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STUDIES ON IDENTIFICATION OF YAM (*DIOSCOREA* SPP) FOOD FORMS AND FACTORS THAT DETERMINE CHOICE CRITERIA FOR CONSUMPTION IN NIGERIA.

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ABSTRACT

Food yam; a traditional crop of great importance in the yam belt of West Africa responsible for 96% of the global annual output of the crop (33 million metric tonnes) for which Nigeria alone accounts for 25.2 million metric tonnes; (over 76% of this) is consumed in many forms all the year round in the Country. A comprehensive national-wide survey was carried out in Nigeria in 1999 and early 2000 to identify the various food forms prepared from yam and the criteria for choice of yams and consumption, under the INCO-Yam project sponsored by the European Union in the Sub-region of West Africa. Thirteen food forms of yam are prepared and consumed in the Country. Five major criteria for choice of yam food-forms which vary with the prepared dishes are; taste, aroma, digestibility, colour and consistency (texture). The criteria for choice of fresh yam tubers by housewives and consumers include; appearance of tubers, shape, ability to store well, quality of dish it can be prepared into size of tuber and area of production.

Keywords: Yam, Food forms, Consumers choice criteria

INTRODUCTION

Yam (*Dioscorea* spp) is not only a preferred high energy food but a reverenced king crop tied up with the Socio-cultural life of the people in the yam belt of West Africa especially Nigeria, the world's largest producer (25.2 million metric tonnes) and consumer of the crop. Even at that rate the supply is yet to meet the local demand all the year round. Every year in eastern Nigeria and Delta areas of the River Niger the first harvest and consumption of yam in the year Usually August/September is celebrated as the "new year festival". (Orkwor 1998, Coursey 1967,Coursey and Booth 1972, Coursey and Coursey 1971).

Despite the importance of this crop as a food security crop believed to provide more than 60 million people with over 200 dietary calories each day (Quin and Okoli, 1998) yam has not received the desired research support for its genetic development.

INCO-Yam project sponsored by the European Union under the INCO-DC (International Co-operation with developing countries) is the first regional project on yam (1998-2003) that has addressed the issues on post harvest technology, consumption processing preservation and marketing of both fresh tubers and dried yam chips.

One of the three broad objectives of this project carried out in Nigeria (NRCRI) was to identify nationally yam food forms and study factors that determine consumption, criteria for choice of food forms and yam tubers by house wives and consumers.

MATERIALS AND METHODS

The studies were carried out using comprehensively structured questionnaires administered to respondents. In the first quarter of 1999 collaborators (surveyors) were identified.

Sample selection: Housewives were targeted as respondents since women generally prepare food in the family. A total of 300 housewives were selected from 40 urban towns in eight states in the major yam production and consumption ecologies using Agricultural Development Project staff, non-governmental organisations, Institutions and Women in Agriculture (WIA) (Table 1). From the last National population census held in Nigeria the areas selected have a population of about 2 million people.

Three main quantitative surveys were carried out in three phases; July 1999, October 1999 and February/March 2000. The spread was to cover periods of scarcity in July when old yam tubers (previous years' harvest) are phasing out and new yams are coming into the market. The second phase was done in October when more new yams have come into the market and old ones completely exhausted. The third survey in February covered the period just after major harvesting in December January. This is the period when a lot of yams are available in the market at affordable prices to the consumers. At Each phase 10 surveyors (trained) covered the States, two per state. The questionnaires were administered directly to the respondents in their homes, or at their convenience in the open through the help of guides who spoke the local languages and are well known to the respondents. The same respondent was used in the 3 surveys.

At the end of the three visits a total of 900 questionnaires were completed, coded and analysed using SAS programme. Weighted index was also computed for comparing averages and percentages of consumption, frequencies and criteria for choice.

Table 1: INCO-DC Yam Project Nigeria States Sample Size and Urban Centres Surveyed for Yam Consumption

Abuja 35	Anambra 40	Benue 50	Delta 30	Ebonyi 35	Enugu 35	Ondo/Ekiti 30	Nassarawa 45 Total 300
FCT Abuja Municipal	Achalla	Gboko	Agbor	Abaka-	Enugu liki	Edo Ekiti	Agharagu
Gwagwa--lada	Awka	Katsina-ala	Asaba	Afikpo	Eham-ufu	Akure	Akwanga
Nyanya	Ogbaru	Makurdi	Igbodo	Akaeze	Nsukka	Ikere-Ekiti	Kadarko
Bwari	Onitsha	Okum	Ogwa--shi	Ezaa	Opanda	Ondo	Keffi
Suleja/ Dikko	**Odaekpe**	**Zaki-Biam**	**Umunede**	**Izii**	**Ukpabi Nimbo**	**Owo**	**Lafia**

RESULTS AND DISCUSSION

Respondents: Detailed analysis showed that the respondents came from 35 ethnic groups with Ibos dominating followed by TIVs, Yorubas, Hausas and others. The respondents belong to 27 professions ranging from traders to Civil Servants, teachers, fulltime farmers and housewives.

Most of the family size of surveyed homes lies between five and ten with an average of 7 for whom food is prepared for on daily basis with the exception of Delta and Nassarawa where sizes were abnormally high due to extended family systems.

Food Forms: Thirteen food forms of yam were identified; Pounded yam (fufu), Amala, Boiled yam, porridge , Fried yam (slice), roasted yam, yam + beans (mixture) Yam + rice + stew, Asondu (dried cooked yam chips in Benue) Ekpa (dried pounded yam in Ondo/Ekiti) ojojo in Ondo Yam balls and yam achicha (of *D. dumetoru* in Abakaliki). More food forms from yam are prepared and consumed than any other food crop in Nigeria. It is therefore not surprising that almost all the 25.2 million metric tonnes produced annually in Nigeria are consumed internally with little or no exportation of the food crop. (Orkwor *et al* 2003). This high demand by the ever increasing population in Nigeria is an incentive for increased production of the crop to satisfy internal demand and to go into export to countries in the sub region and overseas targeting African indigens in diaspora.

Choice Criteria

The identified criteria for choice of yams by housewives (respondents) are grouped into

two: Choice criteria for fresh yam tubers and choice criteria for food forms (dishes).

Choice For Yam Tubers.

These include appearance of tubers (tuber shape), ability of the cultivar to store well, quality of the dish the yam can be prepared into (genotipic); size of the tuber and region of production (Table 2 and 3). Results of the three surveys show that quality of the dish the yam can be prepared into, rated highest followed by appearance, ability to store well and size of the tuber. The least rated is the region of production. Some ethnic groups however were found to attach importance to region of production and take pride where the yams come from in such famous yam zones like Abakliki or Zak where tubers from these areas are simply referred to as Abakaliki or Zaki-Ibam respectively or Ogoja as the case may be. Not all cultivars can be prepared as fufu (pounded yam) or Amala. The house wives pick their choice based on indigenous knowledge of the qualities, of yam cultivars they use for various yam food forms. Various yam cultivars are best suited for various dishes that yam could be prepared into. Therefore the quality of yam dishes start with the choice of cultivars (tubers) for purchase by housewives/Consumers in the market. Most of the characteristics for choice criteria for yam tubers and dishes are embedded in the genotipic characters of the cultivars involved. The knowledge of this fact in marketing will guide traders in the choice of materials (cultivars) in relation to particular markets with respect to the predominant food forms preferred by consumers in those areas.

Table 2: Choice criteria for fresh yam tubers by housewives in Nigeria 1999-2000

	July 1999		October 1999		February 1999		Total of the 3	
	N	%	N	%	N	%	N	%
Sample Size	300	100	300	100	300	100	900	100
No answer	1	0.33	0	-	0	-	0	-
Appearance of tubers	256	85.62	227	75.67	259	86.33	742	82.44
Ability to be stored	193	64.55	210	70.00	199	66.33	602	66.89
Quality of the dish	232	77.59	268	89.33	258	86.00	758	84.22
Size of the tuber	116	38.80	119	39.67	111	37.00	346	38.44
Region of prod.	42	14.05	34	11.33	34	11.33	110	12.22
Total	839	280.60	858	286.00	861	287.00		

Table 3: Weighted index of choice criteria for fresh yam tubers by house wives in Nigeria, 1999-2000.

	July 1999	October 1999	February 2000	Total of the 3 visits
Sample Size	300	300	300	900
No answer	1	0	0	1
Appearance of Tuber	60.09	57.22	60.78	59.30
Ability to be stored	49.50	51.89	50.00	50.41
Quality of the dish	57.41	62.44	61.11	60.26
Size of the tuber	40.36	42.78	42.33	41.80
Region of prod.	11.71	9.56	9.56	10.26

Choice For Prepared Food Forms Of Yam

The following were identified as the food quality criteria for prepared food forms of yam. These are taste, aroma, digestibility, colour, consistency hours after preparation or cooking (Table 3 and Figure 1). These criteria and rating however vary with the food form prepared (Fig 1). For food forms that are swallowed without chewing like pounded yam and amala texture becomes a highly rated

criterion. The various components for measuring these criteria for food forms of yam are shown in Table 4. For the food forms that are chewed (boiled yam, porridge, fried yam, roasted yam, yam achicha etc). such criteria as taste, texture (friability) and aroma become very important, (Fig 1). In all the food forms of yam digestibility is rated very high. No one likes repletion, flatulence constipation and or very soft stool after taking a meal of yam

Two Popular Food Forms of Yam Fufu: Pounded Yam and Amala.

Pounded Yam: Pounded yam (fufu) appears to be the most popular and cherished food form of yam not only in Nigeria but the yam belt of West

Africa (Orkwor 1998). For pounded yam specifically, the following were found to be very important to consumers; poundability,

Table 4:Special Description of the Choice Criteria for Main Yam Food Forms in Nig 1999-2000.

Taste	Digestibility	Aroma	Colour	Consistence/Texture
Sweet	repletion	Highly aromatic	very white	friable
Blank	avoid constipation	Low flavoured	cream	elastic
Acid	avoid flatulence		light brown	tender
Sour	avoid soft stools		black	smooth
Bitter				rubbery
				Crumbly
				Watery

drawing or holding ability (texture), white colour or cream, spotless appearance and retention of the holding capacity long after preparation. While the TIV tribe in Benue and Nassarawa like their pounded yam to be hard, Ondo and Ekiti axis in South Western Nigeria up to the Republic of Benin prefer it soft and drawing (like the Francophones in West Africa), the Ibos and others in South Eastern Nigeria prefer pounded yam midway; not too hard and not too soft.

Amala: Amala is a reconstituted paste made from yam flour in hot water steered into fufu and is consumed with a matching soup ranging from Kokorus leaves, (Ewedu) Okro, or Ogbono or Egusi depending on the consumer preferences. Meat and or fish are used for making the soup depending on the class of the Consumers. Although amala is as old as yam itself in South-Western Nigeria and the adjoining parts of Benin and Togo it is just beginning to appear in the menu of non Yorubas in the urban towns in eastern and northern States of the country. Several yam cultivars especially Kokoros have been identified to have very good qualities for chip, flour and Amala preparation. Colour has been an important characteristic in choice of amala. While the actual indigens of South Western Nigeria; the Yorubas do not mind their amala appearing black or dark brown, other amala eaters in urban towns in the north, east and middle belt of Nigeria would prefer amala to be light brown in colour. Major consumers of amala claim that it is not only traditional nutritive and medicinal but cheaper to procure and easier to prepare than pounded

Global index for consumption of all main yam food forms in Nigeria show that July is the lowest consumption period. This rises with time up to October when the prices come down and with a slow increase up to February the next season and comes down to another June/July (Fig. 2). Frequency and rate of consumption of yam food forms in Nigeria by

States show that in descending order Benue tops highest followed by Delta, Abuja Anambra, Ondo/Ekiti, Nassarawa, Ebonyi and Enugu State (Table 5).

On the whole, the most consumed food form of yam in all the surveyed States is boiled yam followed by pounded yam and porridge. In a previous study (Orkwor 1997) the most consumed food form of yam in Southwestern Nigeria is Amala.

Menu Time: In Urban towns in Nigeria the following food forms; fried yam, roasted yam, boiled yam, yam akara, yam achicha and porridge are consumed as breakfast generally while other elaborate preparations like pounded yam, Amala, yam + beans, yam + rice or yam and vegetables are served as lunch or dinner. (Fig 3).

SUMMARY

This work was carried out under the INCO-Yam (International Co-operation with developing Countries) regional project sponsored by the European Union under DG XII. No. ERBICI8-CT98-302.

In this project we identified 13 food forms of yam and frequency of their consumption in Nigeria. We also identified over 300 cultivars of food yam grown in Nigeria. These cultivars have also been identified with the best food forms of yam they can be used for preparations in various time comprehensive studies on food value, consumption frequency attributes of food yam are carried out on regional level in Nigeria, Benin and Coted'Ivoire. This underscores the importance of yam and demand all the year round which on policy level will support increased production for internal, regional and International market supplies. With the various consumption rates and frequencies in consumption identified yam salers will be best informed on where and when to move their commodities both within the country and in the sub-region when we begin to export food yams, to Europe and America for Africans in diaspora.

Table 5: Consumption Rates for all the main yam food forms in Nigeria

	July 1999	October 1999	February 2000	Total of 3 visits
	ICg	ICg	ICg	ICg
ALL STATES	7.8	12.81	13.03	11.21
EBONYI	3.98	12.85	13.28	10
BENUE	8.78	16.22	16.01	13.34
NASARAWA	7.62	11.11	11.68	10.14
ANAMBRA	6.71	13.34	13.34	11.13
ENUGU	6.36	10.87	10.91	9.38
ABUJA	9.97	11.9	11.9	11.26
DELTA	10.85	14.7	14.26	13.27
ONDO/EKITI	8.45	12.02	11.97	10.81

Source: The indices were calculated using the formula

INDEX = (number of meals consumed 6-7 times/week*6.5)+(number of meals consumed 4-5 times (number of consumed 2-3 times/week*2.5)+number of meals consumed 11 (number of meals consumed less th time/week*0.1)

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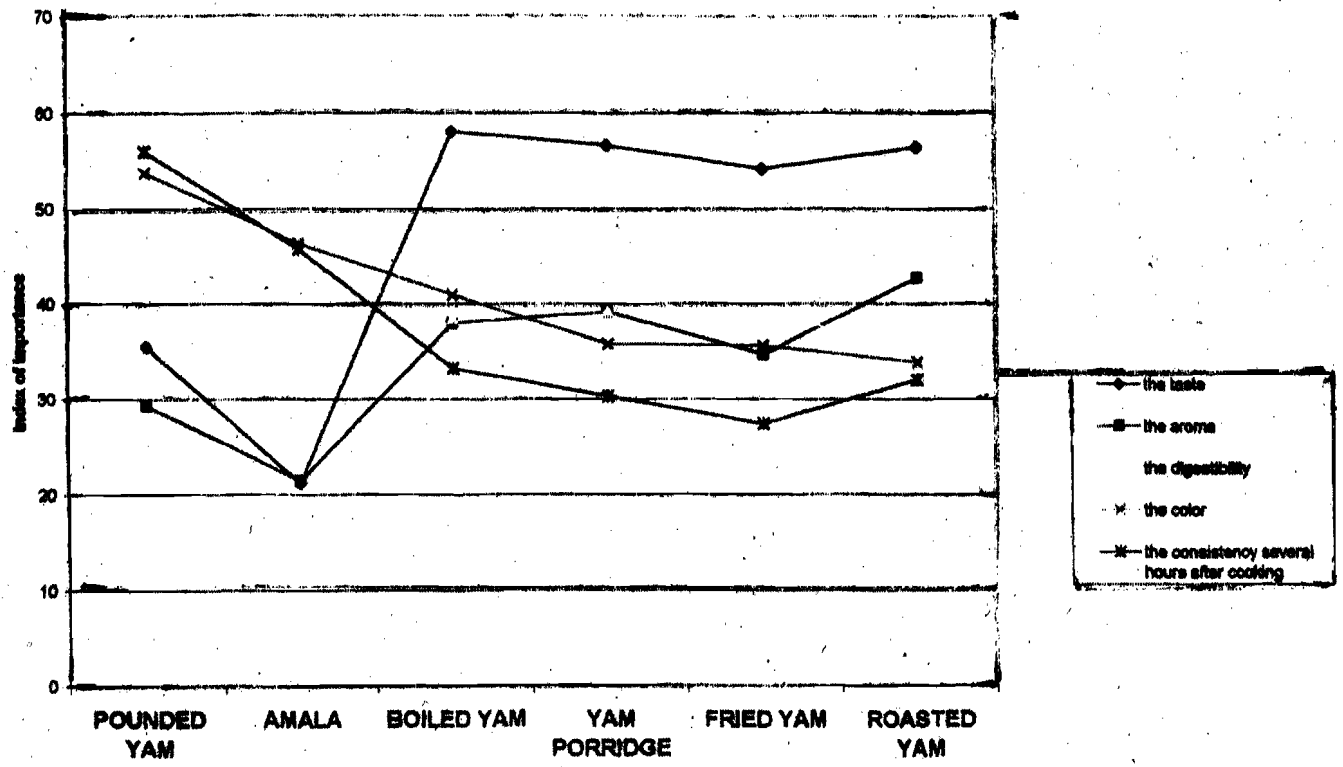
IMPORTANCE OF QUALITY CRITERIA FOR THE MAIN YAM FOODFORMS IN NIGERIA

II=((%"very important"*2)+%"secondary important)/3



GLOBAL INDEX OF CONSUMPTION FOR ALL THE MAIN YAM FOODFORMS

INDEX += (number of meals consumed 6-7 times/week * 6,5)+(number of meals consumed 4-5 times/week * 4,5)+
(number of meals consumed 2-3 times /week * 2,5) + (number of meals consumed 1time/week * 1)+
(number of meals consumed less than 1 time/week * 0,1)

The average has been calculated for each period of the survey

	july1999 ICg	october 1999 ICg	february 2000 ICg	total of 3 visits ICg
ALL STATES	7.8	12.81	13.03	[redacted]
EBONYI	3.98	12.85	13.28	
BENUE	8.78	15.22	16.01	
NASAWARA	7.62	11.11	11.68	
ANAMBRA	6.71	13.34	13.34	
ENUGU	6.36	10.87	10.91	
ABUJA	9.97	11.9	11.9	
DELTA	10.85	14.7	14.25	
ONDO/EKITI	8.45	12.02	11.97	

Fig. 2 GLOBAL INDEX OF CONSUMPTION FOR ALL THE MAIN YAM FOODFORMS IN NIGERIA

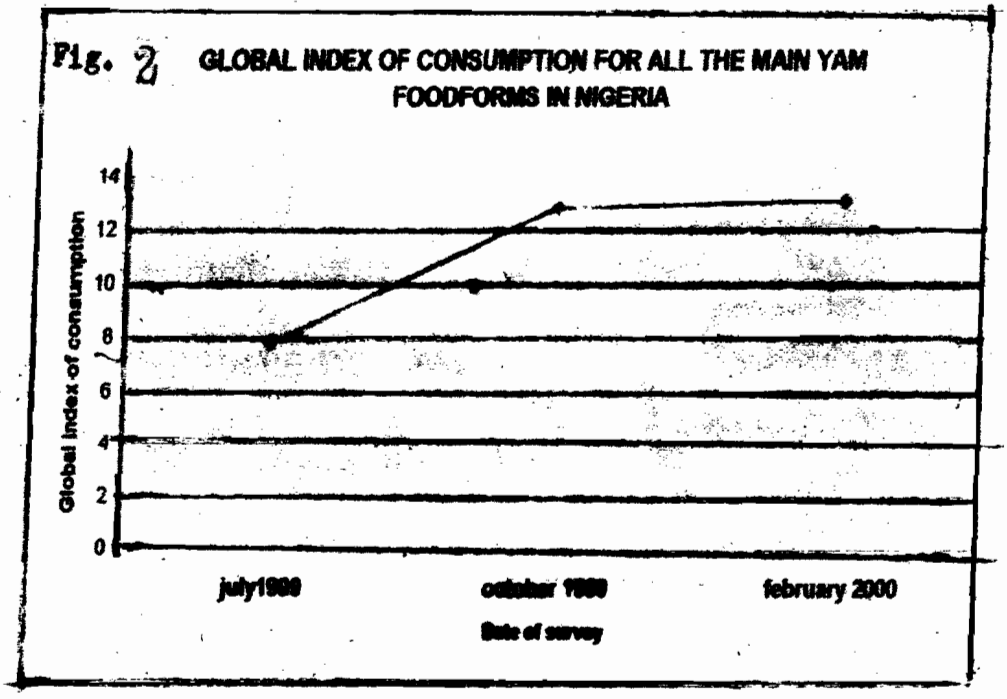


Fig 3 : MEAL PERIODS OF CONSUMPTION OF VARIOUS YAM FOODFORMS IN NIGERIA