International Journal of Applied Research and Technology
Publication details, including instructions for authors and subscription information:
http://www.esxpublishers.com

Assessment of yam biodiversity at community level in Anambra State of Nigeria, West Africa

C. F. Uwasomba, O. N. Eke-Okoro, A. Udealor and J. E.G. Ikeorgu

National Root Crops Research Institute, Umudike

Available online: May 12, 2012

To cite this article:

C. F. Uwasomba, O. N. Eke-Okoro, A. Udealor, and J. E.G. Ikeorgu (2012). Assessment of yam biodiversity at community level in Anambra State of Nigeria, West Africa. *International Journal of Applied Research and Technology*. 1(1): 112 – 118.

International Journal of Applied Research and Technology
Vol. 1, No. 1, May 2012. 112 – 118.

Esxon Publishers

Assessment of yam biodiversity at community level in Anambra State of Nigeria, West Africa

C. F. Uwasomba, O. N. Eke-Okoro, A. Udealor and J. E.G. Ikeorgu

National Root Crops Research Institute, Umudike

(Received: 5 February 2012 / Accepted: 20 March 2012 / Published: 12 May 2012)

Abstract

Yams (*Dioscorea sp*., family *Dioscoreacea*) which are annual or perennial tuber-bearing and climbing plants are an important tuber crop in Anambra State of Nigeria. It is the only crop that is celebrated amongst the people. Over 600 species exit but only few are cultivated as food for man's use. The yam belt stretches from the humid rainforest in the South to the Northern Guinea Savannah. About 85% of a yam tuber is edible, comprising of 15-23% starch, 1-2.5% protein, 0.05- 0.2% fat and so forth. Diverse species exit in the different communities as a result of farmers preferences. This very important food crop is faced with serious problems of loss of biodiversity and land degradation. Earlier survey carried out for collection and conservation of the diversities of this crop could not be sustained in the gene bank as a good number of them have gone on extinction. This necessitated the need for collaborative efforts by Global Crop Diversity Trust (GCDT) and National Root Crops Research Institute (NRCRI), Umudike to embark on a survey to collect all the landraces in the yam belt of Nigeria in which Anambra State falls, with the aim of identifying those that are extinct from the farming systems of the studied areas. Questionnaire with open-ended questions was used to gather information from the farmers. Information on farmer's varietal, agronomic, culinary, socio-cultural and economic characteristics was discussed. Farmers in the studied areas reported that a total of five yam accessions have gone on extinction.

Keywords: yam, biodiversity, farmers, Anambra State, landraces loss

Corresponding author;
E-mail: uwasombachukwudi@yahoo.com
Tel.: +234-8060004565
Maiden Edition

Introduction

Yam is a tuber crop that forms major staple food for millions of people all over the over. Tuber crops are those crops with special anatomy in which the underground terminal end of the vine got swollen to store food. Of the 600 or so species of Dioscorea recognized worldwide, only 12 are grown for food in various tropical and subtropical parts of the world (IITA 2009). A few species are grown on a small-scale for extraction of the pharmaceutical compounds dioscorin and diosgenin use in making steroids. The tubers have organoleptic qualities that can make them the preferred carbohydrate staple and can contribute up to 350 dietary calories per person each day (Asiedu et al.2001). According to the World Health Organization, growing yams is helpful in the maintenance of public health (Arata, 1977).

Yams are produced in over 5 million hectares in 47 countries in tropical and subtropical regions of the world. More than 95% of the world's 47 million metric tonnes of yam produced annually comes from Sub Saharan Africa with Nigeria as the leading world producer (FAO, 2005 and IITA 2009). According to FAO (2009), Nigeria's yam production was 34 million metric tonnes in 2005, this increased by 8% in 2006 to 36.7 million metric tonnes. The yam belts of West Africa include Nigeria, Togo, Ghana, Cote d'ivore and Benin. In Nigeria, the yam belt stretches from the humid rainforest in the South to the Northern Guinea Savannah and is grown both in upland and low land ecologies as either sole or intercrop. About 85% of a yam tuber is edible. This part is composed of 65-75% water, 15-23% starch, 1-2.5% protein, 0.5- 1.5% fibre, 0.7- 2.0% ash and 0.05- 0.2% fat (Janssens, 2001).

The collection of all the varieties of yam grown in Anambra State with the aim of saving the endangered accessions becomes a major task since pest, diseases, poor agronomic practices and bad weather condition (climatic change) will lead to extinction or genetic erosion of some varieties. Yam is consumed by 60 million people daily in Africa, therefore, to protect an incredibly wide variety of yam allows us to feel more reassured that the unique diversity of yam will be safely secured and available to future generations. It is against the backdrop that United Nations Foundation and Bill and Melinda Gates Foundation supported the global initiative to preserve yam biodiversity with the aim that three thousand (3,000) new yam samples will be collected. The yam project is part of a bigger effort involving major crop species which the Global Crop Diversity Trust (GCDT) is assisting to preserve yam biodiversity in Anambra State of Nigeria.

Man rely total on the potential resources of planet's biodiversity for food, medicine, energy, industrial materials and other vital services such as renewal of the earth's atmosphere, absorbing pollutants and maintaining of soil fertility (okojie, 1997). Loss of biodiversity and land degradation has been perceived as serious problems by many communities. Some of the human activities that have accelerated soil degradation and erosion ranged from wrong crop practices, road construction without adequate drainages, bad channeling of run offs, indiscriminate destruction of vegetative cover, use of poorly located foot paths to streams, farms, schools, over-grazing, quarrying, mining operations and trampling by livestock (Adeleye, 1998).

All the potentially very important varieties of yam only exist in the field and there is a risk that they might disappear or be destroyed as a result of disaster, this has geared yam farmers and scientist to initiate projects to preserve yam biodiversity. Okoli (1978) carried out a survey of edible yam (*Dioscorea sp*) in major yam growing parts of the Nigeria. Emphasis was on collection, characterization and classification of germplasm of these collected yams at NRCRI, Umudike.

Evidence of renewed global backing for yam as a source of revenue and food security has come in the form of EU support since early 2010 with programmes managed by IITA, Ibadan, Nigeria in collaboration with 13 other research institutes from 6 countries; Benin, Cameroun, Cote d'Ivoire, Ghana, Nigeria and Togo. It seeks to offer a sub-regional research response to the challenges facing producers (SPORE, 2011).

The objectives of the study were to:

i). Carry out an inventory of the cultivated varieties in the different yam production zones and asses their distribution and extent.

ii). Determine the rates of landraces loss and its variation across villages.

Iii). Understand the reasons that underlie the landraces loss and its variation across diversity.

iv). Identify and prioritize the farmer's variety preference across the zones and

v). Document the cultivated varieties for the construction of national yam database.

Methodology

Anambra State is one of the major yam producing areas in Nigeria. The state is situated between longitude $6^{0}36^{1}$ E and $7^{0}21^{1}$ E and latitude $5^{0}38^{1}$ N and $6^{0}47^{1}$ N. it is located in humid, tropical rainforest zone. Its neighbouring states are Abia, Delta, Imo and Kogi. The state covers an area of 4416 square kilometers. It has semi-tropical rainforest vegetation, a humid climate with a temperature of about 87^{0}F and an annual rainfall of between 152cm – 203cm. Anambra state is agricultural endowed and has two main seasons; the rainy and dry seasons. The farmers mainly practice rain fed farming though there are a lot of potentials for irrigated farming. The farming population of the state is very enterprising and constitutes about 70% of the populace. They practice mixed farming and mixed cropping (Nkematu et al. 2006).

The state is situated on a rolling flatland on the Eastern plains of the River Niger with a population of 4,177,828 (Female: 2,059,844 and Male: 2,117,984) and has natural gas, bauxite, ceramics, iron, stones and kaolin as mineral deposits (National Population Commission, 2006).

A survey was carried out in Anambra State agricultural zones for assessment of yam diversity at community level. The survey covered three major yam producing communities randomly selected from Anambra State agricultural zones namely; Nteje, Nkwelle Ezunanka and Igbariam communities. These three communities served as gathering venues.

These communities were selected because of their high degree in yam diversity. Questionnaire with open-ended questions were used to gather information from the farmers to enable farmers expressed themselves in their own words at a common venue. Data collection was based on the collective responses from male and female farmers.

Data collected include farmer's varietal, agronomic, culinary, socio-cultural and economic characteristics of the yams, the four square analysis (relative frequency of the household cultivating the variety) and assess the varieties with the farmers, since they know the situation of all the varieties within their locality. The four square analysis is divided into four quadrants (Kamara *et al*., 1996)

Result and discussion

Nteje, Nkwelle Ezunanka and Igbariam communities are one of the major yam growing areas of Anambra State. The ages of the farmers in the surveyed areas ranged from 23- 80years and have farming experience between 10-60years (Table 1). Sixty-five farmers participated in the interaction and total of 28 accessions of yam were collected which were differentiated into twenty-three white yam (*D. rotundata*), two yellow yam (*D. cayenensis*) and three water yam (*D. alata*) and they all have maturity of between six to eight months.

Farmers across the surveyed areas reported that Obiaturugo, Unegbe, Adaka and Ekpe can be milked in September and finally harvested in December/January while the other yam species are harvested once across the surveyed areas. Planting time determines yield, these ones that are milked are planted from the first week of March to April while other could be planted up to May. All the yams in the surveyed areas required staking.

A total of five accessions of yam were reported to have gone on extinction across the surveyed ares. Awudu, Ayobe and Ji-oku were reported by Igbariam farmers while Awolo/Awudu and Ayobe were also reported by Nteje and Nkwelle Ezunanka respectively.

Most of the farmers use traditional yam barn to store the tubers as long as they are not injured during harvest while some farmers store their tubers in the soil for some time on the farm as they have high underground storage ability. Yam beetles, Scale insects, Mealybug and nematode are reported as major pest of yam by farmers across the surveyed areas.

Farmers across the surveyed areas reported that Ekpe and Adaka are used for new yam festivals, marriages, thanksgiving etc. while Abana mme were eaten by diabetic patients. Farmers from Igbariam also reported that Abana mme were used for sacrifices, while Abii was used in the treatment of malaria and wounds.

Most of the farmers use traditional yam barn to store the tubers as long as they are not injured during harvest while some farmers store their tubers in the soil for some time on the farm as they have high underground storage ability. Yam beetles, Scale insects, Mealybug and nematode are reported as major pest of yam by farmers across the surveyed areas.

Farmers across the surveyed areas reported that Ekpe and Adaka are used for new yam festivals, marriages, thanksgiving etc. while Abana mme were eaten by diabetic patients. Farmers from Igbariam also reported that Abana mme were used for sacrifices, while Abii was used in the treatment of malaria and wounds.

Among all the varieties, Obiaturugo, Adaka and Ekpe are the best in terms of taste and pound ability. There were a little variations across the areas surveyed as Abana mme, Abii and Abana are reported not good for pounding by farmers from Igbariam, Nkwelle-Ezunanka and Nteje, respectively (Table 2).

Four square analysis

This takes into consideration the relative frequency of the household cultivating the variety. From the surveyed area, Obiaturugo, Ekpe and Unegbe were cultivated across these areas by many households in a large area (Table 3). There was variation in the frequency of cultivation in other varieties across the surveyed area.

Conclusion

Yam is widely cultivated in Anambra State. Yam varieties listed in quadrant 4 are almost endangered and effort should be made for their conservation to avoid diversity losses through genetic erosion. Government should focus their attention to conserve yam diversity to enhance food security by empowering the Institute with the national mandate on root and tuber crops research in Nigeria (NRCRI, Umudike) in this direction. Farmers should be empowered to increase productivity and profitability so as to attract the youth into the venture. Farmers also needs financial assistance, agro-chemicals and other inputs to reduce the cost of production as this will boost yam production and encourage more people to cultivate yam to enhance food security.

Acknowledgements

My immense gratitude goes to Global Crop Diversity Trust (GCDT) and National Root Crops Research Institute (NRCRI), Umudike for making available the resources needed for the accomplishment of this study. I also wish to acknowledge my wife, Mrs. Uzoamaka Chukwudi Uwasomba for typing this work.

References

Arata, A. A. **1977**. Comments on the World Health Organization programme on the environmental effects of vector control operations. Mededelingen van de Faculteit Landbouwwetenschappen Rijksuniversiteit Gent. 42:883–887.

Asiedu, R., Mignouna H., Odu B., Hughes J.d'A. **2001**. Yam breeding. Plant Virology in Sub-Saharan Africa (PVSSA) Conference in 2001, International Institute of Tropical Agriculture (IITA), Nigeria, p. 466–475.

FAO. **2005.** Food and Agricultural Organization Statistics. FAO, Rome, Italy. http://www.fao/stat.org.

FAO. **2009**. FAOSTAT. Statistics Division of the Food and Agricultural Organization Statistics. http://www.faostat.fao.org

IITA. **2009**. http://www.iita.org/cms/details/researchsummary.aspxarticle=2688zoneid=63

Janssens, M. **2001**. Root and Tuber Crops. In: R. H. Raemaekers. Crop Production in Tropical Africa: 165 – 275.

Kamara A., Defoer T and De Groove H. **1996**. Selected of new varieties through participatory research, the case of corn in South Mali. Tropicutura. 14(3): 100-105.

National Population Commission. **2006.** www.population.gov.ng/index.php

Nkematu J.A., Obinabo C.N and Uzoka I. G. **2006**. Anambra State Agricultural Development Programme Extension Services Report. In the Proceedings of the 21st Annual Zonal Research Extension Farmer Input Linkages System (REFILS) Workshop, South East Agro-Ecological Zone held on 21st – 25th November at Yenegoa, Bayelsa State, Nigeria. pp 161- 173

Okojie J. A. **1997**. Tropical Deforestation: A threat to life on earth. Keynote address, world environmental Day Celebration NCF, Lagos. In: Towards Common Ground. Gender and National Resources management in Africa. pp 27-47.

Okoli Obinani. O. **1976**. Characterization of edible yams (*Dioscorea spp.*) and classification of germplasm of yam at National Root Crops Research Institute (NRCRI), Umudike, Umuahia, Nigeria. Un-published.

SPORE. **2011**. A bimonthly Magazine for Agriculture and Rural Development in ACP Countries. http://spore.cta.int. June-July, 153:7.

Table 1. Shows the farmer's characteristics, varieties cultivated and maturity periods of accessions in the surveyed areas

Community	**Age (range)**	**No. of farmers present**	**Years of farming experience (range)**	**No of Accessions**	**Local Name**	***Species***	**Maturity Period (Months)**
Nteje	38-80	24	10-60	8	Ekpe	*D. rotundata*	6-8
					Adaka	*D. rotundata*	"
					Abii	"	"
					Obiaturugo	"	"
					Awolo/Awudu (Extinct)	"	"
					Unegbe	"	"
					Abana	*D. cayenensis*	"
					Agbogho-cha	*D. rotundata*	"
Igbariam	25-78	21	10-60	12	Adaka (Ji-aja)	*D. rotundata*	6-8
					Ekpe	*D. rotundata*	"
					Abii (Abika)	"	"
					Obiaturugo	"	"
					Unegbe	"	"
					Agbogho-ocha	*D. rotundata*	"
					Abana ogbanankata	*D. alata*	"
					Abana mmee	*D. alata*	"
					Nwaopoko (Abubu ocha)	*D. rotundata*	"
					Awudu (Extinct)	*D. rotundata*	"
					Ayobe (Extinct)	*D. rotundata*	"
					Ji-oku (Extinct)	*D. rotundata*	"
Nkwelle Ezunanka	23-60	20	10-35	8	Unegbe	*D. rotundata*	6-8
					Obiaturugo	"	"
					Abana	*D. alata*	"
					Ukom	*D. rotundata*	"
					Abii	"	"
					Adaka	"	"
					Ekpe	*D. rotundata*	"
					Ayobe (Extinct)	*D. rotundata*	"
Total				**28**			

Source: Field survey data, 2011

Table 2. Agronomic and Culinary characteristics of each yam

S/N	**Name of Accession**	**Agronomic characteristics**	**Culinary characteristics**
1.	Ekpe	Requires staking, Good vine length, high yielding and has potentials for double harvest	Good taste and very soft when boiled. Best in pounded yam
2.	Adaka	Requires staking, good vine length, high yielding and has potentials for double harvest	Good taste and very soft when boiled. Best in pounded yam
3.	Abii	Requires staking, good vine length and high yielding	Tasty and very soft when boiled. Not in pounded yam
4.	Obiaturugo	Requires staking, good vine length, high yielding and has potentials for double harvest	Good taste and very soft when boiled. Best in pounded yam
5.	Unegbe	Requires staking, good vine length, high yielding and has potentials for double harvest	Good taste and very soft when boiled. Good in pounded yam
6.	Abana	Requires staking, good vine length and high yielding	Tasty and soft when boiled. Not good in pounded yam
7.	Agboho-ocha	Requires staking, vine is white and high yielding	Tasty and soft when boiled. Not good in pounded yam
8.	Abana Okwanankata	Requires staking, good vine length and high yielding	Tasty and very soft when boiled. Good in pounded yam
9.	Abana mme	Requires staking, good vine length and high yielding	Tasty and soft when boiled. Not good in pounded yam
10/	Nwaopoko	Requires staking, Good vine length, high yielding and has potentials for double harvest	Good taste and very soft when boiled. Best in pounded yam
11.	Ukom	Requires staking, good vine length, bulky tubers and high yielding	Good taste and very soft when boiled. Good in pounded yam

Source: Field survey data, 2011

Table-3 Result of the four square analysis

Communities	**Many household, Large area (++)**	**Many household, Small Area (+-)**	**Few household, Large area (-+)**	**Few household, Small area (--)**
Nteje	Ekpe Adaka Obiaturugo Unegbe Abana	Agbogho-cha	Abii	
Igbariam	Ekpe Obiaturugo Unegbe Agbogho-ocha Nwaopoko (Abubu ocha) Abana ogbanankata	Abii	Adaka	Abana mmee
Nkwelle Ezunanka	Obiaturugo Unegbe Ekpe Adaka			Abii, Ukom Abana

Source: Field survey data, 2011