

ISSN : 1812-5379 (Print)
ISSN : 1812-5417 (Online)
<http://ansijournals.com/ja>

JOURNAL OF AGRONOMY



ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Assessment of Production, Processing, Marketing and Utilisation of Okra in Egbedore Local Government Area of Osun State, Nigeria

¹A.J. Farinde, ²O.K. Owolarafe and ¹O.I. Ogungbemi

¹Department of Agricultural Extension and Rural Sociology, Obafemi Awolowo University, Ile-Ife, Nigeria

²Department of Agricultural Engineering, Obafemi Awolowo University, Ile-Ife, Nigeria

Abstract: Investigation was conducted into the production, processing, marketing and utilization of okra in Egbedore Local Government of Osun state, Nigeria. Data was collected through the use of well-structured questionnaire and field observations from 100 okra farmers using simple random sampling technique. The data collected was analyzed using descriptive and inferential statistics. The results show that the mean age of the respondents was 57.56 years with a standard deviation of 9.28 years. All the respondents are males and married. Women do not own personal okra farms but they do work with their husband on the family farms and mostly involved independently at the processing, preservation and marketing levels more than at the production level. About 49.0% of the respondents did not have any formal education while 51.0% were literates who have access to intermediate farm technology. The mean years of okra production experience is 16.91 years and the mean okra farm size is 3.64 acres with standard deviation of 2.58 acres. All the respondents practiced mixed cropping where other crops such as yam, banana, pineapples, cassava and others were planted with okra. Land preparation for okra production includes land clearing, ploughing, harrowing and heaping or ridging. About 80.0% of the okra farmers used cutlass and hoe regularly, which might have been responsible for okra production at subsistence or small-scale level. Only 20.0% of the okra farmers employed use of tractor. Majority of the farmers hired labour to supplement family labour. The mean persons day of family labour was 6.03 and that of hired labour was 1.25 persons day. Processing and preservation are carried out using traditional techniques of slicing, sun drying and grinding (using mortar and pestle). Sliced and dried okra are stored in gourd, basket and clay-pots. Fresh okra are put in basket lined with leave for maximum of three days during which it is marketed on retail and wholesale basis. Okra is consumed fresh and dried mostly to make draw soup by 81.0% of the respondents. Positive and significant relationships existed between socioeconomic characteristics of respondents investigated and total yield of okra produced. The r-value for variable related to land preparation and operation are low, between $r = 0.234$ and $r = 0.470$. The r-value of variables related to farm size and output (yield) are very high between $r = 0.550$ and $r = 0.922$, which spelt out a situation tending towards a perfect relationship. There is also sharp difference in the r-value of farm size for okra (0.922) and farm size for other crops (0.550). It therefore means that okra yield depends on the size of the farm.

Key words: Assessment, production, processing, marketing, utilization, okra

INTRODUCTION

Okra (*Abelmoschus esculentus* [L.] Moench) is an annual crop belonging to the family Malvaceae. It is an important vegetable especially in West Africa, India, Brazil and the United States (Kemble *et al.*, 1995; ECHO, 2003; Alimi, 2004). *Abelmoschus* has several cultivated species of economic importance, two of which was identified as *Abelmoschus esculentus* and *Abelmoschus caillei* (Siemonsma, 1982). Young fruit harvested before differentiation of fibres and full seed development, are consumed either alone or in salad after

cooking in salty water, are added to stews and in the preparation of certain African sauces. In Nigeria, okra is usually boiled in water resulting in slimy soups and sauces, which are relished. The fruits also serve as soup thickeners (Schippers, 2000). The leaves buds and flowers are also edible. Okra seed could be dried. The dried seed is a nutritious material that can be used to prepare vegetable curds, or roasted and ground to be used as coffee additive or substitute. Okra leaves are considered good cattle feed, but this is seldom compatible with the primary use of the plant for human consumption. Okra mucilage is suitable for medicinal and industrial

applications. It has medically found application as a plasma replacement or blood volume expander. Industrially, okra mucilage is usually used to glaze certain papers and also useful in confectionery among other uses (Markose and Peter, 1990). For a year round of consumption of okra, the fruits are sliced and sun dried or frozen (Alimi, 2004). In Nigeria okra is grown basically in all states of the federation both as rain fed and irrigated crops because of the highlighted values.

Sanders (1995) gave detail agronomic requirements for okra production as well-drained sandy loams with high organic matter free of soil borne disease pests (nematodes, Southern stem blight and wilts). Alimi (2004) in his study of use of cultural practices, economic impact of insecticide use and awareness and practices of insecticide safety precaution on okra production, found that cropping pattern and use of insecticides have significant effects on yield of okra. Etaferahu *et al.* (1996) investigated production practices and sample cost to produce furrow irrigated okra in Coachella Valley Riverside County in California. The main focus of all these studies was to increase the yield of okra for more income to the producers.

In Nigeria, there are two distinct seasons for okra production, the peak and the lean seasons. During the lean (dry) season, okra fruit are produced in low quantities, scarce and expensive to get. In the peak (rainy) season, it is produced in large quantities much more than what the local populace can consume. The study of profitability of vegetable farming under rainy and dry season production in Southwestern Nigeria by Bamire and Oke (2003) found that yield was higher during the rainy season, while higher total revenue was obtained under dry-season conditions. Irrigation and marketing facilities were then suggested as panacea. Alimi (2005) in his study of economics of monocropping okra under tropical conditions during the rainy and dry seasons found that the highest ranked constraints to okra production were low output prices and high perishability in the rainy season and moisture stress and scarcity of cultivable farmland in the dry season. Based on these findings it was suggested that to fully exploit their land in the rainy season, okra producers should have access to effective okra storage and preservation facilities to balance lower prices. Cheap and effective irrigation technologies are needed for dry season okra producers. Proper processing, preservation, marketing and utilisation of okra is necessary to arrest the wastage being experienced during the peak season. Such efforts should involve the development of appropriate technologies for processing and preserving okra to produce products of high market value. The concern of this study therefore was to assess

the production, processing, preservation/storage, marketing and utilization of okra in Osun State, Nigeria. Knowledge of the present level of production, processing, preservation and marketing practices would form basis for appropriate and adequate technological development that would prevent post harvest losses; sustain increase production, increased income and improved standard of living for the okra producers, processors and marketers. To attain this major objective, the following specific objectives were set for the study:

- To investigate the socioeconomic characteristics of the okra farmers in the study area
- To study the production, processing, preservation/storage, marketing and utilization practices of okra and
- To determine the yield of okra under the existing farmer situation

It was however hypothesized that there is no significant relationship(s) between the okra production (yield) and socioeconomic characteristics of okra farmers. This is to ascertain whether any of the socioeconomic characteristics was associated with the level of okra production in the study area.

MATERIALS AND METHODS

The study was carried out in Egbedore Local Government Area of Osun State, Nigeria. Nigeria is one of the Anglophone (English speaking) countries in West Africa of sub-Saharan Africa. Nigeria lies between longitudes 3° and 15° east of Greenwich and between latitude 4° north of the equator. Also Osun State is situated in the Western part of Nigeria and lies on latitude 8° 10' to the North and longitude 6° 5' to the South. Then it is marked by longitude 4° to the west and longitude 5° 4' to the east. Osun State has tropical humid climate. The mean annual temperature for Osun State varies between 21.1 and 31.1°C. Annual rainfall is within the range of 1,000 mm in the derived savannah agro-ecology to 1,200 mm in the rainforest belt (OSSADEP, 1997). Egbedore Local Government is located around the Northwestern part of Osun State. It is found in the transition zone of the derived savannah zone. The predominant occupation here is farming. Major crops grown are maize, cowpea, yams and cash crops like cocoa and oil palm. Some of these farmers plant okra as mixed crop at subsistence level with these crops. The study area was chosen because the farmers here plant okra on a large scale and it is believed this will make a fairly true representation of the study area.

The target population for this study is okra farmers. The respondents are 100 in number and are chosen from the population of the okra farmer through random sampling techniques. Data collected includes background information of the respondents, level of okra production, methods of production, processing and utilisation. Data was collected through the use of well-structured questionnaire and field observations between August and December 2004. The data collected was analyzed using descriptive statistics like mean, standard deviation and frequency distribution. Also correlation and Chi-square analyses were used to test the hypotheses.

RESULTS AND DISCUSSION

Demographic characteristics of the respondents: With regards to the age distribution of the respondents, 4.0% of the respondents were between the ages of 30 and 39 years, 11% were between 40 and 49 years, 40.0% were between 50 and 59 years, 38.0% were between 60 and 70 years and 7.0% were above 70 years. The mean age of the respondents was 57.56 years, with a standard deviation of 9.28 years. This result indicates that the larger percentage of the respondents were above 70 years. Most of the young able-bodied men and women had migrated to the urban centers in search of better life and the older generation is now left on the farm. The implication of this is that the future of agricultural production in the study area is uncertain and okra production may become a thing of the past.

All the respondents were males and were all married. Most women do not own their own farms, but they work with their husbands on the family farms. Women also participate in okra farming but they do so at the processing, preservation and marketing levels more than at the production level. About 49.0% of the respondents did not have any formal education, 45.0% attended primary school, while only 6.0% had secondary school education. Most of the educated farmers did not farm on full-time basis and they had better access to improved technology. This result showed very high level of illiteracy in the study area.

Table 1 shows the distribution of years of okra production. It could be observed that 45.0% of the respondents had been in the practice of okra production for not more than 10 years, 24.0% of them had grown okra between 11 and 20 years, 19.0% had grown okra between 21 and 30 years, while 12.0% of the respondents had grown okra between 31 and 40 years. The mean years of okra production experience was 16.91 years with a standard deviation of 10.38 years. This result shows that okra production is an age long profession of the people in the study area.

Table 1: Distribution of the respondents according to okra production experience

Years of experience	Frequency	(%)	Cumulative (%)
1-10	45	45.0	45.0
11-20	24	24.0	69.0
21-30	19	19.0	88.0
31-40	12	12.0	100.0
Total	100	100.0	

Table 2: Distribution of the respondents according to farm size and multiplicity of plots

Farm size (acres)	Frequency	(%)	Cumulative (%)
1-5	83	83.0	83.0
6-10	16	16.0	99.0
11-15	1	1.0	100.0
Total	100	100.0	
Multiple plots			
Yes	76	76.0	76.0
No	24	24.0	100.0
Total	100	100.0	

Table 3: Distribution of the respondents according to labour supplied for okra production

Labour supplied (persons days)	Frequency	(%)	Cumulative (%)
Family labour			
01-5	6	6.0	6.0
6-10	35	35.0	41.0
>10	58	58.0	99.0
Total	100	100.0	
Hired labour			
0	65	65.0	65.0
1-5	30	30.0	95.0
6-10	5	5.0	100.0
Total	100	100.0	

About 83.0% of the farmers had less than 5 acres, 16.0% had between 5 and 10 acres and only 1% had more than 10 acres (Table 2). Seventy-six percent of the respondents had only one plot on which they intercropped with other crops, while 24.0% of the farmers had more than one plots and these were farmers who grew cash crops and some perennial food crops such as banana, pineapples etc.

The mean farm size cultivated by the respondents was 3.64 acres with a standard deviation of 2.58 acres. Food crops were largely cultivated unlike cash crops. Most of the farmers are either subsistent or small scaled in their production level.

Production of okra: Land tillage is the preparation of land before planting is done. Land preparation for okra includes land clearing, ploughing, harrowing and heaping or ridging. The farmers use different type of tillage implements depending on their ability. The data collected indicates that all the farmers use cutlass and hoe regularly, while 12.0% of them used tractor along side the crude implements. This high percentage of the use of crude implements is one of the main reasons for okra production at a subsistent level or small-scale level. Some of the farmers hired labour to till the ground, but majority

used family labour. The total amount of labour supplied for the production of okra among the respondents was measured in person's days. A person's day is the amount of work that an individual can do in a day. The total amount of labour consists of labour contributed by family and hired labour.

Table 3 shows that 35.0% of the respondents hired additional labour while the remaining 65.0% did not. Six percent of the respondents had no contribution to labour by the family members, 35.0% had between 1 and 5 person's day, 58.0% had between 6 and 10 person's days and 1.0% had more than 10 person's days. For hired labour, 30.0% of the respondents had between 1 and 5 person's days; while the remaining 5.0% had between 6 and 10 person's days. The mean persons day of family labour was 6.03 with a standard deviation of 2.65 persons day while that of hired labour was 1.25 persons day with a standard deviation of 2.14 person's days.

Extension and credit facilities were not enjoyed during the production of okra for the last season. Agricultural extension services had not reached majority of the farmers in the study area. Only 10.0% of the respondents claimed that extension officers got to their village but they did not get any advisory services from them. The implication of this is that, production of okra will always remain stagnant and will not be improved, since improved methods and practices taught by extension will not get to the farmers in the study area. The farmers will not have access to improved technologies involved in production, processing and preservation of okra and this may cause them to continue production at small-scale level.

Table 4 shows that 3.0% of the farmers planted okra on 0.5 acres of land, 89.0% planted on farm land ranging between 1 and 4 acres of land, while 8.0% planted on land between 5 and 8 acres. The mean planted area for okra production is 2.45 acres with a standard deviation of 1.33 acres. Majority of these farmers planted okra on a small scale destined by land tenure system and probably due to the problem of unavailability of storage, processing and preservation facilities.

Concerning the maintenance of the planted crop, none of the respondents uses fertilizer for okra production. This is due to the cultural belief that fertilizer reduces the quality of the okra fruit by making it black and prevents it from drawing when cooked. However, the farmers claimed they used fertilizer for other crops. Pesticide was used to kill the insects, which destroy the floral buds of okra. Some of these insects include the cricket, *Brachytrupes membranaceus*, the bollworm, *Earias biplaga* and the beetle, *Anomala denuda*. The common pesticide used by the farmers was Gammalin 20 (called tari by the respondents). Table 5 shows that 66.0% of the respondents did not use pesticides, 15.0% used between 0.10 and 0.30 L of Gammalin 20, 15.0% used between 0.31

Table 4: Distribution of the respondents according to farm size

Farm size (acres)	Frequency	(%)	Cummulative (%)
<1	3	3.0	3.0
1-4	89	89.0	92.0
1-5	8	8.0	100.0
Total		100.0	100.0

Table 5: Distribution of the respondents according to amount and cost of pesticides used

Amount (L)	Cost (₦)	Frequency	(%)	Cummulative (%)
0	0	66	66.0	66.0
0.1-0.3	33.33-1000	13	13.0	79.0
0.31-0.60	1033.33-2000	15	15.0	94.0
0.61-0.90	2033.33-3000	6	6.0	100.0
Total		100	100.0	

Table 6: Distribution of the respondents according to crops intercropped with okra

Crops	Frequency	(%)	Cummulative (%)
Maize	6	6.0	6.0
Yam	6	6.0	12.0
Cassava	3	3.0	15.0
Pepper	1	1.0	16.0
Cassava and maize	51	51.0	67.0
Yam and maize	16	16.0	83.0
Yam and pepper	4	4.0	87.0
Cassava and pepper	7	7.0	94.0
Cassava and pineapples	2	2.0	96.0
Cassava and beans	2	2.0	98.0
Yam and beans	1	1.0	99.0
Beans and maize	1	1.0	100.0
Total	100	100.0	

Source: Field survey, 2003

Table 7: Distribution of the respondents according to type of okra grown

Type of okra	Frequency	(%)	Cumulative (%)
Yaya and Kudikan	79	79.0	79.0
Iroko, Yaya and Kudikan	11	11.0	90.0
Agric	10	10.0	100.0
Total	100	100.0	

Table 8: Distribution of the respondents according to quantity of okra produced in the growing seasons

Quantity of okra produced (baskets)	Frequency	(%)	Cummulative (%)
1-20	34	34.0	34.0
21-40	43	43.0	77.0
41-60	20	20.0	97.0
61-80	2	2.0	99.0
>80	1	1.0	100.0
Total	100	100.0	

Table 9: Distribution of the respondents according to amount of money made from okra production in the last growing season

Amount (₦)	Frequency	(%)	Cummulative (%)
1-5000	16	16.0	16.0
5001-10000	43	43.0	59.0
10001-15000	49	49.0	86.0
15001-20000	8	8.0	94.0
20001-25000	4	4.0	98.0
>25000	2	2.0	100.0
Total	100	100.0	

and 0.60 L, while 6.0% used between 0.61 and 0.9 litres. The mean quantity of Gammalin 20 used was 0.153 litres with a standard deviation of 0.82 L. The mean cost of purchasing pesticide was ₦525.00 with a standard deviation of ₦826.87. A litre of pesticide costs ₦33.33,

therefore 66.0% of the respondents did not spend any money on pesticide, 13.0% spent between ₦1 and ₦1000, 15.0% spent between ₦1001 and ₦2000, while 6.0% spent between ₦2001 and ₦3000 on pesticides.

All the respondents practiced mixed cropping i.e., planting of more than one crop on a piece of land. Okra was intercropped with other crops like yam, cassava, beans, maize, pineapples and so on Table 6 shows the types of crops planted with okra. Six percent planted only maize or yam, 3.0 % planted only cassava with okra, while 1.0% planted with only pepper. Fifty-one percent planted okra with both cassava and maize, 16.0% planted okra with both yam and maize, 17.0% intercropped okra with pepper, yam, cassava, pineapples and beans in different mixtures

Three types of local okra were produced in the study area. Improved okra called Agric was also produced. The local okra produced include: Yaya or Kogboye planted during the dry season. This has long slender fruits and it has higher productivity than the other two types. The second type is called Kudikan or Ila-ojo and it is planted during the raining season. It has short thick fruits and it does not fruit for a long time. The third type is called Ila-Iroko. The plant grows very tall and it could reach a height of 2.0 m sometimes. It has thick and long fruits which most of the respondents claimed as unpalatable. The improved variety is not common and it has shorter length of maturity. Table 7 shows that 10.0% of the respondents planted the improved variety of okra, 79.0% planted Yaya and Kudikan, while only 11.0% planted Iroko, Yaya and Kudikan.

Table 8 shows that 34.0% of the respondents produced between 1 and 20 baskets of okra in the last growing season, 43.0% produced between 21 and 40 baskets, 20.0% produced between 41 and 60 baskets, 2.0% produced between 60 and 80, while only 1.0% produced above 80 baskets of okra. The mean quantity of okra produced was 30.45 baskets with a standard deviation of 17.64 baskets. This result is an indication of the small-scale level of production of okra in the study area.

Table 9 shows that 16.0% of the respondents made not more than ₦5000.00, 43.0% made between ₦5001.00 and ₦10,000.00, 29.0% made between ₦0,001.00 and ₦15,000.00, 8.0% made between ₦15,001.00 and ₦20,000, 4.0% made between ₦20,001.00 and ₦25,000 and 2.0% made above ₦25,000.00. The mean amount of money made from okra in the last growing season in the study area was 11, 617.50 .

Harvesting of okra: Frequency of harvest of okra was once in five days and the method used for harvest was manual method with the use of the hands. There were no facilities for mechanized method of harvesting in the study area. The farmers complained of blisters on their hands during harvest of okra. This leads to drudgery and

Table 10: Distribution of the respondents according to quantity of okra harvested per acre per day

Quantity of okra (baskets)	Frequency	(%)	Cummulative (%)
Local okra	42	42.0	42.0
1.0-1.5	30	30.0	72.0
1.6-2.0	9	9.0	81.0
2.1-2.5	10	10.0	91.0
>2.5			
Improved okra			
1.5-2.0	1	1.0	92.0
2.1-2.5	7	7.0	99.0
2.6-3.0	1	1.0	100.0
Total	100	100.0	

the farmers may lose interest in production in large quantities. This situation calls for design and production of appropriate technologies for harvesting of okra.

The mean quantity of local okra harvested per acre per day was 1.63 baskets with a standard deviation of 0.80 baskets. For improved okra, the mean quantity was 1.90 baskets with a standard deviation of 0.64 baskets. Table 10 shows that, for local okra, 42.0% of the respondents harvested between 1.0 and 1.5 baskets/acre/day, 30.0% harvested between 1.5 and 2.0 baskets/acre/day and 9.0% harvested between 2.1 and 2.5 baskets/acre/day. For improved okra, 1.0% produced less than 2.0 baskets/acre/day 7.0% harvested between 2.0 and 2.5 acre/day, while 1.0% harvested more than 2.5 baskets/acre/day.

Processing of okra: Manual and semi- modern processing methods were still being used for both fresh and dried okra. The tools used for these processing fresh okra were knife, grater and mortal and pestle/grinding stone, respectively. There were no facilities for mechanized processing. This also called for the design and production of intermediate technologies for processing okra. Table 11 shows that 37.0% of the respondents used only slicing method, 15.0% used slicing and grating, 7.0% used slicing and crushing and 41.0% used slicing, grating and crushing methods together.

Preservation of okra: Okra could be stored for future use. The problem of spoilage encountered during production could be overcome through proper preservation. Preservation is still done naturally in the study area. This is done by sun drying sliced okra for three days. There were no facilities for artificial drying. Dried okra were stored in baskets, clay pots and bags. The dried okra was ground and cooked when needed for consumption. Grinding was done manually, with the use of mortal and pestle or crushing stone in the study area. The mean quantity grounded by mortal and pestle per day was

Table 11: Distribution of the respondents according to methods of processing used

Processing methods	Frequency	(%)	Cumulative (%)
Slicing	37	37.0	37.0
Slicing and grating	15	15.0	52.0
Slicing and crushing	7	7.0	59.0
Slicing, crushing and grating	41	41.0	100.0
Total	100	100.0	

Table 12: Distribution of the respondents according to capacity of dried okra ground per day

Capacity (kg)	Frequency	(%)	Cumulative (%)
Mortal and pestle			
5-7	30	30.0	30.0
8-10	70	70.0	100.0
Total	100	100.0	
Crushing stone			
1-4	64	64.0	64.0
5-8	36	34.0	34.0
Total	100	100.0	

7.95 kg with a standard deviation of 1.66 kg, while the mean quantity grounded by crushing stone per day was 3.91 kg with a standard deviation of 1.24 kg.

Table 12 shows that 64.0% of the respondents could grind between 1 and 4 kg of dried okra on a crushing stone per day, while 36.0% could grind between 5 and 8 kg per day. Using mortal and pestle, 30.0% could grind between 5 and 7 kg per day, while 70.0% could grind between 8 and 10 kg per day. Fresh okra was stored by putting fresh okra fruits in baskets for not more than 1 week and re-heating preserved cooked okra.

Marketing of okra: Marketing includes selling, advertising and packaging (John, 1999). Production of okra, being a perishable crop, is affected by its marketing (Kemble *et al.*, 1995). Channels of marketing in the study area include farm, local market and town. Table 13 shows that 41.0% of the respondents sell their produce on the farm, 43.0% transport the produce to local markets, 10.0% sell in towns while 6.0% sell both on the farm and local market.

Small bowl (called congo) and baskets were used as measuring devices for sales of okra at retail and wholesales levels. Table 14 shows that only 1.0% of the respondents produced for consumption only, 6.0% produced for retail sales trade only, 84.0% produced for wholesales only, 4.0% produced for consumption and retails. Detailed analysis showed that okra is packaged for sales in paper, cellophanes and leaves. There were no facilities for mechanized packaging for either fresh or dried okra.

Utilization of okra: Okra is basically used as food in the study area. It is sliced, grated, or crushed to make soup. Farmers use both dried and fresh okra. Table 15 shows

Table 13: Distribution of the respondents according to marketing channels of okra

Marketing channels	Frequency	(%)	Cumulative (%)
Sales on farm	41	41.0	41.0
Transportation to local market	43	43.0	84.0
Sales in town	10	10.0	94.0
Sales on farm and local market	6	6.0	100.0
Total	100	100.0	

Table 14: Distribution of the respondents according to type of marketing

Marketing type	Frequency	(%)	Cumulative (%)
Consumption	1	1.0	1.0
Retail	6	6.0	7.0
Wholesales	84	84.0	91.0
Retail and consumption	1	1.0	92.0
Consumption and wholesale	4	4.0	96.0
Retail and wholesale	4	4.0	100.0
Total	100	100.0	

Table 15: Distribution of the respondents according to preferred taste, type of use and the most common type of use

	Preferred taste		Type of use		Most common	
	F	(%)	F	(%)	F	(%)
Fresh	62	62.0	15	15.0	15	15.0
Dried	37	37.0	4	4.0	2	2.0
Dried and fresh	1	1.0	81	81.0	83	83.0
Total	100	100.0	100	100.0	100	100.0

that 81.0% of the respondents used both fresh and dried okra, 4.0% used only dried okra, while 15.0% used only fresh okra. Sixty-two percent prefer the taste of fresh okra, 37.0% preferred the taste of dried okra and only 1.0% liked both. Two percent of the respondents claimed that dried okra was more common than fresh okra, 15.0% felt otherwise and 83.0% felt both were used at the same rate.

Test of hypothesis: Information on hypothesis testing is given in this section.

H_0 : There was no significant relationship between the socioeconomic/demographic characteristics of farmers and okra production.

Data in Table 16 shows positive and significant relationships between number of okra plots owned by farmers ($r = 0.267$), cost of labour to till the land ($r = 0.452$), number of family labour ($r = 0.234$), number of hired labour ($r = 0.444$), farm size for okra ($r = 0.922$), farm size for other crops ($r = 0.550$), farm size for local okra in dry and rainy season ($r = 0.789$), yield of local okra in dry season ($r = 0.842$), yield of improved in dry ($r = 0.815$) and okra production. However, the r-value for variable related to land preparation and operation are low, between $r = 0.234$ and $r = 0.470$. The r-value of variables related to farm size and output (yield) are very high between $r = 0.550$ and $r = 0.922$ which spelt out a situation tending towards a perfect relationship between these variables and okra

Table 16: Correlation analysis showing linear relationship between farmers personal and socio-economic characteristics and okra production

Characteristics of farmers	r	r ²	(%)
No of plots	0.267	0.0713	7.13
Cost of labour number of family labour	0.452	0.204	20.4
Number of family labour	0.234	0.0548	5.48
Cost of hired labour	0.470	0.221	22.1
Farm size of okra	0.444	0.197	19.7
Farm size of other crops	0.922	0.850	85.0
Farm size for local okra in dry and rainy season	0.550	0.302	30.2
Yield of local okra in dry season	0.789	0.623	62.3
Yield of improved in dry season	0.842	0.709	70.9
Yield of improved in dry season	0.815	0.664	66.4

Significant at $p \leq 0.05$, r = coefficient of correlation, r² = coefficient of determination

Table 17: Results of the Chi-square Analysis showing relationship between some personal characteristics of okra farmers and okra production

Variables	χ^2 calculated	df	χ^2 tabulated	C	Remark
Level of education	33.860	2	5.99	0.50	S
Marketing channels	81.52	3	7.81	0.67	S
Crops intercropped with okra	261.68	11	19.7	0.85	S
Frequency of harvest	67.24	1	3.84	0.63	S
Enjoyed taste	37.04	3	7.81	0.52	S
Type of processing for dry okra	36.00	1	3.84	0.51	S
Measures used for retail	327.06	5	11.1	0.88	S
Measures used for wholesale	60.84	1	3.84	0.62	S
Marketing used for retail	70.56	1	3.84	0.64	S

Significant, C = Contingency value, df = degree of freedom

production measured by the total yield of okra. There was also sharp difference in the r-value of farm size for okra (0.922) and other crops (0.550).

The magnitudes of contribution demonstrated by r²-value in percentages are equally high. Yield of okra ranges between 66.4 and 70.9%. Farm size for okra ranges between 62.3 and 85.0% while contributions of variables related to land preparation and uses were between 5.48 and 22.1%. The implication of these findings was that size of the farm determines mostly what was produced in terms of yield.

H₀₂: There was no significant relationship between some personal characteristics of okra farmers and okra production.

Data in Table 17 show that $\chi^2_{calculated}$ were greater than $\chi^2_{tabulated}$ at $p \leq 0.005$ with high values of contingency coefficient between 0.5 and 1.0. This $p \leq 0.05$, S means that there was a significant relationship between level of education, crops intercropped with okra, frequency of harvesting okra, types of processing methods, measures of retail and measures of wholesales operations and okra production.

The high contingency coefficient values between 0.5-1.0 for all the variables listed above show the magnitude of the relationship or association between the variables and okra production. It then mean that there were strong relationship between the variables and okra production.

CONCLUSIONS

The following conclusions could be drawn from the findings of this study:

- The mean age of the respondents was 57.56 years; mean years of okra production experience was 16.91 years; mean farm size cultivated by the respondents was 3.64 acres, they were all married with 49% literate. The mean persons day of family labour was 6.03 and that of hired labour was 1.25 persons day.
- Majority of the respondents planted okra on a small scale destined by land tenure system and probably due to the problem of unavailability of storage, processing and preservation facilities The mean planted area for okra production is 2.45 acres.
- Some personal, socio-economic characteristics of farmers such as level of education, marketing channels, crops intercropped with okra, frequency of harvest, enjoyed taste, type of processing for dried okra, measures for retail and measures for wholesales influences okra production.
- The magnitudes of contribution demonstrated by r²-value in percentages are equally high. Yield of okra ranges between 66.4 and 70.9%. Farm size for okra ranges between 62.3 and 85.0%, while contributions of variables related to land preparation and uses are between 5.48 and 22.1%.
- Okra production had been observed to be at small-scale level. Also, processing and preservation were found to be at traditional local levels.
- Government assistance, financial aids, support from agricultural development agencies, provision of basic infrastructure in the study area had been identified as factors that can improve okra production.
- Extension services had not reached majority of the farmers in the study area and advisory services were not given to the farmers reached.

The following recommendations were made for strategic planning in the study area:

- More research on okra should be encouraged. This will facilitate the discovery of various methods of producing, processing and preserving okra and the best methods could be chosen. Also this will lead to the fabrication of mechanized processing and preservation facilities such as mechanized canning, sealing, or bottling machines, mechanized dryers and so on. This will solve the problem of spoilage during the production season of okra and scarcity during the off-season.

- Farmers should be enlightened on the importance and diverse uses of okra. Female extension agents could teach different menus got from okra to the women through extension education. Medical and industrial usage of okra in the production of rope, paper, glazers, plasma expander and so on, should be taught to the local farmers so as to encourage them to produce on a large scale. This enlightenment could be got across to the farmers through the media and extension personal or group contact.
- Exportation of processed okra could be a source of foreign exchange earnings for the nation. Thus the governments, NGOs, farmers groups etc. should take interest in the production, processing, preservation and marketing of okra with the ultimate aim of designing and producing appropriate intermediate technologies and plants.
- Necessary and adequate input should be provided to facilitate production on a large scale. Governmental and non-governmental bodies can provide these. Also farmers can come together and form cooperative groups that will generate adequate financial aids for the production of okra.

REFERENCES

- Alimi, T., 2004. Use of cultural practices and economic impact of insecticide use, awareness and practices of insecticide safety precaution, on okra production. *J. Vegetable Crop Prod.*, 10: 23-36.
- Alimi, T., 2005. Economic of monocropping okra under tropical conditions during the rainy and dry seasons. *J. Vegetable Sci.*, 11: 19-34.
- Bamire, A.S. and J.T. Oke, 2003. Profitability of Vegetable Farming under Rainy and Dry Season Production in Southwestern Nigeria. *J. Vegetable Crop Prod.*, 9: 11-18.
- ECHO, 2003. Plant Information Sheet, N.F.T. Meyers, USA. <http://www.echonet.org>.
- Etaferahu T., Jose, A. and Z. Paul, 1996. Production Practices and Sample Costs to Produce Furrow Irrigated Okra in Coachelle Riverside County, California. University of California Cooperative Extension <http://www.sfc.ucdavis.edu/research/okra.html>.
- John, F., 1999. Introduction to Marketing. International Thompson Business Press. pp: 5.
- Kemble, J.M., E.J. Sikora, G.W. Zehnder and M.G. Patterson, 1995. Guide to Commercial Okra Production. File://E\ ANR-959 Guide to commercial okra Prodcution.htm
- Markose, B.L. and K.V Peter, 1990. Okra. Review of research on vegetable and Tuber crops. Technical Bulletin 16. Kerala Agricultural University Press Mannuthy, Kerala, pp: 109.
- Osun Stae Agricultural Development Programme (OSSADEP, 1997). The report of 1996 crop area and yield survey conducted by planning, monitoring and evaluation Department. Osun State Press, Osogbo, Nigeria, pp: 11.
- Sanders, D.C., 2001. Okra Production. NC State University Horticultural Information Leaflets- Revised 1/01-Author Reviewed 1/01 HIL-19. <http://www.ces.ncsu.edu/depts/hort/hil/hil-19.html>.
- Schippers, R.R., 2000. African indigenous vegetable- an overview of the cultivated species. National Resources Institute (NRI), University of Greenwich, London, United Kingdom, pp: 214.
- Siemonsma, J.S., 1982. The cultivation of okra (*Abelmoschus* spp.), Tropical fruit]-vegetable (with special reference to the Ivory coast). D.H.O. Thesis Wageningen Agricultural Wageningen, the Netherland, pp: 297.