

**SURVEY OF FRUITS AND VEGETABLES**

**PRODUCTION AND PROCESSING**

**IN**

**F.C.T. ABUJA AND NIGER STATE**

**BY**

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SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY  
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA,  
NIGER STATE.**

**JULY 2000**

## DECLARATION

I hereby declare that this work "Survey of Fruits and Vegetables, production and Processing in Abuja, Federal capital Territory and Niger State" was conducted by the author under the supervision and guidance of Mr P.A. Idah of the department of Agricultural Engineering, Federal University of Technology Minna, Niger state during the 1998/99 academic Session.

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**SOWUNMI I.O.**

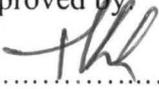
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# CERTIFICATION

This is to certify that this thesis titled “A SURVEY OF FRUITS AND VEGETABLES, PRODUCTION AND PROCESSING IN F.C.T. ABUJA AND NIGER STATE” has been read and certified by the undersigned as having met the partial fulfilment of the requirement of the award of the Post Graduate Diploma in Agricultural Engineering.

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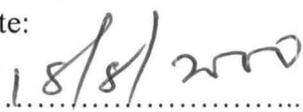
  
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## DEDICATION

This thesis is dedicated to ALMIGHTLY GOD who provided me His grace  
that saw me through.

## ACKNOWLEDGEMENT

First and foremost, I am most grateful to Almighty God who has made it possible for me to start and finish this postgraduate Diploma course at this time against all odds and financial constraints. Glory, Honour and adorations be ascribed unto Him forever and ever. Amen.

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## ABSTRACT

This Project work was carried out on the survey of fruits and vegetables, production, and processing in Abuja, Federal Capital Territory and Niger State. Seven fruits and eight vegetables were randomly chosen. Four Local Government Areas in Abuja, which are Municipal Area Council, Bwari, Kuje and Gwagwalada Local Government Areas were also randomly chosen. In Niger State, five Local Government Areas which are: Shiroro, Paikoro, Munya, Bosso, and Katcha Local Government Areas were also randomly chosen. Questionnaire were randomly distributed to various villages under the Local Government Areas using simple random selection methods and the result was analysed based on the answers provided for questions in the questionnaires and through personal interview. The result showed that majority of the farmers are producers not processors. The results revealed that only Municipal Area Council produces apple and pineapple and the average production figure per annum is 1.6 tons and 15.4 tons respectively. In the Local Government Areas in Abuja the total quantity of fruits produced in tons per annum are as follows: orange 93.6, banana 59.4, mango 100.8, cashew 26.0, guava 40.8, apple 1.6 and finally pineapple 15.4. On the other hand the total production of fruits produced in tons per annum in Niger State Local Government Areas are as follows: mango 83.0, guava 48.4, cashew 45.6, banana 4.0 and orange 37.4. For the production of vegetables in Abuja L.G.A's in tons/annum are as follows: 1.6 for carrot, 97.6 for potatoes, 126.1 for tomatoes while 129.6 tons is for okro. The rest are 4.8 for garbage and 7.8 for water melon. In Niger State L.G.A's 76.2 tons for potatoes, 80.6 tons for tomatoes and 81.0 tons for okro. In Abuja and Niger States only vegetable are processed. The total processed per annum on each L.G.A. in Abuja are 33.8 tons for potatoes, 17.9 tons for tomatoes and 40.5 tons for okro. On the other hand, for Niger State L.G.A.'s, 17.0 tons for tomatoes, 20.5 tons for okro and 9.5 tons for potatoes.

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# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1. BACKGROUND INFORMATION

1.1.1 FRUITS: - Fruits are the seed bearing structure for a flowering plants. To most people, fruits are sweet, flavourable plant parts such as apples, Oranges, Cherries and Strawberries, while food like corn, beans or peas are termed vegetable. To a botanist, fruits are the ripened seed and surrounding tissue of any seed- bearing plant. However, any ripened ovary is a fruit, which includes kernel of corn, a pod of peas and beans as well as an apple, Oranges, Cherry or strawberry.

### 1.1.2 IMPORTANCE TO MAN

Fruits are important as food and they are of more importance to industries that are concerned with growing processing and marketing. Generally, fruits are low in protein and fat while some, such as, dried figs and dates are rich in carbohydrate. Most fresh fruits consist of about 80% H<sub>2</sub>O. Fresh fruits also contain mineral and vitamin C in valuable quantity. Yellow fruits contain vitamin A; many other fresh fruits contain acid that promotes bower movement. Fruits also serve as roughages that aid in elimination of indigestion.

### 1.1.3 TYPES OF FRUITS

There are 4 types of fruits, which are;

- i. Simple fruits: These are fruits that develop from a single ovary. It may be fleshy or dry. Simple fruits include fruits such as Banana, Tomatoes, Guava, Grape, blueberry, pea and peanut. (New Standard Encyclopaedia Volume 5).

- ii. Aggregate fruits: This consist of many ripened ovaries produced by a simple flower e.g. Blackberry, Magnozia and Dewberry.
- iii. Multiple Fruits: It consist of cluster of ovaries from different flowers on a common base e.g. Breadfruit, Fig, pineapple, mulberry etc. [New standard encyclopaedia volume 5]
- iv. Accessory fruits: It contains a matured ovary but consist mainly of tissue and stem parts e.g. Apples, pears, and strawberries.

#### **1.1.4 VEGETABLES**

Vegetables refer to a plant or part of a plant used for food. Some of the vegetables include carrots, potatoes, onions, garlic, cabbage, cucumber, beans, tomatoes, watermelon, peas, green beans, green onions etc.

Generally, vegetables are low in both calories and cost. They are high in food value and are an excellent source of vitamins and minerals. Those vegetables having dark- green leaves, such as Kale and spinach are rich in vitamin A, folic Acid, Thiamine, riboflavin, iron and copper. The thinner and greener the leaf, the more vitamin A it contains. Yellow vegetables are also prime source of vitamin A, while tomatoes cabbage, green pepper and potatoes contribute substantial amount of vitamin C. [New standard Encyclopaedia volume 13]

#### **1.1.5 SOME COMMON VEGETABLES**

- i. Green Vegetables: Green leafy vegetables such as cabbage and Brussels sprouts are nutritionally important as sources of vitamin C, B- carotene, Folic Acid and Iron. The dark green outer leaves contain more vitamin C and B-carotene than the paler inner leaves. Green vegetables rapidly lose vitamin C when they are kept and if they

are boiled up to half their vitamin C content can be leaked out into the cooking water. Brian and Allan (1990)

- ii. **Root Vegetables:** carrots, turnips, Swedes and Parsnips are the most important root vegetables. Root vegetables are good sources of fibre, and carrots are important source of vitamin A. The colourless turnips, Swedes and parsnips contain no B-carotene but they are much richer than carrots in vitamin C. Brain and Allan (1990).
- iii. **Legumes or Pulses:** These refer to seeds, which grow inside a pod. E.g. peas, beans, and lentils. Normally only the seed are eaten but sometimes, as with runner beans, green beans and the aptly named "Mange tout" peas the pod also is eaten. Pulses are good sources of protein and are richer in B vitamins and dietary fibre than green vegetables and root vegetables. Fresh frozen peas and beans eaten in their pods also are good sources of vitamin C. Brian and Allan (1990).
- iv. **Tuber Vegetables:** Potatoes are tuber vegetables. They are easily grown and give good yields. Potatoes like all vegetables consist principally of water. Apart from water they are mainly made up of starch and for this reasons they are often looked upon merely as a cheap source of energy. Potatoes are however of great importance in the diets as a major source of vitamin C, Thiamine Folic Acid and dietary fibre. Brain and Allan (1990).

## **1.2 PRESERVATION AND PROCESSING**

Preservation of fruits and vegetables is any measure that makes the fruits and vegetables keep well over a reasonable period of time. The objective is minimize damage or ideally to avoid damage altogether. The preservation of fruits and vegetables ensure that the consumer is provided with enjoyable, good- tasting fruits and vegetables that retains as

much of their full nutritional value. Good preservation also prevents health hazards caused by contamination with pathogenic microorganism. Encyclopaedia of food science (1997). Processing is the proceed that raise the quality or charge farm products to produce in order to improve its economic values.

### **1.3 STATEMENT OF PROBLEM**

As a result of the perishable nature of these fruits and vegetables there is erratic supply of the produce. During harvest, there is plenty at lower prices while a few months later, there is scarcity and the prices become exorbitantly high. It is at times difficult to plan for effective handling because actual figures of production are lacking. One cannot even tell how much of what is produced go into processing or preservation. Hence the need for this work, which is purely a data generation, project.

### **1.4 JUSTIFICATION OF THE PROJECT**

Fruits and vegetables are often in great demand for consumption by many households or used as ingredient in soup preparation and condiments in other food items. Unfortunately, these important commodity are highly perishable in their fresh forms. This results in scarcity during off-seasons and causes the prices to be exorbitant if available at all Oladapo (1994).

Vegetable production forms 25% of the most minor food crops grown in the tropic. Eric and Bani (1988). Hence it is the means of livelihood for a considerable section of the population that is for both grower and traders.

Quality in both physical and chemical composition in fruits and vegetables is important particularly after harvest. The damages that occur in these crops are caused primarily by loss of moisture, change in composition and pathological attack or

metabolism. Factors contributing in these damages include nature of crop, initial quality of crop, mechanical injury, temperature, humidity and handling given to the crop and package and storage atmosphere.

Advisory Booklet (1990). However with proper preservation and processing, the shelf life of these perishables would be enhanced and the percentage loss will greatly reduce. Subsequently, the farmer will be able to get a good price for his produce and the consumer will get a good quality produce at affordable price throughout the year as good preservation during bumper harvest will ensure that the fruits and vegetables are available during the off season. Provision of such good facilities will require knowing the production figure, their utilization and so on. Effective planning for such facilities requires data. Sometimes good plans fail because of lack of data hence the need for this work.

## **1.5 OBJECTIVE OF THE PROJECT**

The main objectives of this project are

- (i) To quantify how much fruits and vegetables being produced
- (ii) To establish the quantity being preserved through storage
- (iii) To establish what quantity is being processed
- (iv) To quantify the losses being encountered

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

Fruits and vegetables are of great importance in human nutrition as they supply vitamins and minerals to diet, provide variety to the food and make food appetising [fruits and vegetables processing (1988)] In the fresh form, fruits and vegetables are highly perishable especially under hot tropical conditions.

Tropical fruits are of diverse groups and their representatives come from numerous families which includes:

- (1) Anacardiaceae e.g. Mango, Hop plum, imbue.
- (2) Sapindaceae e.g. Rambutan, Taunt, Lynchies, Logan,
- (3) Passifloraceae e.g. Passion fruit.
- (4) Bromeliaceae e.g. Pineapple.
- (5) Annonaceae e.g. Custard apple, sour sop, sugar apple.

Traditionally, tropical fruit were consumed locally, and they are either grown at subsistence level or gathered from the wild. Encyclopaedia of food science (1997)

The perishable nature of tropical fruits and vegetables posed some problems, which at times result from poor handling of the fruits and vegetables right from the time of harvest. This has caused increase in losses, reduction in Quantity and decrease in profitability of the farmers of the fruit and vegetables. This in turn has led to decrease in production resulting from lost of interest. In addition consumers are faced with erratic supplies, high prices and poor Quantity of fruits and vegetables. Fruits and Vegetables processing (1998).

Fruits and vegetables are harvested when ripening of product is at its peak with regard to flavour, texture, and colour. Since these properties are related by enzymatic reaction in the cells of the living plant, which will continue even at low temperature even

after harvesting, the Quantity of the product usually deteriorates if the enzymes are not inactivated. Encyclopaedia of food science (1997).

Fruits and vegetables are processed and preserved so as to extend the shelf life. The activity must start from harvesting, that is, the Quantity at harvest or the initial Quantity must be high if they are to store well. The general principles of extending the shelf life of these crops are considered under the following headings:

- (a) Varietal differences.
- (b) Harvesting.
- (c) Sorting.
- (d) Handling.
- (e) Packaging.
- (f) Transportation.
- (g) Storage.
- (h) Processing. Advisory booklet (1990).

Liu (1978), found that fruit maturity at harvest has a great effect on the eating Quantity and keeping Quantity. Unfortunately, a fruit harvested at the time when it has optimum eating Quantity often does not have the best keeping Quantity. While fruits harvested earlier often has a keeping Quantity but poorer eating Quantity. Therefore, the distance to the market, the handling storage, transportation methods and facilities available largely determines the stage of maturity at which a fruit is harvested.

Kelman (1984) stated that losses of perishable crops in developing countries are as high as 30%. Also in 1978, National academy of sciences reported a far higher figure than 30% for fruits in some developing countries.

## 2.1 REPORTED POST- HARVEST LOSSES

Actually, post harvest losses are very difficult to ascertain. However, such wastage had been closely monitored in the developed countries. Pentzer (1976) attributed the sharp decrease in average losses over some periods to the development of effective fungicides and improvements in storage and transit refrigeration. But such improved techniques are often available for many other sub-tropical fruits particularly in the less developed countries. Cappellini and Ceponus (1984) reported that in U.S.A., losses of fruit at the consumer level were approximately twice those at the point of retail sale.

In Nigeria, enormous quantities of fruits and vegetables are produced and staggering figures are sometimes given as estimated annual production for example, figures such as 3.8 million tons of onions, 6 million tons of tomatoes, and 3.5 million tons of citrus have been quoted as annual production figure for some fruits in Nigeria. Oyeniran (1988)

However, fruits and vegetables in their fresh forms contains high moisture content and are actively living carrying out physiological function of respiration thereby absorbing and releasing deterioration in storage which is more rapid – under conditions of high temperature and humidity resulting in heavy losses. According to FAO report [Oyeniran 1988] losses as high as 50% are not uncommon in fruits in tropical areas. Some of the causes of these losses include among others non-existence or unsuitable storage systems.

An investigative survey carried by the author at Mobil market on fruits and vegetables, it was found out that the packaging and transportation of these fruits and vegetables causes a lot of damages on them. For example oranges were packed other in a sack and this were further loaded on top of each other in the vehicle either to enable the vehicle to move as much as possible at once or for the driver to be able to make more money but before the vehicle will get to the market a considerable amount of the orange or mango would have been destroyed as a result of compression.

In the case of vegetable e.g. tomatoes, they are also packed into a basket and this will further be loaded into the vehicle with a plank on top of one before another will be placed, it was also found that at least  $\frac{1}{3}$  of the quantity that were transported would have been destroyed.

Olorunda and Tung (1985) have it that mechanical damage of fruits and vegetables during transportation results from both static and dynamic stresses, especially along the bumpy at wholesale markets during off-loading. To maintain good avoided since it produces structural and physiological change in tissue, which thus facilitate the entry of pathogens.

Mechanical damage during harvest and in transit poor packaging, and extended transport time have been identified as principal causes of post-harvest losses of fruits and vegetables in Nigeria. Olorunda and Aboaba (1978), Aworh and Olorunda (1981).

Many tropical crops are particularly subjected to problems in transport due to their high respiration rate, rapid deterioration, and susceptibility to chilling injury. Some of these crops are often packed too tightly or too loosely, resulting in inadequate air distribution and damaged loads. The horticultural package must accommodate the special temperature requirements of the produce. The injuries so inflicted through scratches and abrasion or compression creates point of entry for microorganisms and ultimate decay. Ndrika, (1992).

Aworh and Olorunda (1988) [Oladapo (1994)] reported that pressure bruising due to the piling of one bag on the other is largely responsible for higher levels of mechanical damage in pineapple fruits packed in jute bags relative to those packed in plywood crates held approximately the same quantity of fruits (about 40kg per pack). The crates were designed in such away that they could be stacked one on the other with about 2.5cm of clearance between the fruits at the top of one crate, and the floor of the next crate, thus minimising pressure bruising.

Onwuzulu (1984) investigated the packaging of fruits in stated wooden boxes, specially designed plastic crates and perforated cardboard for transportation. He used paper in some of the containers. In his trial with transportation of oranges from Ibadan to Kano, those packed in slatted boxes and perforated cardboard with paper had losses below 1%. Those without paper cells had losses between 3% to 5%, while the control one that is transported naked had 20% - 25% losses when assessed at destination.

Cornelis (1988) stated that proper packaging of product can reduce not only bruising and crushing but can also improve marketing of produce, reduce moisture loss, prevent the contamination of the product with spoilage organisms, reduce pilferage and maintain a sanitary environment during marketing.

As stated earlier, there are very few literature available as far as the production, and processing of fruits and vegetables are concerned in Nigeria.

## **CHAPTER THREE**

### **3.0 MATERIALS AND METHODS**

This project is a survey work, which involves data collection through the administration of questionnaire and oral interview. ISRA (Investigative Surveys Research Approach) method.

### **3.1 METHOD OF DATA COLLECTION AND ADMINISTRATION OF QUESTIONNAIRE**

This project work covers only two states, which are Abuja, the Federal Capital territory, and Niger state. Questionnaires were randomly distributed in some local government areas in these states. These local government areas were also randomly chosen without any priority using a method as simple Random selection.

Ufere (1995). This result in elimination of discrimination. The local government areas covered in Abuja metropolis are Kuje L.G.A. municipal L.G.A., Gwagwalada L.G.A. and Bwari L.G.A. and in Niger state, Bosso L.G.A., Katcha L.G.A., munya L.G.A., Shiroro L.G.A., and Paikoro L.G.A. were covered.

### **3.2 INTERVIEW AND SAMPLING METHOD**

The questionnaire, which among other sources of gathering information's as regards to the production, preservation and processing of fruits and vegetables was randomly distributed to the persons (farmers) concerned. Oral interviews were also conducted with the help of an interpreter.

The method of interview used in each villages/local government area varied and this was as a result of their differences in understanding, hospitality and willingness to release information, though it was randomly done in other to avoid discrimination. In a village

under municipal local government area, after the village head has consented that the questionnaire be filled, the farmer came down to the chief's house and it was there that the questionnaires were randomly distributed. In some other villages both under the municipal local government area and others, the questionnaires were randomly given to farmers from house to house.

Ten farmer were randomly chosen from each village and the method of distributing the questionnaire employed was that three houses at the entrance to the village, four at the center and three at the exit of the village.

The questionnaire was therefore interpreted based on the information collected.

### **3.3 METHOD OF ASSESSMENT**

The questionnaire was assessed using charts. The quantity produced was grouped into three ranges. Under each range the percentage of each fruits and vegetables produced, preserved and processed were assessed based on the total number of people that answer the questions in each local government areas and at the end, the summary of the percentage produced, preserved, and processed were again calculated for each state based on the total number of farmers that fill in for that particular fruits and vegetables for both Abuja and Niger state. These results were presented pictorially using a histogram.

The quantity produced, preserved and processed was also quantified in tons for each local government under the two states and the total of each fruits from all the local government for each state were calculated and these were also represented pictorially using a pie chart.

## CHAPTER FOUR

### 4.0 RESULT AND DISCUSSION

From the questionnaire received back from the various local government areas, it was discovered that most former cultivates both the fruits and vegetables.

**Table 1. Quantity of fruits grown in Municipal L.G.A. (%)**

<i>Tons</i>	<i>Orange</i>	<i>Pineapple</i>	<i>Banana</i>	<i>Mango</i>	<i>Apple</i>	<i>Guava</i>	<i>Cashew</i>
<1-2	61.11	91.67	91.67	31.58	100	75	100
3-5	22.22	8.33	8.33	68.42	-	25	-
>5	16.67	-	-	-	-	-	-

**Table 2. Quantity of vegetables grown in Municipal L.G.A. (%)**

<i>Tons</i>	<i>Tomatoes</i>	<i>Okro</i>	<i>Potatoes</i>	<i>W/melon</i>	<i>Carrot</i>	<i>Onions</i>	<i>Garlic</i>	<i>Cabbage</i>
<1-2	44.44	66.67	46.67	100	100	80	-	-
3-5	50.00	28.57	53.33	-	-	20	-	-
>5	5.56	4.76	-	-	-	-	-	-

**Table 3. Quantity of fruits grown in Gwagwalada L.G.A. (%)**

<i>Tons</i>	<i>Orange</i>	<i>Banana</i>	<i>Mango</i>	<i>Cashew</i>	<i>Guava</i>	<i>Pineapple</i>	<i>Apple</i>
<1-2	100	80	85.71	100	100	-	-
3-5	-	20	14.29	-	-	-	-
>5	-	-	-	-	-	-	-

**Table 4. Quantity of vegetables grown in Gwagwalada L.G.A. (%)**

<i>Tons</i>	<i>Tomatoes</i>	<i>Okro</i>	<i>Potatoes</i>	<i>Garbage</i>	<i>Carrot</i>	<i>Onions</i>	<i>W/mellon</i>	<i>Garlic</i>
<1-2	20	42.86	44.44	100	-	-	-	-
3-5	20	42.86	55.56	-	-	-	-	-
>5	60	14.29	-	-	-	-	-	-

**Table 5. Quantity of fruits grown in Kuje L.G.A. (%)**

<i>Tons</i>	<i>Orange</i>	<i>Banana</i>	<i>Mango</i>	<i>Guava</i>	<i>Cashew</i>	<i>Pineapple</i>	<i>Apple</i>
<1-2	76.77	72.73	68.42	100	100	-	-
3-5	23.53	27.27	26.32	-	-	-	-
>5	-	-	5.26	-	-	-	-

**Table 6. Quantity of vegetables grown in Kuje L.G.A. (%)**

<i>Tons</i>	<i>Carrot</i>	<i>Potatoes</i>	<i>Tomatoes</i>	<i>Okro</i>	<i>Onions</i>	<i>W/mellon</i>	<i>Garlic</i>	<i>Garbage</i>
<1-2	100	100	50	100	-	-	-	-
3-5	-	-	50	-	-	-	-	-
>5	-	-	-	-	-	-	-	-

**Table 7. Percentage distribution of fruits grown in Bwari L.G.A. (%)**

<i>Tons</i>	<i>Orange</i>	<i>Banana</i>	<i>Mango</i>	<i>Guava</i>	<i>Cashew</i>	<i>Pineapple</i>	<i>Apple</i>
<1-2	100	100	100	100	100	-	-
3-5	-	-	-	-	-	-	-
>5	-	-	-	-	-	-	-

**Table 8. Quantity of vegetables grown in Bwari L.G.A. (%)**

<i>Tons</i>	<i>Tomatoes</i>	<i>Okro</i>	<i>Potatoes</i>	<i>Garbage</i>	<i>W/mellon</i>	<i>Onions</i>	<i>Garlic</i>	<i>Carrot</i>
<1-2	23.08	23.08	44.44	100	100	-	-	-
3-5	30.77	15.59	11.11	-	-	-	-	-
>5	46.15	61.54	44.44	-	-	-	-	-

**Table 9. Summary of the fruit production figures in Abuja on L.G.A basis in %**

<i>Fruits</i>	<i>G/lada</i>	<i>Bwari</i>	<i>Kuje</i>	<i>Municipal</i>
Orange	14.89	8.51	38.30	38.30
Banana	14.29	20	31.43	34.29
Mango	14.58	6.25	39.58	39.58
Guava	9.38	12.5	28.13	50
Cashew	-	16.67	33.33	50
Pineapple	-	-	-	100
Apple	-	-	-	100

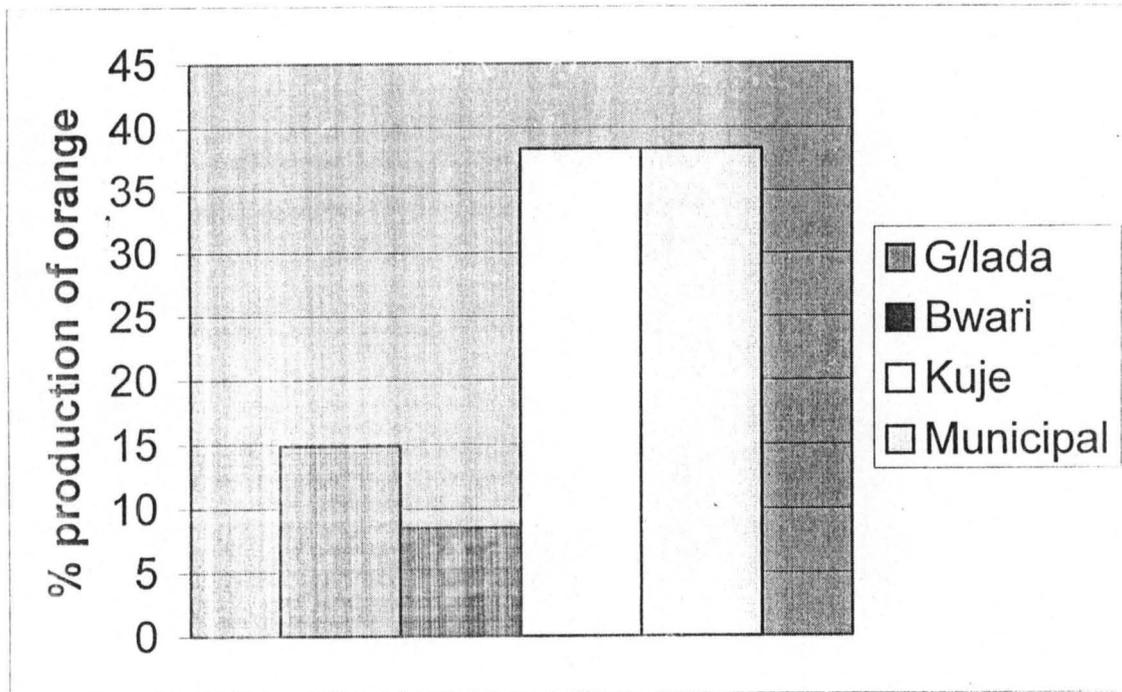


Fig. 1: Histogram representing the % production of Orange in Abuja L.G.A.

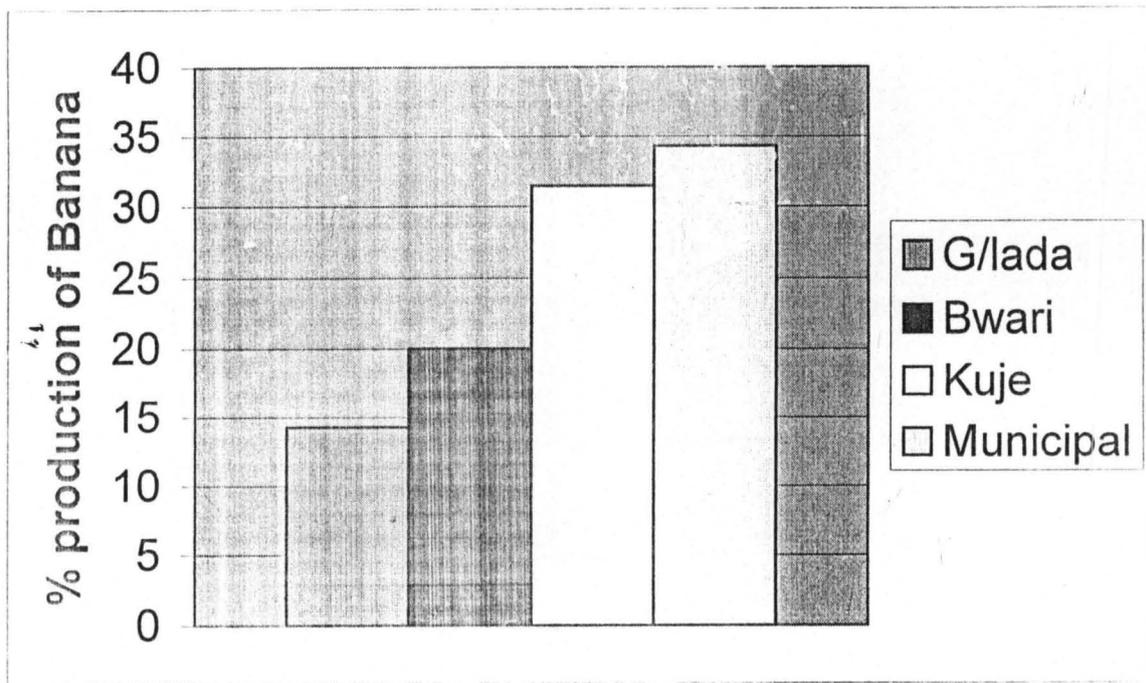


Fig. 2: Histogram representing the % production of Banana in Abuja L.G.A.

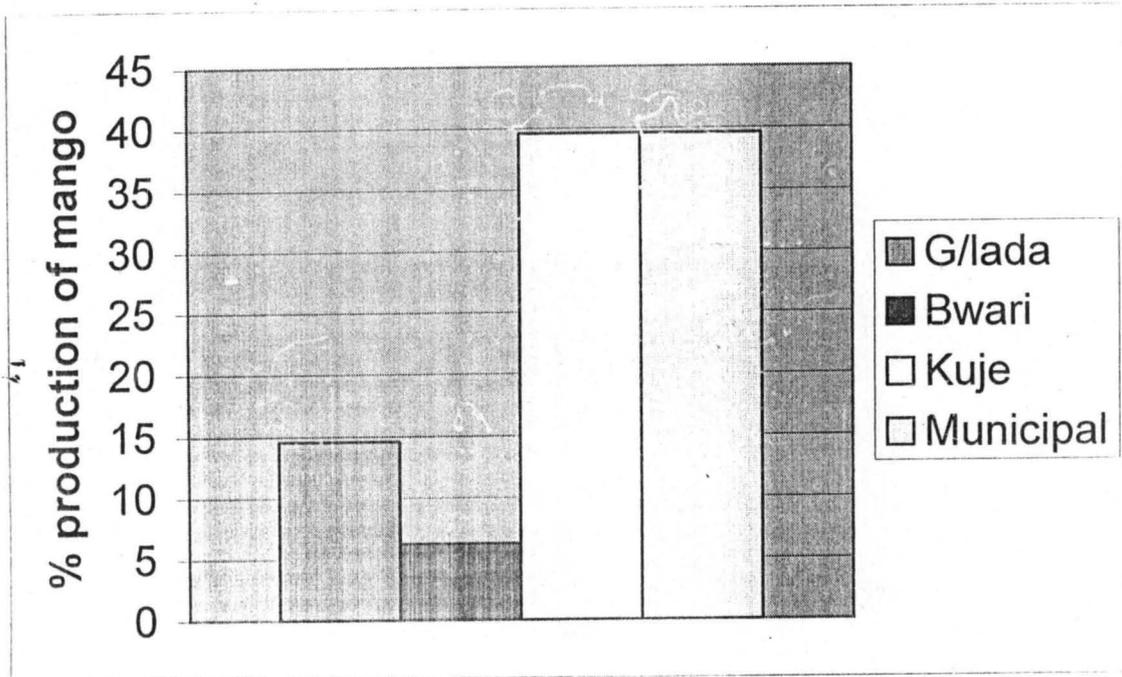


Fig. 3: Histogram representing the % production of Mango in Abuja L.G.A.

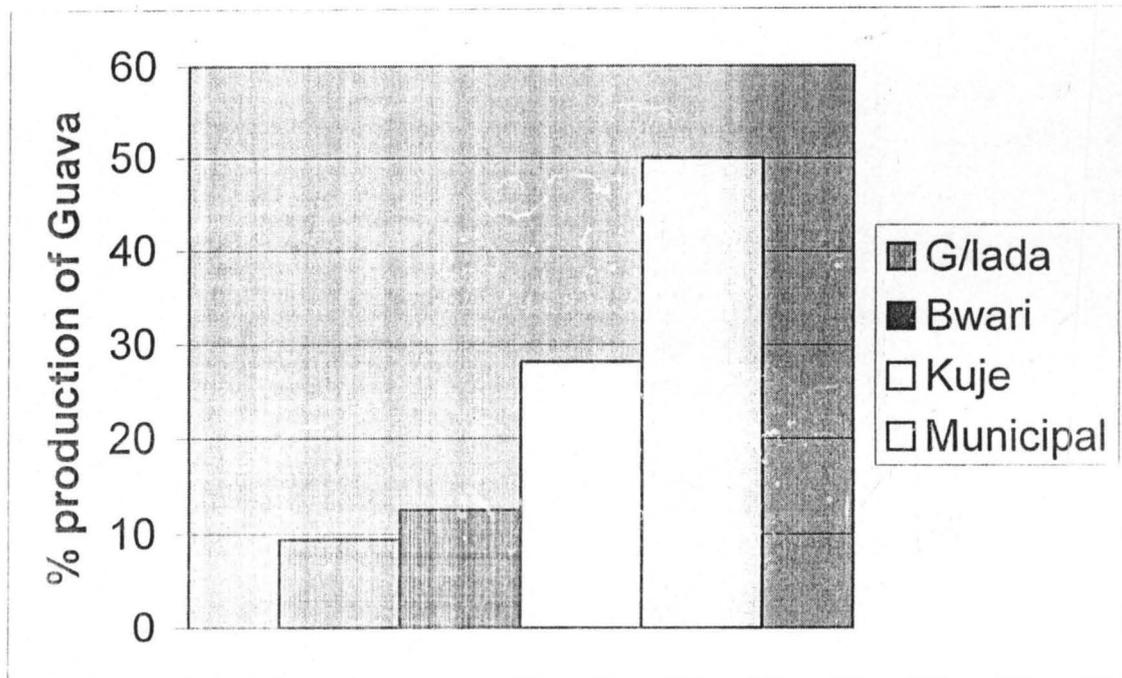


Fig. 4: Histogram representing the % production of Guava in Abuja L.G.A.

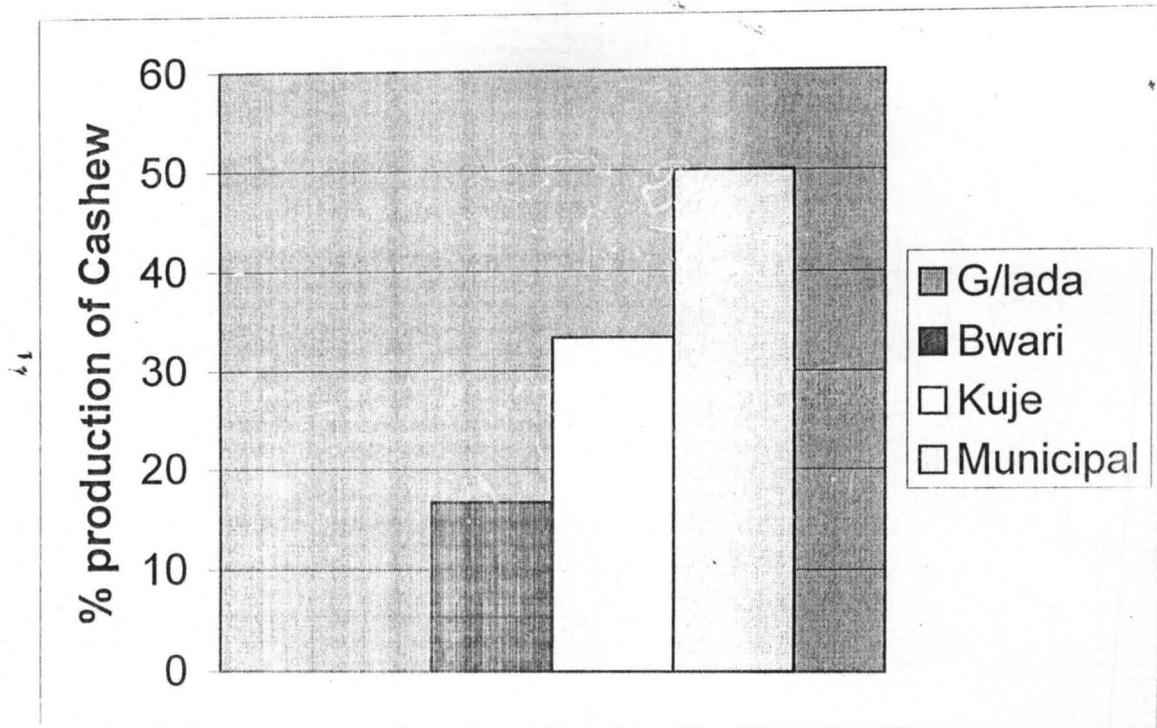


Fig. 5: Histogram representing the % production of Cashew in Abuja L.G.A.

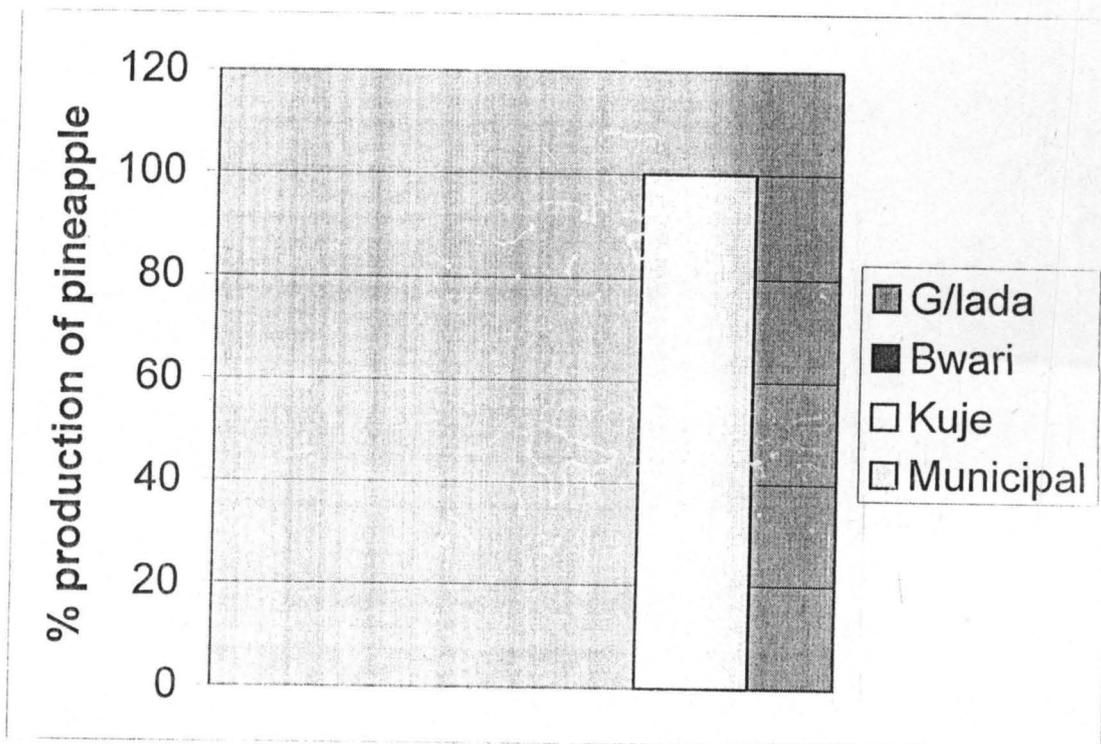


Fig. 6: Histogram representing the % production of Pineapple in Abuja L.G.A.

Table 10. Summary of vegetable production figures in Abuja on L.G.A basis in %

<i>Vegetables</i>	<i>G/lada</i>	<i>Bwari</i>	<i>Kuje</i>	<i>Municipal</i>
Tomatoes	13.16	34.21	5.26	47.37
Okro	15.91	29.55	6.82	47.73
Potatoes	25	25	8.33	41.67
W/mellon	-	14.29	-	84.71
Garbage	50	50	-	-
Carrot	-	-	50	50
Onions	-	-	-	100
Garlic	-	-	-	-

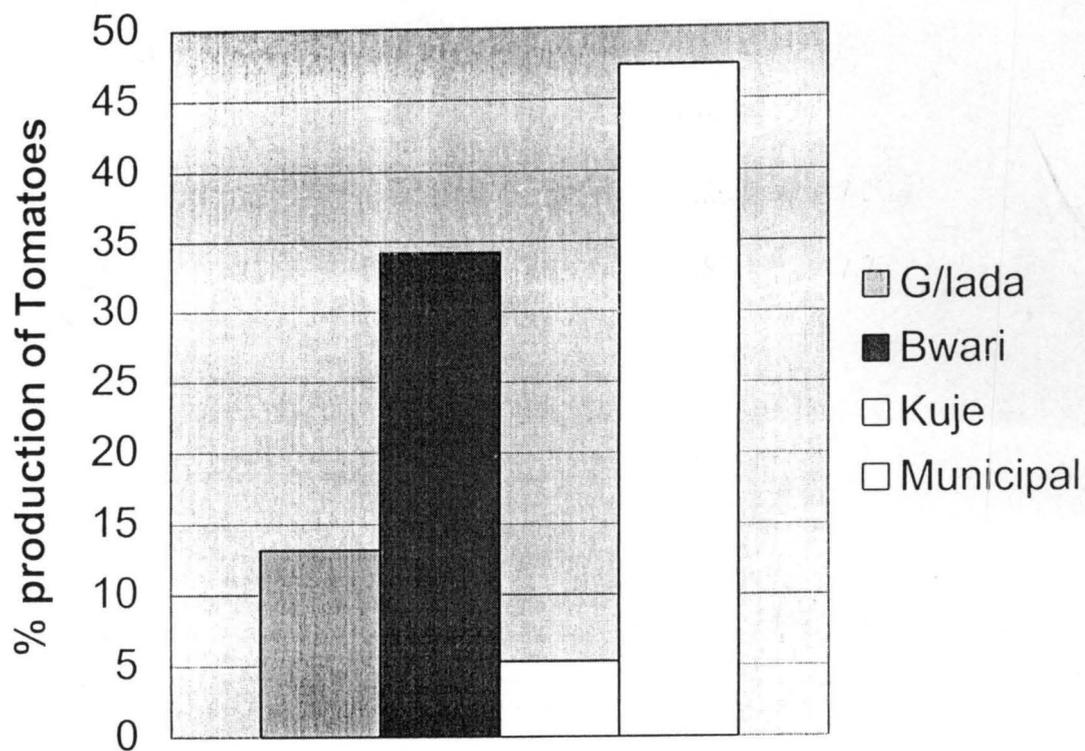


Fig. 7: Histogram representing the % production of Tomatoes in Abuja L.G.A.

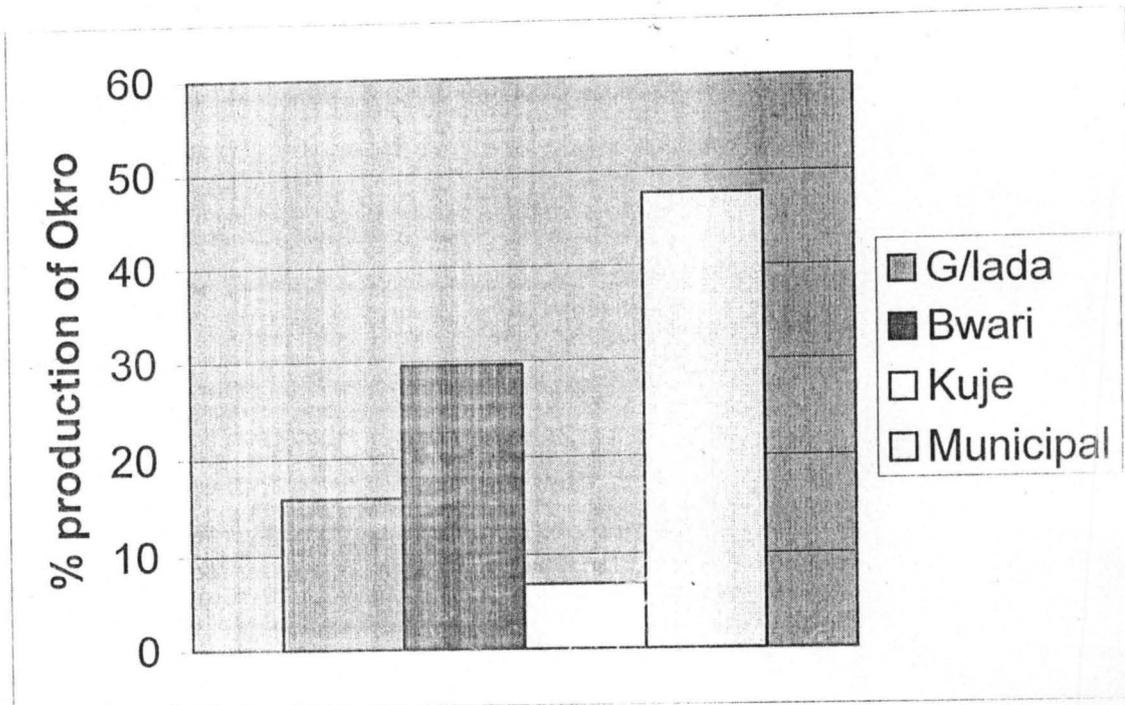


Fig. 8: Histogram representing the % production of Okro in Abuja L.G.A.

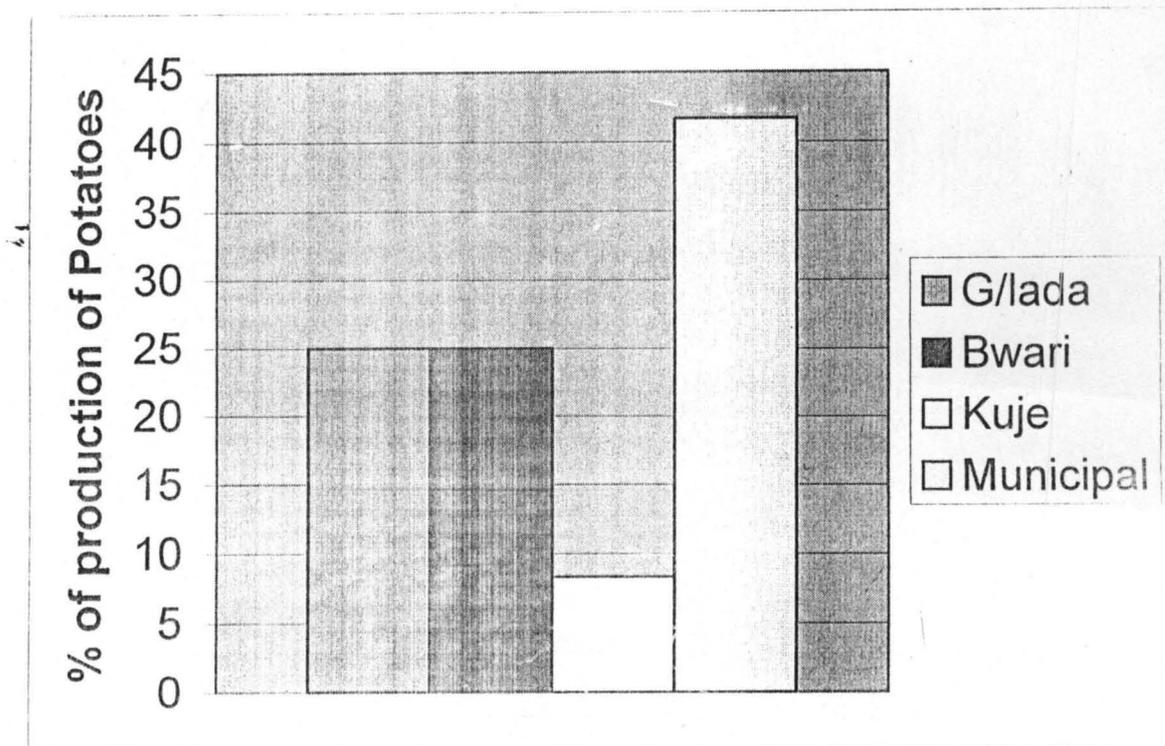


Fig. 9: Histogram representing the % production of Potatoes in Abuja L.G.A.

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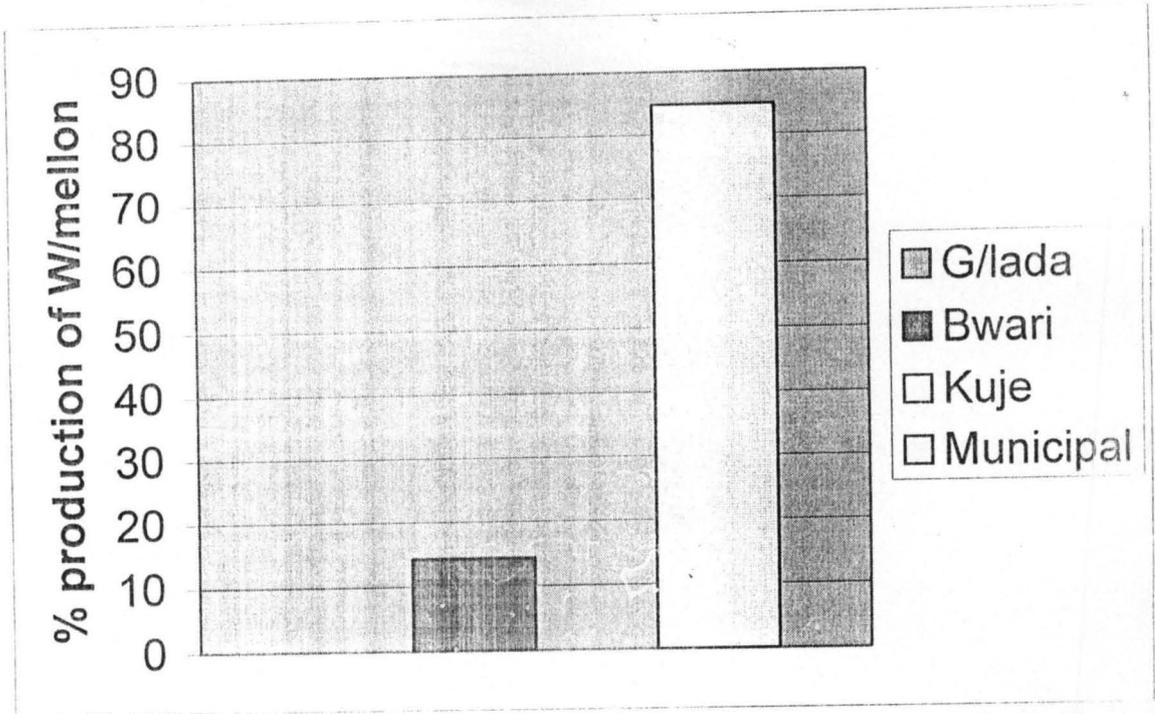


Fig. 10 Histogram representing the % production of W/mellon in Abuja L.G.A.

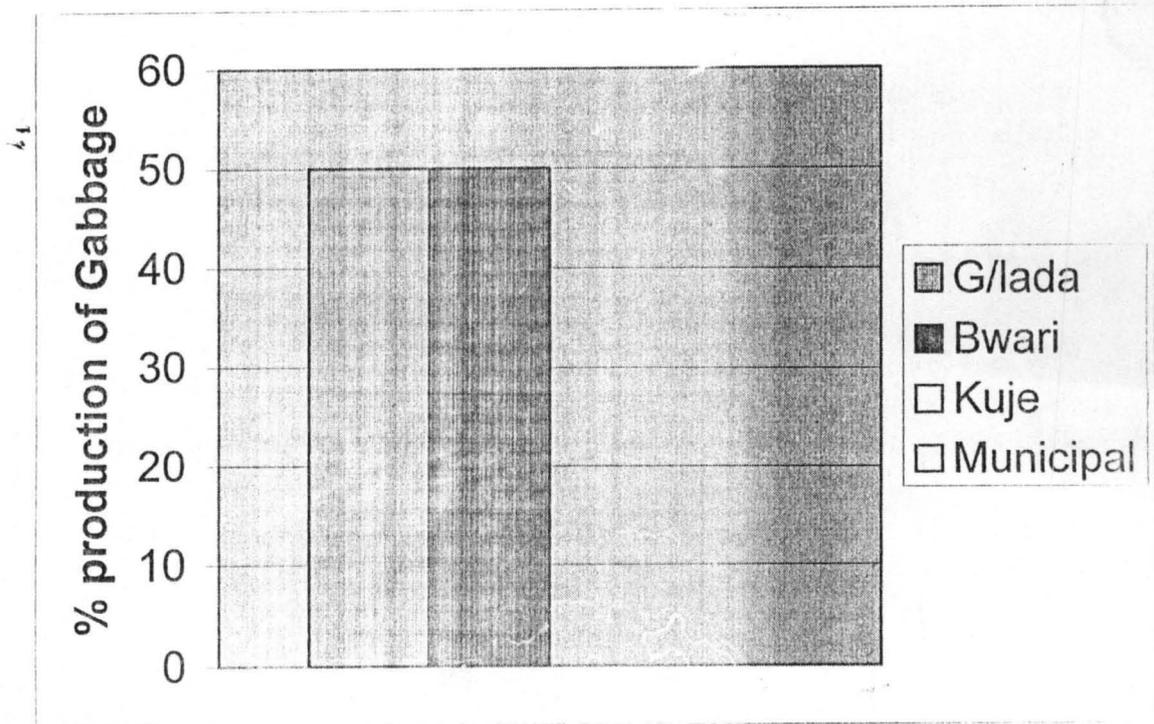


Fig. 11: Histogram representing the % production of Garbage in Abuja L.G.A.

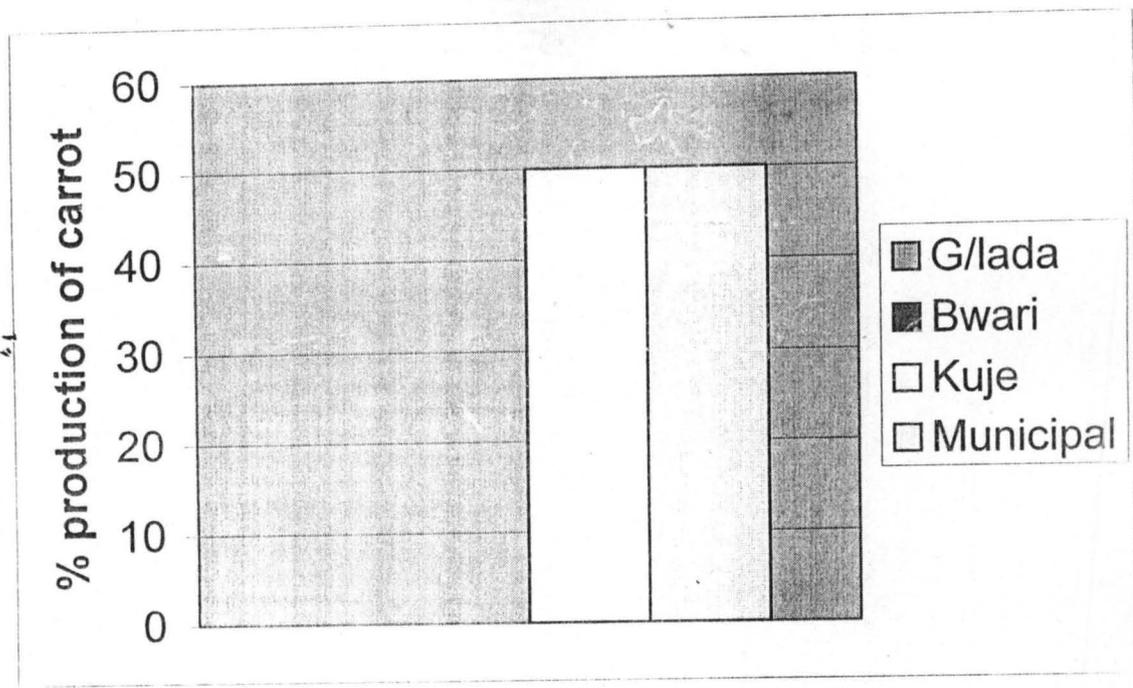


Fig. 12: Histogram representing the % production of Carrot in Abuja L.G.A.

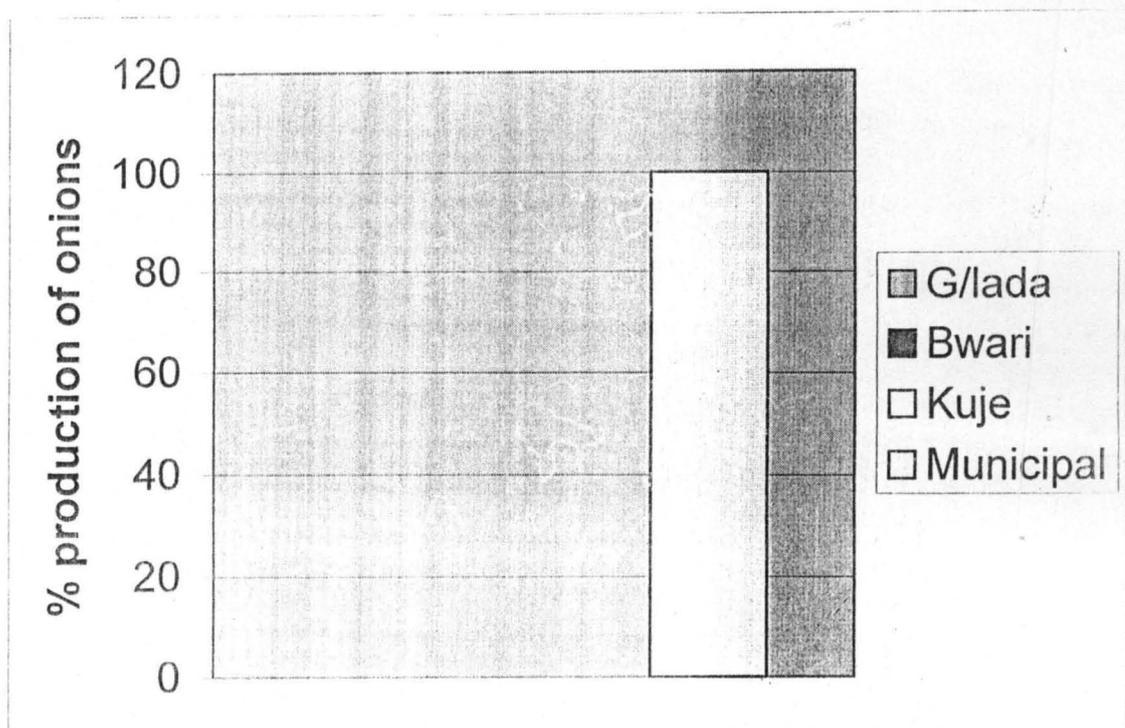


Fig. 13: Histogram representing the % production of Onions in Abuja L.G.A.

**Table 11. Quantity of fruits grown in Bosso L.G.A. (%)**

<i>Tons</i>	<i>Orange</i>	<i>Banana</i>	<i>Mango</i>	<i>Guava</i>	<i>Cashew</i>	<i>Pineapple</i>	<i>Apple</i>
<1-2	100	100	95.24	100	100	-	-
3-5	-	-	4.76	-	-	-	-
>5	-	-	-	-	-	-	-

**Table 12. Quantity of vegetables grown in Bosso L.G.A. (%)**

<i>Tons</i>	<i>Tomatoes</i>	<i>Okro</i>	<i>Potatoes</i>	<i>Onions</i>	<i>Garbage</i>	<i>Carrot</i>	<i>Garlic</i>	<i>W/mellon</i>
<1-2	80	88.89	85.0	-	-	-	-	-
3-5	20	11.11	15.0	-	-	-	-	-
>5	-	-	-	-	-	-	-	-

**Table 13. Quantity of fruits grown in Katcha L.G.A. (%)**

<i>Tons</i>	<i>Orange</i>	<i>Banana</i>	<i>Mango</i>	<i>Guava</i>	<i>Cashew</i>	<i>Pineapple</i>	<i>Apple</i>
<1-2	100	-	100	100	100	-	-
3-5	-	-	-	-	-	-	-
>5	-	-	-	-	-	-	-

**Table 14. Quantity of vegetables grown in Katcha L.G.A. (%)**

<i>Tons</i>	<i>Tomatoes</i>	<i>Okro</i>	<i>Potatoes</i>	<i>Onions</i>	<i>W/mellon</i>	<i>Onions</i>	<i>Garbage</i>	<i>Carrot</i>	<i>Garlic</i>
<1-2	93.33	100	93.75	-	-	-	-	-	-
3-5	6.67	-	6.25	-	-	-	-	-	-
>5	-	-	-	-	-	-	-	-	-

**Table 15. Quantity of fruits grown in Munya L.G.A. (%)**

<i>Tons</i>	<i>Orange</i>	<i>Banana</i>	<i>Mango</i>	<i>Guava</i>	<i>Cashew</i>	<i>Pineapple</i>	<i>Apple</i>
<1-2	100	100	100	100	100	-	-
3-5	-	-	-	-	-	-	-
>5	-	-	-	-	-	-	-

**Table 16. Quantity of vegetables grown in Munya L.G.A. (%)**

<i>Tons</i>	<i>Tomatoes</i>	<i>Okro</i>	<i>Potatoes</i>	<i>Onions</i>	<i>Garlic</i>	<i>Carrot</i>	<i>Garbage</i>	<i>W/mellon</i>
<1-2	100	100	-	100	-	-	-	-
3-5	-	-	-	-	-	-	-	-
>5	-	-	-	-	-	-	-	-

**Table 17. Quantity of fruits grown in Paikoro L.G.A. (%)**

<i>Tons</i>	<i>Orange</i>	<i>Banana</i>	<i>Mango</i>	<i>Guava</i>	<i>Cashew</i>	<i>Pineapple</i>	<i>Apple</i>
<1-2	100	100	37.04	80	100	-	-
3-5	-	-	22.22	20	-	-	-
>5	-	-	40.74	-	-	-	-

**Table 18. Quantity of vegetables grown in Paikoro L.G.A. (%)**

<i>Tons</i>	<i>Tomatoes</i>	<i>Okro</i>	<i>Potatoes</i>	<i>Onions</i>	<i>Garlic</i>	<i>Carrot</i>	<i>Garbage</i>	<i>W/mellon</i>
<1-2	100	74.07	44.44	-	-	-	-	-
3-5	-	25.93	55.56	-	-	-	-	-
>5	-	-	-	-	-	-	-	-

**Table 19. Quantity of fruits grown in Shiroro L.G.A. (%)**

Tons	Orange	Banana	Mango	Guava	Cashew	Pineapple	Apple
<1-2	100	-	20	100	100	-	-
3-5	-	-	80	-	-	-	-
>5	-	-	-	-	-	-	-

**Table 20. Quantity of vegetables grown in Shiroro L.G.A. (%)**

Tons	Tomatoes	Okro	Potatoes	Onions	Garlic	Carrot	Garbage	W/mellon
<1-2	100	100	100	-	-	-	-	-
3-5	-	-	-	-	-	-	-	-
>5	-	-	-	-	-	-	-	-

**Table 21. Summary of the fruit production figures in Niger state on L.G.A basis in %**

Fruits	Bosso	Katcha	Munya	Paikoro	Shiroro
Orange	10.71	25	35.71	14.29	14.29
Banana	60	-	40	-	-
Mango	24.39	19.51	8.54	25.61	21.95
Guava	39.62	30.19	13.21	11.32	5.66
Cashew	38.89	29.63	14.82	11.11	5.56
Pineapple	-	-	-	-	-
Apple	-	-	-	-	-

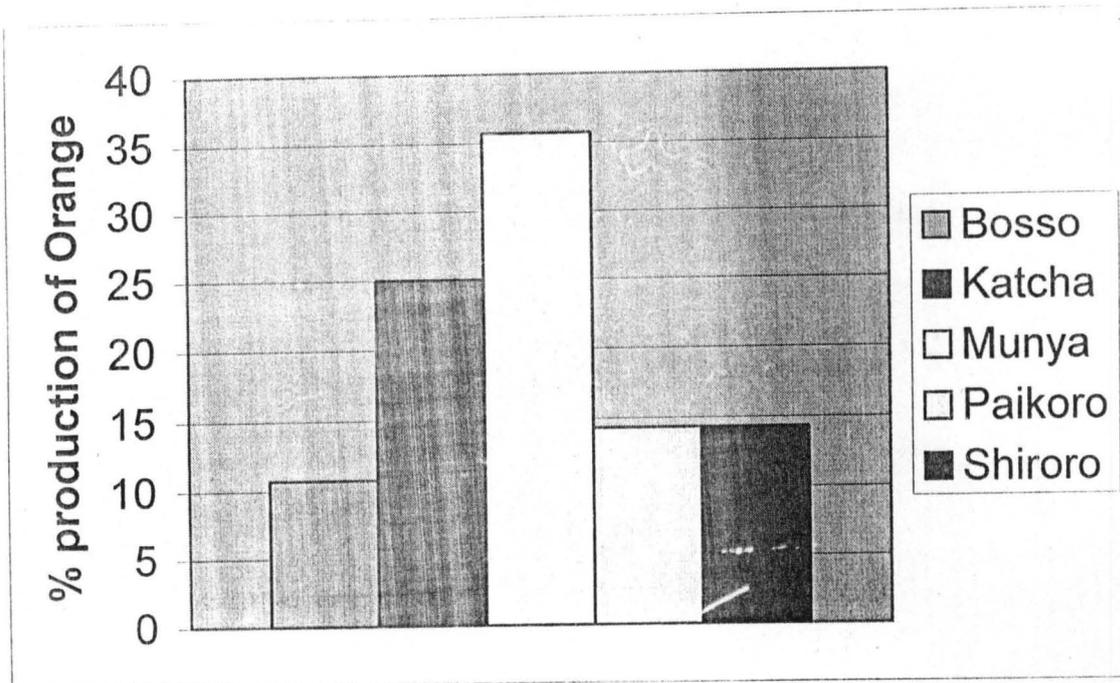


Fig. 14: Histogram representing the % production of Orange in Niger states L.G.A.

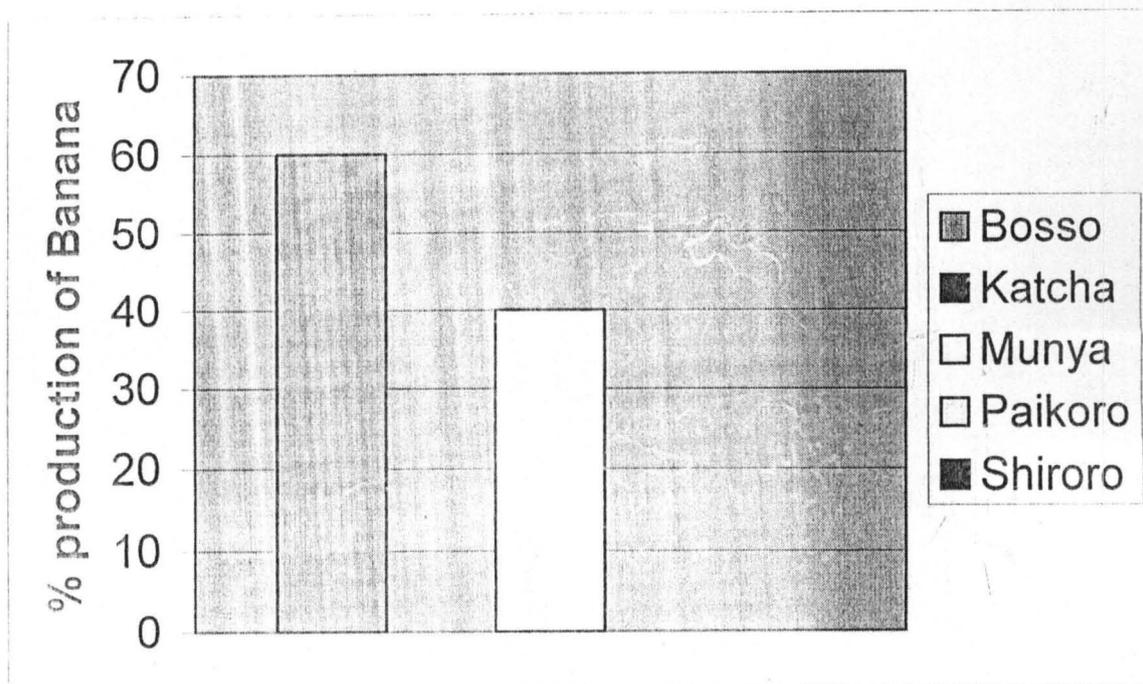


Fig. 15: Histogram representing the % production of Banana in Niger state L.G.A.

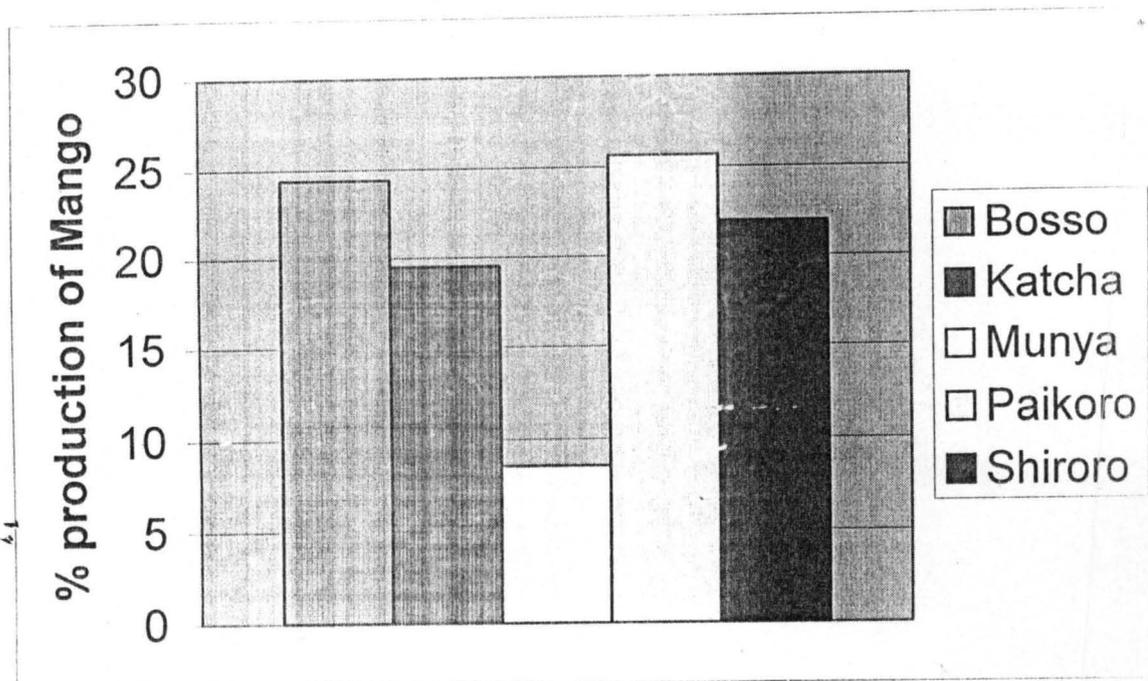


Fig. 16: Histogram representing the % production of Mango in Niger state L.G.A.

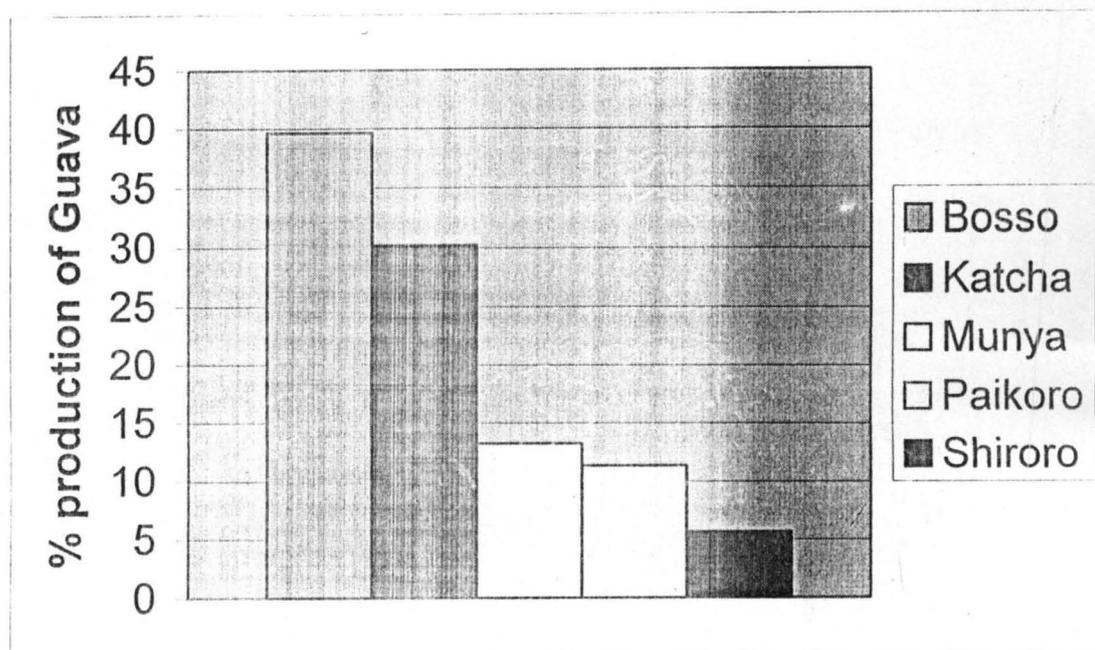


Fig. 17: Histogram representing the % production of Guava in Niger state L.G.A.

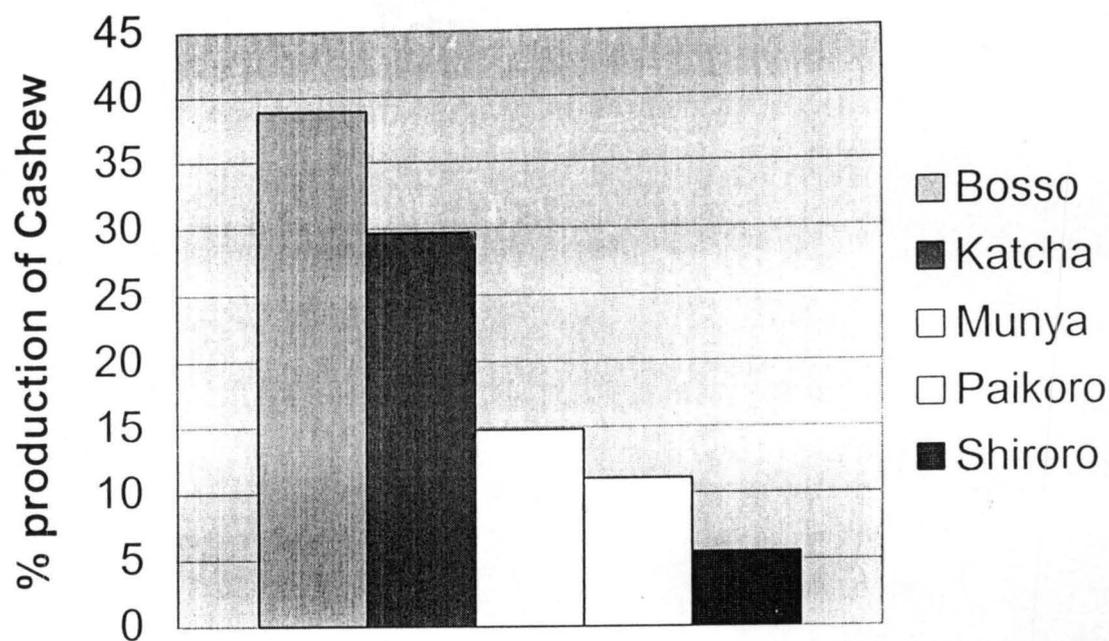


Fig. 18: Histogram representing the % production of Cashew in Niger state L.G.A.

Table 22. Summary of vegetable production figures in Niger state on L.G.A basis in %

<i>Vegetables</i>	<i>Bosso</i>	<i>Katcha</i>	<i>Munya</i>	<i>Paikoro</i>	<i>Shiroro</i>
Tomatoes	38.33	25	11.67	13.33	11.67
Okro	36.21	24.14	17.24	10.35	12.07
Potatoes	47.92	33.33	-	4.17	14.58
Onions	-	-	100	-	-
W/mellon	-	-	-	-	-
Garbage	-	-	-	-	-
Carrot	-	-	-	-	-
Garlic	-	-	-	-	-
Garlic	-	-	-	-	-

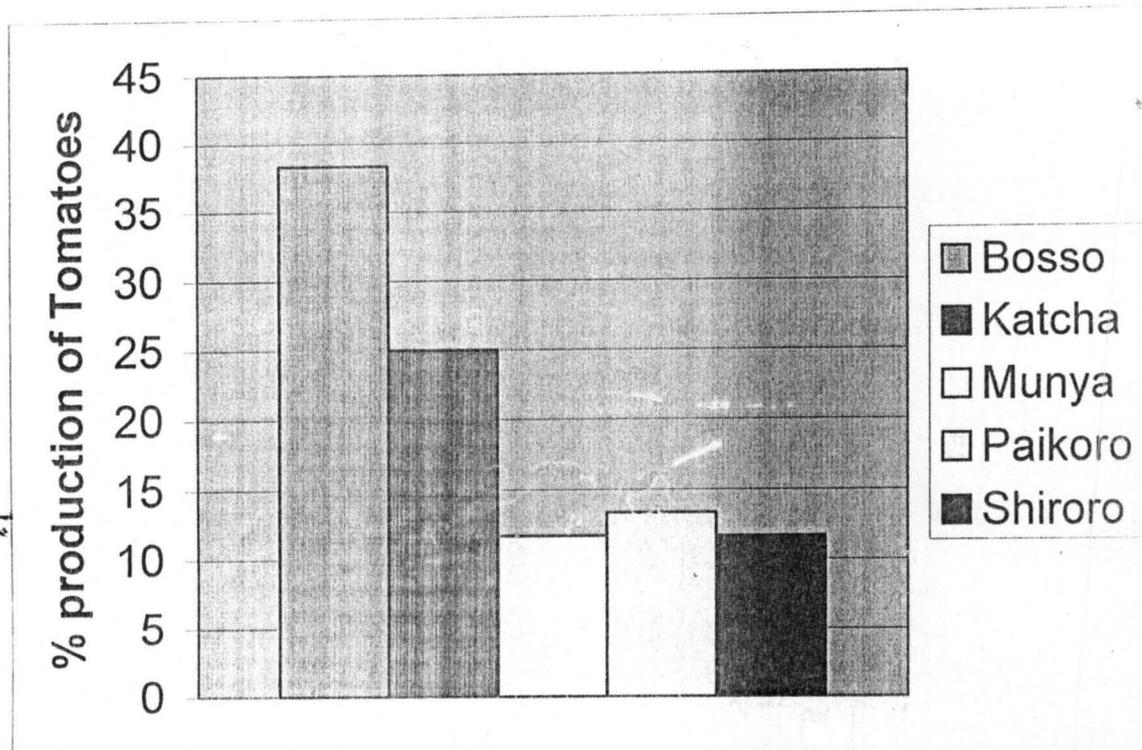


Fig. 19: Histogram representing the % production of Tomatoes in Niger state L.G.A.

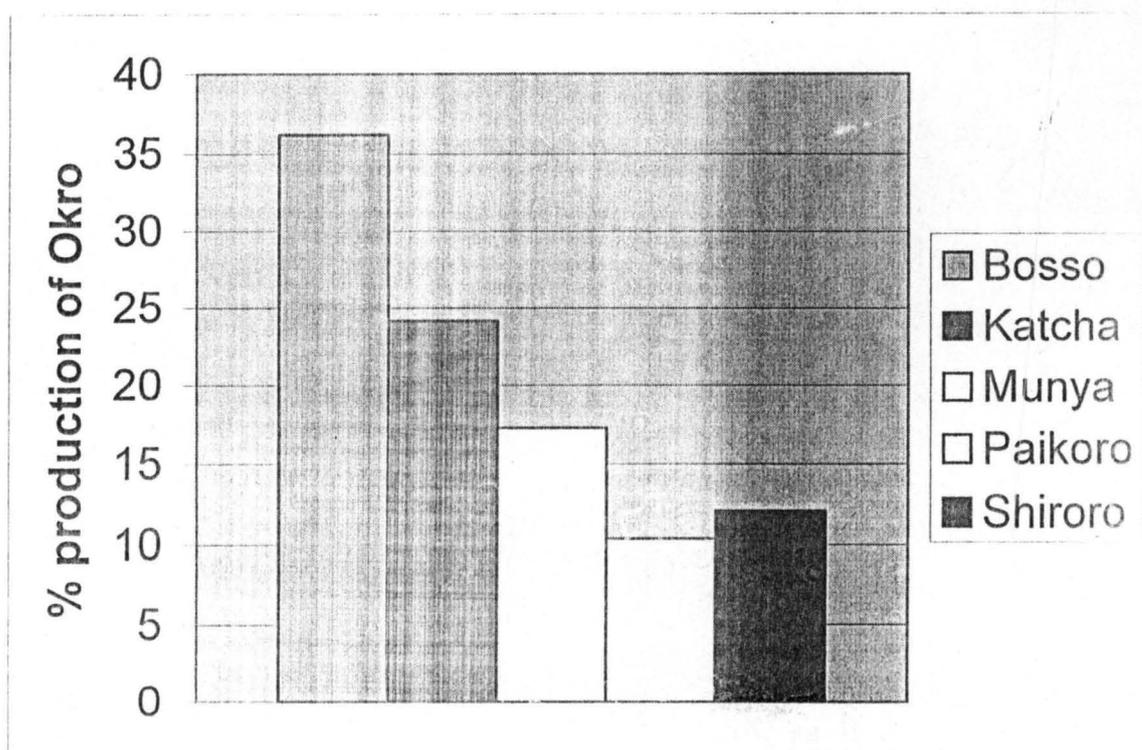


Fig. 20: Histogram representing the % production of Okro in Niger state L.G.A.

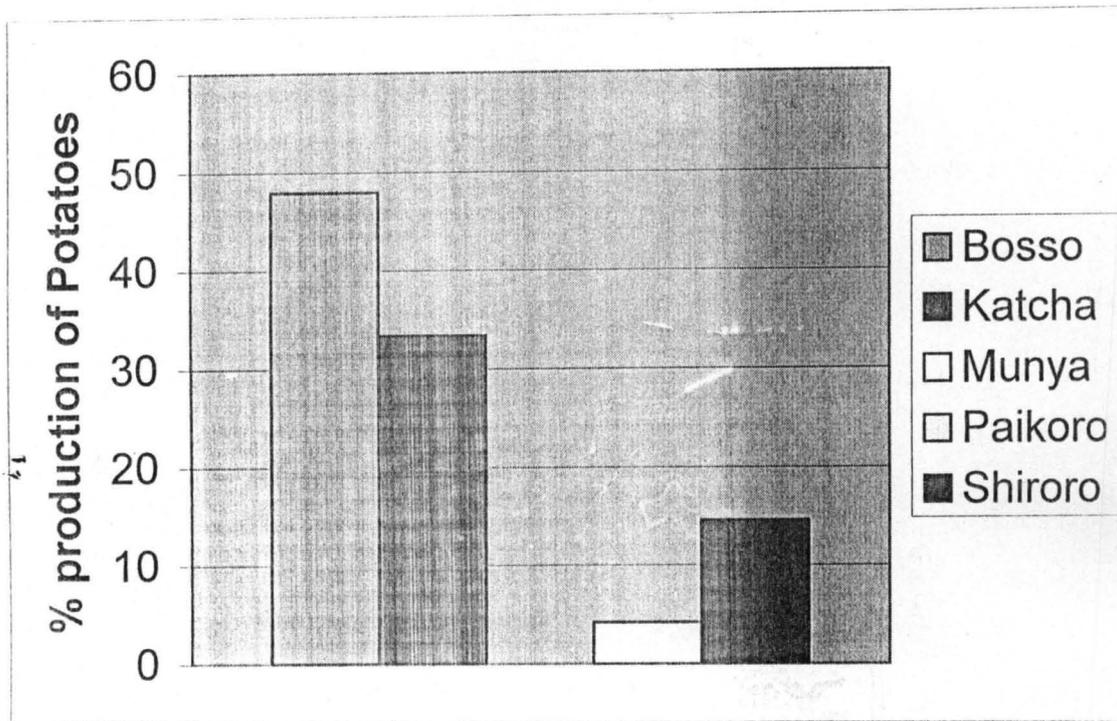


Fig. 21: Histogram representing the % production of Potatoes in Niger state L.G.A.

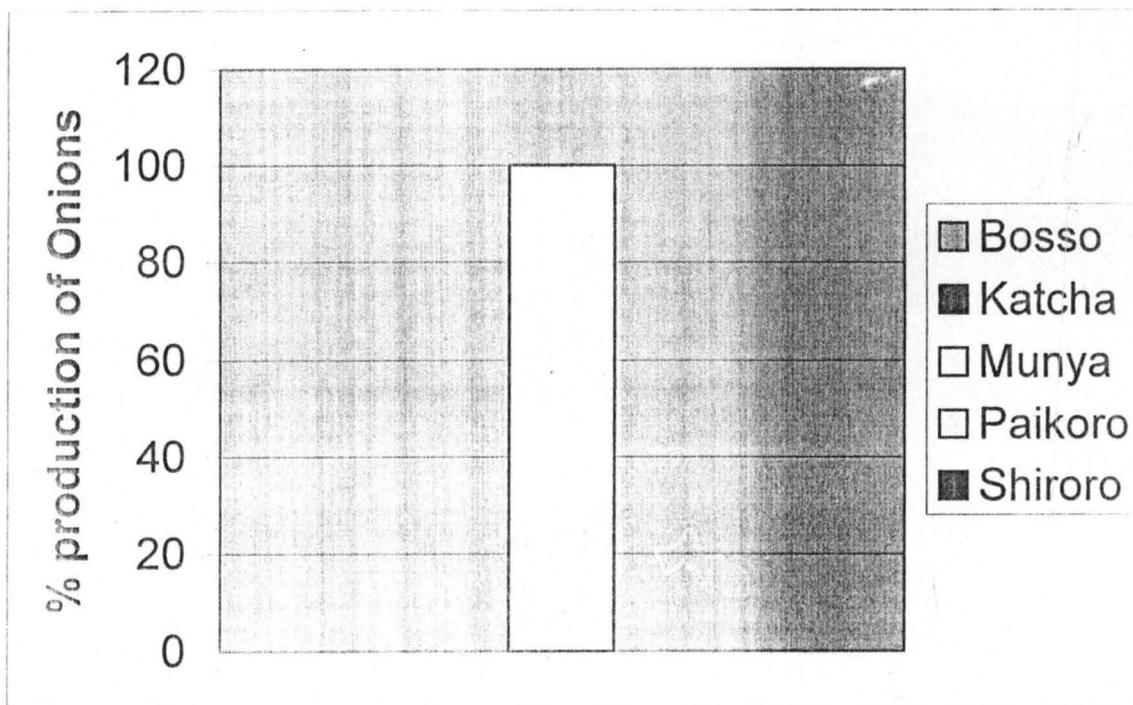
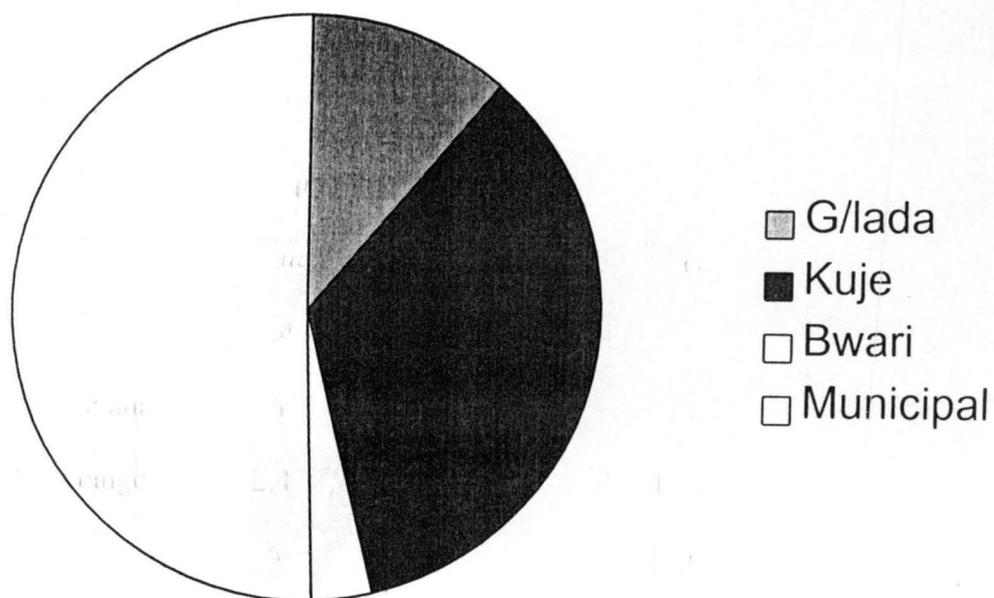


Fig. 22: Histogram representing the % production of Onions in Niger state L.G.A.

#### 4.1 QUANTIFYING IN TONS (t)/ANNUM

**Table 23. Quantifying of fruits produced in Abuja L.G.A in tons/annum**

<i>Fruits</i>	<i>G/lada</i>	<i>Kuje</i>	<i>Bwari</i>	<i>Municipal</i>	<i>Total</i>
Orange	10.4	32.8	3.2	47.2	93.6
Banana	8.6	19.0	14.0	17.8	59.4
Mango	12.4	36.2	4.0	48.2	100.8
Cashew	5.6	8.4	-	12.0	26.0
Guava	2.4	7.6	3.2	27.6	40.8
Apple	-	-	-	1.6	1.6
Pineapple	-	-	-	15.4	15.4



**Fig 23: Quantity of Orange produced in Abuja L.G.A. in tons/annum.**

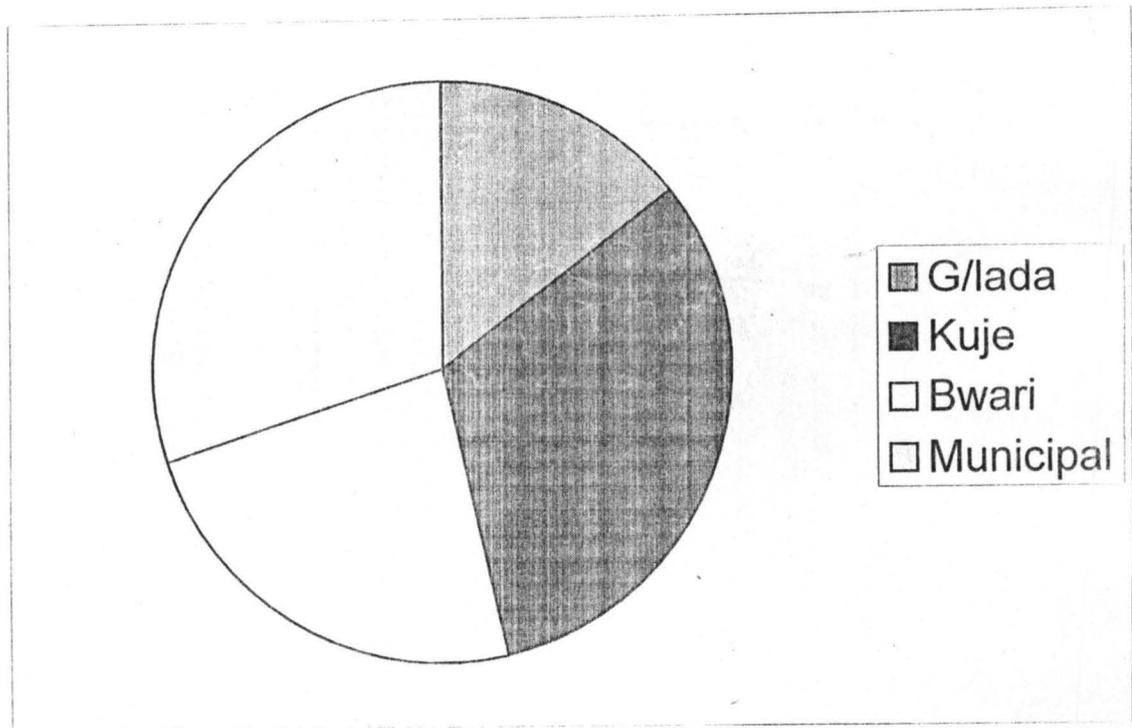


Fig 24: Quantity of Banana produced in Abuja L.G.A. in tons/annum.

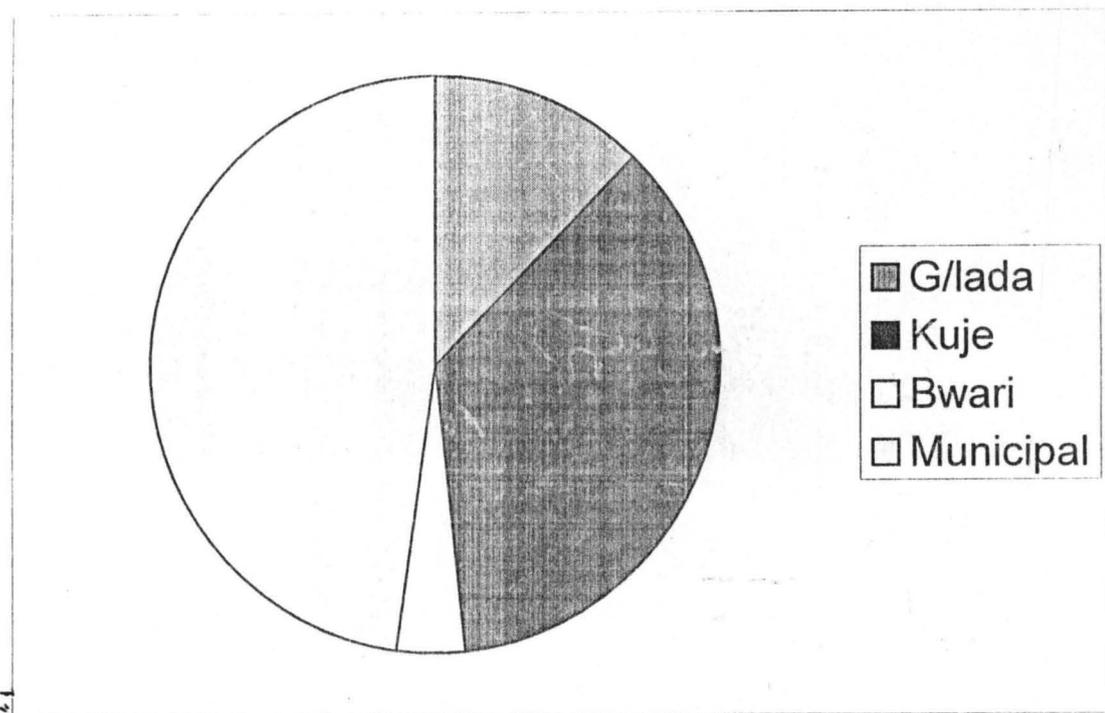


Fig 25: Quantity of Mango produced in Abuja L.G.A. in tons/annum.

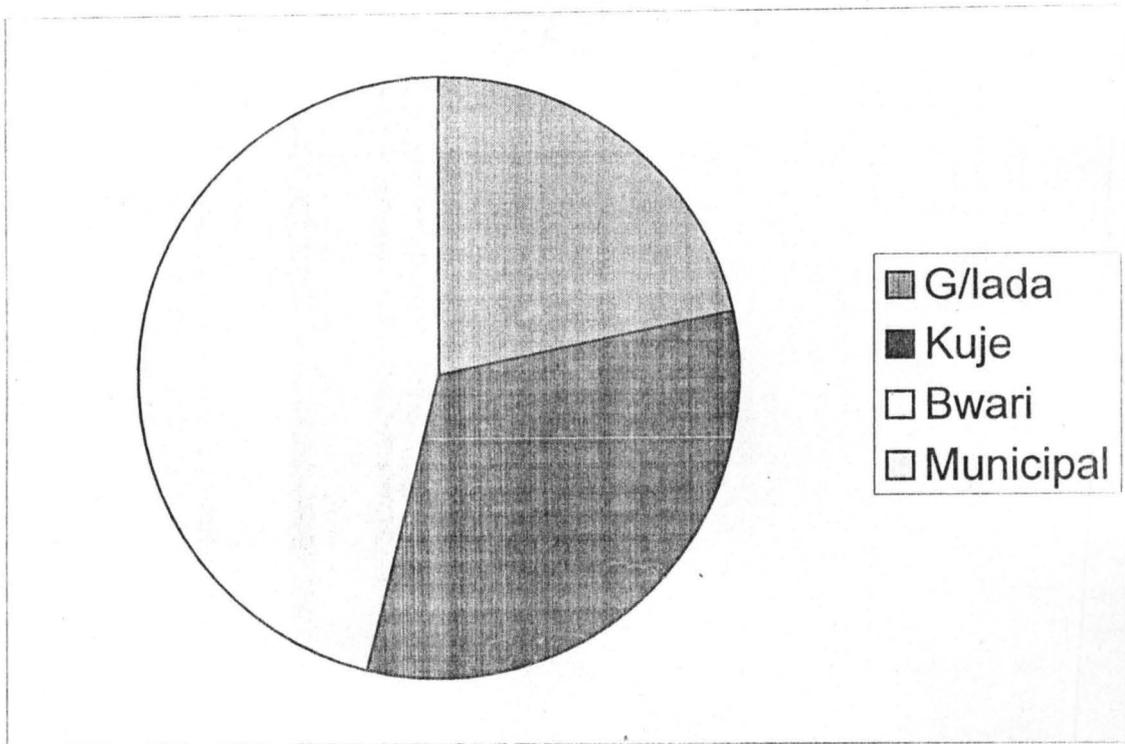


Fig 26: Quantity of Cashew produced in Abuja L.G.A. in tons/annum.

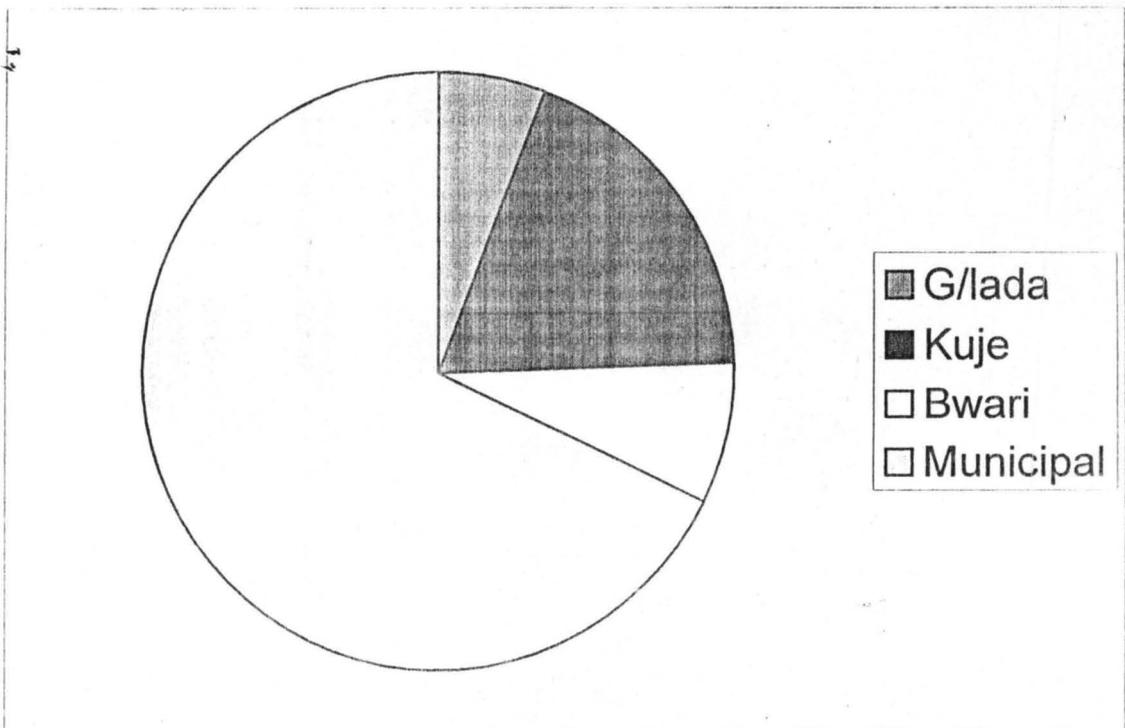
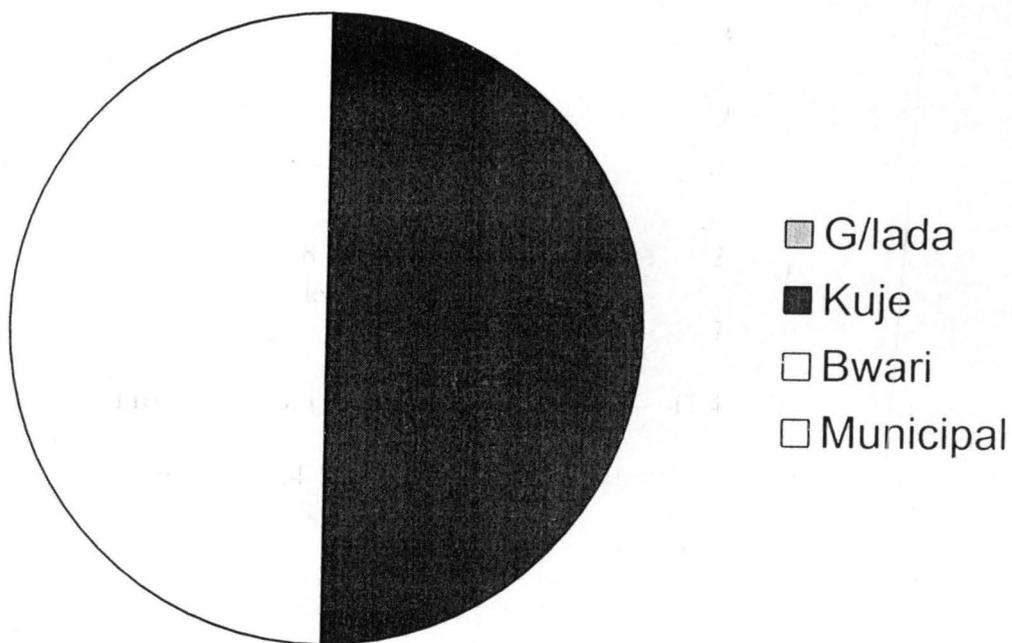


Fig 27: Quantity of Guava produced in Abuja L.G.A. in tons/annum.

**Table 24. Quantity of vegetables produced in Abuja L.G.A. in tons/annum**

<i>Vegetables</i>	<i>G/lada</i>	<i>Kuje</i>	<i>Bwari</i>	<i>Municipal</i>	<i>Total</i>
Carrots	-	0.8	-	0.8	1.6
Potatoes	23.8	4.8	31.8	37.2	97.6
Tomatoes	22	3.8	53.6	46.7	126.1
Okro	20.6	4.8	56.8	47.4	129.6
Garbage	2.4	-	2.4	-	4.8
W/mellon	-	-	3.0	4.8	7.8
Onions	-	-	-	-	-
Garlic	-	-	-	-	-



**Fig 28: Quantity of Carrots produced in Abuja L.G.A. in tons/annum.**

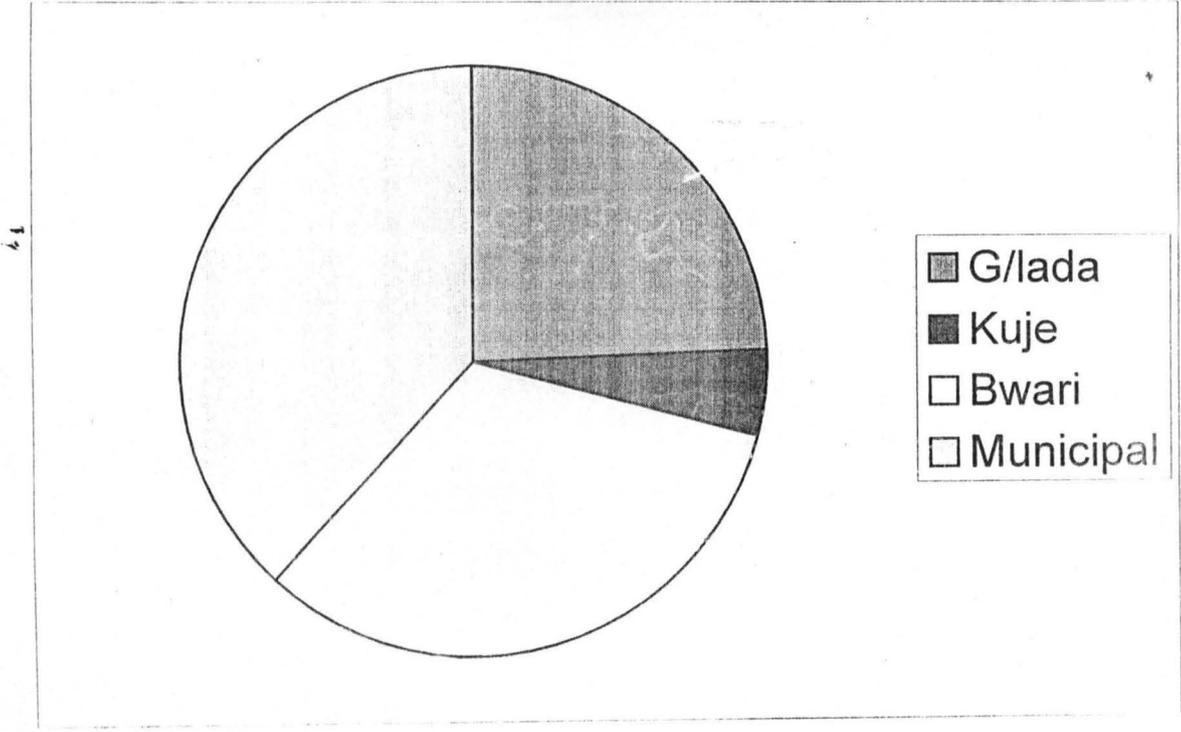


Fig 29: Quantity of Potatoes produced in Abuja L.G.A. in tons/annum.

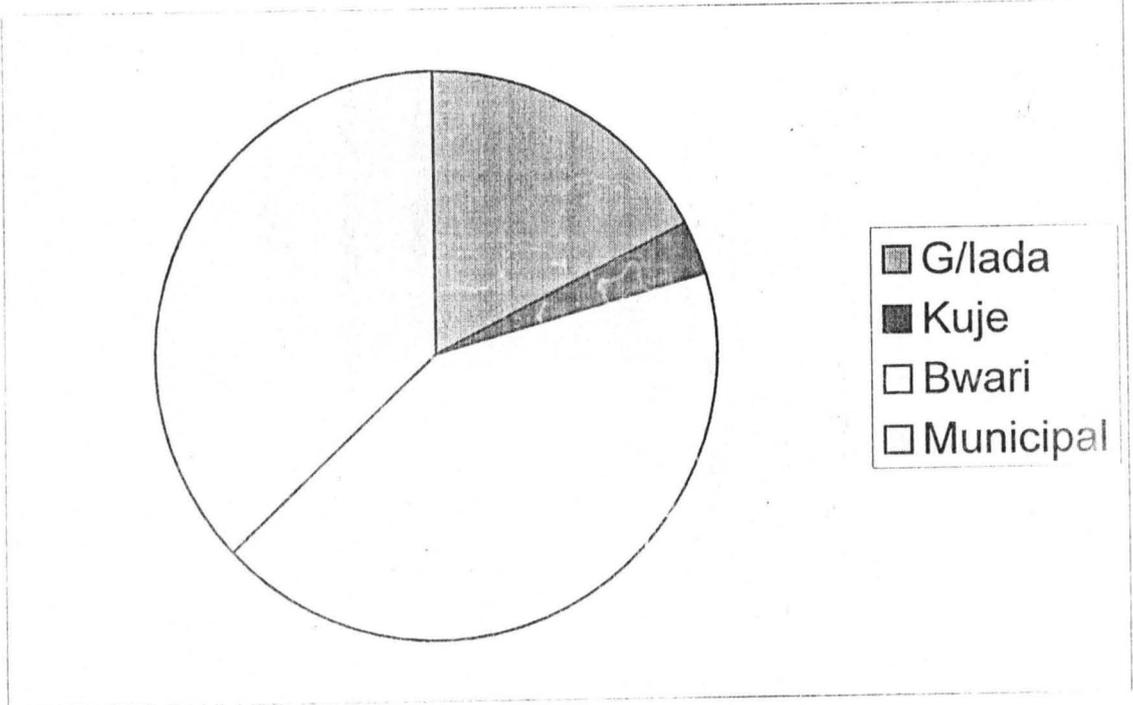


Fig 30: Quantity of Tomatoes produced in Abuja L.G.A. in tons/annum.

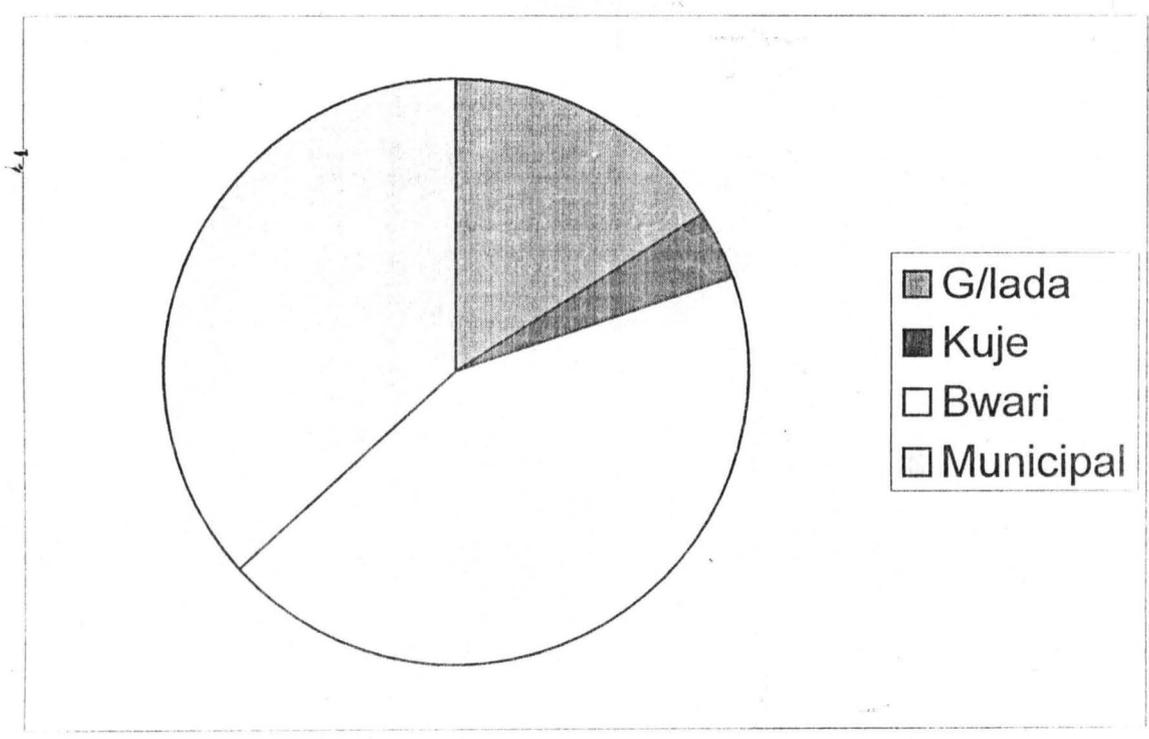


Fig 31: Quantity of Okro produced in Abuja L.G.A. in tons/annum.

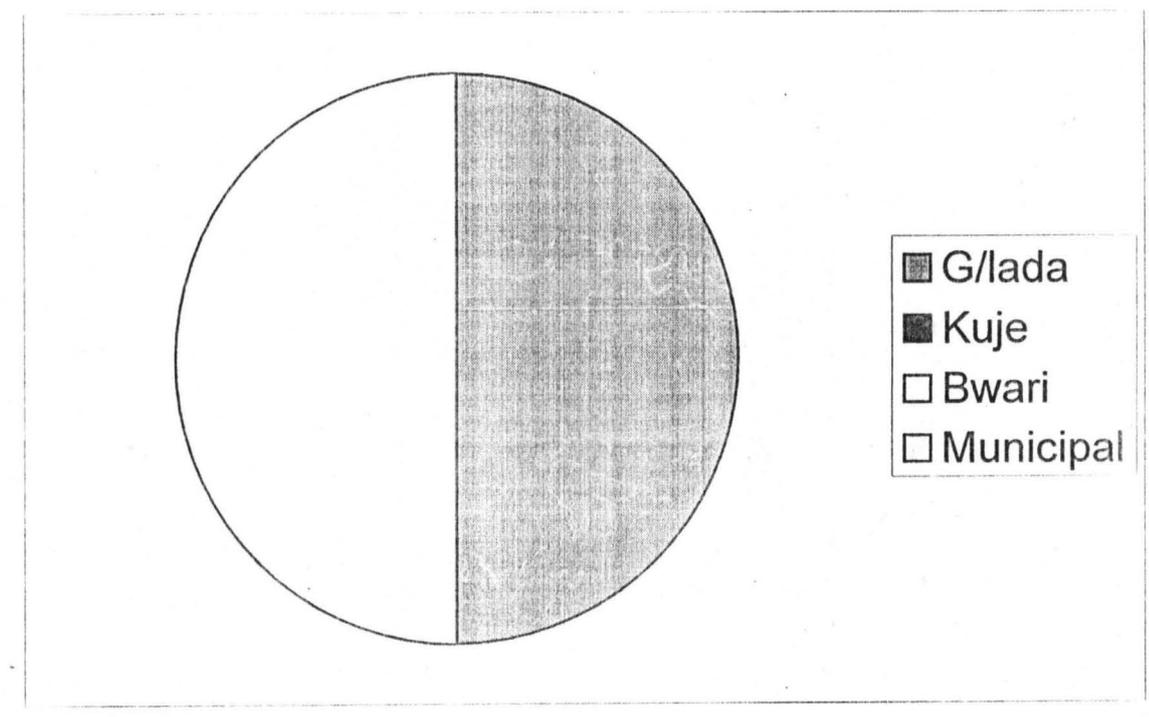
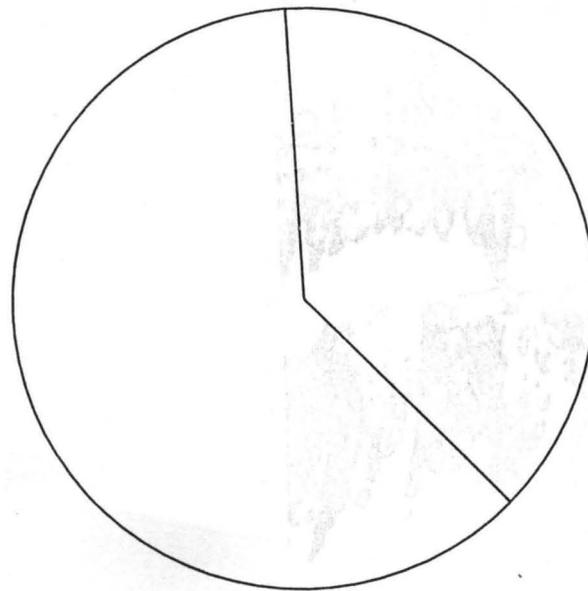


Fig 32: Quantity of Garbage produced in Abuja L.G.A. in tons/annum.



- G/lada
- Kuje
- Bwari
- Municipal

Fig 33: Quantity of W/mellon produced in Abuja L.G.A. in tons/annum.

Table 25. Quantity of fruits produced in Niger state L.G.A. in tons/annum

<i>Fruits</i>	<i>Katcha</i>	<i>Bosso</i>	<i>Munya</i>	<i>Shiroro</i>	<i>Paikoro</i>	<i>Total</i>
Mango	12.8	20.2	10.4	17.8	21.8	83.0
Guava	12.8	16.8	9.2	2.8	6.8	48.4
Cashew	12.8	16.8	6.4	2.8	6.8	45.6
Banana	-	2.4	1.6	-	-	4.0
Orange	5.6	2.4	14.0	7.4	8.0	37.4
Pineapple	-	-	-	-	-	-
Apple	-	-	-	-	-	-

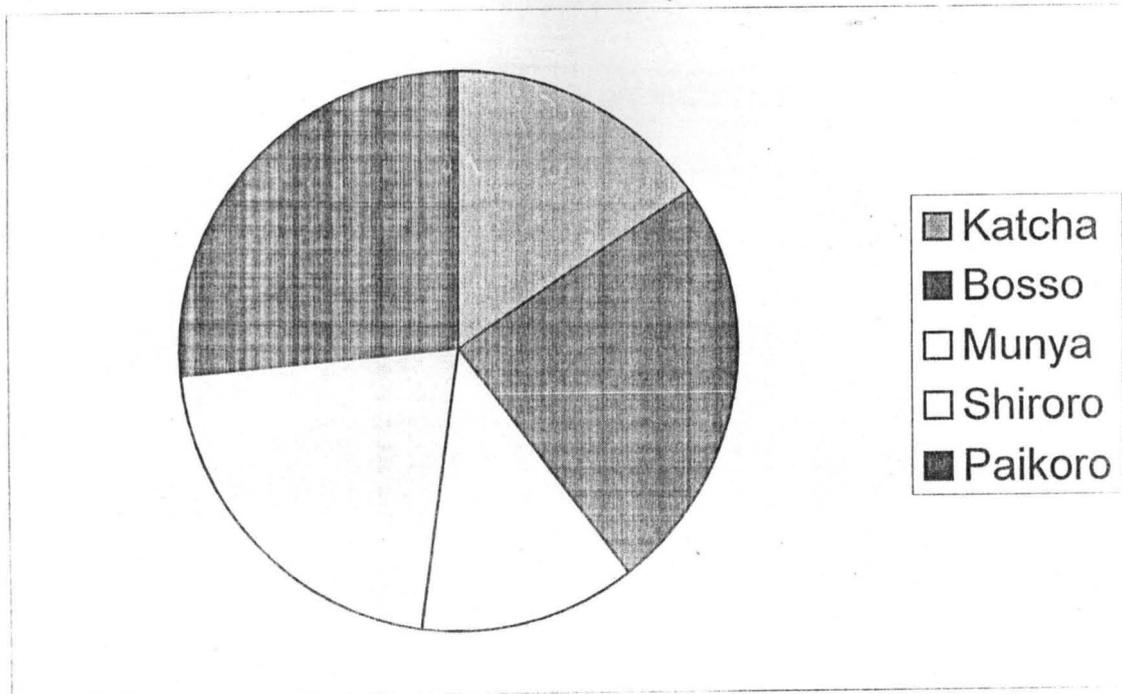


Fig 34: Quantity of Mango produced in Niger state L.G.A. in tons/annum.

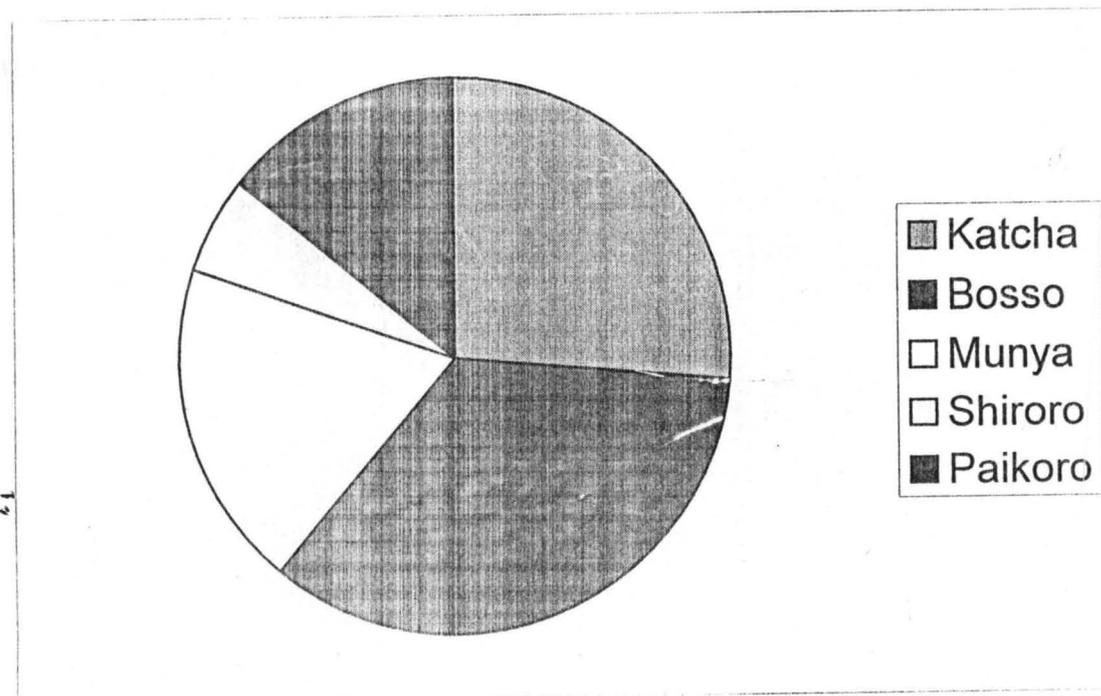


Fig 35: Quantity of Guava produced in Niger state L.G.A. in tons/annum.

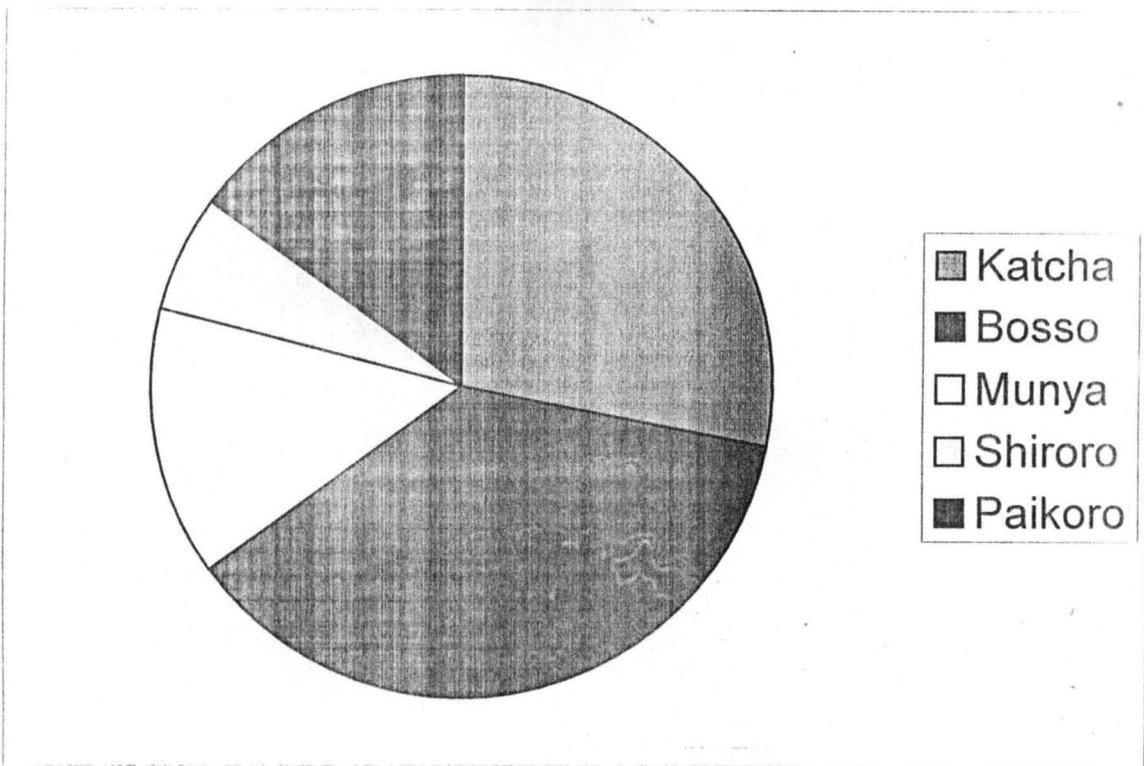


Fig 36: Quantity of Cashew produced in Niger state L.G.A. in tons/annum.

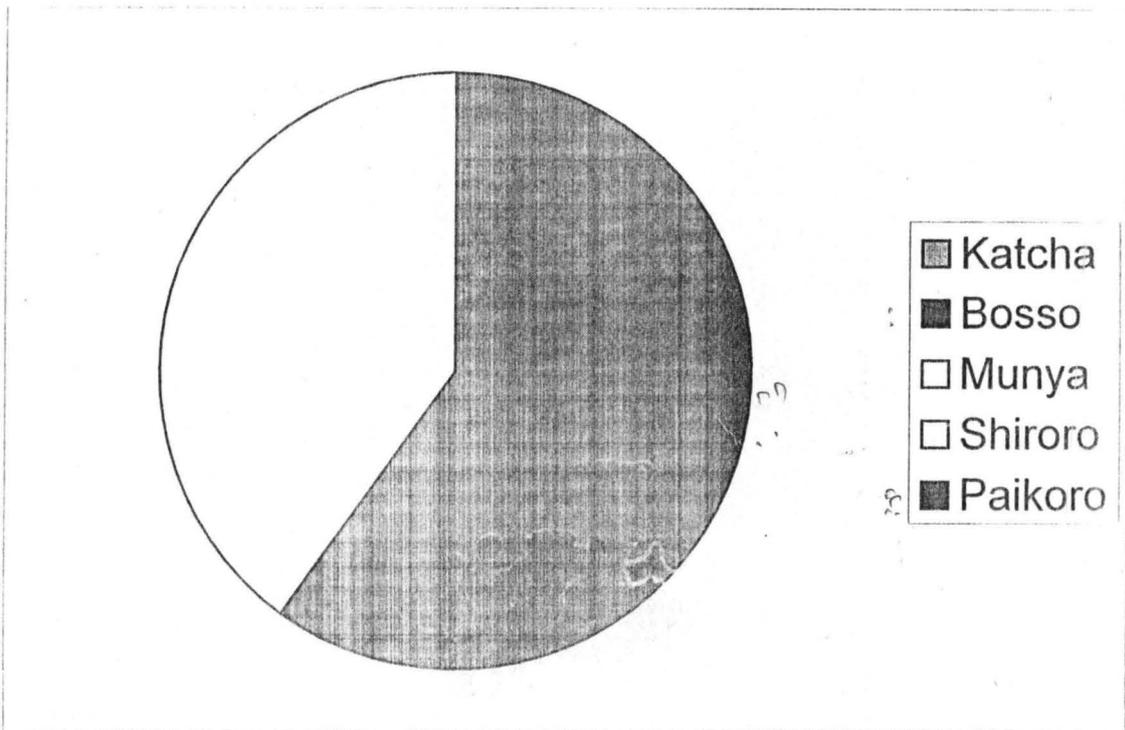


Fig 37: Quantity of Banana produced in Niger state L.G.A. in tons/annum.

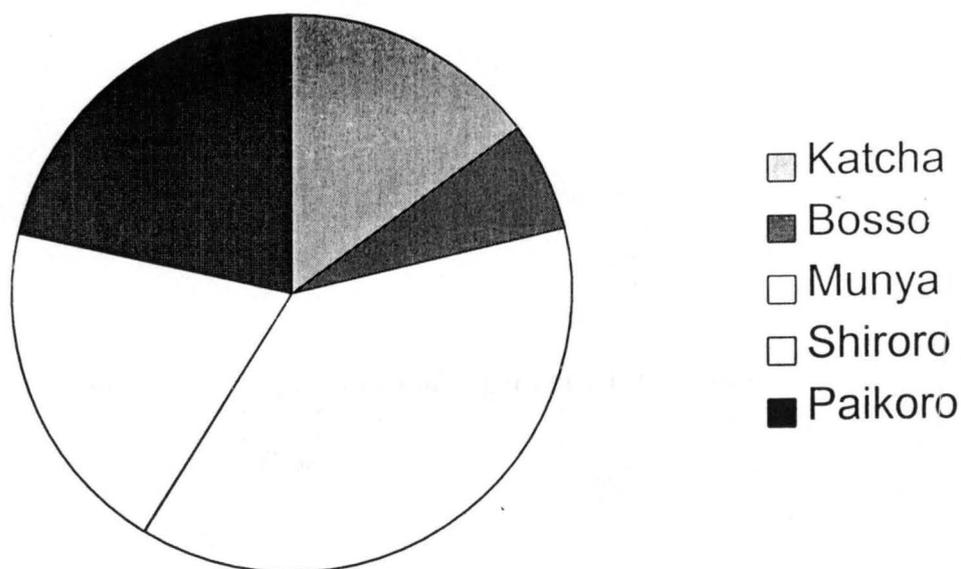


Fig 38: Quantity of Orange produced in Niger state L.G.A. in tons/annum.

Table 26. Quantity of vegetables produced in Niger state L.G.A. in tons/annum

<i>Vegetables</i>	<i>Katcha</i>	<i>Bosso</i>	<i>Munya</i>	<i>Shiroro</i>	<i>Paikoro</i>	<i>Total</i>
Tomatoes	16.2	36.0	14.0	5.6	8.8	80.6
Okro	13.8	33.2	17.6	9.2	7.2	81.0
Potatoes	29.4	35.0	-	7.8	4.0	76.2
Onions	-	-	1.6	-	-	1.6
Carrots	-	-	-	-	-	-
Garbage	-	-	-	-	-	-
Garlic	-	-	-	-	-	-
W/mellon	-	-	-	-	-	-

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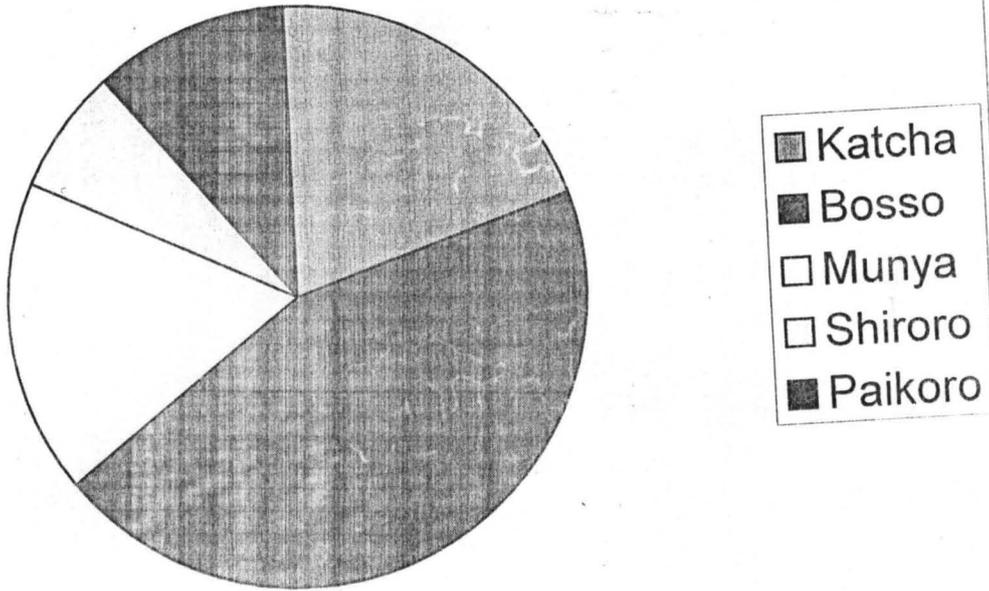


Fig 39: Quantity of Tomatoes produced in Niger state L.G.A. in tons/annum.

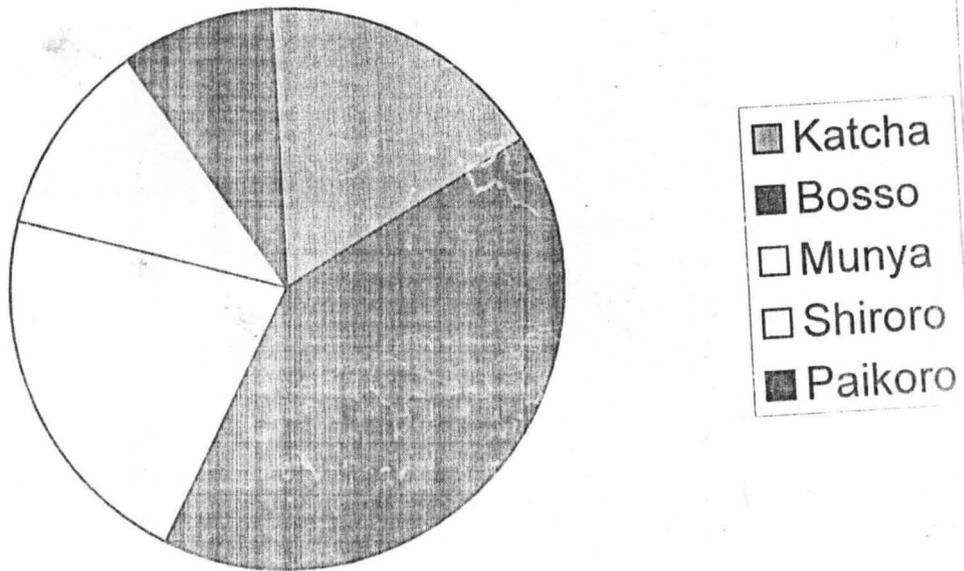


Fig 40: Quantity of Okro produced in Niger state L.G.A. in tons/annum.

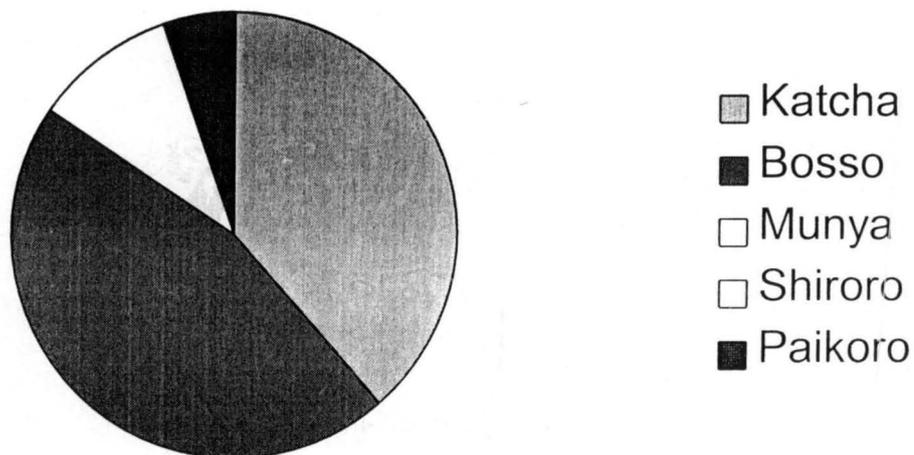


Fig 41: Quantity of Potatoes produced in Niger state L.G.A. in tons/annum.

Table 27. Quantity of vegetables processed in Abuja L.G.A. in tons/annum

<i>Vegetable</i>	<i>G/lada</i>	<i>Kuje</i>	<i>Bwari</i>	<i>Municipal</i>	<i>Total</i>
Carrots	-	-	-	-	-
Potatoes	12.5	3.0	17.5	0.8s	33.8
Tomatoes	6.4	2.5	9.0	-	17.9
Okro	5.5	3.0	28.0	4.0	40.5
Garbage	-	-	-	-	-
W/mellon	-	-	-	-	-
Onions	-	-	-	-	-
Garlic	-	-	-	-	-

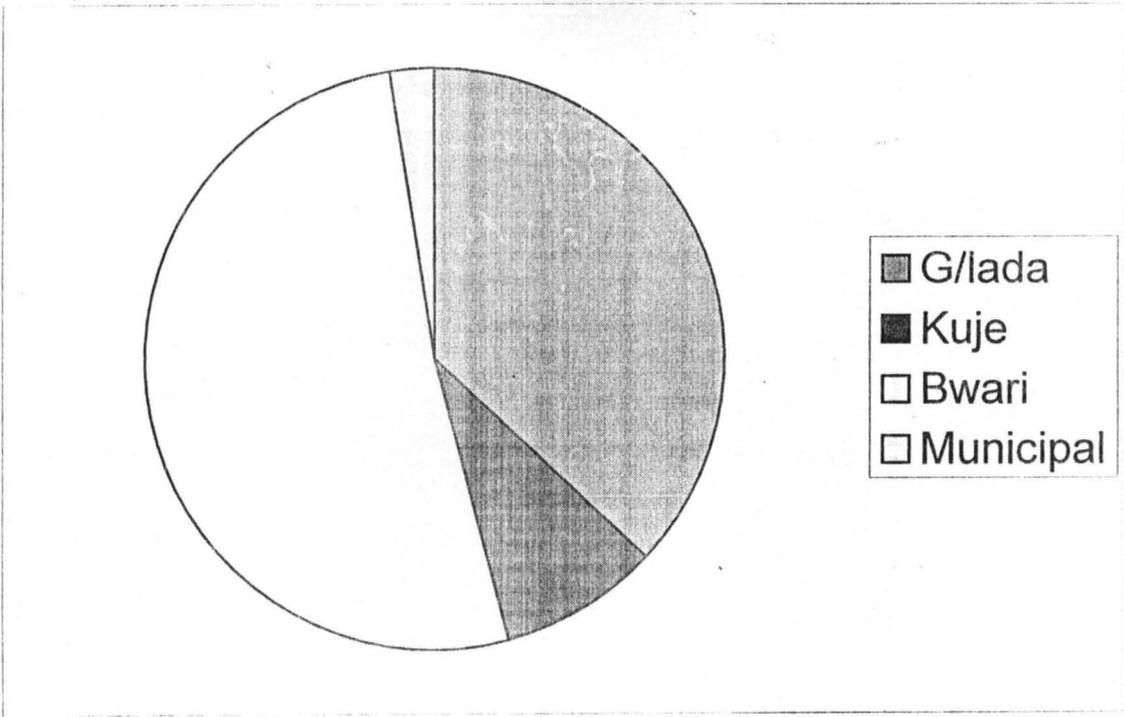


Fig 42: Quantity of Potatoes processed in Abuja L.G.A. in tons/annum.

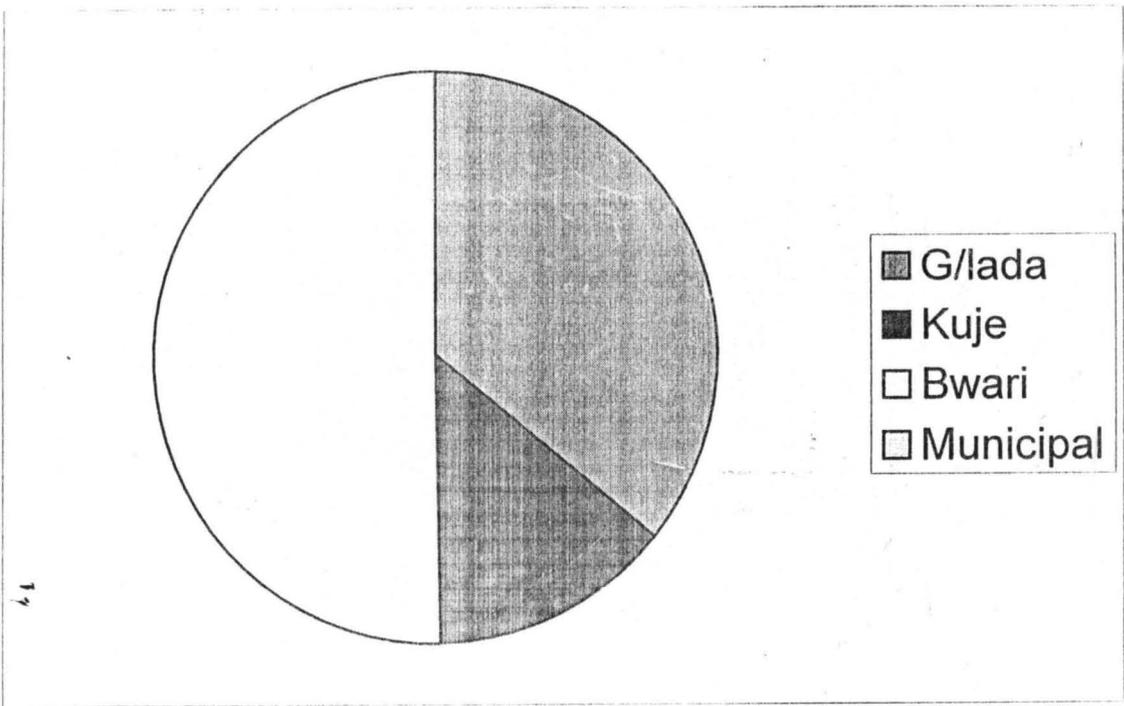


Fig 43: Quantity of Tomatoes processed in Abuja L.G.A. in tons/annum.

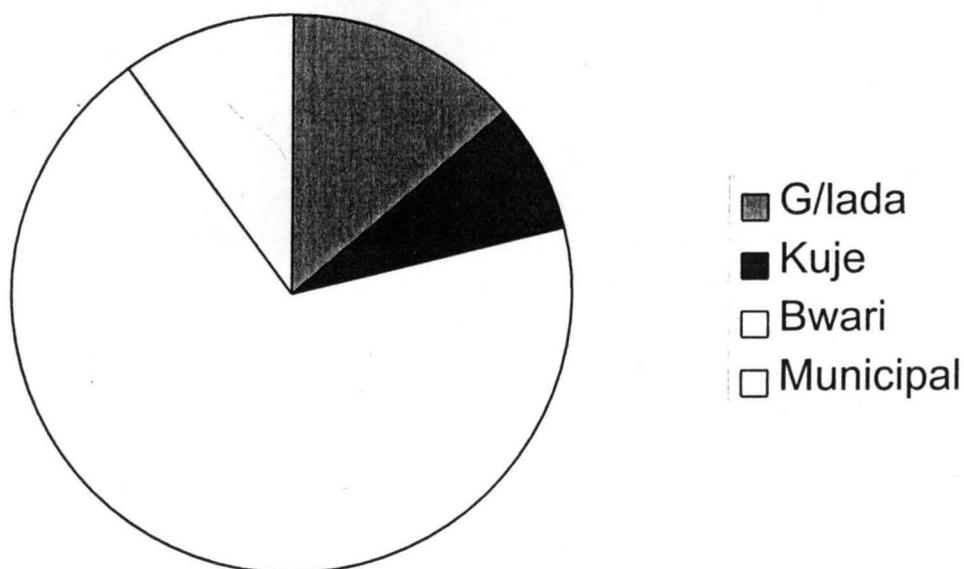


Fig 44: Quantity of Okro processed in Abuja L.G.A. in tons/annum.

Table 28. Quantity of processed vegetables in Niger state L.G.A. in tons/annum

<i>Vegetable</i>	<i>Bosso</i>	<i>Katcha</i>	<i>Munya</i>	<i>Paikoro</i>	<i>Shiroro</i>	<i>L.G.A</i>
Tomatoes	11.0	-	6.0	-	-	17.0
Okro	13.5	-	6.0	-	1.0	20.5
Potatoes	9.5	-	-	-	-	9.5
Carrots	-	-	-	-	-	-
Onions	-	-	-	-	-	-
Garbage	-	-	-	-	-	-
W/mellons	-	-	-	-	-	-
Garlic	-	-	-	-	-	-

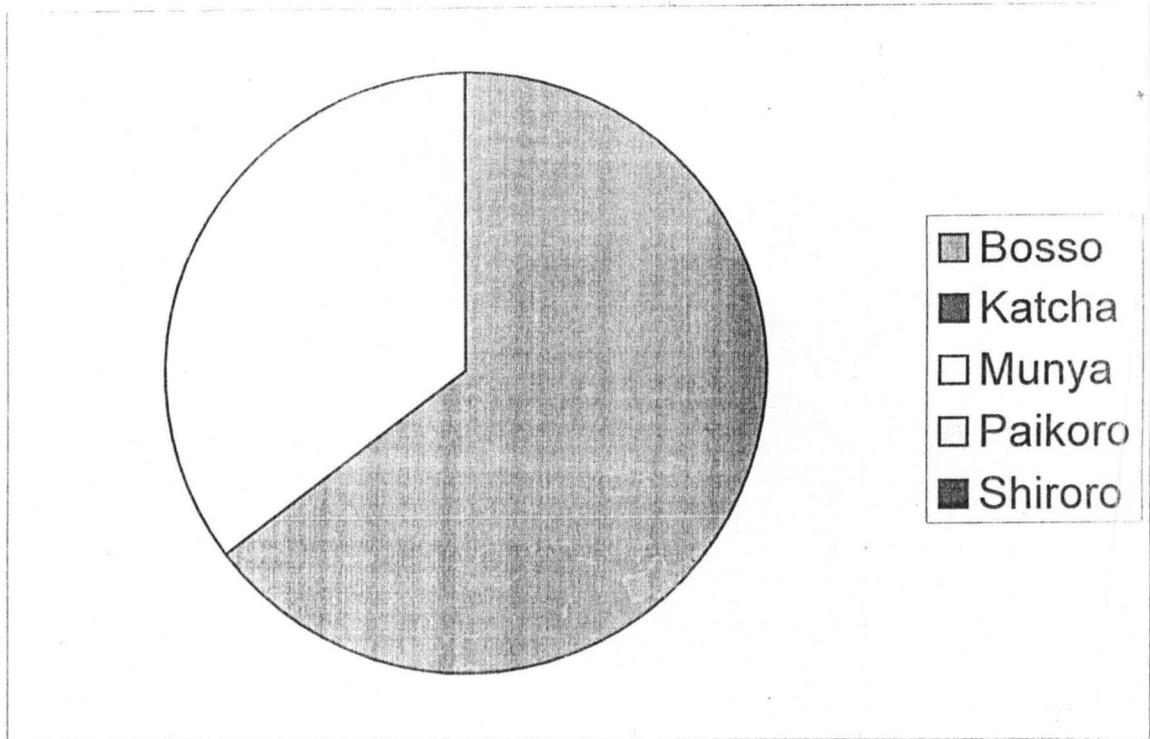


Fig 45: Quantity of Tomatoes processed in Niger State L.G.A. in tons/annum.

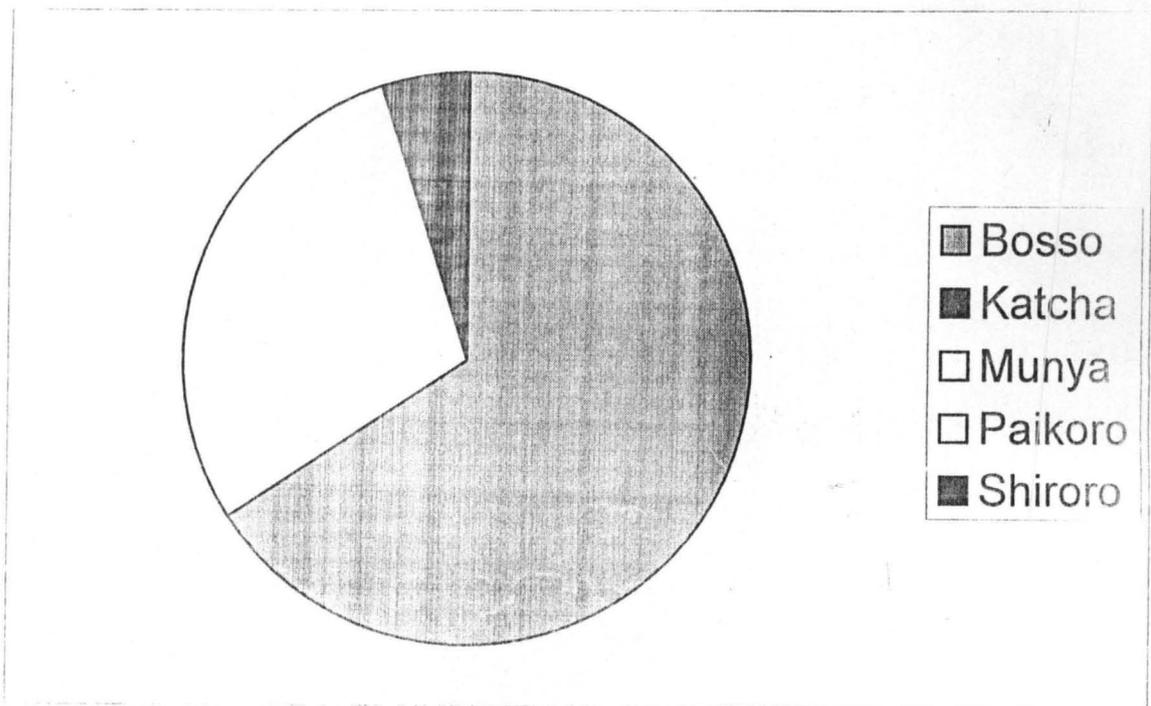


Fig 46: Quantity of Okro processed in Niger State L.G.A. in tons/annum.

**Table 29. Quantity of vegetables processed in G/lada L.G.A. in %**

<i>Vegetables</i>	<i>Production figure (tons)</i>	<i>Processed figure (tons)</i>	<i>% Processed</i>
Carrots	-	-	-
Potatoes	23.8	12.5	52.52
Tomatoes	22.0	6.4	29.09
Okro	20.6	5.5	26.70
Garbage	2.4	-	-
W/mellon	-	-	-
Onions	-	-	-
Garlic	-	-	-

**Table 30. Quantity of vegetables processed in Kuje L.G.A. in %**

<i>Vegetables</i>	<i>Production figure (tons)</i>	<i>Processed figure (tons)</i>	<i>% Processed</i>
Carrots	0.8	-	-
Potatoes	4.8	3.0	66.67
Tomatoes	3.8	2.5	65.80
Okro	4.8	3.0	52.5
Garbage	-	-	-
W/mellon	-	-	-
Onions	-	-	-
Garlic	-	-	-

**Table 31. Quantity of vegetables processed in Bwari L.G.A. in %**

<i>Vegetables</i>	<i>Production figure (tons)</i>	<i>Processed figure (tons)</i>	<i>% Processed</i>
Carrots	-	-	-
Potatoes	31.8	17.5	55.03
Tomatoes	53.6	9.0	16.79
Okro	56.8	28.0	49.30
Garbage	2.4	-	-
W/mellon	3.0	-	-
Onions	-	-	-
Garlic	-	-	-

**Table 32. Quantity of vegetables processed in Municipal L.G.A. in %**

<i>Vegetables</i>	<i>Production figure (tons)</i>	<i>Processed figure (tons)</i>	<i>% Processed</i>
Carrots	0.8	-	-
Potatoes	37.2	0.8	2.15
Tomatoes	46.7	-	-
Okro	47.4	4.0	8.44
Garbage	-	-	-
W/mellon	4.8	-	-
Onions	-	-	-
Garlic	-	-	-

**Table 33. Summary of vegetables processed in Abuja on L.G.A. basis in %**

L.G.A	Carrots	Potatoes	Tomatoes	Okro	Garbage	W/mellon	Onions	Garlic	Total
G/lada	-	52.52	29.09	26.70	-	-	-	-	108.31
Bwari	-	55.03	16.79	49.30	-	-	-	-	121.12
Kuje	-	66.67	65.80	62.5	-	-	-	-	194.97
Municipal	-	2.15	-	8.44	-	-	-	-	8.44

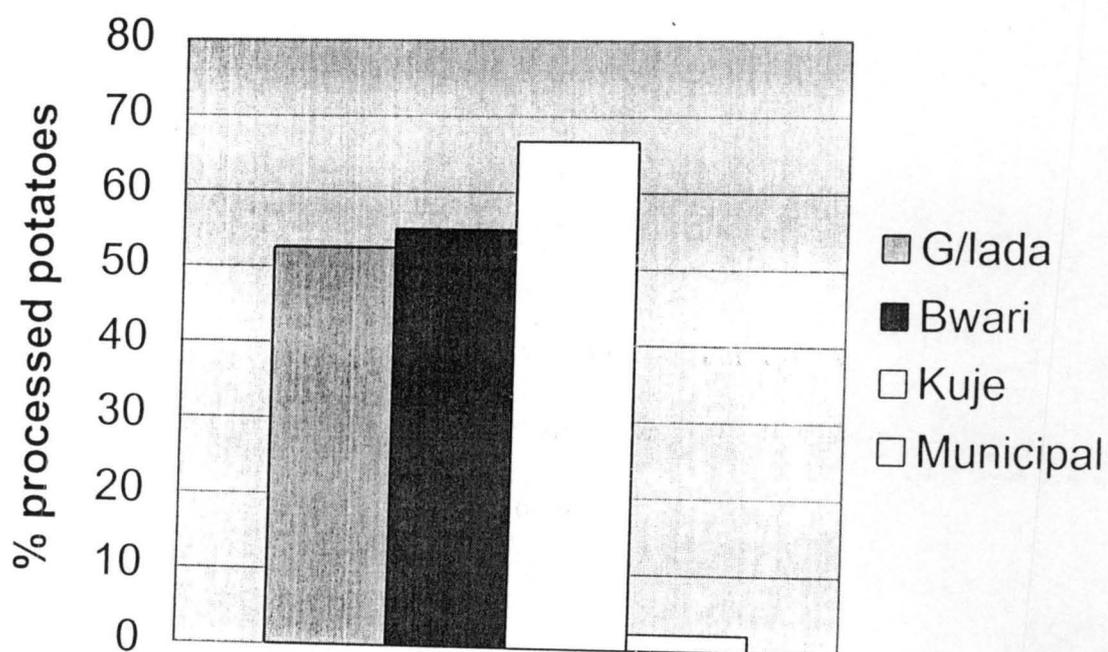


Fig 47: % processed Potatoes in Abuja L.G.A.

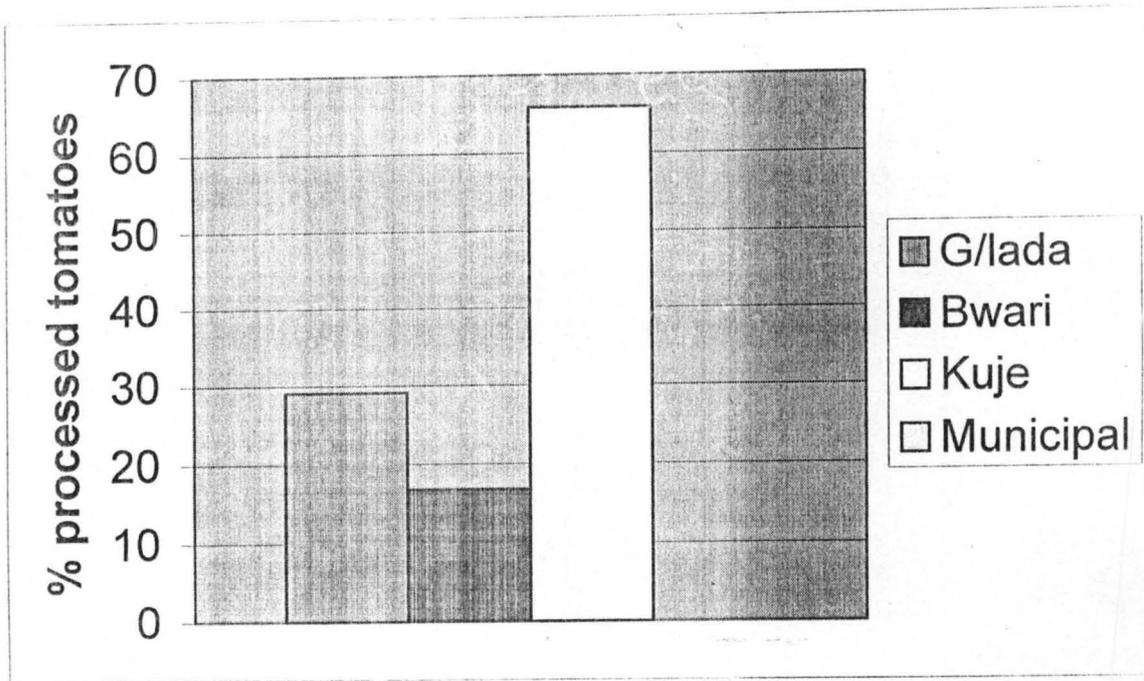


Fig 48: % processed Tomatoes in Abuja L.G.A.

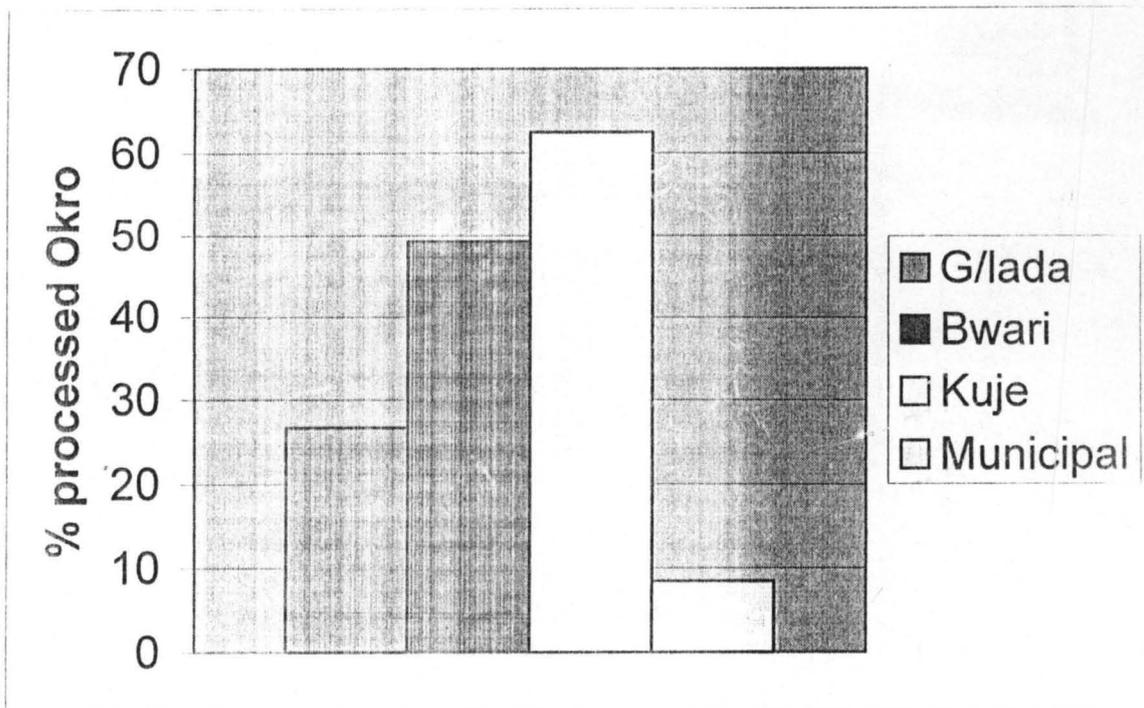


Fig 49: % processed Okro in Abuja L.G.A.

**Table 34. Quantity of vegetables processed in Katcha L.G.A. in %**

<i>Vegetables</i>	<i>Production figure (tons)</i>	<i>Processed figure (tons)</i>	<i>% Processed</i>
Carrots	-	-	-
Potatoes	29.4	-	-
Tomatoes	16.2	-	-
Okro	13.2	-	-
Garbage	-	-	-
W/mellon	-	-	-
Onions	-	-	-
Garlic	-	-	-

**Table 35. Quantity of vegetables processed in Bosso L.G.A. in %**

<i>Vegetables</i>	<i>Production figure (tons)</i>	<i>Processed figure (tons)</i>	<i>% Processed</i>
Carrots	-	-	-
Potatoes	35.0	9.5	27.14
Tomatoes	36.0	11.0	30.56
Okro	33.0	13.5	40.91
Garbage	-	-	-
W/mellon	-	-	-
Onions	-	-	-
Garlic	-	-	-

**Table 36. Quantity of vegetables processed in Munya L.G.A. in %**

<i>Vegetables</i>	<i>Production figure (tons)</i>	<i>Processed figure (tons)</i>	<i>% Processed</i>
Carrots	-	-	-
Potatoes	-	-	-
Tomatoes	14.0	6.0	42.86
Okro	17.6	6.0	34.09
Garbage	-	-	-
W/mellon	-	-	-
Onions	16.0	-	-
Garlic	-	-	-

**Table 37. Quantity of vegetables processed in Shiroro L.G.A. in %**

<i>Vegetables</i>	<i>Production figure (tons)</i>	<i>Processed figure (tons)</i>	<i>% Processed</i>
Carrots	-	-	-
Potatoes	7.8	-	-
Tomatoes	5.6	-	-
Okro	9.2	1.0	10.87
Garbage	-	-	-
W/mellon	-	-	-
Onions	-	-	-
Garlic	-	-	-

**Table 38. Quantity of vegetables processed in Paikoro L.G.A. in %**

<i>Vegetables</i>	<i>Production figure (tons)</i>	<i>Processed figure (tons)</i>	<i>% Processed</i>
Carrots	-	-	-
Potatoes	4.0	-	-
Tomatoes	8.8	-	-
Okro	7.2	-	-
Garbage	-	-	-
W/mellon	-	-	-
Onions	-	-	-
Garlic	-	-	-

**Table 42. Summary of vegetables processed in Niger state on L.G.A. basis in %**

<i>L.G.A</i>	<i>Carrots</i>	<i>Potatoes</i>	<i>Tomatoes</i>	<i>Okro</i>	<i>Garbage</i>	<i>W/mellon</i>	<i>Onions</i>	<i>Garlic</i>	<i>Total</i>
Katcha	-	-	-	-	-	-	-	-	108.31
Bosso	-	27.14	30.56	40.91	-	-	-	-	121.12
Munya	-	-	42.86	34.09	-	-	-	-	194.97
Shiroro	-	-	-	10.87	-	-	-	-	8.44
Paikoro	-	-	-	-	-	-	-	-	-

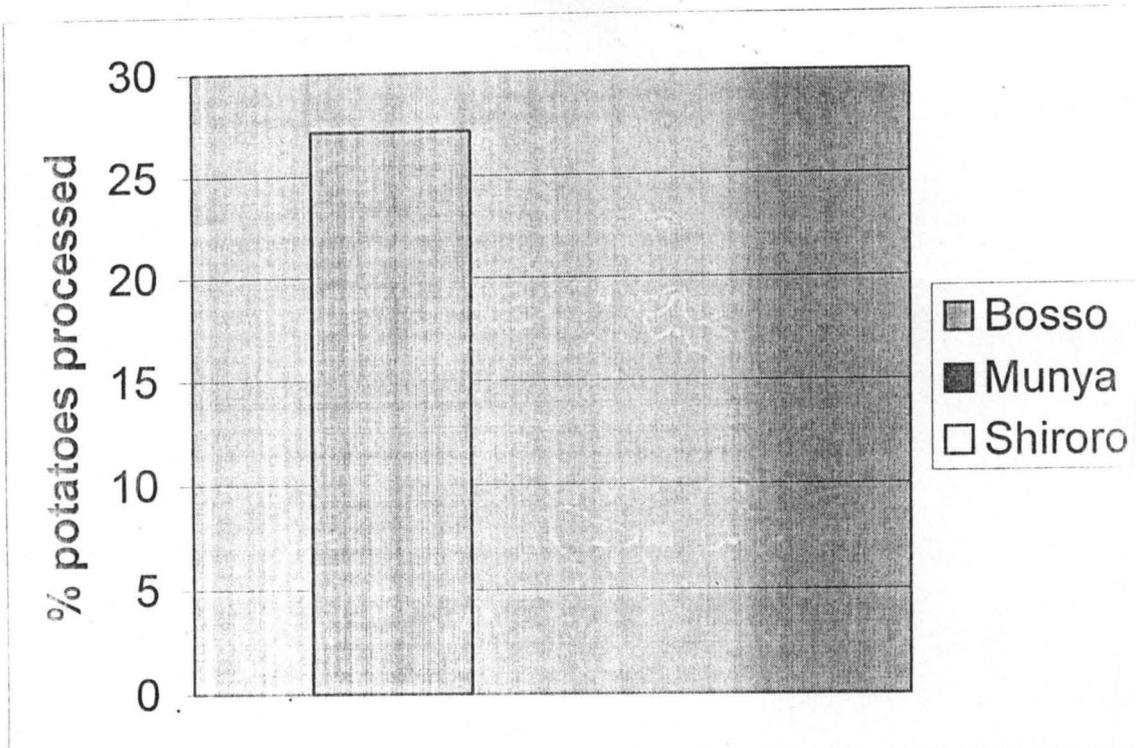


Fig 50: % processed Potatoes in Niger State L.G.A.

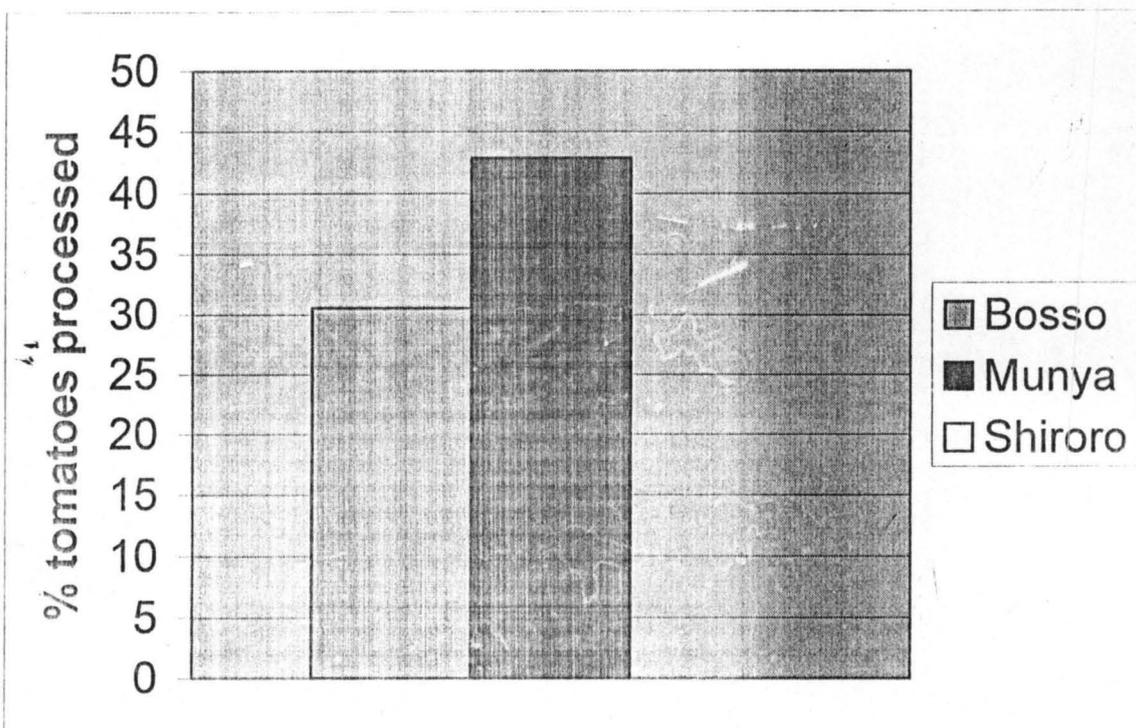


Fig 51: % processed Tomatoes in Niger State L.G.A.

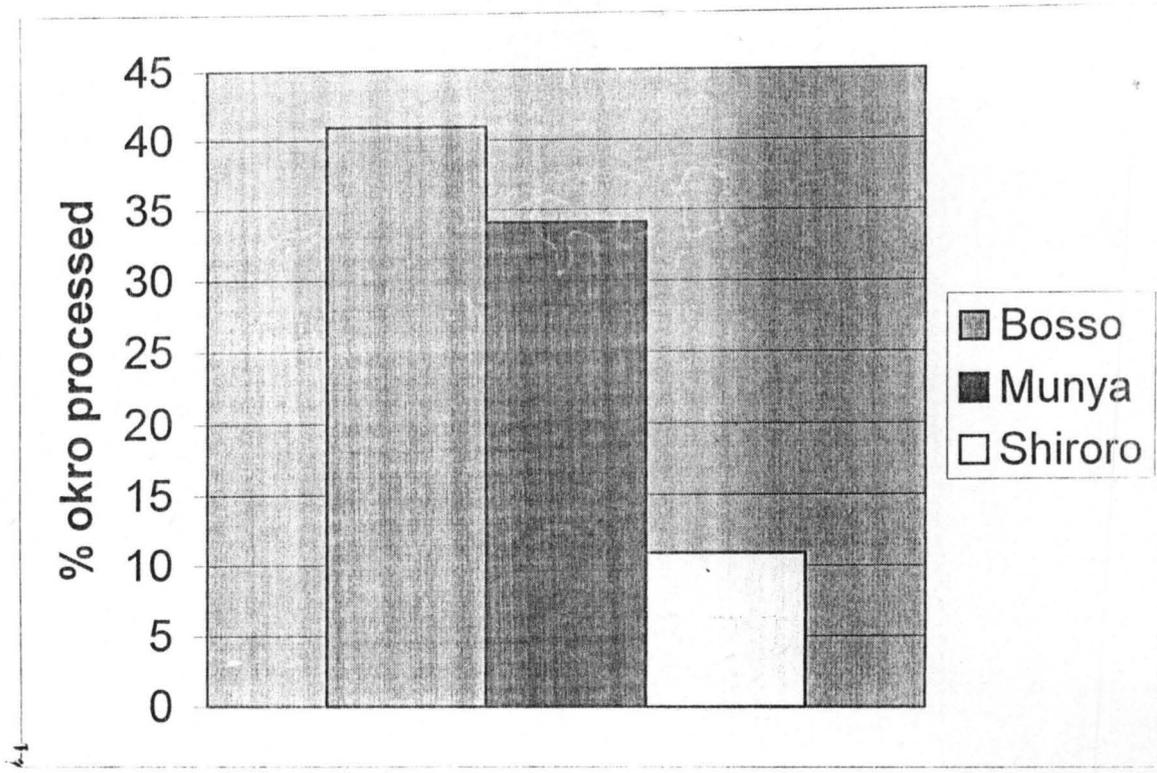


Fig 52: % processed Okro in Niger State L.G.A.

#### 4.2 DISCUSSION OF THE RESULTS

The results obtained from the assessments showed that majority of the production figures of both fruits and vegetables falls within the range of 1ton/annum to 2tons/annum with the exception of mango in shiroro local government area of Niger state that has its production figures ranging from 3 to 5tons per annum. With this it can be deduced that, though the farmers go into the production of these fruits and vegetables but not in a very large quantity.

From table 9, Kuje and Municipal local government areas have the highest percentage of orange production of 38.30% and Gwagwalada local government areas with 14.89% follow this. In the production of banana, Municipal has the largest percentage production of 34.29%. For mango, both Municipal and Kuje produced the highest. For guava, Municipal also produced the largest percentage. Cashew was not produced at all in Gwagwalada L.G.A. The results showed that only Municipal local government areas produced pineapple and Apples.

Table 10, also showed that Municipal L.G.A have the highest percentage production of 47.37% in tomatoes, 47.73% in Okro, 41.67% in potatoes and 85.71% in water mellon. Gwagwalada and Bwari L.G.A. on the other hand are the only L.G.A's that produced Garbage and the percentage production are 50% respectively. The results also showed that carrots is produced by the same percentages in Kuje and Municipal L.G.A.'s Onions from the results in table 10, is produced only in Municipal area council.

Table 21 showed the summary of fruits production in Niger state on L.G.A basis. Orange is prominently produced in Munya L.G.A with percentage production of 35.71% followed by Katcha at 25% and then Paikoro and Shioro at 14.29% each. Banana is produced only in Bosso and Munya L.G.A's with the percentage production of 60% and

40% respectively. For mango production, Paikoro have the highest percentage of 25.61% closely followed by Bosso L.G.A at 24.39% then Shiroro at 21.95%. Bosso L.G.A also produced highest percentage of guava with percentage production of 39.62% followed by Katcha with 30.19%. Bosso L.G.A produced 38.89% of the total cashew produced in the L.G.A studied.

From table 22, the results showed that Bosso has the largest percentage production of 38.33% in tomatoes, 36.21% in Okro and 47.92% in potatoes while Onions are not produced at all. On the other hand the result indicated that onion is produced only in Munya L.G.A.

The studies showed that, in both Abuja and Niger state, farmers do not undertake serious preservation of these fruits and vegetables. The practice is that the harvested produce are taken to market immediately for sale. The ones consumed by the families are not even preserved for long either. However, the results showed that some of the farmers undertake the processing of vegetables.

Table 33, showed the summary of vegetables processed in Abuja L.G.A in %. The result showed in processing of Kuje has the highest percentage of 66.67% followed by Bwari with processing percentage of 55.03% then G/lada and municipal L.G.A with 52.52% and 2.15% respectively. For tomatoes Kuje has the highest percentage of 65.80% then G/lada and Bwari with the processing percentage of 29.09% and 16.79% respectively. On the other hand, in the processing of okro, Kuje has the highest with the processing figures of 62.5%, then Bwari with 49.30%, followed by G/lada with processing figure of 26.70% and then municipal area council with 8.44%.

Table 42, showed the percentage of processed vegetables in Niger state on L.G.A basis. Bosso has the following processing percentages, in potatoes, 27.14%, tomatoes,

30.56% and okro, 40.91% while Munya has 42.86% processed tomatoes and 34.09% processed okro. On the other hand Shiroro only processed okro and it is at 10.87%.

Table 23 showed the quantity of fruits produced in Abuja L.G.A's in tons. Municipal L.G.A have the largest production of 47.2 tons / annum of orange followed by Kuje with 32.8 tons / annum. For banana, out of the total figure of 59.4t / annum in all the L.G.A's in Abuja. Kuje has 19.0tons followed by municipal with the production figure of 17.8tons. For mango, municipal have the highest production of 48.2tons followed by Kuje with production figure of 36.2tons. Cashew is not produced at all in Bwari L.G.A while municipal out of all the total production of 26.0 tons produced 12.0tons. The total production of guava in Abuja based on the L.G.A's studied was 40.8 tons and municipal area councils produced the highest figure of 27.6tons / annum. Apple and pineapple are only produced in municipal L.G.A with production figure of 1.6 tons and 15.4 tons / annum respectively.

From table 24, Kuje and municipal L.G.A.'s produced 0.8 tons/annum each of carrots. The results showed that carrots were not produced in G/lada and Bwari L.G.A.'s. The total production figure for potatoes is 97.6tons / annum with municipal area council producing 37.2 tons per annum while Bwari produced 31.8 tons /annum. Bwari L.G.A.'s have the highest production figures of 53.6 tons /annum for tomatoes while municipal produced 46.7tons/ annum. For okro, out of the total production figure of 129.6tons /annum, Bwari produced 56.8tons, municipal, 47.4t /annum, G/lada 20.6tons, and Kuje 4.8t /annum respectively. G/lada and Bwari L.G.A's are the only local government areas that produce garbage at 4.0t/annum each. Water Mellon on the other hand was produced at municipal and Bwari L.G.A's and the production figure were 4.8tona/annum and 3.0tons/annum respectively.

Table 25 showed the quantity of fruits produced in Niger state L.G.A in tons. In mango production, Paikoro has the highest production figure of 21.8 tons/annum, closely followed by Bosso with production figure of 20.2tons/annum. For guava production Katcha, 12.8t/annum and Munya, 10.4t/annum. Shiroro, 17.8t/annum with total production figure of 48.4t/annum in the local government areas studied, Bosso has the highest figure of 16.8tons/annum while Katcha has 12.8tons/annum. On the other hand, Bosso has the highest production figure of 16.8t/annum followed by 12.8t/annum in the production of cashew. Banana is only in production in Bosso and Muya L.G.A's with production figure of 2.4t/annum respectively. For orange production, Munya L.G.A has the highest production figure of 14t/annum followed by shiroro with production figure of 7.4t/annum.

Table 26, showed the quantity of vegetables produced in Niger state local government areas in tons/annum. Onions were only produced in Munya L.G.A with production figure of 1.6tons/annum out of the total production figure of 80.6tons/annum of tomatoes, Bosso has 36.0t/annum, Katcha has 16.2t/annum, Munya has 14.0t/annum Paikoro, 8.8t/annum and then Shiroro, 5.6t/annum. Bosso has a production figure of 33.2t/annum while munya has 17.6t/annum in the production of okro. Potatoes production is prominent to Bosso with production figure of 35.0t/annum, followed by Katcha with production figure of 29.4t/annum.

The studies further showed the quantity of vegetables processed in Abuja L.G.A in table 27. Only three vegetables, which are potatoes, tomatoes, and okro, are processed. Bwari has the processed figure of potatoes to be 17.5t/annum; G/lada has 12.5t/annum, Kuje, 3.0t/annum and municipal 0.8t/annum. Tomatoes production is prominent to Bwari with production figure of 9.0t/annum G/lada, 6.4t/annum and Kuje, 2.5t/annum. On the other hand Bwari has the highest processed figure of 28.0t/annum while G/lada has a

processed figure of 5.5t/annum while municipal and Kuje has a processed figure of 4.0t and 3.0t per annum respectively.

Table 28 showed the quantity of processed vegetables in Niger state L.G.A. Bosso and Munya L.G.A's processed tomatoes with the processed figure at 11.0t and 6.0t per annum respectively, while okro is processed in the same local government areas are 13.5t and 6.0t/annum respectively and shiroro is 1.0t/annum. For the processing of potatoes only Bosso L.G.A processed potatoes with the processing figure of 9.5t/annum.

The carried out showed that these vegetables are processed into their dried form through the use of direct sun- drying method. The produce after drying is then stored and can be converted to the powdered form.

Comparing the production with what is processed, table 24 gave the grand total of vegetable production in Abuja based on the L.G.A studied in tons/annum to be 367.5t/annum while the processing figure was 92.2 tons/annum from table 27. From these two tables it was also deduced that only potatoes, tomatoes, okro, Garbage, and W/mellon were produced. The study further showed that the ratio of production to processing based on the ground total was 4:1, which means that only 1/4th of what is produced, are processed.

For Niger state, the production figure according to table 26 was 239.4tons/annum and processing figure according to table 28 was 47.0tons/annum. From table 28, only Bosso, Munya and Shiroro L.G.A were into processing and the vegetable processed is tomato, okro and potatoes, out of 80.6tons/annum of tomatoes produced only 17.0t/annum were processed. For okro 81.0t/annum were produced while only 20.5t/annum were processed and for potatoes out of 76.2t/annum produced only 9.5tons were processed. The ratio of production to processing based on the grand total was 5:1, which show that only 1/4th of what is produced, are processed.

## CHAPTER FIVE

### 5.0 CONCLUSION AND RECOMMENDATION

#### 5.1 CONCLUSION

From the research work, it was found out that the production of fruits is more prominent to Abuja L.G.A's with the Municipal having the highest production figure of 47.2t/annum in orange. Kuje has the highest production figure of 19.0t/annum in banana, while Municipal has the highest in mango with production figure of 48.2t/annum and 12.0t/annum for Guava. Apple and pineapple were only produced in Municipal with the figures of 1.6t and 15.4t/annum. Abuja also takes the lead in the production of vegetables only Kuje and Municipal produced carrots with the production figure of 0.8t/annum each. Municipal have the highest production figure of 37.2 in potatoes while Bwari has the highest in tomatoes and okro with the production figures of 53.6t/annum and 56.8t/annum respectively.

In both states, only vegetables were processed. The vegetables processed in Abuja are potatoes, tomatoes and okro. Bwari has the highest processing figure of these three vegetables to be 17.5t/annum, 9.0t/annum and 28.0t/annum respectively. Likewise in Niger state local government areas, potatoes, tomatoes and okro were also processed. Bosso has the highest processing figure in 11.0t/annum, 13.5t/annum and 9.5t/annum respectively.

## 5.2 RECOMMENDATION

From the survey carried out, it was observed that majority of the farmer<sup>s</sup> do not go into processing of vegetables while none goes into preservation or processing of the fruits. The author thus recommend that the agric extension officers should move into these rural areas to educate the farmer<sup>s</sup> villagers on the followings.

- The importance of them releasing information to people that comes to get information because it will help the government to have a proper plan for them.
- The importance of preservation and processing in other to make the fruits and vegetables to be available all the year round and also so that they (farmers) can make more money.
- Farmers should be provided with solar drier and taught how to use it for their drying process.
- Also with the data in this project work, the government should establish fruits processing industries in these villages so that the farmers will have their fruit<sup>s</sup> being processed rather than supplying everything to the market where up to half is still wasted.

With these, the farmers will be encouraged to produce more thus generating employment opportunity through preservation and processing.

## REFERENCES

- Aworh, O.C., and Olorunda, (1988). Effects of packaging methods on post- harvest losses of perishable fruits and vegetables in Nigerian marketing system. No. Mo6687 page 3.
- Brian, A.F., and Allan. G.C., (1990). Food science, Nutrition and Health 5<sup>th</sup> edition 1989.
- Cornelius, C.M.S., (1988). Packaging for fruits and vegetables and root crops food and Agricultural organisation of the United Nations Bridgetown, Barbados page1-14
- Cappellini, R.A. and Capons, M.J., (1984). Post harvest losses in fresh fruits and vegetables in post harvest pathology of fruits and vegetable. Post harvest losses in perishable crops. Ed. H.E. Moline, U.S.A. Dept. of Agric pub. NE-87. pp24-30.
- Encyclopaedia of food science, (1997). Food technology and nutrition. Volume 6. Page 3750.
- Encyclopaedia of food science, (1997). Food technology nutrition. Volume3 pages 2068, 2108.
- Eric and Bani. (1988). Handling and Transportation of vegetables in Ghana, Journal of Agricultural Mechanisation in Asia, Africa and Latin America volume 19, No 2, pages 52-53
- Kelman, A. (1984). The importance of research on post harvest losses in perishable crops. In post harvest pathology of fruits and vegetables: post harvest losses in perishable crops. Ed. H.E. Moline, U.S. department. Published No 87. pages 1-3.

Liu, F.W. (1978). Developing practice methods and facilities for handling fruits in order to maintain quality and reduce losses Department of pomology, plant science Building, Cornell University Ithaca, N.Y. 14853, U.S.A.

New standard Encyclopaedia, volume 5 pages F-365 –F-369

New standard Encyclopaedia, volume 13 page V-33.

Ndirika, V.I.O., (1992). A system for laval storage of fresh Tomato An unpublished M.Sc Degree thesis in Agricultural Engineering. Submitted to the Department of Agric Engineering. Ahmadu Bello University Chap 2, p. 1-30

National Academy of science, (1978). Post harvest food losses in developing countries. 2101 Constitution Avenue, Washington, D.C. 20418, U.S.A. page 206.

Oladapo, M.A., (1994). The packaging and transportation of fruits and vegetables in rural areas of Nigeria. A thesis submitted to the department of Agricultural Engineering, F.U.T. Minna. Niger state

Olorunda, A.O. and Tungl, M.A., (1985). Simulated transit studies on tomatoes, effects of compressive load, container, vibration and maturity on mechanical damage. J. Food technology 20. pages 669-678.

Olorunda, A.O. and Aboaba, P.O., (1978). Food preservation by ionising radiation in Nigeria: present and future status. Proc. Into symp IAEA, Vienna,

Oyeniran, J.O., (1988). Report of activities of the nationally co-ordinated research project on fruits and vegetables storage in Nigeria, proceeding of the National workshop on improved packaging and storage system for fruits and vegetables in Nigeria. Ilorin.

Penzer, W.T., (1976). Historical perspective of food losses. In pro. National food loss conference. Ed. M.V. Zaehring and J.O. Early. University of Idaho, pages 1-5.

Storing your produce, (1990). Advisory booklet No 4 on fruits and vegetables. Prepared by the Nigeria stored products Research institute.

Ufere, U.K. (1995). Sources of loss Assessment in storage of root and tuber drops in Niger state. A thesis submitted to the department of Agricultural Engineering of Federal University of Technology Minna, Niger state.

## APPENDIX

### QUESTIONNAIRE ON SURVEY OF FRUITS & VEGETABLES, PRODUCTION AND PROCESSING IN F.C.T. ABUJA AND NIGER STATE.

The need for increase in food production in the country to feed the teeming population as always being stressed by every successive government in Nigeria. To fulfil such dream requires adequate planning, such planning can only be achieved if there is adequate data and information. The major problem hampering food availability especially fruits and vegetable all year round is mainly due to preservation. For adequate planning, information on the quantities produced is very important, hence the need for this kind of survey.

*You are therefore kindly requested to complete the questionnaire as accurately as possible.*

*Thanks.*

#### A Personal Data

1. Name and Address of Farmers.....  
.....
2. Village .....
3. Local Govt. Area .....
4. Major Occupation .....

#### B Production Processes

1. Which type of fruits and vegetables do you normally produced?

**Fruits:** Orange   Pineapple   Banana   Mango   Apples   Guava   Cashew  
                 

**Vegetables** Tomatoes   Onion   Okra   Carrots   Potatoes   Garlic   Garbage Water Mellon

Use this to answer question 2 (a) Under 1 acres (b) 1-5 acres (c) 6-10 acres (d) 16-20 acres (e) above 20 acres

2. What area of land (in hectares) do you normally cultivate?

**Fruits:** Orange Pineapple Banana Mango Apples Guava Cashew

**Vegetables** Tomatoes Onion Okra Carrots Potatoes Garlic Garbage Water Mellon

Use this to answer question 3 to 5 (a) Less than 1 tons (b) 2 tons (c) 3 tons (d) 5 tons (e) above 5 tons

2. What quantities of the fruits and vegetables do you produced in a year?

**Fruits:** Orange Pineapple Banana Mango Apples Guava Cashew

**Vegetables** Tomatoes Onion Okra Carrots Potatoes Garlic Garbage Water Mellon

4. What quantity do you take to market immediately after harvest?

**Fruits:** Orange Pineapple Banana Mango Apples Guava Cashew

**Vegetables** Tomatoes Onion Okra Carrots Potatoes Garlic Garbage Water Mellon

5. What quantities are consumed by your family?

**Fruits:** Orange Pineapple Banana Mango Apples Guava Cashew

**Vegetables** Tomatoes Onion Okra Carrots Potatoes Garlic Garbage Water Mellon

6. Which of the fruits do you store/(Tick the appropriate box)

**Fruits:** Orange Pineapple Banana Mango Apples Guava Cashew

**Vegetables** Tomatoes Onion Okra Carrots Potatoes Garlic Garbage Water Mellon

Use this to answer question 7 by writing the appropriate option in the box

(a) 1 wk (b) 2 wks (c) 6 wks (d) above 6 wks.

7. For how long are fruits and vegetables stored?

**Fruits:** Orange Pineapple Banana Mango Apples Guava Cashew

**Vegetables** Tomatoes Onion Okra Carrots Potatoes Garlic Garbage Water Mellon

For question 8 (a) Refrigerator (b) Open air (c) pot-in-pot (d) Cold room (e) Drying

8. What are the methods of preservation?

**Fruits:** Orange Pineapple Banana Mango Apples Guava Cashew

**Vegetables** Tomatoes Onion Okra Carrots Potatoes Garlic Garbage Water Mellon

For question 9 (a) Fungi (b) Insect (c) Bacteria (d) Pests

9. What are the cause of Spoilage and Deterioration?

**Fruits:** Orange Pineapple Banana Mango Apples Guava Cashew

**Vegetables** Tomatoes Onion Okra Carrots Potatoes Garlic Garbage Water Mellon

**c. Processing**

10. Do you normally process your fruits and Vegetables?

	Yes	or	No
Fruits:.....	<input type="checkbox"/>		<input type="checkbox"/>
Vegetables:.....	<input type="checkbox"/>		<input type="checkbox"/>

*For question 11 (a) Juice (b) Paste (c) Dried (d) Flour*

11. What do you process your fruits & vegetables into? (Tick the appropriate box)

<b>Fruits:</b>	Orange	Pineapple	Banana	Mango	Apples	Guava	Cashew
	<input type="checkbox"/>						
<b>Vegetables</b>	Tomatoes	Onion	Okra	Carrots	Potatoes	Garlic	Garbage Water Mellon
	<input type="checkbox"/>						

*For question 12 (a) Drying (b) Cooling (c) Juice Extraction*

12. What methods of processing do you use?

<b>Fruits:</b>	Orange	Pineapple	Banana	Mango	Apples	Guava	Cashew
	<input type="checkbox"/>						
<b>Vegetables</b>	Tomatoes	Onion	Okra	Carrots	Potatoes	Garlic	Garbage Water Mellon
	<input type="checkbox"/>						

13. Do you normally store the processed produce?

	Yes	or	No
Fruits:.....	<input type="checkbox"/>		<input type="checkbox"/>
Vegetables:.....	<input type="checkbox"/>		<input type="checkbox"/>

*Use for question 15 (a) Less than 2 wks (b) 4 wks (c) 2 Months (d) above 2 months*

14. For how long can the produce be stored?

<b>Fruits:</b>	Orange	Pineapple	Banana	Mango	Apples	Guava	Cashew
	<input type="checkbox"/>						

Vegetables Tomatoes Onion Okra Carrots Potatoes Garlic Garbage Water Mellon

15. Which type(s) of preservative do you use on your processed produced?

Fruits:.....

Vegetables:.....

16. What type of spoilage do you normally encounter in your stored processed products?

		Fungal	Bacteria
Fruits:.....		<input type="checkbox"/>	<input type="checkbox"/>
Vegetables:.....		<input type="checkbox"/>	<input type="checkbox"/>

17. What is the level of Spoilage encountered?

		Very low	Low	High	Very High
Fruits:.....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vegetables:.....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**D. Acceptability**

18. How are the preserved fruits and vegetables accepted in the markets by consumers?

		Very low	Low	High	Very High
Fruits:.....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vegetables:.....		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. If the acceptability is very low or low what is or are the likely reasons

Fruits:.....

Vegetables:.....

20. Will you go into Preservation of fruits and vegetables?

	Yes	or	No
Fruits:.....	<input type="checkbox"/>		<input type="checkbox"/>
Vegetables:.....	<input type="checkbox"/>		<input type="checkbox"/>

21. Give reason(s) for your answer in question No. 20

Fruits:.....  
.....

Vegetables:.....  
.....

22. Do you prefer to cultivate fruits and vegetables and sell them off during harvesting?

	Yes	or	No
Fruits:.....	<input type="checkbox"/>		<input type="checkbox"/>
Vegetables:.....	<input type="checkbox"/>		<input type="checkbox"/>

23. Give reasons for your answer in question No. 22

Fruits:.....  
.....

Vegetables:.....  
.....

24. Comment generally on the processing and preservation of fruits and vegetables in your area.

Fruits:.....  
.....

Vegetables:.....  
.....