Pesticidal plants diversity, status and uses in North Central Nigeria

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Abstract: This study confirmed the pesticidal plant species; the parts used, their distribution and propagation status in the Central Nigeria using the Federal Capital Territory (FCT), Abuja as a case study. By employing plant quantitative analysis and plant user value determination, it was established that there were 36 plant species whose parts and products were used by the farmers for protecting their crop and crop produce. These plants belong to 28 families in which three were Fabaceae and Lamiaceae respectively; and two each were Apocynaceae, Cucurbitaceae, Euphorbiaceae and Plantaginaceae. Plant species with high local relative importance were christmas berry [*Psorospermum ferrugianum* L. (0.825)*]*, ordeal tree [(*Erythrophleum suaveolens (*Gull and Perr) Brenan (0.717)] poison arrow vine, (*Strophanthus hispidus* DC. (0.75)] and wild yam [*Dioscorea burkilliana* L. Roxb.*)* (0.52)] tuber. Ten of the plants were not only used for pesticidal purposes but sometimes for medicinal formulation. About 71.0% of the pesticidal plants used were found in Kuje, Gwagwalada and Kwali. *Hyptis suaveolens* L. had the highest mean occurrence (52.0%) while the leaves of the pesticidal plants were the most mentioned organ in use (24%). One out of every three pesticidal plants was in the wild and sparsely distributed and 26 out of the 36 pesticidal plants were indicated to be difficult to propagate. The need to carry out such surveys in order to obtain inventories is imperative and recording this knowledge before it disappears with rapid urbanization and the aging farmers in Nigeria were seen as urgent.

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Keywords: Pesticidal plants, Central Nigeria, Occurrence, Distribution, Propagation status

1 Introduction

The middle belt of Nigeria, being in the savanna vegetative zone with rich biodiversity is abundantly blessed with trees, shrubs and herbs are often exploited for their pesticidal potential. These bioresources have locally served as a renewable source of biodynamic products traditionally used against pests and disease pathogens of crops, animals and in humans. Global interest in plants as sources of natural pesticide and medicine is gaining prominence due to their environmental and user-friendliness than synthetic chemicals (David, 2005; Aburjai *et al*., 2007; Sirikantaramas *et al.*, 2008). Khalid *et al*. (2002) confirmed that the toxic effect of most botanicals is normally ephemeral in nature disappearing within 14 - 21 days, thus making them environment-friendly and relatively safe to beneficial organisms such as pollinating insects, earthworms and to humans.

Fresh or dried foliage, the powder or water extracts of stem bark, leaves, fruits and roots of plants were the parts often used for crop protection in Nigeria (Anjorin and Salako, 2009). Ankli *et al*. (1999) and Gradé (2008) noted that the knowledge and technology involved in using plant pesticides are embedded in folklores and tradition of the farmers. In many cases, the identity of pesticidal plants is passed on between generations or to close relatives by words of mouth and is often not documented. Available literature revealed that several ethnobotanical survey have been made in developing countries for indigenous plants used in human and veterinary medicine (Okwute, 2006; Ssegawa and Kasenene, 2007), but information concerning pesticidal plants used in this region is very limited.

This study was set up to contribute to documentation of pesticidal plants used in central Nigeria. The study objectives were therefore to document the common pesticidal plant species and family in the Federal Capital Territory (FCT), Abuja; confirm the pesticidal parts used, their user value, their distribution and propagation status. The need to carry out such surveys in order to obtain inventories is imperative and recording this knowledge before it disappears with rapid urbanization and the aging farmers in central Nigeria were seen as urgent. This document will be useful in the planning, cultivation and conservation of pesticidal plants as an agro-allied industrial raw material sourcing and in bio resource commercial investment decision making in developing countries like Nigeria.

2.0 Materials and Methods

2.1 Sampling area

A total number of 120 studied sites cut across the six Area Councils of the FCT, Abuja Nigeria (between Lat. 9° 40' N, Long. 7° 29' E and Lat. 8 83N, Long. 7 17 E, 388 - 566m asl.). Four sites were selected from each of the five villages in each of the Area Councils (Table 1). The study was carried out within two seasons viz: during dry season from April to May, 2013 and rainy season from July - October, 2013, cutting across various phonological periods of the plants.

All the pesticidal plants both wild and cultivated ones were identified to species level. Proper identification was made possible by making references to relevant standard flora pictures and monographs in textbooks (Abbiw, 1990; Akobundu, 2005) and processed in the laboratory and kept in plant album. Photograph of the identified pesticidal plants were also taken. Some plants identities were authenticated in National Pharmaceutical Research Institute, Idu (NPRI) herbarium and few in the Department of Botany Herbarium, University of Ibadan, Ibadan, Nigeria.

2.2 Plant community analysis

In every study sites, 30 quadrats of 10m x 10m (100 sq m) size and 5m x 5m (25 sq m) were randomly laid to study tree species and shrub species respectively. The herbaceous species was studied by laying 50 quadrats of 1m x 1m (1sq m) size randomly in each study site (Curtis and McIntosh, 1950).

2.3 Occurrence (% Frequency)

This term refers to the degree of dispersion of individual pesticidal species in an area and usually expressed in terms of percentage occurrence. Sampling of the studied area at several places was at random and the name of the species that occurred in each sampling units were recorded. It is calculated by the equation as shown below (Curtis and McIntosh, 1950).

$$\text{frequency (\%)} = \frac{\text{number of quadrats in which the species occurred}}{\text{total number of quadrats studied}} \times 100$$

2.4 User Value Analysis

Species and families recorded were assessed for User Value (UV) (Heinrich *et al*., 1998; Aburjai *et al*., 2007) - a quantitative method that demonstrates the relative importance of species locally is given as:

$$UV = \sum U/n$$

where UV is the user value,
U is the number of user citations and
n is the number of respondents.

2.5 Data Analysis

All data was recorded in previously designed data sheets to reflect different objectives. Calculations and graphic presentations of frequencies were carried out with Microsoft Office Excel, 2007.

3.0 Result Analysis

3.1Records of plant species

Table 2 shows the inventory of all the pesticidal species recorded from the survey of the six area councils of the FCT. The prevailing common and local names - Gwari, Bassa and sometimes in Hausa were as indicated in the Table. Thirty six species belonging to 28 families were recorded (Figure 2). User values of the plant species were as indicated in Table 2. The pesticidal species with high importance were *P. guineensis* (0.825), *S. hisbidus* (0.750), *E. suaveolens* (0.717) and *H. acida* (0.667) while others in a decreasing order of importance were *F. estuans* (0.25), *G. aborea* (0.217) and *C. pepo* (0.15).

The families with the highest percentage pesticidal species were Lamiaceae and Fabaceae with 10.71% of the total number (Figure 2). Apocynaceae, Cucurbitaceae, Euphorbiaceae and Plantaginaceae had 7.14% respectively. The results have established that plants belonging to certain families of plants are more likely to possess pesticidal activity. Thus, these results will serve as useful guides in the collection of plants for laboratory and field research studies.

Obviously, in large-scale field utilization of botanic agricultural pesticides, there must be adequate and constant supply of candidate plants to the areas in need. This means that since plants usually grow well in areas of natural habitat, effort should be made to invest in large scale cultivation and conservation of such plants in their various localities as is the practice in China, Japan and Kenya. This will be of great economic advantage in the developing countries as such programmes can lead to economic empowerment of the poor-resource farmers and ultimately improve the national economy.

Twenty six of the plants were solely used for pesticidal purposes while 10 were used for pesticidal purposes and/or for traditional medicinal formulations (Table 2). Only five species namely *C. zeylanicum, I. cylindrica, E. guineensis, T. lentopetalloides* and *D. villosa* belong to monocotyledonous sub division

while the rest are dicotyledons. Kuje Area Council (KAC) had the highest proportion of pesticidal plant species of (26%), this was followed by Gwagwalada - GAC (25%) and then Kwali Area Council (KWAC) (20%). Abaji Area council (AAC) was the least (4%) as shown in Figure 3.

The number of pesticidal plants cited differs from one region to the other. The highest percentage of plant species used was from KAC, and closely followed by those from GAC (Figure 3). The village heads of Abaji revealed that the use of pesticidal materials is fast losing its popularity due to adoption of modern synthetic pesticides and the effect of urbanization as witnessed by AMAC farmers.

3.2 Plant parts used as source of pesticide

The most used organ of the plants in formulation of pesticides was the leaves. They were reported for 24 species out of the 36 cited species in the survey. It was only the leaves of *H. suaveolens, L. lanceolata* and *N. tabacum* that were indicated as a source of pesticides. They were followed by the stem bark and then the roots with 12 and 7 species respectively (Figure 4). Several intersections were observed as more than one part or organ where named for some plants. Almost all the parts of *E. suaveolens, P. guineensis, C. multagularis, E. poisonii* and *P. thorningii* were indicated to have pesticidal importance (Table 2). Underground storage organ such as the bulb and rhizomes were the least used organs for pesticidal formulation. Plants like *E. guineensis* and *C. pepo* were known for their pesticidal roots while the fruit of *C. annum* was the only organ used as pesticide.

3.3 Cultivation and distribution status

It was indicated that 31.0% of the pesticidal plant species in the FCT were in the wild and sparsely distributed (Figure 5) while 20.0 % of the species were wild and widespread. About 9.0% were cultivated and widespread wild the least group of plants (3%) were indicated to be semi-wild and sparse.

3.4 Ease of propagation of pesticidal plant species in the FCT, Abuja

It was indicated that 19 out 36 the pesticidal plants were difficult to propagate while 7 were specifically noted to be very difficult (Figure 6). Ten plants were said to be easy to propagate while the means of propagating 6 of them were not known by the farmers. Though majority of the pesticidal plants were indicated to be through seeds (Table 3), breaking the dormancy of such seeds in order to propagate them were noted by the respondents to be difficult.

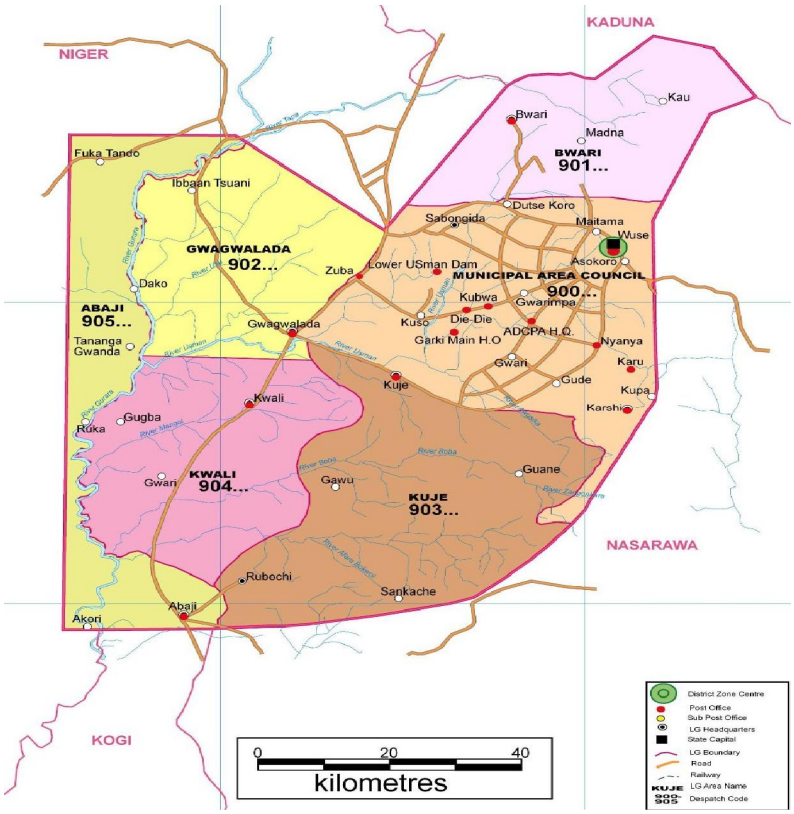

Figure 1. Map of the Federal Capital Territory (FCT) Abuja
(Source: Dept. of Planning & Survey, FCDA, Abuja)

Table 1. Surveyed villages in the FCT, Abuja

S/No.	Area Council	Villages surveyed
1	Abaji	Abaji Central, Agyana, Pandagi, Sabongari and North East Nuku
2	Abuja Municipal	Gwagwa, Kabusa, Karshi, Karu and Orozo
3	Bwari	Bwari Central, Byazhin, Dutse, Kuduru and Ushafa
4	Gwagwalada	Dobi , Gwako, Ibwa , Paiko and Tungan maje
5	Kuje	Chibiri, Gaube, Kuje Central and Kwaku
6	Kwali	Ashara, Dafa, Kilankwa , Kwali Central and Yangoji

Table 2. Pesticidal plants name, their families, where found and Users values (UVs)

Species Common/scientific name/ Voucher No)	**Family**	**Local name**	**Area Council where found/used**	**Times mentioned**	**Relative User values**
Ordeal tree/Red iron wood, (*Erythrophleum suaveolens* (Gull and Perr.) Brenan) FT-001	Fabaceae	Gw: Tsaari Ba: Sobu	Gwagwalada, Kuje , Kwali	43/60	0.717
False shea,(*Lophira lanceolata* Van (Tiegh) Exkaey) FT-002	Ochnaceae	Gw: Gbonrii/Pmali Ba: Zhimya/Zhime Nu:Gbetseuti	AMAC,Gwagwalada, Kuje, Kwali	30/80	0.375
Neem (*Azadrachta indica* Juss) FT-003	Meliaceae	Gw: Sawaki, Ha: Dogonyaro Ba: Kunine	AMAC, Bwari, Gwagwalada, Kuje	52/80	0.650
Large red heart (*Hymenocardia acida* Tul.) FT-004	Phyllanthaceae	Gw:Tsetsi Ba: Orukpa	Gwagwalada, Kuje, Kwali,	40/60	0.667
Violet tree (*Securidaca longepedencola* Fres.) FT -005	Polygalaceae	Gw: Janure	Gwagwalada,Kuje	19/40	0.475
Ornatum (*Crinium zeylanicum*) Aiton)FT-006	Amaryllidaceae	Gw: Ogwa Ba: Upa	Gwagwalada, Kuje	21/40	0.512
Chilli pepper (*Capsicum annuum* L.) FT-007	Solanaceae	Gw: Jyagba Ba**:** Okpokpo	AMAC, Bwari, Gwagwalada	31/60	0.517
Spear grass (*Imperata cylindrica* L.) FT-008	Poaceae	Gw: Eto Ha: Tofa Ba**:**Atokpa	AMAC, Gwagwalada, Kwali, Kuje	37/80	0.463
Mint weed (*Hyptis suaveolens* L) FT- 009	Lamiaceae	Gw: Mutekechigbe/ bassamisin Ba**:**Adabwa	AMAC, Gwagwalada, Kwali, Kuje	47/80	0.587
Soft blumea (*Blumea perotitiana* L. DC) FT-010	Asteraceae	Gw: Minsin/ Digba taba Ba: Gbagbaje/ Ajama taba	Bwari, Gwagwalada, Kuje	22/80	0.275
Baobab *(Adansonia digitata* L.) FT- 011	Bombacaceae	Gw: Kuka Ha: Kuka Ba:Ubwo	Abaji, AMAC, Bwari, Gwagwalada, Kwali, Kuje	49/120	0.408
Tobacco (*Nicotiana tabacum* Blüten) FT- 012	Solanaceae	Gw: Taba Ha: Taba Ba: Utaba	Abaji, Kwali, Kuje	16/60	0.267
Olax (*Olax subscorpioidea* Oliver) FT 013	Olacaceae	Gw: Wazhigage	Abaji, Bwari, Kuje	38/60	0.633
Local bean (*Prosopis africana* Gull, Rich). FT-014	Mimosaceae	Gw: Kaari Ba**:** Zhezheje	Gwagwalada, Kwali	16/40	0.400
Oil palm (*Elaeis guineensis* Jacq.) FT- 015	Arecaceae	Gw: Evin	Kwali, Kuje	13/40	0.325

Pumpkin (*Cucurbita pepo* L.) FT- 016	Cucurbitaceae	Gw: Yakuwa Ba**:**Kolokun	Gwagwalada	3/20	0.150
Cactus (*Cactus multagularis* L.) FT- 017	Euphorbiaceae	Gw: Gaanu Ba: Gaaba sepi	Kuje, Kwali	20/40	0.500
Cactus **(** *Euphorbia poisonii* Pas) FT- 018	Euphorbiaceae	Gw: Gaanu Ba: Gaaba	Gwagwalada,Kuje, Kwali	26/60	0.433
Gmelina (*Gmelina aborea* Roxb) FT- 019	Lamiaceae	Gw:Melaina	Bwari, Kuje	13/60	0.217
Sodom apple *(Calotropis procera* Aiton) F. FT-020	Apocynaceae	Gw: Kpokepoke Ba:Wuchoku	Gwagwalada, Kwali	14/40	0.350
Arrow root (*Tacca lentopetalloides* (L.) Kuntze) FT- 021	Taccaceae	Gw: Efin/Cekpayi Ba: Bukaga	Kuje, Kwali	22/40	0.550
Christmas berry (*Psorospermum guineensis* Jacq.) FT- 022	Guttiferaceae	Gw: Kogaye/Abafi/ Angban Ba: Bubure Hausa:Fukai	Abaji, AMAC, Bwari, Gwagwalada, Kuje, Kwali	99/120	0.825
Poison arrow vine (*Strophanthus hispidus* DC*)* FT- 023	Apocynaceae	Gwari: Obwa	Bwari	15/20	0.750
Wild yam (*Dioscorea villosa* L. Roxb.) FT- 024	Dioscoreaceae	Gwari: Gboguma Bassa**:** Kamagu	Kuje, Kwali	21/40	0.525
Custard apple (*Annona senegalensis* Pers.) FT- 025	Annonaceae	Gwari:Dokoshinwon/Gbakopi/ yingberetsi/Kokekoke Ba: Obiyawae/ Ungoyi	Abaji, AMAC, Bwari	21/60	0.350
Ground star weed (*Mitracarpus vilosus* (SW.) DC.) FT- 026	Rubiaceae	Gwari:Adebapo/Jiji pampwe Bassa: Olugodotondo /Yalogulo Hausa:Gogamasu	Bwari, Gwagwalada, Kuje	24/60	0.400
For both pesticidal/medicinal purposes					
Sweet broom (*Scorparia dulcis* Linn.) FT- 027	Plantaginaceae	Gwari: Zulei	Gwagwalada	7/20	0.350
Bush tea (*Lippia multiflora* (L) Modenke) FT- 028	Verbanaceae	Gwari: Misin *Bassa:* Adabwa/ Bukamburu Hausa:Dadoya/Agwantaaki	Bwari, Gwagwalada	26/40	0.650
Bush scent leaf (*Ocimum sanctum* L. Albahaca *)* FT- 029	Lamiaceae	Gwari: Finnu Bassa: Shigashiga	AMAC, Bwari, Kuje	19/60	0.317
Balsam (*Daniella oliveri* Rolfe, Hutch. & Dalziel) FT- 030	Ceasalpiniaceae	Gwari: Danli Bassa:Waawa	Kwali, AMAC, Bwari	37/60	0.616
Shea butter (*Vittelaria paradoxii* (G. Don) FT- 031	Sapotaceae	Gwari: Kori Hausa: Kaideyan Bassa: Uyigo	Bwari, Kuje	19/40	0.475
Devil horsewhip (*Fluerya estuans* (Linn. [Gaud.]) FT- 032	Urticaceae	Gwari:Namanama Gwari Bwari: Angari	Gwagwalada, Bwari	10/40	0.250
Stinking casia *(Senna alata*L). FT- 033	Fabaceae	Gwari: Wampin Bassa: Kpetesuusu	Gwagwalada, Kuje	12/40	0.300
Camel's foot tree/ monkey bread *Piliostigma thorningii (*Schum.) Milne-Redl.) FT- 034	Fabaceae	Tutuki/Kirolango	Gwagwalada, Kwali	16/40	0.400
Fish poison/ wild indigo, *Tephrosia bracteolata* Pers.) FT- 035	Papilioniaceae	Gwari: Baagotugo Gwari Bwari:Inasape Bassa**:**Shewe	Kuje, Kwali	14/40	0.350
Combretum (*Pteleopsis suberosa* Eugl & Diels) FT- 036	Combretaceae	Gwari: Gogba	Bwari, Gwagwalada, Kuje	27/60	0.450

Table 3. Pesticidal plants of Central Nigeria: Abundance, Distribution, Status and their means of Propagation

S/No	Plant species (Common/scientific name)	Abundance	Part used	Status/Distribution	Means/status of Propagation
1	Ordeal tree, (*E. suaveolens*)	1.8	L,SB,S, P, RB	wild, sparsely distributed	Seed, difficult to propagate
2	False shea (*L . lanceolata)*	26	L	wild, widespread	Seed, do not know how it is propagated
3	Neem (*A. indica*)	25	L, S,SB, R	cultivated , widespread	Seed, easy to propagate
4	Large red heart (*H. acida*)	32	L	wild, widespread	I do not know
5	Violet tree (*S. longepedencola)*	05	L,RB,SB	wild, sparse	I do not know
6	Ornatum (*C. zeylanicum*)	4.5	Bulb, L	wild, sparse	Rhizome, easy to propagate
7	Hot pepper (*C. annum*)	25	F	cultivated, widespread	Seed, easy to propagate
8	Spear grass (*I. cylindrica*)	19	Rh, L	wild, moderately distributed	Seed/rhizome, easy to propagate
9	Mint weed (*H. suaveolens*)	52	L	wild, widespread	Seed, easy to propagate
10	Soft blumea (*B. perotitiana*)	18	L,S	semi-wild , sparse	Seed, difficult
11	Baobab *(A. digitata)*	15	SB, F	semi-wild, ,moderately distributed	Seed/stem cutting, fairly difficult
12	Tobacco (*N. tabacum*)	30	L	cultivated, moderately distributed	Seed, easy to propagate
13	Olax (*O. subscorpinioidea)*	11	L,SB	wild, sparse	I do not know
14	Local bean (*P. africana*)	12	F,SB	wild, sparse	Seed, difficult to propagate
15	Oil palm (*E. guineensis)*	10	R	Semi-wild, cultivated sparse,	Seed, difficult to propagate
16	Cucurbit (*C. pepo)*	21	R	Semi-wild, moderately distributed	Seed, easy to propagate
17	Cactus (*C. multagularis)*	17	Latex	cultivated, moderately distributed	Stem cutting, easy to propagate
18	Cactus **(** *E. poisonii*)	16	Latex	cultivated ,moderately distributed	Stem cutting, easy to propagate
19	Gmelina (*G. aborea*)	15	L,R	cultivated , moderately distributed	Seed, fairly difficult
20	Sodom apple *(C. procera)*	20	Latex, L	wild, moderately distributed	Stem cutting, fairly difficult
21	Arrow root (*T. lentopetalloides*)	23	Tuber	semi-wild, moderately distributed	Tuber, fairly difficult
22	Christmas berry (*P. ferruginum)*	14	SB,L,R	wild, sparse	Do not know, difficult to propagate
23	Poison arrow vine (*S. hispidus)*	06	L, Vine, Fruit	wild, sparse	Do not know
24	Wild yam (*D. bulkilliana*)	02	Tuber	wild , sparse	Tuber, fairly difficult
25	Custard apple (*A. senegalensis*)	16	SB,	wild, moderately distributed	Seed, stem cutting, fairly difficult
26	Ground star weed (*M. vilosus*)	24	L,S	wild, moderately distributed	See, fairly difficult
27	Sweet broom ((*S. dulcis*)	02	L,S,R	Wild, sparse	Seed, difficult to propagate
28	Bush tea (*L. multiflora*)	22	L,SB	wild, widespread	Seed, fairly difficult to propagate
29	Bush scent leaf (*O. sanctum)*	10	L,S	Wild, sparse	Seed, fairly difficult to propagate
30	Balsam (*D. oliveri*)	27	SB, R	Semi-wild, widespread	Seed, fairly difficult to propagate
31	Shea butter (*V. paradoxii*)	13	F,SB	Semi-wild, moderately distributed	Seed, difficult to propagate
32	Devil horsewhip (*F. estuans).*	10	L,S	Semi-wild, moderately distributed	Seed, fairly difficult to propagate
33	Stinking cassia *(S. alata)*	08	L,S	cultivated, moderately distributed	Seed, easy to propagate
34	Camel's foot tree (*P. thorningii*)	33	L,SB, R, F	wild, widespread	Seed, fairly to propagate
35	Fish poison (*T. bracteolate*).	20	L,S	Wild, widespread	Seed, fairly difficult to propagate
36	Combretum *(P. suberosa)*	07	L, RB	Wild, sparse	Do not know

Key: L, Leaf; S, stem; SB, Stem bark, RB, Root bark; F, Fruit/Seed

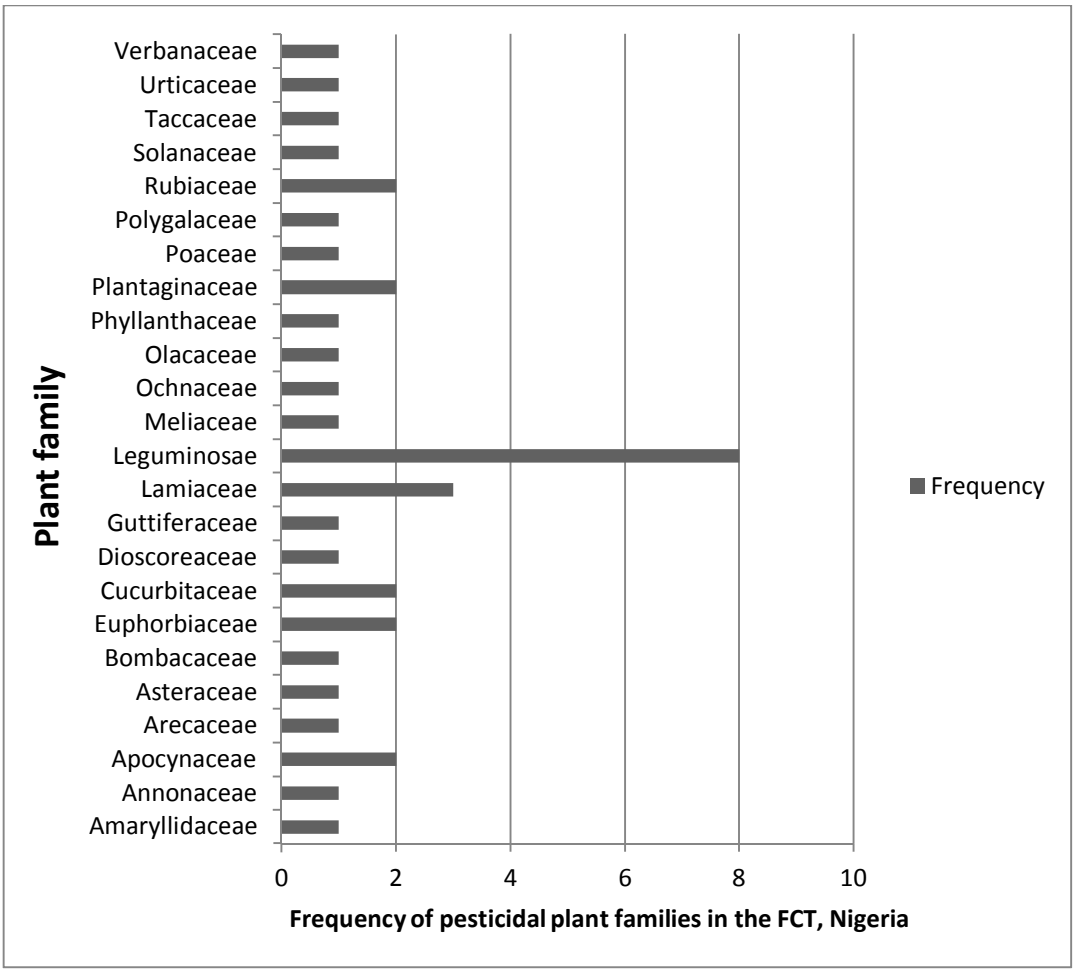

Figure 2: Occurrence of plant species per pesticidal plant family in the FCT, Nigeria

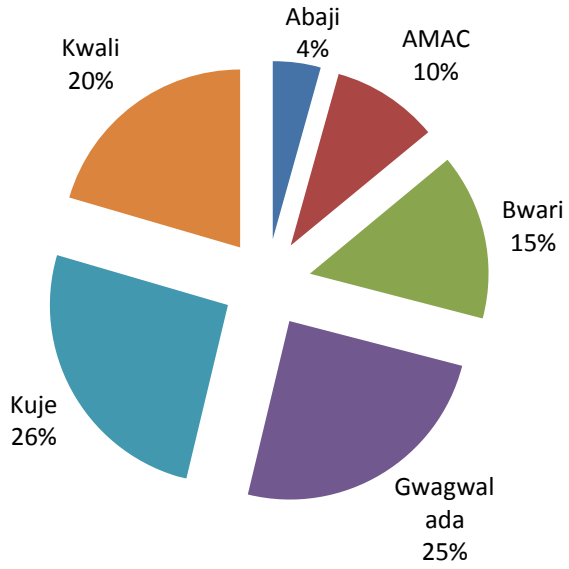

Figure. 3: Proportion of pesticidal plant species used in the six Area Councils of the FCT, Abuja

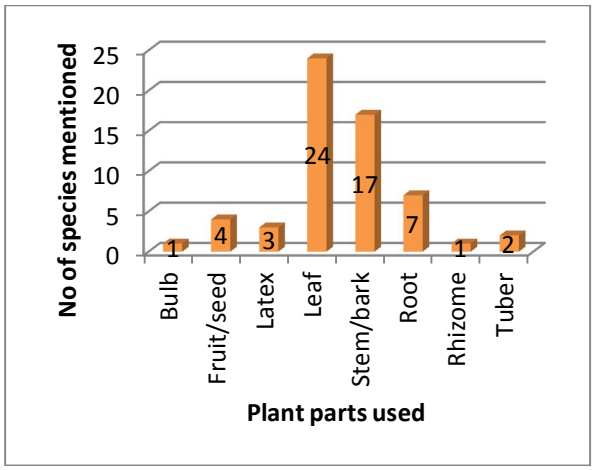

Figure 4. Plant parts used as a source of pesticide

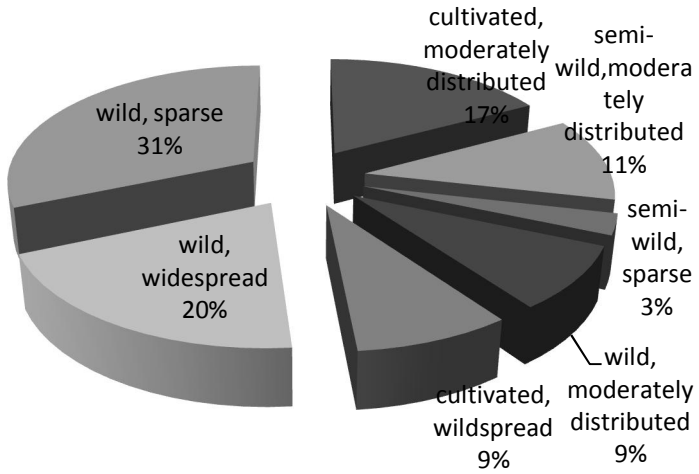

Figure 5. Cultivation and distribution status of pesticidal plants in the FCT, Abuja, Nigeria

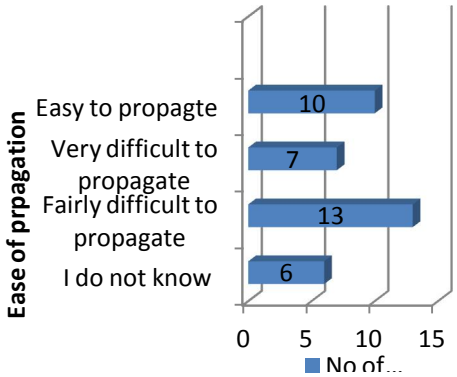

Figure 6. Ease of propagation of pesticidal plant species in the FCT, Abuj

4. Discussion

Ethnobotanical surveys are imperative in the assessment of plants, analyzing species diversity in a given area and in specie identification (Kamatenesi-Mugisha *et al*., 2007). In this study, Lamiaceae and Fabaceae were found to be the most useful families of pesticidal importance in Central Nigeria. From different families in a similar study in southern Uganda, Meliaceae and Euphorbiaceae were reported to be the most useful families (Mwine *et al*., 2011). According to Gaston, 2000, the spatial variations in biodiversity generally include species diversity in relation to size of the area, relationship between local and regional species diversity and diversity along gradients across space, and environmental factors such as latitude, altitude, depth, isolation, moisture and productivity. In addition, species richness of a taxon is not only sufficient to express diversity but the equitability is also a important factor because communities however vary in properties of the total importance of the species and share their functional contribution (Tilman, 2000).

The traditional basis for using pesticidal plants is traditionally imbedded in folklores. However, the natural or scientific basis for the pesticidal plants is that some plants produce a variety of secondary metabolites such as alkaloids, tannins, phenols terpenes to protect themselves against pathogens and herbivores (Sirikantaramas *et al.*, 2008; Swain, 1977). According to Gatehouse (2002), these are the substances man can exploit for formulating pesticides of botanical origin for pest control. Some of the identified pesticidal plant species also served as medicinal sources but there are usually differences in the part of the plant used from the same plant or in how they are formulated (Katuura, 2007).

It was indicated in this study that leaves constitute a large portion of the plant parts used. This might be due to their easy availability and renewability but might not be because it is the most effective part. The most toxic part of *E. suaveolens* or *A. indica* for instance is the seeds or the stem bark (Yi, *et al*., 2004) but the farmers prefer the leaves because it is relatively easier to collect and renew its self. Also in *A. indica* the farmers prefers the leaves to the seeds because it is less laborious to process. Massei *et al.,* (2000) reported that plants tend to deposit and localize chemical or structural defenses substances in exposed parts such as leaves and immature fruits to act as deterrents to herbivores. Plants without conspicuous leaves like *Cactus* spp. utilize their green stem latex for such a purpose. During interviews with the village heads, it was revealed that certain pesticidal plants such as *O. subscorpioidea, E. suaveolens* and *S. hispidus* were no longer available in the area studied and farmers have to travel long distances to harvest them. Twenty six out of the 36 plants were indicated to be either difficult to propagate or have no any idea of their propagation. Cox (2000) opined that unless such plants are studied and domesticated by cultivation, and the traditional knowledge about them is documented, they may soon face extinction. Yi, *et al*., (2004) recommended pre germination treatment of *Erythrophleum fordii* seeds with hot water (100^{o}C) or dense sulphuric acid in order to accelerate germination. Agricultural extension agents have a lot of role to play in this regards.

This study has shown that numerous plant species were used in central Nigeria for purposes of pest management, Notable ones such as *E. suaveolens, A. indica* and *N. tabacum* dominate the application scene but a few 'new ones' like *P. guineensis, S. hipidus T. lentopetalloides* and *D. villosa* were also documented for the first time in this region. There is still need for more plants to be harnessed for use in crop protection and related fields. Ten out of the 36 pesticidal plant species identified were indicated to also have medicinal properties, depending on the part of the same plant used or how they are formulated. For each of these pesticidal plants, there is need to scientifically establish their efficacy and identify the specific pests and pathogens against which their extracts have been indicated to be active.

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