International Academic Research Consortium Journals (IARCJ)
International Journal of Agricultural Science and Technology
ISSN: 2360-9888. Volume 12, Issue 1
PP 176-189, July, 2024
DOI: 427251-452781-1225
arcnjournals@gmail.com
https://arcnjournals.org

Skills Required by Urban Farmers in Sack Farming for Sustainable Tomato Production in Cross River State

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Abstract: *The study sought to identify the skills required by urban farmers in sack farmers for sustainable tomato production in Cros River State. The study had three research questions and three hypotheses were tested. The study adopted survey research design. The population of the study is 208 comprising 11 horticulture lecturers and 197 tomato farmers within Calabar Urban area. All the population were used as they are accessible and manageable. The data for this study was collected through a self-structured questionnaire titled Skills Required in Sack Farming for Tomato Production Questionnaire (SRSFTPQ). The questionnaire was structured in a four-point scale of strongly of H.R-highly required, MR- Moderately required, S.R-slightly required, NR- not required with a corresponding value of 4, 3, 2 and 1 respectively. Validation of the instrument was established with the aid of three validates from University of Calabar. To test the reliability, Cronbach alpha coefficient was used to analyze data collected from 25 similar respondents in Akwa Ibom State and an internal consistency of 0.83 was obtained. The instrument was administered by the researcher and two research assistants. 202 out of the 208 copies distributed were retrieved while 6 were lost. Mean and standard deviation were used to analyze the data for answering all the research questions while t-test was used to test hypotheses at 0.05 level of significance. It was found from the study that there are 28 skills required by Urban farmers in sack farming for sustainable tomato production in Cross River State. They are soil/sack preparation (18 items), planting/transplanting (5 items) and management (8 items). It was further recommended among others that; urban farmers should seek training from extension agents or non-formal horticulturalist on the skills as identified and that vocational training should be organized by ministry of agriculture and other related agencies to impact these skills to farmers.*

Keywords: *Skills, Urban farming, sack farming and tomato production*

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Introduction

The increasing number of commercial and industrial activities in urban areas limits the quantity of lands available for crop production even when the demands for food products for consumption and industrial use are far higher in the urban areas. These non-agricultural operations taking place on urban lands leads to land degradation, leaching, and so on, rendering the little available land

useless for crop production. This poses challenge to urban farming, limiting those who has the skill and willingness to make a living through urban farming

Urban farming is the growing of crops and rearing of animals within the urban and semi urban areas. Alaimo, Beavers, and Crawford (2016) opined that the idea of supplementing food production beyond rural farming operations and distant imports is not new, reporting that it was used during the war and depression times when food shortage issues arose, as well as during times of relative abundance. Allotment gardens emerged in Germany in the early 19th century as a response to poverty and food insecurity (Bellows, Katherine and Jac, 2013)). Urban agriculture, urban farming, or urban gardening is the practice of cultivating, processing, and distributing foodin or around urban and semi-urban areas (United States Department of Agriculture USDA, 2022). Urban agriculture is also the term used for animal husbandry, aquaculture, horticulture and pomology. Litt (2015) asserted that urban agriculture can reflect varying levels of economic and social development. It may be a social movement for sustainable communities. McAleese (2017) pointed that food security, nutrition, and income generation are key motivations for the practice of urban farming. In both scenarios, more direct access to fresh vegetables, fruits, and meat products through urban agriculture can improve food security and food safety. The Urban Agriculture Network UAN (2019) has defined urban agriculture as an industry that produce, processes, and market food, fuel, and other outputs, largely in response to the daily demand of consumers within a town, city, or metropolis. There are many privately and publicly held farming enterprise found throughout intra-urban and semi-urban areas. These farms produce various food crops and animals which are supplied to consumers within the urban area instead of relying on food supply from rural areas. Typically urban agriculture applies intensive production methods, frequently using and reusing natural resources and urban wastes, to yield a diverse array of land-, water-, and air-based fauna and flora contributing to food security, health, livelihood, and environment of the individual, household, and community (UAN, 2019). The need for urban farming is increasing due to increase in rural urban migration, forcing population in the rural areas where more food is produced to urban area. More so, the problem of logistical delays leading to spoilage of perishable agricultural products such as tomatoes has made urban farming a reliable alternative to relying on food transportation from rural producers. Food and Agricultural Organization FAO (2015) observed that the rate of demand of vegetables and fruits in urban areas is on consecutive rise due to increased rural urban migration. The author further reported that greater percentage of vegetables demanded in this urban areas is tomato.

Tomato belongs to the plants family Solanaceae, and is botanically called *(*Solanum lycopersicum *L.)* it is rated to be among the most popular home garden plants and the second most consumed vegetable after potato (*Solanum tuberosum* L.) in the world today. In the mid-16th century, tomato was introduced into Europe, primarily for its herbal purposes (Isaac, Ernest, Etornam & Harrison, 2015). The author further noted that it was not recognized as a useful vegetable until 1800, because it was considered poisonous and was solely grown for the beauty of its fruit. Today, tomato is widely grown in the world for its taste, color, flavor, and nutrient contents. Tomato is processed into paste or eaten fresh. It contributes to a healthy, well-balanced diet because it contains a very low calorie level and is a good source of vitamin A, vitamin C, and minerals. Consumption of tomatoes can reduce the risk of developing gastro enteric diseases, such as colon, rectal, and stomach cancer. It is easily digestible and its bright color stimulates appetite.

Tomato is a perennial plant, cultivated in over 166 countries, with China ranking first in the world sustainable tomato production with about 50 million tones followed by India with 17.5 million tones (Food and agricultural organization statistics FAOSTAT, 2017). The author further noted that in Africa, Egypt and Nigeria is reported to be the highest producer of tomatoes sustainably.

Sustainability as contained in the report of the Sustainable Development Goals SDGs means meeting our own needs without compromising the ability of future generations to meet their own needs. This implies that sustainable tomato production is a production that applies the best and most suitable agronomic practice to produce tomato while preserving the soil and natural resources for further utilization. For any sustainable crop production, the edaphic factor (soil) is an important factor as it is fundamental to agriculture (Unilever Agriculture, 2019). A rich soil ecosystem improves performance of tomato. Sustainable agriculture practices can improve the quality of the soil's ecosystem. Sack farming technique is among the most important and reliable means of achieving sustainable tomato production. This is because through sack farming, the natural environment and soil is not tampered and the tomato still grows to serve the farmers purpose.

In Nigeria today, tomato is majorly produced in the Northern region due to its favourable climatic and edaphic conditions (The Organization for Economic Cooperation and Development OECD, 2017). Also in the world today there is a shift from the traditional soil production system to other production systems especially in areas with unfavourable soil and climate conditions, and this trend is gradually evolving into one of the most cost effective production systems in Nigeria and the world at large. Most notable and cost effective among the various greenhouse and organic farming systems employed today in the production of tomatoes is sack farming. In many cities, there are vacant lands due to urban sprawl and home foreclosures. This land could be used to address food insecurity through urban sack farming instead of turning them to waste disposal spots which makes the land more dangerous for farming purpose. As many urban dwellers begin to show interest in farming as a veritable tool of securing a decent livelihood, ensuring family food security and revitalizing the economy, getting expansive farmland especially in urban areas has constituted a big challenge. The quest to solve this problem led to the adoption of sack farming as a veritable tool in places of endless search for fertile cultivable land.

Sack farming of tomato is defined as a method of growing tomatoes in soil-filled sacks or polythene bags, containers or plastics. It involves filling of bags with soil, manure, and pebbles for drainage, and growing plants on the top and in holes in the sides. Tosheva and Delijska (2013) saw sack farming as a system of farming whereby sacks that were formally used for storing food is now used for farming by filling it up with compost. Gladosh (2018) pointed some examples to include the white long fertilizer sack. A well prepared soil such as compost (biofertilizer), biochar and fertisoil or compost fertilizer is used in ratio terms with soil for the sack installation). Paul, Hanping and Lin (2019) asserted that this technology ensures efficient water management and usage, providing even better soil condition for vegetable growth than the traditional soil planting system. The sacks allow people to grow tomato in places with limited access to arable land and water (Adeline, 2016). Crops like tomatoes, onions, cabbages, pepper, mushrooms, vegetables and many more are grown with this method. Paul, Hapiung and Lin (2019) noted that the sack method allows a freer flow of water to the roots and retains moisture more efficiently than

traditional methods. This implies that sack farmers can keep their plants hydrated with less water. Urban dwellers who live in rented houses are best placed to undertake sack farming. They can grow vegetables in sacks on verandahs, either for their own consumption or for sale to earn extra income. They can also do it for both purposes. According FAO (2015), it is a very good option for landless households to ensure food and nutrition security. It is also a solution for people who have land with low soil fertility or too rocky to support cultivation of crops. One of the advantages of this method is its portability, as well as high productivity at low cost. With this method, the container, soil preparation and other requirements are taken care of. The sack garden are filled with soil mixed with farmyard of compost manure, cow dung or chicken droppings to nourish the soil. Yusuf (2020) said that the adoption of the farming technique would help food security of households as people can grow crops in their domain with little containers filled with soil, there will be abundant of food in the country. The author further maintained that sack farming technique can grow quite a range of vegetable crops, which will help food security of households who can even generate additional income from it, contributing to food security at family level and societal level.

Sack farming in urban areas has proved to be a reliable means of ensuring sufficient and sustainable production of vegetables and fruits such as tomatoes. Tomatoes flourish very well in sack, this is because of the benefits that follows sack farming such as water retention, weed control etc. Tomato sack farming is purely organic, this is to ensure adequate supply of required nutrient to the crop within the sack environment. For optimum yield of the crops, tomato seed is better planted through nursery and later the seedlings transplanted to the sacks containing compost. The procedure for tomato production using sack requires certain skills and unique procedure.

Skills refers to a manipulative ability to accomplish a task. Skills according to Eje (2018) is expressed as one's ability to carry out a task applying their knowledge demonstrated with their hands. Skills in this study refers to ability of urban farmers to demonstrate the tasks involved in tomato production using sacks. The first step to a sack garden is to get the planting soil ready. There will be need to plow and soften the soil before adding it to the sack. The soil is **prepared by raking it and then pressing it with a hoe or shovel (**Yusuf, 2020**). Simply put, compost is prepared for filling into the sack bags for planting.**

The next step after selecting the garden site and preparing the site is soil preparation which is one of the most important steps in tomato sack farming. The condition of the soil influences the fertility of the land, presence of pests and diseases and yield (Unilever Agriculture, 2019). Therefore, the simplest and most effective way of obtaining a good condition of the soil is to plough the available organic materials or green manures or composted organic matter into the soil. Weeds, kitchen wastes, farm yard manure, trees leaves, including the previous crop stubbles and tomato stems can be used and ploughed into the soil for adding plant nutrients into the soil (Vele, 2015).

Compost is used as organic fertilizer in the tomato garden. The best and ideal time to make compost is during the garden site clearing and soil preparation. The reason for this is because

compost making is part of the nursery preparation. It is good to prepare compost right next to the garden to make it easy to apply compost to the garden. The basic steps for compost making as outlined by Vele (2015) are described below; securing a site and designate an area for making compost, digging the borders of the designated area for the compost heap to about 10cm depth or place logs of wood to differentiate the compost. Collecting straws and other organic materials (green manures) such as Weeds, any other plants parts like Banana stem and leaves, kitchen wastes, etc. Fresh seeds with flowers can also be plunged into the compost because the temperature inside the compost will be high and hot enough to destroy most of the seeds and will not germinate. Further, Steve (2017) identified the skills in soil or compost preparation for tomato sack farming to include; laying the straws on the entire heap area as the first layer; putting a layer of plant materials or organic matters on top of the first layer of straws, sprinkling some soil over the plant materials, to build a thin layer of soil; sprinkling some water to make 50-60% moisture content. An indication of 50% moisture content in the compost is when it is grabbed and squeezed in the palm of the hand and one is able to make a mass of soil without it crumbling quickly. An indication of 60% moisture content is when there is visible small amount of water squeezed out of the soil (Smith, 2016). The whole compost is then covered with banana leaves to promote decomposing and the compost turned over the heap after a month. The internal temperature of compost should be higher than 40^0c at the peak stage of compost activities (Steve, 2017). It is preferable to turn over the inner materials to that of the outside from time to time when checking the compost to ensure even decomposition and breakdown of organic matter.

When the compost is well prepared for tomato production, the farmer or entrepreneur proceeds to prepare the sack which servs as the growing medium for the plant. Sack farming utilizes only the sacks as the medium of cultivation, as such the sack is well prepared and filled with compost before the seedling are transplanted into them. The type of sack used ranges from different sizes according to availability and scale of production. Kenneth, Joseph and Samuel (2014) outlined the procedure for sack preparation and planting of tomatoes in sack as follows; cutting incisions **X's** on the sack u**sing a knife, just like the** honeycomb pattern, allowing at least a few inches distance in between each opening; piercing the side of the bags with holes (2 -3 centimeters) for the seedlings to be planted. The holes are made such that every line has eight holes and there are five rows of the same alternating, hence making a total of 40 holes in any given sack. According to Paul, Hanping and Lin (2019), large stick is introduced to the center of the sack before adding the soil into the sack. The stick is roughly the thickness of a forearm or a perforated PVC pipe into the center of the sack. Care is taken to ensure t**o hold it in place as the soil is added to the bag. Other skills required are;** adding the soil/ compost; filling the gap with a porous material allows water to infiltrate. The **hole is filled with gravel or larger, harder earth material.** The chunks and pieces then occupy the space. This more porous center will allow water to permeate towards the bottom of the sack when you water the crops that grow. Gbenga (2021) recommends that once full, 20 liters of water is poured right at the center, stone area.

When the sacks containing the compost mixture are prepared, the seed is planted on them or seedlings transplanted. Sacks can be used to plant tomato at nursery level and can be used to plant transplant seedlings. Each of these X incisions are spaces where one can ultimately introduce seedling. As the produce matures, they will eventually grow outward, making the sack

garden appear more and more vegetated. Typically, this is a good way to grow tomato and other leafy greens. The space left by the stick serves as a waterway. If the tomato seedlings are properly taken care of, by 21-26 days old with 4-5 true leaves, they are ready for transplanting (Mbazu, 2021). However, transplanting can be done any time of the day during a cloudy day possibly after a heavy rainfall during wet season but strictly in the cool morning or evening hours during the dry season. The nursery is wet by watering the nursery garden. Carry each tomato seedling with the ball of soil around its root using hand trowel in such a way that it may not feel the sock of transplanting. Kenneth, Samuel, and Joseph (2014) warned that much seedlings at a time so they will not be exposed to too much of stress. As for the seed trays or disposable cup methods, remove the seedlings with the ball of soil around the root and placed immediately in the holes already dug in the sack. After placing the seedlings into the dug hole, pressed the ball of soil around its base so as to establish good soil contact with the root and force out air (Marxeleo, 2013).

Upon seedling establishment, the plants are properly managed to ensure proper growth till maturity and harvest. Management of the tomato plant in the sack entails proper irrigation, pest control, staking and harvesting. To maintain healthy tomato plants in the sack, 1–2 liters of water can be applied on the top of the sack in the evening (Isaac, Ernest, Etornam & Harrison, 2015). Using a layer of straw or water hyacinth mulch on the top of the sack reduces evaporation of water and allows the soil to remain moist for longer periods of time. This means that less water is required to grow each plant. The main reason for staking and supporting tomato plants is to keep plants and fruit off the ground. This reduces losses from fruit rots when fruit touch the soil and from sunburn when fruit are not shaded by foliage. Staking requires wooden or metal stakes 5 to 6 feet long for indeterminate varieties and 3 to 4 feet long for determinate varieties. Wooden stakes should be at least 1 inch square. Metal stakes can be of smaller diameter and have the advantage of lasting many years. Do not use chemically treated wood. Sections of concrete reinforcing rods (rebar) make excellent tomato stakes. According to Mississipi State University Extension (2019), the following procedure is taking in staking of tomatoes planted in sacks. Place the stake close to the sacks to 4 inches from the base of the plant on the side away from the first bloom cluster to prevent trapping the fruit between the plant and the stake. There are many ways to prune and tie tomato plants. Limit staked indeterminate plants to two or three fruit-producing branches. A popular method is to select the main stem, the sucker that develops immediately below the first bloom cluster (a very strong sucker), and one other sucker below that. Remove all other suckers and as you tie the plants, periodically remove additional suckers that develop on selected branches. Tie individual branches to the stake with soft cord by first tying twine to the stake and then looping it loosely around the plant. Never tie a plant immediately below a fruit cluster because the weight of the fruit may cause the plant to sag and strip the cluster from the plant. Continue to prune and tie the plant as it grows. Other cares given to the plant include trellising and caging.

Pests and diseases pose serious risk for primary producers as they can impact on market access and agricultural production. Pest control is best achieved with an Integrated Pest Management plan using a range of biological, chemical, mechanical, physical or cultural control methods. To reduce the impacts of pests and pest, OECD (2021) recommended; the use of resistant varieties of tomato seeds, working with grower/community/biosecurity groups on control, providing

diagnostic services and information on prevention, management and treatment, providing biosecurity measures to prevent introduction, and to eradicate or manage current pests, use of suitable agro chemicals and use of cultural practices.

When the seeds are due for harvest, it is done by hand picking to avoid injuries on the produce and contamination with foreign smell. In addition, after harvesting, other activities like processing, storage and marketing of products from a sack garden can done as that of conventional tomato produced using the traditional soil system, this is because it is the same products that are produced from the traditional agricultural system that are also produced using the sack farming system, the only difference is the system adopted in producing them (Donnan, 2017).

Statement of the problem

Sack farming make the most use of limited garden space by growing tomatoes in buckets and bags. Container gardening tends to level the playing field in the game of home gardening, allowing even gardeners with less garden area the opportunity to produce high yielding tomato. Buckets and grow bags that provide convenient mobility, can be kept on a deck or patio for easy care, pickings and crop monitoring (Gruel, 2021).

However, sack farming technique is still better imagined to the thoughts of some urban farmers while many others consider it not enough to provide suitable condition required for their tomato production. Certainly, this thought could be attributed to lack of knowledge and skills on the operational mechanisms of sack farming. Kello (2020) observed that despite the numerous impacts of urban sack production of tomatoes, many people in the urban areas still do not utilize the opportunity to produce tomatoes even when they have facilities and resources required for the production and there is high demand for scarce tomato. There is therefore every need to identify the skills in this cultivation system for urban farmers so they would utilize it to produce tomato for family consumption and as a business.

Purpose of the study

The main purpose of the study is to identify the skills required by urban farmers in sack farming for sustainable tomato production in Cross River State. Specifically, the study tends to identify skills in:

1. Soil/sack preparation
2. Planting/transplanting
3. Management of the plant in the sack

Research questions

The following research questions were answered for the study

1. What are the Skills in soil/sack preparation for sustainable tomato production?
2. What are the Skills in planting/transplanting for sustainable tomato production?
3. What are the Skills in management of the plant in the sack for sustainable tomato production?

Hypotheses

The following hypotheses were tested at 0.05 level of significance

1. There is no significant difference between the mean response of horticultural experts and extension agents on the Soil/sack preparation for sustainable tomato production
2. There is no significant difference between the mean response of horticultural experts and extension agents on the Planting/transplanting for sustainable tomato production
3. There is no significant difference between the mean response of horticultural experts and extension agents on the Management of the plant in the sack for sustainable tomato production

Methodology

The study adopted survey research design. The areas of the study is Cross River State with focus on the major urban area which is Calabar. The area was chosen for the study because; it has fast urbanization rate, high rural urban migration leading to lack of tomatoes and other vegetable crops within the urban areas due to increased nonagricultural utilization of land thus making it difficult to access fertile land for traditional farming in the urban area. The population of the study is 208 comprising 11 horticulture lecturers and 197 tomato farmers within Calabar Urban area. Calabar was used because it is the major urban area in the state being studied. All the population were used as they are accessible and manageable. The data for this study was collected through a self-structured questionnaire titled Skills Required in Sack Farming for Tomato Production Questionnaire (SRSFTPQ)**.** The questionnaire was structured in a four-point scale of strongly of H.R-highly required, MR- Moderately required, S.R-slightly required, NR- not required with a corresponding value of 4, 3, 2 and 1 respectively. Validation of the instrument was established with the aid of three validates from University of Calabar. To test the reliability, Cronbach alpha coefficient was used to analyze data collected from 25 similar respondents in Akwa Ibom State and an internal consistency of 0.83 was obtained. The instrument was administered by the researcher and two research assistants. 202 out of the 208 copies distributed were retrieved while 6 were lost. Mean and standard deviation were used to analyze the data for answering all the research questions. A cut- off point of 2.50 was established. This means that any item that has mean of 2.50 and above was regarded as skill required or otherwise. t-Test was used to test the hypotheses. The Ho was rejected if the calculated value is greater than the critical value of 1.96 and accepted if otherwise.

Results

Research question 1: What are the Skills in soil/sack preparation for sustainable tomato production?

Table 1: Mean, Standard Deviation and t-test Result of the Respondents on the Skills in Soil/Sack Preparation for Sustainable Tomato Production

S/N	ITEM STATEMENT	X1	X2	S1	S2	Xg	Sg	t-cal	Rmk
	Soil preparation								
1	**Rake the land portion to collect soil from**	3.43	.85	3.35	.83	3.39	.84	.85	A, NS
2	Secure a site and designate an area for making compost.	3.25	.80	3.11	.76	3.18	.78	1.59	A, NS
3	Dig the borders of the designated area for the compost heap to about 10cm depth or place logs of wood to differentiate the compost	3.38	.84	3.30	.82	3.34	.83	.86	A, NS
4	Collect straws and other organic materials (green manures) such as Weeds, any other plants parts like Banana stem and leaves, kitchen wastes to form the compost	3.29	.81	3.25	.80	3.32	.81	.45	A, NS
5	Lay the straws on the entire heap area as the first layer	3.41	.85	3.29	.81	3.40	.83	1.28	A, NS
6	Put a layer of plant materials or organic matters on top of the first layer of straws.	3.43	.85	3.35	.83	3.39	.84	.85	A, NS
7	Sprinkle some soil over the plant materials, to build a thin layer of soil of not be more than I cm in thickness.	3.25	.80	3.11	.76	3.18	.78	1.59	A, NS
8	Even out the layer of the soil by hand or using a straight edge implement or stick	3.26	.81	3.21	.79	3.24	.80	.56	A, NS
9	Press down the soil layer by foot	3.05	.75	2.92	.71	2.99	.73	1.58	A, NS
10	Repeat 5 to 7 times to form three to five layers of green manure and thin layer of soil	3.34	.83	3.29	.81	3.32	.82	.55	A, NS
11	Sprinkle some water to make 50-60% moisture content.	2.97	.72	2.95	.72	2.96	.72	.25	A, NS
12	Cover the whole compost with banana leaves to promote decomposing.	3.15	.77	3.10	.76	3.13	.77	.59	A, NS
13	Turn-over the compost heap after a month and add some water if the heap is too dry and cover it again with fresh banana leaves	3.31	.82	3.23	.81	3.27	.82	.33	A, NS
	Sack preparation								
14	Get the sacks to be used ready	3.35	.83	3.20	.79	3.28	.81	1.64	A, NS
15	**Using a knife, can now cut X's into the side of the bag.**	2.98	.73	2.95	.72	2.97	.73	.37	A, NS
16	Introduce a large stick to the center of the sack	3.34	.83	3.32	.82	3.33	.83	.22	A, NS
17	introduce the soil layer after layer	3.28	.81	3.25	.80	3.27	.81	.31	A, NS
18	Fill the gap with a porous material to allows water to infiltrate	3.13	.77	3.09	.76	3.11	.77	.47	A, NS

Keys: $\bar{X}_1$ = Mean of Horticulture experts, S_1 = Standard deviation of Horticulture experts, $\bar{X}_2$ = Mean of extension agents, S_2 = Standard deviation of extension agents, Xg-grand mean, *Sg*-grand standard deviation, A-agree, S = Significant, NS= Not significant and Rmk = Remark

The result of the data presented in Table 1 shows that all the items had their mean above the cut off mean of 2.50. this means that all the respondents agreed that all the items are the skills required by urban farmers in soil/sack preparation for sustainable tomato production using sacks. The standard deviations are close to each other and not too far from the mean, this implies that the responses of the respondents are not far from each other. More so, the data shows that all the items had their calculated value less than the Table Value of 1.96 thus accepting the null hypothesis stated. This means that there is not significant difference in the mean response of horticulture experts and extension agents on the soil/sack preparation skills for sustainable tomato production.

Research question 2: What are the Skills in planting/transplanting for sustainable tomato production?

Table 2: Mean, Standard Deviation and t-test Result of the Respondents on the Skills in planting/transplanting for Sustainable Tomato Production

S/N	ITEM STATEMENT Ability to:	X1	X2	S1	S2	Xg	Sg	t-cal	Rmk
1	water the sack filled with the compost	3.34	.83	3.32	.82	3.33	.83	.22	A, NS
2	broadcast seeds on the soil for planting or insert seedling to the x cuts for transplanting	3.05	.75	3.00	.73	3.03	.74	.60	A, NS
3	ensure sufficient pack of soil on the base of the roots while transplanting	3.17	.78	3.15	.77	3.16	.78	.23	A, NS
4	pull soil around the inserted seedling for proper compaction	2.89	.78	2.86	.69	2.88	.74	.39	A, NS
5	sprinkle water on the sacks after planting or transplanting	2.99	.73	2.91	.73	2.95	.73	.12	A, NS

Keys: $\bar{X}_1$ = Mean of Horticulture experts, S_1 = Standard deviation of Horticulture experts, $\bar{X}_2$ = Mean of extension agents, S_2 = Standard deviation of extension agents, Xg-grand mean, *Sg*-grand standard deviation, A-agree, S = Significant, NS= Not significant and Rmk = Remark

The result of the data presented in Table 2 shows that all the items had their mean above the cut off mean of 2.50. this means that all the respondents agreed that all the items are the skills required by urban farmers in planting/transplanting for sustainable tomato production using sacks. The standard deviations are close to each other and not too far from the mean, this implies that the responses of the respondents are not far from each other. More so, the data shows that all the items had their calculated value less than the Table Value of 1.96 thus accepting the null hypothesis stated. This means that there is no significant difference in the mean response of horticulture experts and extension agents on the planting/transplanting skills for sustainable tomato production.

Research question 3: What are the Skills in management of the plant in the sack for sustainable tomato production?

Table 3: Mean, Standard Deviation and t-test Result of the Respondents on the Skills in Management of the Plant in the Sack for Sustainable Tomato Production?

S/N	ITEM STATEMENT	X1	X2	S1	S2	Xg	Sg	t-cal	Rmk
1	Irrigate the sacks regularly by adding 1-2 litters of water every evening	3.28	.81	3.26	.81	3.27	.81	.22	A, NS
2	mulch on the top of the sack using a layer of straw or water hyacinth, to reduces evaporation of water so the soil can remain moist for longer periods of time.	3.44	.85	3.40	.84	3.42	.83	.42	A, NS
3	Apply little fertilizer if the compost is not very rich	3.16	.78	3.17	.78	3.17	.78	.12	A, NS
4	Stake the plant with wooden stakes when it grows tall and begin to bend	3.26	.81	3.22	.79	3.24	.80	.45	A, NS
5	Control pest and disease using cultural practices, suitable agro-chemicals or others	3.43	.85	3.39	.84	3.41	.85	.42	A, NS
6	Regularly check for poachers and domestic animal attacks on the garden	3.00	.73	2.99	.73	3.00	.73	.12	A, NS
7	Monitor the plants for maturity so that preparation for harvest can begin	3.51	.87	3.49	.87	3.5	.87	.21	A, NS
8	Begin to harvest tomato when the seeds are matured and reddish in color	3.44	.85	3.40	.84	3.42	.85	.42	A, NS

Keys: $\bar{X}_1$ = Mean of Horticulture experts, S_1 = Standard deviation of Horticulture experts, $\bar{X}_2$ = Mean of extension agents, S_2 = Standard deviation of extension agents, Xg-grand mean, *Sg*-grand standard deviation, A-agree, S = Significant, NS= Not significant and Rmk = Remark

The result of the data presented in Table 1 shows that all the items had their mean above the cut off mean of 2.50. this means that all the respondents agreed that all the items are the skills required by urban farmers in management of plant in the sack for sustainable tomato production using sacks. The standard deviations are close to each other and not too far from the mean, this implies that the responses of the respondents are not far from each other. More so, the data shows that all the items had their calculated value less than the Table Value of 1.96 thus accepting the null hypothesis stated. This means that there is not significant difference in the mean response of horticulture experts and extension agents on the management of plant in the sack for sustainable tomato production.

Discussion of the findings

The result of the study in research question 1 revealed that there are 18 skills required by farmers in sack/soil preparation for sustainable tomato production. This finding is in line with Yusuf (2020) who stated that sack preparation is the first step in any sack tomato production venture. In line with the findings also, Steve (2017) identified the skills in soil or compost preparation for tomato sack farming to include; laying the straws on the entire heap area as the first layer; putting a layer of plant materials or organic matters on top of the first layer of straws, sprinkling some soil over the plant materials, to build a thin layer of soil; sprinkling some water to make 50-60% moisture content.

The result of the study in research question 2 revealed that there are 5 skills required in planting/transplanting for sustainable tomato production through sack technique. The result is in keeping with Mbazu (2021) who noted that tomato seedlings are properly taken care of, by 21-26 days old with 4-5 true leaves, they are ready for transplanting by pulling together with some lumps of earth to insert in the x cut in the sack. In line with the findings of the study also, Marxeleo (2013) noted that after inserting the seedlings into the sack, the ball of soil around the base of the plant is pressed so as to establish good soil contact with the root and force out air

The result of the study in research question 3 revealed that there are 8 skills required in the management of plant in the sack for sustainable tomato production through sack technique. This finding agrees with Isaac, Ernest, Etornam and Harrison (2015) who found that to maintain healthy tomato plants in the sack, 1–2 liters of water can be applied on the top of the sack in the evening.in line with findings also, OECD (2021) and Mississipi State University Extension (2019) who found that ability to stake tomato in sacks and control pest and diseases are important management skills in tomato production using sack technique.

Conclusion

Based on the findings of the study, it was found that there are 28 skills required by Urban farmers in sack farming for sustainable tomato production in Cross River State. They are soil/sack preparation (18 items), planting/transplanting (5 items) and management (8 items). It therefore means that possession of these skills by farmers in the urban areas will lead to increased tomato production by urban households.

Recommendation

Based on the result of the data collected and analyzed, it was recommended as follows

1. Urban farmers should seek training from extension agents or non-formal hortculturalist on the skills as identified
2. Vocational training should be organized by ministry of agriculture and other related agencies to impact these skills to farmers
3. The skills should be built into the formal school curriculum of agriculture or crop husbandry in secondary schools so that as many as that leave school can possess the skills and utilize them to produce tomato around their homes.

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