



Nigerian Stored Products Research Institute

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Our Pledge:

The Institute aims to be regarded as a formidable institution in post-harvest research that is poised towards the delivery of effective technologies in mitigating post-harvest losses of all crop categories in Nigeria.

Our Vision:

To be a leading provider of Agricultural Postharvest Solution in Nigeria and West African Sub-region.

Our Mission:

Reducing Postharvest losses by ensuring the quality, safety, and availability of Agricultural Produce

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Mainstreaming the Cultural Practices and Postharvest Handling of Neglected Crops in Nigeria



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MAINSTREAMING THE CULTURAL PRACTICES AND POSTHARVEST HANDLING OF NEGLECTED CROPS IN NIGERIA

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Oyr Mandate

The Nigerian Stored Products Research Institute (NSPRI) shall conduct research into the post-harvest handling problems of agricultural commodities and fabricate pilot scale post-harvest handling equipment. NSPRI shall disseminate results of research through appropriate extension methods to improve competence and skills of farmers, industrialists, produce handlers and inspectors. It shall also in collaboration with other agencies, develop standards for marketing of agricultural commodities. The Institute shall conduct research into:

- a) Improvement and maintenance of quality of perishable crops including all roots and tuber crops, fruits and vegetables and other such crops.
- b) Improvement and maintenance of the quality of durable crops including cereal grains, pulses, oil seeds from the farm level to commercial level including export.
- c) Improvement and maintenance of the quality of tree crops including cocoa, kola, palm produce, coffee, cashew, and Shea nut.
- d) Designing, fabricating, and developing post-harvest equipment to the pilot plant stage. Specifically conduct studies into the improvement of food storage structures, primary processing equipment and food packaging.
- e) Improvement in the primary processing methods of livestock products including milk, meat, fish and related products and conduct research into packaging and proper storage of dried meat, fish and related products to maintain quality.
- f) Provision of methods to improve the skill and build capacity building in post-harvest technology through formal training of farmers, industrialists, food handlers, inspectors, and extension workers in food preservation technique.
- g) Develop food standards to improve the quality of food commodities after harvest, which will aid in the marketing of produce in both local and export markets.
- h) Conduct studies on the impact assessment of technologies and processes developed by the Institute.

Preface

The world population is expected to increase by about 50% by the year 2030, according to World Food. The implication is that production must double to feed the world population in the nearest future. Many countries in Africa are vulnerable to food shortages, which they augment by imports of staple food crops such as rice, maize, and wheat from the West. The massive food imports – have caused a sharp decrease in the cultivation of our indigenous crops over the last decade despite their superior nutritional qualities. Data from the global hunger index (GHI) showed that there is acute hunger in Nigeria. Thus, critical effort must focus on the development of indigenous foods for combating hunger in the country.

One of the most essential steps in actualizing the dream of feeding the ever-increasing population in Nigeria is to create awareness for the neglected but important crops leveraging their nutritional benefit, low production-input requirements, and high adaptability in poor soils. But efforts to compile and profile these categories of crops are limited, undermining their utility. Documenting the cultural practices of the neglected crops offer scope for bridging the present information gaps in agronomic and post-harvest handling and storage practices.

This study is one of those efforts aimed at providing detailed best practices and evaluating the research gaps in the post-harvest value chain of selected neglected crops. Such information should stimulate research seeking to mainstream the crops into the research projects, improve their commercialization and utilization as foods in the rural and urban communities, and raw materials for some of the industries in Nigeria. NSPRI systematically compiled vital data on the production, postharvest handling, utilization, and challenges of sixteen (16) selected neglected crops across Nigeria in this technical report. This document, therefore, gives valuable information to anyone intending to have basic knowledge on the crops. At the same time, it also provides researchers in different fields of agriculture with necessary data for research.

The report offers insights to stakeholders within and outside Nigeria on the range and spread of critical minor crops. It is a helpful piece for creating the needed awareness and spur people to make these crops part of their regular meals to ensure food and nutrition security.

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Executive Summary

A critical step towards ensuring food security is documenting the production of available food crops grown by peasant farmers who undeniably form the bulk of food producers in our country. In this study, the Nigerian Stored Products Research Institute worked in concert across seven different locations (Maiduguri, Kano, Ilorin, Lagos, Ibadan, Sapele and Port Harcourt) between 25th May and 17th June 2021, to document the cultural practices in production, post-harvest handling, and utilization of selected Neglected and Underutilized Crop Species (NUCS) in Nigeria. The study focused on sixteen (16) crops, namely Bambara nut, Bitter kola, Bread fruit, Bush mango, Cherry, Garden egg, Jack beans, Locust beans, Moringa, Mushroom, Pigeon pea, Scent leaf, Soursop, Sweet melon, Walnut, and White melon seed. The study used a multi-stage sampling approach covering twenty-four (24) states (viz; Akwa Ibom, Anambra, Bauchi, Benue, Ebonyi, Ekiti, Enugu, Delta, Gombe, Jigawa, Kano, Kebbi, Kogi, Kwara, Lagos, Nasarawa, Niger, Ogun, Ondo, Osun, Oyo, Rivers, Sokoto and Yobe). The selection of the sampling states used availability and popularity of the target crops. Four Local Government Areas (LGA) were selected in each state, and three communities were visited in the selected LGAs. Ten (10) respondents were interviewed in each of the communities. The total of 2880 respondents participated in the survey. The survey used a structured questionnaire that focused on demographic characteristics of respondents, agronomic practices, postharvest handling and storage practices, constraints to production, storage, and preservation, expected areas of intervention, and utilization of the crops.

The results from this study showed that the age of most farmers is between 40 and 60 years which is an indication that they are relatively active. The respondents were primarily males, stressing the dominance of males in farming activities. More than 70 % of the respondents were married, with an average household size of 6. The result implies that farmers still primarily rely on family members for farming activities. About 40 % of the total respondents have at least primary education, which shows some level of improvement in the educational qualification of farmers. This bodes well for the country as educated farmers are easy to train and receptive to innovations. Most of the crops are cultivated annually with a few of them being perennial crops. The average yield of most of the crops considered in this study was less than 1 tonne/ha, which may constrain their commercialization in Nigeria. However, because the crops are grown mainly for food, with a few for commercial purposes, the respondents still grow them regularly. On average, the area used for cultivating the selected crops is about 2 ha/farmer, with many of them also cultivating other significant crops.

Harvesting and postharvest activities such as drying, threshing, winnowing is done manually due largely to the lack of appropriate postharvest equipment. Many crops are prone to insects, and mold attacks and storage losses of as much as 30% are frequently recorded. Grains are stored in bags placed inside rooms or in granaries without proper ventilations. However, a few of the respondents have access to hermetic bags (PICS), which has helped them manage insect problems. Conversely, many of the farmers use all forms of insecticides to control insect attacks, creating health hazards to consumers.

Generally, the respondents underpinned lack of funds and awareness of the nutritional and health benefits of neglected crops as the significant factors responsible for their low production. Other factors are weak extension services, lack of improved seedlings, inadequate storage and processing equipment, and lack of policy incentives for the production and utilization of these crops.

The selected crops are grown for food and commercial purposes. They are used as staple foods, for cultural purposes such as wedding ceremonies, anniversaries, and medicinal purposes. The second volume of this technical report showcases the nutritional and anti-nutrient properties of the selected

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crops.

Some of the crops such as bitter kola, bush mango, locust bean, and cherry trees are already going into extinction because of deforestation in southwest Nigeria, where youths now cut down the trees for wood. The government, through the Federal Ministry of Environment should enact a law categorizing these tree crops as one of the endangered plant species to stop the notorious activities of the loggers in those areas where the NUCS are popular.

In conclusion, the study showed that food production could be boosted with investment and policy incentives on these crops that are indigenous to us and adapted to our weather conditions. The governments at all levels should create awareness on the usefulness of these crops and encourage people to use them as part of their daily meals.

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Table of Contents

Title Page	i
Our Mandate	ii
Preface	iii
Executive Summary	iv
Acknowledgements	vi
Table of Contents	vii
Introduction	1
Objectives	4
Methodology	4
Study area and scope	4
Method of Data Collection	7
RESULTS	7
Key findings	7
Bambara Nut	16
Bitter Kola	19
Bread Fruit	21
Bush Mango	24
Cherry (African Star Apple)	25
Garden Egg	27
Jack Beans	29
Locust Beans	31
Moringa	33
Mushroom	35
Pigeon Pea	37
Scent Leaf	39
Soursop	40
Sweet Melon	42
Walnut	43
Conclusion	45
References	46
Appendices	50

List of Figures

Figure 1. Distribution of surveyed neglected crops across Nigeria	5
Figure 2. Important data on Bambara nut; a-Age distribution, b-Source of seeds, c-Severity of Storage problem, and d- Common Pests	19
Figure 3. Important data on Bitter Kola; a-Purpose of Cultivation, b-Source of seeds, c-Pre-storage operations, and d- Production constraints	21
Figure 4. Important data on Breadfruit; a-Planting period, b-Storage Period, c-Common pests, and d- Postharvest handling	23
Figure 5. Important data on Bush Mango; a-Farming history, b-Source of seedling, c-Common pests, and d- Postharvest challenges	25
Figure 6. Important data on Garden egg; a-Age distribution, b-Harvesting period, c-Storage losses, and d- Postharvest challenges	29
Figure 7. Important data on Jack beans; a-Household size, b-Frequency of cultivation, c-Prestorage operations, and d- Susceptibility to insects	30
Figure 8. Important data on Locust beans; a-Respondents' desire for training, b-Harvesting period c-preservation, and d- Severity of lack of awareness of the nutritional value	32
Figure 9. Some important data on Moringa, a-Educational level, b-Farming experience, c-Average yield, d-Areas of extension contact	34
Figure 10. Important data on Mushroom; a-Marital status of respondents, b-Source of seedlings, c-Prestorage operations, and d- Purpose of cultivation	36
Figure 11. Important data on Pigeon pea; a-Frequency of cultivation, b-Period of harvesting, Postharvest challenges, and d- Severity of ignorance about the nutritional value	38
Figure 12. Important data on Scent leaf; a-Age distribution of farmer, b-Farm size, c-Harvesting period, and d- Common pests	40
Figure 13. Important data on Soursop; a- Farmers' level of education, b-Farming experience, c-Planting period, and d- Production reasons	41
Figure 14. Important data on Walnut; a- Farmers' household size, b-Average yield, c-Prestorage operations, and d- Storage methods	44

List of Tables

Table 1. List of neglected crops surveyed with their scientific and local names	6
Table 2. Neglected Crops and locations of Respondents	8

Taylor, J. R., and Duodu, K. G. (2015). Effects of processing sorghum and millets on their phenolic phytochemicals and the implications of this to the health-enhancing properties of sorghum and millet food and beverage products. *J Sci Food Agric*, 95(2), 225-237. doi:<https://doi.org/10.1002/jsfa.6713>

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Introduction

A country has food security when its people have sustainable access to affordable food in correct quantity and quality. The Global Hunger Index (GHI) reported that Nigeria has a serious hunger situation. However, the situation is complicated by lack of appropriate tools to measure the level of hunger, as the country ranked 98th out of the 107 countries with enough data to calculate GHI scores (GHI, 2020). Low agricultural productivity coupled with poverty are responsible for the growth of food deficits.

Post-harvest losses are the major factor constraining food availability in Nigeria. Though efforts are made to increase agricultural production, a substantial portion of what is produced are lost due to various factors such as pests and mould, poor infrastructure, and inadequate storage facilities. Other factors are low levels of technology and low investment in the food production systems (Kumar and Kalita, 2017). Therefore, adequate storage ensures food security in developing countries where postharvest food losses are high (Adeyeye, 2017). Postharvest losses have aggravated food insecurity in many developing countries, especially in Sub-Saharan Africa (SSA), where many farming households also suffer the loss of income and a dip in livelihood (Onyekwena, 2019; Tesfaye and Tirivayi, 2018).

According to the National Bureau of Statistics (NBS), food prices have been rising within the last year. For instance, the price in 2019 for beans increased by 9%, yam 16%, rice by 24%, tomato by 26%, and garri by 51% above that of the last quarter of 2020 (NBS, 2020). In addition, banditry, farmers' and herders' clashes, COVID-19 pandemic, and global warming effect evidenced by erratic rainfalls and drought have heightened the situation in recent times. This has in no small way affected the livelihood of the rural people. Although many economists and strategists have proposed quite a few solutions like increasing the area under cultivation and increased credit support (Omekwe et al., 2018), the unfolding scenario calls for a paradigm shift in the approach to solving the food crisis in Nigeria. In this regard, neglected crops are essential.

Nigeria has enormous productive soil and conducive climates that supports the production of various food crops in large quantities. These food crops have the potentials to provide the nutritional needs of the population adequately. However, little or no development attention is focused on the indigenous crops in terms of research. They are also known for low input production systems, and subsistence production levels leading to underestimation and exploitation of the potential value of the crops (Idowu, 2009). Neglected and underutilized species (NUS) are crops grown traditionally by farmers in their local communities, mainly to support their nutrition security and other livelihood goals while at the same time contributing to meet their socio-cultural needs and traditional uses (Alercia, 2013). NUS have been identified as crops for hard times, especially during hunger. Though cultivated in the past, many of these crops have been relegated to the background and are grown mostly by rural farmers who use them as foods and occasionally for cash. Across Africa, many cultivated plant species are neglected and underutilized even though they play a crucial role in the food nutrition, and income generation of the rural people (Magbagbeola et al., 2010).

Many neglected and underutilized crop species (NUCS) are nutritionally rich (Bruinsma, 2009; Ghaneetal., 2010; Tilman et al., 2011). Although cultural preferences and traditional practices still maintain these crops, they remain inadequately characterized and neglected by research and conservation (Dansietal., 2012). Lack of attention has meant that their potential value is underestimated and underexploited (Danjietal., 2012). Therefore, their loss can have immediate consequences on the poor's nutritional status and food and nutritional security.

The neglect of these crops has been largely attributed to the promotion of the staple foods (rice, maize, wheat) from the West, which has led to a significant change in food choices in the developing countries, especially in Africa (Mette and Havard, 2014). However, the over-reliance on these crops coupled with intensive farming associated quantum use of inputs (fertilizer and herbicides) contributes to a loss of biodiversity for food and agriculture (Jose, 2019). Furthermore, the gradual deterioration of the ecosystem is eroding the very foundation of our economies, livelihoods, food security, health, and quality of life worldwide (Robert, 2019). Many of the neglected crops are richer in nutrients, phytochemicals than the popular staples. For example, millet and sorghum have been reported to be superior to maize in terms of nutritional value and health benefits (Awika and Rooney, 2004; de Morais Cardoso et al., 2017; Taylor and Duodu, 2015), production of these two important crops have been on the decline in most of the developing countries including Nigeria. Many NUCS are adapted to marginal environments unfit for other crops where they can provide sustainable productions (Johns and Eyzaguirre, 2006). In this way, they contribute significantly to maintaining diversity-reach and hence more stable agroecosystems. The promotion of indigenous crops for food, especially among the rural dwellers, has been identified as a sustainable approach for combatting hunger in Nigeria (Asogwa et al., 2017). Therefore, increase in production, and utilization of the neglected but essential crops can be an excellent antidote to the current food crisis in Nigeria and Africa at large.

Nigeria is the largest producer of Bambara nut in Africa, with an estimate of 100,000 tonnes in 2012 (Hillocks et al., 2012). Zimbabwe is the largest exporter of Bambara nut in Africa, exporting about 1500 to 3000 tonnes to South Africa yearly (Alercia, 2013). Bambara nut, mainly produced by rural farmers in the Northwest and Northeast parts of Nigeria and Benue state, is mainly used as food. The crop thrives in hot and dry conditions, and it is drought tolerant, perhaps the reason for its widespread cultivation in almost all the regions in Nigeria. It is high protein, carbohydrate, oil, and micro minerals such as manganese, potassium, fluoride, magnesium, calcium, phosphorus, zinc, selenium, and sodium which make the crop an excellent food with balanced nutrients (Ibrahim et al., 2018; Akande et al., 2009; Ijarotimi, 2008). In Africa, the Bambara nut is regarded as the third most important legume after groundnut (peanut) and cowpea (Mubaiwa et al., 2019). Despite the importance of the crop as food, it is still one of the neglected and underutilized crops with no reported improved variety. As a result, the average yield is at about 0.5 tonne/ha. The crop has the potential of becoming household food for many Nigerians if adequately harnessed.

African breadfruit (*Treculia africana*) tree is an evergreen plant belonging to the family Moraceae. It is one of the four members of the genera *Treculia* found in many parts of West and Tropical Africa. The seed is nutritious and has a great food value for man. The seed have groundnut flavour when toasted; sometimes they are made into refreshing drinks or used as soup condiments or thickening (Osabor, 2009).

African Walnut *Tetracarpidium conophorum* Mull. (Arg) belonging to the family Euphorbiaceae is a perennial crop found in the forest zones of sub-Sahara Africa. It is planted solely for its nuts which are usually boiled and eaten along with boiled corn in some places (Babalola, 2011). The nuts contain varying concentrations of oxalates and phytates (Enujiugha and Ayodele-oni, 2003).

Bitter kola *Garcinia kola* is a tree crop found in the rainforest areas of central and west Africa. It is indigenous to the southern part of Nigeria. The crop is grown mainly in the forest agro-ecological zones comprising Southwestern and South-Eastern Nigeria and a few states in the savannah region like Kwara, Kogi, and Niger (Moneim and Sulieman, 2019). The crop contributes to food security, nutrition, health, livelihoods, and incomes of farmers that produce them (Ofor, 2013). The bitter kola plant is unique

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- because every part of the plant, from the trunk bark to the seeds has one medicinal value. The stem is used as purgative; its sap for treating parasitic skin diseases; and its gum to treat fresh wounds (Mazi et al., 2013). It is used as an aphrodisiac in herbal medicine as purgative and antimicrobial agents (Okoye et al., 2014).
- Bush mango (*Irvingia gabonensis* and *Irvingia wombolu*), popularly known as Ogbono, is a valuable source of income for farmers and traders in Nigeria, where the fruit is traded locally (Ladipo, 2000). The kernels, which fetch a higher price than the fruits, are traded regionally and internationally, giving it the potential for a true commercial crop, which has led to the more intensive collection in the forests. However, seed extraction is time-consuming and post-harvest losses are high thus limiting cultivation (Kengni et al., 2011).
- Garden egg (*Solanum aethiopicum*) plants are fruit vegetables of some varieties belonging to the family Solanaceae shaped like chicken eggs, hence the name 'eggplants' (Chen et al., 2001). In Nigeria, there are different species/varieties grown by different ethnic groups for local consumption and other uses. The fruits can be eaten raw as a vegetable. It could also be boiled, fried, and stuffed before consumption. The fruit is rich in nutrients with other health benefits (Harish et al., 2008; Ozobia et al., 2013).
- Pigeon pea (*Cajanus cajan* (L.) Mill sp.) is an excellent source of protein, essential vitamins, and minerals such as manganese, magnesium, copper, zinc, iron, and potassium. In addition, it contains essential amino acids such as methionine, lysine, and tryptophan (Menotti et al., 1999). Therefore, it makes a balanced diet when combined with cereals, and it has been shown to correct impairment of bone mineralization (Bazzano et al., 2002).
- Moringa (*Moringa oleifera*) is the most widely cultivated species of the genus *Moringa*, which is the only genus in the family Moringaceae. English common names include moringa, drumstick tree. It is a fast-growing, drought-resistant tree, native to the southern foothills of the Himalayas in northwestern India, and widely cultivated in tropical and subtropical areas where its young seed pods and leaves are used as vegetables and also in cosmetic and pharmaceutical industries (Teixeira et al., 2014). In addition, Moringa contains healthful compounds such as vitamin A, vitamin B1 (thiamine) B2 (riboflavin) B3 (niacin), B-6 folate, and ascorbic acid (vitamin C) calcium potassium iron magnesium phosphorus zinc.
- Soursop fruit (*Annona muricata*), as it is commonly called, is found in rain forests throughout Africa, South America, and Southeast Asia (Moreno-Hernandez et al., 2014). In Nigeria, it is commonly found in the Southern part of the country (Abbo et al. 2006) and, more precisely, in the Oyo and Ondo states of the Southwestern part of Nigeria (Amusa et al., 2003). The fruit has been referred to as a magic fruit due to its immense pharmaceutical uses (Okoye, 2018).
- Sweet melon (*Cucumis melo* L) is a member of the family Cucurbitaceae (Maynard et al., 2001). It is a warm, long-season horticultural crop that is adapted to all climatic zones. In Nigeria, it grows well in the Northern part of the country where it is popular because of its sweet pulp and pleasant aroma (Villanueva et al., 2004), with the highest producers being China and the United States of America (Omorogbe, 2017).
- White melon (*Cucumeropsis mannii*) has edible and oily seeds which are used like the seeds of brown-seeded melon (*Citrullus lanatus*). The seeds are also fried and chewed as a delicacy in the South-South part of Nigeria (Ajuru and Okoli, 2013).

One paramount fact is to remember that indigenous food is helpful for our food security and health benefits, including longevity. The food crisis in Africa calls for an inclusive approach to the development and use of all potential crops adapted in the continent.

Most of the indigenous crops gathered from the wild remain largely unknown because of limited organized research efforts. It is widely acknowledged that the poor rural folks are the custodians of production, utilization, and preservation of these vital but neglected crops. Although low yields have been identified in most of the species, they possess high potential for productivity enhancement and for improving nutrition and farmer's income. Therefore, documentation of these essential minor crops can trigger more research efforts and investments in them.

Objectives

The main objective of the study is to investigate the postharvest cultural practices of some neglected but important food crops in Nigeria.

The specific objectives are to:

- i. Document the cultural practices of some important neglected crops.
- ii. Document the handling procedure from harvesting to marketing level.
- iii. Investigate cultural and medicinal uses of the selected crops.
- iv. Identify problem areas for further research along the postharvest value chain.

Methodology

The study is a cross-sectional survey; cross-sectional surveys collect and analyze data from a representative subset at a specific point drawing inferences about a population of interest at one point in time.

Study area and scope

The study was conducted in twenty-four (24) states of Nigeria; in four (4) Local Government Areas per state and three (3) communities per LGA, making a total of 96 LGAs and 288 communities. Ten respondents were interviewed in each of the communities making a total of 2,880 respondents. The survey was conducted between 25th May and 17th June 2021. The selected crops and their distribution across the country is as shown in Figure 1. Seventeen (17) neglected crops with their scientific and common names are listed in presented in Table 1.

Utilization

Excellent number of respondents (92%) in the study areas reported that walnut is consumed as snacks in either boiled or roasted form.

Areas of intervention

About 65% of the respondents suggested identification and prioritization of the production constraints such as lack of seedlings. In other words, provision of improved seedlings has the potential of increasing yield and total production in the study areas.

Conclusion

The crops considered in this study are common among farmers and their utilization cuts across many communities of the country. However, the average yield of many of the crops are unattractive for anyone intending to make them main crop. Postharvest activities are still being carried out in very primitive way which compromise the safety and quality of many of the crops. Many of the respondents are yet to adopt modern farming techniques and post-harvest technologies. They also have limited access to extension agents as source of information on agronomy, post-harvest handling and uses related to the crops. The study revealed that farmers have the potential to increase the production of neglected crops if properly incentivised in terms of enhanced access to improved seedlings, extension services and appropriate technologies. This study provides baseline information on a few Neglected important crops and underlined some of the priority research and development entry points for the listed crops.

Recommendations

Based on the findings of the study, the following measures are recommended

- 1 Indigenous knowledge of crop agronomy and postharvest handling by the farmers should be documented and research should be done to improve the indigenous knowledge.
- 2 The low yield of the crops calls for research into development of high yielding varieties for the selected crops. Establishment of genebank and assignment of genetic improvement mandate of some of the crops to relevant research Institutions are likely to accelerate the development and commercialization of the neglect crops.
- 3 Low level of extension services to farmer on these crops is an indication of low research output as extension knowledge sharing is derived from research output. Policy support for enhanced promotion of these crops, strengthening extension service institutions and operations are crucial for impactful contributions of the neglected crops. Presently the productivity of these crops are low owing to problematic access to their inputs and high cost of supportive credits. Government would need to recruit extension agents both in research institutes and ADPs to have enough field extension agents to ensure maximum coverage of rural farmers' and marketers' extension needs.
- 4 Research institutes, ADPs and other related NGOs should work in collaboration to train the farmers on improved method of post-harvest handlings of neglected crops in the study area.
- 5 Research/Extension activities should be geared towards improved access to processing and storage facilities which farmers can leverage to reduce postharvest losses. NSPRI solar drying technologies and the hermetic storage technologies are confirmed suitable solutions to postharvest problems for most crops.
- 6 Government through the federal ministry of environment should list bitter kola, bush mango, African star apple, and locust bean trees as endangered species to prevent them from going into extinction. Forest preservation should be included in school curriculum to encourage domestication, and massive awareness creations.
- 7 Tree planting campaign should be improved in adopted villages and schools and penalty should be imposed and implemented by government agencies on illegal cutting of economic trees.

store their commodities between 3-6 and 7-12 months respectively. Traditional structures (54.1%) are the most common methods of storage used while others use rooms (3.4%), polypropylene bags (8%) and PICs bags (17.2%).

Challenges

Major production constraints that severely affect the production of walnut as attested to by most farmers include lack of financial support for production (78.6%), lack of storage facilities (52.2%), ignorance of the crop nutritive value (65.1%), lack of organized market (38.2%), lack of national promotion (65.1%), lack of improved cultural practices and varieties (48.3%), and inadequate knowledge of processing (46.1%).

Common pests for walnut include insect (81.0%), rodents (7.9%) and others (11.1%). Based on the susceptibility of walnut to pests and diseases, 7.9% reported that the issue of the pest and diseases is very severe, 13.5% reported severe, 29.2 attested that it is less severe while 49.4% said it is not severe. While 56.1% reported that walnut is not severely affected by weed, 12.4% consider weed as a very severe problem especially at early stage of planting the crop. A major challenge facing wall nut farmers is strenuous harvesting.

Although many of the farmers (84.3%) agreed that they have problems of storage, storage losses in walnut are very low. The low level of lost in walnut may be attributed to some of the pre storage activities. Some of data collected on walnut are shown in Figure 14.

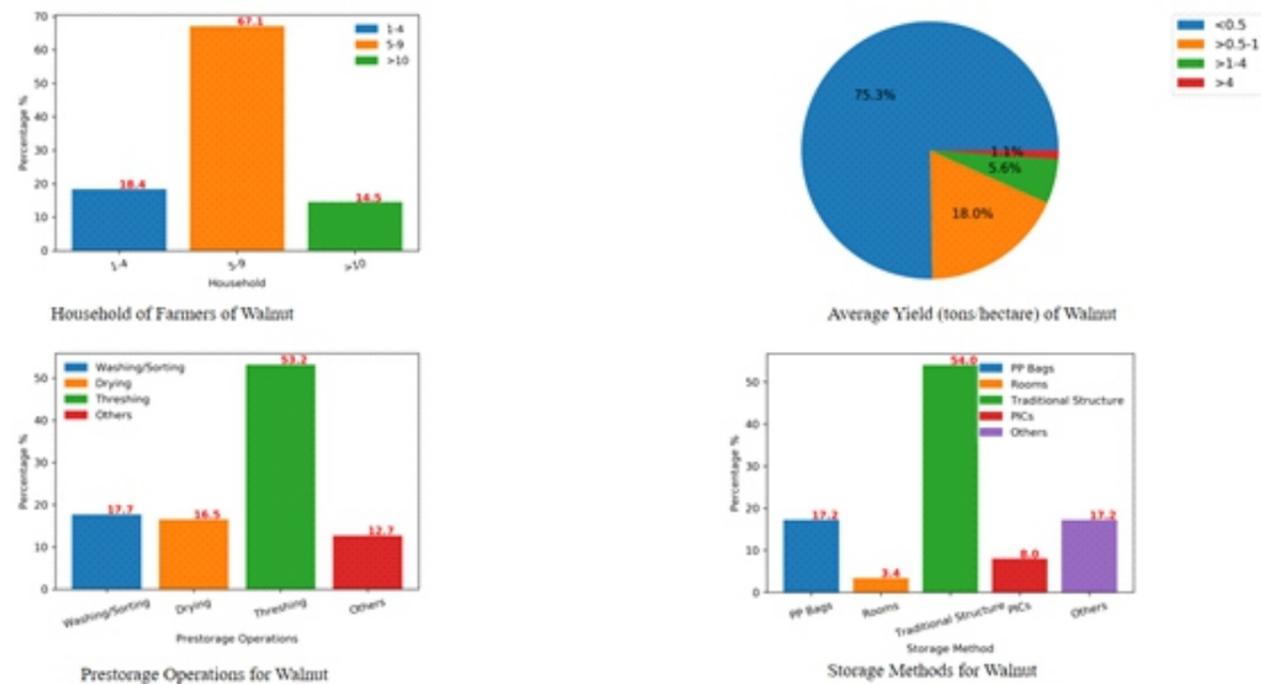


Figure 14. Important data on Walnut; a- Farmers' household size, b-Average yield, c-Prestorage operations, and d- Storage methods

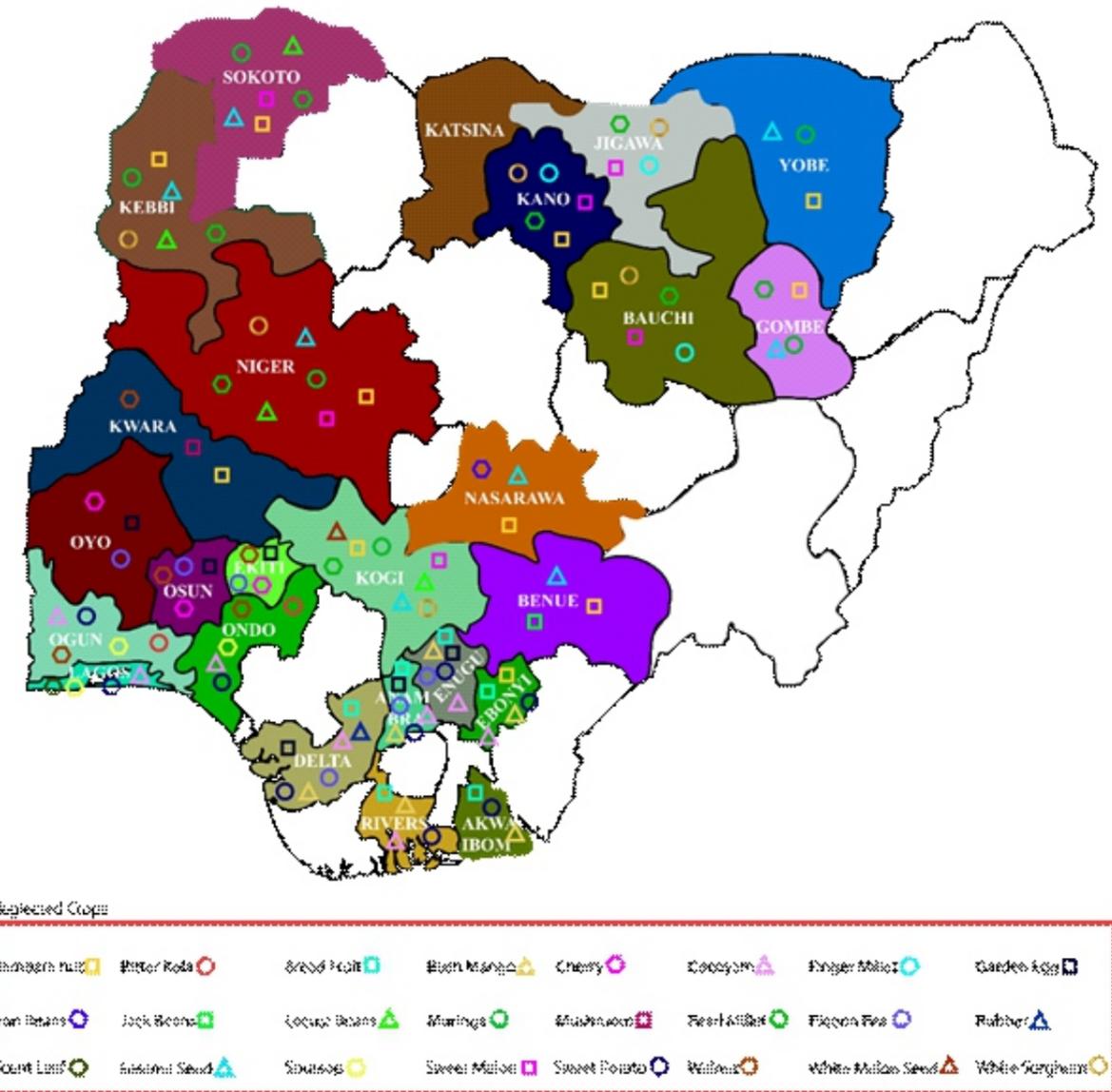


Figure 1. Distribution of surveyed neglected crops across Nigeria

Table 1. List of neglected crops surveyed with their scientific and local names

S/N	English Name	Scientific Name	Common Name
1	Bambara nut	Vigna subterranea	Gurjiya - Hausa, Okpa - Igbo, Epaboro - Yoruba
2	Bitter Kola	Garcinia kola	Mijigoro - Hausa, Orogbo - Yoruba
3	Bread Fruit	Artocarpus altilis	Ukwa - Igbo
4	Bush Mango	Irvingiagabonensis	Ogbono - Igbo, Apon - Yoruba
5	Cherry (African Star Apple)	Chrysophyllum africanum	Agbaluma - Hausa, Udara - Igbo, Agbalumo - Yoruba
6	Garden Egg	Solanum melongena	Yalo - Hausa Anara - Igbo, Igba - Yoruba
7	Jack Beans	Canavalia ensiformis	Jack niirisi - Yoruba
8	Locust Beans	Parkia biglobosa	Dawadawa - Hausa, Ogiri Okpe - Igbo, Iru - Yoruba
9	Moringa	Moringa oleifera	Zogale - Hausa,
10	Mushroom	Agaricusbisporusbrunnescens	Naman kaza - Hausa, Ero - Igbo, Olu - Yoruba
11	Pigeon Pea	Cajanus cajan	Fiofio - Igbo, EwaOtili - Yoruba
12	Scent Leaf	Ocimumgratissimum	Ntong - Efik, Ganyecmaikamshi - Hausa Nchawun - Igbo, Effirin - Yoruba
13	Soursop	Annona muricata	Fasadarur, tuwonbiri - Hausa Sawansop - Igbo, Ebo, apekan - Yoruba,
14	Sweet Melon	Cucumis melo	Guna maizaki - Hausa
15	Walnut	Juglans	Okwe - Edo, Ukpa - Igbo, Asala, Awusa - Yoruba
16	White Melon Seed	Cucumeropsis manii	Faringunairi - Hausa, Egwusi - Igbo Egusi - Yoruba

critical constrain while 44% of farmers identified weed competition.

All (100%) respondents agreed that high temperature leads to spoilage of sweet melon in storage and most (73.6%) indicate that rottenness due to mechanical damage is a major factor responsible for spoilage. Lack of refrigerating system is identified as one of the storage challenges follow by short shelf life (70.8%). Some (25%) of the farmers associate bruises and rottenness with mechanical damages that occurs during handling as a significant challenge farmers face while storing sweet melon. More than half of the respondents (65.3%) believe that keeping in cool condition before and during storage is necessary to prevent spoilage.

Utilization

All the farmers (100%) stated that the seeds are used as food and 72% mentioned that it is used for anti-stress relief, while all the respondents (100%) also confirmed the use of the leaf of sweet melons as fodder (animal feeds).

Areas of intervention

A majority (85%) of the farmers suggested documentation of the indigenous knowledge, 75% suggested identification and prioritization of the production constraints such as lack of seedlings while 68% wants improvement on post-harvest handling.

Walnut

Demographic characteristics of the respondents

Majority (57.9%) of walnut farmers are between the age 40-60 and 23.7% are between 20-39 years which is a productive age while 17.1% are above 60 years. Male is the dominant sex representing about 80% of the respondents. Almost all the farmers have one form of education or the other with 17.3% having at least primary education, 33.3% had secondary education, 30.7 tertiary education while 18.7% had no education. Most of the farmers (89.9%) are married with an average household size of between 5 and 9 individuals which indicates a very good family labour. Majority of the farmers also have more than 10 years farming history.

Agronomic profile

Walnut trees generally grow in the wild but a few of them are planted. Planting period of walnut ranges from Apr/May (27%), May/June (32.6%) and June/July (20.2%). Majority of farmers (96.7%) revealed that the source of their seeds and seedling are from the previous season while about 2.2% are from Agro dealers and extension agents. About 60.7% of the farmers use improved seeds. Walnut is primarily cultivated for family consumption and commercial purpose (78.0%). In terms of frequency of cultivation, 43.9% of the farmers cultivate walnut always, 25.2% occasionally while 30.8% rarely. About half (46.7%) of walnut are harvested July-Sept, Apr-June (26.1%), Oct-Dec (20.1%), while only 6.5% harvest walnut in Jan-March.

Average yield is measured in tons per hectare, with majority of the farmers (75.3%) recording less than 0.5 tonnes/ha, 18.1% had 0.5-1 tonnes/ha and only 1.1% had greater than 4 tonnes/ha.

Postharvest handling and storage

About 73% of the respondent hinted that walnut is transported using baskets or bags. It was reported by 53% of the farmers that walnuts could be stored between 2-3months. Pre storage operation for walnut include drying (16.5%), washing/sorting (17.7%) and threshing (53.1%) among others. Majority (68.3%) of the farmers of walnut store their products for less than three months while 26.6% and 5.1%



Postharvest handling and storage

Soursop harvesting is done manually and transported using baskets. About 100% of the respondents indicated that they do not store soursop.

Challenges

Constraints include inadequate capital for production and inappropriate handling and storage techniques heightened by the perishable nature of the crop.

Utilization

Soursop is generally eaten fresh. However, many (72%) of the respondents use soursop for treatment of skin treatment such as eczema, it was also reported that the crop is very useful in the treatment of haematina and urethritis.

Areas of intervention

Due to enormous nutritional, medicinal, and economic values of soursop, it becomes very important to increase and encourage large cultivation of this crop. This could be achieved by distributing soursop seedlings/inputs to farmers and other relevant stakeholders.

Sweet Melon**Demographic characteristics**

A little less than half (43.1%) of the respondents fall within the age bracket of 41-50 years with an average age of 46 years, and 95.8% are married. Less than half (40.1%) have no formal education, 36.1% had primary education, and 15.3% have higher education, which includes attending colleges and university. About half of the respondents (51.4%) have less than 20 years experience cultivating the crop, and 11.1% have more than 30 years experience producing sweet melon. A majority (80.6%) of the respondents cultivate between 1-3 hectares of sweet melon. It is worthy to note that a large number of people in the study area who engage in farming activities use less than 40% of their farmland for planting sweet melon.

**Agronomic profile**

Sweet melon is an annual crop cultivated in the Northwest and Northeast regions of Nigeria. Sweet melon is planted between the month of July and September and harvested between October and December. Seeds from previous harvest provides 83.3% of seedlings for cultivation while agro dealers supply 16.7% of sweet melon seeds planted in the study area. Mature crops are harvested manually.

Postharvest handling and storage

Sweet melon is harvested manually and stored in cool dry place. There' no improve handling and storage techniques that has been introduced to the respondents.

Challenges

White flies, ants and worms are the predominant pests of sweet melon making up 61, 21 and 18 % respectively. Inadequate fund for the purchase of farm input were identified by 100% of the farmers as a

Method of Data Collection

Primary data was collected through individual interviews using a semi-structured questionnaire consisting of both open and close ended questions. The instrument was validated using face and content validity. The questionnaire was classified into seven sections according to the objectives, which are

- i. Socio-economic characteristics of the respondents in the study area
- ii. Agronomic Profile
- iii. Post-harvest handling of the selected crops in the study area
- iv. Crop uses in the study area
- v. Marketing of the crops in the study area
- vi. Constraints militating against production of neglected crops in the study area
- vii. Research needs/ support areas of the neglected crops in the study area

Validity of the instrument

To ascertain the content appropriateness of the instrument of data collection, content validity was carried out which involved giving questionnaires to experts in Agricultural Extension from University of Ilorin Agricultural Extension Department and the instrument (questionnaire) was rated 5 points.

Reliability of the instrument

The instrument for collecting data was also subjected to reliability test to ascertain that the instrument measures what it was intended to measure with consistent results. The Test-retest method reliability method was used, and this was carried out in Kwara State, in the area different from where the actual research was carried out. Pre-test population comprised about 10% of the number of questionnaires administered, which enabled validation/improvements of the survey tools used.

Results**Key findings**

The distribution of the crops and the communities where the survey was carried out are presented in Table 2

Table 2. Neglected Crops and locations of Respondents

S/N	English Name	States	Local Government Areas	Communities
1	Bambara nut	Bauchi	Alkaleri	Duguri, Gokaru, Lampa
			Bogoro	AguraWaje, Mia, Son-Son
			Ganjuwa	AguraCiki, KafinMadaki, KafinZaki
			Jama'are	Dogenjegi, Ganneri, Horare
		Benue	Konshisha	Korinya, Leke, Tseagberagbe
			Makurdi	Apir, BeeTse, Mu
			Otukpo	Otukpo, Upu and Akpa
		Ebonyi	Ezza South	Amazu, AmikeEzzangbo, Umuebe
			Ikwo	Amagu, Igwefere, Nsokkarara
			Ishielu	Amokpo, AmunuInyimagu, EffegbabuInyimagu
			Ohankwu	IshiaguNkalagu, Umuhali, UmuzuokeEzzilo
		Gombe	Kwami	Kwami, Daban Fulani, Jurara
			Billiri	Banganje, Tal, Todi,
			YamaltuDeba	Lano, Bumbu, YamaltuDeba
			Kaltungo	Awak, Ture, Kaltungo
		Nasarawa	Lafia,	Bunkan, Fadama Bunga, Ogba Ehre
			Akwanga,	KurminTagwaye, AgwanMoyi, Tunga Aboki
			Doma	Lower Benue Doma, Iwash, Doma
			Nasarawa Eggon	
		Niger	Edati	Ekosanagya, Enagi, Safo
			Lavun	Etsuwo, Kutigi, Panti
			Mashegu	Babban Rami, Wawa, Zugurma
			Mokwa	Kudu, Mokwa, Tatabu
		Jigawa	B/Kudu	B/Kudu, GarinGanji, Gurmina
			Jahun	Gambo, Jahun, Jalga
			Kiyawa	Kiyawa, TsansayawaGabas, Tunannan
			Ringim	Darzaki, Majiya, Ringim
		Kano	Bunkure	Bunkure, Gikanya, Gujiya
Gabasawa	Garundanga, Kuka, Zakairai			
Gaya	Gaya Arewa, Gaya Kudu, Kademi			
Gezawa	Bangare, Gezawa, Karo			
Kebbi	Argungu	Fada, Dikko, Kamfani		

can boost the production of the crop. About 21% of the farmers have less than four years (<4) farming experience, 55.2% have 5 – 9 years while 23.7% have more than 10 years farming experience. This shows that the respondents have good history producing soursop.

Agronomic profile

Soursop is not cultivated on a larger scale; farmers often plant between 2 – 20 trees in their farm. The crop serves as food for household while larger portion of harvested crop are sold. About 21% of farmers plant the crop for family consumption only while 57% cultivate the crop for family consumption and commercial purpose. The source of seed is usually based on the recommendation of extension agent and previous harvest. The planting period for soursop is usually between (March/April) as indicated by 31.6% of the respondents, May/June (28.9%), April/May (23.7%). Harvesting period is throughout the year with (28.9%) done in April/June, (13.2%) Jan – March, (28.9%) October – December and (28.9%) July – September. About 77% of the respondents plant soursop always in their farms, 7.7% rarely plant the crop and 15.4% plant it occasionally. Average yield in tonne per hectare for soursop is < 0.5. some important data on soursop are shown in Figure 13.

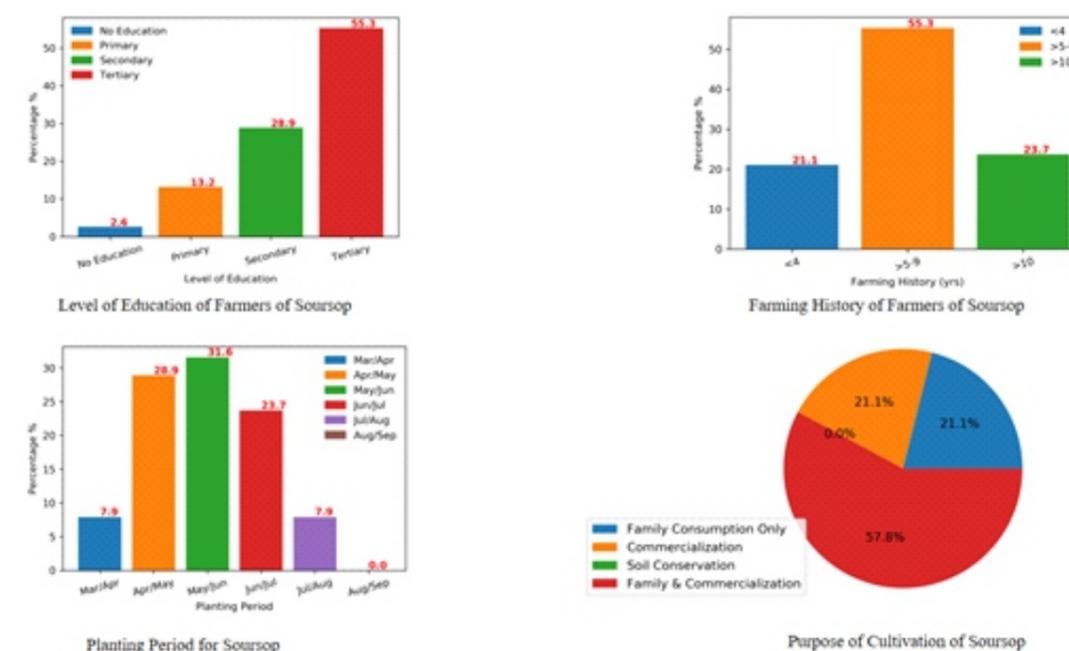


Figure 13. Important data on Soursop; a- Farmers' level of education, b-Farming experience, c-Planting period, and d- Production reasons

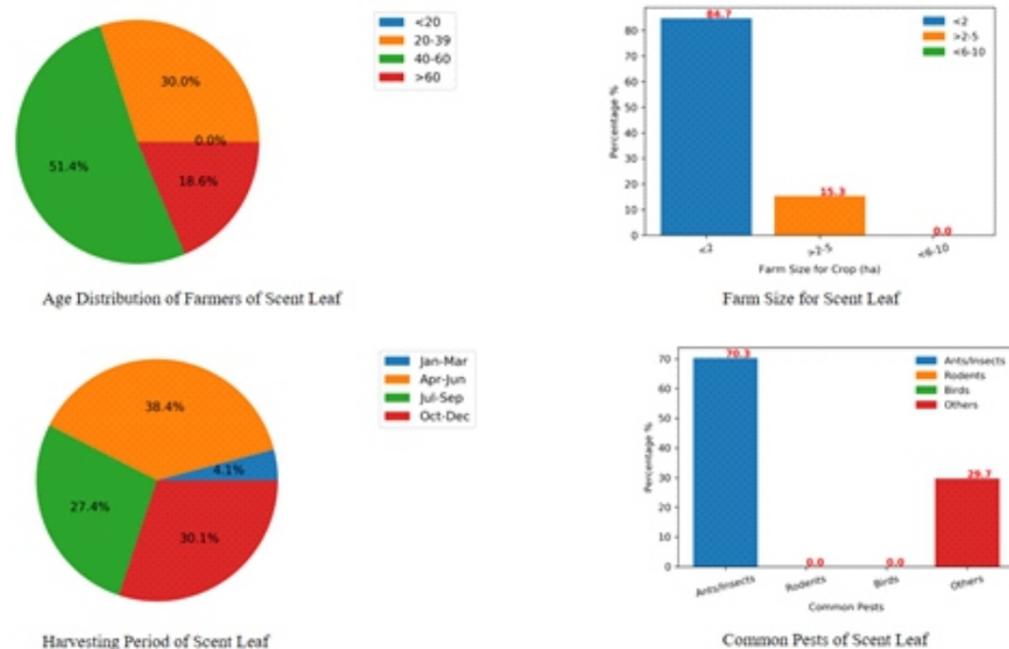


Figure 12. Important data on Scent leaf; a-Age distribution of farmer, b-Farm size, c-Harvesting period, and d- Common pests

Utilization

About 93% of the respondents noted that scent leaf is used for preparing soup and for treating constipation. Folkloric uses of scent leaf were reported by 18% of sampled respondents.

Areas of intervention

Majority of the respondents (94%) suggested development of processing technologies as research needs area and 97% of the respondents identified storage problems as area of research needs

Soursop

Demographic characteristics of the respondents

Of all the soursop farmers interviewed about (86.8%) of them are males and 13.2% are females. All the respondents are married and have an average household of 1 – 4. The farmers (2.6%) had no formal education (13.2%) of the respondent had only primary education while (28.9%) of them had secondary education. More than half (55.3%) had tertiary education which, indicates that the farmers will be willing to receive new techniques and innovation that



			BrininKebbi	BrininKebbi, Gwandaji, Zauro
			Gwandu	Dahjan, Gwanbaran, Gwanyel
			Jega	Akalawa, Dangamaji, Jega
		Kogi	Kabba-Bunu	AiyegunleIgun-Bunu, Kabba, Odokoro, Okebukun,
			Ijumu	Gbede, Aiyetoro-Gbede,Ijumu,
			Yagba East	Iddo, Isanlu-Mopo, Ojesha,
			Yagba West	Egbe, Ejiba, Idofin, Odo-Eri
		Kwara	Oyun	Erin-Ile, Igosun, Ipee
			Kaiama	Gwaria, Kaima, Shirigwaria
			Ilorin West	Ita-Elepa, Sabo-Oke, Tanke,
			Pategi	Patigi, Saggi Tunga-Aboki
		Sokoto	Bodinga	Badari, DabajiDancadi, Tuluri
			DangeShuri	Fajaldu, Dange, Wababe,
			Gwadabawa	Asara, Gigare, Gwadabawa town
			Kware	Basansa, Kwaze, Umaruma
		Yobe	Damaturu	Modori, Malummatari, Dikumari
			Fune	Maltumba, Balumi, Gajanje
			Potiskum	Mamadu, Adaya, Maje
			Fika	Gadaka, Gashinge, Sabon Pegi
2	Bitter Kola*	Ogun	Abeokuta North	Opeji, Bonuola,
			Ado Odoota	Igbesa, Ajegunle
			Ijebu North	Ijebu Igbo, Agunboye, Oke Agbo,
			Ikene	Iperu, Sagamu, Ilisan
		Ondo	Akure South	Aponmu, Ijare
			Owo	Pagege, Ogbese
			Ifedore	Iloro 2, Ipoba 2
			Idanre	Isaru, Ila Ero
3	Bread Fruit	Akwa Ibom	Abak	Ikot Obong Utu, UrukObong, Utu Edem
			Ibiono Ibom	Ata ObioAkpa, Nket Ikot Ubo, Nung Ikot
			Itu	Ikot Anantia Akpan, Ikot Okpon-Ono, Use Ikot Amana
			OrukAnam	Emaltam, Ikot Annie Itam, Ikot Ayan Itam
		Anambra	Aguata	Ekulobia, Isuofia, Uga, Ukno, Ula
			Awka South	Amawbia
			Idemili South	Abatete, Ojoto

			Oyi	Awkuzu, Nteje
		Ebonyi,	Ezza South	Amazu, AmikeEzzangbo, Umuebe
			Ikwo	Amagu, Igwefere, Nsokkarara
			Ishielu	Amokpo, AmunuInyimagu, EffegbabuInyimagu
			Ohankwu	IshiaguNkalagu, Umuhali, UmuzuokeEzzilo
		Enugu,	Enugu East	Abakpa, Emene, Ogbeke
			Igboeze	Amachalla, Enugu-Ezike, Ikpu-Iga, Ogrute, Orba
			Nsakka	Amaozara, Nsukka, Lejja, Obukpa, Uwani
			Udi	Amokwe, Nsude, Obioma, Udi
		Delta	Aniocha South	Kelekwuma, Oloho, Ubulu-Uku
			Ethiope	Adjikakite, Jesse, Mosogar, Oghara
			Sapele	Amukpe, Orapele, Otor
			Ughelli	Eyara, Okpare, Utujeremi,
		Rivers	AbuaOduval	Degema, Harry's town, Ilelema
			Ahoda East	Arukwu, Oghora, Otari
			Asari-Toru	Abarikbo, Ogbo, Ula-Ehuda
			Degema	Abalama, Kala Abalama, Sama
4	Bush Mango	Akwa Ibom	Abak	Ikot Obong Utu, UrukObong, Utu Edem
			Ibiono Ibom	Ata ObioAkpa, Nket Ikot Ubo, Nung Ikot
			Itu	Ikot Anantia Akpan, Ikot Okpon-Ono, Use Ikot Amana
			OrukAnam	Emaltam, Ikot Annie Itam, Ikot Ayan Itam
		Anambra	Aguata	Ekulobia, Isuofia, Uga, Ukno, Ula
			Awka South	Amawbia
			Idemili South	Abatete, Ojoto
			Oyi	Awkuzu, Nteje
		Delta	Aniocha South	Kelekwuma, Oloho, Ubulu-Uku
			Ethiope	Adjikakite, Jesse, Mosogar, Oghara
			Sapele	Amukpe, Orapele, Otor
			Ughelli	Eyara, Okpare, Utujeremi,
		Ebonyi,	Ezza South	Amazu, AmikeEzzangbo, Umuebe
			Ikwo	Amagu, Igwefere, Nsokkarara
			Ishielu	Amokpo, AmunuInyimagu, EffegbabuInyimagu
			Ohankwu	IshiaguNkalagu, Umuhali, UmuzuokeEzzilo
		Enugu	Enugu East	Abakpa, Emene, Ogbeke
			Igboeze	Amachalla, Enugu-Ezike, Ikpu-Iga, Ogrute, Orba

Scent Leaf

Demographic characteristics of the respondents

A combined 70% of respondents are above 40 years comprising 51% (between 40-60 years) and 19% (above 60 years) while 30% are between 20 and 30 years. The respondents are mostly (73 %) male cultivating about 4 ha of scent leaf annually. Most of them (93%) are married with an average household size of 5. About 55% of them have at least secondary school education.



Agronomic profile

Scent leaf is cultivated annually by most farmers (86%) while few of them cultivate it as a perennial crop in which case they leave the plant to continue to grow while they harvest the leaves from time to time. The crop is cultivated on an average land area of 2 ha by most farmers (85%) with an average yield of less than 0.5 tonne/ha as attested to by 86% of the respondents while other respondents confirmed that a yield of about 1 ton/ha is a possibility. However, most of the farmers (88%) still cultivate this crop regularly despite the seemingly low yield. The leaves are usually harvested mostly during the raining season until the onset of the dry season as indicated by the respondents with 39% of them harvesting between April and June, 30% between October and December and 27% between July and September. Only 4% of the respondents harvest during the dry season (January to March).

Extension contact on scent leaf has been virtually non-existent with 100% of respondents having never received extension contact. Similarly, most of the information disseminated has been on production activities (80%) with only 20% of extension efforts focused on storage and pest control. This skewed concentration greatly hinders the maximization of the crops since processing and packaging receive limited attention.

Postharvest handling and storage

Scent leaves are harvested manually by hand picking of the leaves or with the aid of a sharp knife. About 100% of sampled respondents reported that they do not store scent leaves long term, however, they experienced about 40% loss in the spice during short term storage.

Challenges

The most common pests of scent leaves are Ants and insects as attested to by 70% of the respondent. Improper drying is recognized as a factor precipitating common storage problems. Some important data collected on scent leaf are shown in Figure 12.

Challenges

Current production constraints that affect the production includes lack of funds, farm inputs and improved seeds and seedlings. Among the respondents, the very severe constraints include lack of national promotion policy (93%) inadequate finance (87%) improved seedlings (72%), Storage problems (67%), ignorance of the crop nutritional value (57%), inadequate demand for the crop (55%), inadequate knowledge of processing (55%), lack of organized markets (51%). Other less severe constraints include cultural beliefs, lack of improved cultural practices and varieties, susceptibility to pests and diseases, susceptibility to weeds with 66%, 57%, 43%, and 41% of respondents respectively indicating so.

The chief postharvest handling challenges encountered by respondents during storage are activities of ant/Insect Infestation (72%), rodents (26%) and moulds (2%). About 83% of respondents experience storage losses of less than 10% while others (17%) record losses between 10 and 29%. Common field pest and disease in pigeon pea are insects, rodents, mistletoe, and caterpillar. Ants and insects (77%) represent the most common pests of pigeon pea among respondents while rodents (2%) are less of a problem. Improper drying is recognized as a factor precipitating common storage problems.

Utilization

Apart from eating boiled pigeon pea, 60% of the respondents used pigeon pea for malaria treatment and 10% claimed its consumption can reduce high blood pressure and sugar level while 7% of the respondents used it for curing skin diseases.

Areas of intervention

The suggested areas of intervention by respondents are in the improvement of postharvest handling (68%), development of processing technology (64%), documentation of the indigenous knowledge (59%), and identification and prioritization of pigeon pea production constraints (57%). Some of the important data collected on pigeon pea are shown in Figure 11.

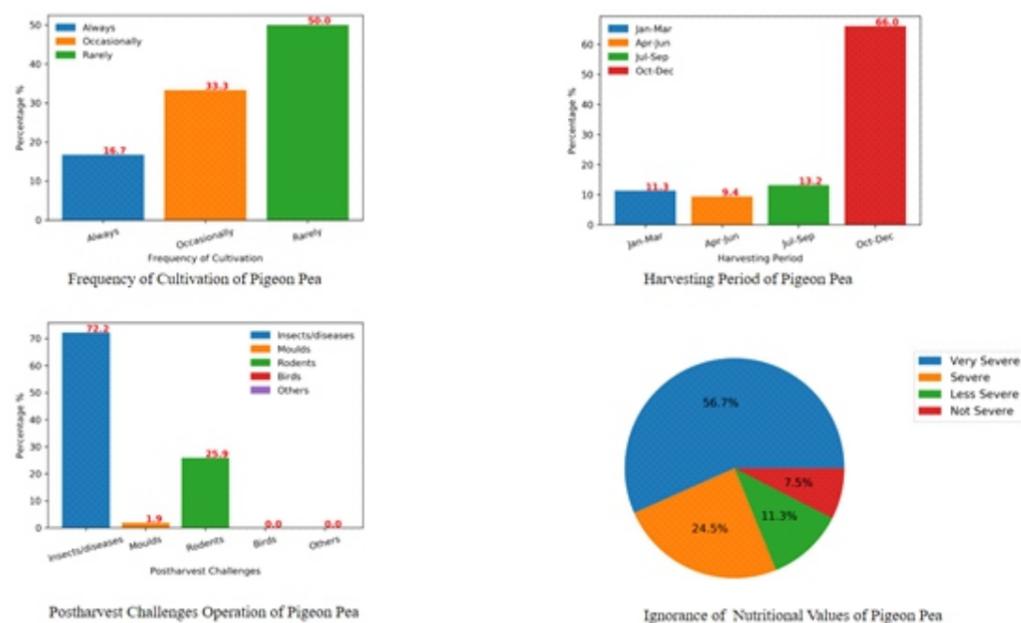


Figure 11. Important data on Pigeon pea; a-Frequency of cultivation, b-Period of harvesting, Postharvest challenges, and d-Severity of ignorance about the nutritional value

			Nsakka	Amazara, Nsukka, Lejja, Obukpa, Uwani
			Udi	Amokwe, Nsude, Obioma, Udi
		Rivers	AbuaOduel	Degema, Harry's town, Ilelema
			Ahoda East	Arukwu, Oghora, Otari
			Asari-Toru	Abarikbo, Ogbo, Ula-Ehuda
			Degema	Abalama, Kala Abalama, Sama
5	Cherry (African Star Apple)	Ekiti	Ado	Ado
			Ikere	Ikere
			Irepodun/Ife lodun	Igbemo
			Oye	Ayegbaju, Itapa, Oye
		Osun	Ede South,	Alajue
			Ife East	Modakeke
			Olaoluwa	Amere, Iwo
			Osogbo	Oshogbo
		Oyo	Akinyele	Idowu-oko
			Egbeda	Erunmu
			Oluyole	Olojuoro, Adesiyon
			Ona-ara	Akinwande, Butubu
6	Garden Egg	Anambra	Aguata	Ekulobia, Isuofia, Uga, Ukno, Ula
			Awka South	Amawbia
			Idemili South	Abatete, Ojoto
			Oyi	Awkuzu, Nteje
		Ekiti	Ado	Ado
			Ikere	Ikere
			Irepodun/Ife lodun	Igbemo
			Oye	Ayegbaju, Itapa, Oye
		Enugu	Enugu East	Abakpa, Emene, Ogbeke
			Igboeze	Amachalla, Enugu-Ezike, Ikpu-Iga, Ogrute, Orba
			Nsakka	Amazara, Nsukka, Lejja, Obukpa, Uwani
			Udi	Amokwe, Nsude, Obioma, Udi
		Delta	Aniocha South	Kelekwuma, Olluh, Ubulu-Uku
			Ethiope	Adjikakite, Jesse, Mosogar, Oghara
			Sapele	Amukpe, Orapele, Otor
			Ughelli	Eyara, Okpare, Utujeremi,
		Osun	Ede South,	Alajue

			Ife East	Modakeke
			Olaoluwa	Amere, Iwo
			Osogbo	Oshogbo
		Oyo	Akinyele	Idowu-oko
			Egbeda	Erunmu
			Oluyole	Olojuoro, Adesiyan
			Ona-ara	Akinwande, Butubu
7	Jack Beans	Benue	Konshisha	Korinya, Leke, Tseagberagbe
			Makurdi	Apir, BeeTse, Mu
			Otukpo	Otukpo, Upu and Akpa
		Nasarawa	Akwanga	Bunkan, Fadama Bunga, Ogba Ehre
			Doma	KurminTagwaye, AgwanMoyi, Tunga Aboki
			Lafia,	Lower Benue Doma, Iwash, Doma
			Nassarawa Eggon	
8	Locust Beans	Kebbi	Argungu	Fada, Dikko, Kamfani
			BrininKebbi	BrininKebbi, Gwandaji, Zauro
			Gwandu	Dahjan, Gwanbaran, Gwanyel
			Jega	Akalawa, Damgamaji, Jega
		Kogi	Kabba-Bunu	AiyegunleIgun-Bunu, Kabba, Odokoro, Okebukun,
			Ijumu	Gbede, Aiyetoro-Gbede,Ijumu,
			Yagba East	Iddo, Isanlu-Mopo, Ojesha,
			Yagba West	Egbe, Ejiba, Idofin, Odo-Eri
		Niger	Edati	Ekosanagya, Enagi, Safo
			Lavun	Etsuwo, Kutigi, Panti
			Mashegu	Babban Rami, Wawa, Zugurma
			Mokwa	Kudu, Mokwa, Tatabu
		Sokoto	Bodinga	Badari, DabajiDancadi, Tuluri
			DangeShuri	Fajaldu, Dange, Wababe,
			Gwadabawa	Asara, Gigare, Gwadabawa town
			Kware	Basansa, Kwaze, Umaruma
9	Moringa	Gombe	Kwami	Kwami, Daban Fulani, Jurara
			Billiri	Banganje, Tal, Todi,
			YamaltuDeba	Lano, Bumbu, YamaltuDeba
			Kaltungo	Awak, Ture, Kaltungo
		Kebbi	Argungu	Fada, Dikko, Kamfani
			BrininKebbi	BrininKebbi, Gwandaji, Zauro

Areas of intervention

All the respondents (100%) confirmed that they require training on mushroom management and storage.

Pigeon Pea

Demographic characteristics

Only a quarter of the respondents (25%) are between 20-39 with 53.6% between 40-60 and 21.4% above 60 years. Of this, 79.7% are males while 20.3% are females. This implies that knowledge and interest in the production of pigeon pea rests in the hands of an ageing farming population. Older farmers embody a rich source of indigenous knowledge on neglected crops, pest control and crop management. Most (82.8%) of respondents are married; 28.6% have no form of formal education, 35.7% have up to secondary education while 14.3% were educated to the tertiary level. About 75% of the respondents have household sizes between 6-9, 14.3% have between 1-4 persons in their households while 10.7% have more than 10 persons under their roof. This implies that the farmers rely mostly on their family members for the farming activities. Considering the area used for production of pigeon pea, about 83.3% of the farmers have farm holdings of less than 2 hectares while 14.8% have farmlands between 2-5 hectares with only 1.9% having their farm size between 6-10 hectares. This corroborates the findings of Mgbenka and Mbah (2016) that most farmers in Nigerian are smallholder with less than 2 hectares of land for producing specific crops. Most of the farmers (83%) have been cultivating pigeon pea for upwards of 10 years with others (17%) having fewer years of experience in its production and handling. Only 16.7% of the respondents cultivate the crop every year, 33.3% grows it occasionally while 50% rarely produce it. This demonstrates that the crop is indeed neglected when compared to other staples in the country.



Agronomic profile

Pigeon pea have been successfully domesticated with seeds for planting usually sourced from previous season's harvest (90.6%) and planted annually as indicated by the farmers in the survey areas. Planting period for pigeon pea ranges from March to June. The harvest period also ranges from August (13.2%) to November (66.0%) and harvesting is done manually by all the respondents (100%). The sign of maturity is the yellowing/falling of the leaves and opening of the pods. They are usually harvested when the pods are dried and turn brown. The method of measuring the yield in the study area is basically using 50kg sack. Average yield of 0.2 to 3.0 tonnes/ha is obtained by farmers.

Postharvest handling and storage

About half (47%) of the farmers reported that they thresh, winnow, sundry their commodity before storage. Akin to the nature of their operations, harvested pigeon pea is usually dried openly relying on solar radiation (100%). This method is time-consuming, labour intensive, fraught with the challenge of non-uniform drying and not suitable for large scale production. The crop is kept in bags and placed on a pallet in fumigated stores by 74% of respondents. About 67% of the respondents hinted that pigeon pea can be stored between 5-12 months.

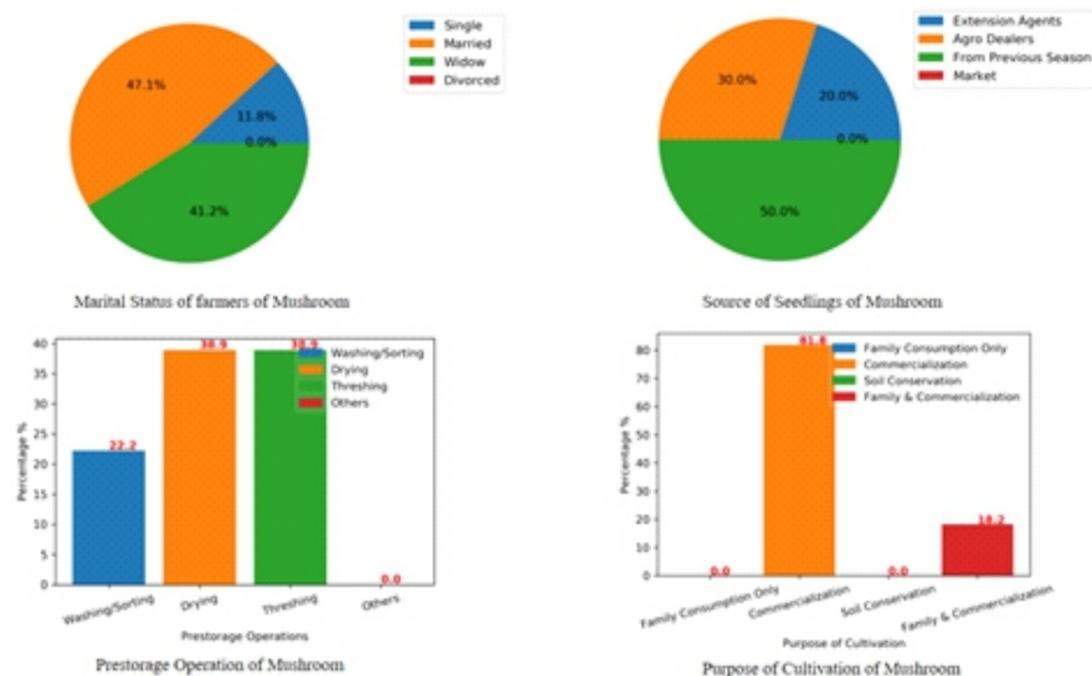


Figure 10. Important data on Mushroom; a-Marital status of repondents, b-Source of seedlings, c-Prestorage operations, and d- Purpose of cultivation

Postharvest handling and storage

Mushroom is usually dried before storage, and 39% of farmers confirmed drying of mushroom in the sun. In some cases (22%), washing and sorting are carried out by farmers before drying.

Adequately dried crops are stored in polypropylene bags. However, mushroom is mostly kept in polyethylene bags. Half of the respondents (50%) stored mushroom for more than twelve months and 25% of the farmers stored only for 7-12 months while the remaining 25% of the respondents stored only between 3-6 months.

Challenges

There are not specially made dryers for mushroom, so farmers generally dry mushroom under the sun or in well ventilated rooms. Challenges faced by farmers during drying are animals, rainfall, dust, and theft among others. Mould is identified as a major pest of mushroom especially after drying. Some of the respondents (30%) mentioned improper drying, moisture, humid environment, and premature harvest among others as the causes of the mould growth. Some of the factors that limit the processing of these crops include, time consumption, few productions, lack of fund and lack of processing equipment.

Utilization

Respondents reported that all parts of mushroom are consumed. Mushrooms are used in cooking soups or for stew. No cultural use was mentioned by all the respondents.

			Gwandu	Dahjan, Gwanbaran, Gwanyel
			Jega	Akalawa, Damgamaji, Jega
	Kogi	Kabba-Bunu	Ijumu	Aiyegunlelgun-Bunu, Kabba, Odokoro, Okebukun,
		Yagba East	Yagba West	Gbede, Aiyetoro-Gbede,Ijumu, Iddo, Isanlu-Mopo, Ojesha, Egbe, Ejiba, Idofin, Odo-Eri
	Niger	Edati	Lavun	Ekosanagya, Enagi, Safo Etsuworo, Kutigi, Panti
		Mashegu	Mokwa	Babban Rami, Wawa, Zugurma Kudu, Mokwa, Tatabu
	Sokoto	Bodinga	DangeShuri	Badari, DabajiDancadi, Tuluri Fajaldu, Dange, Wababe,
		Gwadabawa	Kware	Asara, Gigare, Gwadabawa town Basansa, Kwaze, Umaruma
	Yobe	Damaturu	Fune	Modori, Malummatari, Dikumari Maltumba, Balumi, Gajanje
		Potiskum	Fika	Mamadu, Adaya, Maje Gadaka, Gashinge, Sabon Pegi
10	Mushroom	Kwara	Oyun	Erin-Ile, Igosun, Ipee
			Kaiama	Gwaria, Kaima, Shirigwaria
			Ilorin West	Ita-Elepa, Sabo-Oke, Tanke,
			Pategi	Patigi, Saggi Tunga-Aboki
11	Pigeon Pea	Anambra	Aguata	Awka South
			Idemili South	Oyi
			Oyi	Awkuzu, Nteje
		Ekiti	Ado	Ikere
			Irepodun/Ife lodun	Oye
			Oye	Ayegbaju, Itapa, Oye
		Enugu	Enugu East	Igboeze
			Nsakka	Udi
			Udi	Amokwe, Nsude, Obioma, Udi
		Delta	Aniocha South	Kelekwuma, Oloho, Ubulu-Uku

			Ethiophe	Adjikakite, Jesse, Mosogar, Oghara		
			Sapele	Amukpe, Orapele, Otor		
			Ughelli	Eyara, Okpare, Utujeremi,		
		Osun	Ede South,	Alajue		
			Ife East	Modakeke		
			Olaoluwa	Amere, Iwo		
			Osogbo	Oshogbo		
		Oyo	Akinyele	Idowu-oko		
			Egbeda	Erunmu		
			Oluyole	Olojuoro, Adesiyan		
Ona-ara	Akinwande, Butubu					
12	Scent Leaf	Lagos	Badagry	Ajara, Igbamidara, Yafin		
			Ikorodu	Imota, Agbowa		
			Ojo	LASU/Iyana-Iba,		
13	Soursop	Ogun	Abeokuta North	Opeji, Bonuola,		
			Ado Odoota	Igbesa, Ajegunle		
			Ijebu North	Ijebu Igbo, Agunboye, Oke Agbo,		
			Ikene	Iperu, Sagamu, Ilisan		
		Ondo	Akure South	Aponmu, Ijare		
			Owo	Pagede, Ogbese		
			Ifedore	Iloro 2, Ipoba 2		
			Idanre	Isaru, Ila Ero		
		Lagos	Badagry	Ajara, Igbamidara, Yafin		
			Ikorodu	Imota, Agbowa		
			Ojo	LASU/Iyana-Iba,		
		14	Sweet Melon	Bauchi	Alkaleri	Duguri, Gokaru, Lampa
					Bogoro	AguraWaje, Mia, Son-Son
Ganjuwa	AguraCiki, KafinMadaki, KafinZaki					
Jama'are	Dogenjegi, Ganneri, Horare					
Jigawa	B/Kudu			B/Kudu, GarinGanji, Gurmina		
	Jahun			Gambo, Jahun, Jalga		
	Kiyawa			Kiyawa, TsansayawaGabas, Tunannan		
	Ringim			Darzaki, Majiya, Ringim		
Kano	Bunkure			Bunkure, Gikanya, Gujiya		
	Gabasawa			Garundanga, Kuka, Zakairai		
	Gaya			Gaya Arewa, Gaya Kudu, Kademi		
	Gezawa			Bangare, Gezawa, Karo		

Utilization

Half of the respondents (50%) confirmed the use of roots and leaf of moringa as medicine for the cure of diabetes and high blood pressure (BP)

Areas of intervention

To improve the farming and marketing of moringa, there is the need to develop processing technology, manage pest and diseases appropriately and improve post-harvest handling.

Mushroom

Demographic characteristics of the respondents

Less than half of the respondents (46%) were between 20 and 40 years old and 27% of the farmers were between ages 40 and 60 while 9% of the respondents were above 60 years. The findings indicated that more than half of the respondents (66%) were still in their active age and more productive and ready to take risk on innovation than the old farmers. This will enhance innovation adoption and increase mushroom production. The number of male farmers were slightly higher (55%) than that of (45%). The result revealed that 47% of the respondents in the study area were married, while 41% of the respondents were widow and few (12%) of the respondents were single. Majority of the respondents (89%) have a household size of at least 5 persons while 11% had 1-4 persons in their household. This implies that the mushroom farmers rely on labour supply from their households which will reduce the cost of production.

All mushroom farmers are learned, and majority (73%) had tertiary education and only few (27%) of the respondents had secondary education, indicating high level of literacy among the respondents in the study area.

Agronomic profile

Mushroom is an annual crop it could be cultivated or grows in wild. Planting is done in August/September and harvesting is done manually around October/December. Half of the farmers' population (50.0%) in the study area source for seedling from the previous harvest and 30.0% of the respondents got mushroom seedlings through agro dealers while 20.0% sourced for mushroom seedlings through extension agents. This showed that previous harvest is the main source of mushroom seedlings in the study area. Many of the respondents (82%) cultivate mushroom for commercial purpose while 18% of mushroom farmers confirmed the production for both consumption and commercial purpose. Some of the data collected on mushroom are shown in Figure 10.



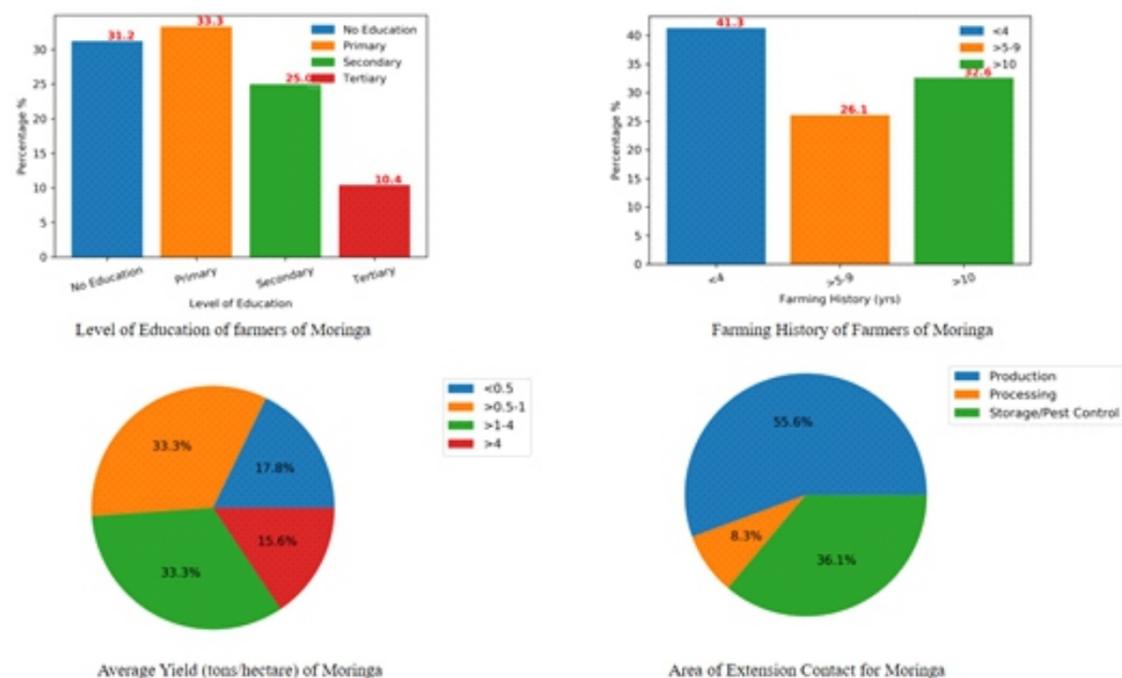


Figure 9. Some important data on Moringa, a-Educational level, b-Farming experience, c-Average yield, d-Areas of extension contact

Postharvest handling and storage

Activities done before storage is mainly drying and bundling (100%) with main method of storage as room storage and for a period of below 4-month (80%) and between 5-6-month (20%). Challenges during storage was reported to be ant/insect (100%). Dried moringa leaves are generally stored in polyethylene bags abd kept in the rooms.

Challenges

Respondents reported that three factors that is responsible for spoilage are improper drying (95%) pest activities (5%). Greater percent of the respondents (80%), dry their products properly to prevent spoilage while 15% use fumigation and 5% use others means like traditional use of herb to prevent spoilage. However, the use of pesticide and insecticide (100%) are common methods used in solving the problem of pest and insects in moringa storage. All the respondent (100%) reported leaf caterpillar to be a major pest of moringa leaf. Mould problem is associated with premature harvest (35%), improper drying (30%) and moisture migration during drying (35%). All the farmers responded that the only method of drying moringa leaf is by sun drying on tarpaulin under shade or in a room with drying challenges that ranges from rainfall (40%), animal (35%) and dust (25%). 75% of the respondents said the limiting factors in processing is lack of fund while 20% lacked improved machine and the other 5% reported lack of adequate knowledge. Poor storage facilities (70%), fund (20%) and expertise (10%) are some of the factors affecting effective storage of moringa in the study area. Majority (75%) of respondent record 10-20 per cent loss, 15% record loss between 30 – 40 per cent, while loses of above 50% are record by only 10% of the respondents. Two factors responsible for the losses as reported by respondents are pest activities (85%) and moisture migration (15%). To minimize the loses about 75% adopted fumigation, 20% sell at cheaper prices and 2% ensure harvesting the product at right time.

		Kogi	Kabba-Bunu	AiyegunleIgun-Bunu, Kabba, Odokoro, Okebukun,
			Ijumu	Gbede, Aiyetoro-Gbede, Ijumu,
			Yagba East	Iddo, Isanlu-Mopo, Ojesha,
			Yagba West	Egbe, Ejiba, Idofin, Odo-Eri
		Niger	Edati	Ekosanagya, Enagi, Safo
			Lavun	Etsuwo, Kutigi, Panti
			Mashegu	Babban Rami, Wawa, Zugurma
			Mokwa	Kudu, Mokwa, Tatabu
		Sokoto	Bodinga	Badari, DabajiDancadi, Tuluri
			DangeShuri	Fajaldu, Dange, Wababe,
			Gwadabawa	Asara, Gigare, Gwadabawa town
			Kware	Basansa, Kwaze, Umaruma
15	Walnut	Ekiti	Ado	Ado
			Ikere	Ikere
			Irepodun/Ife lodun	Igbemo
			Oye	Ayegbaju, Itapa, Oye
		Ogun	Abeokuta North	Opeji, Bonuola,
			Ado Odoota	Igbesa, Ajegunle
			Ijebu North	Ijebu Igbo, Agunboye, Oke Agbo,
			Ikene	Iperu, Sagamu, Ilisan
		Ondo	Akure South	Aponmu, Ijare
			Owo	Page, Ogbese
			Ifedore	Iloro 2, Ipoba 2
			Idanre	Isaru, Ila Ero
		Osun	Ede South,	Alajue
			Ife East	Modakeke
			Olaoluwa	Amere, Iwo
			Osogbo	Oshogbo
		Kwara	Oyun	Erin-Ile, Igosun, Ipee
			Kaiama	Gwaria, Kaima, Shirigwaria
			Ilorin West	Ila-Elepa, Sabo-Oke, Tanke,
			Pategi	Patigi, Saggi Tunga-Aboki
16	White Melon Seed	Kogi	Kabba-Bunu	AiyegunleIgun-Bunu, Kabba, Odokoro, Okebukun
			Ijumu	Gbede, Aiyetoro-Gbede, Ijumu

		Yagba East	Iddo, Isanlu-Mopo, Ojesha,
		Yagba West	Egbe, Ejiba, Idofin, Odo-Eri
	Niger	Edati	Ekosanagya, Enagi, Safo
		Lavun	Etsuwo, Kutigi, Panti
		Mashegu	Babban Rami, Wawa, Zugurma
		Mokwa	Kudu, Mokwa, Tatabu
	Sokoto	Bodinga	Badari, DabajiDancadi, Tuluri
		DangeShuri	Fajaldu, Dange, Wababe,
		Gwadabawa	Asara, Gigare, Gwadabawa town
		Kware	Basansa, Kwaze, Umaruma

* Bitter kola is found across South-West, but respondents were only interviewed in Ogun and Ondo State.

Bambara Nut / Bambara Groundnut

Demographic characteristics of the respondents

Analysis of the demographic characteristics of farmers of Bambara nut revealed that about 40% fall between the age bracket of 40-60 years, 37% were 20-29 years, 21% were >60 and 2% were <20 years. Male (70%) was the dominant sex, 83.6% of the respondents were married, 7.4% were single, and 9.0% were widows. Respondents with farming history of >10 years, where 34%, 34% have <4 years and 32% have between 5-9 years. The respondents had one form of education or another ranging from primary education (33%) to secondary education (31%). However, 36% had no formal education. A half (50%) of the population had between 5-9 family members, (30%) had more than 10 family members, and 10% have 1-4 family members.



Agronomic profile

A majority (84%) of the respondents agreed that they had received improved seedling for Bambara nut, while others plant seedlings from the traditional stock. While 57.4% of the respondents have their seedlings from the previous season, 16.4% from markets, 14.9% from Agro Dealers and 11.3% from Extension agents. In contrast, 85% of the respondents had yield of just about 0.5 tonnes per hectare, 7% had an average yield of 1.4 tonnes per hectare, while 8.4% of the respondent had >4 tonnes per hectare. Significant proportion (69%) of the respondents agreed that they harvest Bambara nut between October and December, 27% of respondents harvest Bambara nut between July and September while few (3%) harvests Bambara nut between January and March. A large proportion (54 %) of the sampled respondents, agreed that they cultivate Bambara nut always, while 28% cultivate it rarely and the remainder of them cultivate Bambara nut occasionally. While a little above half (56.0%) of the respondents agreed that production constraints for Bambara nut were funds, 22.0 % were lack of input, 13.0% were pest and diseases, 7.2 % lacked labor.

More than half (62.6 %) of the respondents agreed that they had no extension contact on Bambara nut. In comparison, 37.7% had contact with the extension agents on Bambara nut. The result implies that an increase extension contacts with the farmers enhancing productivity of Bambara nut. 64.6% of the respondents agreed that they were trained on crop management for Bambara nut, 35.4% did not receive

Areas of intervention

Development of processing technologies for locust bean was a yes for above 80% of sampled respondents. It further showed that documentation of indigenous knowledge on locust bean is highly required as posited by about eighty-two percent of sampled respondents.

Moringa

Demographic characteristics of the respondents

38% of the moringa farmers were above 60 years of age and 31% of the respondents were between 40 and 60 years of age while 18% of the population were between 20-39 years and the least age of the respondents was less than 20 years of age with lowest population (13%). This shows that moringa production is still done by the old people in the study area. Majority of the respondents (69%) were literates and only 31.2% of the respondents had no formal education. This implies that the level of the respondents' education could influence their adoption of innovation on moringa production. The moringa farmers in the study area with 5-9 house-hold size were 41% of the population, while 32% of the farmers had 1-4 house-hold sizes and only 27% had more than 10 persons. This implies that the family would be able to provide labor required to produce the crop.



Agronomic profile

Moringa is a perennial crop which is in season once in a year. In the Northeast of Nigeria, it is planted between May and June with 5 % growing in the wild. Source of seedlings in the Northeast are previous harvest (95%) and agro dealers (5%) while in North Central previous harvest and agro dealers accounts for 56 and 34 % of the seedlings respectively. The result showed that many farmers (41%) had less than 4 years experience and 33% of the respondents had less than 10 years' experience. Meaning that some of the respondents just started cultivation of moringa and still learning on the production and could require extension services attention for better production.

Also, more than half of the population had extension services on production, while 36% of the respondents got extension services on storage pest control only 8% of the population had extension services on processing. There is a need for improvement on extension services to boost production, reduce pest infestation and improve processing quality.

About half of the respondents (51.1%) reported that on the average, yield of moringa was between usually less than 1 tonnes/ha while another 33 % recorded between 1-4 tonnes of moringa /ha. However, 15.6% of the respondents recorded more than 4 tonnes/ha. Some of the data collected are shown in Figure 9.

Challenges

Production constraints identified by 88, 26 and 22 % of farmers are inadequate capital, farm machinery and farm inputs respectively. There are myriads of challenge militating against production of locust bean in the study areas. While certain challenges are of great concern to the respondents, others require very little attention. About 35% of sampled respondents regarded ignorance of nutritional value of locust bean by buyers as a severe challenge obstructing adequate production of locust bean. Sixty-three percent of the respondents reported lack of national promotion policy as a severe challenge, ditto, inadequate knowledge on processing of locust bean (56%) and lack of improved cultural practices and varieties of locust bean (60%). More than 55% of the respondents regarded lack of financial support to produce locust bean as a challenge of great concern against optimum production of locust bean in the study area. Inadequate demand for locust bean was less severe to about 41% of the respondents. Similarly, lack of organized market for the crop was not challenge to 50% of the respondents.

Activities of rodents, insects and diseases were noted as postharvest constraints of locust bean that requires immediate solutions. Respondents adopt various preservation methods for locust bean which include drying (33%) and about 67% apply pesticides and insecticides. Insects are the only known pests of locust bean seeds. Some of the important data on locust bean are shown in Figure 8.

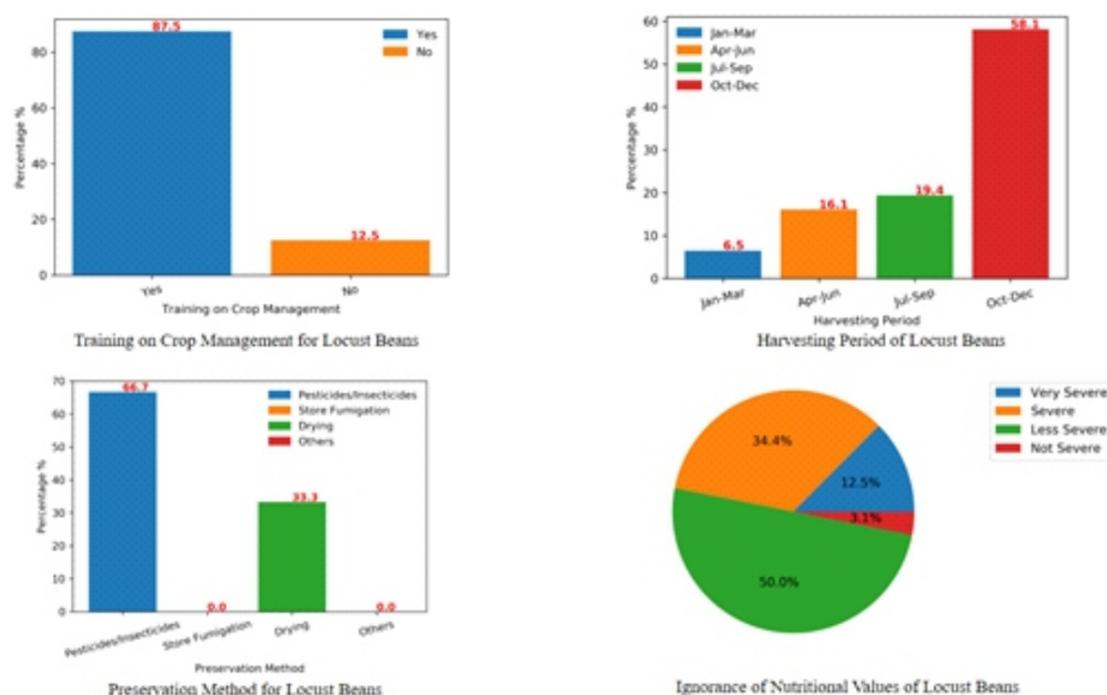


Figure 8. Important data on Locust beans; a-Respondents' desire for training, b-Harvesting period c-preservation, and d- Severity of lack of awareness of the nutritional value

Utilization

Locust bean is used mainly as condiment or natural sweetener in local stew/soup both in urban and rural Africa settings. It was also reported that locust bean helps in soil conservation.

training on Bambara nut. Training will help to improve the knowledge and skills of Bambara nut farmers, resulting in increased yield over time.

Postharvest handling and storage

After harvest, they are stacked on rows under sunlight in the farm for days to allow for drying. Then, the seeds are shelled when a rattling sound is heard upon shaken while in the pods. Shelling is either conducted by using flat stone to brake-up the dried pods or on a large scale; groundnut shellers are used. About 72.2% of respondents said they store Bambara groundnut seeds with pesticide dust and the seeds stay weevil-free for 6-8 months. Usually, the seeds are stored in the dried pods until needed for sale; this is because once seeds are removed from the pods, they become more susceptible to weevil damage unless treated with pesticide dust or wood ash or smeared with vegetable oil.

Challenges

Almost all the Respondents (94.3%) opined that cultural beliefs were not against the cultivation of Bambara nut. However, 36.2% of the respondents agreed that low yield for Bambara nut is not severe a severe challenge, 34.6% perceived it as less severe, for 23.1% it is severe, and for 6.2% consider it very severe. While 36.2% of the respondents reviewed that lack of organized markets for the crop is less common, 24.6% common, 23.1% very common, 16.2% not common. The respondents reported that lack of improved cultural practices and varieties for bambara Bambara nut were very severe, 30.2% less severe, 28.6% severe, and 9.5% not adequate. Thirty-seven percent (37% of the respondents reviewed that storage facility for bambara nut were less available, 30.8% very available, 18.8% available and 13.5% not available. Forty four (44.4%) of the respondents agreed that lack of sufficient seedling or seeds for Bambara nut were not common, 26.6% less common, 20.2% common and 8.9% very common. Forty six (46.2%) of the respondents agreed that inadequate knowledge on processing for bambara nut were very apparent, 30.3% less apparent, 15.9% apparent and 7.6% not apparent. 44.8% of the respondent agreed that high cost production for bambara nut were high, 32.8% very high, 16.0% less high and 6.4% not high. 45.3% of the respondents coincide that the nutritional value of bambara nut were less known, 25.8% very known, 21.1% known and 7.6% not known. 45.8% of the respondents agreed that lack of financial support for production for bambara nut were very high, 25.2% less high, 17.6% not high, and 11.5% were high. 41.2% of the respondents opined that the lack of national promotion policy for bambara nut was very severe, 35.9% severe, 13.7% less severe, and 9.2% not severe. About 48% of the respondents agreed that inadequate demand for the crop was less severe, 24.6% not severe, 21.5% severe, and 5.4% very severe. 45.7% of the responded agreed that economically non-profitable production for Bambara nut were less severe, 31.8% were not severe, 20.9% were severe and 1.6% were very severe. While 53.3% of the respondents agreed that strenuous production for was less severe, 30.6% were severe, 11.3% very severe, and 4.8% were less severe.

An excellent number (84.7%) of the respondents agreed that the susceptibility to weeds for Bambara nut is severe, 10.6% not severe, and 4.7% very severe. While 43.1% of the respondents agreed that susceptibility to pests and diseases for Bambara nut is severe, 25.4% less severe, 16.9% very severe, 14.6% not severe. Above half (58.7) of the respondent agreed that the common pest for Bambara nut were Ants and Insects, 28.4% were rodents, 12.8% were birds.

Slightly more than half (57.6%) of the respondents agreed that postharvest challenges for Bambara nut were insects/diseases, 29.7% were rodent, 12.7% were birds. While 37.2% of the respondent opined that the strenuous harvest for bambara nut was severe, 24.8% very severe, 21.5% less severe, and 16.5% not severe. In the North East, insects made up 60% of the pest, rodents were 40%, and farmers identified only insects as their only field pest. Non-biological constraint to the cultivation of Bambara nut as identified in the North East as was inadequate farm input (45%), farm machinery (20%) and fund (35%).

In comparison, 84 and 77% of the farmers identified farm input and farm machinery respectively as constraints.

Overwhelming proportion (83.3%) of the respondents agreed that storage losses for Bambara nut were <10, 15.1% were 10-19 and 1.0 were 20-29. 70.9% of the respondents opined that the storage method for Bambara nut was pp Bags, 12.6% was PICS traditional structure, 9.4% were others, and 5.5% were rooms. 50.0% of the respondent agreed that storage is not a problem for Bambara nut, 50.0% was a problem. 41.1% of the respondent agreed that storage period (months) for Bambara nut were 7-12, 38.1% were 3-6, 12.5% were <3, 8.3% were >12. All (100%) the respondent uses sundrying method in drying the crop. Less than half (36.5%) of the respondent engaged in threshing activities as a prestorage operation for Bambara nut, 29.6% were washing/sorting, 28.0% were drying, and 5.8% were others. While 47.7% of the respondent,s used pesticide/insecticide as a preservation method for bambara nut, 19.6% engaged in store fumigation, 18.7% used drying, and 14.0% used other methods.

Utilization

Bambara nut is a good source of fiber, calcium, iron, protein, carbohydrates, minerals, and potassium. Bambara nuts are roasted, milled, and the flour is used to make soup, relish, and also a substitute for coffee. Additionally, a thin porridge and stiff porridge can be made from flour. It was also reported that the crop is good for combating malnourishment, mostly in children, and it's also suitable for resolving the lack of sleep. It was revealed that Bambara groundnut, when roasted and eaten, ameliorate ulcerative patients. Less than ten percent (8%) of the total respondents attested that the water from steamed seeds could serve as a remedy for diarrhea and fast healing to newly circumcised teenagers. The leaves of Bambara nuts are used to treat wounds, inflammation, and abscesses, and the sap from leaves can solve epilepsy when applied to the eye. Raw seeds are chewed and swallowed by some pregnant women to relief nausea, as reported by some respondents in the study areas.

Areas of intervention

More than half (82.2%) of the respondents needed research support on the development of processing technologies, while 17.8% did not. The respondents (68.1%) suggested that they should be trained on pest and diseases management, while 31.9% were not interested. A majority (81.7 %) of respondents, needed improvement on post-harvest handling, while 18.3% had no interest. 68.8% of the respondents mentioned the identification and prioritization of the production constraints. 31.2% were not. 62.5% of the respondents preferred domestication of the crops, 37.5% did not.45.7% of the respondent needed documentation of the indigenous knowledge, 54.3% were not. While 67.3% of respondents needed knowledge and strategy on the marketing of the commodity, 32.7% did not. Some of the important data collected on Bambara nut are presented in Figure 2.

about 67% of jack beans farmers.

Jack beans is not exempted from the activities of pests such as ants/insects identified by all (100%) sampled respondents as the common pests of jack beans. It was reported that jack beansis severely susceptible to susceptible to pest and diseases observed by 57% of sampled respondents.

Utilization

Seed of jack beans are edible for human, other parts like the stalk, chaff, and pods are also used as animal feed, house roofing material or manure. Respondents also hinted that the crop can be used to cure pain/ache as well as high blood pressure.

Areas of intervention

It was observed that farmers have almost stopped the cultivation of jack beans in the study areas.

Locust Beans

Demographic characteristics of the respondents

Analysis of the demographic characteristics of locust bean respondents revealed that about 38% falls between the age brackets of 20-39 years and about 60% are between the ages 40 and 60; an indication of active and productive farmers. Male was the dominant sex (72%) among the respondents while 94% of them were married. About ninety-four percent (93.7%) of the respondents had one form of education or another ranging from primary to tertiary while 66% of sampled respondents had over ten years of farming history on cocoyam. Majority (72%) had between 5-9 family members.



Agronomic profile

Although locust bean tree grows in the wild in most of the communities where they are found. There's an indication that some farmers go out of their ways to plant the crop. Data analyzed on locust bean showed that more than 27% of the farmers plant the crop between March/April and May/June (46%). The results further showed that locust bean is cultivated occasionally (43%) for family and commercial purposes (68%) as well as for soil conservation. This means that respondents not only derived food value benefits from the crop, but they also earn income through the sales of the fermented seeds as additives/condiment to soups. All sampled respondents (100%) reported they harvest locust bean manually between June-Sept (19%) and Oct-Dec (58%).

Training is important for knowledge and capacity development required for optimum agricultural production. Majority of sampled respondents (88%) agreed to have received training on locust bean management, specifically, through extension contact in the areas of storage and pest control (38%), production (31%), as well as processing (31%). Sources of locust bean seedling are from previous season (97%) and markets (3%).

Postharvest handling and storage

Drying and washing/sorting were the main pre-storage operations carried out by 48 and 45% percent of sampled respondents respectively. About 94% of the respondents used polypropylene bags to store their locust bean within 1 year or more (72%) amd losses of up to 20% can be recorded during storage.

average yield of less than 0.5 tonnes per ha. All (100%) sampled respondents agreed to have received training on jack beans management, simply through extension contact on production (100%). Eighty percent of the respondents acknowledged extension agents as their source of jack beans seedling, while 10% identified previous season as their source of seedling. Some of the important data on jack beans are shown in Figure 7.

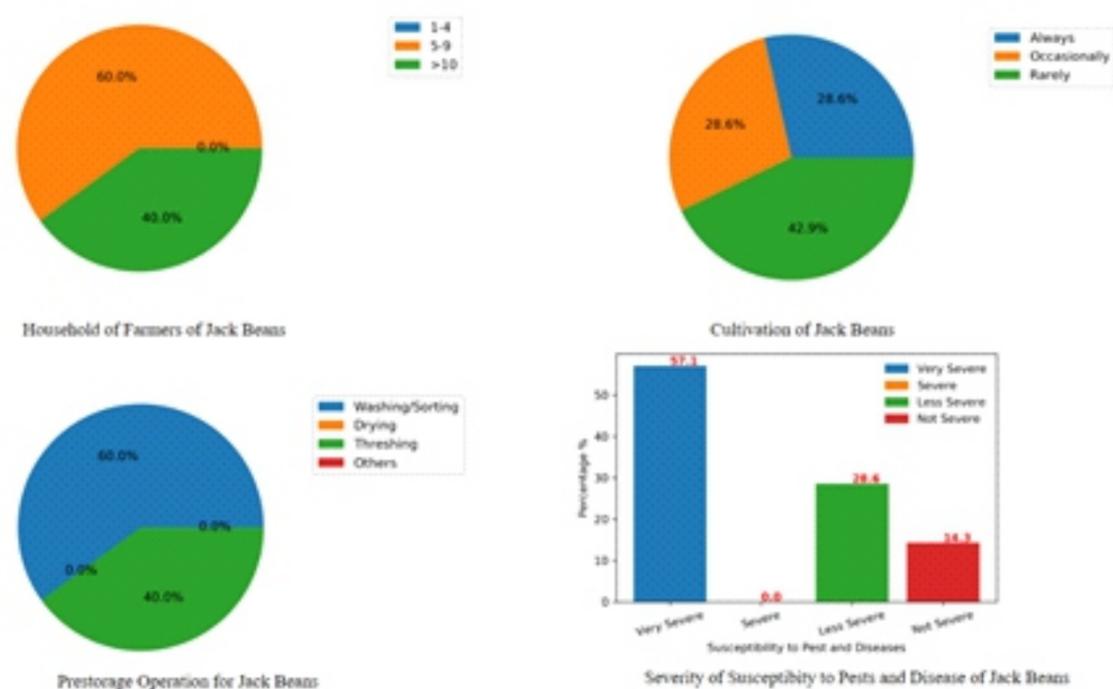


Figure 7. Important data on Jack beans; a-Household size, b-Frequency of cultivation, c-Pre-storage operations, and d-Susceptibility to insects

Postharvest handling and storage

The main pre-storage operation of jack bean was washing, and sorting indicated by 60% of the farmers. Forty percent of sampled respondent also reported threshing as one of their pre-storage operation before they store between 3-6 months. Jack beans is threshed and winnowed manually and there is no specialized processing equipment for these activities. Less than one-quarters (24%) of the farmers do not need to further dry the crop before storage. Drying is mostly achieved by spreading the crops in the open on a tarpaulin. Farmers are faced with challenges such as rodents, rainfall, dust, and theft among others during drying. Generally, farmers store their crops for more than two months. Some of the factors that limit the processing of these crops include tedious means of extraction, time consumption, and lack of fund. All respondents used pesticides/insecticides for preservation of jack beans.

Challenges

Jack bean farming is faced with some challenges observed generally by the respondents. Some of the challenges identified by the respondents are lack of national promotion policy, lack of improved cultural practices and lack of financial support for production. These challenges were considered as very severe by all (100%) of sampled respondents. The challenge of ignorance of nutritional value of jack beans was not a severe one to about 43% of sampled respondents, whereas low yield was a very severe challenge to

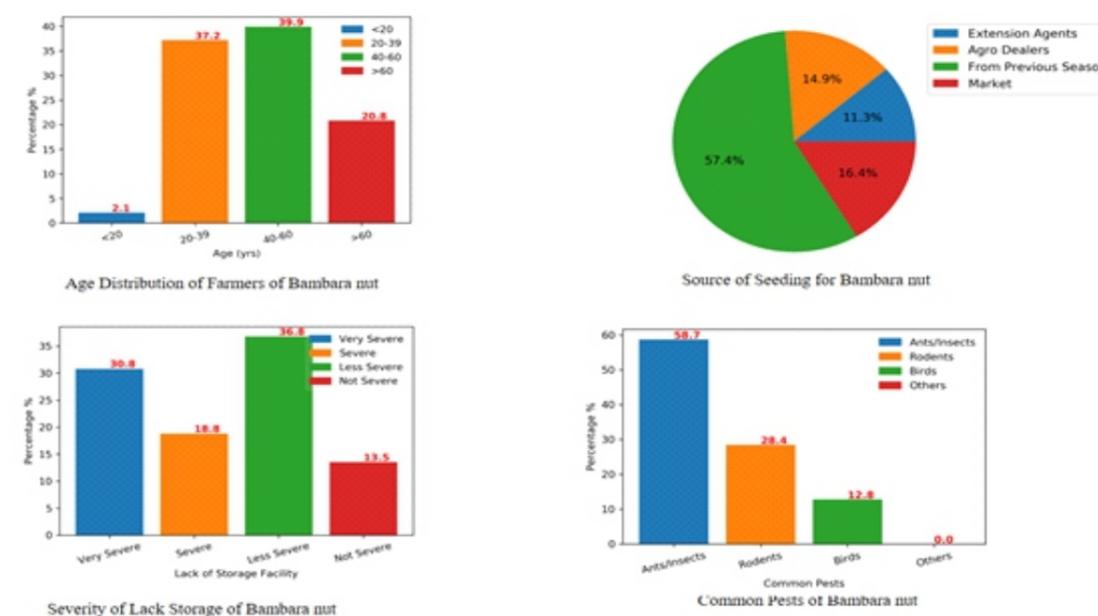


Figure 2. Important data on Bambara nut; a-Age distribution, b-Source of seeds, c-Severity of Storage problem, and d-Common Pests

Bitter Kola

Demographic characteristics of the respondents

Analysis of the demographic characteristics of Bitter Kola respondents revealed that about 80% falls between the age brackets of 20-39 years and 40-60 years: an indication of active and productive farmers. Male was the dominant sex (74.4%), while 94.8% of the respondents were married. An excellent number (89.5%) of the respondents had one form of education or another ranging from primary to tertiary. Many of the respondents were experienced farmers with 61.5% of sampled respondents having over ten years of farming history on Bitter Kola. The majority (56.4%) had between 5-9 family members.



Agronomic profile

Bitter Kola is a perennial crop. A majority (63.1 %) of the respondents use a farm size greater than 2ha for planting this crop. Analysis shows that 56.4% of the respondents cultivate bitter kola for commercial purposes only, 10.3% for family consumption only, while 33.3% cultivate it for both family consumption and commercial purposes. More than half (61.6%) of the respondents always cultivate the crop. The planting period for bitter kola falls between May and July. This was agreed to by 74.4 % of the respondents, while 69.2 % suggested that the harvesting period falls between July and December. All (100%) respondents employ manual method of harvesting. The average yield (tonnes/ha) for most of the respondents (92.3%) is less than 0.5 tonnes/ha.

Analysis shows that the susceptibility of bitter kola to weeds is not severe (100%). Its susceptibility to pests and diseases is also not severe as attested to by 69.2% of the respondents. Ants/insects (57.1%) are common pests of bitter kola.

There was no extension contact (100%) for the crop in the study area, which shows the neglect rate of underutilized crops in Nigeria. A high proportion of the respondents (77.5%) want training on the management of the crop. Seedlings for bitter kola cultivation is usually sourced from the previous season's harvest (60%) and Agro-dealers (37.5%).

The following production constraints are reported, which varied between very severe/ severe effects on optimum production of bitter kola. These are; high cost of production (15.4%), ignorance of the crop nutritional value (71.8%), lack of storage facilities (82%), lack of good seedling or seeds (64.1%), lack of organized market (92.3%), lack of national promotion policy (97.4%), low labor (10.2%), lack of improved cultural practices and varieties (53.8%), lack of financial support for production (82%), inadequate knowledge on the processing of the crop (87.2%), inadequate demand for the crop (100%), low yield (79.5%), economically non-profitable production (43.6%) and strenuous production (20%).

Postharvest handling and storage

The Pre-storage operations for bitter kola are drying (57.6%), washing and sorting (30.3%), and threshing (9.1%). This crop is preserved by drying (73.9%) and sometimes pesticides/insecticides are used (17.4%). The general drying method used by bitter kola handlers is Sun drying (93.9%). The processed nuts are usually stored at ambient conditions for up to 12 months (37.8%) and above 12 months (32.4%) with either polypropylene bags (41%), traditional structures (15.4%), or spreading them in a room (10.3%). As a result, there are storage problems (63.4%). Most times, these problems result in storage losses of less than 10 kg/tonne (68.3%) and storage losses greater than 10 kg/tonne (31.7%) among the respondents.

Challenges

The challenges/constraints of post-harvest activities in bitter kola are insects/diseases (40.9%), moulds (18.2%), and others (40.9%). Although, the nuts are harvested manually, the respondents do not consider it as strenuous (89.2%). A good proportion (48.8%) of the farmers agreed that the supply of improved seedlings will be a good way for improved production practices in bitter kola, while 51.2% deemed it unnecessary. Cultural belief is not a severe constraint (74.4%) to the production of bitter kola in the surveyed states. Another important challenge is that bitter kola trees are already going into extinction because of deforestation in southwest Nigeria, where loggers now cut down the trees for wood. This is observed in almost all trees crops that were inherited from our forefathers. The destruction of this heritage is due to temporary monetary gains to be derived by the deforesters. This act can be branded as 'Esaulistic behavior' of one selling ones' birthright at the expense of a plate of pottage.

Utilization

Bitter kola offers a wide variety of products. Its fruits, seeds, bark, twigs, leaves, or wood can be utilized for treatment of gastric and liver disorders. Bitter kola seeds have a sharp, bitter flavor that eases into a slight sweetness as you chew, and they're typically eaten raw. It was reported that the seeds be chewed to suppress headaches, laryngitis, bronchitis, malaria, and gonorrhoea. The seed extract is used to cure various types of inflammation or liver cirrhosis, while dried ground kernels can be mixed with honey to prepare a traditional paste against cough. The kernels also play an essential role in traditional ceremonies, e.g., the celebration of childbirth, marriage, or chieftaincy. Finally, offering the seeds is considered an act of hospitality and used to welcome visitors.

Areas of intervention

Most of the farmers (82.9%) needed processing technologies. A reasonable percentage of the farmers (63.4%) suggested that solutions should be provided to storage problems, pests, and disease

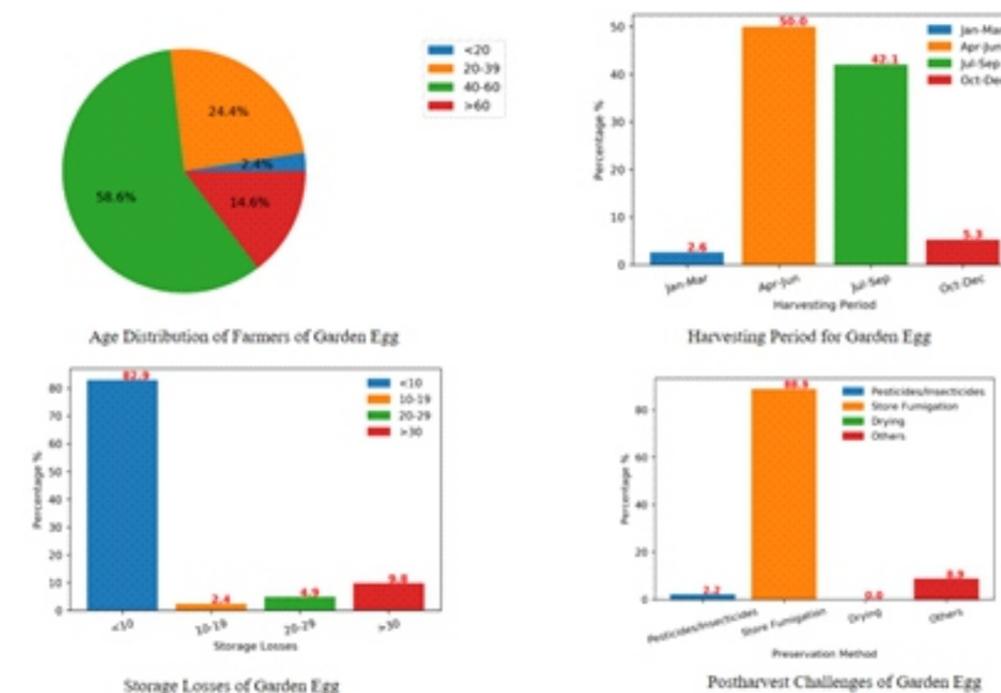
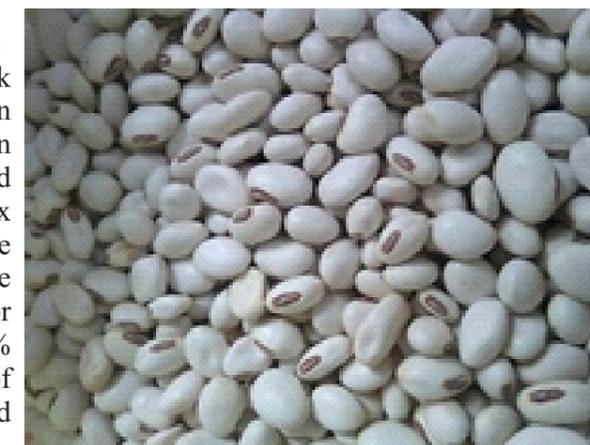


Figure 6. Important data on Garden egg; a-Age distribution, b-Harvesting period, c-Storage losses, and d- Postharvest challenges

Jack Beans

Demographic characteristics of the respondents

Analysis of the demographic characteristics of jack beans farmers revealed that about 30% falls between the age brackets of 20-39 years and 50% are within 40-60 years of age; an indication of active and productive farmers. Male was the dominant sex (80%) while all (100%) of the respondents were married. The results further revealed that all the respondents (100%) had one form of education or another ranging from primary to tertiary while 60% of sampled respondents had between 5-9 years of farming history on jack beans. Majority (60%) had between 5-9 family members.



Agronomic profile

Data analyzed on jack beans showed that 40% of the farmers plant the crop between March/April and May/June (30%). Forty-three percent of the respondents reported that they plant jack beans occasionally, done principally for family and commercial purposes (80%), an indication that besides the food value of jack beans, it is also a good source of income for the respondents. All sampled respondents (100%) reported that they harvest jack beans manually between Oct-Dec (80%) with an

March/April and April/May (18%). Fifty percent of sampled farmers cultivate garden egg basically for family and commercial purposes (78%), an indication that besides consuming the crop, it also provides some monetary benefits. Garden egg is harvested manually between June-Sept (26%) and Oct-Dec (52%) with an average yield of less than 0.5 tonnes/ha. Garden egg is not exempted from the activities of pests such as ants/insects.

Postharvest handling and storage

All (100%) sampled farmers indicated they store garden egg for less than 3 months recording less than 10% storage losses.

Challenges

Garden egg production is confronted with many challenges widely reported by the respondents. While some challenges posed great concern, others require very little attention. All (100%) sampled farmers identified ants and insects as the common pests of garden egg. It was reported that garden egg is susceptible to weeds (28%) and highly susceptible to pest and diseases (46%). The ignorance of nutritional value of garden egg by people, lack of storage facility, lack of national promotion policy, lack of improved cultural practices and lack of financial support for production constitutes very severe challenges to 44, 63, 63, 15 and 68% of sampled respondents respectively. The cost of producing garden egg is also a very severe challenge as indicated by 41% of the respondents, whereas low yield of garden egg is not a severe challenge to more than 53% of sampled respondents.

Insects, rodents, caterpillars were identified by farmers as pest of garden egg irrespective of the region where it is grown. Other constrains to cultivation of garden egg include inadequate fund, inadequate machinery, inadequate farm input, inadequate rain, stress, low sales, and weed.

About 58% of garden egg farmers identify insects and diseases as the main constraints to effective postharvest management of the crop. Respondents adopt various preservation methods for garden egg which include fumigation in stores (89%), and application of pesticides and insecticides (2%).

Utilization

Majority (98%) of the respondents mentioned that garden eggs help to reduce digestive problems, whereas 35% of them reported that garden egg improve vision. In like manner, 23% mentioned that it boosts libido in men, 28% acknowledged that it purifies the liver, 10% of the respondents also acknowledged that it serves as de-wormer and 14% of the farmers confirmed that garden eggs normalize blood pressure.

Some of the important data are shown in Figure 6.

Areas of intervention

The phenomenon of climate change with its attendant effect on time and volume of rainfall is a serious production challenge to garden eggs. The farmers agreed to the need to document indigenous knowledge on garden egg.

management (53.8%), as well as the marketing of the commodity. A little less than half of the respondents (43.9%) desire research support on the domestication of the crops while majority, 87.8%, want support on documentation of indigenous knowledge. In addition, a large percentage 68.3% desire research support in the identification and prioritization of the production constraints, while 63.4% want research efforts geared towards improvement on post-harvest handling. It is believed that if some of these interventions are addressed by relevant stakeholders, the production and availability of the crop will be enhanced. Thereby addressing malnutrition, unemployment, poverty level, and food security in Nigeria. Some of the important data collected are shown in Figure 3.

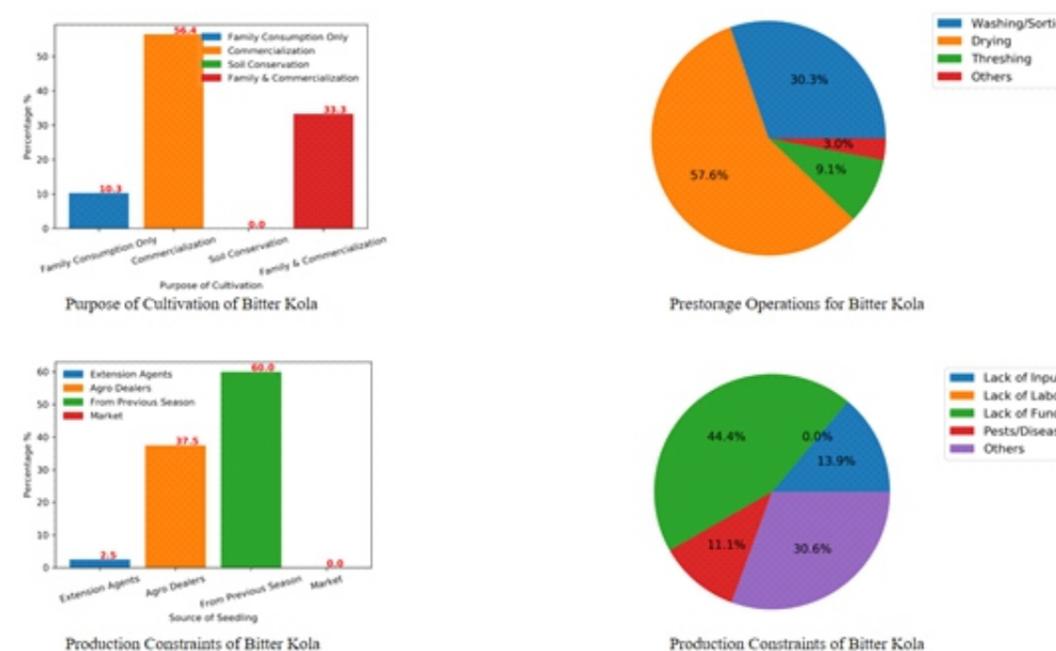


Figure 3. Important data on Bitter Kola; a-Purpose of Cultivation, b-Source of seeds, c-Pre-storage operations, and d-Production constraints

Bread Fruit

Demographic characteristics of the respondents

The demographic characteristics show that many of the respondents are male (56%) and are within 40-60 years (56%); this is still within the active age bracket. The highest level of education is a primary school (48%) while 88% are married. The house size of 5-9 members (86%) is the highest. This shows the availability of cheap family labour for farming activities. All the breadfruit farmers cultivate less than 2ha (100%) of farmland and they (87.5%) have more than 10 years period of handling of the crop; this shows adequate farming experience by the respondents.



Agronomic profile

Breadfruit is reported to be majorly planted around March and April (60%), while harvesting is usually done manually (100%) between April and June (40%) and between October and December (32%). The

respondents indicated that the crop is cultivated occasionally (46.5%); this is understandable since the crop is a perennial crop (100%) with a long gestation period. The average yield of the crop is less than 0.5 tonnes/ha (88.1%), which means improving seedling development is very necessary to improve the yield per hectare in breadfruit production. The crop is cultivated for family and commercial purpose (92.6%). Most (95.7%) of the respondents indicated there was no extension contact for the crop in the study area, this further reiterates the neglect of underutilized crops in Nigeria even in extension service, and when there is extension contact, it is mostly in production (100%). Seedlings for breadfruit cultivation is usually sourced from two sources, previous harvest (40.7%) and market (40.7%).

Postharvest handling and storage

Respondents opined that the pre-storage operations for breadfruit are washing and sorting (21.3%) with drying (37.7%). The processed crops are usually stored for less than 3 months (60%) with either polypropylene bags (15%) or spreading them in the room (11.5%). There are storage problems as indicated by all (100%) the respondents; this most times result in storage losses of less than 72% encountered by the respondents. The most familiar drying method by breadfruit handlers is sun drying (95.7%), the majority (91.7%) usually preserve breadfruit by drying the seeds and storing in airtight containers to prevent spoilage during storage. All (100%) of the respondents wash and dry breadfruits before storage, while 20% fermented and all (100%) respondents stored in airtight container. Per the duration of storage, 50% of the respondents stored below 4 months and 50% between 5-6 months. While 25% of the farmers faced challenges of breaking of the seeds, 25% of the respondents were affected by ants and insect infestation and 25% of the farmers experienced grain weight loss during storage. The majority 75% of the respondents, managed the storage problems by reducing the storage period. Factors responsible for spoilage include ant and insect infestation reported by 25% of the respondents and improper drying mentioned by 50% of the farmers and heat problem by 25% of the farmers in the study area. All the farmers (100%) that experienced insect named the insect weevil. All farmers (100) agreed that breadfruit required drying and sun-drying is the only method used by all (100) the farmers; challenges during drying include rainfall reported by 25% farmers, and 50% mentioned animals, and 25% mentioned dust.

The post-harvest activities are constrained by molds (29.5%) and birds (27.3%). Breadfruit has a strenuous harvest (56%) while majority (84%) reported an inadequate knowledge on the processing of the crop; the traditional practice of leaving breadfruit in a cool environment to get soft to ease the removal of seeds is mostly practiced. The study by Akande and Fabian (2010), also supported this finding, where they reported that, the heavy and large fruits of breadfruits are traditionally harvested by allowing them to ripen and drop from the tree, thereafter, allowed to soften in a cool environment and washed in water to remove the seeds.

Challenges

The common pests of breadfruit are birds (75%) while ants/insects (18.8%) are also threats to abundant production of the crop.

Production constraints reported to affect optimum production in breadfruit are, lack of good seedling or seeds, ignorance of the nutritional value of the crop (60%), low labor (44%), lack of financial support for production (84%), lack of improved cultural practices and varieties (36%), lack of national promotion policy (96%), strenuous production (48%), and lack of storage facilities (32%). The respondents 56% said that demand is not a severe constraint crop production. These production constraints are also in line with the findings of Philippa and Fabian (2021), who reported that a long gestation period (up to 10 years) and tall breadfruit trees are some of the constraints faced by breadfruit traders in Nigeria.

Utilization

Results on breadfruit utilization indicate that 100% of the respondents confirmed the utilization of the

25.0% indicated not severe a postharvest constraint. About half (45.8%) of the respondents agreed that lack of storage facility is a constraint of African star apple, 29.2% indicates inavailability and 25.0% indicates availability of storage facilities.

Challenges

Majority (86.1%) of respondents indicated that less than 10% of the crop are loss during storage, 11.1% say they record losses up to 10-19% and 2.8% lost over 20% their harvest during storage. All the respondents store their crop for less 3 months. A notable section (82.2%) of respondents indicated that they faced storage problems while 17.8% indicated no storage problem. Majority (93.7%) of the respondent used pesticide/insecticides for drying, pre-storage operations and storage, 4.2% used other methods, 2.1% engaged in store fumigation. All (100%) of the respondent engaged in pre-storage operation for African star apple.

Utilization

African star apple acts as a natural remedy for common issues such as constipation, toothache, sore throat, and indigestion. Herbal practitioners recommend the use of the bark of the tree for treating yellow fever, malaria, and cough, while the leaves are potent for treating wounds, stomachache, and diarrhea. However, the leaves have been proven to be toxic when taken in excess quantities. The roots are used in the treatment of sexual weaknesses, asthma and sterility. The cotyledons on the young seedlings are also helpful in treating vaginal infections.

Areas of intervention

As much as three-quarter (73.3%) of the respondents agreed that supply of improved seedlings will improve the production practices of African star apple. Majority (86.7%) of the respondents desired research support on development of processing technologies. Almost all the respondents (95.6%) suggested that they should be trained on pest and diseases management, while 4.4% were not interested. Majority (97.8%) of respondents needed training on improved post-harvest handling. A little above half (55.6%) of the respondents are interested in the domestication of the crops and 66.7% of them wants indigenous knowledge to be documented while 95.6% of respondents need knowledge and strategy on marketing of the commodity.

Garden Egg

Demographic characteristics of the respondents

About 25% of Garden egg farmers are 20-39years, and 57% are between 40 and 60 years old, 73% are male and 91% are married. About ninety percent (90.2%) of the respondents are educated. About sixty percent (59%) of sampled respondents had over ten years' experience producing garden eggs.

Agronomic profile

A large percentage (81%) of the farmers received improved seedling from ADP offices. Data analyzed further show that showed that 56% of farmers plant this crop between



another ranging from primary to tertiary while 85.4% of sampled respondents had over ten years of farming history on African Star Apple. Many of the household size (73.9%) had between 5-9 family members. Higher proportion 85.4% had farming experience of more the 10 years.

Agronomic profile

Although Cherry mostly grows in the wild in many places in southern part of the country, the result from the study suggests that the crop is also being planted. About 44.9% of the respondents plant the crop in June/July, 34.7% May/June, 8.2% Mar/April while very few (4.1%) plants in July/August. This implies that African star apple is mostly planted during raining season. A high proportion of respondents 87.5% has an average yield of less than 0.5 tonnes per ha, 10.4% greater than 0.5 tonnes per ha and 2.1% has between 1-4 tons per ha. Analyzing the purpose of cultivating crop reveals that higher percentage of respondents 66.7% cultivate for family and commercial purpose, 20.5% for commercial purpose only and 12.8% for family consumption only. Fifty percent (50%) of the respondents rarely cultivate the crop, 33.3% cultivate it occasionally while 16.7% always cultivate the crop. All (100%) of the respondent agreed that African star apple is harvested between January and March. A large percentage of respondents agreed that production of African star apple is affected by some constraints; 6.5% were pest/diseases, 4.3% were lack of fund, and 2.2% were lack of inputs. 40.0% of the respondent used the total farm size of >2.5 hectare for African star apple, 31.1% used <6-10, and 28.9% <2 hectare. Result shows that 79.5% of the respondents had no contact with extension agents. All (100%) of the respondents use seedlings from their own farms for planting. Improved varieties African star apple are not available indicating lack of improvement research efforts on the crop.

High proportion of the respondents 47.9% indicates severe susceptibility of African star apple to pest and diseases, 27.1% not severe, and 12.5% very severe. 47.9% agreed that African star apple is severely susceptible to weed and 4.2% indicated that that the crop is very severely susceptible to weed. All the respondents (100%) agreed that ant/insects are common pest of this crop. About 95% of respondents indicates lack of financial support for production not as a severe production constraint, while 2% allude to adequate financial support. Majority of the respondents 91.7% indicates that inadequate demand for the crop is not a severe production constraint while 8.3% indicates it to be very severe. Also, a higher proportion (98%) of the respondents view inadequate knowledge on processing to be a severe production constraint of the crop. For a huge chunk of the respondents, 77%, high cost of production of African star apple is a severe production constraint, while less than a quarter of them (23%) perceive it to be not severe.

A significant proportion 73% of respondents alluded to low yield as a severe constraint in the production of the crop, while for 27.1% it is not severe. Similarly, for 73% of the respondents, lack of organized market for African star apple is a less severe production constraint and for 27.1% it is severe. A little more than half of the respondents (58%) of the respondents indicated that lack of improved cultural practices and varieties is less severe production constraints of African star apple whilst for 42% it is adjudged as not severe. Majority 72.9% of respondents agreed that insufficient labour for production of African star apple is not a severe production constraint while 27.1% of respondents indicated that insufficient labour is a production constraint which affect African star apple very severely.

Postharvest handling and storage

Majority 95.8% of the respondents indicated that insect/diseases is the main postharvest challenges of African star apple while 4.2% indicated other challenges. 48.1% of respondents agreed that tedious harvesting for African star apple is a severe postharvest constraint, 26.9% indicated very severe and

crops for food consumption. While 5% of the respondents stated that the leaves and the barks be used for curing fever, 4% stated that it couldbe used to control blood pressure and blood sugar. The study by Philippa and Fabian (2021), reported that breadfruits might be cooked with palm oil, salt, and pepper as porridge or with additives like fish, scent leaf, palm oil, and condiments. Although, sometimes, they may also be cooked and served with rice, it is a normal practice in South-eastern Nigeria to roast and eat breadfruit as a snack.

Areas of intervention

The study underlined the need to make improved seedlings available to boost the production. It is also important to note that post-harvest handling and storage problems were reported by the respondents. All the respondents (100%) want training on the management of the crop. They are desirous of research support on the development of processing technologies, a majority (92%) want support on documentation of indigenous knowledge and domestication of the crop; this is important because the crop is majorly found wild. A large percentage (92%) want identification and prioritization of the production constraints, while 52% want research efforts towards improvement of post-harvest handling. It is believed that if some of these interventions are provided by relevant stakeholders, the production and availability of the crop will be enhanced. Thereby addressing malnutrition, unemployment, poverty level, and food security in Nigeria. Figure 4 shows some of the important data on breadfruits.

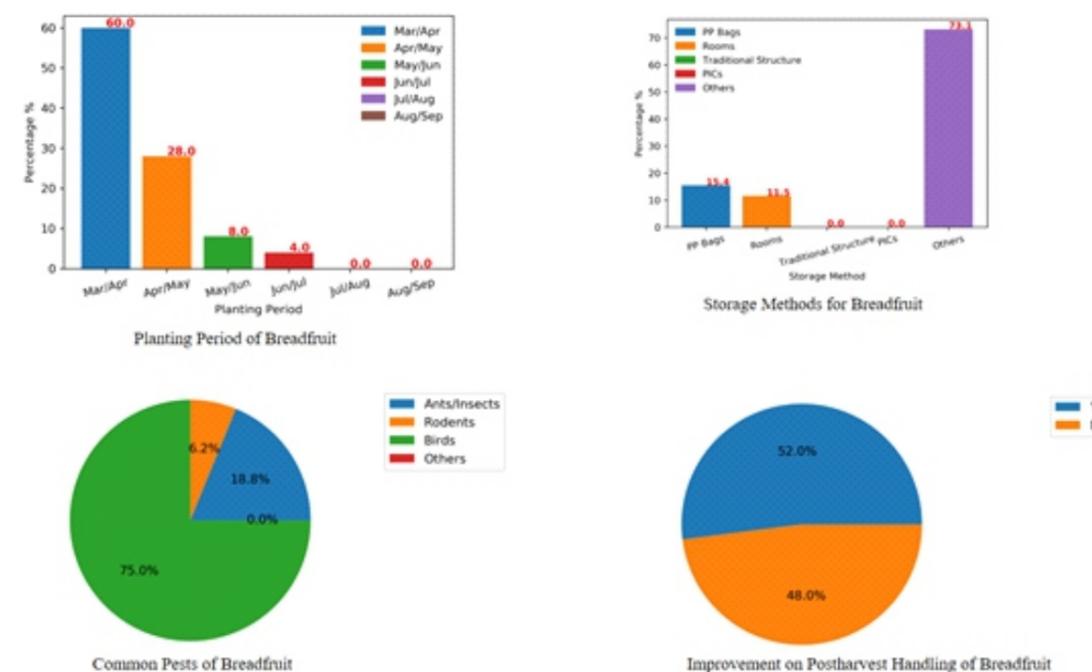


Figure4. Important data on Breadfruit; a-Planting period, b-Storage Period, c-Common pests, and d- Postharvest handling

Bush Mango

Demographic characteristics of the respondents

Analysis of the demographic characteristics of bush mango respondents revealed that about 45% were of the age brackets 20-39 years, an indication of young, active and productive farmers. Male was the dominant sex (56%), while 77% of the respondents were married. An excellent number (87%) of the respondents had one form of education or another ranging from primary to tertiary, while 72% of them had over ten years of farming history on bush mango.



Agronomic profile

More than ninety percent of bush mango farmers reported they received improved seedlings from appropriate authorities; however, they all (100%) lack processing and storage technologies. Data analyzed on bush mango show that 58% of the farmers plant the crop between March and April while 27% plant between April and May. Many of them cultivate the crop for family and commercial purposes (98%). This suggests that it is a good source of income for the respondents. All sampled respondents (100%) reported they harvest bush mango manually between April-June (77%) and July-Sep (20%) with an average yield of less than 0.5tonnes/ha.

Activities of pests and diseases result in quantitative and qualitative crop losses. Bush mango is attacked by these pests such as ants/insects, birds, and rodents. Forty-one percent of the respondents identified birds and ants/insects (2%) as the common pests of bush mango. However, bush mango is not severely susceptible to pest and diseases and weeds according to 39 and 44 % of sampled respondents, respectively.

Training is primarily for knowledge and capacity development, which are essential for agricultural production. About 97% of sampled respondents agreed to have received training on bush mango management through extension contact in production. Sources of bush mango seedling are from the previous season (51%), and agro-dealers (26%).

Postharvest handling and storage

About 93% of respondents noted that they break the pods and sundry. The common method of bush mango storage is bagging (91%). Spoilage was the main challenge experienced during storage as indicated by 61% of the respondents. Sun drying is the only means of drying before storage. More than seventy percent of the respondents store bush mango primarily in polypropylene bags between 3-6 months (78%), and storage losses of less than 10% storage are usually recorded as attested to by 91% of the farmers.

Challenges

The respondents reported several challenges associated with bush mango production. Some of the constraints are ignorance of the nutritional value of bush mango by the respondents, lack of storage facility, lack of national promotion policy, lack of improved cultural practices, and lack of financial support for production constitutes very major challenges to about 70, 54, 49, 39 and 60% of sampled respondents respectively. The cost of production of bush mango is not a serious challenge to more than sixty percent of the respondents, whereas inadequate knowledge of processing of bush mango is a major challenge to about 75% of sampled respondents. The farmers identify birds as a constraint to effective postharvest crop management (during drying). Only 17% of the respondents reported the problems of insects and diseases in Bush mango during storage.

Utilization

Bush mango is reputed to have curative potentials in ulcer patients. It was also reported that the crop helps in boosting ovulation and libido, it lowers blood cholesterol, and it is very useful for managing diabetes. It is frequently used to resolve stomach upset, pile, and heart failure.

Areas of intervention

Most of the Bush Mango farmers (99%) expressed interest to learn more about processing and storage technologies. Many of respondents (95%) requested for capacity development related to post-harvest handling and how to domesticate of the crops. They all (100%) say, documenting/dissemination of the indigenous knowledge, and practices on bush mango could accelerate its production. Some of the useful data collected on bush mango are shown in Figure 5.

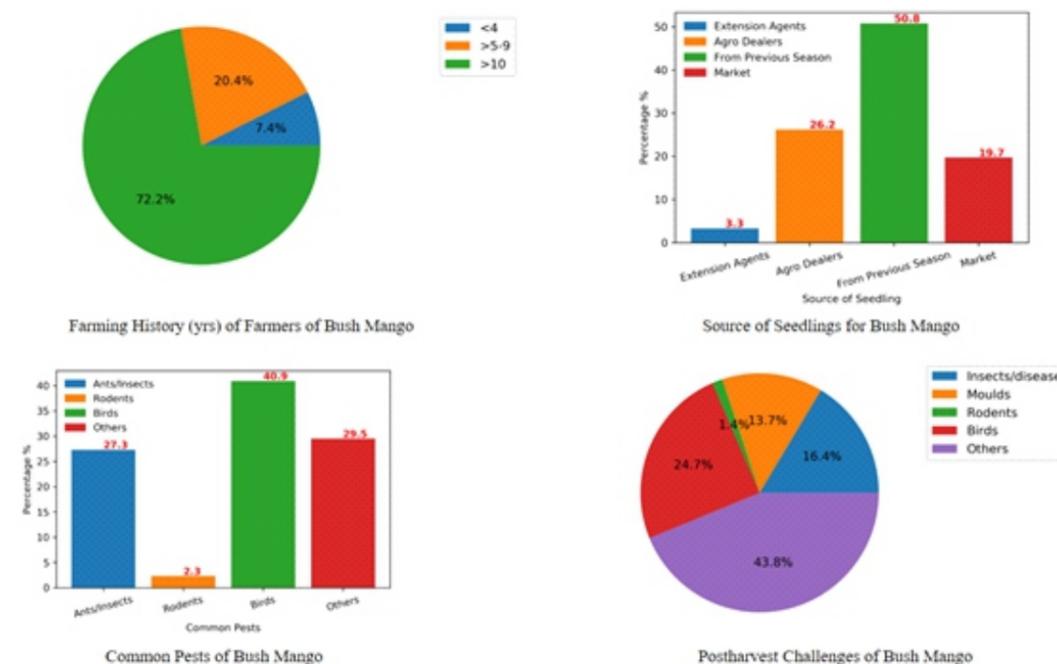


Figure 5. Important data on Bush Mango; a-Farming history, b-Source of seedling, c-Common pests, and d- Postharvest challenges

Cherry (African Star Apple)

Demographic characteristics of the respondents

Analysis of the demographic characteristics of respondents producing African Star Apple revealed that 72.9% are between 20-60 years reflecting the potential vibrancy of farmers. Male was the dominant gender (78.7%) of which 81.3% were married. A huge number (89.6%) of the respondents had one form of education or

