

## Crop production systems of market gardens in Nigeria

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### Abstract

There is a dearth of information on market gardens in Nigeria. This study was conducted to establish a current status and practices in the market garden. The country, Nigeria, was stratified into six zones and 600 market gardeners were interviewed through personal visits, direct interviews and questionnaires on market garden practices with respect to crop production. The result showed that male and female with different ratios were generally actively involved in market gardens except in North-West and North-Eastern zones, where it was solely men. The age of gardeners generally ranged from 20 to 65, males ranged from 30 to 65 while female ranged from 20 to 50 years. The classes of market garden practitioners identified were full-time and part-time practitioners, and the crops were either grown alone, in mixtures or relayed. Generally, there was definite geographical distribution and differences in vegetables in the market gardens with respect to production and consumption. Some crops such as Amaranthus, tomatoes and pepper were found to have national importance while such crops as Telfairia, Corchorus and waterleaf tend to have regional importance. Most of the exotic vegetables such as lettuce, watermelon and cabbage are grown mainly in the north and to a very limited extent in the south. Intensive market gardening is carried out mainly during the dry season and this commands higher price. During the wet season, greater attention is given to arable crops because of low returns from vegetable production.

**Key words:** Garden practices, age of gardeners, gender, cropping systems, vegetables.

### Introduction

Market gardening is the growing of vegetables mostly in gardens for commercial purposes and sparingly for domestic use. It could include the use of glasshouse or greenhouse for specialized crops and for out-of-season production. Market gardens are found in the outskirts of towns and cities, where human population is enormous, with ready market for easy sales of crops with little or no transportation to the market. Also, it can be found where the soil is suitable for cultivation, coupled with adequate water supply. In some cases, they are located near processing factories, where the excess from the gardens are processed, which can be sold. The major produce in market gardens, namely vegetable and fruits are perishable and this is compounded with the vagaries of weather in the tropics. The economic returns arising therefore are very variable.

Fruit and vegetable production in the tropics is an ancient practice. Farmers grow vegetables and fruit tree crops around their compounds in villages, towns or cities on subsistent level while others grow their crops in semi-commercial level. Further, some farmers grow only vegetables as a full time job, employing farm hands in some cases, while others intensively grow vegetables as a part time job in and around the towns, cities near the market and along the busy roads, on small parcels of land.

Most of the vegetables consumed during the dry season are from market gardens in 'fadamas', flood plains, river banks and on flat land near source of water supply. Market gardening has its main objective as to produce economic crops for sale. This assures the grower a regular source of income and livelihood especially for unemployed youth in towns and cities. Vegetables are also a

good source of regular food, being relatively cheap and rich in essential nutrients. At times, it may not be just any crop which forms part of every day's diet.

Market gardens in Nigeria are often carried out on a small scale, which results in low frequency and the amount consumed per family with astronomic increase in population. If market gardens is supported by government, it could be a veritable instrument for poverty alleviation. The objective of this study therefore was to establish a baseline information for research intervention for deriving full benefits from market gardens in Nigeria.

### Methodology

The entire country, Nigeria (Fig. 1), was delineated into six zones for this study as shown in Table 1. Six hundred farmers were interviewed on crops that they grow, classes of gardeners, sex (gender) and the cropping systems practised in each zone in the gardens visited. The information obtained was complimented with personal observations and *in situ* data collection.

### Results and Discussion

**Gender involvement in gardens:** It was observed that both males and females are involved in market gardening in Nigeria. Males dominated as market garden practitioners in NE and NW, and female participation was superior in the SE zone (Table 2). The predominance of males in vegetable market gardening in Northern Nigeria may be attributed to the dominance of Islam religion in the North East and North West. The religion forbids female gender above 14 years of age from being seen outdoors till night. Gardening is done in the day time. In addition, the females below

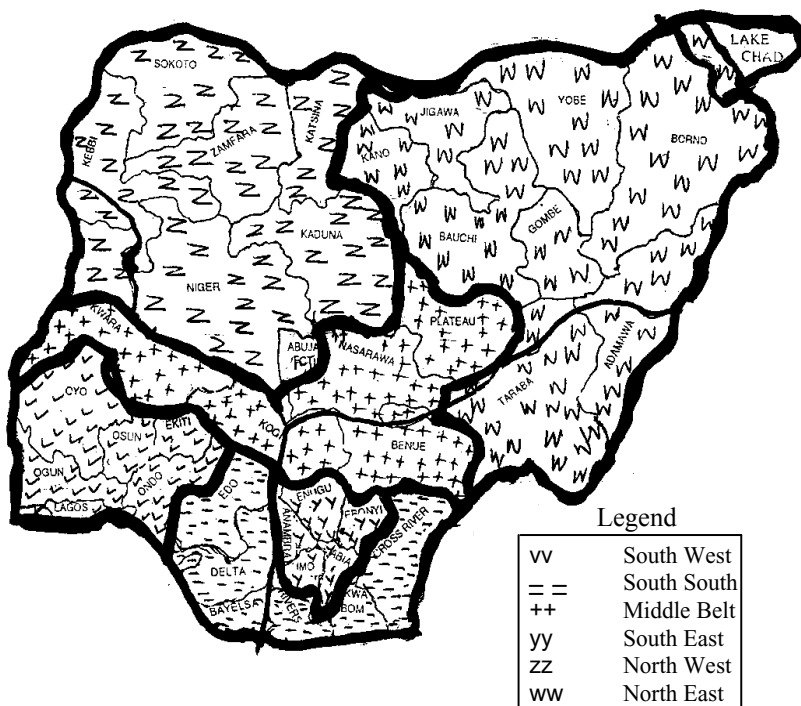


Figure 1. Map of Nigeria with 6 zones and 36 states.

14 years of age, are engaged mainly in the selling of commodities traditionally. The dominance of female gardeners in the South Eastern Zone, may be attributed to concentration of males in doing buying and selling business, while in South West, South-South and in most parts of Middle Belt zones, both males and females do market gardening.

**Age and literacy:** The market gardeners vary in age. The age varied from 20 to 65 years in both sexes. The bulk of the males was found to be between 30 and 65 years and females from 20 to 50. Most of the practitioners have no formal education. The most educated ones are school certificate holders, while there were pocket of gardeners who were retired from government services. This may probably be the reason why gardening has not advanced in the country.

**Classes of market gardeners:** Based on the level of involvement, two classes of gardeners were identified.

a) **Full-time market gardeners:** This group grows vegetables throughout the year. They are often referred to as commercial vegetable growers and are frequently found in and around urban centres such as Lagos, Port Harcourt, Jos, Kano, Kaduna and Enugu. Market gardening is their major source of livelihood. They use flood plains and hydromorphic soils otherwise referred to as fadamas. They also make use of any available land in the cities and particularly vacant government reserved and undeveloped areas. They are of great importance for year-round vegetable supply in urban centres. They grow both indigenous and exotic types of vegetables.

b) **Part-time market gardeners:** This group grows vegetables mainly during the dry season when the products command higher prices and retire to their major farms during the rainy season. Within this group, most of the traditional farmers grow vegetables along with food crops in the wet season. They grow indigenous vegetables mainly.

**Seasonal cropping:** There are two climatic seasons in the country, Nigeria. These are wet (rainy) and dry seasons. In the wet season, vegetables are sown between March and September in the South (South-East, South-South and South-West) and June to September in the North (North-East and North-West) while the Middle Belt leans to either of these two major zones (North and South) depending on the zonal proximity. In the dry season, the vegetables are grown mainly between November and March throughout the country. Early maturing crops, Amaranthus, Celosia and Corchorus, are usually grown 3 – 6 times in a year, while the relative late maturing ones are cropped about 1–3 times in a year. Such crops include okra and tomato.

The vegetable crops in market gardens are grown in wet season by full-time and part-time practitioners. Full time growers utilize the dry season mostly. This may not be unconnected with higher demand for vegetables during the dry season and thus attracting higher economic returns than in the wet season, when a great number of farmers and gardeners grow vegetables which causes glut in the market.

During the wet season, most market gardeners resort to the production of non-vegetable staple food crops such as Guinea corn, maize and cowpea. This is evident of low production of tomato production in most parts of Northern Nigeria in the wet season. This was attributed to high incidence of pests and diseases of vegetables, aside from the relative lower returns in the wet season. This accounts for why there are a lot of farmers at subsistence level in market gardens in the season and few specialized ones in the dry season with resultant effect of glut and scarce period as shown in Table 3.

**Market garden crops:** The commonest type of garden crops grown in market gardens in different zones in Nigeria are listed in Table 4. The different vegetable crops and food crops grown in market gardens in the six zones in the country, can be attributed to consumer preference, ethnic preference, physiological adaptation and agro-climatic analogue of the crops, save few vegetables grown in almost all the six zones. This agrees with the findings of Olanitan <sup>6</sup>, who observed that out-of-season vegetables grown in Nigeria, are a reflection of the degree of crop adaptation, socio-cultural and eco-physiological values.

**Cropping systems and crop distribution:** A wide range of cropping systems is practised in market gardens. These include sole cropping, monoculture, intercropping and multiple cropping. The market gardens adopt a cropping system which is most beneficial and profitable, with regards to time and space availability. Thus, some practitioners sow vegetables in mixtures either with food crops or in vegetable mixtures only. The number of crops in the combination varies and the commonest crops observed are indicated in Table 5. In most of the urban centres, sole cropping of vegetables is more popular. Such vegetables include Amaranthus, carrot, Corchorus and lettuce, while inter-cropping and multiple cropping are most popular with rural dwellers. The crops grown as sole and in their mixtures are usually seeded. These include Amaranthus, Celosia, Corchorus and okra while others are transplanted, and these include cabbage, egg plant and tomato.

**Table 1.** Different zones and their states delineated for the study on market gardens in Nigeria.

Zone	State
Middle Belt (MB)	Benue, Kogi, Kwara, Nassarawa, Plateau
North East (NE)	Adamawa, Bauchi, Bornu, Gombe, Jigawa, Kano, Taraba, Yobe
North West (NW)	Kaduna, Katsina, Kebbi, Niger, Sokoto, Zamfara
South East (SE)	Abia, Anambra, Ebonyi, Enugu, Imo
South South (SS)	Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Rivers
South West (SW)	Ekiti, Lagos, Ogun, Ondo, Osun, Oyo

**Table 2.** Proportion (%) of male and female gardeners participation in market garden in the six zones of Nigeria.

Zone	Proportion (%) of gardeners	
	Male	Female
Middle Belt (MB)	52	48
North East (NE)	100	0
North West (NW)	100	0
South East (SE)	30	70
South South (SS)	60	40
South West (SW)	55	45

**Table 3.** Major market garden crops in different zones and their level of importance.

Crop/Plant type	Importance					
	North East	North West	Middle Belt	South East	South South	South West
Tomato	***	***	***	***	***	***
Garden egg	***	***	***	***	***	***
Telfairia	*	*	**	***	***	**
Water leaf	*	*	**	***	***	**
Bitter leaf	*	*	*	***	**	**
Amaranthus	***	***	***	**	**	**
Lettuce	***	***	***	**	**	***
Pepper	**	**	**	**	**	***
Cabbage	***	***	***	**	**	**
Onion	***	***	**	**	**	**
Celosia	*	*	*	**	*	***
Okra	**	**	**	***	**	***
Cauliflower	**	**	*	*	*	*
Roselle	**	**	*	*	*	*
Celery	**	**	*	*	*	*
Garlic	***	***	**	*	*	*
Corchorus	**	**	**	***	**	***
Parsely	**	**	*	*	**	*
Cucumber	***	***	**	**	*	*
Spring onions	***	***	**	*	*	*
Sugarcane	***	***	***	**	***	*
Paw-paw	*	*	*	**	**	**
Mango	*	*	*	*	*	*
Banana	**	**	*	***	***	***
Guava	**	**	*	**	**	*
Irish potato	***	***	***	*	*	*
Maize	**	**	**	***	***	***

\* Little importance \*\* Important \*\*\* Very important

The full-time growers who practice sole cropping or monocropping, monoculture and crop rotation intensively and utilize market gardens as their only source of livelihood, sell their vegetables, thus unprovided for home consumption, friends and

season in Northern Nigeria (Northeast, Northwest and Middle belt) and their excess is exported to Southern Nigeria. Similarly, crops such as Celosia, Corchorus and okra, which are grown in Southern Nigeria (Southeast, Southwest and South-south) are

well-wishers. This system ensures higher crop yield and better control of pests and diseases and is easier to manage and more amenable to mechanisation.

The part-time practitioners, who practise inter-cropping, mixed-cropping or multiple cropping, who grows vegetables for family use, preserve biodiversity<sup>8</sup>, spread risk and minimize damage from pests and diseases. The practise of mixed cropping or multiple cropping and inter-cropping observed in market gardens ensures a greater stability of annual returns<sup>1</sup> and yield advantage over a unit area<sup>9</sup>. It also offers maximum utilization of space and water<sup>4</sup>, better weed suppression<sup>7</sup>, maximizes the use of labour and ensures a more stable biological system that withstands natural hazard than sole crops<sup>2</sup>. Similarly, Olasantan<sup>5</sup> and Ikeorgu *et al.*<sup>3</sup> opined that mixing vegetable crops and food crops have no adverse effect on growth and yield of vegetables.

Generally, in hydromorphic soil, valley-bottom and flood plains, where out-of-season market garden thrives, fruit crops and moisture loving crops, such as banana, plantain and sugarcane are grown at the edge of the gardens and in farms in suburban and rural areas. This system maximises crop productivity per unit land area, reduces risk against crop failure and preserves biodiversity. This supports the findings of Olasantan<sup>6</sup>, who opined that locations, where out-of-season vegetable thrives, farmers grow a mixture of vegetables and other moisture loving field crops such as cocoyam, plantain and sugarcane.

The choice of crops within and between each of the six zones is influenced by the demand of each crop within and between each zone and the environment. This could be why some crops such as tomato and onion which are important in all the zones, are given prominence in the dry

**Table 4.** Major vegetables in market gardens in different zones in Nigeria.

Zone	Crop dominance
Middle Belt (MB)	Amaranthus, carrot, Corchorus, garden egg, lettuce, okra, onion, pepper, roselle, tomato, waterleaf, water-melon
North East (NE)	Amaranthus, carrot, garden egg, garlic, lettuce, onion, pepper, roselle, tomato, water-melon
North West (NW)	Amaranthus, carrot, garlic, lettuce, okra, onion, pepper, tomato
South East (SE)	Amaranthus, bitterleaf, garden egg, lettuce, okra, Telfairia, waterleaf
South South (SS)	Amaranthus, bitterleaf, Celosia, cucumber, garden egg, okra, Telfairia, waterleaf, melon
South West (SW)	Amaranthus, cabbage, Celosia, Corchorus, lettuce, okra, pepper, Telfairia, <i>Solanum macrocarpon</i> , tomato

often exported to the Northern zones during the dry spell (December–February). Thus, the choice of crops (consumed) in any locality are influenced by social values, marketability and price of the products.

**Sources of seeds:** Vegetable seeds are mainly sourced locally and maintained on yearly basis by the growers or farmers and in extreme cases from open market. Further, seeds are rarely sourced from State’s Agricultural Development Programmes (ADP’s), National Seed Service and Research Institutes. There is a dearth of information, on the names of vegetable crops varieties and their potential yields for most of the vegetable crops produced by the growers.

**Factors influencing crop selection:** The type and number of crop grown by the practitioners vary from locality and zone to another. Generally, the type of crops grown depends on the market value of the vegetables and the choice of the purchasing community. The range of vegetables produced are enormous and similar within each of the six zones. Table 3 illustrates the special importance attached to market garden crop in the various zones of Nigeria. The environment influenced the types of crop sown in each zone. Crops like cabbage, cauliflower, garlic, Irish potato and onion are adapted to the Harmattan in the Northern part of the country between December and February.

**Crops consumption:** This study revealed that most of the crops were mainly consumed where they were produced. Also, not all the vegetables were consumed in the same zone. However, some of the crops such as tomato, garden egg and pepper are consumed in the same level across the six zones (Table 4). This may be attributed to eco-physiological values. Other crops such as Telfairia, waterleaf and celery may be attributed to ethno-socio-cultural values and adaptation of the crops. This agrees with

Olasantan <sup>6</sup>, who opined that the importance of crop production is reflected by the degree of adaptation, eco-physiological values and their respective socio-cultural values.

**Periodicity of vegetables:** The periodicity of most vegetables in the six zones is illustrated in Table 6. There are two distinct levels of various vegetable availability. These are scarce and glut periods. The indigenous vegetables such as Amaranthus, okra and Telfairia come into glut during the rainy season from May to September while they become scarce during the dry periods of the year from November to April. With regards to such other vegetables as pepper, tomato, lettuce and carrot, they come to glut from January to March, while they become scarce during the dry season.

### Recommendations and Conclusions

The promising potentials of market gardens in the six zones of Nigeria indicate that young school leavers and graduates between the ages of 18–30 years and retired civil servants could be encouraged to take up full-time market gardening as a profession, decongest the labour market and for poverty alleviation. This will enhance the availability of vegetables all year round.

The market garden practitioners source their seeds mostly from their farms even though they are of low yielding and diseased. The relevant agencies, such as Ministry of Agriculture and Natural Resources, agricultural development projects, agricultural procuring agencies, universities and national and international research institutes, should work out a suitable distribution system, where improved seeds can be made available to full-time and part-time practitioners with minimal efforts.

It is suggested that further investigation should be carried out in areas of seasonality of crops, crop selection, crop combination and cropping systems involved.

**Table 5.** Major vegetable and their mixtures in market gardens.

Main vegetable crop	Other vegetable crops often combined
Amaranthus	Cabbage, carrot, carrot and lettuce, Corchorus, garden egg, lettuce, lettuce and tomato, okra, okra and tomato, onion, pepper, tomato
Corchorus	Carrot, lettuce, okra
Onion	Lettuce, parsley, pepper, pepper and okra, pepper and tomato
Okra	Corchorus, Corchorus and pepper, tomato, Telfairia
Telfairia	Bitterleaf, garden egg, okra

**Table 6.** Glut (G) and scarce (S) period in months for different vegetables in the six zones of the country.

Crop	Months of the year						
	Northeast	Northwest	Middle belt	Southeast	South-south	Southwest	
Amaranthus	G	Jun-Aug	Jun-Aug	May-Sep	May-Sep	May-Jul	May-Oct
	S	Nov-Jan	Nov-Jan	Nov-Feb	Nov-Feb	Nov-Mar	Nov-Apr
Carrot	G	Feb-Mar	Feb-Apr	Feb-Apr	-	-	-
	S	Nov-Jan	Nov-Jan	Nov-Jan	-	-	-
Lettuce	G	-	Jan-Mar	Jan-Nov	-	-	-
	S	Jul-Aug	Jul-Aug	Jul-Aug	-	Mar-Apr	-
Okra	G	Aug	Jun-Aug	Jun-Sep	Jun-Oct	Oct-Nov	Jun-Nov
	S	Nov-Jan	Oct-Jan	Nov-Feb	Dec-Apr	Sep	Apr-May
Onion	G	Jan-May	Dec-Apr	Jan-May	-	May	May
	S	Oct-Jan	Oct-Jan	Sep-Oct	-	Oct-Jan	Oct-Jan
Pepper	G	Feb-Mar	Jan-Mar	Jan-Mar	-	-	Jan-Feb
	S	Jul-Aug	Jul-Dec	Jul-Dec	-	-	Jul-Aug
Telfairia	G	-	-	Jun-Sep	May-Oct	Jun-Oct	Jun-Oct
	S	-	-	Nov-Apr	Nov-Mar	Nov	Dec-Mar
Tomato	G	Feb-Mar	Mar-Apr	Feb-Apr	May-Sep	-	Feb
	S	Jul-Aug	Jul-Dec	Jul-Sep	Nov-Mar	Mar-Jun	Mar-Jun

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