Assessment of predominant pests in Ogun State, Nigeria and their control

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ABSTRACT

The study evaluated predominant pests in Ogun state; damage caused by the pests, methods of their control and perception of the pests by home owners. Twenty local government areas in the state were used as the study population. Ten year data (2000-2010) on predominant insect pest controlled by Ministry of Agriculture, Abeokuta, Ogun State was collected from Plant Protection and Pest Control unit of Produce Department. Structured questionnaires were administered by the researcher to collect relevant information from the study participants. A total of eight hundred (800) copies of questionnaires were given to forty randomly selected respondents from each of the twenty local government areas. Data collected were analysed for frequency and percentage of responses using Statistical Package for Social Science (SPSS) Version 20. The result of the study shows that pest such as termite, mosquitoes, housefly, bedbug, honey bees, ants, cockroaches, rats, bats and snake were predominant in homes, while mosquitoes, cockroaches, housefly, and termite were highly predominant. Over 70 % of the respondents were of strong opinion that domestic pest are of serious concern and affect human health. Fifty seven percent of the respondents strongly disagree or disagree that there is adequate provision by government for control of pest. Fifty six percent of the respondents opined that they are aware of government agencies that could handle pest control in their homes. Fifty percent of pest infestation in Ogun State were chemically controlled, while others were controlled through non-chemical means. The study shows that Government provisions for pest control in the state are inadequate. Government should invest more in procurement of pest control equipment, agro-chemicals and personnel that will adequately meet the need of home owners. Government should advertise the agency responsible for pest control in the state through enlightenment campaign that will educate the citizenry of the danger and damage that pest could cause if not timely controlled.

Key words: Pest, Predominant, Infestation, Respondents, Ogun state.

INTRODUCTION

Pests are organisms considered harmful or detrimental to humans, his possessions and other human interest or concerns (Pimental, 2002). Noxious organisms considered as pests are plants or animals that carry disease, cause disease or destroy crops. They could be nematodes, insects, viruses, bacteria, molluscus, rodents, herbs, shrubs, mites and annelids. Pest may also be referred to as organisms that destroy crops or man-made structures. In its broadest sense, a pest is a competitor of humanity. In agriculture, pests are detrimental to production because they cause reduction in yield and quality of output. They also act as vector of diseases and cause injuries to man and animals (Cotton *et al*., 2000; Gore and Schal, 2007). Pest differs by region and what is common in one region of the country, may not in other regions. The word pest also refers to myriad of household invading

creature including: mice, roaches, termite, bedbug, fleas, wild bird, spider and snake. Pest constitute nuisance, annoys and transmit epidemic diseases associated with mortality (Matson *et al.*, 1997)

A large number of insects such as cockroaches, bed bugs, flies, rodents, birds and mites occur in the human environment. Many of these are considered pest because of their economic, medical or aesthetic influence on the quality of life (Gore and Schal, 2007). This group of animals are adapted to the habitat and conditions created when natural environment are altered or when agricultural environment is further developed to provide living and recreation space for people and pest. In some location, human structures and activities may interfere with natural environment and this will disrupt the natural equilibrium of the environment and thus make a hitherto non-pest to become a pest, creating pest problem (Samways, 1989). The urban population is expected to increase the importance of urban pest (Davis, 1978). In the developing countries, the predominant household pests include mosquitoes, housefly, rodent, flies and termite among others. Mosquito was reported as most importance and abundance in urban, sub-urban and rural environment (Yap and Foo, 1984). With the increasing problem caused by the urban pest, there is a need for their control which is generally archived by chemical control and integrated control (Tidwell *et al.*, 1994; WHO, 1986; Mars, 1993; Rozendaal, 1997; Castle *et al.*, 1999). Other convectional measures include surface residual spray, larviciding inclusive of chemical and microbial agent.

Household insecticide products (HIPS) and repellent, coil and aerosol are major household insecticide products that are readily used by consumers (Yap and Foo, 1984; Yap 1996, 1999; Yap *et al.*, 2003a). In 2010, the World Health Organization estimated that there were 216 million cases of malaria; about 660,000 people died from the disease, most of whom were children under the age of five (www.cdc.gov/malaria/about/fact.html.) The actual number of deaths may be significantly higher, as precise statistics are unavailable in many rural areas, and many cases are undocumented. Malaria is commonly associated with poverty, and can indeed be a cause of poverty and a major hindrance to economic development. Despite a clear need, no vaccine offering a high level of protection currently exists. Likewise, House flies are considered to be polyphagous species, which means that they can feed on a wide variety of food material (West, 1951). They acquire their nutrients mostly from animal dung, human food and garbage (Bernard, 2003). House flies, can act as very effective disease vectors because of their behavior and biology (Service, 2000).

In the developed countries, proper records of insect pest were kept to assist in appropriate control measure to apply. In the UK, common damage to household materials by pests eating clothes or carpets constitute 89 %, those gnawing pipes 77 %, those damaging furniture 63 %. In some worst occurrences, a pest controller counted 220 rats in one property, 500 mice in one house. Similarly, 9 % of the pest controller dealt with properties damaged by fire caused by a rodent chewing through cables. Seventy three percent of the people had infestation of ants, wasps, mice, rats, squirrels, and moths living in their properties (Anonymous).

In Ogun state, feedback from home-owners on the perception of house-hold pests and damage caused by them is not available. This information would assist government in formulating appropriate pest control strategies to minimize the detrimental effect of these pests. The objectives of this study therefore were:

- To identify domestic pests that are predominant in Ogun State.
- To ascertain the various control methods used in controlling domestic pests in Ogun State.
- To ascertain the damage caused by domestic pests to materials in the homes.

MATERIALS AND METHODS
Sampling and sampling techniques

Twenty local government areas in Ogun State were used as the study population. They are: Ewekoro, Abeokuta South, Ogun waterside, Remo North, Ijebu East, Ikenne, Yewa North, Obafemi Owode, Ijebu North East, Odeda, Ijebu-ode, Yewa south, Abeokuta North,

Odogbolu, Ijebu North, Ado/ Odo Ota, Ifo, Imeko/Afon, IPokia, Sagamu. A total of eight hundred copies of questionnaires were administered to forty randomly selected respondents from each of the twenty local government areas

Ten year data (2000-2010) on predominant insect pest controlled by Ministry of Agriculture, Abeokuta, Ogun State was obtained from Plant Protection and Pest Control unit of Produce Department, Ministry of Agriculture.

Research instrument

Structured questionnaires were used to collect relevant information from the respondents. It was divided into 4 sections: A, B, C and D.

Section A – This section covered demographic characteristics, the section tapped relevant personal information of the respondents such as: sex, age and qualification.

Section B – This section identifies the predominant pest in the study area. Likert-type scale (Likert, 1932) rating was used as follows:
1.	Highly predominant
 2. Predominant
3. Least predominant
4. No incidence

Section C - This section measured the economic damage caused by pest and the views of respondents were measured using Likert-type scale (Likert, 1932) scoring as follows:
1.	Strongly agree
2.	Agree
3.	Strongly disagree
4.	Disagree

Section D – This section identifies the house hold materials that are likely to be damaged by the pests.

Data analysis

Data collected was analyzed for frequency and percentage of responses using Statistical Package for Social Science (SPSS) Version 20.

RESULTS
Pest predominance rating by respondents

Table 1 shows pest predominance rating by respondents. Twenty one percent of the respondents reported honey bee as highly predominant, 42.5 % as least predominant, 23 % as predominant, 13.5 % reported no incidence of the insect. Twenty two and half percent of the respondents reported bed bug as highly predominant, 32.5 % as predominant, 29 % as least predominant, while 16 % reported no incidence of the insect. Sixty two and half percent of respondents reported mosquitoes as highly predominant, 20.5 % as predominant, 11 % as least predominant, while 6 % reported no incidence of the insect pest.

Seventeen and half percent 17.5 % of the respondents reported snakes as a highly predominant, 31 % as predominant, 38.0 % as least predominant, while 13.5 % reported no incidence of the pest. Twenty seven and half percent of the respondents rated ants as highly predominant, 31.5 % as predominant, 29 % as least predominant, while 12 % reported no incidence of the pest

As shown in the table, 26.5 % of the respondents reported rats as highly predominant, 42.5 % as predominant, 19.5 % as least predominant. Eleven and half percent of the respondents reported no incidence of the pest. Six percent reported bats as highly predominant, 20 % as predominant, while 41.5 % reported the pest as least predominant. Thirty two and half percent 32.5 % reported no incidence of the pest. As indicated in the table, cockroach was reported as highly predominant by fifty nine and half percent of the respondents, 24 % as predominant, 9.5 % as least predominant. Seven percent of the respondents reported no incidence of the pest

The rating of highly predominant/predominant pest by respondents in descending order is Cockroaches (83.5 %) > Mosquitoes (83 %) > Housefly (76.5 %) > Rats (69 %) >Termite (67.5 %) > Ants (59 %) > Bedbug (55 %) > Birds (49 %) > Snakes (48.5 %) > Honey bee (44 %) > Bats (26 %) > others (15 %). The highest percentage of respondents with no reported incidence of pest was 32.5 % for bats followed by 29.0 % for birds and 16.0 % for bed bug.

Table 1: Predominance Rating of Pest by Respondents.

	Pest Predominance Rating by Respondents (%)			
Insects Rating	Highly Predominant %	Predominant %	Least Predominant %	No incidence %
Termite	38.0	29.5	23.0	9.5
Honey Bees	21.0	23.0	42.5	13.5
Bed bug	22.5	32.5	29.0	16.0
Mosquitoes	62.5	20.5	11.0	6.0
Housefly	42.5	34.0	14.5	9.0
Snake	17.5	31.0	38.0	13.5
Ants	27.5	31.5	29.0	12.0
Rats	26.5	42.5	19.5	11.5
Bat	6.0	20.0	41.5	32.5
Birds	20.5	28.5	22.0	29.0
Cockroach	59.5	24.0	9.5	7.0
Others	6.5	8.5	15.0	70.0

Mostly Controlled Pest by the Ministry

Fig. 1 shows the mostly controlled pests in homes based on ten years data from the pest control unit of Ministry of Agriculture, Ogun State. Thirty eight percent of the respondents patronized Ministry of Agriculture for termite control, 12 % for ants, 10 % for mosquitoes, 10 % for rats, 7 % for snakes, 3 % for honey bee, 2 % for bed bugs, 2.5 % for bats, 0.5 % for birds, 4 % for housefly and 11 % for others.

Methods of pest control used by respondents

Table 2 shows that majority (86.5 %) of termite infestation was controlled by chemical method, 9 % by cultural method and 4.5 % by other methods of control. Similarly, majority (72 %) of honey bee incidence was controlled by chemical method, 19.5 % by cultural method and 8.5 % of the infestation controlled by other methods of control. Sixty percent of the respondents controlled bedbug chemically, 33 % culturally and 7 % using other methods of control.

The table shows that 64 % of mosquitoes/housefly/cockroaches infestation in homes were chemically controlled, 31 % culturally controlled and 5 % controlled using other methods. As shown in the table, 49 % of snake infestation in homes were chemically controlled, 38 % culturally controlled and 13 % controlled using other methods. Similarly, 62 % of ants' infestation in homes were chemically controlled, 30.5 % culturally controlled and 7.5 % controlled using other methods. Forty percent of rat infestation in homes were chemically controlled, 42.5 % culturally controlled and 17.5 % controlled using other methods.

Fifteen and half percent of bats infestation in homes were chemically controlled, 46 % culturally controlled and 38.5 % were controlled using other methods. The table indicates that 11 % of bird's infestation in homes was chemically controlled, 34.5 % culturally controlled and 54.5 % were controlled using other methods. Eighty and half percent of infestation by other pest were controlled using other methods, 8.5 % chemically controlled and 11 % culturally controlled.
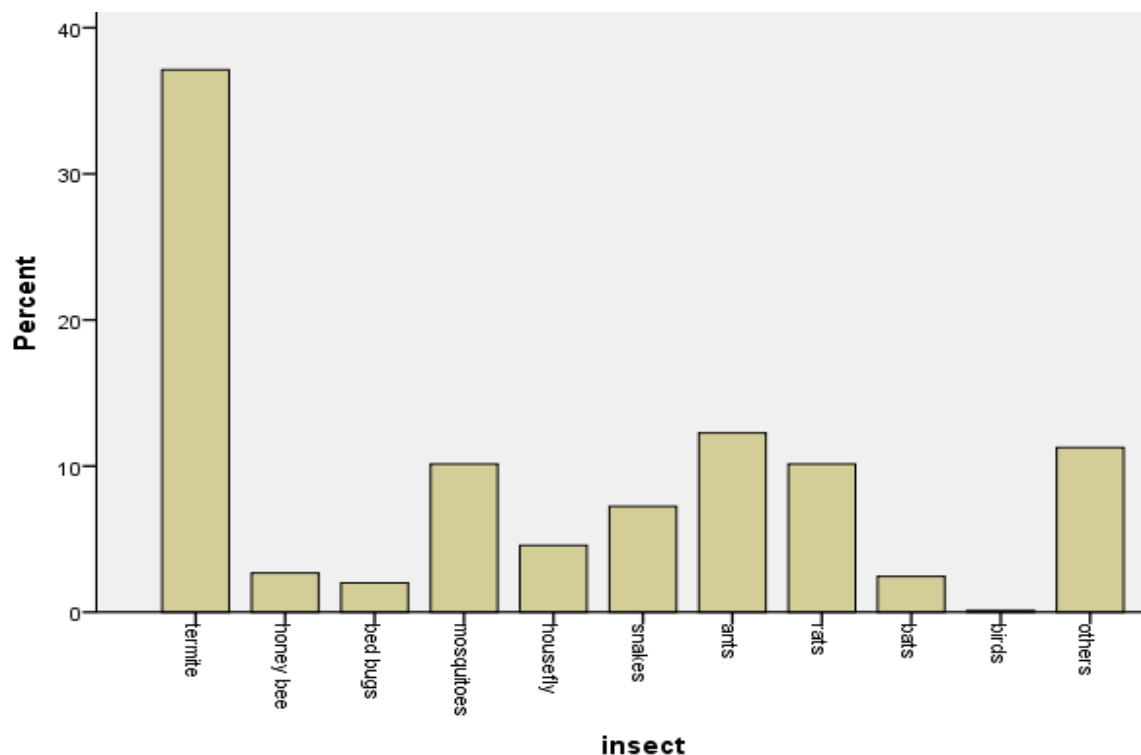
Fig. 1: Mostly Controlled House hold Pest by the Ministry

Table 2: Distribution of pest based on their control method

Pest	Control Methods (%)		
	Chemical	Cultural	Others
Termite	86.5	9.0	4.5
Honey bee	72.0	19.5	8.5
Bedbug	60.0	33.0	7.0
Mosquitoes/Housefly /Cockroaches	64.0	31.0	5.0
Snake	49.0	38.0	13.0
Ant	62.0	30.5	7.5
Rat	40.0	42.5	17.5
Bat	15.5	46.0	38.5
Bird	11.0	34.5	54.5
Cockroach	83.0	10.5	6.5
Others	8.5	11.0	80.5
Mean	50.09	27.77	22.09

Economic damage caused by pests.

Table 3 shows the economic damage caused by pest to humans and infested materials. Respondents reported termite as causing 77 % damage to wooden materials. Sixty eight and halve percent reported bees as beneficial, while 30.5 % reported bees to constitute health hazard. Sixty five and half percent of the respondents reported bed bugs as inimical to health; 13.5 % reported them as damaging to clothes. Ninety nine and half percent of the respondents implicated mosquitoes as constituting health hazard. Sixty seven and half percent of the respondents reported housefly as constituting health hazard, 18.5 % reported the insect as threat as food, while 1.5 % reported them as beneficial. Eight-eight and half percent of the respondents reported snake as constitute danger, while 4.5 reported them as beneficial. Forty eight and half percent of the respondents reported ants as infesting food items, while 38.0 % reported them to constitute health hazard. Forty four percent of the respondents reported rats as polluting food items, while 25.5 % sees them as constituting health hazard. Nine-eight and half percent of the respondents reported bats as constituting health hazard.

Views of respondents on the need to control pests

Table 4 shows the views of respondents on the need to control pest and the perceived roles of government in their control. Majority (98.0 %) of the respondents either strongly agreed or agreed that domestic insect pests are of serious concern in the study area, while 2.0 % either strongly disagree or disagree that the pest is of serious concern in their area. Similarly, 94.5 % of the respondents strongly agreed and agreed that the pest constitute health hazard and affect human health, while only 4.5 % strongly disagreed and disagreed that that they affect human health. Only 43.0 % of the respondents strongly agreed and agreed that there are adequate provisions for control of domestic pest by government, while 57.0 % strongly disagreed and disagreed that government made adequate provisions for the control of domestic pest. Fifty six percent of the respondents strongly agreed and agreed that they are aware of the government agencies in charge of pest control in Ogun state, while 44.0 % of the respondents are ignorant of the agency responsible for pest control. Thirty seven percent of the respondents strongly agreed and agreed that bureaucratic procedure in controlling pest using government agencies is too much, while 63.0 % strongly disagreed and disagreed that bureaucratic procedure is too high.

Table 3: Economic damage caused by pest

	Materials damaged, Benefits and Health implications (%)							
Insect	Wooden	Clothing	Books	Bed&Files	Food	Wire/Cable	Health	Beneficial
Termite	77.0	4.0	6.5	4.0	2.5	0.5	2.5	3.0
Honey Bees	1.0	0.0	0.0	0.0	0.0	0.0	30.5	68.5
Bed bug	0.0	13.5	3.0	9.0	9.0	0.0	65.5	0.0
Mosquitoes	0.0	0.0	0.0	0.0	0.0	0.0	99.5	0.5
Housefly	5.0	3.0	2.5	0.0	18.5	2.0	67.5	1.5
Snake	0.0	0.0	0.0	0.0	0.0	0.0	88.5	4.5
Ants	2.5	0.0	9.0	1.0	48.5	0.0	38.0	1.0
Rats	4.5	6.5	6.0	2.5	44.0	5.5	25.5	4.5
Bat	0.0	0.0	0.0	0.0	0.0	0.0	98.5	1.5
Birds	0.0	0.0	0.0	0.0	62.5	0.0	16.0	21.5
Others	6.5	0.5	4.5	13.5	23.5	9.5	26.0	16.0

Table 4: Views of respondents on the need to control pest

Questions	Views of respondents on the need to control pest			
	SA %	A %	SD %	D %
Domestic pest are of serious concern	79.0	19.0	1.5	0.5
They affect human health	72.0	22.5	2.0	3.5
There is adequate provision for their Control by government.	20.5	22.5	28.5	28.5
Am aware of government agencies in Charge of their management	27.0	29.0	10.0	34.0
Bureaucratic procedure through Government agencies is very high	16.5	20.5	70.0	35.0

DISCUSSION

Pest has existed in the forest before the creation of man, but they constitute no threat, because their population was naturally controlled by biotic and abiotic agents that ensure population control below economic injury level (EIL) and economic threshold (ET) and they therefore constitute problems. However, with the existence of man and man's activities, pest became problem to man, animals, environment and materials. The intervention of man with the careless use of agrochemicals such as pesticides and fertilizer destabilized the equilibrium in the agro-ecosystem and pest erupted (Mc Guinnes, 1993). Likewise, ecological causes such as large scale agriculture, planting of highly nutritious crop varieties, planting of high yield crops among others further exacerbated the pest problem. These provide abundant supply of food to insects, which eventually result into higher fecundity of pest, shorter life cycle, faster development rate and higher pest population (Miguel, 2005).

Ever since human beings have lived in a shelter, they have been harassed and attacked by insects and mite pest that are devastating. In the UK, Americans spend over $3 billion for pest control operator service alone and $400 billion for individual do-it-yourself and another $520 million to keep pets pest-free (National Pest Control Association). The control of these household pest is important because of the damage they cause; cockroaches are obnoxious, odorous and leaves fecal droppings on food and house furnishings; termites moves into the house from underground and attack wood, books, and papers; ants can contaminate food, damage fabrics and annoy home owners. Flies and mosquitoes constitute nuisance and could transmit diseases in humans (Monath, 1984)

In this study, pest such as termite, mosquitoes, housefly, bedbug, honey bees, ants, cockroaches, rats, bats and snake were predominant in homes, while mosquitoes, cockroaches, housefly, and termite are highly predominant. Over 70 % of the respondents were of strong opinion that domestic pest are of serious concern and affect human health. Mosquitoes has been reported to transmit diseases to over 700 million people per year and in most developed countries, diseases are very limited, death comparatively rare, but in Africa and Asia, deaths result from mosquito-borne diseases. Mosquito was reported to cause malaria and yellow fever (Mullen and Durden, 2002); symptoms of the diseases include fever, chills, headache, joint pains, vomiting, and convulsion. Each year, 515 million people are infected with malaria, and 1 to 3 million people mostly children, die from the disease (eHow.com Mobile). Severe cases of yellow fever cause internal hemorrhage, coma and death. Annually, there are 200,000 infections and 300,000 deaths annually (eHow.com Mobile). Bedbugs are human parasite that parasitically feed on blood and are capable of feeding on their host without being noticed. The rate of infestation by the insect was reported to decrease from 1930 to 1980s in the developed countries, but increased dramatically since the

1990s as a result of international travel, resistance to insecticides, focus on the control of other pest and neglect of bedbug. The rate of infestation has been reported to be high in developing countries (Jerome and Richard, 2009).

The study also indicated the need for more effort on the part of the government to made adequate provision for their control as 57 % of the respondents strongly disagree or disagree that there is adequate provision by government for control of pest. This implies that the government should invest more in procurement of pest control equipment, agro-chemical and personnel that will adequately meet the need of home owners.

Fifty six percent of the respondents opined that they are aware of government agencies that could handle pest control in their homes, while only 44 % claimed ignorance of the service. This implies that government needs to carry out enlightenment programmes that will educate the citizenry of danger and damage that pest could cause if not managed and also advertised the agencies responsible for control of pest in Ogun State.

The results of the study indicated that for the entire pest, 50 % of the respondents controlled pest in their homes with agro-chemicals, 28 % culturally, while 22 % use other control methods which may be physical, traditional etc. This connotes that chemical control is still the foremost pest control method in Ogun state. There is thus the need to promote integrated pest management in the state to support the global campaign for minimum use of agrochemicals in the environment. Pesticides have been embroiled in controversies of drawbacks such as resistance to pesticide, pest resurgence, misuse, high cost and adulteration. Pesticides are also highly toxic and could cause injury to the handler when misused. However, use of other methods such as physical and cultural are environmentally friendly, cost less and are within reach.

The study indicated that termite, honey bee, bedbug, mosquitoes/housefly, ants, cockroaches infestation were mostly controlled chemically. These may be as a result of the devastating damage caused by the insect pest, their health related implications and the swiftness of chemicals in controlling the pests.

Termites are true social insect that live in colonies with a division of labor among the various types of individuals called caste (Myles, 2003). The worker castes of termite build/repair the nest and make tunnels. In the process of making nest and tunnels and ingesting food, they chew and eat wood, thus causing the destruction that makes termites economically important (Watson *et al.,* 1985). Termites move from their termitaria in a pencil size mud to infest materials in homes and cause damage. Honey bees are dangerous in homes because of their ability to sting human and animal.

CONCLUSION

The results of the study indicate that pest such as termite, mosquitoes, housefly, bedbug, honey bees, ants, cockroaches, rats, bats and snake were predominant in homes, while mosquitoes, cockroaches, housefly, and termite are most predominant. The pests are devastating, cause serious damage to properties and affect human health.

Fifty percent of pest infestation in Ogun State were chemically controlled, while others were controlled through non-chemical means such as physical, traditional etc

Government provisions for pest control in the state is inadequate to meet the increasing needs of the residents in the state.

From the foregoing, government should invest more in procurement of pest control equipment, agro-chemical and personnel that will adequately meet the need of home owners. Also, government should do more enlightenment programmes that will educate the citizenry of danger and damage that pest could cause if not managed and also advertised the agency responsible for control of pest in Ogun State. There is also the need to promote the use of integrated pest management that allows for minimum and selective use of agrochemicals to avoid the detrimental effects of agrochemicals.

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