

Full Length Research Paper

A survey on Market garden features in Nigeria

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The study examined the characteristics of market gardens in Anambra State Nigeria. Questionnaire was used to collect data from 48 respondents using snow ball sampling procedure. Descriptive statistics were used to analyze data. Majority (79.2%) of the respondents were sole owners of the gardens. About 38% of the respondents used personal savings as initial investment in their operations. A greater proportion (31%) of the respondents invested N111,000 - N140,000 in establishing gardens. The output of the gardens include *Citrus aurantifolia* (100%), hedge seedlings such as *Ixora coccinea* (100%), *Solanum melongena* (87.5%), medicinal seedlings (e.g. *Ocimum viridus*) and grasses (52.1%). All the respondents sold their produce at farm gates. Majority (98.0%) of the operators used wheel barrow for transportation of the produce for sale. Watering, planting in polythene bags, and manure application were practiced by all the respondents. All the respondents used rain harvested water in their gardens. However, 60.4% of the gardeners dug shallow wells. Some (29.2%) of the respondents had pruning saw, 25.0% raffia rope and 22.9% budding knife as tools used for budding. Constraints encountered by farmers include difficulty in securing land, lack of capital and ability to control fire outbreak.

Key words: Market garden, characteristics, fruits, vegetables, grasses, Nigeria.

INTRODUCTION

Market garden is the name given to commercial horticulture and is defined as the science and art of cultivating, processing and marketing of fruits, vegetables, nuts and ornamental plants (Adebisi-Oyedele et al., 2010). According to Ojeifor et al. (2006) market gardening is the growing of vegetables, mostly for commercial purposes and for domestic use. The economic potentials and production contribution of fruits, vegetables and other horticultural crops to the agricultural economy of Nigeria were estimated at 20 billion naira (FAOSTAT, 2007) which was more than that of forestry (1.4 billion) and fishery (1.25 billion). On the other hand, the country was only able to export 9 metric tons (MT) of fresh/dried horticultural produce/products in 2002 and 3.2 MT in 2003, even though international trade in fresh horticultural and floricultural products (FHFP) was growing

at a rate of 7% per year, compared with only 2% for staple crops (Gioè, 2006). Therefore, the export sector faces major challenges to maintain growth of exporting horticultural products. Any growth in the domestic horticultural industry is likely to reduce poverty in different ways in rural and urban areas. Bachmann (2002) reports that market gardening entails the intense production of high-value crops and gives farmers the potential to increase their income from a few acres.

The government of Anambra State established market gardens in Awka, Onitsha and Nnewi only in 2005 (Erinne, 2005). The delay in setting up government market gardens gave private individuals opportunities to establish small scale gardens in cities and towns to satisfy the ever increasing demand for horticultural products. New regulations in international horticultural trade

and intense competition are redefining the marketing system which may challenge gardeners. In other to curtail challenges face by market gardeners in Anambra State, and therefore improve on their production scale, there is need to examine the characteristics of market garden operations in the State; describe the socioeconomic characteristics of market gardeners and identify constraints encountered in market garden enterprises in Anambra State.

METHODOLOGY

The study was conducted in Anambra State of Nigeria. The state lies between latitudes 5°41' and 7°05' North and longitude 6°31' East and occupies an area of approximately 5025 km² (NPC, 2006). The inhabitants of the rural communities are mainly farmers. Within urban towns and cities, there is the cultivation of market gardens. Anambra State is divided into four agricultural zones (namely: Aguata, Anambra, Awka and Onitsha). The agricultural zones are comprised of 21 Local Governments Areas (LGAs).

Three out of the four agricultural zones were purposively selected (Onitsha, Aguata and Awka) due to high concentration of market garden operators. Two LGAs were similarly purposively selected from each of the agricultural zones to give a total of six LGAs used for the study. Selected LGAs were Onitsha North and South, Awka North and South, Nnewi North and Aguata. Each LGA has on the average 15 market gardens. Considering the manageable number and strong network among gardeners in the state, snowball sampling procedure was used to select eight operators from each of the six LGAs giving a total of 48 respondents. Questionnaire was used to collect data for the study. The questionnaire contained questions on the socio-economic characteristics of respondents, characteristics of market garden operations and constraints encountered in market garden enterprises.

To examine the characteristics of market garden operations, the respondents were asked to indicate their sources of fund for investments, the amount invested on equipment, tools and planting materials, and production practices. Respondents were asked to indicate their marketing channels, sources of water and methods of transportation of their products. To seek information on the constraints confronting the gardeners, 16 possible constraints were listed and respondents were asked to indicate the level of their perceived seriousness on a 3-point Likert type scale. Their response categories were as follows: Not serious (NS) = 0, serious (S)=1 and very serious (VS)=2. The cutoff point was determined as follows; 0+1+2=3/3=1. Any constraint that had a mean score of one and above was regarded as being serious while any mean score below one was regarded as not being serious. Descriptive statistics was used to analysed data collected.

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents

The percentage distribution of respondents according to their socio-economic characteristics is shown in Table 1. Majority (79.2%) of the respondents were sole owners/proprietor of their operation. Others were managers (14.6%) and workers (6.3%). About 42% were within the age bracket of 41 to 50 years. Majority (70.8%) of the respondents were males. All the respondents had

some form of formal education and 72.9% practiced market gardening on full time bases. Sixty two percent had no formal training on market garden and 83.3% were willing to undergo training. The areas of training indicated by respondents were pest control (75.0%), propagation by budding (52.1%), herbicide use (75.0%), marketing strategies (47.9%) and wreath making and marketing (41.7%). Most (52.0%) used government land for their operations.

Characteristics of market garden operations

Source of capital and amount invested

A greater proportion (37.5%) of the respondents used personal savings as initial investment in their operations (Table 2). Other sources of initial capital invested included: family sources (33.3%), loan from friends (25.0%) and bank loan (4.2%). High interest rates and requirement for collateral demanded by banks may be responsible for the poor utilization of banks as source of capital for investment in market gardening in the state. Thus, to boost market garden activities in the state, state government should provide financial assistance to market gardeners. About 31% of the respondents invested N111,000 - N140,000 while 25.0, 8.3 and 4.1% invested N171,000 and above, N51,000 - N80,000 and 20,000-50,000, respectively. It was observed that market garden operators adopted working tools used in other farming activities in their enterprises. For this reason, capital was invested only for purchasing those items not owned, replacing damaged ones and planting materials.

Tools used in market gardening

Polythene bags were used by all the respondents for their garden operations as shown in Table 3. This is because it enhances the ease of handling and conveyance of seedlings for transplanting and to the market. Water storage containers owned by 92% of the respondents, was found to be important to the extent that even those located very close to perennial source of water still deemed it necessary to own water storage containers. Water storage containers are very important for market gardening activities especially during the dry season. Other tools used for production include hoes (98%), spade (93.8%), machetes (81.3%), hand trowel (83.3%) and digging folk (83.3%). Although a pump is very necessary for distributing water irrespective of the source of water, only 12.5% of the respondents owned one. This may be because farmers could not afford the cost. The use of these implements suggests that, market gardeners in the study area were small scale operators. The Kenyan Horticultural Crops Development Authority estimated that 40% of exported fruit and 70% of exported vegetables

Table 1. Percentage distribution of respondents by socio-economic characteristic.

Variable	Percentage
Sole owner/proprietor	79.2
Manager	14.6
Worker	14.6
Sex	
Male	70.8
Female	29.2
Age	
20-30	14.6
31-40	29.2
41-50	41.7
51-60	10.4
61 and above	4.2
Educational qualification	
Primary school incomplete	25.0
Primary school completed	6.3
Secondary school incomplete	20.8
Secondary school completed	33.3
NCE, OND, HSC	8.3
HND, Degree	6.3
Mode of farming	
Full-time	72.9
Part-time	27.1
Type of training on horticulture received	
Formal	25.0
Non-formal	62.5
No training	12.5
Willingness to undergo further horticultural training	
Yes	83.2
No	16.8
Areas of training needs*	
Pest control	75.0
Propagation by budding	52.1
Herbicide weed control	75.0
Marketing strategies	47.9
Wreath making	41.7
Land acquisition	
Government land (government land)	
Rentage	52.0
Purchase	26.0
Inheritance	16.0

*Multiple response, NCE = National Certificate of Education, OND- Ordinary National Diploma, HSC- Higher School Certificate, HND- Higher National Diploma.

Table 2. Percentage distribution of respondents based on source of capital and amount invested.

Variable	Percentage (n=45)
Source of capital*	
Personal savings	37.5
Family sources	33.3
Loan (from friends)	25.0
Bank Loan	4.2
Capital invested (₦)**	
20,000-50,000	4.2
51,000-80,000	8.3
81,000-110,000	0.0
111,000-140,000	31.3
141,000-170,000	0.0
171,000 and above	25.0

*Multiple responses ₦: Naira, **₦160 = US Dollar 1.

Table 3. Percentage distribution of respondents according to equipment and tools purchased and use for market gardening.

Equipment	Percentage
Polythene bags	100.0
Spade	93.8
Water tank	91.7
Plastic basins	85.4
Trowel	83.3
Machetes	81.3
Wheel barrow	68.8
Head pan	62.5
Hoe	97.9
Knapsack sprayer	35.4
Pruning saw	29.2
Raffia rope	25.00
Budding knife	22.9
Budding stool	20.8
Twine	18.8
Wire netting	16.7
watering can	14.6
Water pump	12.5
Motorcycle	8.3
Digging fork	8.3

are produced by smallholders (Harris, 2001). Some (68.0%) of the respondents had wheel barrow while 62.0% had head pan which were tools used for carrying seedlings and other materials within the farm. Others had pruning saw (29.2%), raffia rope (25.0%), budding knife (22.9%) and twine (20.2%) as tools used for budding prac-

tices in the garden.

Most important market garden seedlings/crops produced

A relatively restricted number of crops dominated market garden activities in the study area. Table 4 shows the seedlings and market garden products grown in the study area. All the respondents produced citrus seedlings/fruits. Majority (83.3%) of the respondents produced each of mango and guava seedlings/fruits. About 73% produced paw-paw seedlings/fruits, 62.5% avocado, 62.5% *Irvingia gabonensis*, 52.1% plantain and bannana, 52.1% apple, 31.3% cashew and 20.8% melon seedlings. Fruit from these plants rarely existed in Anambra State before the year 2000 (Olufolaji, 2000).

Majority (87.9%) of the respondents were involved in the production of egg-plant (*Solanum melongena*), pepper, pumpkin, curry leaves and bitter leave (*Vernonia amygdalina*) (Table 4). The market garden activities undertaken by majority of the respondents studied were vegetable production. This may be attributed to the fact that there is more demand for vegetables than fruits as they are used for everyday cooking. Fruit and vegetables play an important role in human nutrition and health (Gioè, 2006). World Bank (2004) found that the vegetable sector presents more market opportunities for sub Saharan Africa (SSA) producers than the fruit sector. All the respondents produced hedge seedlings and spot beautification seedlings while 81.3% produced grasses and 52.1% produced medicinal seedlings. This implies that ornamental plants are of immense importance in the study area. Lawson (2000) opined that the economic importance of ornamentals has been increasing in many countries, and international demand has rapidly expanded.

Production practices in market garden enterprise

Watering, planting in polythene bags, and manuring were practiced by all the respondents (Table 5). This indicates the importance of these practices to the success of market garden operations. Sixty percent of the operators practiced mulching during dry season to conserve water. Budding was carried out by 41.7% of the respondents while 21.0% practiced grafting to enhance early maturity and fruiting of crops. The use of fencing sticks (16.7%) and wire gauze (35.4%) around the seedlings was to protect seedlings from damage by predators. A small proportion of respondents employed chemicals in the control of weed (10.4%) and pest (16.7%) in their gardens. This may be attributed to the gardeners' lack of knowledge on the availability or method of application of chemicals in weed and pest control. Despite the low use of chemicals for pest control it has been noted that, pesti-

Table 4. Percentage distribution of respondents according to types of market garden products.

Types of seedling/produce*	Common name	Percentage
Fruit seedlings		
<i>Citrus aurantifolia</i>		100
<i>Irvingia gabonensis</i>	Bush mango	62.5
<i>Carica papaya</i>	Pawpaw	72.9
<i>Annona muricata</i>	Soursop	41.7
<i>Mangifera Indica</i>	Mango	83.3
<i>Musa species</i>	Plantain/banana	52.1
<i>Anacardium Occidentale</i>	Cashew	31.3
Cycamine		20.8
<i>Psidium guajava</i>	Guava	83.3
<i>Malus domestica</i>	Apple	52.1
<i>Persea Americana</i>	Avocado pear	62.5
<i>Pyrus communis</i>	Pear	62.5
Vegetable seedlings/produce*		
<i>Abelmoschus Esculentus</i>	Okra	18.8
<i>cucurbitaceae spp</i>	Melon	20.8
<i>Amaranthus viridus</i> L.	Green	62.5
<i>Talinum Triangulare</i> ,	Water leaf	41.7
<i>Vernonia amygdalina</i>	Bitter leaf	72.9
<i>Cucurbita moschata Decne</i>	Pumpkin	81.3
<i>Corchoris olitorius</i>		41.7
<i>Pegularial extensa</i> seedling and leaf		62.5
<i>Murraya Koenigii</i> leaves and seedling	Cury leaves	72.9
<i>Lactuca sativa</i> leave	Lettuce leaves	10.4
<i>Capsicum annuum</i> seedling and fruit	Pepper	83.3
<i>Solanum melongena</i>	Egg plant	87.9
Ornamental seedlings*		
Hedge seedlings: cherry (<i>Ixora coccinea</i> , <i>Prunus spp</i>), yellow ficus (<i>Flagellaria indica</i>) and yellow bush (<i>Lupinus arboreus</i>), <i>Hibiscus</i> spp. etc)		100
Spot beautification: seedlings pines (<i>Pinus aphremphous</i>), <i>Acasia</i> spp, ashoka tree (<i>Saraca indica</i> etc)		100
Grasses: (<i>Chasmistes cujus</i> (cui-cui), carpet grass (<i>Axonopus fissifolius</i>), peanut grass (<i>Arachis hypogaea</i>) etc)		81.3
Medicinal seedlings: nchuanwu (<i>ocinium viridus</i>), lemon grass (<i>Cymbopogon</i> spp), neem (<i>Azadirachta indica</i>), ginger (<i>Zingiber officinale</i>), garlic (<i>Allium sativum</i>) etc.		52.1

*Multiple responses.

use will continue to be a significant strategy for dealing with arthropod pests so that ornamental producers can stay competitive in both national and international markets (Bethke and Cloyd, 2009).

Market channels used by respondents

All the respondents sold their produce at farm gates (Table 6). Sale at farm gates results in reduction of cost of production and a resultant increase in profit margin.

In addition to farm gate sales, 53.2% of the respondents indicated that they also sold their products along the streets. Over 37% of the respondents sold their products by decorating entertainment places, while 35.0% made wreath during funerals and 31.3% sold in super markets. This shows that respondents had multiple market channels to dispose of their produce. Bachmann (2002) indicated that farmers' market, roadside stands, pick-your-own, subscription marketing arrangements, and sales to restaurants are common marketing strategies in market gardening. According to Erinne (2005), effective

Table 5. Percentage distribution of respondents according to production practices in market garden enterprise.

Production practices*	Percentage
Planting in polythene bags	100.00
Manuring	100.0
Watering	100.0
Weeding (hand weeding)	87.5
Provision of light shade over the seedlings	83.3
Rogueing out diseased plants	81.3
Clay slurring of seedling exposed roots of seedlings	81.3
Mulching	60.4
Budding	41.7
Wire guaze	35.4
Planting insitu	20.8
Grafting	20.8
Use of fencing sticks around the seedlings	16.7
Chemical control of pest	16.7
Chemical control of weed	10.4

*Multiple responses.

Table 6. Percentage distribution of respondents base on marketing channels.

Market channels*	Percentage
Farm gate	100.0
Along the streets (carried in barrows or motor cycles)	52.1
Landscaping of clientele houses	52.1
Decorations of entertainment places	37.5
Making of wreath during funerals	35.0
local daily markets	33.3
Super markets	31.3
Primary and secondary schools	16.7
Photographers studios	16.7

*Multiple responses.

marketing is a function of marketing strategies and channels adopted to distributed and sell products. Farmers need to develop a clearly focused marketing plan before any crops are planted (Bachmann, 2002). Having marketing channels in mind before planting helps to ensure but will not guarantee that most of what you plant will be sold, thus eliminating wasted time, space, produce, and money.

Sources of water used in market garden enterprises in Anambra State

All the respondents used harvested rain water in their gardens (Table 7), because according to them it was cheaper. It was observed that most (70.8%) of the market garden enterprises were located near perennial streams. However, 60.4% of the gardeners dug shallow wells while

41.7% used piped borne water and another 48.0% used tanker vendors. About 52% of the respondents used water from boreholes. The water sources used by most of the respondents depended on accessibility and cost. However, the danger associated with the use of perennial streams and other small surface sources is that the period of maximum need will probably coincide with the period of lowest water levels.

Hence, particularly with resource-poor small farmers, it is essential that sustainable and cost-effective methods of applying and managing irrigation water are adopted, and that the quality of the water applied and its impact on soil and crop water balances is carefully monitored.

Means of transporting produce

Majority (98.0%) of the operators used wheel barrow for

Table 7. Percentage distribution of respondents based on sources of water used in the enterprises.

Sources of water	Percentage
Rain	100.0
Perennial streams	70.8
Shallow well	60.4
Pipe borne water	41.7
Bore hole	52.1
Buy from tanker vendors	48.0

Table 8. Percentage distribution of respondents based on methods of transportation.

Means of transportation*	Percentage
Personal car	60.4
Taxi	54.2
Bus	41.7
Commercial motorcycle	12.5
Personal motorcycle	50.0
Wheel barrow	97.9

*Multiple response.

transportation of the produce for sale as shown in Table 8. About 60% of the respondents used personal car, 54.2% used taxi, and 50.0% used personal motorcycle. Means of transportation was dependent on the affordability and quantity of produce to be sold or carried.

Constraints encountered by market garden operators

Out of 15 possible constraints listed, 12 were considered serious in market garden enterprises in Anambra State (Table 9). These include: lack of capital (M=1.5), poor sales during dry season (M=1.5), high cost of transportation (M=1.4), no operators association for co-operate actions (M=1.4), poor access roads (M=1.3), high cost of inputs (M=1.3), low extension visit (M=1.3) wild fire outbreak (M=1.2), inadequate land for expansion, (M=1.2), and high cost of labour (M=1.2). High cost of implements (M=1.1) and lack of credit facilities (M=1.1) were also identified as constraints by operators. These factors may constitute a barrier for respondents to expand their operations and as well as discourage individuals taking up market garden enterprise in the state.

Marketing can be hampered by poor access roads. This may be the reason why most of the farmers sale at farm gates. This can also act as barrier to participation in the value chain for small farms and firms. Small producers and processing firms are frequently eliminated from markets for failure to understand market dynamics or be-

Table 9. Mean score of constraints encountered by market garden operators.

Constraint	Mean (M)
Poor sales during dry season	1.5*
Lack of capital	1.5*
High cost of transportation	1.4*
No gardeners' association or co-operate action	1.4*
Low extension workers visits	1.3*
High cost of input	1.3*
lack of credit facilities	1.1*
Poor access roads	1.3*
Fire outbreak	1.2*
Inadequate land space for expansion	1.2*
High cost of labour	1.2*
Lack of credit facilities	1.1*
High cost of implements (tools)	1.1*
Lack of production skill	0.9
Lack of water	0.9
Government interference	0.8

cause of their inability to meet new production, sanitary and quality standards. Because market garden development and marketing are strongly dependent upon knowledge, human capital and technical inputs must be provided if interventions and growth are to be sustainable.

Compared to cereal crops, most market garden crops demand high levels of inputs. Producers in developing regions often lack access to appropriate inputs and the necessary technical production skills due to inadequate input and credit markets as well as weak extension systems (USAID, 2005). Improving access to appropriate inputs and information resources can help farmers raise productivity and contribute to sound natural resource management. USAID (2005) reported that, inadequate government regulation and organization, coupled with insufficient input markets and infrastructure, severely limit rural producers' access to planting materials.

The absence of an effective, well-trained extension network is a significant constraint to the development of the market garden industry and the capacity of small producers in particular. Ineffective and inaccessible extension and education networks have resulted in inadequate human technical capacity and expertise throughout the market garden chain in developing countries. The market garden industry changes rapidly, and extension and education networks must have effective mechanisms to ensure that all parts of the market chain are trained in currently required methodologies and practices. Inadequate land, lack of labour and access to credit are of core importance to all aspects of market garden development as these may hinder expansion. However, high labour demands of market

market garden production have the benefit of local employment generation. Per hectare, the production of market garden crops creates more than twice the number of jobs that cereal production generates (Ali and Farooq, 2002).

Gardeners association is also an important factor to increase productivity among producers as this may increase their bargaining power and information sharing/exchange. This did not exist in the study area and consequently, new production knowledge, standards, regulations and innovations did not reach the producers. In the absence of this information, small producers are at an economic disadvantage and often find their product excluded from the marketplace for lack of compliance with poorly understood regulations. Given the high local demand for market garden produce and the potential for exports, it is important to address these challenges for producers to benefit from market opportunities and to increase their incomes. Dealing with these challenges will require a whole value chain approach.

Conclusion

Market garden enterprise in Anambra State is operated on a small scale. All the respondents used harvested rain water in their gardens as well as sold their produce at farm gates. Also, watering, planting in polythene bags and manuring were practiced by all the respondents. However, operators lack proper knowledge about chemicals for pest and disease control and encountered a number of problems such as lack of capital, fire outbreak, difficulty in securing land space for expansion, inadequate extension visit etc. nonetheless, it is a lucrative venture and therefore a veritable source of livelihood for the operators. Young people, especially those in the job market and retired civil servants could be encouraged to take up full-time market gardening as a profession by providing funds, land and ensured market of produce. There is need for extension education on the use of chemical for pest and disease control through seminars, demonstrations and regular visits.

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