	5
7.	Gujba	3	2	-	1	2	-	8
8.	Gulani	4	-	-	3	-	-	7
9.	Jakusko	-	6	-	-	3	-	9
10.	Karasuwa	3	-	-	2	-	-	5
11.	Machina	-	2	-	-	1	-	3
12.	Nangere	4	1	1	2	1	-	9
13.	Nguru	1	1	3	1	1	1	8
14.	Potiskum	3	1	1	1	2	-	8
15.	Tarmuwa	1	-	1	-	2	-	4
16.	Yunusari	2	1	-	3	-	-	6
17.	Yusufari	1	3	-	1	2	-	7
Totals		43	25	8	27	22	1	126

Keys: SUB = Subterranean termite, DRY = Drywood termites, DAMP = Dampwood termites, PIN = Pin-hole Borers, LYC = Lyctdae, and LHORN = Long horn beetles

Table 3 displays the laboratory analysis of types of wood pests that attack roofs of educational buildings in Yobe State. The laboratory analysis showed that out of 126 samples presented for laboratory analysis, there are 43 subterranean termites, 25 Drywood termites, 8 Dampwood termites, 27 Pinhole borers, 22 Lyctidae and 1long horn beetle. This was seen in the distribution of wood pests in the table across the

state. The predominant wood pests in the state were the subterranean termites, followed by pin hole borers. The wood pest that is less prevalent in the study area was long horn beetle. This was an indication that the roofs of educational buildings in Yobe State were not only infested with a single species of wood pests but, by many species.

Research Question 2: *What are the Common Types of Timber used for Construction of Roofs of Educational Buildings in Yobe State?*

The data collected to investigate research question 2 is presented in table .

Table 2: Mean Responses of LMO & SMO on the Common Types of Timber

S/N	Name of Timber	$N_1 = 68$	$N_2 = 17$					
		$\overline{X_1}$	$\overline{X_2}$	SD_1	SD_2	$\bar{X}$	SD	*REMARK*
1.	Mahogany (Hardwood)	2.96	2.94	0.78	0.83	2.99	0.79	Agreed
2.	Obeche (softwood)	3.07	3.00	0.74	0.79	3.06	0.75	Agreed
3.	Melina (softwood)	2.97	2.82	0.73	0.73	2.94	0.73	Agreed
4.	Apple (Softwood)	2.66	2.71	0.87	0.92	2.67	0.88	Agreed
5.	Achuwele (Hardwood)	2.53	2.65	.95	1.12	2.55	0.98	Agreed
6.	Marobiya (Hardwood)	1.91	1.82	0.93	1.02	1.89	0.94	Disagreed
7.	Abura (Hardwood)	2.16	2.18	0.94	0.95	2.17	0.94	Disagreed
8.	Iroko (Hardwood)	2.24	2.06	0.93	1.03	2.20	0.95	Disagreed
9.	Black Afara (Hardwood)	2.31	2.35	0.90	1.06	2.32	0.93	Disagreed
10.	Mansonia (Hardwood)	2.27	2.12	0.92	0.99	2.24	0.93	Disagreed
11.	Agba (Hardwood)	2.41	2.41	0.95	1.00	2.46	0.96	Disagreed
12.	Larch (Softwood)	2.19	2.12	0.92	0.93	2.18	0.92	Agreed
13.	Arere (Softwood)	2.69	2.77	0.95	0.97	2.71	0.95	Agreed
14.	Akwamiri (Softwood)	2.56	2.59	0.95	0.94	2.57	0.94	Agreed
15.	Doka (Hardwood)	2.66	2.65	0.92	0.93	2.66	0.92	Agreed
16.	Marke (hardwood)	2.66	2.71	0.89	1.05	2.67	0.92	Agreed

Key: $\overline{X_1}$ = mean for LMO, $\overline{X_1}$= mean for SMO, SD_1 = Standard Deviation for LMO, SD_2 = Standard Deviation for SMO $\overline{X_G}$ = Grand mean for LMO and SMO, SD_G = Standard Deviation for LMO and SMO

Table 2 showed the data on the type of timber used for construction of roofs for educational buildings in Yobe State are, Mahogany, Obeche, Malina, Apple, Achuwele, Arere, Akwamiri, Doka and Marke. This can be seen from their mean responses that range between 2.55 and 3.05. Agba, Mansonia and Black Afara are also used for construction of roofs of educational buildings considering the level of response shown on the table. On the other hand the Local Government Maintenance Officers and State

Maintenance Officers indicated that Marobiya, Abura, Iroko, and Larch are least used for construction of roofs of educational buildings in Yobe State.

Research Question 3: *In which way do activities of common wood pests on roofs of educational buildings affect teaching and learning in Yobe State?*

Table 3: Mean Responses of Headmasters on ways Common Wood Pests Activities on Roofs of Educational Building Affect Teaching and Learning in Yobe State

S/N	Item statement	$N_1 = 39$ $N_2 = 43$ $N_3 = 44$								
		$\overline{X_1}$	$\overline{X_2}$	X_3	SD_1	SD_2	SD_3	$\overline{X_G}$	SD	REMARK
1	Sagging ceiling due to wood pests infestation distract teaching and learning	2.97	2.67	2.66	1.04	0.94	0.83	2.76	0.94	Agreed
2	Particle of ceiling boards falling from wood due to wood pests infestation disrupt teaching and learning	2.44	2.33	2.31	0.97	0.97	1.11	2.35	1.01	Disagreed
3	Collapsed roof due to wood pests infestation affects teaching and learning in the classroom	2.85	2.77	2.86	0.99	0.97	0.93	2.83	0.96	Agreed
4	Noise due to wood pests attack on roof members of the classroom disrupts teaching and learning	2.44	2.16	1.98	1.05	0.97	0.10	2.18	1.02	Disagreed
5	The frequency of maintenance as a result of wood pests attack is high and this disrupts teaching and learning	3.00	2.56	2.84	0.89	1.03	0.75	2.79	0.91	Agreed
6	Classrooms without roofs and ceiling due to wood pests distraction and expose the pupils to high heat radiation	3.05	3.09	2.71	0.95	0.72	0.93	2.94	0.8	Agreed
7	Effect of wood pests on educational buildings result to merging of classrooms for instruction which affects teaching and learning	2.82	2.98	2.77	1.05	0.94	0.91	2.86	0.96	Agreed
8	Effect of activities of wood pests on educational building result into pupils attending lessons under the tree, this affects teaching and learning	2.80	3.07	2.73	0.98	0.77	1.04	2.87	0.94	Agreed
9	When pupils attend lessons under the tree due to activities of wood pests, thus student's attention is always distracted by what is passing by this affect teaching and learning	3.00	3.07	2.73	0.98	0.77	1.04	2.87	0.94	Agreed
10	Wood pests infestation on classroom compel school authorities to merge classrooms; this implies that the number of students per class will increase and this does permit individualized instruction	2.80	2.79	2.84	1.11	0.89	1.03	2.81	1.00	Agreed
11	Infested school library by wood pests do not allow students to use library effectively	2.46	2.93	2.77	1.17	0.83	0.80	2.73	0.95	Agreed

Key: $\overline{X_1}$ = mean for Headmasters Zone A, $\overline{X_2}$ = mean for Headmasters Zone B, $\bar{X}$ = Mean for Headmasters Zone C, SD_1 = Standard Deviation for Headmasters Zone A, SD_2 = Standard Deviation for Headmasters Zone B, SD_3 = Standard Deviation for Headmasters Zone C, $\overline{X_G}$ = Grand mean for LMO and SMO, SD = Standard Deviation for LMO and SMO

Table 3 reveals the common ways the activities of wood pests on roofs of educational buildings affects teaching and learning. These common ways are; sagging ceiling, collapsed roofs, frequent maintenance, classrooms without roofs and ceiling, merging of classrooms, attending lesson under the trees, too many pupils in classroom and infested library building are factors that affect teaching and learning as a result of powder post beetle infestation on educational buildings. This is seen in the means that stand between 2.73

- 2.94. While the least common ways the activities of wood pests affect teaching and learning are when particles of dust from ceiling boards and noise from wood pest has less effects on teaching and learning. This is also seen from their means that stood at 1.01 and 1.02 respectively. The result showed that there are numerous ways through which activities of wood pests affects teaching and learning in Yobe state as reported in this study.

Hypothesis 1: There is no significant difference between the common types of wood pests that attack roofs of educational buildings in the 3 senatorial zones of Yobe state

The Analysis of variance to test the null hypotheses I was presented in table 9.

Table 4: Analysis of variance (ANOVA) of the common types of wood pests that attack roofs of Educational Buildings in the 3 Senatorial Zones of Yobe state

S/n	Types of wood pest	Sources of variance	SM	Df	MS	F	P	Remark
1	Subterranean termite	Between Groups	20.438	2	10.219	8.038	0.005	S
		Within Groups	17.798	14	1.271			
		Total	38.235	16				
2	Drywood Termite	Between Groups	7.223	2	3.612	1.743	0.211	NS
		Within Groups	29.012	14	2.072			
		Total	36.235	17				
3	Dampwood termite	Between Groups	4.036	2	2.018	0.382	0.689	NS
		Within Groups	73.964	14	5.283			
		Total	78.000	26				
4	Pin hole borers	Between Groups	8.927	2	4.464	4.114	0.039	S
		Within Groups	15.190	14	1.085			
		Total	24.118	16				
5	Lyctidae	Between Groups	1.280	2	0640	0.133	0.876	NS
		Within Groups	67.190	14	4.779			
		Total	68.471	16				
6	Long horn beetles	Between Groups	0.108	2	0.054	0.906	0.427	NS
		Within Groups	0.833	14	0.060			
		Total	0.941	16				

KEY: S= Significant NS= Not Significant

Table 4 showed the p-value of item 1 as 0.005 and that of item 4 was 0.038 at 0.05 level of significance. Since the p-values are less than the significant values, we reject the null hypothesis and concluded that there was significant difference between the common types of wood pests that attack roofs of educational buildings in the 3 senatorial zones of the study area. While items 2, 3, 5 and 6 in the same table indicates that their p-values were 0.211, 0.689, 0.876 and 0.427 respectively at 0.05 per cent level of significance. We therefore accept the null hypothesis and conclude that there was significant difference in drywood termites, damp wood termites, lyctidae and long horn beetles that attack roofs of educational buildings in the 3 senatorial zones of Yobe State.

Hypothesis 2: There was no significant difference between the common wood pest's activities on roof members of educational Buildings affecting teaching and learning in Yobe State.

The analysis of variance to test the null hypotheses 3 is presented in Table 11

Table 5: Analysis of variance (ANOVA) of Common Roofing Defects on Roofs of Educational buildings in the 3 Senatorial Zones of Yobe State

Source of Variance	sum of squares	df	mean square	f	p	Decision
Bet. Groups	0.002	2	0.001			
				0.006	0.994	NS
Within Groups	4.499	123	0.150			
Total	4.501	125				

Not Significant

Table 11 shows a p-value of 0.515 at significance level 0.05. Since the p-value of 0.515 is greater than the null hypothesis hence the null hypothesis was accepted. This implies that, there is no significant difference between the activities of wood pests on roofs of educational Buildings affecting teaching and learning in the 3 senatorial zones of Yobe State.

Findings of the Study

The findings of this study are presented in the same order in which the research questions and hypotheses are presented:

1. The type of wood pests that attack roof structures of educational buildings are; subterranean termites, Dry wood termites, Damp wood termites, Pinhole borers and Lyctidae powder post beetle. Long horn beetle were not considered to be a species of wood pests that attack roofs of educational buildings in Yobe State.
2. The types of timber used for construction of roof structures of educational buildings in Yobe State are, Mahogany, Obeche, Melina, Apple, Achuwele, Arere, Akwamiri, Doka and Marke. Iroko, Black Afara, Mansonia and Agba. While Marobiya, Abura and Larch were not used for construction of roof structures of educational buildings in Yobe State.
3. The way activities of wood pests on roof structures of educational buildings affecting teaching and learning are: sagging of ceiling, collapsed roofs, frequent maintenance, classrooms without roofs and ceiling, merging of classroom, attending lesson under the trees, too many pupils in classroom and infested library building are factors that affect teaching and learning. Particles of ceiling boards and noise from wood pests does not affect teaching and learning.
4. It was found out from hypothesis 1 that there was significant difference in the mean response of LMO and SMO on common types of wood pests that attack roofs of educational buildings in the 3 senatorial zones in the study area in items 1 and 4. While items 2, 3, 5 and 6 indicated that there was no significant difference between the common types of wood pests that attack roofs of educational buildings in the 3 senatorial zones of Yobe state.
5. It was discovered from hypothesis 3 that, there was no significant difference between the activities of wood pests on roofs of educational Buildings affecting teaching and learning in the 3 senatorial zones of Yobe State.

DISCUSSION OF FINDINGS

The findings related to research question 1 revealed the types of wood pests that are predominant in the study area as; subterranean termites, Drywood termites, Dampwood termites, Pinhole borers and Lyctidae powder post beetle whose number are 43, 25, 27, and 22 respectively out of a total of 126 samples. While only 8 damp wood termites and 1 pin hole borer were found, out of the total samples of 126 in the study area which were taken to the laboratory for microscopic identification. This finding concurred with the statement made by Zabel and Morrell (2012), where they are of the opinion that wood destroying organism are those living creatures who survive on timber and degrade them. Roofs of educational buildings are degraded because they are timber product and are susceptible to rapid deterioration by

variety of termites and powder post beetles. Such varieties of termites and powder post beetles are subterranean termites, drywood termites, dampwood termites, Pinhole borers and Lyctidae powder post beetle species. These are the major threats to longevity of timber in use as opined by (Dudley, Jeanrenaud and Sullivan, 2014). They also account for meaningful percent of economy distraction in the world as stated by (Su and Scheffrahn, 2000). On the other hand the laboratory identification of wood pests revealed that only 1 long horn beetle was found in the study area. This finding was in place because long horn beetle in most cases start their attack on living trees. Eggs are laid on the back and the larva bore tunnels into wood parallel to the longitudinal axis of the tree as mentioned by Kangkamanee (2010). Since eggs are laid on living trees the possibility of survival becomes narrow considering stages logs undergo until it become timber for use. The only trace of a long horn beetle according to a study by FAO, (2006) was the appearance of a larva's large elliptical tunnels on wood surfaces. But this can be prevented by careful selection of timber before use.

The types of timber used for construction of roof structures of educational buildings in Yobe State are Mahogany, Obeche, Malina, Apple, Achuwele, Arere, Akwamiri, Doka and Marke. The findings was in harmony with the statement made by Thomas, (2014) who opined that majority of the hardwood trees are found in tropical areas like Nigeria in Africa. Hard woods are considered reliable for roof structures. The findings of study however revealed that Marobiya, Abura, Iroko, Black Afara, Agba and larch are not timber species used for construction of roof structures of educational buildings. This is because, most of the wood mentioned is found in temperate regions hence timbers produced from these trees are soft wood. Soft wood timber species are always prone to termites and powder post beetle infestation. From the result it was discovered that Agba, Mansonia, Black Afara and Iroko are also used considering their means.

The severity of effect of the activities of wood pests on teaching and learning are collapsed ceiling, leaking roofs, sagging of roof members, drops of sand and powder in the classroom, blown roofs, and sagging noggins. It is quite true that these defects mentioned above have a significant effect on teaching and learning. These findings coincided with observation by Stiglitz (2012) who observed that in the United States of America, pupils who attend well maintained schools with good classrooms have a higher achievement than those who attend poorly maintained schools with poor classrooms. Schools with better facilities stand a good chance of providing education effectively. Hines (1996) found that student achievement was as much as 11 percentile points lower in substandard buildings as compared to student achievement who attended schools in that have above standard buildings.

The outcome of this study is supported by Owoeye and Yara (2010) who opined that, Schools with well-built classrooms have their pupils performing better than their counterparts in schools with dilapidated classrooms. It should be noted that dilapidated classroom will not only affect students' performance but also the effectiveness of the teacher in imparting the knowledge, this implies that such situation will affect teaching and learning process. On the other hand the activities of termites and powder post beetle are not severe on roofs of educational buildings in the following area; particles of ceiling boards failing from the roof and noise from termites and powder post beetle. The finding of the study is not surprising because particles from ceiling boards do not drop from the roof constantly. This idea is further supported by Schlachter (2000) as he is of the opinion that the present day invention of ceiling boards results from the high binder to filler ratio of latex composition which is applied to the ceiling boards and gives it a high quality board that will resist sound and external invasion. The noise from wood pests does not affect teaching and learning probably because of the low tune of the ticking noise produce by the wood pests. Therefore may not disrupt teaching and learning in the schools.

It was found out from hypothesis one that there was no significant difference in the mean response of local government maintenance officers and state maintenance officers on the types of timber used for construction of roofs of educational buildings in Yobe State. This implies that the types of timber used for construction of roofs of educational buildings in Yobe State are of same type. It was found out in hypothesis 2 that there was no significant difference between the activities of wood pests on roofs of educational Buildings affecting teaching and learning in the 3 senatorial zones of Yobe State. This means

that the effects of activities of wood pests on roofs of educational buildings have similar effects throughout the state.

CONCLUSION

Education is commonly accepted as power considering its role in national development and individual growth. Evidence from research findings shows that the nature of educational building structures has an influence on how well pupils achieve a wide range of educational outcomes. It is also clearly stated that timber for construction of roof structures are selected yet wood pest continued to attack the roof structure of educational buildings. The study found out that the activities of wood pests affects teaching and learning in Yobe State negatively.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made;

1. Proper selection of timber for construction of roof structures of educational buildings should be imposed by Yobe State Ministry of Education. This may be possible by co-opting local government maintenance officers of works department during selection, since they are always up to date on problems facing school buildings and are therefore familiar with weak and strong species of timber for construction purposes.
2. Proper treatment of timber using appropriate treatment method should be imposed. This can be achieved by liaising with chemical industry or forestry department of the nearby university to assist them identify the most appropriate preservative for timber treatment.
3. Maintenance officers should at the end of each term spray insecticide and relevant chemicals, especially when the school close formally on vacation. This will reduce the rate at which wood pests will encroach into school buildings now that all windows and doors are closed thereby giving enabling warm temperature for wood pests to carry out their harm on roof members

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