

Edible Fruit Trees Diversity in a Peri-Urban Centre: Implications for Food Security and Urban Greening

Larinde S. L

Department of Forestry and Wildlife Management, University of Port Harcourt, Nigeria

A. T. Oladele (Corresponding author)

Department of Forestry and Wildlife Management, University of Port Harcourt, Nigeria

Tel: 234-803-545-3341 E-mail: adekunle.oladele@uniport.edu.ng

Received: Nov. 10, 2014 Accepted: December 2, 2014 Published: December 31, 2014

doi:10.5296/jee.v5i2.6847 URL: <http://dx.doi.org/10.5296/jee.v5i2.6847>

Abstract

One of the numerous sources of Edible fruits from trees in peri-urban centres are home gardens. However, there are limited research on the implication for food security and urban greening due to transient nature of farming in the cities. The aim of this study was to determine the extent of edible fruit tree (EFTs) planting in home garden in University of Port Harcourt and assess its impact on the social and physical environment as well as its contribution to food security and urban greening. Total enumeration of edible fruit bearing tree species in the residential areas was carried out in Choba and Delta parks of the university while, representative sample consisting of all student halls of residence and major streets in the staff quarters in the main university park enumerated. *Mangifera indica* (Mango) has the highest population of 91 trees while *Prunus persica* (Peach) was the least with a single tree population in Abuja Park. *Carica papaya* (Pawpaw), *Psidium guajava* (Guava), *Cocos nucifera* (Coconut), *Elaeis guinensis* (Oil palm) and *Persia americana* (Avocado pear) ranked high among the common fruit trees planted or conserved in residential areas of the University. Valued local species in the survey include; *Irvingia wombulu* (Bush mango/Ogbono), *Chrysophyllum albidum* (African star apple), *Citrus sinensis* (Sweet orange) and *Dacryodes edulis* (African pear). Site distribution of EFTs in the study showed that residential areas of Delta Park possess the highest population of EFTs (243) among the three Parks while Choba Park has the least EFTs populations (92 trees). EFTs diversity consists of Twelve (12) families distributed over Fifteen (15) genera. Palmae has the highest frequency while

Rosaceae was the least with one species (*Prunus persica* (L) Batsch). Judging from the way the well-educated protect, conserve and plant ETFs within the University environment food security and urban greening can be achieved if it is extended to other public and private residential area within the peri-urban centres.

Keywords: Edible fruits trees, Diversity, Home garden, Food security

1. Introduction

Edible fruits from trees in home gardens play important role in the family diet and food security in rural areas and urban centres in Nigeria. Udofia *et al.*, (2012) noted that rural people in Nigeria to some extent depend on home gardens for food, medicine, small poles and income generation. Fruits perform important role in the nutritional and livelihood of low income earners in Nigeria by providing important nutrients, vitamins and part of family income (Adeboye and Adedayo, 2008). Home gardens combine physical, social and economic functions on the land around the family home in a form of traditional agroforestry. Home gardens supplement food and fruit supplies from farms that are far from the settlement (Aweto, 2014). In the tropics, the culture of keeping home gardens for edible fruits, commonly used medicinal plants for pediatrics ailments and other food items is a common practice especially in Africa, Asia and Brazil. Edible fruit trees (EFTs) are equally important in the environmental amelioration and carbon sequestration of urban centres in developing countries. EFT species are either cultivated or semi-wild and protected around homesteads in rural, peri-urban and urban communities in Nigeria. They improve the aesthetic value of the environment, render ecological and social services, play indirect roles in improving mental, psychological health and social well-being. Common EFTs in rainforest region of Nigeria include but not limited to: *Persea americana*, *Citrus species*, *Artocarpus altilis*, *A.incisa*, *Mangifera indica*, *Spondias mombin*, *Dacryodes edulis*, *Treculia africana*, *Irvingia wombulu*, *Elaeis guineensis*, *Carica papaya* and *Cocos nucifera*. These EFTs and other plants contribute to the urban greening and plant diversity in a large extent besides their food function.

Ajewole (2010) stated that sustainable urban forestry aims at a balanced vegetation structure within each urban locality, for continuous tree cover and other diverse benefits. EFTs has the capacity to provide the much desired tree cover and other benefits in urban and peri-urban centres. Environmental degradation can be checked and sustainable food security can be enhanced if edible fruit bearing trees are planted in suitable places in the homesteads (Bolaji-Olutunji *et al.*, 2008). According to the FAO (1989), food security exists when all people, at all times, have access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Food security has been noted to constitute a fundamental challenge to people's welfare and economic growth especially in the developing nations of sub-Saharan West Africa (Bolaji-Olutunji *et al.*, 2008). Inadequate food production from resource-poor and small farm holdings predisposes the people to food insecurity (Ojo and Adebayo, 2012). Substantial part of locally grown food in south east and south south Nigeria are obtained from home gardens or compound farms around homesteads (Udofia *et al.*, 2012). In the urban and peri-urban centres of south east and Niger Delta region of Nigeria, EFTs produces substantial amount of fruit intakes to supplement family diet and nutrition. Keeping indigenous fruit trees such as *Dacryodes edulis*, *Irvingia gabonensis*, *Treculia africana* and *Pentaclethra macrophylla* in homesteads is highly valued for food and income generation among the local people of south east and Niger Delta region of Nigeria (Adesope *et al.*, 2007). The culture of home gardens in peri-urban centres in Nigeria such as university campuses with protected lands enhances food security and livelihood sustenance for the immediate population. In this work we aimed at carrying out the inventory of EFTs

cultivated at homesteads within the University of Port Harcourt residential areas and subsequent implications for urban greening and food security in the urban population.

2. Methodology

2.1 Study Site

University of Port Harcourt is located on latitudes 4° 52'N and 4° 55'N and longitudes 6° 54'E and 6° 56'E (Figure 1) in Obio/Akpor Local Government Area (LGA), River state. It is situated in the Niger Delta wetland of southern Nigeria. Study site is characterized by tropical monsoon climate with mean annual temperature of 28°C and annual rainfall over 2500mm. The relative humidity is very high with an annual mean of 85% while, the soil is usually sandy or sandy loam underlain by a layer of impervious pan and is always leached due to the heavy rainfall. The relief is generally lowland which has an average elevation between 20m and 30m above sea level, geology of the area comprises basically of alluvial sedimentary basin and basement complex. Vegetation structure is typical of tropical swampy rain forest with high degree of biodiversity.

The university composed of three parks namely; University/Abuja Park (Permanent site), Delta Park and Choba Park. The parks are separated by two major roads (East West and Aluu roads), each of the park consist of university administrative offices, classrooms, students halls of residence, sports facilities and senior staff residential areas. The University Park has higher human populations and residential housing units than other parks. Human population of the university are mostly of the southern Nigeria stock comprising the Ikwerre, Ijaw, Ogoni, Urhobo, Edo, Igbo and the Yoruba ethnics.

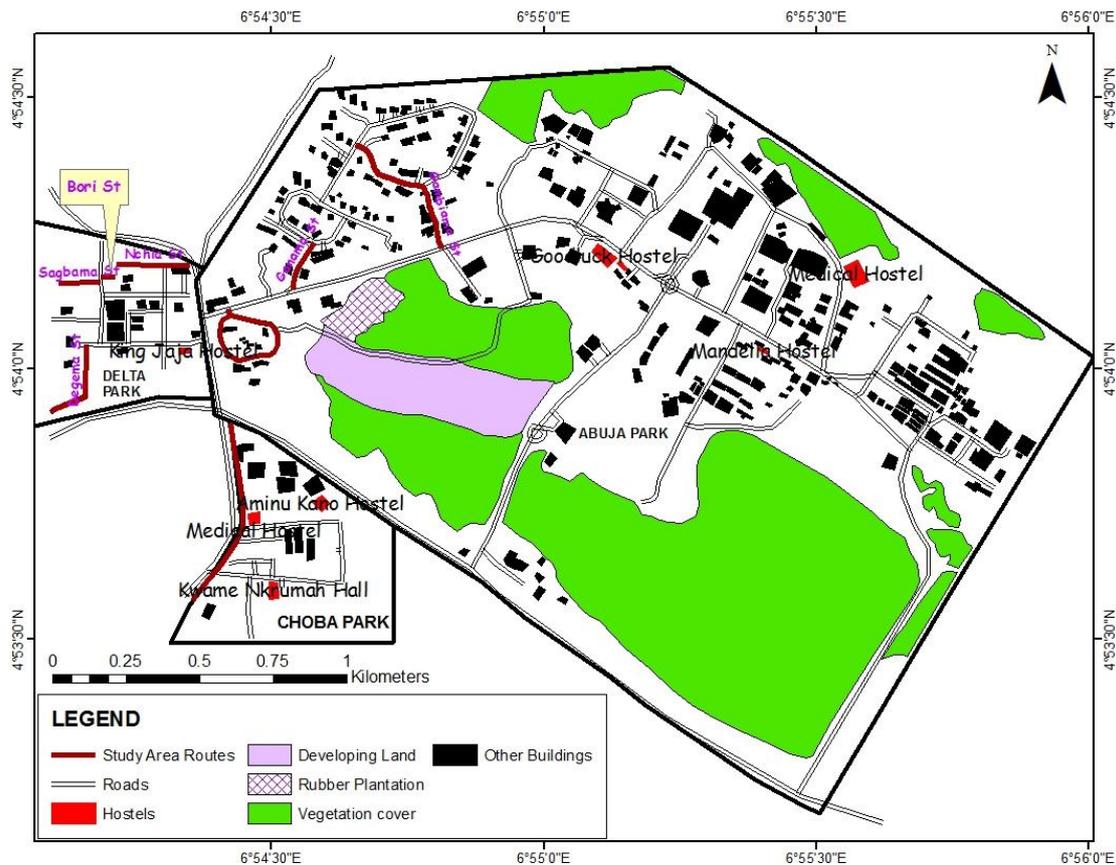


Figure 1. University of Port Harcourt Map

2.2 Data Collection and Analysis

Study site was divided into three, based on the location of the sub campuses. Total enumeration of edible fruit bearing tree species in the residential areas was carried out in Choba and Delta parks of the university while, representative sample consisting of all student halls of residence and major streets (*Ganama and Gambiama*) in the staff quarters were selected in the main university park due to its large size. However, the selected areas at the main University Park covered about 70% of the total residential population in the park. EFT enumeration was done in March 2013. EFT species below 10cm in girth were not considered in the survey, plants were properly identified and their populations carefully recorded in each compound. Data was analyzed with frequency tables and charts

3. Results and Discussion

Results showed that total of Eighteen (18) different fruit bearing tree species distributed into fourteen (12) families were encountered in the survey as shown in Table 1. *Mangifera indica* (Mango) has the highest population of 91 trees while *Prunus persica* (Peach) was the least with a single tree population in Abuja Park. *Carica papaya* (Pawpaw), *Psidium guajava* (Guava), *Cocos nucifera* (Coconut), *Elaeis guinensis* (Oil palm) and *Persia americana* (Avocado pear) ranked high among the common fruit trees planted or conserved in residential areas of the University. Valued local species in the survey include; *Irvingia wombulu* (Bush mango/Ogbono), *Chrysophyllum albidum* (African star apple), *Citrus sinensis* (Sweet orange)

and *Dacryodes edulis* (African pear).

Table 1. Species Abundance of Edible Fruit Trees in University of Port Harcourt Residential Areas

No	Name	Family	Common Name	Species Abundance
1	<i>Anacardium occidentale</i> Linn.	Anacardiaceae	Cashew	4
2	<i>Anonas muricata</i> Linn.	Anonaceae	Sour sop	14
3	<i>Carica papaya</i> Linn.	Caricaceae	Pawpaw	70
4	<i>Chrysophyllum albidum</i> Linn.	Sapotaceae	African star apple	3
5	<i>Citrus limon</i> (L) Burn.F	Rutaceae	Lemon orange	13
6	<i>Citrus paradise</i> Linn.	Rutaceae	Grape orange	7
7	<i>Citrus reticulata</i> Swingle	Rutaceae	Tangerine	11
8	<i>Citrus sinensis</i> (L) Osbeck	Rutaceae	Sweet orange	13
9	<i>Cocos nucifera</i> Linn.	Palmae	Coconut	53
10	<i>Cola pachycarpa</i> Schott. & Endl.	Sterculiaceae	Monkey cola	9
11	<i>Dacryodus edulis</i> (G.Don.f) Lam.	Burseraceae	African pear	10
12	<i>Elaeis guinensis</i> Jacq.	Palmae	Oil palm	68
13	<i>Irvingia wombulu</i> Baillon	Irvingiaceae	Ogbono	3
14	<i>Mangifera indica</i> Linn.	Anacardiaceae	Mango	91
15	<i>Persia americana</i> Miller	Myrtaceae	Avocado pear	45
16	<i>Prunus persica</i> (L) Batsch	Rosaceae	Peach	1
17	<i>Psidium guajava</i> Linn.	Myrtaceae	Guava	65
18	<i>Terminalia catappa</i> Linn.	Combretaceae	Almond	46

Most of the EFT species in the survey play multiple roles in the wellbeing of the people. EFTs are noted to be important for food security and they provide a significant nutritional contribution especially during times of drought and famine, and create more varied, palatable, and balanced diets (FAO, 1989; Adepoju and Adeniji, 2012). Multipurpose tree species have been noted to contribute significantly to the livelihood of local populations in the developing regions globally (Avocevou-Ayisso *et al.*, 2009, Larinde and Ogunniyan, 2011). *M. indica*, *C.albidum*, *D.edulis*, *I. wombulu*, *P. Americana*, *P. persica* and *T.catappa* provide shade, fresh and cool breeze, beautifies the environment in addition to nutrition enhancing fruits. EFTs with special massive branching patterns such as *D. edulis*, *C. albidum*, *T. catappa* and *M. indica* help in environmental amelioration, wind breaks, carbon sequestration and cash income for the family. Natural disasters including wind storms and surface water erosion can be effectively controlled by heavily branched and deep rooted EFTs. *Mangifera indica* have been successfully used as shelter belts in Katsina state, northern Nigeria since year 2010 (Yaradua Centre, 2014). Larinde and Ogunniyan reported that among urban tree planters in the city of Portharcourt 40.7% planted for Aesthetic/beautification, Shade (28.0%), Microclimate (11.3%) and Windbreaks (20.0%). Results revealed high concentration of Mango trees (91) as EFTs in the study area, mango is easily propagated from seeds and planted in most home gardens for its' economic, nutritional and environmental amelioration values. The fruit though eaten as dessert in Nigeria rank first among other tropical fruits like citrus and pineapple fruits. The dietary contribution of mango fruits in the diet of most people in the tropics rank above that of citrus fruits and other common fruits (Onyeani *et al.*, 2012). Mango fruit is relished by both young and old people; fruits contain many important diet requirements such as proteins, vitamins and amino acids. Ugese *et al.*, (2012) asserted that mango fruit generates sizable additional household income for farmers in Nigeria. Leaves and

stem bark are boiled in water as important antimalarial medicine locally. Live plants provide shade while domestic livestock also feed on fresh leaves.

On the other hand, the three (3) *Irvingia wombulu* trees sighted in the survey were not planted by the residents, young trees growing naturally on the sites are protected due its' socio-economic importance. The kernel of *I. wombulu* is important economically; dried seeds are in great demand and used in soup (Ogbono) as well as a complement to fufu, cocoyam, and gaari (Okafor, 1981; Aweto, 2014). Dry cotyledons are traded across national boundaries in sub Saharan West Africa, its' collection, processing and trade is a major livelihood sustenance strategy in rural and urban centres of southern Nigeria and Cameroun. Worth of trade in the dry cotyledons was estimated at about US\$50 million in 1999 alone in Nigeria and Cameroun (Ladipo and Boland, 1994; Ladipo, 1999; Nkwatoh, 2005).

Fruits of *D. edulis* are boiled in hot water or roasted over charcoal and eaten with boiled or roasted maize in its' season which usually coincides with scarcity of staple food such as yam and cocoyam. The fruit pulp yields about 48% edible oil, its rich in vitamins and contains a range of amino acids (Okunomo and Egho, 2010). The kernels which contains about 3.3% proteins, is commonly fed to livestock such as sheep and goats. Volume of domestic trade in the fruits of *D. edulis* is enormous especially in south eastern states of Nigeria and neighbouring Cameroun. Trade in *D. edulis* fruits provides means of livelihood to thousands of rural dwellers and low income earners in urban centres across south east and south - south of Nigeria. Several workers have reported the contribution of trade in *D. edulis* fruits to local economic and wellbeing of the people in southern Nigeria (Ndoye *et al.*, 1997; Anegbeh *et al.*, 2005; Larinde *et al.*, 2012; Larinde and Peters, 2013). *D. edulis* is usually planted in residential lands because it is viewed as cash and food crop in the south east and south-south part of Nigeria.

Chrysophyllum albidum fruits popularly called "Udara" are widely eaten across southern Nigeria, being popular with young people and women especially. The tree is protected for its' economic and nutritional values in home gardens. Findings in this work are in agreement with Okafor, (1981; Dimelu and Odo, 2013) who observed that the species is an important agroforestry home garden species in southern Nigeria. Fresh fruit pulp has been reported to contain crude protein, vitamins, fibre, carbohydrate and micronutrients such as calcium, iron and phosphorus in reasonable quantities (Ureigho and Ekeke, 2010; Adepoju and Adeniji, 2012). Trade in Udara fruits when in season alleviates poverty by yielding substantial income to producers and marketers locally. Local fruit vendors sell six pieces of udara fruit (about 400gm in weight) for about N100 (US\$0.8).

Elaeis guineensis (oil palm) is widely planted and protected within traditional agroforestry systems and home gardens in southern Nigeria. Sixty eight (68) trees were encountered during the survey, high occurrence of the species can be linked to its' economic and socio-cultural values in the study area. Wide range of useful products from the tree make it one of the most economic and useful tree in southern Nigeria, its' products include; palm oil, kernel oil, palm wine and palm fronds processed into baskets and brooms locally, hence the species population (68 stands) is high in the home gardens surveyed. Gourichon, (2013)

and Aiyelaja *et al.*, (2014) noted that sustainable production of palm oil and palm wine locally from *E. guinensis* can contribute positively to food security and sustainable livelihood in Nigeria. Vegetable oil from the oil palm is a major economic item in West Africa and it plays significant role in the diet and economic wellbeing of rural and peri urban dwellers. Palm oil production provides direct employment and income to about 4 million persons in Nigeria, mostly in the southern part of the country; numerous people are involved in the production, processing and marketing (Olagunju, 2008). The trunk is also sawn into planks for local buildings in the villages by the rural poor. Although, most of the stands were not planted deliberately by the residents, due to the benefits from the species, naturally occurring oil palm trees are usually protected and nursed to maturity both in residential areas and farmlands in southern Nigeria.

T. catappa (almond fruit) and *P. americana* (avocado pear) are common shade and ornamental plant species in Nigeria. *T. catappa* is widely used as avenue trees in peri urban and urban centres specifically due to its' canopy form which is suitable for shade provision. The ripe fruits are relished by children and young adults while the fruit nuts can be roasted or eaten raw, leaves are used to treat dysentery, asthma and malaria fever in different parts of the country. Similar observations were made in Vanuatu, where almond tree is an important home garden species providing nuts for consumption, local medicine, used as ornamental and serve as excellent control of strong winds (Thomson and Evans, 2006; Nwosu *et al.*, 2008). *P. americana* fruits are consumed in conjunction with other meals; ripe fruits are eaten raw or boiled. It is popularly referred to as butter tree for the nutritious non-volatile oil produced by the fruits. Populations of these two species are high in home gardens surveyed (46 & 45 stands for *T. catappa* and *P. americana* trees respectively), this may be attributed to; easy propagation from seeds, species survival with little care and has ability to withstand harsh weather conditions. Avocado pear fruits harvested from home gardens are commonly marketed by local fruit sellers to supplement family income. In a survey of 100 home gardens in Enugu state, Nigeria, 88% of the respondents were noted to plant avocado pear for purely economic reasons (Dimelu and Odo, 2013). Avocado fruits are rich in fats and potassium (Lopez *et al.*, 1996) while its seeds are locally used to lower blood sugar level in hypertensive patients.

EFTs such as *Carica papaya* (70 stands) and *Psidium guajava* (65 stands) were planted by residents for the short gestation period advantage, *Carica papaya* (pawpaw) commence fruiting in a year while *Psidium guajava* fruits within three years at most. Unripe pawpaw fruit and leaves are also used to treat various ailments locally such as malarial fever, sickle cell anaemia, arthritis and hypertension. Fruits of *Annonas muricata*, *Citrus spp*, *Cocos nucifera* and are good sources of vitamins, fats, proteins, carbohydrate and mineral nutrients in addition to family income obtained from marketing the fruits. Findings in this study corroborates studies in Nasarawa state of Nigeria where urban fruit trees contributed about 74% of the total annual income and 55.56% of house hold feeding items which implies that EFTs has a major contribution to means of livelihood (Salau and Attah, 2012).

Site distribution of EFTs in the study showed that residential areas of Delta Park (243) possess the highest population of EFTs among the three Parks studied (Table 2). Choba Park

(92 trees) has the least EFTs populations, reasons could be that there are few staff housing units in Choba Park. Most of the available lands have been built up into offices, classrooms and student hostels. In peri-urban zones, there is intense competition among the various land uses. Food crop cultivation, infrastructure, buildings and forests share the territory, depending on urban demand (Marien and Gauthier, 2012). This scenario has made the Park congested with building structures while the remaining undeveloped lands were possibly abandoned construction worksites that has been underlaid with concretes and metallic substances. It is difficult for most plants to develop on concretes and metallic underlaid lands, few plant species can adapt and thrive on such harsh environment and marginal lands. Cotonou Street play host to most of EFTs in the Choba Park, comprising only Mango, Pawpaw, Oil palm and Guava. It is the only street with staff residential housing unit in the park others are student hostels, hence, the residents plant EFTs because they are stable with long periods of stay in the quarters to nurture the plants to maturity. The dominant species such as *M. indica* were planted mainly for fruits, shade and windbreaks during storms to protect the housing units. *Carica papaya* and *Psidium guajava* produces fruits within short period within one and three years respectively, in addition to short gestation, the soil in Choba Park is well drained sandy soil suitable for such species (Aiyelaagbe *et al.*, 1986). Pawpaw is one of the most nutritious fruit grown and consumed in Nigeria; it produces fruit throughout the year on good soil. Pawpaw is easily affordable by the poor masses and widely consumed (Agbowuro, 2013).

Few EFTs were encountered in Choba Park (Fig. 2) because development plans of the university are focused on Abuja and Delta Parks which are the new and permanent sites of the university, integration of trees generally in residential areas as part of building plan is a new concept in Nigeria and most often not included in old building plans. This is the experience of Choba Park. Cost of maintaining the EFTs is a challenge in university owned apartments, many residents treat apartments as rented and shy away from maintaining permanent trees in their premises. Ownership challenges have been reported as a major problem facing urban forestry management and development in West Africa (Fuwape and Onyekwelu, 2011; Udofia, 2012; Mensah, 2014). Species composition were scanty in all the student hostels as a result of lack of proper planning, students lacks time to nurse plants, they are unstable, mobile and have no sense of tree ownership while in school. On the other hand, staff residential areas such as Cotonou Street (Choba), Gambiama, Ganama and Cape Verde Streets (Abuja) and Sagbama, Degema and Nchia Streets (Delta) were all fairly rich in EFTs. Residents in these areas stay in the properties for long periods until retirements in many cases, protect and nurse the EFTs in their premises. In addition to preservation of selected EFTs, fast growing and short gestation EFTs species such as Pawpaw, Citrus and Guava were also introduced into home gardens.

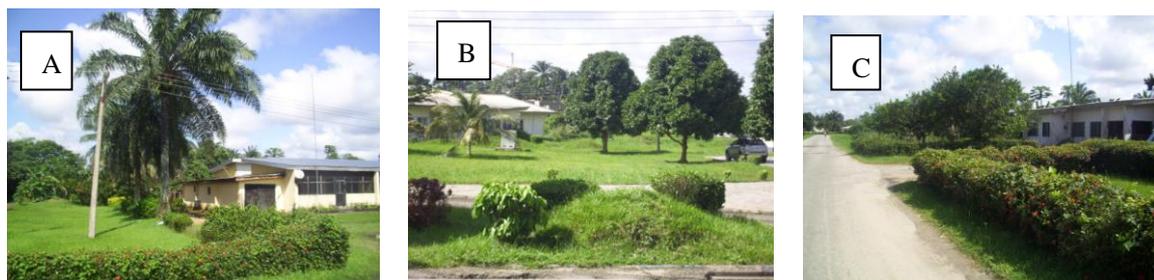


Plate 1: Photographs of edible fruit trees (EFTs) - A (*Elaeis guineensis*), B (*Mangifera indica*) and C (*Citrus sinensis*) planted in home gardens of staff residential units at University of Port Harcourt, Nigeria

Table 2. Site Distribution of Edible Fruit Bearing Trees in Residential Areas of University of Port Harcourt, Nigeria

Common Name	Site Species Population																				
	Delta Park								Abuja Park								Choba Park				To tal
	K J H	P C L	S S	D S	S H	N S	B S	To tal	M H	M D	D A	G J H	C V S	G A M	G N	To tal	A K H	M H C	K N H	C T S	
Mango	-	-	8	5	-	1	-	29	5	7	-	-	4	1	8	37	1	-	-	23	24
Pawpaw	-	-	-	-	-	-	-	-	-	-	-	-	3	7	8	44	5	-	6	9	20
Oil palm	1	-	2	1	-	6	-	45	3	-	3	2	1	-	-	20	-	-	-	4	4
Guava	-	-	8	1	-	7	2	30	4	7	2	1	2	-	-	16	5	-	2	12	19
Coconut	-	1	3	1	-	5	1	39	-	3	1	-	-	-	1	14	1	-	-	-	1
Almond	-	-	-	1	3	1	-	21	3	1	-	-	3	2	4	22	1	1	-	1	3
Avocado pear	-	1	1	-	-	9	5	30	-	4	1	-	2	3	-	10	-	-	-	5	5
Sour sop	-	1	4	-	-	7	-	12	-	-	-	-	-	-	-	-	-	-	-	2	2
Lemon orange	-	-	3	-	-	-	-	3	-	-	-	-	-	2	7	9	-	-	-	1	1
Sweet orange	-	-	-	-	-	-	-	-	-	-	-	-	-	2	5	7	2	1	1	2	6
Tangerine	-	-	-	-	-	1	-	10	1	-	-	-	-	-	-	1	-	-	-	-	-
African pear	-	-	-	-	-	4	-	4	-	-	-	-	-	-	2	2	-	-	-	4	4
Pachycarpha	-	-	3	-	-	6	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-
Grape orange	-	-	2	-	-	2	-	4	-	-	-	-	-	2	-	2	-	-	-	1	1
Cashew	-	-	2	-	-	-	-	2	-	1	-	-	-	-	-	1	-	-	-	1	1
African star apple	-	-	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	1	1
Bush Mango	-	-	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Peach	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-
Total								24							18					92	

Legend: KJH – King Jaja Hostel, PCL – Pro Chancellor’s lodge, SS – Sagbama street, DS – Degema street, SH – Security House, NS – Nchia street, BS – Bori street, MH – Medical Hostel, MDH – Mandela Hostel, DAH – Dan Etete Hostel, GJH – Goodluck Jonathan Hostel, CVS – Cape Verde, GAM – Gambiama, GN – Ganama, AKH – Aminu Kano Hostel, MHC – Medical Hostel Choba, KNH – Kwame Nkrumah Hall, CTS – Cotonou street.

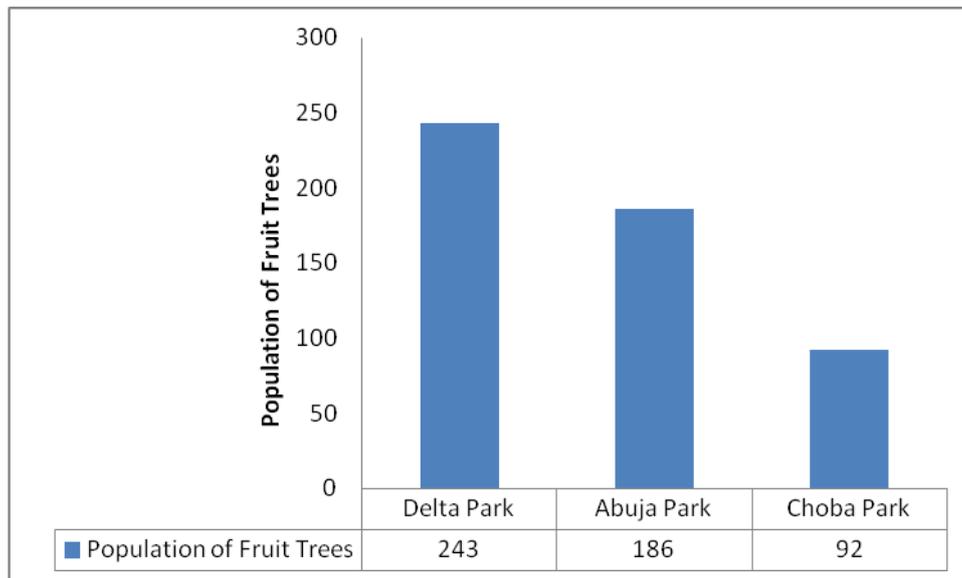


Figure 2. Edible Fruit Trees Population in the Three University Parks

EFTs diversity consists of Twelve (12) families distributed over Fifteen (15) genera (Fig. 3). Palmae has the highest frequency while Rosaceae was the least with one species (*Prunus persica* (L) Batsch). The high occurrence of Palmae can be linked to edaphic factors of the study area which has slightly salty fresh water due to proximity to the coastal area.

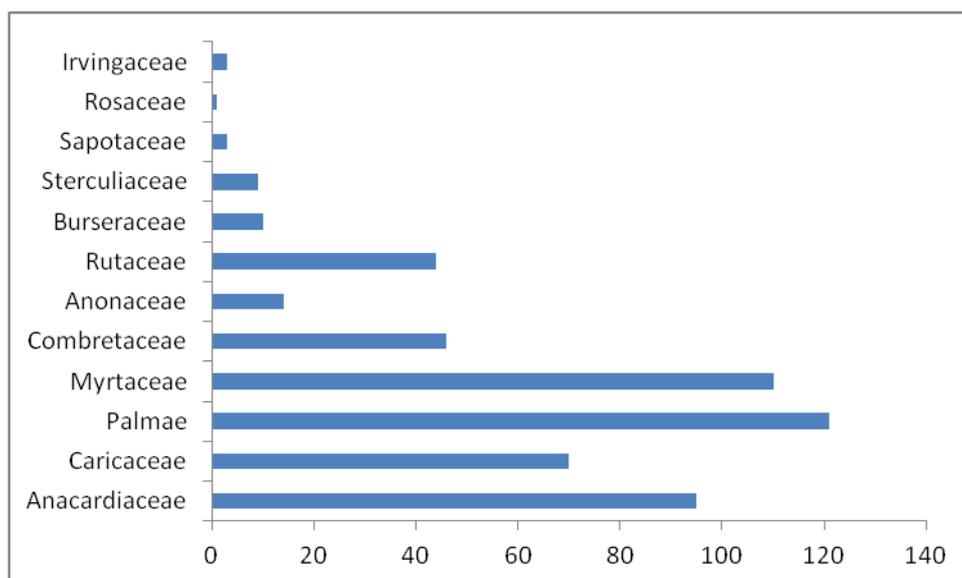


Figure 3. Family diversity of edible fruit trees in University of Port Harcourt

4. Conclusion

In Africa, urban green spaces are depleting at an alarming rate with green spaces now occupying small proportion of the landmass of several urban areas. More and more agricultural lands are becoming marginal and unproductive with the traditional farming system of slash and burn agriculture coupled with unaffordable mineral fertilizers by the peasant farmers in sub Saharan West Africa. Peri-urban agricultural lands are been depleted and giving way for urbanization at an alarming rate. All these afore-mentioned factors predisposed the region to food insecurity and forced importation of food materials to meet the required food intake of the teeming population. Incorporation of EFTs in home garden such as the Delta and Abuja Parks of the university possesses great potentials to healthy food production at affordable cost. Numerous species of EFTs thrive in different agro-ecological zones of the region which can be tapped for improved fruit supply in a bid to combat food insecurity. Eighteen species of EFTs were encountered in University of Port Harcourt survey. Fruits rich in basic nutritional content for healthy living need to be promoted as components of home gardens across West African sub region for a guaranteed food security. Home gardens can readily supply fresh fruits devoid of preservatives that can pose health hazards at little or no cost to the home owners, absence of handling and transportation cost reduce fruit injury, family budgets on fruits and generate additional family income in fruiting seasons. EFTs species such as Almond, Citrus, Mango and African pear in urban centers contribute to urban forestry/greening for beautification. The trees render unquantifiable environmental, health and social benefits to mankind in terms of carbon sequestration, soil and water conservation, recreation and environmental amelioration. City and town planners in Nigeria and entire West Africa sub region need to develop policies that will encourage integration of EFTs in residential lands for urban greening development and food security.

References

- Adeboye, O. A., & Adedayo, A. (2008). Nigeria under Exploited Indigenous Fruits Vegetables in Era of Climate Change. A Review of Scientific Literature. Pp: 1-4
- Adepoju, O. T., & Adeniji, P. O. (2012). Nutrient Composition and Micronutrient Potential of Three Wildly Grown Varieties of African Star Apple (*Chrysophyllum albidum*) from Nigeria. *African Journal of Food Science*, 6(12), 344-351, Retrieved Sept. 2014, from <http://www.academicjournals.org/AJFS>. <http://dx.doi.org/10.5897/AJFS12.045>
- Adesope, O.M, Agumagu, A. C, Larinde, S. L., & Anegbah, P. O. ((2007). Rural Households' Involvement in Social Forestry Practices in Imo State, Nigeria. *Global Approaches to Extension Practice (GAEP)*, (2), 98-107
- Agbowuro, G. O. (2013). Evaluation of Different Agricultural Wastes as Fertilizers on Nursery Performance of Pawpaw (*Carica papaya* L) and soil Chemical Properties. *Agricultural Journal*, 8(1), 56-59. Medwell Journals
- Aiyelaagbe, I., O. O, M., O., Fawusi, A., & Babalola, O. (1986). Growth, development and yield of pawpaw (*Carica papaya* L) "Homestead selection" in response to soil moisture stress. *Plant and Soil*, 93(3), 427-435.

Aiyeloja, A. A., Oladele, A. T., & Tumulo, O. (2014). Potentials of *Raphia hookeri* Wine in Livelihood Sustenance among Rural and Urban Populations in Nigeria. *International Journal of Social, Management, Economics and Business Engineering*, 8(7), 2296-2303. <http://waset.org/Publication/9998958>, USA.

Ajewole, O. I. (2010). Urban Forestry Development in Britain and Ireland: Lessons for Nigeria; In Adeyoju S.K and S.O Bada Eds. *Readings in Sustainable Tropical Forest Management, Essays in Honour of Prof. Labode Popoola*, Zenith Book House, Ibadan, Nigeria

Anegbeh, P. O., Ukafor, V., Usoro, C., Tchoundjeu, Z., Leaky, R. R. B., & Schreckenber, K. (2005). Domestication of *Dacryodes edulis*: Phenotypic Variation of Fruits Traits from 100 Trees in Southeastern Nigeria. *New Forests*, 29(2), 149-160, Springer Publishers.

Avocevou-Ayisso, C, Sinsin, B., Adegbidi, A., Dossou, G., & Damme, P. Van. (2009). Sustainable use of non-timber forest products: Impact of fruit harvesting on *Pentadesma butyracea* regeneration and financial analysis of its products trade in Benin. *Forest Ecology Management*, 257, 1930-1938.

Aweto, A. O. (2014). Agriculture in Urhoboland. *Urhobo Historical Society*. Retrieved Sept. 2014 from <http://www.waado.org/geography/Agriculture/Agruclture-Aweto.html>

Bolaji-Olutunji K. A., Adebago, C. A., & Tolawo, O. A. (2008). Environmental degradation and sustainable food security in Nigeria. *Journal of Agriculture, Forestry and Social Sciences*, 6(2).

Dimelu, M. U., & Odo, R. N. (2013). Production preference and importance of fruit species in home garden among rural households in Igbo-Eze North Agricultural Zone of Enugu State, Nigeria. *African Journal of Agricultural Research*, 8(46), 5733-5740. Retrieved from <http://www.academicjournals.org/AJAR>. <http://dx.doi.org/10.5897/AJAR2013.7766>

FAO. (1989). Food and Agricultural Organisation of United Nations. Household food security and forestry: An analysis of socio-economic issues. FAO, Rome.

FAO. (1989). Preparation of comprehensive national food security program: overall approaches and issues. FAO, Rome, Italy.

Fuwape, J. A., & Onyekwelu, J. C (2011). Urban Forest Development in West Africa: Benefits and Challenges. *Journal of Biodiversity and Ecological Sciences*, 1(1), 77-94.

Gourichon, H, (2013). Analysis of incentives and disincentives for Palm Oil in Nigeria. *Technical notes series*, MAFAP, FAO, Rome.

Ladipo, D. O. (1999). The development of quality control standard for Ogbono (*Irvingia gabonensis* and *Irvingia wimboul*) kernels: Efforts toward encouraging organized and further international trade in NWFP in West and central Africa. In T.C.H Sundarland, L.E. Clark and P. Vantomme (eds). Non wood forest products of central Africa: Current research issues and prospects for conservation and development. Rome; Food and Agricultural Organization, pp. 245 – 250.

- Ladipo, D. O., & Boland, D. J. (1994). Trade in *Irvingia* kernels. In D. O. Ladipo & D. Boland (Eds.), *Proceedings of the international workshop on Irvingia in West Africa. International Centre for Research in Agroforestry (ICRAF) Nairobi, Kenya*
- Larinde, S. L., Oladele A. T., & Oputa Nwakaego. (2012). Non Wood Forest Products in Poverty Alleviation and Its Implication in Species Conservation in Emohua Local Government Area, Rivers State, Nigeria. *Journal for Environmental Extension*, (10), 10-17.
- Larinde, S. L., & Ogunniyan, D. J. (2011). Urban Forest and Sustainable Livelihood in Portharcourt City. *Journal of Agriculture, Forestry and the Social Sciences (JOAFSS)*, 9(1), 177-185.
- Larinde, S. L., & Peter, G. C. (2013). Consumption of Edible Non-Timber Forest Products in Oguta Local Government Area of Imo State. *Agricultural Economics and Extension Research Studies (AGEERS), University of Portharcourt*, 2(2), 25-37.
- Lopez, L. R, Frati, M. A. C., Hernandez, D. B. C., Cervantes, M. S., Hernandez, L. M. H., Juarez, C., & L.S Moran. (1996). Monounsaturated fatty acid (avocado) rich diet for mild hypercholesterolemia. *Arch-Med-Res.*, 27(4), 519–523.
- Marien, J. N., & Gauthier, M. (2012). Urban and peri-urban forestry in Africa: The outlook for woodfuel, eds. A. G. Abherv é-Quinquis, Urban and peri-urban forestry working paper No 4. Food and Agriculture Organization of the United Nations, 95 pages, FAO, Rome.
- Mensah, C. A. (2014). Urban Green Spaces in Africa: Nature and Challenges. *International Journal of Ecosystem*, 4(1), 1-11. <http://dx.doi.org/10.5923/j.ije.20140401.01>
- Ndoye, O., Ruiz-Perez M., & Eyebe, A. (1997). The markets of Non-timber Forest products in the humid Forest Zone of Cameroon. *Rural Development Forestry Network. Paper No 22c* ODI, London, UK.
- Nkwatoh, A. F. (2005). Production and marketing of Non Timber Forest Products NTFPs, a Major Source of Rural and National Income in the South West Province of Cameroon. Paper Presented at 17th Commonwealth Forestry Conference, Colombo, Sri Lanka.
- Nwosu, F. O., Dosumu, O. O., & Okocha, J. O. C. (2008). The Potential of *Terminalia catappa* (Almond) and *Hyphaene thebaica* (Dum palm) Fruits as Raw Materials for Livestock Feed, *African Journal of Biotechnology*, 7(24), 4576-4580. <http://http://www.academicjournals.org/AJB>
- Okafor, J. C. (1981). Promising trees for agro-forestry in southern Nigeria (In) L. H. MacDonald EDs: Agro-forestry in the African Humid Tropics. Proceedings of a Workshop Held in Ibadan, Nigeria, 27 April - 1 May 1981. NRTS-17/UNUP-364.
- Okunomo, K., & Egho, E. O. (2010). Economic Importance of Some Underexploited Tree Species in Nigeria: Urgent Need for Separate Research Centres. *Continental J. Biological Sciences*, 3, 16-32. <http://http://www.wiloludjournal.com>
- Olagunju, F. (2008). Economics of Palm Oil processing in Southwestern

Nigeria. *International Journal of Agricultural Economics and Rural Development, Nigeria*, 1(2), 69-77.

Onyeani, C. A, Samuel, O., Sunlaja, O. O., Owuru, O., & Sosanya, O. S. (2012). Mango Fruit Anthracnose and the Effects on Mango Yield and Market Values in Southwestern Nigeria. *Asian Journal of Agricultural Research*, 6, 171-179.

Salau, E. S., & Attah, A. J. (2012). A Socio-Economic Analysis of Urban Agriculture in Nasarawa State, Nigeria. *Production Agriculture and Technology Journal*, 8(1), 17-29.

Thomson, L. A. J., & Evans, B. (2006). *Terminalia catappa* (Tropical almond) Ver. 2.2. In Elevitch, C. R. (Eds.), Species Profile for Pacific Island Agroforestry. Permanent Agriculture Resources (PAR), Hololualoa, Hawaii, <http://www.traditionaltree.org>, Accessed Sept. 2014.

Udofia, S. I, Owoh, P. W., Ukpong, E. E., & Ekpo, I. E. (2012). Assessment of Plant Species of Socio-economic Importance Conserved in Homegardens of Nsit Ubium Local Government Area of Akwa Ibom State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment*, 8(1), 99-108.

Ugese, F. D, Iyango, P. O., & Swem, T. J. (2012). Mango (*Mangifera Indica* L.) Fruit Production and Production Constraints In Gboko Local Government Area of Benue State. *Production and Agricultural Technology*, 8(1), 164 -174.

Ureigho, U. N., & Ekeke, B. A. (2010). Nutrient Values of *Chrysophyllum Albidum* Linn African Star Apple as a Domestic Income Plantation Species. *African Research Review*, 4(2), 50-56.

Yaradua Centre. (2014). Charity Programmes, Yaradua Foundation. Retrieved from <http://www.yaraduacentre.org/component/content/category/89-programmes>

Copyright Disclaimer

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).