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COMPARATIVE ASSESSMENT OF PLANT DIVERSITY AND UTILIZATION PATTERNS OF TROPICAL HOME GARDENS IN EDO STATE, NIGERIA

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ABSTRACT

Home gardens are small land units or acreage of land for food production, usually within the homestead in traditional communities worldwide. These gardens are important component of subsistence living, sometimes a cash resource and repository sites for uncommon and common plant species of mixed life cycles. A survey of crop diversity was carried out in two communities namely Iyanomo and Ogbekpen (here referred to as Community A and B respectively) to assess garden and gardener characteristics, species composition and physiognomy, utilization pattern and availability of plant life forms. Primary data was obtained through open ended questionnaire, crop inventory and participatory guided walk. Results showed a total of 42 crops were inventoried with 35 in community A and 33 in community B. A total of 26 crop species were common to both communities. Nine categories of crops were recorded during this survey. Fruits and vegetables were predominant in both communities, 51.43 % and 17.14 % respectively in community A and 69.70% and 12.12% respectively in community B. The agricultural system is long term with 60 % having been cultivated for more than 15 years. The home gardens visited in both communities had characteristics three layered structure. Most of the crops were perennial fruit crops mainly used for food, medicine and provision of shade. Majority of home gardens in the two communities showed similarity in location, size, diversity, life forms and food categories. They differed in the length of time for which they have been cultivated. As a result of nearness to dwelling, most crops are available all year round and maintained by the input or debris of household wastes. From garden composition and occurrence of plants, two types of home gardens are suggested from this study- tree-vegetable and vegetable home garden and both exhibit three layers zonation of the associated vegetation of the communities.

Key words: Home gardens, Plant diversity, Species composition, Land use, Nigeria

INTRODUCTION

Home gardens are family farms on a small land scale with high species composition and are widespread globally (Ariyadasa, 2002). Home gardens represent land use systems where management of multipurpose

crop plants of different life cycles within the compounds of individual gardener. The food procurement systems are managed by family labour and household inputs like kitchen refuse (Fernandes and Nair, 1986).

The composition of home garden is affected by the presence and socio economic conditions of the gardener's as well as the soil quality (Kehlenbeck and Maass, 2004). The nature of garden represents climax ecosystems in ecological succession. According to Ariyadasa (2002), Bambaradeniya (2003), home gardens are composed of mixed crops which serve as source of food, fruits, spices and timber. Most multi-storied vegetation in traditional home gardens consists of trees, shrubs, vines and herbs (Bambaradeniya, 2003).

Home garden is a land use system where marginal land is maximized for partial food production. However, home garden have been established due to the increasing distance between homes and natural forest. According to Okigbo (1985) it evolved as a product of the sedentary nature and an intensified land use system coupled with increasing population growth and food demand. The system of agriculture primarily supplements and improves home consumption of food all over the year with low input and high output with little or no extra cost. Different family food needs are produced with great species diversity under mixed culture (Dania-Ogbe *et al.,* 1992).

Apart from afore mentioned, UNU/INRA identified the production system as one of the sustainable food production system in sub Saharan Africa with ecologically adapted and complementary species. It is relevant in developmental intervention targeted at the most nutritionally and economically disadvantaged people. More so, it contributes to the stability and sustainability of the ecosystem which man depends on.

These gardens provide food products of substantial proportion of nutritive and energy requirements of local diet (Fernandes and Nair, 1986); they provide supplementary food, fuel, fodder and serve as a recovery area for people (Osawaru and Dania-Ogbe, 2012) and serve as reservoirs of agro-biodiversity on highly fertile soil (Marjor *et al*., 2005). Conservation and development agencies promote home gardens among families to improve their welfare and promote conservation of natural resources (Marquez and Schwartz, 2008). They are important in local food production which is an integrated pathway to achieving sustainable food future, appropriate urban ecosystem maintenance and meaningful environmental impact reduction (Ghosh *et al.,* 2008). Many traditional crops are grown under marginal conditions and often provide a farming system in a non-farming pattern, for example, urban home garden. In these systems, crops of indigenous relevance abound.

The food production system in Nigeria has been extensively studied especially where population density is high. In Edo state, land is highly fragmented for non-agricultural purposes and population density is estimated at 250 persons/Km^2 (Anonymous, 2006). Little or no work has been done in the state to assess home garden and gardener characteristics. This work attempts to document and identify crops diversity in the home gardens as well as factors that contributes to crop diversity in home gardens in Iyanomo (community A) and Ogbekpen (community B) communities.

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MATERIALS AND METHODS

Study Area

The two study communities lie in the tropical rainforest zone and are within Ikpoba Okha Local Government Area of Edo State Nigeria (6.26 N and 5.67 E). The first community (community A) is located within the premises of the Rubber Research Institute of Nigeria (RRIN), Iyanomo while the second community is located in Ogbekpen village (community B). Both communities are approximately 40 kilometers apart and from Benin City, the state capital. In terms of economic activities, Community A is mainly heterogeneous with civil servant, artisans and farmers while Community B is homogenous with farmer accounting for over 80 % of the population.

The climate in the study area is affected by two opposing surface air currents. The annual rain is usually concentrated in two peaks July and September. These are separated by one short and another long dry season. Annual rainfall ranges from 2000 - 2500mm. The daily temperature usually ranges from 21 – 32 ^{0}C but may vary more during the harmattan. The mean monthly relative humidity is high (60 % in the driest month to 95 %) (Data from RRIN weather unit). However climate change affects amount and spread of the rains from year to year.

Sampling Frame and Data Collection

In each community, twenty five home gardens were randomly selected for study based on methods outlined by Snelder (1987) and Osawaru and Dania-Ogbe. (2012). Three visits were carried out to each community. Firstly to identify and label garden and gardeners, secondly, to administer questionnaire and thirdly for participatory guided field walks and inventory crops species. This was done during the threshold of dry and wet seasons. For each home garden visited, an individual was subjected to oral administration of semi structured questionnaire on the types of crops observed in their garden, reasons for choice of crops and their uses. The average size of each home garden in the communities was calculated using measurements of their length and breadth determined with a measuring tape. Species identification was done using *Trees of Nigeria* (Keay, 1989) and *Tropical Tree Crops* (Opeke, 1987) and *The Useful plants of West Tropical Africa volumes 1-5* (Burkil 1985, 1994, 1995, 1997 and 2000). Local names were also used to identify taxonomic species.

RESULTS

Results of the characteristics of garden and gardeners are presented in Figures 1, 2 and 3. The crop plants encountered are represented in Figures 4a and b and Table 1. Five age categories where used to distinguish the age of the home gardens in both communities. The result suggest that most home gardens in Community A have been in existence for 3 years or less while in Community B, most gardens have been in existence for more than 15 years (Figure 1).

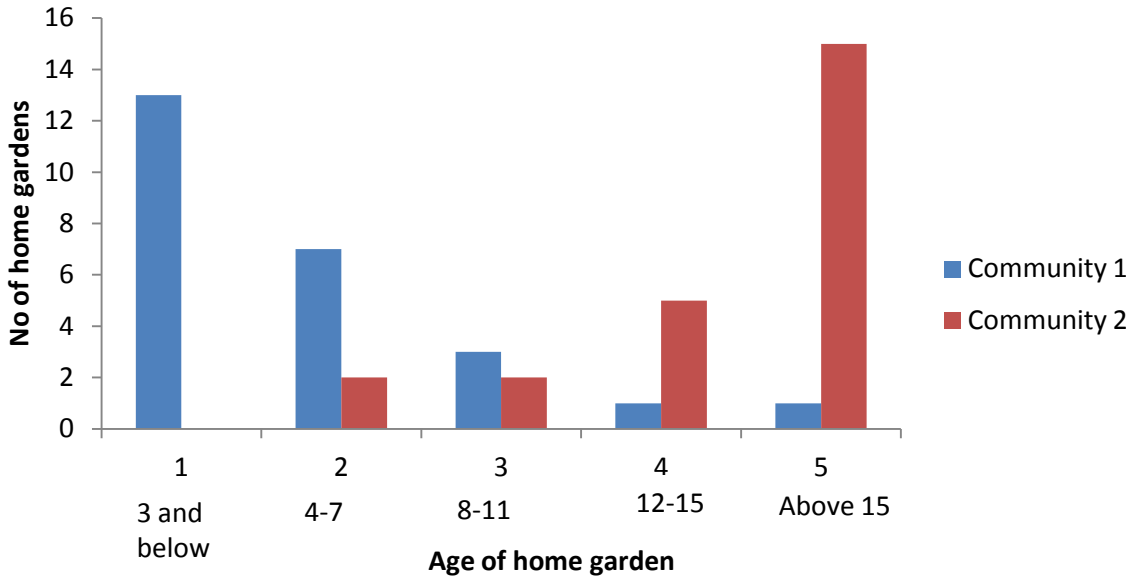

Figure 1: Age of Home Gardens in the two communities

Key: Community 1- Community A (Iyanomo)
Community 2 – Community B (Ogbekpen)

The occupational distribution of gardeners in the two communities surveyed is presented in Figure 2. The results suggest that majority of gardeners in Community A are civil servants and farmers in community B. Other occupation encountered included native doctors, tailors, electricians, hair dressers and business man but these were not significant.

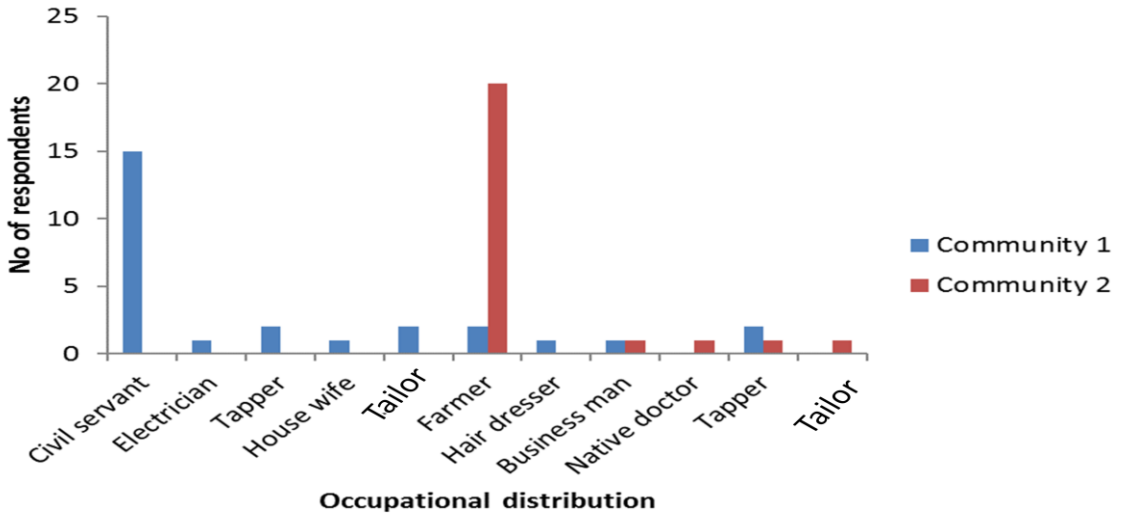

Figure 2: Occupational Distribution in the two communities

Key: Community 1- Community A (Iyanomo)
Community 2 – Community B (Ogbekpen)

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A total of six Nigerian ethnic groups were encountered in both communities. Relatively, the Bini's and Esan's are the dominating groups in the survey. Ibo's and Urhobo's are equally significant in the survey (Figure 3).

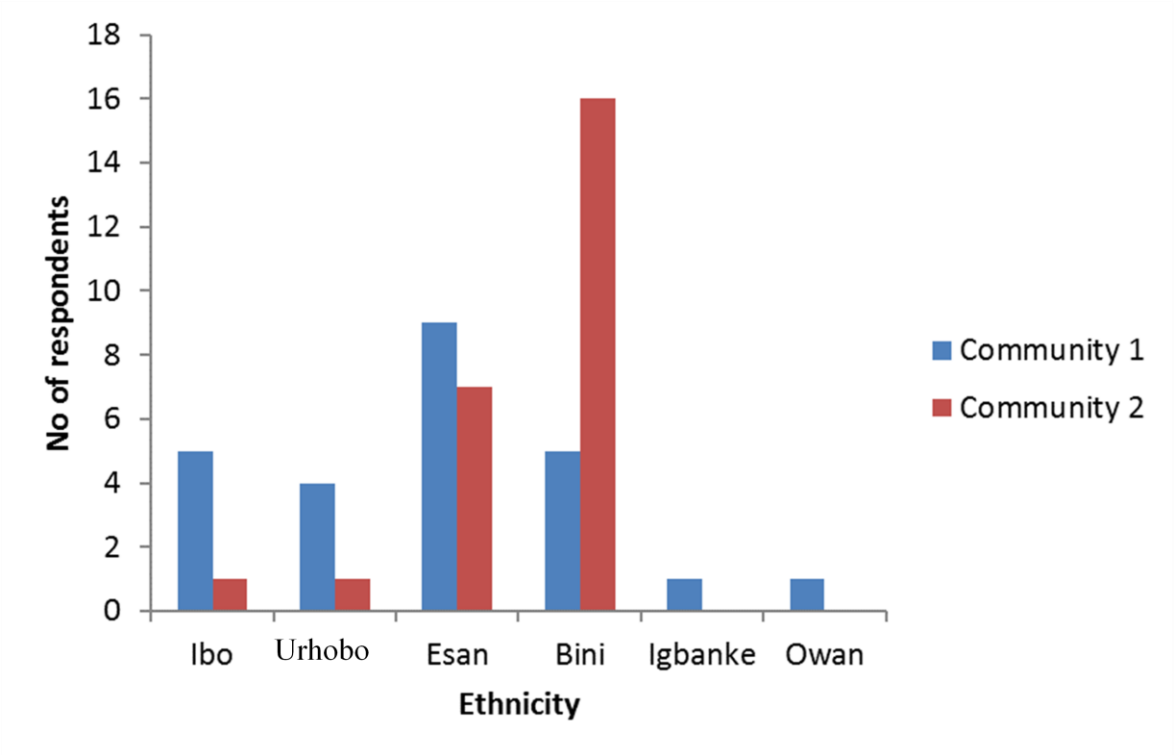

Figure 3: Ethnicity in both communities of survey

Key: Community 1- Community A (Iyanomo)
Community 2 – Community B (Ogbekpen)

According to crop categorization pattern, nine categories were recorded. All categories were present in Community A and seven in B. Legumes were completely not recorded in community B. The degrees of occurrence are prersented in percentages with fruits and nut trees highest with 51.43 % in A and 69.70 % in B (Figures 4 a and b)

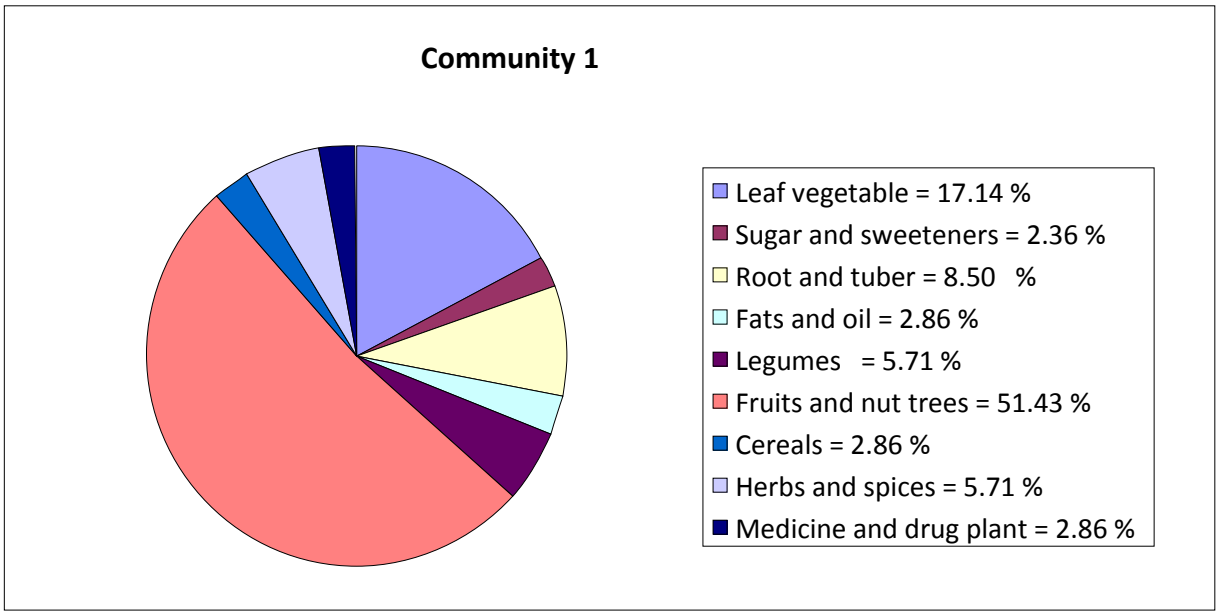

Figure 4a: Crop categories in community A

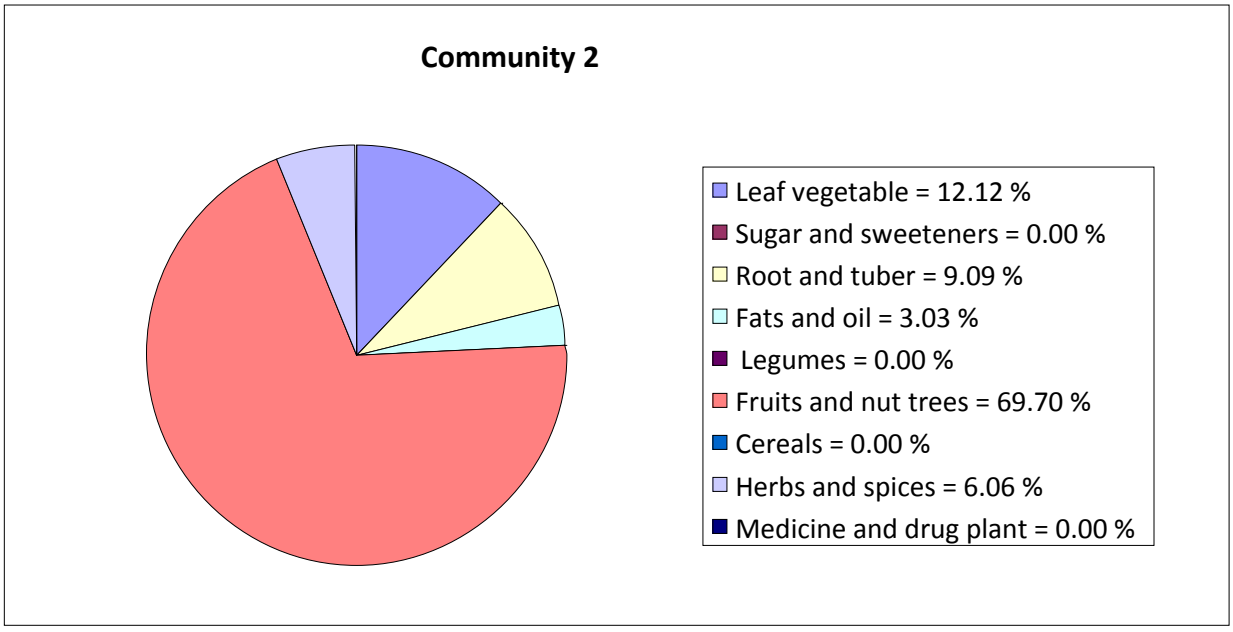

Figure 4b: Crops categories in community B

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Frequency of occurrence

Community A: *Musa paradisiaca* had the highest occurrence as it occurred in all home gardens (100.00 %). Other species with high frequency in home gardens within this community are *Vernonia amygdalina* (52.00 %), *Manihot* sp (44.00 %), *Zea mays* (44.00 %) *Ananas comosus* (40.00 %), *Carica papaya* (40.00 %), *Ocimum gratissimum* (40.00 %), *Abelmoschus esculentus* (40.00 %) and *Amaranthus hybridus* (36.00 %). On the other hand, *Kola acuminate* (4.00%), *Psidium guajava* (4.00%), *Theobroma cacao* (4.00 %), *Citrus reticulate* (4.00%), *Persea americana* (4.00 %) and *Lycopersicon esculentum* (4.00 %) occurred in very low frequencies; found in only in 4% home garden surveyed.

Community B: *Dacryodes edulis* (84.00 %) had the highest occurrence in home lens, appearing in 19 of the 25 home gardens visited for this study. Also of high occurrence were *M. paradisiacal* (16.00 %), *Elaeis. guineensis* (44.00 %), *Citrus sinensis* (40.00 %), *Scorea sp.* (40.00 %), *C. papaya* (36.00 %), and *Xanthosoma sagittifolium* (36.00 %). In general, *Ipomoea batatas* (4.00 %), *Musa. paradisiaca* (4.00 %) *Amaranthus hybridus* (4.00 %) and *Desplastsia* sp (4.00 %) had the least occurrence in home gardens, appearing in only home garden surveyed.

Seasonal availability: Defined in terms of season's i.e. rainy, or dry season and availability throughout the year (both rainy and dry season).

Availability of Crops

Community A: Most (48.57%) of the crops were available throughout the year, wet season 34.28% and dry season 17.14%.

Community B: Most of the species found were available during the rainy season 1.42%. All year round 33.33% and dry season 24.24%.

Home garden size, position and structure

Community A: On average, home garden size ranged between (5 -10) x (3- 8) m. Most of the time (68%), home gardens were located in the back of the house. *Musa paradisiaca* contributed in close spacing (<60 cm) because natural growth from sucker always supplemented the population of the species which resulted into high density. The ground layer was composed .of herbaceous species *Amaranthus hybridus*, while the middle layer was made up of *Xanthosoma sagittifolium, V. amygdalina, Zea mays* and *Manihot esculenta.* Finally, the upper profile/stratum of the home garden was dominated by tall trees like *C. papaya, M. paradisiaca, Cocos nucifera* and *Elaeis guineensis.*

Community B: In terms of average size home gardens varied between 4 x 5, and 4 x 6m. Majorly, the trend was for home gardens to be located behind the house, recording 56% of the home gardens at the back of houses. *Musa paradisiaca* contributed in close spacing as a result of natural growth from suckers, giving rise, to a high density. *Ocimum itissiumum, Telfairia occidentals Solatium nigrum Xanthosoma sagittifolium* and *Piper guineensis* make up the ground layer of home gardens while the middle layer was made up *Theobroma cacao, Psidium guajava, Musa radisiacal* and *Musa sapientum.* The upper layer was composed of abundant tree species, which includes *Cocos nucifera, Carica papaya, Elaies guineensis,* and *Chrysophyllum albidum.*

A total of 42 crop plant species distributed in 29 angiospermic families were recorded from both communities. Rutaceae had the highest representative. They vary in growth habit with 20 (47.62 %) trees, 20 (47.62 %) herbs and 2 (4.76 %) shrubby life forms. Uses are multipurpose majorly food. Uses for medicinal and environmental services (shade) were also recorded. Life cycle is either perennial or annual for all the crops inventoried in both communities (Table 1).

Table 1: Species composition, habit, life cycle and uses of crop plants in home gardens from the two communities

S/No	Common name	Scientific name	Family	C1*: frequency	C2*: frequency	Growth habit	Life cycle	Uses
1.	African pear	*Dacryodes edulis* (G. Don) H.J. Lam	Burseraceae	2	19	Tree	P	Food, shade
2.	Avocado pear	*Persea Americana* Mill.	Lauraceae	1	5	Tree	P	Food, shade
3.	Banana	*Musa sapientum* Linn.	Musaceae	6	6	Herb	A	Food
4.	Beans	*Vigna unguiculata* (Linn.) Walp.	Fabaceae	2	-	Herb	A	Food
5.	Bitter leaf	*Vernonia amygdalina* Del.	Asteraceae	13	4	Tree	P	Food, medicine
6.	Bush okro	*Desplastsia subericarpa* Bocq.	Tiliaceae	-	1	Tree	P	Food
7.	Bush mango	*Irvingia gabonensis* (Aubry-Lecomte ex O'Rorke) Baill.	Irvingiaceae	-	4	Tree	P	Food, shade
8.	Cashew	*Anacardium occidentale* L.	Anacardiaceae	-	5	Tree	P	Food, shade, medicine
9.	Cassava	*Manihot esculenta* Crantz	Euphorbiaceae	11	-	Shrub	A	Food
10.	Cherry	*Chrysophyllum albidum*	Sapotaceae	-	5	Tree	P	Food, shade
11.	Cocoa	*Theobroma cacao* L.	Sterculiaceae	1	2	Tree	P	Food, shade
12.	Coconut	*Cocos nucifera* L.	Arecaceae	2	5	Tree	P	Food

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13.	Cocoyam	*Xanthosoma sagittifolium* (L.) Schott	Araceae	8	9	Herb	A	Food
14.	Ewedu	*Corchorus olitorius* L.	Tiliaceae	2	-	Herb	A	Food, medicine
15.	Garden egg	*Solanum nigrum* L.	Solanaceae	7	6	Herb	P	Food, medicine
16.	Ginger	*Zingiber officinale* Rosc.	Zingiberaceae	3	2	Herb	P	Food
17.	Grape	*Citrus paradise* Macfad.	Rutaceae	1	1	Tree	P	Food, medicine
18.	Green leaf vegetable	*Amaranthus hybridus* L.	Amaranthaceae	9	1	Herb	A	Food, shade
19.	Guava	*Psidium guajava L.*	Myrtaceae	1	2	Tree	P	Food
20.	Kola	*Cola nitida* (Vent.) Schott & Endl.	Sterculiaceae	1	4	Tree	P	Food, shade
21.	Lady's mantle	*Alchemilla vulgaris* L.	Rosaceae	2	-	Shrub	P	Food, shade
22.	Lemon grass	*Cymbopogon citrates* (DC.) Stapf.	Poaceae	4	-	Herb	P	Food, medicine
23.	Lime	*Citrus aurantifolia* (Christm.) Swingle	Rutaceae	-	2	Tree	P	Food, medicine
24.	Maize	*Zea mays* L.	Poaceae	11	-	Herb	A	Food
25.	Mango	*Mangifera indica* L.	Anacardiaceae	5	7	Tree	P	Food
26.	Melon	*Citrullus lanatus* (Thunb.) Mansf.	Cucurbitaceae	4	-	Herb	A	Food
27.	Oil palm	*Elaeis guineensis* Jacq.	Arecaceae	6	11	Tree	P	Food, shade, medicine
28.	Okro	*Abelmoschus esculentus* (L.) Moench.	Malvaceae	10	6	Herb	A	Food, shade

29.	Orange	*Citrus sinensis* (Linn.) Osbeck	Rutaceae	6	10	Tree	P	Food
30.	Pawpaw	*Carica papaya* L.	Caricaceae	10	9	Tree	P	Food, shade
31.	Pepper	*Piper guineense* Schum. & Thonn.	Piperaceae	5	4	Herb	P	Food, shade, medicine
32.	Pepper fruit	*Dennettia tripetala* Bak. F.	Annonaceae	-	2	Tree	P	Food
33.	Pineapple	*Ananas comosus* (L.) Merrill	Bromeliaceae	10	2	Herb	P	Food, shade
34.	Plantain	*Musa paradisiacal* L.	Musaceae	25	2	Herb	A	Food
35.	Potato	*Ipomoea batatas* L. Lam.	Convolvulaceae	3	1	Herb	A	Food
36.	Fluted pumpkin	*Telfairia occidentalis* Hook. F.	Cucurbitaceae	9	6	Herbaceous	P	Food
37.	Scent leaf	*Ocimum gratissimum* L.	Lamiaceae	10	7	Herb	P	Food, medicine
38.	Sour sop	*Annona muricata* L.	Annonaceae	-	4	Tree	P	Food, shade
39.	Sugar cane	*Sacchurum officinarum* L.	Poaceae	5	-	Herb	P	Food
40.	Tangerine	*Citrus reticulate* Blanco	Rutaceae	1	3	Tree	P	Food, shade
41.	Tomato	*Lycopersicon esculentum* Mill.	Solanaceae	1	-	Herb	A	Food
42.	Yam	*Dioscorea* L. spp	Dioscoreaceae	12	10	Herb	A	food

C1 = Community A, C2 = Community B, P = Perennial, A = Annual
Note: Crop plants are listed in alphabetical orders of common/English name.

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DISCUSSION

Home gardens have been studied in the two communities within the same ecological zone but characteristically vary in human resources and nature of the gardens.

The home gardens assessed in both communities were small (14 - 11sq m) mainly due to the size of land available to the owners of the gardens. Different ranges of size have been reported by Fernandes *et al.* (1986) as 0.2 – 1.2 ha, Brierley (1985) as 0.42 – 0.80 ha, Sanyal (1985) as 0.02 – 0.32 ha, Dania-Ogbe *et al*. (1992) as 0.01 – 0.63 ha. The range reported in this study fell within the reported ranges. The relative small size in this study could be as a result of many factors including land use system and available labour. According to Khoshbakht *et al.* (2006), the relative small size of garden are due to labour, number of hours that could be spent by the gardeners in the maintenance of the garden and availability of land. The finding of Khoshbakht *et al.,* (2006) gives credence to the smallness of gardens in both communities. In Iyanomo community, size of these gardens are fixed and relatively not large with gardeners harnessing the resources for subsistence. Irrespective of size, the gardens hold higher species diversity than Ogbekpen community due to the presence of educated elite. In Ogbekpen, home garden is most often complemented by distant farms. Thus, these gardens serve to provide gardeners with crops that are required often and in emergencies. In the view of Aworinde *et al.* (2009) the physical appearance of home garden is species composition dependent. Similar trend was also observed in the present study.

Coupled with the size, age of garden and status gardeners (occupational distribution) and the stratification of gardens and culture are significant in this study. The differences in age of home gardens in the two communities are related to the length of time the residents have lived in the premises. Community A an institutional residential quarters for civil servants while in community B, farmers or landlords or in family property. As such in Community B, more than 60 % had been cultivated for 15 years and above while in Community A, only 4 % had been planted the same length of time. More than half (52 %) of the gardens in Iyanomo had been planted for not more than 3 years. Although Osawaru (1995), and Dania-Ogbe *et al.* (1992), reported that age of home garden occupation of home gardener and ethnicity/culture of home gardener affected diversity. Several other factors have been reported to affect crop diversity including income, religious beliefs and taste (Kehlenbeck and Maass, 2004). This is clearly shown in the study from the high diversity of crop plants inventoried (Table 1). The likely attribute to the relative high diversity in the communities could be traced to culture majorly heterogeneous ethnicity (Figure 3) and other factors like beliefs and religion.

A total of 42 species were recorded from the two communities of studied. Results are in agreement with the findings of Agnitori *et al.,* (2004), which suggest that home gardens are living gene banks where variety of germplasm, in the form of indigenous varieties, landraces and rare species thrive side by side and has been preserved for some time. Most of the crops inventoried were similar to those recorded for home gardens in tropical regions. Crop diversity in tropical forest home gardens could be very high. Sahoo (2009), recorded 231 species, Sanyal (1985) 98 species, Brierley

(1985) 108 species, Dania-Ogbe *et al.* (1992) 111 species. Species diversity is a functional characteristics of home garden (Brierley, 1985). The study of Aworinde *et al.* (2013), suggest that plant domestication represents a major achievement in the study of indigenous cultivation, food production, local medicinal knowledge and varied use of vegetal species. Consequently, the diversity here recorded is relatively high and points to home garden as a source of plant domestication.

In Community A, there was a fair distribution of crop species found in the various crop categories. This could be seen to be due to the high dependence of the garden owners on the home garden to supplement their food production. Cassava had a high occurrence in home gardens in community A one as a result of it being a major staple food. In Community B, most of the species recorded were fruit producing species. In the study carried out by Gebauer (2005), most of the species recorded were fruit species and this could be traced to the occupation of the inhabitants as farmers. Thus, most of the other crops are cultivated in their various distant farms. Most of crops were perennial, with pear occurring most frequently in community B as a result of it being complementary crop to maize. Maize is one of the staple foods cultivated in Community B and it is mainly eaten with African pear either boiled or roasted. There is similarity in food eaten by people in the two communities shown by the close range of relative occurrence of crops like scent leaf, pumpkin, cocoyam, plantain, banana, mango, garden egg, ginger, yam and pawpaw. This could be due to proximity, the similarity in diet of both communities as a result of cultural similarity of the different ethnic groups. This is plausible since the geographical distribution of these ethnic groups to the Midwestern part of Nigeria.

Most of the crops had multiple uses. Home gardens are important sources of food, fooder, shade provision, fuel, medicines, spices and income (Koshbakht *et al.,* 2006). Perennial crops occurred more frequently in both communities. This could be attributed to the underlying reason for the establishment of home gardens which is to supplement the family food supply (Ghosh *et al.,* 2008). Since these crops have the ability to produce food for longer periods, thereby removing the stress of planting and replanting of crops. The low occurrence of crops like kola, cocoa, and tangerine could be as a result of their being non-staple food. However, crops like the green vegetables and bush okra occur in low frequency in home gardens in community B. This may be because they are cultivated in large quantities on their farms. Most of the crop species in community A were available all year round which reflects the function of the home gardens as providing food supplement (Sahoo, 2009). However, in community B most (42.42%) of the crops were seasonal available during the rainy season.

Home gardens in both communities as reported had a similar structure 3 multi-storey, which could be linked to similarity in crop composition. However, home gardens in community B had a denser upper layer because of its higher composition of tree species, making it look like that of a surrounding rainforest. Albuquerque *et al.* (2005) also observe the similarity between home gardens and the surrounding vegetation. The reason for the position of home gardens was found to be largely due to availability of space. In both communities most of the gardens were found at the back

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of the house. This is similar to the findings of Aworinde *et al.* (2009), Eichemberg *et al.* (2009) and Albuquerque *et al.* (2005). The building pattern in the communities leaves more space at the back of the house than in front. This provides privacy and protection for the crops at the back. Some of the trees species were planted to act as wind breakers and provide shade. Home garden types according to Sanyal (1985) are usually categorized as trees-vegetable and vegetable, based on the proportion of trees and vegetable compositions. The fruit and nut trees and vegetable proportion are important in the consideration of types of home garden. From Figures 4a and b, the proportion of vegetable to fruit and nut trees are 1:3 in community A and 1:6 in community B. Based on this, two types of home gardens are reported in this report, the tree-vegetable home gardens in community B and vegetable home garden in community A. this gives credence to Sanyal (1985), Snelder (1987) and Osawaru and Dania-Ogbe (2012) that in areas where fragmentation of land is common as in RRIN with enlightened individuals, vegetable garden predominate. Conversely, where less fragmentation of land and less enlightened individuals are predominant, associated garden will most likely be tree-vegetable. Here garden play more environmental services and conservation of biodiversity.

The number of fruit and vegetable species demonstrates the nutritional importance home gardens. These species are sources of minerals and vitamins (Mensah *et al.,* 2008; Onibon *et al.,* 2007). Plantain occurred in most home gardens visited. Plantain contains mineral nutrients which are important for healthy living and also has high market value. Bitter leaf, pumpkin, green vegetables, and scent leaf were found in home gardens in both communities and are used for preparing soups and vegetable stew delicacies consumed with starchy staples. Pineapple, orange, avocado pear, African pear, mango, sour sop and pawpaw were the main fruit crops. They serve as sources of vitamin and fatty acids (Odebumi and Dosomu, 2007; Nnamani *et al.,* 2009).

Vegetables are an important component of species in home gardens of both communities. They may be aromatic, bitter or tasteless (Edema, 1987). They are important sources of protective foods which are highly beneficial the maintenance of good health and prevention of diseases (Sheele *et al.,* 2004; Nnamani *et al.,* 2007). The nutrient content of different vegetables varies considerably and they are not major sources of carbohydrates compared to starchy foods which form bulk of the diet in the two communities, but contain vitamins, essential amino acids, as well as minerals and antioxidants (Fasuyi, 2006). Vegetables are the cheapest and most available sources of important proteins, vitamins, minerals and essential amino acids. The potassium content of leafy vegetables is good in the control of diuretic and hypertensive complications, because it lowers arterial blood pressure (George, 2003). Ascorbic acid is an important antioxidant which helps to protect the body against cancer and other degenerative diseases such as arthritis. Leaves with high protein are recommended for patients suffering protein deficiency diseases. The major mineral component of vegetables includes calcium, a major factor sustaining strong bones. It also plays a major role in muscle contraction, relaxation and blood clotting, potassium and magnesium are known to decrease blood pressure. Patients with soft bone problems

are usually placed on high calcium and potassium vegetable meals. Vegetables contain iron needed in haemoglobin formation (Latindo-Data, 1990) and hence needed for treatment of anaemic convalescence. Various minerals contained in vegetables also act as co-enzymes in certain biochemical reactions. Because of their high fiber content, vegetables help clean the digestive tract, by removing potential carcinogens from the body and prevent the absorption of excess cholesterol.

Fruits have been part of human diet and food supplement over the years. They are considered as healthy food supplements because they contain high amounts of water, carbohydrates, proteins, vitamins, minerals and organic compounds which are required in small amounts, to make the body function properly. Besides their dietary importance, they are also useful as nutrient supplements and recommended internationally as superior to processed foods. According to Agnihotri *et al.* (2004) the study of home garden could be used as a tool to develop methodologies for the application of traditional knowledge in the conservation and management of biodiversity as well as for community development.

In conclusion, home gardens are diverse in composition and vary in food categories. The major function is to supplement food supply for the family. Home gardens within the same locality may hold almost similar crop diversity. The study suggest that the diversity in home gardens may not to be affected by the proximity to natural rainforest or managed systems rather by the subsistence food need of the household. In it, a range of crops vegetables and fruits are in cultivation, which serves as food supplements with the potential to improve the health status of users. Also some species found in home gardens have medicinal uses. This traditional system of agriculture requires recognition and support in order to be better positioned to contribute to food security and conservation strategies. They should be encouraged at all levels, since they are multipurpose and provide important nutritional and health benefits. Crops in the garden are available for most part of the year, or all year round.

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