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Extension Mechanisms for Mobilizing Urban Farmers to Adopt Sack Farming Technique for Tomato Production in Abia State

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Abstract: *The study sought to ascertain the extension mechanisms for mobilizing farmers to adopt sack farming technique for tomato production in Abia State. Three research questions were answered and three hypotheses were tested at 0.05 level of significance. The study adopted survey research design. The population of the study is 2437 comprising 153 agricultural extension agents and 2284 tomato farmers within Umuahia and Aba Zone. The total sample size for the study is 344, drafted using Taro Yameni formula for estimating sample size. The data for this study was collected through a self-structured questionnaire titled Extension Mechanisms for Mobilizing Farmers to Adopt Sack Farming Questionnaire (EMMFASFQ)**. The questionnaire was structured in a four-point scale. Validation of the instrument was established with the aid of three validates while the reliability yielded 0.83 using Cronbach alpha coefficient. The instrument was administered by the researcher and two research assistants. 334 out of the 344 copies distributed were retrieved. Mean and standard deviation were used to analyze the data for answering all the research questions. while t-test was used to test the hypotheses. It was found that there are mass media (9 items), green field days (11items), SPAT (11items) mechanisms for mobilizing urban farmers to adopt sack farming technique. It was concluded that Extension mechanisms are reliable means of mobilizing farmers to adopt sack farming technique for sustainable tomato production. Among the recommendation were that; tomato farmers should adopt mass media mechanisms to source information and skills in trending farming technologies and that tomato farmers cooperatives should regularly organize field days for their members so that the emerging technologies such as sack farming could be communicated to them.*

Keywords: *Urban farming, sack farming, extension mechanisms and tomato production.*

Introduction

Farming is the basic source of food for man. All food consumed globally has its origin from farm produce processed into desired forms. 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 cultivation, processing, and distributing food in or around urban and semi-urban area (United States Department of Agriculture USDA, 2022). Urban agriculture is also the term used for animal husbandry, aquaculture, beekeeping, horticulture and pomology. These activities occur in semi-urban areas as well. 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.

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). 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, ands minerals. Consumption of tomatoes can reduce the risk of developing gastro enteric diseases, such as colon, rectal, and stomach cancer.

Further, 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.

Sack farming is regarded as the best because it reduces the limitations and risk encountered by climatic factors, pest and diseases or by seasonal growing of crops, while using the traditional soil system. Sack farming is an initiative that has given a new vista to those who preferred to toe the line of farming, either to get quick cash or for subsistence purpose. Sack farming is the growing of crops usually vegetables in sacks. Gbenga (2021) defined sack farming as a method of growing crops in soil-filled sacks or polythene bags, containers or plastics. The author maintained that it involves filling of bags with soil, manure, and pebbles for drainage, and growing plants on the top and in holes in the sides. The sacks allow people to grow food 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, Hanping 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 own building or 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 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 and societal level.

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 poor awareness and understanding of the impact and operational mechanisms of sack farming. Kello (2020) observed that despite the numerous impacts of urban sack production of tomatoes, many people still do not utilize the opportunity to produce tomatoes even when they have all that is required for the production. There is therefore every need to mobilize more semi-urban and urban farmers for the adoption of sack farming in order to ensure more sustainable production of tomatoes for home use and income generation. Among the various mechanisms for achieving this purpose is through agricultural extension delivery techniques.

Agricultural extension is the dissemination of modern or improved farming techniques to the farmers. Agricultural extension is a training programme for making farmers to be aware of alternatives from where they can choose the most desirable means as well as how the different methods or techniques that exist can assist in carrying out farming and other operations of food production. The main goal of agricultural extension is to improve the socio-economic condition of farmers and rural dwellers (Williams, 2014). According to Kughur, Aveuya and Kuza (2021) extension mechanisms are is a programme that assists the farmers in acquiring necessary skills, knowledge and attitudes to utilize the modern technologies in agriculture effectively. According to Nwaekpe, Anyaegbunam, Asumugha, Ekwe and Okoye (2014), extension mechanisms are methods used by extension agents or workers to achieve set goals or objectives. Agricultural extension mechanisms in the context of this study is the dissemination of information about sack farming to urban farmers in order to make them adopt the technique in tomato production. Agricultural extension agents usually apply different teaching methods or mechanism in training the farmers with the notion that the more the techniques used, the better the results obtained.

There are various extension teaching methods used as tools by the extension worker to effect desirable changes in the behaviour of farmers. Such mechanisms or teaching methods/pathways include group training, demonstration plot, adopted towns, On - Farm Adaptive Research and mass media (Nwaekpe *et al.,* 2014). The extension delivery techniques in the context of this study are

mass media, green field, small spot adoption technique (SPAT), individual discussion and group discussion techniques. Extension agents utilizes any of the above medium when suitable to convey their messages to the understanding of the farmers. The technique adopted usually depends on the type of message being passed.

Mass media mechanism involves the use of print or electronic media such as radio, television, news papers and a lot o others. According Gyata (2019), to television, phones; through newspaper; on social media; farmer's magazine; publications on pamphlets are all the mass media media mechanisms. In a study by Zaktarn (2015), it was found that mass media represent any of the means used to broadcast information to a wide range of people across varying location. FAO (2014) noted that mass media such as radio, telephone and social media represent the fastest means of dissemination of agricultural innovations.

The green field mechanism is also another notable extension mechanism for urban farmers adoption of sack farming. Green field day is a special extension activity organized by extension agent to publicize and promote the results of recommended practices to many farmers as possible (Udoma, 2013). Farmers at each field day are provided information on how to identify opportunities for increasing energy efficiency, how to conduct an energy assessment and how to calculate energy savings and simple payback. Mixon and Pauley, (2017) stated that green field day involves selecting suitable venue for the field day display; source all the necessary materials and facilities needed for the field day; plan the activity with farmers to enable them get acquainted with the processes; prepare good tomato plants in sack for display at the field day venue; inviting all necessary stakeholders for the event. Kughur, Aveuya and Kuza (2021) noted that green field days organized for farmers is among their most notable means of sourcing information of trending farming techniques.

The small plot adoption technique SPAT is another notable extension mechanism for getting farmers to adopt sack farming. According to Murari and Michael (2016) SPAT is a training ground for farmers and is the last stage of testing any new technology for mass adoption. It is a stage where farmers would either accept or reject a message depending on how easy the practice is fit into peasant farmers practice, However, Bell and Rickman (2013) maintained that SPAT can carry more than one message at a time. SPAT involves test the sack farming technique to ensure success before displaying to farmers, collaborate with farmers to choose a conducive venue/farm to use (Ajayi & Fapojuwo, 2013). The authors further noted that SPAT is very effective in impacting new farming techniques to the farmers and that farmers.

Statement of the problem

Based on the ease of handling and management of sack farming techniques coupled with its cost effectiveness, families in urban areas needed to adopt the technique to make vegetable and fruit crops readily available for home consumption and as a small scale business especially now that the demand for tomatoes and other fruit or vegetable crops are far higher than the supply.

Meanwhile crop farmers in the urban and semi urban areas of Abia State still battle with the challenge of lack of fertile land space for their tomato production. Many farmers are still far from the knowledge of the impact of sack farming as a reliable alternative to the traditional farming directly on the land. A face to face interaction with most of the tomato farmers in the study area revealed that most of them are not aware of the operations of the system while some others revealed

that they are not certain if this farming technique can give them equivalent yield they realize from the traditional system they currently adopt. Due to this fear and ignorance, they miss out in the opportunities provided by sack farming technique. The urban and semi urban farmers in the study area seems to lack extension education on the need to adopt or utilize sack farming to grow tomato thereby limiting their production due to lack of cultivable lands. This lack of awareness has affected the farmers and indeed all consumers of tomato as evidenced by the high cost and scarcity of tomatoes in the study areas hence the need for this.

The study identified the extension mechanisms for mobilizing farmers to adopt sack farming techniques for sustainable tomato production in urban areas of Abia State. Specifically, objective was focused on three extension mechanisms which are mass media, green field days and SPAT

Research questions

The following research questions were answered for the study

1. What are the mass media mechanisms for mobilizing farmers to adopt sack farming technique?
2. What are the Greenfield day's mechanisms for mobilizing farmers to adopt sack farming technique?
3. What are the small plot adoption mechanisms for mobilizing farmers to adopt sack farming technique?

Hypotheses

The following null hypotheses were tested at 0.05 level of significant

1. There is no significant difference between the mean response of farmers and extension agents on the mass media mechanism for mobilizing farmers to adopt sack farming technique
2. There is no significant difference between the mean response of farmers and extension agents on the greenfield days mechanism for mobilizing farmers to adopt sack farming technique
3. There is no significant difference between the mean response of farmers and extension agents on the small plot adoption mechanism for mobilizing farmers to adopt sack farming technique

Methodology

Survey research design was adopted for the study. The areas of the study is Abia State. 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. The population of the study is 2437 comprising 153 agricultural extension agents and 2284 tomato farmers within Umuahia and Aba Zone. (Abia ADP office, 2019). Umuahia and Aba zone were used because they are the major urban area in the state being studied. The total sample size for the study is 344, drafted using Taro Yameni formula for estimating sample size. Further, simple random sampling technique was used to select 191 farmers while all the 153 extension agents was used. The data for this study was collected through a self-structured questionnaire titled Extension Mechanisms for Mobilizing Farmers to Adopt Sack Farming Questionnaire

(EMMFASFQ)**.** The questionnaire was structured in a four-point scale of strongly of S.A-strongly agree, A-agree, D- disagree and S.D- strongly disagree with a corresponding value of 4, 3, 2 and 1 respectively. Validation of the instrument was established with the aid of three validates. To test the reliability, Cronbach alpha coefficient was used to analyze data collected from 25 respondents in Enugu State and an internal consistency of 0.83 was obtained. The instrument was administered by the researcher and two research assistants. 334 out of the 344 copies distributed were retrieved while 10 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 an extension mechanism 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 mass media mechanisms for urban farmers' adoption of sack farming technique for sustainable tomato production in Abia State Nigeria?

Hypotheses 1: There is no significant difference between the mean response of farmers and extension agents on the mass media mechanisms for urban farmers' adoption of sack farming technique for sustainable tomato production in Abia State.

Table 1: Mean Ratings, Standard Deviation and t-test Result of the Respondents on the Mass Media Mechanisms for Urban Farmers' Adoption of Sack Farming Technique for Sustainable Tomato Production

S/N	ITEM STATEMENT	$\bar{X}_1$	S_1	$\bar{X}_2$	S_2	$\bar{X}_g$	S_g	t-cal	RMK
	MASS MEDIA								
1.	Farmers' do have information through radios	2.93	.71	2.90	.70	2.92	.71	.38	NS
2.	Agricultural extension workers do air their views on television	3.05	.75	3.00	.73	3.03	.74	.60	NS
3.	Farmers sometimes get information through phones.	3.17	.78	3.15	.77	3.16	.78	.23	NS
4.	Information is being sent through newspaper to farmers	2.89	.78	2.86	.69	2.88	.74	.39	NS
5.	Extension agents do receive questions from farmers' on social media	2.99	.73	2.91	.73	2.95	.73	.12	NS
6.	Farmer's do get information through website	2.41	.76	2.34	.75	2.38	.76	.24	NS
7.	Information can be sent to farmers through Magazine	3.49	.87	3.47	.86	3.48	.87	.21	NS
8.	Farm publications on pamphlets are also useful for disseminating information to farmers	3.51	.87	3.49	.87	3.5	.87	.21	NS
9.	Farmer's do have information through newspaper publication	3.31	.82	3.29	.81	3.3	.82	.22	NS
10.	Information is passed to farmers through leaflets	2.93	.71	2.90	.70	2.92	.71	.38	NS

Keys: $\bar{X}1$**-mean of farmers (**$\bar{X}2$**) mean of extension agents,** S_1**-standard deviation of farmers, S2-standard deviation of extension agents,** $\bar{X}g$**-grand mean,** Sg **grand standard deviation, NS- not significant, df-332, t-tab-1.96**

Source: Field survey, 2024

Data presented in Table 1 above revealed that all the items except items 6 had their mean above the cut off mean of 2.50. This means that items are the mass media mechanisms for urban farmers' adoption of sack farming technique for sustainable tomato production in Abia State. However, items 6 had its mean as 2.38 which is below the cut off mean, implying that the item is not a mass media mechanism for adoption of sack farming. More so, the data shows that shows that all the

items had their calculated value higher than the Table value of 1.96 thus accepting the null hypotheses stated. This implies that there is no significant different between the mean response of farmers and extension agents on the mass media mechanisms for urban farmers' adoption of sack farming technique for sustainable tomato production.

Research question 2: what are the green field days mechanism for urban farmers' adoption of sack farming technique for sustainable tomato production in Abia State.

Hypotheses 2: There is no significant difference between the mean response of farmers and extension agents on the green field days mechanism for urban farmers' adoption of sack farming technique for sustainable tomato production in Abia State.

Table 2: Mean, Standard Deviation and t-Test Result of the Respondents on the Green Field Days Mechanism for Urban Farmers' Adoption of Sack Farming Technique for Sustainable Tomato Production

S/N	ITEM STATEMENT	$\bar{X}_1$	S_1	$\bar{X}_2$	S_2	$\bar{X}_g$	S_g	t-cal	RMK
1.	Select suitable venue for the field day display	3.41	.85	3.39	.84	3.40	.85	.21	NS
2	Source all the necessary materials and facilities needed for the field day	3.28	.81	3.26	.81	3.27	.81	.22	NS
3.	Plan the activity with farmers to enable them get acquainted with the processes	2.98	.73	2.95	.72	2.97	.73	.37	NS
4.	Prepare good tomato plants in sack for display at the field day venue.	3.53	.88	3.50	.87	3.52	.88	.36	NS
5	Invite all necessary stakeholders for the event	3.19	.79	3.15	.77	3.17	.78	.46	NS
6.	Create sufficient awareness about the event prior to field day	3.31	.82	3.28	.81	3.29	.82	.33	NS
7.	Give farmers some tools and resources for use on their individual farms during green field days	3.41	.85	3.39	.84	3.40	.85	.21	NS
8.	Demonstrate to farmers the simplicity of sack farming technique during field days	3.57	.89	3.54	.88	3.56	.89	.28	NS
9.	Display attractive products during the field day to attract other farmers	3.43	.85	3.39	.84	3.42	.85	.42	NS
10.	Provide different assessment methods to farmers during green field days	3.28	.81	3.25	.80	3.27	.81	.31	NS
11.	Extension agents meet and teach farmers in group on green field days	3.17	.78	3.14	.77	3.16	.78	.30	NS

Keys: $\bar{X}1$-mean of farmers $\bar{X}2$-mean of extension agents, S_1-standard deviation of farmers, S2-standard deviation of extension agents, $\bar{X}g$-grand mean, Sg grand standard deviation, NS- not significant, df-332, t-tab-1.96

Source: Field survey, 2024

Data presented in Table 2 revealed that all the items had their mean ranging from 2.97 to 3.56 and are above the cut off mean of 2.50. This means that all the items are the green field days mechanisms for urban farmers' adoption of sack farming technique for sustainable tomato production. The result also shows that all the items had their calculated value higher than the Table value of 1.96 thus accepting the null hypotheses stated. This implies that there is no significant different between the mean response of farmers and extension agents on the green field days mechanisms for urban farmers' adoption of sack farming technique for sustainable tomato production in Abia State.

Research question 3: What are the SPAT mechanism for urban farmers' adoption of sack farming technique for sustainable tomato production?

Hypotheses 3: There is no significant difference between the mean response of farmers and extension agents on the SPAT mechanism for urban farmers' adoption of sack farming technique for sustainable tomato production in Abia State.

Table 3: mean, standard deviation and t-Test Result of the Respondents on the SPAT Mechanism for Urban Farmers' Adoption of Sack Farming Technique for Sustainable Tomato Production in Abia State

S/N	ITEM STATEMENT	$\bar{X}_1$	S_1	$\bar{X}_2$	S_2	$\bar{X}_g$	S_g	t-cal	RMK
1	Test the sack farming technique to ensure success before displaying to farmers	3.31	.82	3.28	.81	3.30	.82	.33.	NS
2	Collaborate with farmers to choose a conducive venue/farm to use	3.43	.85	3.40	.84	3.42	.85	.32	NS
3	Get all the necessary facilities or tools needed for training ready	3.26	.81	3.22	.79	3.24	.80	.45	NS
4	Set up the venue for the training together with the farmers	3.29	.81	3.26	.81	3.28	.81	.33	NS
5.	Demonstrate the methods in sack preparation on the SPAT plot for farmers to learn	3.52	.88	3.49	.87	3.51	.88	.31	NS
6.	Demonstrate the various varieties of tomato that could be grown for farmers to learn from on SPAT plots	3.31	.82	3.28	.81	3.30	.82	.33.	NS
7.	Demonstrate Fertilizer application in the SPAT plots	3.43	.85	3.40	.84	3.42	.85	.32	NS
8	Demonstrate compost making for producing tomato in sack in the SPAT plot	3.44	.85	3.40	.84	3.42	.85	.42	NS
9.	Use improved seeds when demonstrating to farmers during SPAT to avoid disappointment which will lose farmers interest	3.32	.82	3.30	.82	3.31	.82	.22	NS
10.	Make the time spent on SPAT concise and rich for farmers to comprehend easier	3.31	.82	3.29	.81	3.30	.82	.22	NS
11.	Provide adequate information and supervision to farmers when carrying out SPAT	3.28	.81	3.25	.80	3.27	.81	.33	NS

Keys: $\bar{X}1$-mean of farmers ($\bar{X}_2$)mean of extension agents, S_1-standard deviation of farmers, S2-standard deviation of extension agents, $\bar{X}g$-grand mean, Sg grand standard deviation, NS- not significant, df-332, t-tab-1.96 Source: Field survey, 2024

Data presented in Table 3 revealed that all the items had their mean ranging from 3.27 to 3.51 and are above the cut off mean of 2.50. This means that all the items are the SPAT mechanisms for urban farmers' adoption of sack farming technique for sustainable tomato production. The result also shows that all the items had their calculated value higher than the Table value of 1.96 thus accepting the null hypotheses stated. This implies that there is no significant different between the mean response of farmers and extension agents on the SPAT mechanisms for urban farmers' adoption of sack farming technique for sustainable tomato production in Abia State.

Discussion of the findings

The findings of the study in research question 1 revealed that there are 9 mass media mechanisms for urban farmers' adoption of sack farming technique for sustainable tomato production in Abia State. The finding is in accordance with Zaktarn (2015) who found that greater percent of information gotten from farmers are through mass media such as telephone, radio, social media and posters. The author also found in line with the findings of this study that the views of the farmers and agricultural advisors are not significantly differ.

The findings of the study in research question 2 revealed that there are 11 green field mechanisms for urban farmers' adoption of sack farming technique for sustainable tomato production in Abia State. The finding is in keeping with Kughur, Aveuya and Kuza (2020) who found that green field days organized for farmers is among their most notable means of sourcing information of trending farming techniques. The finding in hypothesis 2 is also in keeping with Egbong (2020) who found that significant difference does not exist between the mean response of male and female farmers on the green field strategies for enhancing farmers production.

The findings of the study in research question 3 revealed that there are 11 SPAT mechanisms for urban farmers' adoption of sack farming technique for sustainable tomato production in Abia State. The finding is in agreement with Ajayi and Fapojuwo (2013) SPAT is very effective in impacting new farming techniques to the farmers and that farmers' benefits from spat were increased yields and increased awareness of improved varieties. The findings in the hypothesis is in keeping with Egbong (2020) who found that there is no significant difference between the mean response of male and female farmers on the SPAT mechanisms for enhancing farmers production through adoption of recent technologies.

Conclusion

Based on the findings of the study, it was concluded that there are 31 extension mechanism for rural farmers' adoption of sack farming technique for sustainable tomato production. They are mass media (9 items), green field days (11items), SPAT (11items), Extension mechanisms are therefore a reliable means of mobilizing farmers to adopt sack farming technique for sustainable tomato production.

Recommendations

Based on the result of the study and the findings made, the following recommendations were made

1. Tomato farmers should adopt mass media mechanisms to source information and skills in trending farming technologies
2. Tomato farmers cooperatives should regularly organize field days for their members so the emerging technologies such as sack farming could be communicated to them
3. Extension agents should demonstrate sack farming technique to the farmers during small plot adoption technique so they get more convinced to adopt it to produce tomato within their surroundings.

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