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Swamp Rice Production Skills and Food Security Enhancement in Akwa Ibom State, Nigeria.

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Abstract

The study identified swamp rice production skills and food security enhancement in Akwa Ibom state. The population of the study consisted of three hundred and fifty (350) swamp rice farmers in Akwa Ibom state. This study employed the survey research design. Four major purposes, four research questions and four hypotheses were formulated to guide the study. The instrument was face validated by three experts from the Department of Vocational Education in the University of Uyo, Akwa Ibom State. Cronbach's Alpha was used to establish the reliability and a reliability coefficient of 0.83 was obtained. Mean and standard deviation were used to analyse the data collected. t-test was used to test the null hypotheses at 0.05 level of significance. The findings revealed that the application of the skills for the selection of swamp soil, land preparation, selection of rice varieties for cultivation and fertilizer application had significant influence in the yield of rice for enhancement of food security. Accordingly, the researchers recommended the following, the establishment of skill acquisition centre that would design programmes that offer training to swamp rice farmers to improve their production skills in the area. Extension agents should give more talk over radio and televisions or use any relevant media to enlighten farmers on the latest skills in swamp rice production. Extension agents in the Ministry of Agriculture should use the identified skills in this study to guide swamp rice farmers for improved rice production.

Keywords: Swamp Rice, Production Skills, Enhancement And Food Security

Introduction

Rice (*Oryza sativa*) is one of most important cereal crops growing in Nigeria; it belongs to the family of poaceae. Rice constitutes the principal food of about half the world's population. In the far East, where the world production is greater, it is a staple food (Udoh, Ndon, Asuquo and Ndaeyo, 2005). Among the cereals, the world's rice production is only slightly below that of wheat. During 1961-1965, rice was grown on 124 million hectares in the world with an annual production of 253 million tones. In 1979, the figures rose to 145 million hectares and 380 million tones, an increase of

16% in area cultivated and 50% in production, which was mainly due to the adoption of modern cultivars and improved cultural management practices (Diblo, 2008). Some of the important rice producing countries in tropical Africa includes Nigeria, Madagasca, C'ote d'voire, Sierra Leone, etc. The greatest production at world level comes however from China (Onyekwere, Maji and Eze, 2008). Apart from direct use as food to humans, rice can be processed for starch, beers, wines and spirits. The bran from the milling process is used as livestock feed and the oil from the bran is used for soap manufacturing and cooking of food hence it is rich in proteins, fats and vitamins. The rice straw is used for thatching, mats making, straw boards, rayon and linoleum.

Swamp rice has been noted as one produce in the agricultural sector that can relaunch Nigeria into the league of economically viable nations using the agricultural route (Nweke, Dustan and Lynam, 2002). The production of swamp rice is concentrated in the hands of the numerous small holder farmers located primarily in the south-south and south-east regions of Nigeria (Nweke et al; 2002). In Nigeria, swamp rice production has been characterized by dominant use of poor quality planting materials that are disease proned and local varieties with long maturation period and low yield. Effective performance in any given occupation requires acquisition of relevant skills and knowledge.

Swamp rice which had been neglected by research workers in the past is now receiving attention of both national and international research centres (Udosen, 2002).The significance of swamp rice in tropical agriculture has been recognized in the area of its growth potentials, human and animal food, its enrichment and fortification, industrial uses and genetic improvement (Ojeagbase, 2005). For swamp rice production to improve, swamp rice farmers must adopt new technologies needed to reduce costs and improve productivity. Until farmers adopt new and improved practices, rice production will remain at the subsistence level and unable to contribute significantly to Nigeria's economic development. While technical education facilitates the acquisition of practical and applied skill as well as basic technical and specific knowledge, crop production skills are important instrument for improving productivity (African Economic outlook, 2013).Therefore, private and public investment in research and development are required to develop swamp rice products for industrial uses, if well targeted, could offer good returns and prospects for the future of swamp rice in Nigeria and the world at large. To achieve this, swamp rice farmers must have inputs such as improved varieties, fertilizers, herbicides, and other agro-chemicals (Ndaeyo, Udo and Ekpe, 2001). Obanya (2003) defined skills as ability to do something well or versatility in knowledge. In the context of this study, skill is the ability of swamp rice farmers to put into practice those knowledge, skills, judgment ,ability and habits obtained for swamp rice production from cultural practices (that is

pre-planting, planting and post planting and maintenance operations) into production of swamp rice. There is need to improve the quality and quantity of swamp rice and other related products being produced in Nigeria as well as the production equipment for the country to benefit from demand at the domestic and international level.

Food security, in the view of Clinton (2008), occurs when all people in a state or country have enough to eat to be healthy and active, and do not have the fear that the situation will change in the future. Anderson (2009) defined food security as access to enough food by all people at all times for active healthy living. Food security exists when every person has physical and economic access at all times to healthy and nutritional food in sufficient quantity to cover the needs of their daily nutritional and food preferences in order to live a healthy and active life (world summit, 1996). Maillard (2008) posited that capacity building focuses on a series of actions directed at helping participants in the development process to increase their knowledge, skills and understandings and to develop the attitudes needed to bring about the desired developmental change and skills for swamp rice production.

Rice is grown on wide range of soils than any other major crop. Swamp rice is mainly restricted to the level or slightly undulating flood plains which are seasonally flooded and weakly aerated, slow permeability and capillary rise with high structure (David, 1999). David further stressed that the skill needed for selection of swamp soil for rice production by farmers is highly needed in order to get maximum yield. The farmers are expected to know the deep percolation component of rice water consumption and reliability to salting and development of water table in rice lands. This has been found to be completely independent of the actual soils on which rice is grown. On soil selection, the skill to determine the best texture, fertility and organic matter content is very expedient.

Plant growth and yield is limited by various combinations of nutrient disorder and soil stresses. Nweke et al (2002) positioned that, it is necessary for the farmers to posses the skills for land selection for swamp rice production. This is based on the general chemical and physical characteristics of the land. They went further to outline the skills needed for the selection of swamp soil for rice production to include; skill to identify the soil that cover much vegetation, dark in colour, ability to test soil by hand feeling, determine the length of time that water stands in the swamp soil and to test for the acidity or alkalinity of the soil. Accordingly, Udoh et al (2005) observed that in choosing fertile land with good water retention capacity, it must contain clay fractions and also that experts should be consulted for soil survey and proper analysis of the soil before cultivation of rice as these skills will boost rice productivity.

To increase the production capacity of swamp rice, farmers must have improved varieties of rice. Maillard (2008) posited that capacity building focuses on a series of actions directed at helping farmers to develop skills need for selection of improved varieties of rice. Maillard went further to say that farmers should use good quality seeds with no insect damage, no contamination, and high percentage of viability and to avoid seeds of mixed varieties. Farmers are to used filled grains of good quality for sowing, add water to seeds and discard all empty grains that float in water and use the technique of nursery establishment to know the seed that are dormant. The improved varieties can be gotten from State Agricultural Development Programme Centres, Seed Company and other rice farmers.

According to Onyekwere et al (2008) swamp land preparation is necessary for rice production to minimize competition with weeds. Land is prepared after the establishment of the nursery. Ploughing may be done mechanically with tractor drawn implements. In areas with lots of perennial weeds, disc plough the soil immediately after harvest in November/December to expose the rhizomes (roots) to the sun. Onyekwere et-al also explained that soil preparation for swamp rice production requires that farmers have the ability to determine Marsh season for swamp soil clearing, the type of tillage based on topography, incorporation of organic matter during land preparation and erosion control.

Fertilizer application should be done directly after the cultivation of the field at the planting time or along with the irrigation water by broadcasting at the booting stage. Udoh et al (2005) reiterated that rice responds well to Nitrogen and phosphorus fertilizers, especially when soil is not rich in organic matter. To supply nitrogen, use urea on very acidic soils and ammonium sulphate elsewhere. Apply single or mixed fertilizers at 50-150 kg N/ha and 30-50kg P_2O_5/ha. The precise rate should be determined through soil testing. Apply fertilizer before flooding or after draining field temporarily to enable minimum uptake of nutrients and reduce the denitrification of nitrogen. A second dose of nitrogen may be given just before heading.

Statement of the Problem

Despite the favourable environmental conditions and the role played by the government in agriculture through extension services in facilitating rice production in Akwa Ibom state, it is still faced with poor yield and a few farmers doing it at subsistence level while some produced quantities a little more than their household can consume. This may be as a result of lack of needed skill in swamp soil selection, lack of right varieties of rice and lack of appropriate skill in soil fertility management through fertilizer application.

Objectives of the Study

This study therefore focused on the swamp rice production skills and food security in Akwa Ibom State. Specifically the study sought to:

(1) determine the skills needed for selection of swamp soil for swamp rice production to enhance food security in Akwa Ibom State.
(2) determine the skills needed for swamp land preparation for swamp rice production in Akwa Ibom State.
(3) determine the skills needed for selection of improved swamp rice varieties for cultivation to enhance food security in Akwa Ibom State.
(4) determine the skills needed in fertilizer application for swamp rice production in Akwa Ibom State.

Research Questions

The study was guided by four research questions;

1. What are the skills needed for selection of soils for swamp rice production to enhance food security in Akwa Ibom State?
2. What are the skills needed for swamp land preparation for swamp rice production in Akwa Ibom State?
3. What are the skills needed for selection of improved varieties of swamp rice for production in Akwa Ibom State?
4. What are the skills needed in fertilizer application in swamp rice production in Akwa Ibom State?

Null Hypotheses

The following null hypotheses were tested at 0.5 alpha level.

1. There is no significant difference in the responses of farmers (male and female) on selection skills need for swamp rice production to enhance yield for food security.
2. There is no significant difference in the responses of farmers (male and female) on land preparation skills need for swamp rice production to enhance yield for food security.

3. There is no significant difference in the responses of farmers (male and female) on rice varieties selection skills need for swamp rice production to enhance yield for food security.
4. There is no significant difference in the responses of farmers (male and female) on the fertilizers application skills need for swamp rice production to enhance yield for food security.

Methodology

This study employed the survey research design as an investigation in which only part of the population was studied and the selection was made so that the sample represents the whole population. The study was conducted in North-West Senatorial District of Akwa Ibom State. North-West Senatorial District comprises of Ibiono-Ibom, Ini and Ikono Local Governmet Areas. The climatic environment of these is basically humid with slight variation from the coastal zones in the South to the North. The area has a good proportion of swampy land suitable for the cultivation of swamp rice. The population of the study included all the swamp rice farmers in North-West Senatorial District which was three hundred and fifty two (352) farmers.

The purposive sampling technique was used to select three swamp rice producing local government areas where swamp rice are produced predominantly. The selected local government areas are Ibiono-Ibom, Ini, and Ikono. A total of one hundred and seventy nine (179) farmers made up the sample size (48 from Ibiono-Ibom, 59 from Ini and 72 from Ikono) from the three (3) swamp rice major producing local government areas of Akwa Ibom State. This sample size is made up of 96 male and 83 female rice farmers.

A 24 item research made instrument titled “Swamp Rice Production Skill Needs and Food Security Questionnaire (SRPSNFSQ)”, was used to collect data from the farmers. The researchers collected data from swamp rice farmers to ascertain the swamp rice production skills needed by them. A five point rating scale of very highly needed (VHN), highly needed (HN), moderately needed (MN), lowly needed (LN), and very lowly needed (VLN) with numerical values of 5, 4, 3, 2, and 1 respectively. The instrument was face validated by three experts from Vocational education department and tested for reliability using split-halves method and Cronbach’s Alpha statistics and reliability coefficient of 0.83 was obtained.

The researchers visited and administered the instrument through three research assistants trained for that purpose. All the instruments administered were completed, retrieved and used for data analysis.

Method of data analysis

Mean and standard deviation were used to answer research questions while t-test was used to test the null hypotheses at 0.05 level of significance. Based on the five point Likert scale, any item above 3.00 point based on the real limit is regarded as needed while any item with mean less than 3.00 is regarded as not needed.

Table 1: Mean Responses of the Respondents on the Skills for Selection of Soil for Swamp Rice Production.

S/N	Swampy Soil Selection Skills	X	SD	Remarks
1	Ability to identify vegetative cover that suits rice production in the swamp	4.53	0.67	Needed
2	Ability to select thick but dark colour soil in the swamp	4.68	0.58	Needed
3.	Ability to do a soil field test by hand feeling	4.51	0.87	Needed
4.	Ability to determine the length of time that water can stand in the swamp soil	4.41	0.73	Needed
5.	Ability to select swamp soil based on gradient	4.42	0.73	Needed
6.	Ability to test the acidity or alkalinity of swamp soil for rice production	4.37	0.89	Needed

The data presented in Table 1 shows that the respondents needed the skills in all the items as the basic skill for soil selection for swamp rice production based on the mean which range from 4.37 to 4.68. The standard deviation values ranging from 0.58 to 0.89 show that the respondents are not far from each other on their responses.

Table 2: Mean Responses of the Respondents on the Skills Needed for Swamp Soil Preparation for Swamp Rice production. (N=179)

S/N	Skills needed for swamp soil preparation	$\overline{X}$	SD	Remarks
1.	Ability to determine the season for swamp soil clearing	4.27	0.70	Needed
2.	Ability to determine type of soil clearing needed by the soil type	4.05	0.84	Needed
3.	Skills to determine type of tillage based on topography	4.36	0.79	Needed

4.	Skills to incorporate organic matter during land preparation	4.14	0.89	Needed
5.	Skills to check soil erosion during soil preparation	4.27	0.67	Needed
6	Skills to apply post emergence herbicides to kill weed before sowing.	4.61	0.88	Needed

The analysis in Table 2 shows that all the items had mean scores above 3.00 which are above the criterion level indicating that all the six items were needed skills for swamp rice production

Table 3: Mean Responses of the Respondents on the Skills needed for Selection of Improved Varieties of Swamp Rice N=179

S/N	Varieties selection skills	X	SD	Remarks
1.	Ability to select high yielding varieties	4.55	0.51	Needed
2.	Ability to select disease-free varieties	3.93	0.81	Needed
3.	Ability to select early maturing varieties	4.36	0.89	Needed
4.	Ability to select varieties that adapt to soil environmental conditions	4.46	0.67	Needed
5.	Ability to select varieties that are resistant to diseases and pests	4.28	0.87	Needed
6.	Ability to select varieties based on pH of soils	3.85	0.89	Needed

Data presented in Table 3 shows that the respondents needed all the items as the basic pre-requisite skills for selection of improved varieties of swamp rice. Based on the mean and standard deviation it shows that the respondents are close to each other on their responses with values ranging from 0.50 to 0.72.

Table 4: Mean Responses of the Respondents on the Skills needed for Fertilizer Application in Swamp Rice Production. (N=179)

S/N	Fertilization skills needs	X	SD	Remarks
1.	Skills to apply fertilizer before flooding	3.85	0.89	Needed
2.	Ability to apply fertilizer after draining field to enable maximum uptake of nutrients.	4.05	0.81	Needed
3.	Ability to determine the type of fertilizer to apply	4.61	0.88	Needed
4.	Ability to determine when to apply the second dose of fertilizers	4.73	0.56	Needed
5.	Ability to determine the quantity of fertilizer to apply per unit area	4.59	0.50	Needed
6.	Ability to determine the best method in the application of fertilizers	4.77	0.76	Needed

The data in Table 4 revealed that the six (6) skills items had their X (mean) ranging from 3.85 to 4.77 and were above the cut-off point of 3.00. This indicates that all the swamp rice farmers needed skills in fertilizer application.

Test of Hypotheses

Null Hypothesis 1: There is no significant difference in the responses of farmers (male and female) on selection skills need for swamp rice production to enhance yield for food security.

Table 5*: t-test analysis of responses on the skills needed for selection of swamp soil for rice production and the influence on the yield.*

Variables	n	X	SD	df	t-cal	t-critical
Male	96	13.7	2.12			
				177	3.15	1.97
Female	83	13.2	2.35			

(n=179). Significant at P>0.05

The hypothesis tested in Table 5 indicates that the t-calculated value of 3.15 is greater than the t-critical value of 1.97 at 0.05 significance. The null hypothesis which state that skills needed for the selection of swamp soil for rice production does not significantly influence rice yield was rejected

while the alternate was retained. This implies that the skills needed for the selection of swamp soil for rice production are needed as they have significant influence on the yield of rice in Akwa Ibom state.

Null Hypothesis 2

There is no significant difference in the responses of farmers (male and female) on land preparation skills need for swamp rice production to enhance yield for food security.

Table 6*: t-test analysis of responses on land preparation skills need for swamp rice production to enhance the yield of rice for food security*

Variables	n	$\bar{X}$	SD	df	t-cal	t-critical
Male	96	13.02	2.33			
				177	27.64	1.97
Female	83	12.64	2.44			

(n=179). Significant at P>0.05

The result in Table 6 revealed that skills needed for swamp soil preparation for rice production is important as indicated by t-calculated value of 22.64 higher than t-critical value of 1.97 at significance level of 0.05 and 177 degree of freedom. The result reveals that the skills needed for swamp soil preparation enhances the yield of rice for food security. The null hypothesis was rejected and the alternate retained.

Null Hypothesis 3

There is no significant difference in the responses of farmers (male and female) on rice varieties selection skills need for swamp rice production to enhance yield for food security.

Table 7: ***t-test analysis of responses on the selection skill need of swamp rice varieties for cultivation to enhance the yield of rice for food security***

Variables	n	$\bar{X}$	SD	df	t-cal	t-critical
Male	96	12.84	2.21			
				177	12.50	1.97
Female	83	12.59	2.43			

(n=179). Significant at P>0.05

The null hypothesis in Table 7 shows that the selection of swamp rice varieties for cultivation does not significantly enhances yield of rice for food security. Therefore the null hypothesis was rejected while the alternative was retained since the t-critical value of 1.97 was less than t-calculated value at 12.50 given 0.05 significance level.

Null hypothesis 4

There is no significant difference in the responses of farmers (male and female) on the fertilizers application skills need for swamp rice production to enhance yield for food security.

Table 8: ***t-test analysis of responses on the skills need in fertilizers application for swamp rice production and the influence on the yield of rice***.

Variables	n	$\bar{X}$	SD	df	t-cal	t-critical
Male	96	12.84	2.21			
				177	12.55	1.97
Female	83	12.59	2.43			

(n=179). Significant at P>0.05

Table 8 revealed that the t-calculated value of 1.97 at 0.05 level of significance was less than t-calculated value of 12.55 the skills in fertilizer application for swamp rice production significantly influences the yield of rice and the null hypothesis was rejected while the alternative was retained. This implies that fertilizer application for swamp rice production has great influence on the yield of rice to enhance food security.

Findings of the study:

1. The skills in swamp rice production is highly needed by the farmers (site selection, land preparation, varieties selection and fertilizer application)
2. There is no significance difference in the responses of male and female farmers on the skills need for swamp soil selection, land preparation, rice varieties selection and fertilizers application

Discussion of findings

The findings of the study on Table 5 revealed that the skills for the selection of swamp soil for rice production has great influence on the yield of rice. The finding is in consonance with the view of Nweke et-al (2002) who stated that farmers need to posses some skills for selection of swamp soil for

rice production. They outlined the skills to include, the identification of swampy soil that are covered with much vegetation, dark in colour, skill to test soil by hand feeling and the length of time water stands in the swamp soil. The finding also in agreement with Udoh et-al (2005) who explained that the skill in selection fertile soil with good water retention capacity which contain clay, loamy and organic matter must be acquired to achieve high yield of rice.

The findings on Table 6 on the land preparation skills for swamp rice production to enhance the yield of rice for food security is in support of the work by Onyekwere et al (2008) who posited that swamp land preparation is necessary for rice production to minimize competition with weeds. Land is prepared after the establishment of the nursery. They further highlighted the skills for soil preparation to includes, the ability to determine marshy season for swamp soil clearing, the type of tillage on various topography, incorporation of organic matter during land preparation and erosion control.

The findings on Table 7 revealed that various skills are required by farmers in the selection of improved varieties for swamp rice cultivation to enhance the yield of rice. The result is in agreement with Maillard (2008) who outlined the skills involved in the selection of rice varieties to include the selection of good quality seeds with no insect damage, avoidance of seeds of mixed varieties and use filled grains of good quality for sowing.

The findings on Table 8 revealed that the skills for fertilizer application for swamp rice production have influence on the yield and is in consonance with Udoh et al (2005) who reiterated that fertilizers should be applied directly after the cultivation of the field at the planting time or along with the irrigation water by broadcasting at the booting stage and before flooding or after draining field temporarily to enable maximum uptake of nutrients.

Conclusion

Rice is one of the most important cereal crops growing in Nigeria. It constitutes the principal food of about half the world‘s population and become staple food where production is great. There is need to improve the quality and quantity of rice production to ensure food security in the nation. This can be achieved through acquisition of skills by farmers of which some have been identified but rice farmers are still lacking in some areas to improve in the production efficiency of rice. The need for relevant government agencies to use the result of this study to channel training programmes for rice farmers is hereby emphasized.

Implication of the study

The objectives of this study sought to determine the skills required by swamp rice farmers in Akwa Ibom state. These skills as earlier identified could be acquired through various mode of training of swamp rice farmer in the study area. Capacity building of farmers on the skills would increase the level of production of swamp rice in Akwa Ibom state in both quantity and quality, therefore achieving food security in the state could be realizable.

Recommendations

1. Rice production skill acquisition centre that would design programmes that offer training to rice farmers to improve their production should be established by Akwa Ibom state government through the Ministry of Agriculture and Natural Resources.
2. Extension agents can give more discussion over radio and televisions to enlighten farmers on the latest skills in swamp rice production
3. The identified skills for swamp rice production should be packaged and used to retrain farmers on rice production.
4. Extension agents in the Ministry of Agriculture should use identified skills in this study to guide rice farmers for improved swamp rice yield.
5. Extension workers should be given enough incentives and audio visual equipment to teach all the identified skills in actual practice.
6. Most of the swamp rice farmers living in the areas discussed speak mostly in the native language, therefore government, through the Ministry of Agriculture should help translate and incorporate the identified skills for better understanding and utilization of the skills.

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