SOYA BEANS PRODUCTION COMPETENCIES NEEDED BY ARABLE CROP FARMERS FOR FOOD SECURITY IN EDO STATE, NIGERIA

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Abstract
The study identified competencies needed by arable crop farmers in soyabeans production for food security in Edo State, Nigeria. Four research questions guided the study. Survey research design was employed for the study. The study was carried out in Edo State, Nigeria. The population for the study was all the Agricultural extension workers in Edo State and all agricultural science teachers in the agricultural zones in Edo State. Simple random sampling technique was used to select 177 agricultural science teachers and 30 agricultural extension workers making a total sample of 207 respondents. Structured questionnaire on soyabeans production was developed and validated by three experts. Two hundred and seven copies of the questionnaire were administered to the respondents and were retrieved and analyzed using mean and standard deviation to answer the research questions. Cronbach Alpha reliability method was used to determine internal consistency of the instrument which yielded reliability coefficient of 0.84. Findings from the study revealed that arable crop farmers in Edo State need requisite competencies in pre-planting, planting, post-planting and marketing operations of soyabeans. It was recommended amongst others that crop farmers in Edo State should be trained by agricultural extension workers in soyabeans production using the identified requisite competencies.

Keywords: Competencies, Arable Crop Farmers, Soyabeans Production, Food Security and Agricultural Extension Workers.

Introduction

Soyabean is a popular arable crop grown in both tropical and sub-tropical zones around the globe. It belongs to the family called *Fabaceae* which was formerly called *Leguminosae*. It is an erect and hairy crop plant having between 0.6 to 1.5m height with large trifoliate leaves, small white or purple flowers and short pods with one to four seeds. It is an important source of vegetable oil both for human and animal consumption (Couto et al., 2011). It is an essential food crop grown by farmers in Nigeria. According to Anjov et al. (2015), it has been cultivated over one thousand years ago in countries like China, Japan and Korea. IITA in Omodona (2016) also reported other countries in the world where soyabeans are majorly being produced to include Argentina, United States, Nigeria, Brazil, India, Uganda and South Africa. Omodona (2016) also reported that soya beans cultivation in Nigeria is very common in Benue State as the state is the largest producer of its seeds, followed by other states such as Kaduna, Plateau and Nasarawa. Its cultivation in Nigeria according to Omodona (2016) begins in the month of May or June with land preparation while its harvesting is usually done in October or November. It is harvested 3-4 months after planting, depending on the time it was sowed and the particular variety or species.

There are several varieties of soya beans grown in Nigeria and other parts of the world. Ayoola in Adebayo et al. (2018) listed common varieties grown in Nigeria to include the 16XTGM, Samson and Malayan. Other improved varieties of soya beans grown in Nigeria according to IITA in Omodona (2016) are TGX 306-036c, TGX 1485—IED, TGX 53-02D, TGX 440—1E, M351- 1E, TGX 1448-2E, TGX 306- 036C and TGX 1485-IED. These varieties, when successfully grown and consumed have lots of health benefits. Several researches are being carried out to investigate health benefits of soya beans. Collision et al. in Omodona (2016) reported that any food containing soya beans protein may help to reduce the risk of Coronary Heart Disease (CHD). It also helps to lower serum cholesterol in human body by 33%, it reduces the risk of rectal cancer by 80%, mammary tumour by 40% and breast cancer by 50%. It was for this reason that consumption of 25 grams of soya beans protein per day was approved by the US Food and Drug Administration in 1999 to reduce the risk of heart disease (Collison et al. in Omodona, 2016).

Still on the usefulness of soya beans, Dugje et al (2009) opined that soybeans production is favored in

Nigeria for several reasons which include its marketing for economic gains and the income derived from its sale which can be used to solve other pressing family needs. Other uses of soya beans are for food both by man and livestock, soya-milk, soya-cheese among others. It also helps to improve soil fertility and controls the parasitic weeds on the farm, serves as a source of vegetable oil, used by industries as raw materials for production amongst other uses. Apart from domestic and industrial usefulness of soya bean, it also has some nutritional importance.

Some nutritional usefulness of soyabeans have been reported by Ajay and Arvind in Anjov et al. (2015) as protein and fiber and are also an excellent source of mineral elements such as molybdenum and copper. The authors further stated that soya beans are a very good source of iron, omega – 3 fatty acids, dietary fiber, vitamin B2, magnesium, vitamin K, and potassium. Other nutritional values in soya beans are peptides and phytonutrients which include flavonoids and isoflavonids (diadzein, genistein, malonyzgnenistin, and malonyldaidzin), phenolic acids (caffeic, coumeric, ferulic, gallic and sinapic acids), phytoalexins (glyceollin I, glyceollin II, and glyceollin III), phytosterols (betasitosterol, beta-stigmasterol, campestrol), unique proteins and peptides (defensins, glycinin, conglycinin, and lunacin), and sapoins (soyasaponins from group A and group B, and soyasapogenols) amongst other nutrients that are contained in soya beans.

Competency has been defined as a standardized requirement on which an individual carries out any given task (Spenser in Onipede et al., 2018). Ifeanyieze et al. (2014) viewed competency as knowledge, skills and attitude required by teachers or individuals carrying out assigned tasks or farm operations. Competency as it relates to this study is the knowledge, skills and attitude needed by arable crop farmers in soya beans production which covers pre-planting, planting, post-planting and marketing operations. Once these operations are carried out successfully by the farmers in soya beans production, it will help to attain food security in the study area and beyond.

Food security has been defined by Food Agricultural Organization (2008) as attainment or reaching a point when every individual at all times has physical and economic access to sufficient, safe and nutritious food which will meet their dietary needs and food preferences for an active healthy life. FAO (2008) in summary declared that food security is the availability of food in terms of production, processing, marketing, distribution and consumption. World Health Organization during the World Food Summit in 1996 in corroboration of FAO definition of food security declared that food security is when all people at all times have both physical and economic access to sufficient food for both active and healthy lives. WHO further emphasized that food security is based on three pillars which are having sufficient quantity of food consistently, having sufficient resources to purchase food that is appropriate with required nutrients and having knowledge of basic nutrition and cure, as well as adequate water and sanitation. If farmers in any nation must have access to quality food, it is therefore very important to identify the competencies needed to successfully carry out production of food crops which soya beans belong.

In Edo State, soyabeans are consumed as whole food by many people and as forage and hay by farm animals. The whole food includes full fat, soya milk and powdered milk. For these reasons, soyabean is an essential plant commodity in the locality (Edo State) and its production could be engaged in by arable crop farmers. Arable crops according to Hajdu (2024) refer to all kinds of field crops that complete their life cycle from germination to seed production within one year. Various types of arable crops according to the author include grain crops such as maize, rice and millet; pulse crops such as beans and peas; oilseed crops such as rapeseed, soyabeans and sunflower; forage crops such as cowpea; fiber crops such as cotton and sugarcane and tuber crops such as potato, yam, cocoyam and cassava. Arable crop farmers as it relates to this study are crop producers or agronomists who cultivate arable crops. For these crops to be grown successfully inclusive of soya beans, the farmers must possess the necessary skills or competencies for its cultivation.

Purpose of the Study

The general purpose of this study was to identify competencies needed by arable crop farmers in soyabeans production for increased food security in Edo State, Nigeria. Specifically, the study sought to identify:

1. competencies needed by arable crop farmers in pre-planting operations of soyabeans production for increased food security in Edo State, Nigeria.
2. competencies needed by arable crop farmers in planting operations of soyabeans production for increased food security in Edo State, Nigeria.
3. competencies needed by arable crop farmers in post-planting operations of soyabeans production for increased food security in Edo State, Nigeria.
4. competencies needed by arable crop farmers in marketing operations of soyabeans

production for increased food security in Edo State, Nigeria.

Research Questions

The following research questions were formulated and answered in this study:

1. What are the soyabeans production competencies in pre-planting operations needed by arable crop farmers for increased food security in Edo State?
2. What are the soyabeans production competencies in planting operations needed by arable crop farmers for increased food security in Edo State?
3. What are the soyabeans production competencies in post-planting operations needed by arable crop farmers for increased food security in Edo State?
4. What are the soyabeans production competencies in marketing operations needed by arable crop farmers for increased food security in Edo State?

Methodology

The study adopted a survey research design. The study was carried out in South-South, Nigeria; specifically in Edo State. The population for the study was all the agricultural science teachers in the three agricultural zones of Edo State and all the agricultural extension workers in the state. The sample of the study was 207 made up of 177 agricultural science teachers and 30 agricultural extension workers. The instrument for data collection was a structured questionnaire titled: Soybean production skill questionnaire (SPSQ). The skill items had a 4-point response scale of Seriously Needed (SN), Moderately Needed (MN), Needed (N) and Not Needed (NN) with corresponding values of 4, 3, 2 and 1. The instrument was validated by three university lecturers, one from Agricultural Education Unit of University of Benin, one from Department of Agricultural Education of University of Nigeria Nsukka and one from Crop Science Department of University of Benin, Benin City. Their corrections and suggestions were utilized to improve the initial copies of the questionnaire to produce the final copies. Cronbach Alpha reliability method was adopted to determine the internal consistency of the questionnaire item. A Cronbach Alpha coefficient of 0.87 was obtained. Two hundred and seven copies of the questionnaire were administered to the respondents. The entire Two hundred and seven copies administered were retrieved and analyzed. Mean and standard deviation were used to answer the research questions. The average mean of 2.50 was used for decision making. Any item with a mean rating of 2.50 or above was regarded as needed, while any item with a mean score less than 2.50 were regarded as not needed. Any item with a standard deviation between 0.00 and 1.96 indicated that the respondents were not far from the mean and the opinion of one another.

Results

Research Question 1: What are the soyabeans production competencies in pre-planting operations needed by arable crop farmers for food security in Edo State?

Table 1: Mean ratings of crop science lecturers and extension agents on soya beans production competencies in pre-planting operations

S/N	Item Statement	$\overline{X}$	SD	Decision
1.	Select a suitable site for soya beans production with good soil	3.59	0.59	Needed
2.	Select a suitable site for soya beans production with good soil	3.66	0.47	Needed
3.	Pack the trashes or burn them	3.28	0.88	Needed
4.	Carry out stumping of stems and roots	3.16	0.76	Needed
5.	Map out the land into plots to create roads and parts	3.31	0.76	Needed
6.	Till the soil with appropriate tools (ridges or seed beds)	3.33	0.58	Needed
7.	Spread organic matter to increase soil nutrient	3.57	0.76	Needed
8.	Select seeds of high viability for easy germination	3.48	0.50	Needed
9.	Treat soya beans seeds appropriately before sowing	3.28	0.77	Needed

Keys: $\overline{X}$ = Mean, SD = Standard Deviation, n = Number of Respondents, N = Needed

Data in Table 1 showed the mean responses and standard deviations of crop science lecturers and extension agents on soyabean production competencies in pre-planting operations. The mean values ranged from 3.16 to 3.66 while the standard deviation ranged from 0.47 to 0.88. The values of the SD are considerably low and this shows that the responses are clustered around the mean. It can be deduced from the mean values that all the identified

items are pre-planting operations in soyabean production.

Research Question 2: What are the soyabeans production competencies in planting operations needed by arable crop farmers for food security in Edo State?

Table 2: Mean ratings of crop science lecturers and extension agents on soya beans production competencies in planting operations

S/N	Item Statement	$\bar{X}$	SD	Decision
10.	Identify suitable period for planting soya beans	3.50	0.76	Needed
11.	Test the seeds for viability for planting	3.45	0.66	Needed
12.	Maintain a spacing of 50-74cm between rows and 5-10cm within rows	3.01	0.71	Needed
13.	Sow 3 to 4 seeds per hole	3.28	0.81	Needed
14.	Sow seeds at 2-5cm planting depth	3.31	0.59	Needed
15.	Water the farm immediately after sowing if it is dry season	3.38	0.67	Needed
16.	Check for germination 5 days after planting	3.54	0.60	Needed
17.	Carry out mulching for the crops	3.23	0.63	Needed
18.	Replace ungerminated seeds after 10 days of planting	3.37	0.75	Needed

Keys: $\bar{X}$ = Mean, SD = Standard Deviation, n = Number of Respondents, N = Needed

Data in Table 2 showed the mean responses and standard deviations of crop science lecturers and extension agents on soyabean production competencies in planting operations. The mean values ranged from 3.01 to 3.54 while the standard deviation ranged from 0.59 to 0.81. The values of the SD are considerably low and this shows that the responses are clustered around the mean. It means that all the items are planting operations in soyabean production.

Research Question 3: What are the soyabeans production competencies in post-planting operations needed by arable crop farmers for food security in Edo State?

Table 3: Mean ratings of crop science lecturers and extension agents on soya beans production competencies in post-planting operations

S/N	Item Statement	$\bar{X}$	SD	Decision
19.	Thin out any stand that is more than two sweet melon seedlings	3.32	0.58	Needed
20.	Weed regularly after planting	3.36	0.59	Needed
21.	Apply manure or fertilizer to the soil to supply more nutrients	3.37	0.75	Needed
22.	Apply recommended pesticides to control disease and pest attack	3.50	0.61	Needed
23.	Irrigate or drain the soil to maintain recommended soil moisture Level	3.48	0.74	Needed
24.	Spray recommended insecticides to reduce insect vector during pre-flowering stage	3.33	0.75	Needed
25.	Cut the pods off the plant once fully matured and drop the pods in a tarpaulin for weeks to dry	3.24	0.72	Needed
26.	Thresh dried soybean pods and winnow soybean manually or mechanically to remove seeds from the debris	3.44	0.80	Needed

Keys: $\bar{X}$ = Mean, SD = Standard Deviation, n = Number of Respondents, N = Needed

Data in Table 3 showed the mean responses and standard deviations of crop science lecturers and extension agents on soyabean production competencies in post-planting operations. The mean values ranged from 3.24 to 3.50 while the standard deviation ranged from 0.58 to 0.80. The values of the SD are considerably low and this shows that the responses are clustered around the mean. It shows that all the items are post-planting operations in soyabean production.

Research Question 4: What are the soyabeans production competencies in marketing operations needed by arable crop farmers for food security in Edo State?

Table 4: Mean ratings of crop science lecturers and extension agents on soya beans production competencies in marketing operations

S/N	Item Statement	$\bar{X}$	SD	Decision
27.	Advertise soybean on internet and other media platforms	3.67	0.47	Needed
28.	Grade and measure soybean seeds in bags or any suitable Container	3.01	0.74	Needed
29.	Open a sales book record for the product	3.42	0.74	Needed
30.	Fix appropriate prices for the different grades and measures	3.29	0.71	Needed
31.	Distribute and transport the soya beans to the buyers	3.36	0.76	Needed
32.	Balance farm account at the end of farming season to determine profit	3.22	0.76	Needed

Keys: $\bar{X}$ = Mean, SD = Standard Deviation, n = Number of Respondents, N = Needed

Table 4 showed the mean responses and standard deviations of crop science lecturers and extension agents on soyabean production competencies in marketing operations. The mean values ranged from 3.01 to 3.67 while the standard deviation ranged from 0.47 to 0.76. The values of the SD are considerably low and this shows that the responses are clustered around the mean. It can be deduced from the mean values that all the identified items are marketing operations in soyabean production.

Discussion of the Results

The results in Table 1 revealed that arable crop farmers need 9 requisite competencies in pre-planting operations for soya beans production. The competencies are: select a suitable site for soya beans production with good soil, clear the trees, grass on land manually or mechanically, pack the trashes or burn them, carry out stumping of stems and roots, map out the land into plots to create roads and parts, till the soil with appropriate tools (ridges or seed beds), spread organic matter to increase soil nutrient, select seeds of high viability for easy germination and treat soya beans seeds appropriately before sowing. This result is in agreement with Ukonze (2010) who found out that clearing site ready for tillage, marking out the tilled land for beds, maintaining farm hygiene and providing shade are important skills in nursery operation for vegetable crops production in Enugu State, which are collectively known as pre-planting operations.

The result in Table 2 revealed that arable crop farmers need 9 requisite competencies in planting operations for soya beans production. The identified requisite competencies are: identify suitable period for planting soya beans, test the seeds for viability for planting, maintain a spacing of 50-74cm between rows and 5-10cm within rows, sow 3 to 4 seeds per hole, sow seeds at 2-5cm planting depth, 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 replace ungerminated seeds after 10 days of planting. The result is in consonant with the report of Goulding (2023) who identified the skills required in planting operations of soybean production to include sowing of seeds into holes and watering after sowing which means irrigating the soil among others.

The result in Table 3 revealed that arable crop farmers need 8 requisite competencies in post-planting operations for soya beans production. The identified requisite competencies are: thin out any stand that is more than two sweet melon seedlings, weed regularly after planting, apply manure or fertilizer to the soil to supply more nutrients, apply recommended pesticides to control disease and pest attack, irrigate or drain the soil to maintain recommended soil moisture level, spray recommended insecticides to reduce insect vector during pre-flowering stage, cut the pods off the plant once fully matured and drop the pods in a tarpaulin for weeks to dry and thresh dried soybean pods and winnow soybean manually or mechanically to remove seeds from the debris. The result is in agreement with David et al (2015) who reported that the activities in post-planting operations for cocoyam production which is also a crop plant include: drainage, mulching, fertilizer application, irrigation, weeding and pest and disease control among others. Also, the result is in line with Pascale (2020) who listed some skills to be carried out in harvesting and processing operations which are post-planting operations too. The skills identified are: threshing dry soyabean pods, drying of the pods, winnowing soya beans to remove the seeds from the debris and drying of the seeds amongst other operations.

The result in Table 4 showed that 6 items are competencies needed by arable crop farmers in marketing of soya beans. The requisite competencies are: advertise soybean on internet and other media platforms, grade and measure soybean seeds in bags or any suitable container, open a sales book record for

the product, fix appropriate prices for the different grades and measures, distribute and transport the soya beans to the buyers and balance farm account at the end of farming season to determine profit. The result corroborated the report of Amusa, Akali and Oketoobo (2010) identified some skills to be carried out in marketing operations as; advertising soya beans to attract customers, grading and measuring soya beans seeds in bags for marketing operations among others.

Conclusion

In Edo State, arable crop farmers rarely cultivate soya beans. One of the reasons for this could be that they lack the competencies needed for a successful production of the crop. This creates a gap between the quantity demanded and the quantity supplied in the market necessitating the marketers to import soya beans from other states of the federation. This showed the need for the farmers in the state to diversify into soya beans production. But the lack of identified competencies in the production gave rise to this study. The study is to enable agricultural extension agents and agricultural science teachers to develop training programme in soya beans production for farmers. Hence, the above competencies were identified for soya beans production in Edo State.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The identified competencies in soya beans production should be developed into training modules by extension agents and agricultural science teachers for training of farmers and students
2. The identified competencies should be used by farmers to increase the production level of soya beans in Edo State.
3. Arable crop farmers in Edo State should be trained by skill acquisition centres and extension workers in soya beans production using the identified requisite competencies.
4. Arable crop farmers should be sensitized through workshops and seminars on the economic importance of soya beans production to create more awareness of the crop.

References

Adebayo, C.O., Coker, A.A. & Tsavhemba, S. (2018). Adoption of improved soybean production technologies in Benue State, Nigeria. *Nigerian Agricultural Journal,* 49(1), 65-70 available online at: http://www.ajol.info/index.php/naj.

Amusa, T.A; Akali, M and Oketoobo,E.A. (2010) In-service Training Needs Of Instructors For Effective Teaching of Soybean (Glycine max) Production To Students Of Schools Of Agriculture In North-Cental Nigeria. *Nigerian Vocational Association Journal*, 15(1), 194-204.

Anjov, I. S, Mudu'utdai, R. U. & Longshall, M. (2015). Skills needed by youths for soy-beans production for enhancing food security in Benue State, Nigeria. *Nigeria Vocational Association Journal*, 20(2), 1-12

Couto C, Silva LR, Valentão P, Velázquez E, Peix A, Andrade PB (2011). Effects induced by the nodulation with Bradyrhizobium japonicum on Glycine max (soybean) metabolism and antioxidant potential. Food Chemistry 127:1487–1495. doi:10.1016/j.foodchem.2011.01.135.

David, A.A. & Okeke, E.I. (2015). Work skills required by secondary school graduates for entry into cocoyam production enterprise in Cross River State, Nigeria. *Journal of Emerging Trends in Educational Research and Policy Studies*, 6(6), 418-424.

Dugje, I.Y, Omoigui, L.O; Ekeleme, Bandyopadhyay, R; Lava-Kamar, P, Kamora, A.Y (2009). Farmers' Guide to Soybean Production in Northern Nigeria Ibadan: International Institute of Tropical Agriculture (IITA).

Egbo, B.N. & Ayozie, V.I. (2017). Skills Required by Women in Agriculture in Soybean Production for Poverty Reduction, *International Journal of Agricultural and Home Economics Education (IJAHEE)* 4 (1), 155-166. www.ijvocter.com

Food and Agricultural Organization (FAO) (2008). Food Security Information for Action. What is Food Security Learner's Notes. Retrieved from fao.org/e-learning/course

Goulding, J. (2023). How to grow soybeans-discover the benefits of growing these high-protein legumes. Homes and Gardens, https://www.homesand garden.com/gardens/how-to-grow-soybeans?utm_source=perplexity

Hajdu I. (2024). All Aspects of Proper Arable Crop Harvest. https://www.agrivi.com/blog/all-aspects-of-proper-arable-crop-harvest/

Ifeanyieze, F.O., Iheji, A. & Ishiwu, E.C. (2014). Competency improvement needs of lecturers of agricultural education in maintenance of equipment in universities in South-East Nigeria for production of employable graduate. *Nigerian Journal of Educational Research and Evaluation,* 13(1), 115-124.

Omodona, S. (2016). Factors Influencing Adoption of Improved Soyabean Production Technologies among Farmers in Two Local Government Areas of Kogi State. M.Sc. thesis. Department of Agricultural Extension and Rural Sociology, Ahmadu Bello University, Nigeria.

Onipede, O. & Lawal, O.I. (2018). Competency improvement needs of lecturers in agricultural education curriculum content for effective teaching in colleges of education in South West Nigeria. *Journal of Agricultural Education Teachers' Association of Nigeria,* 2(1), 33-39.

Pascale, W. (2020). Soybean Production Training Manual. https://www.afard.net/publications/manuals/220-alenu-soybean-production-manual/file?utm_source=perplexity

Ukonze, J. A. (2010). Vegetable Production Skills Needed by Instructors in Universities for Effective Teaching of Vegetable Crops in Enugu State. *Nigerian Vocational Association Journal*, 15(1), 63-71.