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Essential Competencies for Secondary School Graduates in Sweet Melon Production for Sustainable Agriculture in Ovia North East, Edo State, Nigeria

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ABSTRACT

Background and Objective: Sweet melon (*Cucumis melo*) production plays a crucial role in sustainable agriculture and food security. However, secondary school graduates require specific competencies to engage effectively in its cultivation. This study aimed to identify the essential competencies needed by secondary school graduates in sweet melon production for sustainable agriculture and food security in Ovia North East L.G.A. of Edo State, Nigeria. **Materials and Methods:** A survey research design was employed to conduct this study. The target population comprised Agricultural Science Teachers and Agricultural Extension Officers in Benin City, Edo State. A total of 300 respondents, including 250 Agricultural Science Teachers and 50 Agricultural Extension Officers, were selected using a multistage sampling technique. Data collection was facilitated through a 32-item structured questionnaire titled Competency Needs of Secondary School Graduates in Sweet Melon Production Questionnaire (CNSSGSMPQ). The instrument's validity was confirmed by three experts from the University of Benin, while its reliability was established using the Cronbach Alpha method, yielding a coefficient of 0.80. Weighted mean and standard deviation were used for data analysis. **Results:** The study revealed that secondary school graduates required competencies across four key areas of sweet melon production: Pre-planting (8 competencies), planting (8 competencies), post-planting (8 competencies), and harvesting/handling and marketing operations (8 competencies). These findings highlight the specific skills necessary for effective sweet melon production. **Conclusion:** It was recommended that the identified competencies be integrated into the secondary school Agricultural Science curriculum to enhance skill acquisition. Additionally, training programs should be implemented for secondary school graduates and farmers to improve employment opportunities in sweet melon production. Further research is encouraged at the state and federal levels for broader applicability.

KEYWORDS

Competencies needed, secondary school graduates, sweet melon production, food security, agricultural science teachers, extension officers

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INTRODUCTION

Sweet melon (*Cucumis melo* L.) is a horticultural crop plant that can be grown in almost every climate, whether warm or cold. In Nigeria, it is mostly grown in the Northern part of the country, where it is popular because of its sweet pulp and pleasant aroma[1]. According to a report, the world's annual production of sweet melon rose from 9 million (700,000 ha) in 1992 to 22 million (1.2 million ha) in 2002. The countries leading in the production of the sweet melon are China with 400,000 ha, West Asia which includes Turkey, Iran and Iraq with 200,000 ha, the America which includes United State, Mexico, Central and South American countries with 165,000 ha, Northern Africa which includes Egypt, Morocco and Tunisia with 110,000 ha, Southern Asia which includes India, Pakistan and Bangladesh with 100,000 ha amongst others[2].

Sweet melon is a very valuable crop in Africa and other parts of the world. The crop belongs to the family called Cucurbitaceae. Other crops in the same family with sweet melon are cucumber (*Cucumis sativus*), watermelons (*Citrullus lantus*), calabash (*Lagenaria siceraria*) and pumpkins (*Cucurbita pepo*) amongst others. Sweet melon as a crop originated in Africa before it then gain root into the United States of America and later spread to Asia[2]. In a report, the average world production of sweet melons is valued to be 31 million tons. The crop is reported as well to be rich in flavor, has low-calorie as well as low fat[3]. Sweet melon usually produce fruits which are rich in Vitamin A which serves as a powerful antioxidant and good for vision[4]. The fruits also have vitamin B complex as well as vitamin C which help to build up or improve human immunity[5]. Other compositions of sweet melon fruits are polyphenols and carotenoids, which are natural antioxidants needed in the human body. It was opined that people are attracted to the sweetness of sweet melons, the aroma, and more importantly, the health benefits of the fruits when consumed[6].

Sweet melon fruits are harvested once fully matured; the sweet and juicy pulp in the fruit is consumed. The pulp can also be made into ice cream or juice by mixing it with water and sugar, and milk. Fruits from sweet melon that are not mature can be cooked fresh or fried for consumption. The seeds from the fruits can also be roasted for their oil and also for consumption. The Hausas in Nigeria make fermented cake from the kernel of the seeds by grinding it while the young leaves are eaten as a pot herb and can be used in soups[7]. The leafy stem and the fruit of sweet melon can be used as forage for different farm animals as a feed ingredient. For sweet melon to give the best aroma during consumption, harvesting the fruits a few days before they are fully ripped is advisable. The edible seed kernel of sweet melon, as reported, consists of about 46% yellow oil and 36% protein. Growing the crops, though has lots of nutritional and health benefits, but is affected by some pests and diseases[7].

Common pests of sweet melons have been reported to include cutworms (*Agrotis segetum* S.), which destroy sweet melon roots under the soil surface at an early stage shortly after germination; whitefly (*Bemisia tabaci* G.); aphids (*Aphis gossypii* G.); fruit flies (*Bactrocera cucurbitae*); red spider mites (*Tetranychus evansi* B.); and leafhoppers (*Circulifer tenellus* B.). Aphids, leafhoppers, and whiteflies are regarded as foliage pests, which damage the crop by causing leaf distortion, while *Bactrocera cucurbitae* destroys the melons as their larvae bore into the already-formed fruits.

Other common diseases of sweet melons include blight (*Phytophthora infestans*), root rot (*Cochliobolus sativus*), and powdery mildew (*Blumeria graminis*).

Production has been defined as the process of combining some inputs to produce or manufacture tangible stuff for consumption or for other uses for man's benefit. In the context of this study, production involves the successful management of crop production practices for growing sweet melon. The practices involved in the cultivation process include pre-planting operations, planting operations, and post-planting operations, such as weeding, fertilizer application, harvesting, and processing of the fruits for consumption

and other uses. To be efficient in the production of melon seeds to ensure food security and sustainability in agricultural production, the farmers growing the crop need competency improvement in all the production processes of the crop.

Food security ensures that all citizens have consistent physical and economic access to sufficient, safe, and nutritious food. It relies on three pillars: Food availability, financial accessibility, and nutritional adequacy. Achieving food security requires identifying key competencies for effective food crop production, including soya beans.

Competency is the standard knowledge, skills, and attitude required for successful task execution. In this study, competency needs refer to equipping secondary school graduates with practical skills for sweet melon production, which are often lacking due to a theoretical curriculum. Agricultural science teachers provide general knowledge, but students may graduate without hands-on competencies for profitable farming.

Sweet melon production in Southern Nigeria has declined, leading to supply shortages. Melon production in Nigeria dropped from 103.26% in 2007 to 92.98% in 2008 due to poor access to inputs, credit, infrastructure, markets, land, and research support. Many farmers rely on traditional subsistence farming, intercropping, and outdated techniques, reducing yields and profitability[9-12].

This study aims to identify essential competencies for sweet melon farmers and secondary school graduates to enhance sustainable agricultural production in Ovia North East Local Government Area, Edo State, Nigeria.

MATERIALS AND METHODS

Research design: The study adopted a survey research design.

Study area: The study was carried out in 2024 from April to September. The study was conducted in the Ovia North-East Local Government Area (LGA), located in Benin City in Edo State, South-South Geopolitical Zone of Nigeria. The headquarters of the LGA is Okada, and it comprises several communities where farming is the major occupation. These communities include Odighi, Odiguetue, Igbekhue, Osasimwonba, Uvgbojobo, Uniaro, Utekon, Ogua, Iwu, Iguiye, and Iguowa, among others. The total area of the LGA is 2,301 km^2, with an average temperature of 28°C.

Population of the study: The study population included all Agricultural Science Teachers and Agricultural Extension Agents in Ovia North-East LGA.

Sample and sampling technique: A total of 250 Agricultural Science Teachers and 50 Agricultural Extension Agents were selected, making a total sample size of 300 respondents. The sampling technique employed was multistage sampling, conducted as follows:

- **First stage:** Purposive Sampling was used to select ten communities in Ovia North-East LGA where melon cultivation is common
- **Second stage:** Proportionate Stratified Random Sampling was used to determine the sample size for each community

Twenty-five Agricultural Science Teachers were selected from each of the ten communities, totaling 250 teachers. Fifty Agricultural Extension Agents were selected through the Ministry of Agricultural and Water Resources, Edo State, Nigeria.

Instrument for data collection: The instrument used for data collection was a structured questionnaire titled "Competencies Needed by Secondary School Graduates in Sweet Melon Production Questionnaire (CNSSGSMPQ)". The questionnaire consisted of 32 structured competency items and was divided into two parts:

- **Part A:** Collected personal data of the respondents
- **Part B:** Organized into four sub-groups of competencies needed in sweet melon production:
- Pre-planting operations (8 items)
- Planting operations (8 items)
- Post-planting operations (8 items)
- Harvesting and marketing operations (8 items)
- Each item was rated using a four-point response scale:
- Strongly required (SR) = 4
- Moderately required (MR) = 3
- Required (R) = 2
- Not required (NR) = 1
- Validity and reliability of the instrument
- Questionnaire was validated by five experts:
- Two experts from the Agricultural Education Unit
- Three experts from the Crop Science Department

A trial test was conducted using 30 copies of the instrument on 30 respondents from the Egor Local Government Area, Edo State, who were not part of the main study. The reliability of the instrument was determined using the Cronbach Alpha method, yielding a reliability index of 0.80, indicating high reliability.

Data collection procedure: The researcher, with the assistance of two research assistants, personally administered the questionnaire to Agricultural Science Teachers and Agricultural Extension Agents in the study area.

Data analysis: The data collected were analyzed using weighted mean and standard deviation to answer the research questions. The decision rule was based on an arithmetic mean of 2.50, with an interval scale of 0.05 to determine the upper limit:

Mean $\geq$2.50→Competency was regarded as required
Mean <2.50→Competency was regarded as not required

Ethical consideration: This manuscript on essential competencies for secondary school graduates in sweet melon production for sustainable agriculture in Ovia North East, Edo State, Nigeria, is based on ethical research practices. It ensures accuracy and fairness to various contributors. Information contained in the manuscript is from reliable sources and practical works with the acknowledgment of contributions of researchers, farmers, extension agents, and agricultural experts.

RESULTS

The results of the descriptive statistics were presented in Table 1-4.

Research question 1: What are the competencies needed by secondary school graduates in pre-planting operations for sweet melon production?

The data in Table 1 revealed that secondary school graduates needed competencies in all the eight items with their mean values ranging from 3.15 to 3.65 and were all above the benchmark of 2.50. This indicated that secondary school graduates need competencies in all the eight competency items in pre-planting operations of sweet melon production.

Research question 2: What are the competencies needed by secondary school graduates in planting operations for sweet melon production?

The data presented in Table 2 revealed that all the eight competency items, which ranged from 3.00 to 3.55 were positive. This indicated that secondary school graduates need competencies in all the listed planting operations of sweet melon production.

Research question 3: What are the competencies needed by secondary school graduates in post-planting operations for sweet melon?

The data in Table 3 revealed that secondary school graduates need competencies in all the eight items with their mean values ranging from 3.14 to 3.48 and were all above the benchmark of 2.50. This indicated that secondary school graduates need competencies in all the eight competency items in post-planting operations of sweet melon production.

Research question 4: What are the competencies needed by secondary school graduates for harvesting and marketing of sweet melon fruits?

The data presented in Table 4 showed that all the eight competency items, which ranged from 3.02 to 3.85, were positive. This indicated that secondary school graduates needed competencies in all the listed harvesting and marketing operations of sweet melon production.

Table 1: Mean ratings of agricultural science teachers and extension agents on the competencies needed by secondary school graduates in pre-planting operations for sweet melon production (N = 300)

S/N	Item statement	X	SD	Decision
1	Select a suitable site for melon production in terms soil fertility, climatic factors, and market demand	3.58	0.58	Needed
2	Clear the trees, grass on land manually or mechanically and level the surface for easy plotting	3.65	0.46	Needed
3	Map out the land into plots to create roads and parts	3.18	0.77	Needed
4	Plough the soil to incorporate the remains of cleared vegetation	3.15	0.75	Needed
5	Spread organic matter to increase soil nutrient	3.30	0.76	Needed
6	Harrow to pulverize soil and incorporate organic manure into the soil	3.32	0.55	Needed
7	Make ridges of about 20 m long, 1 m wide and 3 cm high	3.56	0.75	Needed
8	Treat sweet melon seeds appropriately before sowing	3.35	0.76	Needed

Table 2: Mean ratings of agricultural science teachers and extension agents on the competencies needed by secondary school graduates in planting operations for sweet melon production (N = 300)

S/N	Item statement	X	SD	Decision
1	Identify suitable period for planting	3.51	0.75	Needed
2	Test the seeds for viability for planting	3.43	0.64	Needed
3	Plant seeds on the ridges with spacing 1.5 m between the rows	3.00	0.70	Needed
4	Sow 2-3 seeds per hole and cover the seeds with soil and press slightly	3.28	0.81	Needed
5	Water the farm immediately after sowing if it is dry season	3.21	0.58	Needed
6	Check for germination 5 days after planting	3.28	0.67	Needed
7	Carry out mulching for the crops	3.55	0.59	Needed
8	Plant early to overcome falling off of pre-mature flowers	3.35	0.67	Needed

Table 3: Mean ratings of agricultural science teachers and extension agents on the competencies needed by secondary school graduates in post-planting operations for sweet melon production (N = 300)

S/N	Item statement	X	SD	Decision
1	Supply ungerminated seeds after 5 days	3.31	0.68	Needed
2	Thin out any stand that is more than two sweet melon seedlings	3.26	0.59	Needed
3	Water regularly during dry season	3.37	0.74	Needed
4	Apply manure or fertilizer to the soil	3.40	0.60	Needed
5	Weed regularly after planting	3.48	0.74	Needed
6	Apply recommended pesticides to control disease and pest attack	3.31	0.75	Needed
7	Spray recommended insecticides to reduce insect vector during pre-flowering stage	3.14	0.62	Needed
8	Guide the plants on the ground since they are creeping crops	3.44	0.79	Needed

Table 4: Mean ratings of agricultural science teachers and extension agents on the competencies needed by secondary school graduates in harvesting and marketing of sweet melon fruits (N = 300)

S/N	Item statement	X	SD	Decision
1	Observe sweet melon crop for maturity 80-90 days after planting	3.67	0.47	Needed
2	Harvest matured sweet melon fruits using hands to pick them	3.02	0.75	Needed
3	Use wheelbarrow, head-pan or basket for carrying the fruits	3.42	0.74	Needed
4	Carry out a market survey to determine the price of sweet melon fruits	3.20	0.71	Needed
5	Advertise sweet melon fruits for sales	3.36	0.76	Needed
6	Sort the fruits according to their sizes and fix prices for the different sizes	3.22	0.76	Needed
7	Supply sweet melon fruits to wholesalers, retailers and consumers	3.85	0.67	Needed
8	Keep financial records of production cost, sales cost and profit/loss account	3.56	0.78	Needed

DISCUSSION

In Table 1, the results of the data analysis showed that secondary school graduates needed 8 competencies in pre-planting operations for sweet melon production. The competencies identified according to the study are selecting a suitable site for sweet melon production, clearing the vegetation either manually or mechanically and leveling the soil surface for easy plotting, mapping out the land into plots to create roads and parts, ploughing the soil to, application of organic manure into the soil, harrowing, making of ridges with the appropriate planting distance and treating sweet melon seeds with appropriate chemicals before sowing into the prepared land. The results of this study is in consonance with the findings of Omeje and Asogwa[13], in a study carried out on competencies needed and possessed by rice farmers in Abia State, where it was found out that rice farmers needed capacity building in 10 competencies in pre-planting operations.

Findings on competency items in planting operations in Table 2 indicated that secondary school graduates need 8 competencies in sweet melon production which include identify suitable period for planting, test the seeds for viability for planting, plant seeds on the ridges with spacing 1.5 m between the rows, sow 2-3 seeds per hole and cover the seeds with soil and press slightly, water the farm immediately after sowing if it is dry season, check for germination 5 days after planting, carry out mulching for the crops and plant early to overcome falling off of pre-mature flowers. The findings are in agreement with that of Ndem and Aneke[14], where resource management skill improvement needs of women farmers in melon production for poverty reduction in Enugu state, Nigeria was investigated, and findings showed that women farmers needed improvement in 6 skills in planting operations for melon.

From Table 3, the result of the data analyzed revealed that secondary school graduates need 8 competencies for post-planting operations in sweet melon production. The competencies needed according to the findings are supply ungerminated seeds after 5 days, thin out any stand that is more than two sweet melon seedlings, water regularly during dry season, apply manure or fertilizer to the soil, weed regularly after planting, apply recommended pesticides to control disease and pest attack, spray recommended insecticides to reduce insect vector during pre-flowering stage and guide the plants on the ground since they are creeping crops. The findings of this study are in agreement with the findings of Reardon *et al.*[15], where it was reported that 11 post-planting skills were required in cocoa production enterprise for employment of secondary school graduates in Ondo State.

From Table 4, the result of the data analysis revealed that secondary school graduates need 8 competencies for harvesting and marketing operations in sweet melon production. The competencies needed according to the findings are observe sweet melon crop for maturity 80-90 days after planting, harvest matured sweet melon fruits using hands to pick them, use wheel barrow, head-pan or basket for carrying the fruits, carry out market survey to determine the price of sweet melon fruits, advertise sweet melon fruits for sales, sort the fruits according to their sizes and fix prices for the different sizes, supply sweet melon fruits to wholesalers, retailers and consumers and keep financial records of production cost, sales cost and profit/loss account. The findings of this study on the skills required in marketing operations concurred with the views of Reardon *et al.*[15] where it was found out that agricultural marketing involves distribution of farm produce such as cucumber fruits from the farm to the final consumers who are the end users of such product. The study had the following limitations: Geographical constraints as it focuses on a particular region with specific conditions of climate which may not apply to other regions; variability in farming practices and techniques and limited scope of data as the researchers relied only on available literature. The study recommended that students and individuals should be given training to acquire the basic skills and competencies needed for all the operations in sweet melon production.

CONCLUSION

This study identified the essential competencies required by secondary school graduates for sweet melon production in the Ovia North East Local Government Area of Edo State, Nigeria. The findings highlight the need for competencies in pre-planting, planting, post-planting, and harvesting/marketing operations. Acquiring these competencies will enable individuals interested in sweet melon farming to adopt appropriate agronomic practices, ultimately leading to increased production. To ensure the sustainability of agriculture, these competencies should be integrated into agricultural science curricula, skill acquisition programs, and extension training. Additionally, policymakers should support their incorporation into secondary school and agricultural institution training to enhance knowledge transfer and promote efficient sweet melon farming.

SIGNIFICANCE STATEMENT

This study provides a structured framework for training secondary school students, apprentices, and farmers by identifying the essential competencies required for sweet melon production. By integrating these competencies into agricultural education and extension services, the study enhances skill development, boosts productivity, and promotes the adoption of modern farming techniques. Furthermore, it serves as a valuable resource for policymakers, educators, and agricultural institutions in designing curricula and training programs that support sustainable agriculture and contribute to economic growth.

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