

TITLE PAGE

**ENTREPRENEURIAL COMPETENCY NEEDS OF SECONDARY
SCHOOL GRADUATES AND FARMERS IN COMMERCIAL PLANTAIN
PRODUCTION IN ABIA AND IMO STATES**

BY

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DEDICATION

The work is dedicated to:

My lovely husband Mr. Christopher C. Okafor and our children: Chiebuka, Chinaza, Chianugo,
Chimdiya and Chibuike Okafor.

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Abstract

The study focused on identification and packaging of entrepreneurial competencies in commercial plantain production for training secondary school graduates for employment and retraining farmers for proficiency on the job in Abia and Imo States. Seven (7) research questions were developed and answered by the study -while three (3) null hypotheses were formulated and tested at 0.05 level of significance. The population of the study was 1460 made up of 644 agricultural science teachers, 766 extension agents and 80 registered plantain farmers. The sample for the study was (362) made up of 129 agricultural science teachers, 153 extension agents and 80 registered plantain farmers. Four (4) sets of structured questionnaire were developed for obtaining data from the respondents. The four (4) sets of the structured questionnaire were face validated by five (5) experts. Cronbach Alpha method was used to determine the internal consistency of the four (4) sets of structured questionnaire. A reliability coefficient of 0.88 was obtained for plantain nursery questionnaire, 0.95 for plantain plantation questionnaire, 0.90 for plantain processing and marketing questionnaire and 0.84 for training questionnaire. The data collected were analyzed using weighted Mean and Improvement Need Index (INI) to answer research questions and Analysis of Variance (ANOVA) was used to test the hypotheses of no significant difference at probability of less than or equal to 0.05. The study found out that: secondary school graduates needed 98 entrepreneurial competencies in plantain nursery, 89 in plantain plantation management and 101 in plantain processing and marketing for employment in commercial plantain production enterprise. Farmers needed improvement in 98 entrepreneurial competencies in plantain nursery, 89 in plantain plantation management and 101 in processing and marketing in commercial plantain production. The study also found out that there was no significant difference in the mean ratings of the responses of Agricultural Science teachers, Extension agents and plantain farmers on 96 out of 98 competencies in plantain nursery enterprise, 86 out of 89 in plantain plantation management enterprise and 99 out of 101 in plantain processing and marketing needed by secondary school graduates for employment in commercial plantain production. Based on these findings, the study recommended that Abia and Imo States governments should direct the administrators of skill acquisition centres in the two States to integrate the identified competencies in commercial plantain production and packaged plantain programmes in (nursery, plantation establishment, processing and marketing) into programmes of skill acquisition centres for training secondary school graduates for employment and retraining plantain farmers in the two states for competence on the job.

CHAPTER ONE

INTRODUCTION

Background of the Study

*Plantain is a crop plant with green leaves and herbaceous stem. Its fruits are cherished by many people in Abia and Imo States. Rasheed (2003) stated that more than 60 plantain varieties have been identified. The author stressed that these varieties can all be grouped into Giant French, Medium or Small French and Dwarf French plantains. Davies (2006) highlighted species of plantain as *Musa sapentium* and *Musa paradisiaca*. Ogazi (1996) also said that plantain belongs to the *Eumusa* of the genus *Musa* (family *Musaceae*) with species *Musa sapentium* and *Musa paradisiaca*. Agbakoba (2001) highlighted that plantain species are classified either by bunch type, floral size or size of the pseudostem (false stem). The author classified bunch type and floral size based on their characteristics into: french plantain, french horn plantain, horn plantain, false horn plantain and further classified the size of the pseudostem into: giant plantain, medium plantain and small plantain.*

*The specie of plantain mostly grown in the area of study is false horn plantain. It usually produces heavier bunches and greater number of fruits than others. This variety has similar methods of production like other species. Plantain as contained in Food and Agricultural Organization (FAO) report (2003) can be eaten in many forms either ripe or unripe. The author stressed that unripe fruit can be boiled or roasted, eaten with oil or vegetable; it can also be boiled and pounded or mixed with boiled yams and eaten as *fufu*. The ripe fruits can be eaten alone or fried, used for garnishing rice. Plantain is ground into powder and prepared into food paste called *amala* which is eaten with*

suitable soup. Morton (2006) stated that plantain flour can be mixed with wheat flour to make bread, cake and biscuits. Ekunwe and Ajayi (2010) stated that many people have developed commercial processes of plantain fruits to provide a wide variety of products, such as puree, flour, jam, jelly, chips, crisps, flakes, vinegar and wine. The author further said that though plantain fruit is the main economic product, but parts of the crop plant can be used as food, fodder or as raw materials for the industries used for manufacturing acids. The leaves are also used for wrapping food items. Adewole and Duruji (2010) stated that plantain fruit is composed of 75 per cent liquid of different elements and 32 per cent of carbohydrates. It contains several vitamins including A, B, C and is very low in protein and fat but rich in minerals particularly iron. Also, it is free from cholesterol, high in fibre and low in sodium.

It was reported by Opeke (2006) that plantain is useful in the cure of different diseases such as cardio vascular and kidney problems, dehydration in infants and diabetic patients or people with arthritis and gastro-intestinal ulcers. Skinner (2005) stated that the fruit of plantain is used to treat asthma and bronchitis, diarrhea and constipation; the peel of riped plantain has antiseptic properties and is used to prepare a poultice for wounds or even applied directly to a wound in an emergency; leaves of plantain have been used medicinally for a range of disorder from headache to urinary track infections, the stem juice was considered as a remedy for gonorrhoea. The fruit is easy to carry and peel, it is of great value to sports men and women as a quick and healthy method of replenishing energy. In agriculture, plantain products such as the fruits or peels are used as feed for animals; the peels are used as organic manure by farmers. The dead leaves and pseudostems of plantain are used for mulching or allow to decay to form organic manure.

Based on the value of plantain as stated above, the farmer involved in plantain production enterprises cannot be out of business easily.

A farmer is an individual that cultivates a piece of land for the purpose of growing crops and rearing animals. Amusa (2009) defined a farmer as a person who owns or manages an area of land and buildings on it, for growing crops and/or keeping animals. Uga (2006) said that a farmer is one who owns his farm and some of the resources and he is the one who determines priorities. In situations where the farmer is illiterate, the setting of priorities and determining how to maximize income along with some other welfare objectives may depend on the advice of an extension agent. In the context of this study, a farmer is an individual who cultivates land for the production of plantain at commercial scale. The farmer obtains relevant farm information from the extension agents in order to be successful in plantain production.

An extension agent in view of Onuoha and Nnadi (2004) is one that is professionally trained to extend improved farming practices to farmers. In the context of this study, an extension agent is a staff of Agricultural Development Programme (ADP) charged with responsibilities of disseminating information from agricultural research institute to farmers for implementation and also taking the problems of farmers to the research institute for solutions. These farmers use simple farm tools and family labour in plantain production. Family labour is sum of work performed by the entire household in the cultivation and processing of plantain. The researcher observed that most of the farmers in the study area grow plantain as intercrop and abandon them in the bush after the harvest of the main crop. The plantain crops in the bush now compete with weeds for nutrients and struggle with pests and diseases for survival which resulted to low productivity. For these farmers to become entrepreneurial in plantain production to meet

demand they need to be assessed on what they possessed to determine the existing discrepancy. Need assessment according to Olaitan and Ali (1997) is a data gathering and analysis process technique which provide information for curriculum modification and programme evaluation. Need assessment focused on concept that the significance needs of any educational system must be determined empirically through data gathering and analysis in order to identify the discrepancy between "what is" and "what it should be." Therefore, when "what it should be" to be effective is lacking, there is need for improvement.

Improvement is defined by Amusa (2009) as the act of bringing into a more desirable or condition; to become better. Robinson (2006) explained improvement as the development of circumstance in which something is lacking to better standard or quality than before. Galesburg (2007) stated that improved performance on the job by the employee needs to be consistent and continuous in their use of tools, equipment and machines. The author also advocated for adequate supervision of activities of workers by their superiors, which should be coupled with retraining programmes to update knowledge and skills in the use of facilities. Therefore, for farmers in the study area to improve, they need to acquire entrepreneurial competencies for success in plantain production. Procter (1995) defined need as a condition of lacking or wanting something necessary or very useful. In view of Omeh (2010) a need is something required to fill an existing essential gap. The author further explained need gap as what one requires in order to meet a target standard. This gap needs to be identified to enable adequate provision of relevant retraining programme for the farmers to make them become entrepreneurial proficient in any of the commercial plantain production enterprises.

Entrepreneurship in the view of Tasbulatova (2000) involves new ways of looking

at opportunities and identifying new approaches towards solving problems. It is understood as a combination of creativity and innovation. Uduma (2004) explained that being entrepreneurial involves the consideration of a number of opportunities to enhance employee performance and business profit. The author suggested that the entrepreneur is expected to apply strategic planning to assess if the opportunities provided for growth are worthwhile and how they could be successfully exploited. The author stressed that strategic planning is an essential part to the concept of entrepreneurial development of an individual, which implies dexterity of competencies in an occupation to achieve a goal.

Competency as explained by Alawa, Abanyam and Okeme (2010) is the successful performance of a task through the use of knowledge, skill, attitude and judgment. The authors emphasized that competency can also be referred to as the state of being functionally adequate in performance of one's duty. Competency in the opinion of Cooper and Graham (2001) involves training situation where trainees have to attain a small number of specific and job-related competencies. This ensures that participants build confidence as they succeed in mastering a particular competency. Competency as explained by Taba in Olaitan (2003) lays emphasis on knowledge, skills, attitudes and judgment which is generally required for successful performance of task rather than all the components comprising the tasks. The author stated that competency-based analysis involve the identification of relevant elements and using them to carry out some works. To be competent means that individual has acquired knowledge, skills and attitudes which are required for performing successfully at a specified proficiency level in any given work. Entrepreneurial competency in the context of this study refers to identified knowledge and skills in plantain production that are organized sequentially in the way

that a learner could master them and in addition with business knowledge and skill that would be used to pilot these competencies into economic success in plantain nursery, plantain plantation management, plantain processing and marketing enterprises. These competencies are also required to sustain the farmers in commercial plantain production for livelihood.

Commercial plantain production according to the report of International Institute of Tropical Agriculture IITA (2008) is the cultivation of large expanse of land with plantain plants of different species growing in it for commercial purpose. It requires huge investment of capital, labour and good managerial ability in order to ensure the sustainability of the resource inputs in the commercial plantain production. In another way, the report of FAO (2003) described commercial plantain production as that type of production in which products are primarily meant for market. This implies that production of plantain at commercial scale goes beyond production for food for consumption by immediate family members but rather production of plantain in large quantity for market to make profit by the farmers. Commercial plantain production could be informed of an enterprise.

The production of plantain in Abia and Imo States have been regarded by the people as a viable enterprise hence they are eager to become involved in it profitably. Anugwom (2007) stated that enterprises refer to business operations undertaken by a body which maybe one person, a family, a company or co-operative for a particular production or marketing activities. In the context of this study enterprise refers to business operations, undertaken by a farmer and his family in the cultivation of plantain for generating income for their livelihood.

In the study area, plantain production enterprises include plantain nursery,

plantain plantation management, plantain processing and marketing. These enterprises could provide jobs not only for farmers but also for secondary school graduates. Secondary school graduates in the view of Onuka (2003) are school leavers who have completed the senior school certificate programme some of who may continue their studies in the higher institutions or may decide to enter into occupational fields. In the context of this study, secondary school graduates are those individuals that have completed six years of secondary school but could not secure admission into any higher institution or secure employment in any farm related occupation due to lack of interest and skills in farming. These unemployed secondary school graduates are found mostly in cities and urban towns in the area of study such as Aba, Okigwe, Orlu, Owerri among others roaming about the streets or found at motor parks or other public places as tout seeking for daily livelihood through political thurgerry, kidnapping, prostitution among others. In many cases they constitute menace to the society. These unemployed secondary school graduates could have benefited in commercial plantain production if they were mobilized and trained with competencies in commercial plantain production.

Statement of the Problem

Plantain is one of the fruit crops that are of high importance to people of Abia and Imo states. It serves as food for human beings; while the peels serve as feed for animals. The benefit of plantain to man and animals has increased the demand for plantain in the area of study; based on this, government of Abia and Imo states have always encouraged secondary school teachers to teach students plantain production as major crop in order to improve its availability. Onuka (2008) reported that the curriculum of Agricultural science in secondary school was broad and made little provision for mastering of crop production skills. Therefore, teachers could only teach rudimentary knowledge of

plantain to students based on the congestion of the curriculum and interest of the teachers to teach students for passing external examination. Many students graduated from schools without acquiring competencies in plantain production or in any skill demanding occupation. The unemployed secondary school graduates migrate to urban cities where there are no jobs, causing nuisance such as kidnapping, militancy, stealing and all other vices; thereby making the study area insecure for life and property. These unemployed secondary school graduates in the cities therefore, could be mobilized and trained with competencies in plantain production for employment if the needed competencies are identified and packaged into programmes for training them for employment in different plantain enterprises.

Presently, in the area of study farmers who are involved in plantain production grow plantain as intercrop with either cocoyam or maize or cassava, when the major crop is harvested, plantain is abandoned in the farm without care. The crop continues to compete with weeds, insects and nutrients for survival and at the end develop plantain with low yield and poor quality. Imo Agricultural Development Programme (ADP) (2007) reported that government through the extension agents provided farmers with inputs like fertilizer, improved plantain seedlings and financial assistance. The farmers diverted these inputs to growing cassava, cocoyam and yam that have almost the same maturing periods with plantain; while still growing plantain as an intercrop. Therefore, the low yield and poor quality of plantain still persist. Onuka (2003) reported that government of Abia and Imo states respectively established skill acquisition centres for skilled jobs like hair dressing, carpentry among others for equipping people with skills for work. In these acquisition centres, there were no programmes on plantain production for empowering unemployed secondary school graduates or retraining farmers in

plantain production. It, therefore, becomes necessary that plantain production competencies be identified and packaged into entrepreneurial programmes for integration into skill acquisition centres for training unemployed secondary school graduates for employment and retraining farmers for proficiency on the job.

Purpose of the Study

The major purpose of the study was to identify and package entrepreneurial competencies in plantain production enterprises for training secondary school graduates for employment and retraining farmers in commercial plantain production in Abia and Imo states. Specifically, the study sought to identify:

- 1. Entrepreneurial competencies needed by secondary school graduates for employment in plantain nursery practice enterprise.*
- 2. Entrepreneurial competencies needed by secondary school graduates for employment in plantain plantation management enterprise*
- 3. Entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprise.*
- 4. Entrepreneurial competencies in plantain nursery where farmers needed improvement*
- 5. Entrepreneurial competencies in plantain plantation management where farmers needed improvement*
- 6. Entrepreneurial competencies in plantain processing and marketing where farmers needed improvement.*
- 7. Competencies in training needed by trainers for training secondary school graduates for success in employment and retraining farmers for proficiency in any plantain enterprise.*

8. *Package the competencies identified for each enterprise for training secondary school graduates and training farmers in commercial plantain production.*

Significance of the Study

The findings of the study were of benefit to Abia and Imo States government; administrators of skill acquisition centres; curriculum planners and farmers.

The study provided information to Abia and Imo States government on entrepreneurial competencies in plantain production needed by secondary school graduates for employment and farmers for improvement which have been packaged into competency training programme. The government could direct the skill acquisition centres to integrate the identified and packaged plantain production programmes into skill acquisition centres for training secondary school graduates for employment and retraining farmers for competency in any plantain production enterprises.

The study provided information to administrators of skill acquisition centres on competencies in plantain production enterprises needed by secondary school graduates for employment and farmers for improvement. The administrators could integrate the packaged programmes into the skill acquisition centres for training of secondary school graduates for employment and retraining of farmer for competency.

The findings of this study is useful to curriculum planners as they could use it as a guide in developing programmes for students in schools and colleges or universities of agriculture in plantain production enterprises especially those who are interested in future careers in plantain production enterprises.

The study provided information to the extension agents on competencies in plantain production enterprises. This information could be utilized by the extension agents for retraining the farmers at skill acquisition centres or through small plot adoption techniques to enable farmers acquire improvement in plantain production.

Research Questions

The following research questions guided the study:

- 1. What are the entrepreneurial competencies needed by secondary school graduates for employment in plantain nursery enterprise?*
- 2. What are the entrepreneurial competencies needed by secondary school graduates for employment in plantain plantation management enterprise.*
- 3. What are the entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprise?*
- 4. What are the entrepreneurial competency improvement needs of farmers in plantain nursery practice enterprise?*
- 5. What are the entrepreneurial competency improvement needs of farmers in plantain management enterprise?*
- 6. What are the entrepreneurial competency improvement needs of farmers in plantain processing and marketing enterprise?*
- 7. What are the competencies in training needed by trainers for training secondary school graduates for success in employment and retraining farmers for proficiency in any plantain enterprise?*

Hypotheses

Three null hypotheses were formulated for this study. They were tested at 0.05

level of significance:

1. *There is no significant difference in the Mean ratings of the responses of Agricultural science teachers, extension agents and farmers on the entrepreneurial competencies needed by secondary school graduates for employment in plantain nursery enterprise.*
2. *There is no significant difference in the Mean ratings of the responses of Agricultural science teachers, extension agents and farmers on the entrepreneurial competencies needed by secondary school graduates for employment in plantain plantation management enterprise.*
3. *There is no significant difference in the Mean ratings of the responses of Agricultural science teachers, extension agents and farmers on the entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprise.*

Scope of the Study

The study was restricted to identification and packaging of entrepreneurial competencies in plantain production enterprises for training secondary school graduates for employment and retraining farmers for proficiency on the job. Collection of data was restricted to the use of questionnaire for obtaining information from the agricultural science teachers, extension agents and farmers, on the three plantain production enterprises.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

The review of related literature was presented under the following sub-headings.

- **Conceptual Framework**
- **Commercial plantain production**
- **Approaches to Identification of Competencies**
 - *Job analysis*
 - *Task analysis*
 - *Modular analysis*
 - *Competency based analysis*
 - *Occupational area analysis*
 - *Functions of industry analysis*
 - *Need assessment*
 - *Need gap*
 - *Improvement*
- **Theoretical framework**
 - *Occupational Theory*
 - *Training Theory*
- *Literature on:*
 - *Planning plantain production enterprise,*
 - *Plantain nursery practice enterprise,*
 - *Plantain plantation management enterprise,*
 - *Plantain processing and marketing enterprise and,*
 - *Training for any plantain production enterprise*
- **Related empirical studies**
- **Summary of literature review.**

Conceptual Framework

Concept as defined by Eboh (2009) is the distinctive meaning of a term; that is, it can be inform of phrase or a single word. According to Khan (1999) concept is an idea

or a principle that is connected with something. Olaitan (2003) defined concept as a philosophical term that refers to general ideas. Concept in this study refers to general ideas used for expressing or given meaning to certain words or phrases that may present more than one idea to somebody. The idea that best expresses what the researcher is conveying to the readers is termed a concept in this study. Eboh (2009) defined conceptual framework as a schematic description and illustration of the causative mechanisms and relationship deducible from the research problems. In this study, conceptual framework refers to relationship that exists among the concepts that help to explain the ideas and principles in plantain production enterprises (See Fig. 2 page 36).

Literature was therefore reviewed on the following related concepts: Commercial plantain production Approaches for identification of competencies:

- i. Job analysis
- ii. Task analysis
- iii. Modular analysis
- iv. Competency-based analysis
- v. Occupational area analysis
- vi. Function of Industry Approach

Need Assessment

Need Gap

Improvement

Commercial Plantain Production

Commercial plantain production is large-scale production of plantain crops for sale, intended for widespread distribution to wholesalers or retail outlets (FAO, 2006) report. The report stated that it involves farming system which is performed on a large

scale, with the help of machines like tractors and so on. Robinson (1996) emphasized that production of plantain at commercial scale goes beyond production for consumption by immediate family members but rather production of plantain in large quantity for market to make profit by the farmers.

The report of FAO (1990) showed that commercial plantain production differs significantly from subsistence production, as the main objective of commercial plantain production is achieving higher profits through economics of scale, specialization, introduction of capital-intensive production techniques, labour-saving technologies, and maximization of plantain yields per hectare through synthetic and natural resources (fertilizers, hybrid seeds, irrigation and so on). In the report of IITA (2004), commercial plantain production is categorized into two, these include:

Intensive commercial plantain production: A system of plantain production in which relatively large amounts of capital or labour are applied to relatively smaller areas of land for plantain production.

Extensive commercial plantain production: It is a system of plantain production in which relatively large amounts of capital or labour investment are applied to relatively large areas of land for plantain production. At times, the land is left fallow to regain its fertility. It is mostly mechanized as labour is very expensive or may not be available at all.

Approaches to Identification of Competencies

Job Analysis

Job analysis in the view of Olaitan (2003) is a detail listing of duties, operations

and skills necessary to perform a clearly defined job, such operations and skills are organized into a logical sequence which may be used for teaching, employment or classification purposes. The author further stated that job analysis is a statement of facts concerning a job which reveals its content and modifying factors which surround it. Hernandez (2002) stated that job analysis is a process of identifying and determining in detail the particular job, duties and requirements and the relative importance of those duties for a given job. The author further stated that job analysis is a detailed description of the physical and other demands of a job or job goal based on direct observation of the job and it describes what the worker does in terms of activities, functions and the workers characteristics (skills, knowledge, abilities and adaptabilities) needed to accomplish the task involved.

According to Olaitan, Nwachukwu, Igbo, Onyemachi and Ekong (1999), the importance of job analysis are as follows:

- 1. Establishing a priority for selection and placement on the job*
- 2. Estimates criteria of job success*
- 3. Estimates traits which differentiate success on the job from the success on the others and furnishing of preliminary estimated in selecting persons for the job.*

In view of Guide (2001), job analysis data may be collected from the incumbents through interviews or questionnaire and the product of the analysis is a description or specification of the job and not of the person. The author therefore enumerates the purposes, methods of job analysis and aspect of a job that could be analyzed as follows:

- a. Purpose of job analysis: According to the author, is to establish and document the*

"job relatedness" of employment procedures such as in training, performance appraisal, selection and composition. These are further explained as for determination of the training needs.

- b. *Training need assessment: Job analysis, the author said is used in training "need assessment" to identify or develop training content, assessment test to measure effectiveness of training, equipment to be used in delivering the training and methods of training. The author added that job analysis can be used in compensable job factors, work environment (e.g. hazard and attentions, physical factors), responsibilities (e.g. fiscal supervisory) required, level of education (indirectly related to salary level).*
- c. *For selection procedures: Job analysis is used in selection procedures to identify the following: Job duties that could be included in advertisements of vacant positions; Appropriate salary level for the position to help determine what salary should be offered to a candidate; Minimum requirements (education and or experience) in screening applicants; Interview questions; Selection tests/instruments (e.g. written tests, oral tests, job simulations); Applicant appraisal/evaluation forms and Orientation materials or applicants/new hires.*
- d. *For performance review: The author stressed that job analysis is used in performance review to identify:*
 - i. *Goals, objectives and performance standard evaluation criteria*
 - ii. *Length of probationary periods and*
 - iii. *Duties to be evaluated.*

According to Onah (2003) steps in job analysis are as follows: Identify the use to which the information will be put since this will determine type of data you collect and how you collect them; Review relevant background information such as organizational chart, and shows how the job in question relates to overall organization; Selection representative positions to be analyzed; Analyzed the job by collecting data on job activities required, employee behaviour working condition, human traits and abilities needed to perform the job; Review the information with job incumbents; Develop a job description and job specification, job description is a written statement that describes the activities and responsibilities of the job. Job specification summarizes the personal qualities traits, skills and background required for getting the job done. Fines and Cronshaw (1999) listed the steps in job analysis as:

Interviews with incumbents and supervisors; Use of questionnaires (structural or open ended); Observation; Gathering background information such as duty statement or classification. In view of Hernandez (2002) steps in conducting job analysis are: Review formal job documentation; Understand the organization's strategy and culture; Find out who the top achievers are and understand why they are successful; Check that you have the people and resources to do the job; Confirm priorities with your boss and take action. Job analysis is related to this study as it guided the researcher in identifying skill elements of the competencies in commercial plantain production.

Task Analysis

A task is defined by Fabio (2004) as an activity that should be performed in order to reach a goal. Task as explained by Mager in Olaitan (2003) is a set of logically

related action required for the completion of a job. The author described task analysis as listing of all the steps involved in each task in terms of what the person does when performing the steps for accomplishing the job.

Task analysis as stated by Osuala (1999) is the procedure of breaking down job activities to determine the teachable content in terms of operations, tools, processes and technical information to be organized into a course of study and arranged in a sequence of difficulty. Task analysis in the view of Martijin (2008) is statement of all facts concerning a task which reveals its content and the modifying factors which surround it. It is an attempt to list the skills, knowledge and attitudes the learner must be taught if he is to learn a trade. Carmen and Marucci (2003) described task analysis as detailed listing of duties, operations and skills necessary to perform a task. The author maintained that such operations and skills are organized into logical sequence and may be used for training and employment. Task analysis in the opinion of Ogwo (1996) is used to select training curriculum if trainers want to produce workers with skills. In view of Onuka (2003) task analysis is important in

- 1) Designing instructional strategy to be adopted in training workers*
- 2) Selecting valid curriculum content for training programme and evaluating the performance of employee.*

Olaitan, et al (1999) outlined the importance of task analysis as follows:

- 1) Provides basis for collecting interrelated information about work in order to allocate priorities,*
- 2) Helps to make decisions about structuring a leadership environment*

- 3) *Makes content selection process in any work valid*
- 4) *Helps in specifying instructional objectives*
- 5) *Useful in the designing of instructional activities*
- 6) *Helps in the determination of teaching strategy and useful in evaluating performances.*

In the contribution of the authors task analysis is concerned with process of breaking work into smaller components and is derived from an occupational area; the occupational area is broken down into tasks which are subdivided into sub-tasks. Task analysis as further explained by the authors involves developing a list of tasks that are usually performed by practitioner in an occupation to accomplish a job. They further identified four major steps in task analysis as follow:

- i. *Task identification: in task identification skills to be taught are identified in clear terms,*
- ii. *Task clarification: the task clarification involves critical examination of skills identified as relevant to the task to be accomplished.*
- iii *Task detailing: this involves breaking of skills into minute parts for handling during training*
- iv *Task fixing or sequencing: Task sequencing is when tasks are arranged logically for easy management during training or learning.*

In the view of Hackos and Reddish (1998), task analysis examines what a user is required to do in terms of action and cognitive process to achieve in a task. The authors further explained that task analysis makes possible to design and allocate task

appropriately within the system; the functions to be included within the system and the user interface can then be specified. The authors further listed the following steps of breaking down tasks into sub-tasks:

- i. Identify the task to be analyzed;*
- ii. Break the task into 4 or 8 units;*
- iii. Draw the sub-task as layered diagram ensuring that it is complete;*
- iv. Continue the breaking process ensuring that the breaking and numbering are consistent;*
- v. Present the analysis to someone also who has not been involved in breaking but who know the task well enough to check its inconsistency.*

Steps involved in a task analysis as highlighted by Olaitan (2003) are as follows:

- i. Break the occupation into various tasks;*
- ii. Break the tasks into specific learning activities;*
- iii. Validate the activities through a review of job functions to be performed;*
- iv. Identify materials and methods for performing each activity;*
- v. Implement the activities*

In the submission of Watkins (2007) the following are steps in conducting task analysis:

- i. Understanding the activities to be represented;*
- ii. Task elicitation: Information on activities considered as central relevance to development should be focus and elicited through interview;*
- iii. Task representation (i.e. clarifying notes, making diagrams or tables);*
- iv. Show notes to user: this is to ensure that the representations are correct;*

- v. *It is advisable to go through the preliminary description with the users and input to the design;*
- vi. *The task analysis diagram can be used directly in discussions about the system being considered.*

The task analysis is suitable for this study because it enables a programme to be broken into tasks and other teachable skill activities adaptable for students and teachers. It guided the researcher in organising the identified competencies into relevant tasks in plantain production enterprises.

Modular Analysis

In view of Tasbulatova (2000), modular analysis is a training reform method that will sufficiently equip the trainee with skills for employment and that it is for immediate goal attainment and it involves short training period. The author further stated that it requires a detailed assessment procedure and certification compared to what is needed in a more traditional system of training in order to ensure quality control. Olaitan and Ali (1997) defined modular analysis as a unit of curriculum based on the development of entry level competencies of students. Anyanwu, Nzewi and Akudolu (2004) stated that modular analysis is an organized packet of information that includes elements such as objectives, assessment content, assignment or activities, the authors stated further that typical learning modules are assigned to enable students move through the content linearly.

According to Olaitan, et al (1999) the importance of modular analysis are as follows:

1. *Provision of immediate goal attained when a learner is aware of the skills to be learnt and under a condition he or she operates.*
2. *Incorporation of new knowledge, practices and improvement in occupation and provision of students with diverse ability level in occupation, hence at least every student will be able to develop a minimum entry in one occupation.*

Chermish and Scott (2002) outlined the importance of modular approach as:

1. *Achievement of immediate goal,*
2. *Promote the individualization of training.*
3. *Strengthen the ability of the learner to work independently and promoting active participation of teachers and learners within the training processes.*

Brophy (2000) identified steps necessary in a modular analysis as: i. Identify the major concepts to be explained in the course; ii. Establish learning objectives from taxonomy categories, iii. In this step the list of concepts are transformed into actions that students can perform to demonstrate their level of understanding expected by the instructor; iv. Prioritizing the Content; the goal of this step is to identify how critical this content is towards achieving the major learning outcome for the course; v. Designing challenges for instruction.

This should not be abstract to enable students noticed the connection between ideas. Marzano (1998) outlined 10 steps in a modular analysis as:

- i. *Definition of the target population for training;*
- ii. *Listing the task to be performed by the target population on the job;*
- iii. *Listing the skills and knowledge needed to do the task;*

- iv. *Selecting the skills as well as the knowledge to be taught;*
- v. *Organizing the selected skills and knowledge into suitable learning units and developing the training design including brief outline of module content and planned training methods;*
- vi. *Draft expanded outlines of modules including instructional objectives, main body of text and description of training methods;*
- vii. *Experts providing realistic examples and information used in the exercise;*
- viii. *Drafting the complete modules and course directory guideline;*
- ix. *Field testing the training materials;*
- x. *Revise and finalize training materials based on the field test.*

Modular analysis provides information to assist the researcher in the identification of planned series of learning activities, interpretation of data and packaging of such activities into training modules; based on this information, modular analysis is suitable for unit by unit arrangement of learning activities in plantain production enterprises for training of secondary school graduates and retraining of farmers with reference to new technologies. Therefore it helped to guide the researcher in arranging tasks in plantain production into modules.

Competency Based Analysis

Competency based analysis, in the opinion of Carmen and Fabio (2003) is a process of designing and delivering strategies which help a student to acquire knowledge, skills and attitudes needed for successful entry into an employment, it involves arranging skills, knowledge and attitude to be learnt in hierarchy of difficulty. In

view of Ogwo (2002) competency-based analysis is characterized by clearly stated, attainable and measurable objective expressed in form of knowledge and skills that learners have to master within a given time frame. Competency based analysis in the view of Marrelli, Tondora and Hoge (2005) is the process designed with the aim that each learner acquires knowledge, skills, attitude and values essential to be competent. The author explained further that competency-based analysis is a set of related behaviours that impact job performance, measured against established standards and can be improved through training and development. According to Anne, Janis and Michael (2005) competency based analysis is an organizing framework that lists knowledge, skills, attitude and judgment required for effective performance of a specific job, job family (i.e. group of related job), organization, functions or processes.

According to Hayton and Kelley (2006) the importance of competency based analysis are as follows:

- 1. Being superior to other approaches such as job analysis method, task analysis and behaviour analysis because task analysis is highly specific, behaviour analysis is moderately specific while competency approach is least specific and facilitate a broad application of the same model through out the organization.*
- 2. It generates success profiles of job, the breadth and flexibility built into competency based approaches are consistent with the need for strategic flexibility.*
- 3. It reduces interesting leap from individual difference to job performance.*

4. *It provides direct bases for identification behaviour to be observed (i.e. competent innovative activity) and*
5. *It is used to directly derive behavioural based performance appraisal mechanism, which is expected to be more valid, reliable and acceptable to raters and ratees.*

Importance of competency based analysis in the view of Olaitan, et al (1999) are as follows:

1. *Helping teachers to make decisions relative to what to teach, when to teach it, how to teach it and how much time to spend on it.*
2. *Helping teachers to organize knowledge and skill for each task into a hierarchy and it assures educators that what they are providing about vocational education is appropriate.*

In view of the authors competencies in module should be arranged in steps. These steps are:

- i. *Identify all task operation to be learnt;*
- ii. *Arrange tasks and jobs in appropriate course;*
- iii. *Determine what one would need to know and do in order to perform the identified task;*
- iv. *Organize knowledge and work-skills to be learnt in hierarchy;*
- v. *State what would be done in order to master each skill and knowledge*

Cooper and Graham (2001) enumerated steps in competency analysis as:

1. *Clearly and specifically define objectives: In defining objective four essential*

questions are to be answered and these are why is there a need to develop a competency approach; what is the unit of analysis; what is the relevant time frame and how will the competency approach be applied.

2. *Obtain the support of sponsor (i.e. one who will provide information, resources and authority required to ensure success.*
3. *Develop and implement a communication and education plan*
4. *Plan the methodology: This involves selecting the sample of individuals who will contribute data for the project, as well as the methods to be used to obtain data.*
5. *Identify the competencies and create the competency model: This involves three interrelated tasks - content of the job is defined, competency identification and assembling of the competency model which provide information used to identify the specific competencies required for effective performance.*
6. *Apply the competency model: The worth of competency model lies in its application. The value is maximized if it is applied in all aspects of human resources.*
7. *Evaluate and update the competency model: After development and application, it is important to evaluate both the competency model development process and the value of the resulting approach to the organization. In view of Anne, Janis and Michael (2005) steps in competency analysis are:*
 - i. *Identify the life of work domain;*
 - ii. *Review available resources;*
 - iii. *Identity competencies;*
 - iv. *Verify competencies;*

- v. *Identify competency standards;*
- vi. *Develop objectives and criterion referenced measure;*
- vii. *Develop instructional activities and materials; initiate programme.*

Coursey (2003) enumerated steps in competency based analysis as follows:

- i. *Compiling a detailed description of the tasks that makes the job;*
- ii. *Observe incumbent people performing the jobs;*
- iii. *Conducts the interview with people who are currently doing the job,*
- iv. *Facilitate meetings with job content experts and*
- v. *Facilitate meetings with people in the organization who are visionaries i.e. people who really know the jobs, the organization and most importantly the feature of the jobs and the organization.*

Competency-based analysis is suitable for identifying competencies in plantain production enterprise for training secondary school graduates and retraining of farmers for competencies in plantain production enterprises. Therefore this study identified with it and the competency based analysis helped the researcher in identifying relevant knowledge, skills and attitude in plantain production needed by secondary school graduates and farmers in plantain production enterprises.

Occupational Area Analysis

An occupation as stated by Baker (1996), is a social role performed by adult members of a society that directly and indirectly yield social and financial consequences and that constitute a major focus in the life of an adult. In the opinion of Taba in Olaitan et al (1999) occupational analysis is concerned with listing of all the job as well as

knowledge, skill and attitude, the learner must learn to enable him/her gain entry and function in an occupation. Thompson (1997) observed that there are different occupations in some occupational areas, some technical competencies of one occupation may be relevant to the technical competency of another.

The author stated that some occupations may require competent workers in planning, organizing, marketing such that the competent personnel who are the experts and along with other groups combine their efforts towards achieving stated objectives of the enterprises. For instance, plantain Nursery production enterprise may require competent personnel in planning evaluation, marketing and accounting from plantain processing enterprise. These professionals along with other staff of the enterprise work to realize the objectives of each enterprise. The implication of this overlap in technical competencies is that marketers in one occupational area can offer their services in another and vice versa (Ehiamentolor, 1999). This has serious implications in training and retraining of secondary school graduates and plantain farmers respectively. For better understanding of occupational area approach, see Figure. 1

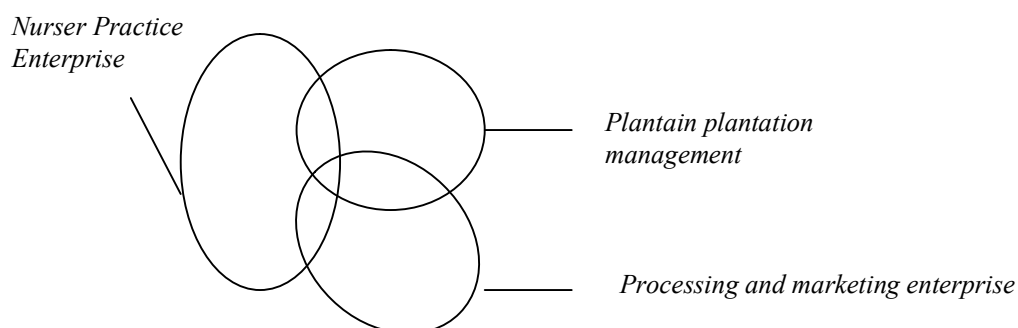


Figure 1: Occupational Clusters in Plantain Production

Source: Olaitan and Ali (1997)

In the contribution of Baker (1996) the identified competencies were common and to some extent necessary for initial employment in a number of related jobs and or occupations. The author added that the analysis maybe of good use in curriculum of skill occupation that involves levels of technical knowledge for efficient performance of the skills, abilities, attitudes and understanding of the profession.

According to Thompson (1997) the importance of occupational area analysis are as follows:

- 1. Providing an overview of a sector and the common job roles and key occupational areas found at all levels within it.*
- 2. Identify any overlaps or gaps in the coverage of existing occupation and identify where amendment might be necessary and helping to define occupational areas for which qualification might be necessary.*

Dumbiri (2011) stated that professionals such as planners, marketers, accountants etc in the different occupation but with overlapping competencies may be trained on the same enterprise skill model on planning, marketing, accounting with slight variation to suite their occupational area. In the report of Human Resource Partnerships Directorate (HRPD) (2000) the following steps are applicable to occupational area analysis

- 1. In planning process, the following are involved:*
 - Identify human resource needs*
 - Determine the purpose for development*
 - Identify the industry or committee members in the process,*
 - Define the scope of the occupation or skill set »J» Investigate appropriate methods*

of development

- *Select industry participants for the occupational analysis participants must be current and experience in their occupation*
 - *Represent the full range of activities and specialist being considered*
 - *Be individuals with knowledge and skill in advance technologies and*
 - *represent small medium and large enterprise*
2. *In conducting the occupational analysis, the following format are involved:*
- *Organize information in an approved structure and format*
 - *Arrange for professionals to proofread and edit the information or document*
 - *Establish approved training programme*
3. *In delivery the training programme, this is delivered through:*
- *Training of industrial trainers*
 - *Educational institution*
 - *Distance learning*
 - *Distance learning and self study*
4. *Assessment and certification of individuals: this is carried out by:*
- *Determining the potential for revenue generation from certification*
 - *Awarding certificate and*
 - *Maintaining registry of certified practitioners*

The following steps are applicable to occupational analysis according to the report of the joint International labour organization (ILO) and World Health Organization (WHO) (2003):

1. *Plan and develop occupational programme that will be in line with the policy of the occupation.*
2. *Make consultant from professionals or experts that will advice where necessary.*
3. *Set up a training strategy such as:*
 - *Induction training*
 - *Supervisor and management training*
 - *On the job training and workforce procedures*
 - *Skill training*
4. *Conducting the training using experts of various areas of the occupation*
5. *Evaluating your training program to monitor its effectiveness by promoting, maintaining and improving strategies for efficiency.*

Occupational area analysis is relevant for this study in order to reduce cost and wastage of time especially when the situation involves planning and marketing across enterprises. It helped the researcher to identify areas of overlap in the enterprises where participants in many enterprises could be train together in order to save time and resources; such areas include planning and marketing within each enterprise that is planning in plantain nursery, plantation and processing could be trained together, the same thing in marketing.

Functions of Industry Approach

Function of industry approach is defined by Finch and Crunkiton (1984) as the operations that must be performed somewhere in the total business or industry in order

for it to be successful. Olaitan (2003) stated that function of industry focuses on identification of job activities of an industry or occupation, organizes this task logically according to the demand of the industry or occupation. The author further said that these tasks or activities form the curriculum content of a training programme for preparing personnel that can work in similar industry or occupations, provided that adequate and relevant facilities to that of the industry or occupation are involved in training.

According to the author, functions of industry approach can be used to develop a programme where none has existed before such as zero programme. It can also be used to refocus or change the direction of objective of a programme to occupational needs, for example a programme may be developed in crop production, but any time the programme is not needed again, can be changed to another e.g. animal production. Finch and Crunkiton (1984) enumerated the steps in functions of industry analysis as:

- i. Define the purpose of the industry and identify the essential functions to be performed in line with the purpose;*
- ii. Develop a list of activities for each function;*
- iii. Develop the list of various competencies needed by persons performing;*
- iv. Group the activities and competencies into compatible areas for the purpose of developing the proper educational mix required to prepare personnel for the industry;*
- v. A jury of experts should examine the curriculum content and verify its appropriateness.*

This study sought information from research centres, farmers and processors of

plantain to identify step by step practices in plantain production enterprises (nursery, plantation management, processing and marketing. The study helped the researcher to identify competencies in each enterprise as it is practiced in the occupation and also guided the researcher in packaging the identified competencies into programme.

Need Assessment

Need assessment according to Anyakoha (1988) is a type of evaluation research used in determining the various areas of need or discrepancies in education. The author further stated that need assessment is based on the notion that the relevance of education must be empirically determined and should identify the discrepancy between "what is" and "what it should be." Olaitan and Ali (1997) described need assessment as data gathering and analysis process technique for providing information for curriculum modification and programme evaluation. The authors stressed the need assessment is conducted for variety of reasons in educational setting and for the purpose of identifying different types of needs served by a particular educational system. The authors stated specifically that need assessment is used to:

- i. identify the needs of students in a given subject area.*
- ii. determine the weakness in students academic achievement.*
- iii. determine the needs of teachers for additional training.*
- iv. determine the future needs of the school educational system.*
- v. identify the educational areas where desired outcomes have not been attained.*
- vi. identify the strengths and weaknesses of a programme.*

Need assessment guided the researcher in determining the discrepancies in the

farmers' competency for their retraining i.e, the gap between the competencies they possessed and what they need to possess.

Need Gap

Need gap in the view of Chuta (1992) is what one requires in order to meet a target standard; that gap to be filled constitutes a need. Omeh (2010) stated that need gap is a discrepancy between a current state of affairs and a desired future state. Okeme, Ifeanyieze and Eze (2009) explained that need gap is the difference between the real performance of teachers and their expected performance. In order to determine the retraining need of the farmers, the need gap must be known through assessment, therefore the technique of obtaining the need gap as explained by the authors above serve as a guide to the researcher to obtain the need gap of farmers in plantain production enterprises. This identified need gaps in competencies where they exist constitutes improvement needs.

Improvement.

Improvement as explained by Pearson (2006) is a change for better or progress in development. The author added that improvement is concerned with promotion in desired qualities or progress towards what is better. Robinson (2006) stated that improvement is the circumstances in which there is development in something that is lacking to better quality than before. It guided the researcher to identify training/retraining competencies that will make the farmers become proficient or perform better on the job after retraining. The conceptual frame work of the study is summarized by the schema below.

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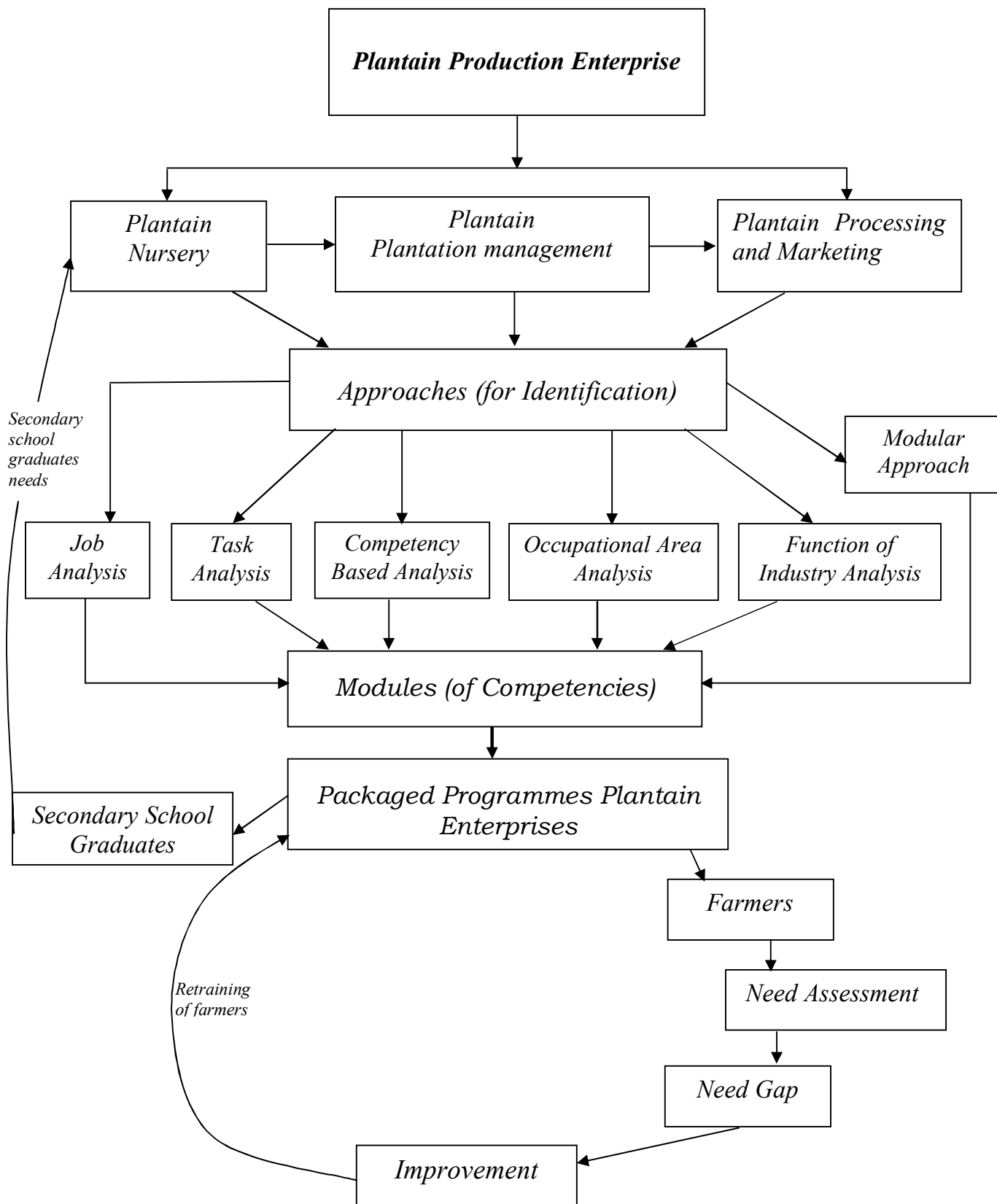


Figure 2: Conceptual Framework for the Study
Source: The Researcher

Figure 2 explains conceptual framework of the study. Commercial plantain production have three (3) major enterprises (plantain nursery, plantation management, processing and marketing) each is made up modules with task and competencies identified through a combination of job analysis, task analysis, competency based analysis, occupational area analysis and function of industry analysis. These modules are packaged into programmes for each enterprise and utilizable for training secondary school graduates for occupation in relevant enterprises. The packaged programmes can also be utilized for retraining farmers after need assessment have been carried out on the farmers to determine their need gap for retraining which will bring about improvement.

Theoretical Framework of the Study

A theory as stated by Beauchamp in Olaitan (2003) is a set of related statements that are arranged systematically so as to give functional meaning to a set of series of events. The author maintained that statement may take the form of descriptive or functional definition, occupational construct, assumption, postulations or hypothesis and generalization, laws or theorems. Nwachukwu (1988) stated that a theory is a systematic group of interrelated principles and concepts which provides a framework for significant knowledge. Williams and Jensen (1997) also defined theory as an idea that is intended to explain certain things or happenings. The authors further explained that theories are concepts upon which phenomenon are explained. In the context of this study, a theory is a set of principles that guide this work.

The theoretical framework of the study is based on:

- 1. Occupational theory.*
- 2. Training theory*

Occupational theory

An occupation as stated by Baker (1996) is a social role performed by adult members of a society that directly and indirectly yielded social and financial consequences and that constitute a major focus in the life of an adult. Occupation as stated by Mark-Wardt (2001) is what a person devotes one's self to do especially one's regular work, employment, trade, job, pursuit or means of getting a living. Occupation in the view of Barnhart (1995) is the work a person does regularly to earn his living. The author stated further that occupation is a principal activity in one's life which one does to earn money and activity that serves as one's regular sources of living. Olaitan and Ali (1997) defined occupation as a number of related jobs that an individual does to earn a living. Olaitan (1996) stated that occupation is based on the following:

1. *Occupation theory of value*
2. *Occupational skill element theory*
3. *Occupation theory of body of knowledge.*

Occupation theory of value:

Value in the view of Robinson (1999) is the quality of being useful or desirable, the degree of usefulness or desirability of a thing. Olaitan, et al, in Dumbiri (2011) stated that occupation must have value that attracts individual into it, which may be economic, social or prestige. Okorie (2000) stated that the value of occupational education depends on the ability of the individual to use the training in gainful employment in any occupation and that if he cannot get such in any occupation; the training is of no value to his economic or social life. In this study, the occupational theory of value has relevance as plantain production enterprise is occupation that has economic value to the people of Abia and Imo States. Therefore, the major beneficiary of

this study such as secondary school graduates and farmers could earn sufficient money from it for their living. The theory guided the researcher in identifying and packaging relevant competencies in plantain enterprises for training secondary school graduates and retraining farmers for proficiency on the job.

Occupational skill element theory:

According to Olaitan in Akwaji (2006) occupation must have skills in which an individual must be trained to ensure long employment for living. The author stated that skills in occupation must be amendable to logical arrangement during the training process for the purpose of practice and mastery. In the view of Ogwo and Oranu (2006) an occupation must have job clusters with specific skill elements within the occupation to prevent unemployment. Okoro (1999) stated that for every occupation, there is a minimum of productive skill which an individual must possess in order to secure or retain employment in the occupation; otherwise it will neither be personally or socially effective.

The theory guided the researcher in identifying the skill aspect of the competencies in plantain enterprise for training secondary school graduates for occupation and retraining the farmers for proficiency on the job.

Occupation theory of body of knowledge:

Body of knowledge in the view of Smith (2000) is a particular test to be analyzed, broken down to into competency elements and list of competencies drawn up. The author stated further that learning is planned and guided, therefore, what is to be learnt must be specified in advance and it should be implemented and evaluated. Eneogwe (1996) stated that body of knowledge is the content or subject matter to be studied, "what" of the study or of any achievement. In the view of Olaitan (1996) occupational theory of knowledge

will be relevant on condition that the knowledge to be learnt in occupation is arranged logically during training for the purpose of mastery. The author stated further that occupation must have a level of proficiency in training without which a professional certificate or recognition cannot be guaranteed; that is, occupation must have contents that are logically arranged for training of secondary school graduates and retraining farmers that should be certified for proficiency.

Okorie (2000) observed that for every occupational field, there are specific skills, body of knowledge and attitudes required to progress in the field; and in planning occupational instructions for a group of students, the teacher must base his instructional materials on:

The capabilities and competencies that are needed by all workers in the enterprises; Attitudes common to an occupational field; Level of skills which are specific to the job a student is learning to perform at his training station; Ability to construct, assemble or combining unit elements of the job. In this study, body of knowledge consist of identified competency elements, logically arranged into modules and packaged into programmes in plantain enterprise such as nursery, plantain, processing and marketing.

Training Theory

Training as stated by Aliyu (2001) is the organizational efforts aimed at helping an employee to acquire basic skills required for the efficient execution of the function for which he was hired. McNamara (2007) stated that training involves an expert working with learners to transfer to them certain areas of skill to enable them improve in their current job.

Some theories have been formulated, and used in the development of work skills needed for preparing tasks in different jobs. These theories are stated in the form of

principles, descriptive or functional definitions necessary to offer useful instructional guides to trainees in related enterprises (Uko, 2010). Training theories relevant to this study are those of Okoro (1999) which stated that:

1. *Training will be efficient on the job if the environment where the learner is trained is a replica of the environment where he is going to work. The prevailing conditions or environment where the learner is trained must be similar to those conditions where he is going to work, that is, where he is going to make use of the training he has received for earning a living. For example, if an agricultural science student will work in farm after graduation he must be trained in an environment with farm conditions such as the school farm instead of the classroom or football field also if a learner is to be a football player he must be trained in a playing ground rather than in a classroom.*

Environment, according to Okorie (2000) includes the place, facilities and personnel involved in the operation of an occupation. It will not be suitable to train a farmer without farming conditions such as tools, planting materials and land as conditions for training or train a football player without a ball, football butts and field. In the context of this study, the secondary school graduates will not be efficient as plantain production entrepreneur in the absence of such conditions as land for training him for competencies in plantain production and demonstrate his acquired competencies on the job in the field, materials as tools to be used, markets where to sell to make money. This theory guided the researcher to identify suitable materials and environment for training for success in plantain enterprise.

2. *Training will be efficient if operations during training are carried out in the same*

way with the same tools and machines as it should be on the job in the field. In the view of Olaitan, et, al (1999) training can only be achieved where training jobs are carried on in the same way with the same tools, operations and machines as in occupation itself. The authors further stated that the acquisition of knowledge in equipment habits, doing habits or work methods of operation and process habits in a particular job or occupation by the workers will promote efficiency and minimize wastage of scarce resources and exposure to occupational hazards. Manu , Nelson and Thiongo (1996) emphasized on entrepreneur acquisition of knowledge and skills in the use of machines, equipment, tools and technicalities available to address issues in productivity and environmental management. In the context of this study therefore, the tools, equipments, planting materials, processing equipment that should be involved in the training of the secondary school graduates and retraining the farmers for success in plantain production enterprise should be similar to those tools, equipments, machines and other materials they will use on employment after training/retraining as conditions for effectiveness. This study guided the researcher to identify those materials e.g tools, equipment among others that are necessary for producing plantain in the field which also can be used in the training.

3. *Training will be effective in proportion as the instructor has had successful experience in the application of skills and knowledge to the operation and processes he undertakes to teach. In the opinion of Okwuenu (1996) an instructor must be master of the subject matter, method and psychology of learning for him to play his role effectively, that is he must have the knowledge of what he is to teach, select appropriate methods and should have knowledge of the behavior of*

the learners. Olaitan, et, al (1999) stated that training will be effective if the only reliable source of content for specific training in an occupation is the experience of masters in the occupation; that training must be administered by the masters in the occupation if the learners must learn and acquire the relevant competencies that will enable him practice on the job.

In training secondary school graduates for employment and retraining farmers for proficiency on the job, the instructor must be competent in the relevant competencies in plantain enterprises and methods of imparting these competencies. Training theory guided the researcher in identifying those relevant training competencies to be adopted by instructors in training secondary school graduates and retraining farmers in plantain production enterprises.

Literature on Planning for Plantain Production

In any enterprise, planning is an important aspect of management. Nothing succeeds well in an enterprise without adequate planning. Anyanwu, Nzewi and Akudolu (2004) defined planning as a decision making process about what, how and how much to be produced in any enterprise. Planning in the opinion of Igbinosa (2002) is the selection of enterprise objective and department goals and finding ways of achieving them. The author further stated that planning depend on what to do, how to do it and who should do it. Olaitan and Mama (2001) stated that planning as a deliberate attempt by the farmers to arrange and document farm activities in order, before implementing them. They expressed that planning activities consider certain things such as farm land and its topography, the crop to grow or livestock to rear, resources or facilities to be made available for successful farm operations, market demands for the crop and livestock to be produced. The authors outlined the importance of planning as: it guides the farmer on

the effective way of utilizing available meager resources for its activities such as land, money and labour; it guides the farmer on the type and size of crops to grow or livestock to keep; it enables the farmer to direct his farm resources towards meeting demands for agricultural product; it enables the farmer make adjustments in his farming efforts based on available information on school and market demands for his products; farm planning enables the farmer adjust his efforts to suit available technology to meet school and market demands; it allows the farmer to maintain a sort of agricultural pattern suitable for the school farm operation; it enables the farmer to cope with the problem of risk and uncertainties in agricultural production as they affect the farm.

Olaitan and Mama (2001) stated the steps in planning as: i.

Formulation of specific objectives for the farm

- ii. Revising the objectives of the farm periodically based on the demand and supply of the products*
- iii. Drawing up programme plan for the farm*
- iv. Deciding on the farming and cropping system to adopt on the farm*
- v. Budgeting for the farm; Planning for procurement of farm inputs*
- vi. Selection of soil conservation practices for application in the school farm*
- vii. Selection of appropriate equipment for specific farm operations.*

In the view of Anyanwu, et al (2004) the steps in developing good plan for farm include:

- i. Formulating specific objectives for farm activities,*
- ii. Draw up programme or plan for the farm activities,*
- iii. Revising objectives of the farm,*

- iv. *Identifying sources of credit for farming,*
- v. *Budget for the farm operations,*
- vi. *Establish new challenging standard of performance for farming activities.*
- vii. *Identify records to keep for farm activities,*
- viii. *Develop financial statement as needed to determine feasibility of various time period.*
- ix. *State the farm activities,*
- x. *Establish specific control procedures for anticipating or detecting differences between plans and realities,*
- xi. *Identify man power and market outlets.*

In the opinion of Olaitan (2008) some of the competencies involved in planning of competitive model for financing community development project are: formulation of objectives for the community project; selection of project site; determination of the resources required by the project; assessment of the available resources within the community for the project; development of the interest of the community members to participate in the project; budget for time for the project activities benchmarks; budget for the resources for the project activities; identify specific locations for project resources within and outside the community.

Bernard and Nix (1997) outlined the steps required for effective farming as: planning of farm sufficient size to support the objectives of the farm; fit the capabilities, interest and knowledge of the farmer to the type of farm operations; identifying sources of credit for farm operations; plan the farm for as long as possible; design of farm

building for present and future needs; base the cropping system on the type of soil; plan all farm operations to make most efficient use of the available money; schedule storing and timing of getting the farm produce to market during the highest price period; plan to study the farm; leave relevant and adequate space in future changes (for future expansion); Identifying relevant record to keep for farm operations among others.

In the view of Geoffrey, Robert and Philip (1996) steps needed in business planning are: decide to go into business; analyse your strengths and weaknesses; select a product or service; conduct market research; assess your potential share of the market; select a location for your business; prepare a financial plan; prepare a production plan and prepare a management plan.

In view of Ellah (2004) steps in planning for school farm include: state realizable objectives in terms of internal environmental constraints and future trends; revises the objective periodically; make budgets for the farm activities; identifying different levels of manpower needed for the school farm; determining which resources are needed; planning all farm operations to make most efficient use of available money

Competencies in planning for business according to Obhakhahs (2005) include: making the commitment to go into business; analyzing your strengths and weaknesses, paying special attention to your business experience, business education and desires; choosing the product or service that best fits your strengths and desires; research the market for your product or service; forecast sales revenue; choose a site for your business; develop a production plan; develop a marketing plan; develop an organizational plan; develop a legal plan, focusing on whether to form a sole proprietorship, a partnership, or a corporation; develop an accounting plan, ex-planning

the kinds of records and reports you need and how you will use them; develop an insurance plan; develop a computer plan, spelling out the ways the computer services can help plan and control a business; develop a total quality management program and develop a financial plan.

In the contribution of Igbinonsas (2002), steps in planning in an organization are arranged in sequence of operation as follows: identification of the problems; formulation of the general goal and the definition of more specific and measurable objective relating to problem; identification of possible constraints or difficulty; projection of the future situation; formulation of the alternative approaches to reach the desired end result; evaluation of the different solutions; interpretation of the findings and production of a plan. The opinions and submission of the above authors helped the researcher to identify competencies needed for planning in an enterprise for plantain production in Abia and Imo states.

Literature on Plantain Nursery Enterprise

Nursery is divided into pre-nursery and main nursery.

Pre-Nursery

Pre-nursery as described by FAO report (2003) is a nursery system which involves the raising of the sprouted seedlings first in the bed, boxes, and trays before transplanting the young seedlings into large polythene bags in the main nursery. The report stated that the pre-nursery is more advantageous than the single stage in that:

- i It is cheaper*
- ii It allows better selection of vigorous and healthy seedlings*
- iii seedlings may remain in the pre nursery for up to 3 weeks while the main nursery is prepared.*

Pre-nursery as stated by the report is correctly the practice in NIHORT and the processes are: choose a convenient pre-nursery site free from pests and diseases; cover with shade materials to ward off excess heat; provide pre-nursery beds or boxes or trays, with poly bags; fill the boxes, trays, poly bags with topsoil high in organic matter content in the ratio of 8 head pans of top soil to 1 poultry manure (8:1); mixed carefully together before filling in the boxes, trays and poly bag; water the soil in the boxes, trays and poly bags; arrange the poly bags in rows to form beds; acquire the corms to nurse; slice the corms into sizes of not more than 2-3cm; arrange the sliced corms one per poly-bag in rows in the boxes or trays; apply water at alternate days especially during dry season and transfer sprouting corms into the nursery.

In view of IITA (2008) report, corm should be first planted in pre-nursery where they remain for 14-21 days before planting in the nursery. The author stated that corms from pre flowering and harvested plants are used through corm multiplication techniques. The author listed the four corm multiplication techniques and the steps involves in each thus:

i. *Whole corm technique*

Choose a convenient pre-nursery site free from pests and diseases; cover with shade materials to ward off excess heat; provide pre-nursery beds or boxes or trays with poly bags; fill the boxes or trays or poly-bags with top soil high in organic matter content in the ratio of 8 head pans of top soil to 1 poultry manure (8:1); mixed carefully together before filling in the boxes or trays or poly-bags; water the soil in the boxes, trays and poly-bags; arrange the poly-bags in rows to form beds; mulch with dry grasses; dig out whole corms to nurse and wash with water; lose any cover on the bud surface; arrange in poly-bags or in trays or boxes and cover with soil or saw dust; apply water at alternate days; observe the buds for sprouting after 14-21 days; remove any

weeds on the beds or trays or polythene bags and transfer sprouted beds into nursery.

ii Split-Corm Technique

Dig out corms and wash immediately under running tap or any other water source to remove soil and plant debris; the outer leaf sheaths are stripped back with kitchen knife to expose the buds at the base of the corm; split corm into two equal halves with a matchet; the buds are scarified and covered with top soil or saw dust in pre-nursery beds; water the buds immediately after planting; scarified buds sprout 14-21 days after planting; weed manually to keep the pre-nursery weed free; sprouting buds excised from the corm are transferred to nursery.

iii Excised Buds: Procedure

Dig out corms and wash immediately under running tap or any other water sources to remove soil and plant debris; the outer leaf sheaths are stripped back with kitchen knife to expose the dormant buds at the based of the corm; buds are excised with knife, scarified and planted in the pre-nursery beds containing top soil covered with saw dust; water the buds immediately after planting; exercised scarified buds sprout from 1-7 days after planting; weeding is carried out manually; fence the pre-nursery with shrubs to prevent goats and other animals from eating the leaves and destroying the plantlets; praying with insecticides to protect the seedlings from damage by pests; sprouting buds are transferred to ground beds in a nursery or to polybags and grown to planting size before transplanting to the main nursery.

iv. Sliced corn Techniques

Choose a flat site, free from pests and diseases for pre-nursery; make a shade with materials toward off excess heat; prepare pre-nursery beds or boxes or trays with

polythene bags; mix carefully top soil and poultry manure (8:1) that is 8 head pans of top soil to 1 head pan of poultry manure; fill the boxes, trays, poly bags with mixed top soil and poultry manure; water the soil in the boxes, trays and polybags; arrange the poly bags in rows to form beds; acquire the corms to nurse; slice the corms into sizes of not more than 2 - 3cm; arrange the sliced corms in rows in the boxes or trays and one per polybags; apply water at alternate days especially during dry season and transfer sprouting corms into the nursery.

Plantains are mainly propagated through the use of corm as stated by Adelaja (2005) due to its morphological characteristics. The author outlined four methods of sucker multiplication techniques in the pre-nursery as follows

half corm method

- i. whole corm method*
- ii excised bud or*
- iii split corm method*
- iv. Split bud method*

The methods are described below:

Whole corm: procedure

This involves uprooting corm of a freshly harvested plantain stand or pre flowering stand; remove roots on the corm and ensures that corm is free from nematode and borer weevil infestation. Note that corm of harvested plantain if to be used for sucker multiplication must be up rooted for use within 48 hours in order to avoid deterioration and decay; wash and treat the corm with appropriate fungicides e.g 190 solution of Benomy/Benlate; (ie 1 gm/litre of water); plant the whole corm in a rich mixture of saw

dust and top soil (1:1) at a spacing of 15cm or 20cmX15 cm; or 20cm; water the pre-nursery; about fourteen days after planting, sprouts will begin to appear on the corms and remove immediately and plant in the secondary nursery of trays or polythene bags.

Half corm technique: procedure

Uprooting a healthy corm that has not been damaged by nematode or borer weevil; clean and cut the corm into two equal halves and treat the half corms with appropriate fungicides (Benomy/Benlate). For local farmers, ash slurry could be used. The slurry has both insecticidal and fungicidal properties; air dry the corms under shade for 24 hours; plant the half corms in a rich mixture of saw dust and top soil (1:1) at a spacing 15cm or 20cm by 15cm or 20 cm; plantlets are removed/ excised as they sprout from the corm and plant out in the nursery beds or poly corm.

Excise buds or split corm procedure:

This technique involves sourcing for a corm of a pre-flowering, or fruited plantain plant that is not damaged by nematode or weevil; the corm is thoroughly cleaned to remove roots; areas of lesions and infections; remove the bud using kitchen knife; the excised/split bits should be of size ranging from 90gm- 130gm. Note sizes less than 80gm is not desirable as they are prone to early decay soon after planting; treat the cut bits/excised buds in a solution of 1% Benlate and air dry under shade for 24 hours; the treated bit/buds are planted in a medium of 1:1 mixture of rich top soil and saw dust at a spacing of 15cm x 15 cm or 20 cmx20 cm either in nursery beds or trays (wooden or plastic); shading the young seedling; mulching with grasses; applying fertilizer soon after sprouting; watering which is done twice a day in absence of rain; weeding by hand and transferring the seedling into the main nursery when the seedling attains 2-3 leaves.

Split buds Technique

This involves cutting the corm into 4-8 portions called buds depending on the corn size, with or without visible eyes/buds; treat the buds with appropriate fungicide for 24 hours; plant the buds in a rich pre-nursery medium at a spacing of 20 cm x 20 cm with partial shading; examine after two weeks for sprouts; these are carefully removed and each sprout split into four parts; carefully separate multiple shoots and plants out in the main nursery.

Rapid multiplication of plantain, pre-nursery techniques according to IITA (2005) involves various methods of sucker multiplication, the choice of which to use will however be on the operators. The report described the technique of plants issued from stem Bits (PIF) as it involves conditioning of an ex-plant obtained from a sucker (stem bit), then stressing of the stem apical meristem, activation and growing in an appropriate medium in a particular conditions of temperature and humidity.

Pre-nursery according to Eze (2006) takes the following stages: corms are uprooted and taken to the experimental site; the corms are washed and air dried; expose the nodes (eyes) with sharp kitchen knife to facilitate sprouting; carefully prune the corm to remove all roots, pseudostem and any spot which may serve as a host to any pathogen; allow the corms to 'cure' for two days (48 hours); make a deep cut using a sharp kitchen knife at the apex of the corm to destroy the growing point (apical dominance); keep for 1 hour; weigh each of the corms; plant the corms in the saw dust; water the pre-nursery; milking out or de-suckering the sprouted ones and plant the plantlets in nursery beds, poly bags or boxes.

Imo State Agricultural Development Programme (IMOADP) (2007) the report on

stages in plantain tissue culture production include: shoot meristem tips are inoculated onto culture on agar solidified medium; proliferation of large numbers of shoot buds are generated by controlling media composition and culture condition; transfer of plants to a root inducing medium; the final stage is transfer of rooted plants onto hardening medium to enable them to stand the adverse condition of the weather outside. Note:-the culture is grown in temperature and light controlled facilities.

Stage I: Culture Initiation

Plantain suckers are dug out; reduce the suckers with a knife 2-3cm size; Treat in ethanol and in a mixture of bleach and tween; Rinse thoroughly with sterilized water; Reduce to 2-3 mm, size with a scapel to bring out the meristem which is the actively dividing portion of the plant; The meristem is inserted onto the medium made up of growth nutrient salts, vitamins, sucrose as the typical carbon energy source and hormones which are growth regulators; The culture is transferred to the culture room where the temperature, light and dark periods are regulated; The temperature is maintained between 80 and 82°F; The light duration for 16 hours and the dark duration for eight hours

Stage II: Sub-Culturing of Multiple Buds

The buds which clustered together are separated and inserted onto fresh medium and allowed to stay for a period 5-8 weeks for further multiplication

Stage III: Regeneration of Multiple Buds

As long as the buds stay in the multiplication method, they will continue to multiply as buds only. They need to form plants by producing roots and shoots. Another growth media which induces root and shoot formation are prepared. The

buds are inserted onto them and they induce formation of roots and shoots called plantlets in 7-8 weeks.

Stage IV: Hardening of Plantlets

The plantlets having growing in the culture room under controlled atmospheric conditions need to be hardened to enable them stand the adverse weather condition outside.

Green house is a house carefully prepared for plantlets or seedlings just transferred from tissue culture laboratory. Eze (2006) stated that green house is provides with

- 1. Green covering of polythene bags or other related materials eg palm fronts, dry grasses that will allow the required sun light to penetrate.*
- 2. Provision of water through land pipes, foot dip watering can, buckets, kitchen knives. Extra poly bags etc*
- 3. Fence the surrounding with dwarf walls or wire netting to prevent invading animals.*

Main Nursery

Main Nursery is a place where seedlings transferred from pre-nursery are raised and cared for before they are transplanted to the permanent site. Main Nursery as stated by IITA report (2003) is where young seedlings receive the necessary attention and care to enable them establish before they are transferred into the field for easy adaptation to harsh field conditions. Barren (2007) highlighted conditions to be considered in selection of a site for the main nursery practice as: the site should be as level as possible and well drained; the site should be as close as possible to adequate and perennial source of

water; the site should be easily accessible; the site should be protected from natural hazards such as erosion, wind or animal damage and the site should be close to the growers (farmers).

Conditions to be considered in site selection for main nursery practice as stated in FAO, report (2005) are as follows: selection of well drained site, flat to allow uniform arrangement of polythene bags and it must be close to the source of water supply. FAO (2003) also listed conditions to be considered in planting seedling in main nursery as

- 1. The land must be flat*
- 2. There must be a sure source of water near the site*

Nursery in the view of Skinner (2005) should be sited on flat or gently slopping ground, well drained, insusceptible to flooding, close to permanent source of water. Eze (2006) stated that nursery starts at the onset of rainy season, in the month of March. The steps in nursery practice according to the author are as follows: Selection of flat and well drained site; Clear all vegetation; Pack all the thrashes; burn them or heap them in the farm or out of the site; Construct shade with palm frond into the ground for farm support; lay oil palm frond across bars to produce shade; Construct a fence by placing 1.20 mesh poultry wire round the base and the shade provided. This is to keep off rodents and clear pest from damage to seedlings; Arrange for the supply of top soil and the polythene bag; soil and manure are collected and mixed together at the rate of 8 head pans of top soil to 1 head pan of poultry manure; Transfer the mixture into the nursery poly bags; Apply water to the soil; Collect sucker from viable strong and healthy plant; Open the middle of soil in the polythene bags with hand fork;sPlant plantlets in them; Cover the plantlets with soil and press very hard water judiciously in the morning or evening daily; Spray

with Benomyl or ash slurry with pseudostem base and around the plants; Hand picking of the weeds in the polythene bag and the nursery area manually; Start hardening of seedling a week to transplanting by gradually removal of the shade; Grow plantlets for 6-8 weeks and plant in the farm as plants or dispose off in the markets

Okoro and Tenkouano (2008) stated that plantain sucker could be prepared in various forms

In situ on ground beds in field; on trays in poly-bags or on raised rectangular concrete. The report stated that a good feature of nursery is

- i. A relative control of sunlight and humidity*
- ii. A shade to reduce the rate of evaporation and direct effect of sunlight on the young emerging plantlets. Absence of shade in the raining season could increase splashing from heavy rain and thereby exposing planted buds in the nursery,*
- iii. Watering should be regulated and applied as appropriate that is when needed.*

Unregulated watering encourages dampness, which can accelerate rotting of the planted buds,

- iv. The use of sawdust to increase the pore spaces for better water percolation, nursery medium could be made of saw dust only; top soil only; or sandy soil with appropriate mixture of sawdust and top soil, in ratio 3:1 or in situ (1:1).*

Main nursery practice according to FAO report (2005) are as follows: Use of 400 or 500 gauge black polythene bags measuring 40x35 cm laid flat; Provide bags that are with a centrally placed perforation at the bottom to allow excess water to drain out; Fill the bags with top soil from the nursery area or imported from other areas and placed in square formation of 45x75 cm spacing; Leave the bags for at least one week to consolidate before planting; Plant in march/April with the young seedling from the pre-nursery;

Make a hole of the size of the making a hole of the size of the ball of earth holding the young seedling in the bag; Cut and remove the polybag of the young seedling; Select the differentiated young seedling from pre-nursery; Place carefully the ball of earth carrying the young seedling in the hole made; Mulch after planting with partially decomposed refuse or dry grass; Shade especially in the northern fringes

outside the plantain belt, where harmattan can be particularly severe; Pick pests like snails, crickets, grasshoppers and caterpillars daily; Protect the nursery by fencing with wire net against rodents; Weed the nursery regularly which is necessary; Cut of dead leaves regularly away from the base of the seedlings; Prun all the leaves that are badly infected with freckle regularly, removed from the nursery and burnt. An older leaf should be cut off when at least one third of it has become brown/black in colour. This is a sure sign that the lead is dying and of no further use to the seedlings; Harden the platelets by gradually removal of shade.

Sucker multiplication techniques according to Rasheed (2003) are manly propagated through the use of corm due to its morphological characteristics and the various conventional methods for vegetative multiplication of plantain suckers are

- 1. Use of sucker plots-This involves the establishment of sucker multiplication plot of a desired size by:

 - i. Clearing the bush or removal of all vegetation from the site, leveling and filling of depressions,*
 - ii. Planting is at higher density of 1m X 1m or 1.5 X 1.5m to give a population per hectare of 10,000 and 4, 000 plantain sands respectively,*
 - iii. The plots should be well managed with good cultural (management) practices especially mulching and fertilizer applications. Split application of NPK 20:10:10**

10gm/plant) at 8weeks interval is recommended,

- iv. In the absence of NPK, appropriate mixture of urea, muriate of potash and super phosphate could be applied at about 50% Nitrogen per plant in split application,*
- v. Weeding should be done*
- vi. Peeper suckers begin to appear at about six months after planting.*
- vii. These are removed when they attain minimum diameter and height of about 15cm above the soil*
- viii. Sucker is removed by severing it from the mother plant.*
- ix. If the suckers have grown to maidens or late sword sucker stage, these are usually cut back at the top to about 25 cm after removal to reduce bulkiness and for better field establishment.*

2. On the Field Forcing Method

The author said that sucker production in the field can be accelerated through the following ways:

a. Leaf Stripping Method

- (i) Sucker production can be speeded up by leaf stripping. This is done by stripping back the outer leaf sheaths in order to expose the buds at the base,*
- (ii) The buds are then covered with earth and left to grow into suckers,*
- (iii) twelve weeks after this operation, peeper or sword suckers would start to sprout*
- (iv) These are later severed from the mother plant for field planting.*

b. Decapitation method: *The basic idea of this approach is to remove the apical dominance factor and induce more sucker development. Okoro and Tenkouano (2008) stated that mature but non fruiting plants could be decapitated to induce more sucker*

production. The authors outlined types of decapitation as follows:

Total Decapitation: *this involves*

- 1. Cutting off the plantain pseudo-stem at about 0.5 metre above the ground, to get to the growing point;*
- ii The growing tip is meshed with a machet or knife. The meshing ensures total destruction of the growing tip.*
- iii Make a mound of earth around the base of the plant (earthen up) iv The cessation of growth of the main plant causes loss of apical dominance which induces more side suckers to form*

2. False Decapitation: *This involves*

- (i) The removal of the growing tip, but in this case, a small hole or window is cut through the pseudostem to get to the growing point/meristem which is then destroyed;*
- (ii) The foliage can remain active for up to 3 months after the removal of the meristem;*
- (iii) The death of the meristem prevents movement of nutrients to the leaves but the foliage still transfer food to the developing suckers*

3. Toppling: *This is a variation of false decapitation method. The plantain stand is cut slightly about 1.0m up the middle of the plant and toppled over. Using both false and total decapitation methods, about 6-15 peeper suckers per plant can be produced annually from the sixth month of field establishment. Macro propagation techniques are methods that uses whole suckers or relatively large pieces of the parent plants to produce planting materials (eye, small sucker, pieces of rhizomes) are grown for five or six months in the field until new eyes appear at soil level then the plant are cut back with a*

matchet, 50-60cm above the ground, three or four months after cutting the back, there will be four or five suckers per plant, ready for, planting (Imo ADP, 2007)

In false decapitation, a window or small hole is made on the pseudostem through which the meristem is destroyed, the foliage remains photo synthetically active for about three months while in complete decapitation, the pseudostem is cut down and the meristem is destroyed; both methods increase sprouting and sucker multiplication in the nursery. The rate of suckering ranges from 9 to 14 suckers per annum (IITA 2004). In the view of Adelaja (2005) removal of small sword suckers in the field as soon as they are 40-50cm high will enable a higher number of suckers to be obtained from each plant. Reviews of the authors and reports of various research institutes sited above helped the researcher to isolate relevant competencies needed for pre nursery and nursery establishment in plantain production enterprises.

Literature on Plantain Plantation Establishment and Management

Plantain plantation establishment is the act of planting plantain in the permanent site where they will be cared for until their growing period. According to Blomme and Ortiz (2000) plantain plantation establishment involves the following:

- i. Choose a suitable site that is well drained and flat;*
- ii. Complete clearing of the undergrowth to allow free access to all land;*
- iii. Fell forest trees;*
- iv. Extraction of stumps;*
- v. Staking out of the land into distance between the future plant row;*
- vi. Burn the wind rows'Establish essential shading such as centrosema pubiscens to*

protect the soil from complete dryness due to heat of the sun. Plantain plantation establishment in the contribution of Chadha (2007) involves:

- i. Select suitable site that is well drained loamy soil,*
- ii. flat having an average rainfall of 500-2,000mm per year with a temperature of 15⁰ 35⁰C;*
- iii. Under brush the under growth;*
- iv. Stump of all trees.*
- v. Pack and burn all debris;*
- vi. Line out/peg Sports for digging;*
- vii. Line out the field 3m between rows and 2m within rows;*
- viii. Dig holes of 30cm by 30cm by 30cm for each plant sucker*

Steps in carrying out the establishment of plantain plantation as outlined in NIHORT report (2006) are:

- i. Select suitable site that is well drained, soil rich in organic matter.*
- ii. Clear land manually with minimum disturbance to soil;*
- iii. Allow debris to decay Line out/peg sports for digging holes;*
- iv. Spacing is 3m between rows and 2m within rows;*
- v. Dig planting holes with a minimum size of 30cm x 30cm (spade size);*
- vi. Keep top soil separate from bottom soil;*
- vii. Place seedling (centrally) in the hole;*
- viii. Cover first with top soil and then with bottom soil.*

In the view of Faturoti, Tenkouano, Lemchi and Nnaji (2006) establishing a

plantain field involves:

- i. Choose a good plantain field with average temperature of 25-30°C and average rainfall of 120-150mm per month;*
- ii. Clear the land;*
- iii. Pack the cleared debris;*
- iv. Stump and burn;*
- v. Lay out the blocks of four hectares;*
- vi. Dig holes of 30cm x 30cm x 30cm for each of the plantain sucker.*

In the opinion of Philips and Lordbanjou (1995) plantain establishment in the field involves: select suitable site that is easy to access and a deep, light soil which is rich in organic; clear the undergrowth; larger trees are felled; stumps are removed; clear forest residues packed/heaped in the windrows and burnt; plough land (3-4cm deep) and disc harrowed one or two times; lay of drains network especially in areas liable to flooding; layout in block of 4 hectares. According to IMO ADP report (2007) steps in plantain plantation establishment are:

- i. Choose a site that is accessible with high organic matter or good loamy soil that is well drained;*
- ii. Clear the undergrowth with cutlass; iii. Stake and allow drying, avoiding burning in other not to deplete the organic matter;*
- iv. Mark out the farm with pegs spaced 3m X 2m along and within the row; v. Dig the holes measuring 30cm by 30cm by 30cm;*
- vi. Dig out the top-soil and place by the side of the row and then the bottom soil;*

vii. Fill back the hole first with top soil, insert the platelets or suckers;

viii. Press firmly around the suckers avoiding the presence of air pores.

Planting Plantain in the Field

Planting on the field in the opinion of Eze (2006) are as follows: select desired seedlings from the nursery site with the ball of earth in polythene bags; remove bottom portion of the polythene bag to 2cm from the base; cut the poly bag from the top to the bottom; place seedlings centrally into the hole with the two hands in the poly bag; remove the poly bag away from the seedlings; refill gradually the hole around the root ball with the soil until the hole is filled; place dry leaves and twigs around all the seedlings without contact with the seedling collar; water regularly and appropriately too.

In the report of Gowen (1995) steps in planting seedlings effectively and successfully are: select of well differentiated seedling after 7-8 weeks in the nursery; remove the poly bag; keep a ball of earth on the roots; lower seedling with the ball of earth into the hole; consolidate the soil round the seedling; replace all stands that failed to survive 2-3 weeks after planting.

In the contribution of FAO report (2005) steps in planting of seedling are: select the differentiated seedling from the nursery between May-June; cut the base of the polythene bag in the already dug hole; fill back the hole first with top soil and then with bottom soil; support the seedlings with extra soil; press firmly around the seedlings; place mulch materials around each planted seedlings; water the seedlings daily; sow cover crops (leguminous crops) like pueraria and centrosema; put wire net at the collar of each seedling if necessary and replace dead plants 2-3 weeks after planting.

In the view of Rasheed (2003) planting of plantain involves: select a well developed seedling that has been growing in the nursery for 7-8 weeks and planting between May-July; cut the base of the poly bag; remove the polybag away from the seedlings; place mulch materials around each planted seedlings; press down the soil firmly around the seedling and put a net at the collar of each seedling at 45cm high, 12cm long and 15cm away from the base.

Planting of the plantain seedlings as viewed by FAO (2003) are as follows: select a well developed seedling from the nursery at the on set of rains (May- June) when the seedling is about 7-8 weeks old; dig planting holes with a minimum size of 30cm x 30cm x 30cm (Spade size); keep top soil separate from bottom soil; remove bottom portion of polyethene bag to 2cm; cut the polyethene bag from the top to the bottom hole with the two hands in the polyethene bag; collect plantain seedlings from the nursery beds, trays among others with a ball of soil at the roots of the seedlings; place seedlings centrally in the soil; cover first with top soil and then with bottom soil and support the seedlings with extra soil. In the opinion of Chadha (2007) steps in planting seedling are:

- i. Separate surkets from the mother plant with a spade or machet;*
- ii. Peeled/ trimmed corms with machet to reduce bulkness and improves early growth of the newly planted sucker;*
- iii. Transport prepared corms to their destination where they are left to dry for a few days;*
- iv. Plant suckers at the middle of the rain; Plant seedling at the spacing of 2.5m x 2.5m or 3m x 2m.*

Barren (2007) highlighted that suckers are planted immediately after field preparation at the middle of the rainy season. The author outlined steps in planting seedlings thus:

- 1. planting holes are prepared with a minimum size of about 30cm x 30cm x 30cm*
- 2. paring of the planting materials to remove all signs of borer or nematode damage*
- 3. Place the seedling at the middle of the hole and cover first with the top soil and subsequently with bottom soil*
- 4. Consolidate the soil around.*

In the opinion of Ekunwe and Ajayi (2010), steps in planting of plantain seedlings are as follows:

- 1. Plant plantain seedlings in holes dug by hand*
- 2. Pen manure or compost should be added to the hole at planting*
- 3. The size of the hole is 45m deep and 45cm wide.*
- 4. The planting material should be in as fresh condition as possible*
- 5. The eyes (buds) of the suckers or bits should be 25-30cm below the soil surface.*
- 6. Disinfect suckers or corms with 5 percent formaldehyde before planting.*

Maintenance of Plantain in the Field

Maintenance is the practice of keeping plantain plantation in good condition. The practices are:

- (1) Weeding*
- (2) Fertilizer application*
- (3) Disease and pest control.*

Weeding- Weed is a plant growing where it is not wanted. Weed in the view of Emone (2003) is a plant growing where it is not desired in such away that it constitutes a nuisance either to man, livestock or to the crops. Weeding is the act of removing weed from the farms. Valmayor, Jamaluddin Silayoi, Kusumo, Dahn and Pascua (2002) stated that weeding promotes air and water penetration around the plantain plant thus promoting the productivity. The authors highlighted ways of controlling weeds in the plantain plantation as follows;

- 1. Remove weeds with any suitable tools*
- 2. Plant leguminous crops within rows at initial stage.*
- 3. Spray weeds with appropriate herbicides if there is no inter-cropping with legumes.*

In the view of Ekunwe and Ajayi (2010) clean weeding is ideal with small holding up to 2 hectares. The author said that controlling weeds in plantain plantation involves: Intercropping with legumes or cocoyam in rows at young age of plantain; Applying weed killer (herbicides) like Aminotriazole, simazine or parawal; Prune the dry leaves and use as much around the base of the plant.

Chadaa (2007) highlighted methods of controlling weeds as follows: use of cultivators in between rows to keep plantation weed free; regular hand weeding; In wet land cultivation, turning of soil to bury the weeds after complete wetting the field followed by no irrigation for 15-20 days to check weed growth for 2-3 months; Intercropping with cowpea; Soil mulching with sugar cane trash and paddy straw.

FAO (2006) stated that apart from cultural practices, weeds can be control chemically by use of the following:

- 1. 0.4% Glycel spray*
- 2. Selected herbicides such as Ametryne, Simazin, Diuvon, Paraquat and Glyphosate.*
- 3. Pre-emergence herbicide, Ametryne which can suppress general weed growth for 3-4 months.*
- 4. Contact herbicide, Paraquate applied to the weed cover when the plantation is about 6 months old.*

The report stated that weeding helps to check weeds and it takes the following steps: Row weed with hoes or the use of herbicides in the plantain field; Ring weeding which involves weeding around the base of each seedling; Total weeding which is weeding the entire plantation with the use of herbicide or cutlass. Weed control in the opinion of Philips and Lordbanjou (1995) should be done by regular slashing every 6-8 weeks before the canopy closes after about 5-6 months; apply contact herbicide at the time of planting (when the plantain do not have any leave); applying paraquate (2-4 Li/ha) or diqual two to three months after planting and mulching.

IITA (2008) in its research findings identified four methods of controlling weeds in plantain farm: These methods include:

- i. Manually which involves weeding using hoe; the farmer holds the hoe with one or two hands, bending down while using the implement,*
- ii. Chemical control which involves using herbicides such as chloram-bean or diuron applied at the rate of 1-3kg/ha. They are pre-emergence weed control in plantain*

plantation,

- iii. Mechanical control which involves the use of machines like harrows, cultivators among others in between the rows to keep plantation weed free,*
- iv. Biological control which involves mulching or growing cover crops on plantation.*

In the opinion of Daniells, Engiberger and Lovens (2010) mulching is the most efficient means because a mulch layer can impede or prevent weeds growth. Mulching as stated by the author involves leaving the soil undisturbed by protecting it with a layer of straw (grass). The author stressed that plantain respond more effectively to mulching than any other cultural practice.

Fertilizer Application

Fertilizer is a substance or materials in form of organic or inorganic which is applied to the soil to increase its fertility. Fertilizer application to plantain plantation according to IITA report (2006) will normally promote increased yield and should be applied. The report highlighted steps involves in fertilizer application as follows:

- i. Apply compound fertilizer (NPK) to seedlings one month after planting;*
- ii. Apply fertilizer NPK around the plantain plant in a circle about 50cm in diameter;*
- iii. Apply 300kg/ha of nitrogen (urea) at the rate of milk tin per plantain plant;*
- iv. Apply 500kg/ha of potassium (as muriate of potash) 30 days after the first application at the rate of small tomato tin per plant; v. Apply organic fertilizers in form of mulch and ash from wood fires.*

In view of Imo ADP report (2007) the amount of fertilizer needed will depend on soil fertility and soil type. The report outlined stages of fertilizer application as: Apply

NPK fertilizer to plantain seedlings one months after planting or with the first rains in existing field; Apply 3 to 4 split doses in equal installment in the 4th, 16th, 24th week; Apply the last dose before or as soon as flowering commences; Apply magnesium fertilizer at the 3rd and 4th installments. Blomme and Ortiz (2000) showed the range of requirements of NPK to fall with in the range of 3:1:5 values from

1. *200-350kg per hectare for N*
2. *150-250kg per hectare for P₂O₅*
3. *350-550kg per hectare for K₂O*
4. *120-200kg per hectare for MgO*
5. *Apply supplementary application of 680kg of muriate of potash per hectare at the beginning of the last month of the rainy season*
6. *Apply organic manure in form of poultry or farm yard manures.*

On the need of fertilizer for plantain plant Baigeri and Tenkouano (2006) remarked that the type and rate of fertilizer applied depends on soil structure natural fertility of the soil and chemical properties. Fertilizer recommendation according to the author is a mixture of Nitrogen (N), Phosphorus (PiOs) and Potassium (K) in the ratio of 400kg active ingredient (a.i), 160kg a.i and 320kg a.i respectively per hectare per year.

The author outlined ways of application of fertilizer as follows:

- i. *Apply fertilizer one month after planting (IMAP) of plantain seedlings;*
- ii. *Apply around the main plant in a circle of 50cm in diameter;*
- iii. *Apply 250g (N), 100gm (P₂O₅) and 200gm (K) at the rate of 50gm/plant when it starts to maiden;*

- iv. *Apply Nitrogen and Potassium at regular intervals (split applications) during growing (rainy) season, at four months after planting (4MAP), 12 MAP, 20MAP and 2 MAP;*
- v. *Ring applied Urea (or) and muriate of potash (K₂O) at 50gm and 100gm per plant respectively if NPK complete fertilizer is not used.*

In view of Chadaa (2007) plantain plant requires very large quantity of nutrients for growth and yield depending upon cultivar, production system and agro climatic condition. The author outlined ways of fertilizer application in plantain plantation thus:

- i. *Apply 100—250g of Nitrogen per plant;*
- ii. *Apply urea in 3-4 splits; Apply 150g N/plant in vegetative phase and 50g N/plant in reproductive phase;*
- iii. *Apply 20 to 40g/plant of Phosphorus in single dose at time of planting;*
- ..
- iv. *Apply rock phosphate 50-95g/plant at planting;*
- v. *Apply mixed fertilizer around the plant about 50cm in diameter;*
- vi. *Apply organic manure along with growing of green manure crops like crotalaria.*

Faturoti, et al, (2005) outlined steps involved in fertilizer application to include application of 300kg/ha of nitrogen in form of urea to seedlings one month after planting at the rate of milk tin per plantain plant; application of 500kg/ha of muriate of potash 30 days after the first application at the rate of small tomato tin plantain plant; application of mixed fertilizer of 250 gm (N), 10 gm (P₂O₅) and 200 gm (K) at the rate of 50gm/plant when it starts to maiden.

Pest and Disease of Plantain Control

Pest is organisms that destroy plants thereby causing reduction in yield while disease is an infection or internal disorder caused by organism to plant or animal. Barren (2007) stated that a disease may be regarded as an abnormality in health while disease in plants is a physiological activity caused by a continuous irritation of a primary casual factor (pathogen) or malnutrition exhibited through abnormal cellular activity and expressed in characteristic pathological conditions known as symptoms and harmful to the plant.

Onwueme and Sinha (1999), stated that various pests and diseases affect plantain on the fields which if not controlled immediately can result into poor performance of plantain plant, increase in cost of production and death of plantain plants on the field. The authors recommended that appropriate method and chemical should be used to control pests and diseases. Various diseases of plantain exist which include:

- (1) Panama*
- (2) Leaf sport or Sigatoka*
- (3) Ciga end rot (Chadaa, 2007)*

The author emphasized that these diseases reduce yield and may cause premature ripening of fruits. The author recommended that the disease should be controlled with appropriate resistant cultivars; application of low volume oil sprays or oil fungicide at cooler periods of the day and removal of floral parts at fruit tips as soon as the bracts above the hands are shed.

Disease of plantain as stated by Philips and Lorbanjou (1995) are differentiated

into roots, foliar and fruit diseases. They outlined these diseases as:

- i. *Black Sigatoka disease*
- ii. *Panama disease*
- iii. *Cordana leaf spot*
- iv. *Deightoniella leaf spot*
- v. *Chloridium leaf speckle*
- vi. *Bunchy top*
 - vi. *Bacterial wilt (Moko disease)*
- viii. *Fruit spot or pitting disease among others.*

The authors therefore stated that these diseases are controlled by: cultural practices like mulching, weeding and other phytosanitary measures: pruning (cutting off); burying or burning affected leaves; Pruning the infected leaves; weed regularly chemical control using bayleton, daconu, caliyx; Use of Glyphosate injections (20ml injections of 50% Glyphosate or 25% round up) (Ogieve, 2003). Onwueme and Sinha (1999) maintained that these diseases can also be controlled by Mulching; use of Kerosine and glyposphate 2-4D; Using appropriate fungicides; drainage; Weed control; Pruning; Use of resistant plantain cultivars; Use bird scaring gun to scare away birds or animals such as monkey; Hand pick pests or insects on green leaves of plantain Nematode a minute worm in view of Okoro and Tenkouano (2006) is a major pest of plantain, which lives in the soil according to the author can be controlled by application of nematicides in a circle 25cm in diameter around the plant.

National Institute of Horticultural Research and Training (NIHORT) report

(2006) stated that pest of plantain include stem borer, nematodes, lepidoptera caterpillars, locus, zonocerus variegates, thrips, spider mites. The author outlined methods of controlling these pests to include:

- i. Hand pick pests or insects on green leaves of plantain plant;
- ii. Apply insecticides such as chordecone, Isoferphos, aldicarbe and carbonfuran to destroy insect pest;
- iii. Use of healthy planting materials;
- iv. Planting of resistant variety to guide against diseases;
- v. Use bird scaring gun to scare away birds;
- vi. Practice sanitary pruning;
- vii. Maintain clean weeding of plantain plantation

In view of FAO (2005) on disease and pests of plantain, the report stated that black sigatoka is the major disease affecting plantain while nematode and weevil are the major pests. They further stated that the only effective means of control is by use clean planting materials; resistant varieties; mulching; trapping; maintain correct spacing and remove insect or disease infested leaves and burn.

The report of IITA (2004) showed that most serious pest of plantain is weevil also known as plantain borer and beetle; other insect pest damaging plantains are plantain rust thrips, plantain fruit scarring beetle, plantain scab moth, aphid burrowing nematode. According to the report various methods can be used to control them: These methods are:

- i. Use of clean planting material which has been pared, washed and treated with a

nematicide;

ii. Plant resistant variety to guide against diseases;

iii. Use of insecticides;

iv. At planting coat each sucker with a mixture of clay a liquid or granular nematicide (nematicides are applied in a ring around the base of the plantain plant);

v. Maintain correct spacing; vi. Remove insect or disease infested leaves.

Philips and Lordbanjou (1995) stated that the leaf blades of plantain are attacked by various Lepidoptera caterpillars. These include; Antichloris viridis, plusia Chalcites eurilochus; All these insects feed on the soft tissue and attack heart leaves. The author highlighted steps in controlling the insect pest attack in plantain as follows: spray with appropriate insecticides; weeding regularly; pruning of the infected plant parts. The authors listed the following steps of regulations governing the use of chemicals as:

- 1. When the chemical is applied during the dry season. It will be necessary to supply each plant with a substantial amount of water*
- 2. Use recommended insecticide and carefully read the product label before spray*
- 3. Select the right pesticide applicator for effective spray*
- 4. Wear protective clothes e.g over all or long sleeved shirt with trousers and gloves, wide trimmed water-proofed hat, boots, goggles and nose mask or respirator.*
- 5. Avoid spoilage of spray mixture to reduce wastage and skin contamination, tight dips to avoid leaking holes, leaking sprayers, tanks, worn out nozzles*
- 6. Commence spraying when the weather is good*
- 7. Do not spray when is raining tense sunlight and strong wind*

8. *Avoid eating, drinking or smoking while spraying*
9. *Apply pesticides to target area to prevent environmental pollution through drift to settlement, streams, lakes, grazing land.*

According to the authors, some precautions to be taken after pesticide application are:

1. *Wash thoroughly all the equipment used after use in the site*
2. *Avoid using mouth to free blocked nozzles instead rinse the nozzle in running water.*
3. *Wash all clothing materials used and take bath immediately*
4. *Do not store left-over used chemicals in bottles or containers used for food, store pesticides in a safe place away from foodstuff, heat and children*

Propping and debudding

To avoid plantain bunch from bending and breaking of pseudostem, fruit bearing stands should be propped. According to IITA report (2006) props are usually long support sticks with a Y-shaped end. The report outlined steps in propping and debudding as:

1. *Get a stick that has "Y" shape*
2. *The "Y" shaped stick is hooked on to the fruit*
3. *Dug the stick firmly into the soil to proud support*
4. *Cut the male bud after the fruit has being set when the fingers are not coming out*

Harvesting Plantain

Harvesting is necessary in any plantain plantation production. Emone (2003) stated that harvesting is cutting, digging, gathering and handling of mature crop

products up to their final removal; from the field. Harvesting in view of Hauser (2006) is the removal of useful crop parts for processing and storage for either home consumption or for sales. Harvesting in the context of this study concerns with cutting, gathering and handling mature plantain fruits with machet or go to hell with the aim of removing the plantain fruits for consumption, sales or processing. Imo ADP report (2007) stated that harvesting of plantain depends on the cultivar, the farmers' desire and intended use of bunches (own consumption, sale in a local or export). The report outline d ways of harvesting as follows:

- i. Identify mature plantain fruits for harvesting;*
- ii. Harvest when 1 or 2 fingers of the first hand start yellowing;*
- iii. Harvest when matured at about 3 months from time of flowering;*
- iv. Make a nick, two-thirds of the way up to the pseudostem to enable the bunch drop under its own weight;*
- v. Then holds the rachis and cuts the peduncle some ways beyond the hand;*
- vi. Harvest using sharp machet;*
- vii. Carefully allow the bunches to drop on the ground*

Harvesting of plantain according to Chadaa (2007) has no definite yardstick; in a polyclonal condition, harvest index varies a lot depending on the variety, proximity to the market and mode of transportation. The author stated the following steps in harvesting of plantain, they are:

- 1. Harvesting is done at 75-80% maturity for a long distance transportation*
- 2. Harvest when mature at 113-130 days after shooting*

The author emphasized that some tools are used for harvesting of plantain fruit. These tools are: sharp machet for cutting the bunch handle with arm's reach; harvesting knife attached to long pole for harvesting plantain well above ground level; harvesting knife with short wooden or metal handle for harvesting the plantain bunch and basket or any good container for putting harvested bunch to where they will be separated. NIHORT report (2006) stated that plantain is harvested for processing when the pulp content is over 60%. The following measures according to the report are followed in plantain harvesting:

- i. Harvest at mature, green stage;*
- ii. Harvest at about 90 days after shooting irrespective of the time of planting;*
- iii. Cut off bunch carefully and hold on to it while cutting, so it does not drop and bruise;*
- iv. Collect the harvested bunches together for airing;*
- v. Bend low to cut the pseudostem gradually to avoid injury the,*
- vi. Cut fingers at fall; down the entire pseudostem and chop together with foliage of the main plant;*
- vii. Spread chopped pseudostem and foliage over the soil as much for raton crop.*

The literature from different authors and research institutes reviewed above helped the researcher to isolate relevant competencies needed for plantain plantation management enterprise.

Literature on Plantain Processing

Plantain fruits, like other fruits are highly perishable products. Ogazi (1996) stated that plantain is usually seasonal in terms of availability, spanning from a period of

plenty to short supplies; In order to address the problem of wastage and ensure the availability of plantain products during the period of short supplies there is the need to process it into consumable products that have longer shelf life. Emone (2003) viewed processing as those operations which take place after harvesting and which is used by the farmer, sent to the market or sold to various agencies. The author emphasized that processing involves changing plantain fruits into various forms for consumption. IITA report (2007) stated that further processing of plantain fruits improve their palatability gives them a longer self-life, ensures price stability and makes them easier to transport. The report further stated that some of the products into which plantain fruits can be processed are flour, chips, malt, plantain Jam, juice, ice cream, wine, Ethanol (Gin), soap, moi-moi, amala, meat pie among others. The products that are of concern to this study are flour and chips.

Plantain Fruits Processing into Flour

Plantain processing to produce flour according to the report involves: obtain a bunch of unripe plantain, wash with water to remove dirt and spray residues, peel and keep pulps in a bowl containing water to avoid turning black, slice into two halves and oven-dried at 60°C for 18-24 hours or slice thinly to enhance dehydration and sun dried for 2-3 days and slices can be blended and sieve to obtain flour with fine particles.

According to Akinyemi (2005) plantain flour (an alternative to wheat, corn, cassava flour) can be produced in commercial quantity following these processes: obtain unripe, green plantain fruits, the plantain fruits are peeled to remove the peels, the peeled plantain pulp are sliced using knife or automatic dicing machine to an

appropriate thickness of about 15mm, the sliced or diced pulp are then dried under sun or in oven (cabinet drier), the dried pulp is milled using hammer mill (or grinded/ground) using domestic grinding machines, until the desired particles size is obtained and the flour is then sieved, packed and sold to the market.

Plantain Fruits Processing into Chips

The processes involved in plantain chip production as stated by Imo ADP (2007) are: peeling, slicing, frying, cooling and packaging. The report described the processes by:

(a) Peeling: *Plantains fruit are hand peeled using knife as the irregular shape makes it difficult for mechanical peeling. Blanching the fruits for about 10-15mins softens the peel and makes peeling easier.*

(b) Slicing: *Three methods had been in use namely*

- i. Hand slicing using knife.*
- ii. Two different mechanical sheers, operated manually*
- iii. Electrically operated slicers*

In one case, of the mechanical slicers, the peeled pulp is cut into halves and each half put into the slicer where it is pressed against the blade by turning the handle to rotate the blade while at the same time pressing the pulp slices of the desired thickness. The mode of operation of the other slicer involves the rubbing of the pulp against the blade to produce the desired thickness.

The manually operated mechanical slicers produced more uniform slices than the hand slicing using knife. The thickness of the slices is between 1mm and 2mm.

(c) **Frying:** *Frying is usually carried out in batch and is fried using the deep-fat fryer.*

(d) Packaging of Chips

Fried plantain chips are packaged in polythene bags and cellophane bags. Chips or crisps production as stated by Adeniji, Tenkouano, Lemchi and Fatureoti (2008) is carried out using these ingredients are unripe plantain as required, vegetable oil deep fry and salt to taste. The report highlighted methods of chips production as follows:

- i. Collect unripe plantain fruit as required*
- ii. Peel plantain*
- iii. Immerse in a bowl containing water*
- iv. Heat vegetable oil or palm oil in a frying pan or electric fryer to about 170°C*

Rub salt on peeled fruits

- v. Slice salted fruits directly into the hot oil and fry with constant stirring until crispy, golden yellow*
- vi. Remove chips into plastic sieve and allow the oil to drain*
- vii. Spread chips on polyethylene bag or any clean material and allow to cool*
- viii. Package with an impulse (electric) Sealer or candle flame with the aid of hacksaw or kitchen knife.*

Other Processed Products of Plantain Fruits are:

(1) Malt

In view of IITA report (2008) malt (non- alcoholic plantain drink) is produced by the following ways: obtain figs from plantain i.e dried plantain, mill the figs into powder and keep until required, reconstitute about 55g (2 heaped tablespoons) of fig powder in

0.3 litres of water and mix, set aside for 5-10 minutes to enable the component of the power to each into the water, filter through muslin clothes, bottle and allow to sediment, decant or filter again and add vanilla flavour, granulated or icing sugar to sweeten the 'malt' and finally bottle and refrigerate.

(2) Plantain Jam

The report also outlined plantain fruit processing into jam as:

- 1. Obtain 2 or 3 ripped plantain*
- 2. Blend the ripe plantain and mixed together withl cup of granulated sugar*
- 3. Add 200ml or 2 cups of water and mix together.*
- 4. Add 30-35ml lime juice in the mixture.*
- 5. Boil the mixture and allow the formed gel to cool*
- 6. Preserved the gel with sorbic acid*

(3) Plantain Juice

In view of Adeniji et al (2008), plantain fruits can be processed into juice in the following ways: obtain some ripe plantain fruits, peel and blend the pulp, soak slurry in hot water for 10-15minutes for optimum juice extraction, pulp and water should be in the ratio 1:3, filter through white muslin (Akamu) cloth, pasteurise the juice by boiling and simmer for 3 minutes, cool and fill into sterilized bottles and colouring may be added prior to bottling.

(4) Ice cream

As stated in IITA training report (2008); plantain fruits are processed into ice cream. The report outlined the ingredients used for processing Ice cream and the method involved

thus:

Ingredients:

Ripe plantain - 20-24, depending on size

Egg - 12 (albumin, whisked)

Granulated or icing sugar - 1 cup or 5 heaped table spoon

Water - 500ml (1 cup = 170ml)

Vanilla powder or liquid Vanila flavour

Essence - (a pinch/few drops)

Pint cream - A pinch (Sparingly)

Milk (5 heaped table spoons for powdered or preferably 1 tin of evaporated milk)

Method

- i. Obtain 20 - 24 ripe plantain fruits
- ii. Peel and blend the pulp
- iii. Soak slurry in hot water for 10-15 minutes for optimum juice extraction
- iv. pulp and water should be in the ratio 1:3
- v. Filter through white muslin (Akamu) clothe
- vi. Add all ingredients to the extracted and mix thoroughly
- vii. Pour into cream cups or seal in polyethylene bag
- viii. Place in a freezer until required

(5) Wine Production

Gareth (2009) highlighted the procedure of wine production from plantain fruits as follows

Ingredients

<i>Ripe/over ripe plantain</i>	-	<i>2kg</i>
<i>Plantain skins (peels)</i>	-	<i>250g</i>
<i>Granulated sugar</i>	-	<i>1.5kg</i>
<i>Water</i>	-	<i>4 litres</i>
<i>Yeast</i>	-	<i>1 tablespoon or 1 sachet (3g) for 4.5-27 litres</i>
<i>Yeast nutrient (optional)</i>	-	<i>Juice of one ripe grape fruit</i>
		<i>Juice of one ripe lemon</i>
		<i>Juice of one ripe sweet orange</i>

Method

Preparation of the slurry and primary fermentation

(aerobic)

- i. Obtain 2kg ripe/over ripe plantain and 250g plantain skin (peels)*
- ii. Slice peeled plantain and the peels*
- iii. Place in a clean, sterilized white cloth bag*
- iv. Tie the bag and place into a sauce pan (Preferably Aluminum)*
- vi. Add water, boil and simmer for 20-30 minutes*
- vii. Pour the hot liquid over granulated sugar and fruit juice*
- vii. When the bag is cool, apply pressure to extract as much juice as possible*
- viii. Add the extracted juice to sugar liquor*
- ix. Shake to dissolve the sugar and cool in cold water*
- x. Add the yeast and yeast nutrient into the liquor at 27 - 30°C to extract juice.*
- xi. Record the initial temperature and specific gravity*
- xii. Keep for a week at room temperature*

- xiii. *Agitate the jar occasionally by giving it a shade*
 - xiv. *As fermentation proceeds, take record of temperature, Ph and specific gravity xv.*
- Collect data until fermentation quietens after about a week.*

Literature on secondary fermentation (anaerobic)

- i. *Plug air lock (fermentation trap) to the fermenter*
- ii. *Put few drops of sterilizing solution into the air lock to form a U shape*
- iii. *Plug the top of the trap with cotton wool to enables the yeast to undergo an anaerobic method of self-reproduction*
- iv. *Rack occasional by siphoning the wine off the lees of yeast and deposited solids*
- v. *Allow the wine to clear of its own accord, given time, when it does not, you may have to filter*
- vi. *Keep decanted wine together as long as practicable, and bottle as required. This ensure adequate maturation period which may result in a better quality.*
- vii. *Wine should be stored in sterilized bottles and corks.*
- viii. *Store finished wine in a rack or bin at 13°C or in a refrigerator.*

The literature from different authors and research institutes reviewed above guided the researcher to isolate relevant competencies needed for plantain processing.

Marketing of Plantain Products

Marketing is an important aspect of plantain production enterprises. Aliyu (2001) defined marketing as a place or process in which buyers express their demands for goods and services and sellers provide the supplies of goods or services to meet their demand or need. Amoyedo (2007) viewed marketing as all those legal, physical and economic

services that make possible for product from producers to get into the hands of customers in the various forms desired at the agreeable prices for effective exchange of ownership or possession. George (2002) explained that marketing is the sums total of all business strategies that direct the flow of sales of products and services from all business activities from the producers (farmer) to the consumers or end users.

The author outlined the competencies involved as follows: packaging of the farm products, assembling and packing of products, grading, weighing and measurement of products to size, weight and quantity, fixing prices on the bags based on the sizes and quality, sorting of products into groups, storage of products to preserve quality, helping customers to transport their goods to their nearest destination if necessary, loading and offloading of products to and from market and financing market activities. Onuka (2003) listed marketing competencies to include: the ability to record the number of produce, keep produce secured and ventilated in containers for market, fix price for the produce, identify suitable wholesaler's or retailer's agents, assist customers in handling and transporting produce, keep adequate records of produce sales or purchases and those of the unsold products.

According to Daniells, Engiberge and Lovens (2010) many competences are to be carried out by the producer or marketer as the product moves along the marketing channels. These competencies include: packaging of goods, sort the goods to sizes in the warehouse, labeling and advertising in order to create consumer awareness, fix their prices based on production cost, transporting of goods from the farm to market, keep records of purchased goods and sells made. In view of Ugo (2005) marketing of

Agricultural products required certain competencies which include: advertise the goods and services for buyers, carry out market survey to know the best time to sell products for profits, fix price on the products based on the sizes and weight, sell the products to different buyers, reconcile sells and expenditure to determine "profit and loss, keep records of purchase and sales made, make choice for the type of transport to be used depending on the quality, container, and warehouse to be used for storage.

Several competencies as stated by Stanton (1996) are needed for an individual to succeed on the marketing of agricultural products, such competencies include:-

- 1. The ability to calculate time of production*
- 2. Carry out market survey for sell of agricultural goods*
- 3. Identify your customers and invite them for supply*
- 4. Sort*
- 5. Grade*
- 6. Harvest and weigh the products*
- 7. Fix price of the products*
- 8. Transport the purchase goods to buyers*
- 9. Record financial transaction*
- 10. Reconcile sales and purchase record to identify profit and loss.*

In their own opinion Madu, Uzochi, Agu and Kanu (2000) stated that marketing encompasses those business strategies involved in the flow of goods and services from production to consumption (including buying, selling, advertising, standardizing and grading, transporting, storing or ware- housing); financing (granting of credits); Packing,

pricing and the market information functions. Jhingan (2002) stated that some variables exist in marketing; these variables according to the author are classified into products, place, promotion and price, usually called the 4 Ps in marketing. The author stressed further that.

1. Products include the quality, packaging, size of the products, services reforms.
2. Place includes channels of distribution, coverage, location, inventory and transportation
3. Price includes the list price, discount, payment periods and credit terms.
4. Promotion includes advertising, personal selling, extension, sales and publicity.

In the view of Udeh (1999) the total sum of all marketing competencies is to increase sales and make profit and this can be achieved by: advertising the goods or services, processing, grading and standardization, storage, transportation and selling the goods or services by placing them in the market. Some of the competencies that could be adopted by a farmer according to Kotler (2001) include: advertise the products and fix prices based on production cost, carryout effective market survey to know the best time to sell products for profit, store the products and keep record of all marketing activities.

Bianze (2005) stated that several competencies are needed by an individual to succeed on the marketing of agricultural product such basic competencies include: the ability to calculate time of production, assemble the products into sizes or groups, search for market, grading and storage of the product, record financial transaction, reconcile sales and purchases, fix price on the goods based on sizes and vigour and transport the purchased product.

Arene in Amoyedo (2007) stated that there are many services to be performed by

the marketer or producer as the product moves along the marketing channels. These competencies are: assembling the products together for further movement, grading or sorting products into group of uniform quality, processing of products into a suitable form, transporting by vehicle to processing centre and to the customers, storing products for future use, financing products until it is sold and assuming risks that are likely to occur due to spoilage, poor packaging or improper handling and transportation.

Marketing of plantain products in the context of this study comprises all the activities that take place from the point of plantain production (farm gate) until the plantain products reaches the final buyer or consumer. The opinions and submissions of the various authors cited above helped the researcher to identify competencies needed for marketing in an enterprise for plantain production in Abia and Imo states.

Literature on Materials in Plantain Production

Plantain production requires good management of materials/ resources for its success. Materials/resources are those facilities inform of tools or equipment used in an enterprise. Olaitan, et al, (1999) classified facilities into tools, equipment and consumables. The authors explained that tools are simple instrument as mechanical devices that can be handled easily while carrying out special operations and equipment as mechanical devices for operations in industries. Equipment are more sophisticated than tools. The authors explained consumables as materials that are utilized in machines as component. Proper facilities are necessary for efficient plantain management. FAO report of (2003) stated that materials needed in pre-nursery are land, boxes, trays, bags poly bags, head pans, building conns, organic matter, knife, water, chemical for control of disease, saw dust top soil, mulching materials, weeding, hoe, water tank and nozzle hose. IMO ADP (2007) recommended the following material/resources as necessary for

successful plantain pre-nursery. The report outlined the materials resources as follows land, sucker, knife, shade, saw dust, wheel barrow, polythene bags, cutlass, rope, tape, trays, pegs, wire nettings, corm, shade, weighing balance, water, organic manure.

Materials in the main-nursery according to the report include; land, shade, wire netting, polythene bags, water, hand fork, cutlass, fertilizer, spade, weeding hoe, wheel barrow, bore hole. In view of Okoro and Tenkuoano (2008) plantain pre-nursery and nursery prepared in various forms using materials. These materials the author outlined are: ground beds, trays, polybags, shade, saw dust, top soil. The authors further listed below some materials resources for main nursery and care of the equipment thus:

<i>S/N</i>	<i>Material resource</i>	<i>Type of use</i>	<i>Care needed</i>
<i>I</i>	<i>Land</i>	<i>Regularly</i>	<i>Keep free from weed etc</i>
<i>Ii</i>	<i>Water</i>	<i>Regularly</i>	
<i>Iii</i>	<i>Irrigation equipment</i>	<i>Regularly</i>	<i>Store on racks during the dry season</i>
<i>Iv</i>	<i>Access road</i>	<i>Regularly</i>	<i>Maintains regularly</i>
<i>V</i>	<i>Cutlass</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
<i>Vi</i>	<i>Spade</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
<i>Vii</i>	<i>Wheel barrow</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
<i>Viii</i>	<i>Hoe</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
<i>Ix</i>	<i>Knapsack prayer</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
<i>Xi</i>	<i>Measuring tape 30m</i>	<i>Occasionally</i>	<i>Protect from rainfall</i>
<i>Xii</i>	<i>Kitchen knife</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
<i>Xiii</i>	<i>Hand fork</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
<i>Xiv</i>	<i>Hand trowel</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
<i>Xv</i>	<i>Head pan</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
<i>Xvi</i>	<i>Plastic bucket</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
<i>Xvii</i>	<i>Ranging pole</i>	<i>Occasionally</i>	<i>Protect from rainfall</i>
<i>Xviii</i>	<i>Protective clothing</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
	<i>Hand glove</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
	<i>Boath</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
	<i>Grogle</i>	<i>Regularly</i>	<i>Protect from rainfall</i>
<i>Xix</i>	<i>Agro-chemicals</i>	<i>Occasionally</i>	<i>Protect from rainfall and sunshine</i>
<i>Xx</i>	<i>Insecticides</i>	<i>Occasionally</i>	<i>Protect from rainfall and sunshine</i>
<i>Xxi</i>	<i>Mematicide</i>	<i>Occasionally</i>	<i>Protect from rainfall and sunshine</i>

Xxii	Fungicide	Occasionally	Protect from rainfall and sunshntne
Xxiii	Fertilizer	Occasionlly	Protect from rainfall and sunshine
Xxiv	Knap sac prayers	Occasionally	Protect from rainfall and sunshine

Materials required in plantain plantation establishment according to Rodomiro and Akoroda (1996) are land that is flat, measuring tape, spade, knife, seedlings, rope, organic matter, pegs and wheel barrow. For land preparation, materials needed are matchet, axe, and assess roads, line and pegs and fertilizer. Planting: Seedlings, knife, mulch materials watering can. Maintenance: Hoe, herbicides, pesticides, fertilizer, mulch materials. Harvesting: Sharp matchet, harvesting knife, long pole and basket.

National Institute of Horticultural Research and Training (NIHORT) (2006) listed material resources that are needed in different plantain production enterprises as:

(i) Nursery:

(a) Pre-Nursery:-Land, trays, polythene bags, top soil, wheel barrow

(b) Main Nursery:-Land, polythene bag, wheel barrow, water, spade, head pan, hoe, watering earn.

(ti) Plantation Management'.

(a) Land Preparation:- Land, rope, pegs, measuring tape, seedlings, mulch materials

(b) Maintenance Unit:- Fertilizer, weeding hoe, herbicides, pesticides, water

(iii) Harvesting: *Basket, short wooden or metal handle harvesting knife, bucket, wheel barrow.*

(iv) Plantain Processing: *Kitchen knives, frying pots, weighing balance, oven, automatic dicing, hammer mill slicers, cellophone bags, oil, salt, plastic sieve,*

sealer, candle flame, muslin clothes, other resource materials as stated by the report include water, egg, icing sugar, vanilla powder, citric acid, protective coverings (clothes, goggles, nose masks, hand gloves), margarine, mixed fruits.

(v) Marketing Unit: *weighing balance, vehicle, head pan, wheel barrow, warehouse,*

plantain seedlings, plantain fruits and leaves, plantain processed products, sales record adding machine.

According to IITA report (2006) to raise, develop or multiply plantain up to consumption stage requires basic materials such as;

- ❖ Land for planting seedlings: Identification and selection*
- ❖ Cutlass: For clearing bushes, cutting*
- ❖ Hoes: Used for making beds, mounds*
- ❖ Wheel Barrows: For conveyance of materials to and from the farm*
- ❖ Spade/Shovel:- Used for digging and making of beds, mounds and ridges manually*
- ❖ Knap sac sprayer:- For application of necessary chemicals (pesticides, herbicides)*
- ❖ Tape:- for measuring or determination of areas of cultivation*
- ❖ Head pans: - conveyance of materials/harvesting*
- ❖ Farm houses:- For administrative purposes*
- ❖ Farm stores:- for keeping farm tools*
- ❖ Suckers: for planting and or for multiplication*
- ❖ Fertilizer/organic manure:- For improvement of soil fertility and increasing yield.*

The report also highlighted materials needed in different enterprise of plantain

production thus:-

(a) Pre nursery/Nursery Practice: *Materials needed for this exercise include:- plantlets or direct suckers, poly-bags, saw dust, seed boxes, water, soil, organic manure, temporary shed.*

(b) Plantain Plantation Establishment: *To establish Plantain Plantation, it requires a lot of resource material such as cutlass, spade, tape, pegs, suckers, fertilizers, land, strong forked sticks, dried mulch materials water, knapsack or boom sprayer, harvesting knife*

(c) Processing: *To process plantain, it need mature bunches, peeling with stainless kitchen knives, washing, slicing into chips or flakes, hammer mill is used for processing bunches into flour. Frying pans, vegetable oil or red palm oil, cabinet drier, water for washing the peeled plantain, mechanical slicers, salt, bowl, polyethylene bag, sealer or candle knife.*

(d) Marketing Materials: *wheel barrow, pick- up vehicles or vans, baskets, weighing balance, biro and paper for recording. The reviews on materials and equipment on plantain production guided the researcher in isolating materials needed for each plantain production enterprise such as plantain nursery practice, plantain plantation management, processing and marketing.*

Literature on Training for Plantain Production Enterprise

Training competencies for plantain production enterprise are arranged under the following headings

a. Planning for training in any of the plantain enterprise:

i. instructional planning

ii. instructional plan

b. Training procedures.

Instructional Planning

Instructional planning is a process of itemizing step by step units of instruction in particular references to topics. Olaitan and Ali (1997) viewed instructional planning as the process of deciding what instructional content, media and other related activities are necessary for instruction. The authors stated that the basic processes in instructional planning are: determining the rationale of the course on which the instructional plan is based, identifying the intended learning outcomes, concept mapping that is making a map that links the major concepts in the work to be converged and making available instructional materials and resources.

Aguolu (2007) stated that instructional planning is that aspect of teaching where teacher formulate a course of action for carrying out instruction over a school year, semester, month, day or a lesson. The author listed instructional planning to involve: identification and structure the content into topics or units, identification and selection of instructional materials for teaching in each unit area, write down the concept, facts or generalizations to be learnt, identification of goals or objectives, identification of students abilities, needs and interests, identification of relevant instructional method for teaching each unit content, allocation of time of teaching each topic or unit and identification of skill performance of unit needed to develop.

Steps in instructional planning according to Olaitan (2003) are as follows: selection and organization of instructional content, materials and activities to be

performed by the teacher and the learner, determine a need for the content which may be part of a course or topic, state the objectives or intended learning outcomes expected of the student to achieve at the end of instruction, identifying major key concepts in the course or topic which need explanation by the teacher and understanding by the students, identify and select relevant content and arrange them logically in terms of related objectives to be achieved, identify and select relevant materials to use to teach selected topics, identify and select relevant materials, techniques and support systems for teaching each unit content, identify appropriate evaluation technique for each content area to be taught so that teachers can use it to find out whether the objectives of the content have been achieved, study carefully the instructional plan and become familiar with it and develop a comprehensive lesson plan.

Oyetunde (2004) outlined steps in instructional planning as follows: establishing the behavioral objectives of lesson, following the content of the lesson systematically, developing the lesson appropriate to goal, constructing lesson plans, employing efficient methods for changing activities, providing room for motivation, selecting materials activities, establishing long- range goals, capitalizing on outside experience and using visual aids.

The literature reviewed above will help the researcher to isolate those relevant components of instructional planning that could be developed into an instrument on instructional planning for this study. Instructional plan are learning experiences and subject matter that are organised and broken down into units for easy presentation to student. Aguolu (2007) defined instructional plan as a lesson road map which guides the

teacher on what to teach, content to cover, objectives or learning outcomes, steps in presentation of content and evaluation. The author further stated that instructional plan is a teacher directed unit of instruction which learns itself to proper preparation for utmost effectiveness; and that a well prepared classroom instruction is bound to accomplished specific objectives.

In view of Olaitan (2003) instructional plan have three basic considerations namely.

- 1. The scope of the class programme, that is, what type of educational experiences should be provided to pupils in the plan hi an organized classroom situations*
- 2. The allocation and sequential study of the content, that is at the school level in which certain instructions should be given and the amount of time to be allocated.*
- 3. Instructional plan must be systematic and the contents logically arranged from know to unknown, simple to difficult and broad to narrow knowledge or skills.*

The author suggested the use of work sheet in developing a good instructional plan, which should contain the following: subject matter segmented into topics or unit areas, suggested activities for the teacher and the learners, expected outcomes in learner's behavior, concepts, facts or generalizations to be learnt, skill performance to be developed, developmental values to be acquired and evaluation. Olaitan (2003) further outlined two broad aspects of an instructional plan as

- 1. Macro:** *instructional plan which contain: the title (major topic), course units or unit content, rationale or justifications, and objectives or intended learning outcome.*
- 2. Micro:** *instruction plan- which include: unit course title (or sub- topics), unit sub-topics, sub-*

unit objectives, sub-unit content, teacher activities, pupils or learners activities, methods for delivery system which could be demonstration, discussion, questioning, note taking and other techniques, materials required and evaluation. The literature reviewed above helped the researcher to isolate competency items that were developed into questionnaire for data collection.

Training Procedure

Training is the process of learning a job you need. Chalmers (2003) defined training as a process of teaching, adapting and moulding of a person to justify his fitness for specific productive activity or job. Gibb (1996) defined training as an organized learning activities aimed at achieving productive skills such as:

- *Technical ability,*
- *Productive competency*
- *Ability for out put,*
- *Initiatives for job performance and for innovation.*

Ajayi and Laogun (1999) defined training as the act of increasing the knowledge and skill of an employee in doing a job. The authors explained further that training is mostly directed at improving the ability of individual to do their vocation more effectively and efficiently. Farunde (1995) stated that training involves acquiring information and abilities or altitudes, which will result in greater competence in the performance of a work. Okorji (2001) said that training may be in form of short term courses, attendance to seminars, workshops, conference and further educational programmes.

In view of Chalmers (2003) training may, and often does involve teaching of new methods and procedures. The author outline training procedures as follows: the

instructor should start teaching from simple to complex, starting the training programme in the trainee's language, the instructor should explain the skills sequentially to the trainees, clarify aided by use of known examples, follow up with questions at intervals to ascertain whether trainees understand essential elements of the training programme and assessment or evaluation to know performance of the trainees.

Chermish and Schott (2003) highlighted training procedures as: conveying the training information to trainees in common language they can understand, teach the skills step by step bearing in mind the logical arrangement, provide a high level of active practice for all the trainees, assess performance as trainees practice and correct errors, give the final assessment by testing the practice of each trainee and provide feedback on the result of trainees performance. In the opinion of Oyetunde (2004) training procedures include: ensuring adequate supply and utilization of material resources for practices,, guiding students in the use of appropriate materials, starting the training programme in the trainee's language without necessarily telling them the specific objectives of the training unit, relating the training information to the future goals it will help to accomplish, demonstrating the skills with the use of training material to captivate the attention materials to captivate the attention and retain the interest of the trainees, asking the trainees to imitate the instructor in performing the demonstrated skills and allowing the trainees to work as a team by giving assignments.

Okeke (2004) outlined training procedures to include: teaching the trainees from known to unknown, teaching only approved procedures and practices, making sure that the activities of individual trainees are effectively monitored, provide the materials to be

used and explain each of them to the trainees, demonstrate the skills to be used to the trainees, trainees observed the skills and practice what the instructor demonstrated, assessment through the use of practical test to know the trainee's ability.

In view of Onuka and Olaitan (2007) some steps on training procedures needed to guide the instructor on how to train individuals in acquiring skill in egg production include: the instructor should start teaching trainees from known to unknown, explain the facilities to be used by the trainer for training each trainee in each competency area of the programme, explain the skills clearly to the trainees, one after the other or step-by-step, demonstrate the explained skills using appropriate facilities while the trainees observe, call each trainee to imitate what the instructor has demonstrated while the instructor observes each trainee perform, correct any mistake made by the trainee, encourage repetitive practice of the skills learnt, test the practice of a group of related skills towards the goal of commercial egg production, tell the trainee the result of his performance, suggest to trainees sources of facilities required for the business and how they can procure them, encourage visit to other training centres (after they had left) to provide trainee feedback on their practice in the establishment, identify other hazard to their establishment in their environment and how they can overcome these problems (eg insecurity or disease maybe such hazard). Onuka (2008) stated that instructors should follow the following procedural steps in training people for cassava processing,

- i. Teach the skill clearly to trainees, one after the other or step by step.*
- ii. Explain each of the facilities to be used to the learners and how to use them*
- iii Try out the facilities and steps of skills learning by the instructor before the learners on how to carry out the task using the identified facilities*

- viii. *Provide the same facilities to the learners to carry out the task individually or as small group before the instructor.*
- ix. *Supervise what the trainees are doing and how they are carrying out the task.*
- x. *Assess the job done by the learner to ascertain if they have acquired the necessary skills required to carry out the job properly*
- xi. *Cause trainees to apply the acquired skills to planning, organizing and implementation of plants to produce the identified project or practice the task (s). The literature of authors reviewed above guided the researcher to develop an instrument for data collection on competencies in training for plantain production enterprise.*

Related Empirical Studies on Entrepreneurial Competency

Empirical Studies on Entrepreneurial Competency

Some studies have been carried out to identify entrepreneurial competencies required for success in employment in occupations. A study was carried out by Enete, Amusa and Eze (2009) on entrepreneurial competencies required by students of schools of agriculture in southwestern Nigeria for processing cocoyam into flour and chips for employment on graduation. Three research questions were developed to guide the study. Three hypotheses were formulated and tested at the probability of 0.05 level of significance. The study adopted survey research design. It was carried out in SouthWestern Nigeria. The population of the study was 440 made up of 200 instructors in the school of agriculture in Ondo and Oyo States respectively and 240 food processors in the two states. The sample of the study was 56 made up of 26 instructors from the departments of crop science and Home Economics in the two schools and 30

food processors from the two states. The instrument used for data collection was a 33-competency structured questionnaire. The competency items had a 4 point response scale of Highly Required, Averagely Required, Slightly Required and Not required with a corresponding value of 4, 3, 2, and 1. The instrument was face-validated by three experts, split half technique and cronbach alpha reliability method were adopted to determine the internal consistency of the competency questionnaire item; a cronbach alpha coefficient of 0. 84 were obtained. Fifty-six copies of the instrument were retrieved and analyzed using weighted mean and standard deviation where the hypothesis, were tested using t-test statistic.

The result of the study revealed that 11 skills were required in planning for cocoyam processing enterprise. It was also found out that 4 skills were required in general cocoyam processing practices, 4 skills hi processing cocoyam into flour, 4 skills in processing cocoyam into chips and 10 skills in marketing processed cocoyam products. The results of the null hypotheses tested revealed that there were no significant differences in the mean ratings of the response of instructors and food processors in the thirty-three (33) entrepreneurial competency items. The researcher therefore recommended that the identified competencies needed to be incorporated into the curriculum of crop production and processing in schools of agriculture. The study is related to the present study because it involves identification of entrepreneurial competencies and incorporating the competencies into the curriculum of the schools for employment on graduation. It guided the researcher in selecting some aspects of the methodology to use for the study such as the design of the study.

A study was carried out by Olaitan, Eze and Elom (2009) on entrepreneurial competencies required by secondary school graduates for entering into oil palm processing enterprise in South Eastern States of Nigeria. Three research questions were developed and answered by the study while three hypotheses were formulated and tested at the probability of 0.05 level of significance. Survey and function of industry designs were used for the study. The study was carried out in South Eastern Nigeria made up of Abia, Anambra, Ebonyi, Enugu and Imo States. Population of the study was 1,102 made up of 920 teachers of agriculture science in senior secondary schools and 182 registered oil palm processors. The sample was 459 made up of 277 teacher and 187 oil palm processors; the sample of the teachers was derived from 3% of the population of the teachers in each state covered by the study. A 45 competency item questionnaire was developed from literature reviewed and had a four (4) point response scale of Highly Needed (HN), Averagely Needed (AN), Slightly Needed (SN) and Not Needed (NN) with a corresponding value of 4, 3, 2 and 1 respectively. The questionnaire had 2 parts A and B. part A was used to obtain information on personal data of the respondents. Part B was divided into 3 sections which are planning skills (11), processing skills (16) and marketing skills (18). The instrument was face validated by three (3) experts. Split half technique and Crobach Alpha correlation method was used to obtain reliability of the instrument which yields a co-efficient of 0.84. The questionnaire was administered on 459 respondents made of 277 teachers of agricultural science and 182 registered oil palm processors. All the copies of the questionnaire were retrieved and analysed using

weighted mean and standard deviation to answer the researcher questions, while t-test statistic was used to test the hypotheses.

The result of the study revealed that 11 competencies in planning, 16 competencies in processing of oil palm and 18 competencies in marketing of palm oil were required for success in oil palm processing enterprise the study also revealed that there was no significant difference in the mean ratings of the responses of the teachers of agricultural science and oil palm processors on competencies required in planning, oil palm processing and marketing of palm oil in oil palm processing enterprise. It was recommended that the 45 entrepreneurial competencies identified by this study be packaged into a training programme for empowering interested secondary school graduate. The study is related to this study in that it guided the researcher in selecting some aspects of the methodology to use for the study such as survey design.

A study was carried by Onuka (2008) on development of entrepreneurship skills Training modules for enhancing youth participation in regulated cassava processing occupations in South East Nigeria. Eight research questions were developed and answered by the study. Four null hypotheses were formulated and tested at 0.05 level of significance. The study adopted the functions of industry and survey research designs. The study was carried out in Southeast which comprise of Abia, Anambra, Ebonyi, Enugu and Imo states. The population of the study is 1110, made up of 726 agricultural extension agents and 384 youths in various cassava processing occupations. The overall sample size was 348 consisting of 300 agricultural extension agents and 48 youths. Questionnaire and a rating scale were developed; the instrument was made up of part

one and two. Part one was used to obtain information on the personal characteristics of the agricultural extension agents, while part two consisted of questions addressed by the study in form of questionnaire items. The questionnaire items were face validated by five (5) experts. The questionnaire after validation consisted of the following sections and items: Section A: Planning skills (13 items), Section B: Organizing skills (7items), Section C: Implementing skills (14items for starch, 14 for flour, 14 for gam, 11 for low cyanide chips and 13 for high- cyanide chips), Section D: Marketing (8 items for starch, 9 for flour, 5 for garri and 11 for chips) Section 'E': Evaluation (5 items), Section F: wastes and by-production management (7items) Section 'G': Facilities (17 items for starch 17 for flour, 18 garri and 15 for chips).

Each item in part two of the instrument excepting module G, was assigned a four point response scale and the response options were. Highly Required (HR), Required (R), Required little (RL), Not required (NR). Numerical values of 4, 3, 2, and 1 were assigned to the items. For G, the response scale is discrete. The respondents were required to rank the response options to an item by checking either "required" (R) or " Not required" (NR). The researcher also developed a rating scale to be used together with the modules during training for assessing or judging the performance of the trainees in starch, flour, garri, and chips. The rating scales were assigned a four response options of excellent performance (EP), high performance (HP) low performance (LP) and No performance 2 and corresponding to respondents feeling and observations of how well the instrument represented each items in the rating scale. Cronbach alpha technique used to determine the reliability of the questionnaire items. The reliability tests yielded the following

reliability coefficients: starch 0.90, flour 0.88, garri 0.96 and chips 0.90.

Three hundred (300) copies of the questionnaire were administered on agricultural gents. The number of copies of the questionnaire retrieved was 271. The data collected for the study were analysed using the statistical package for social sciences (SPSS). The analysis was on item-by-item basis. Percentages, mean and standard deviation were used to answer the research questions and t-test statistic for testing the hypotheses at probability of 0.05 level of significance.

The researcher found out that

- (1) Nine (9) clusters of skills consisting of 86 skills and facilities were required for the development of entrepreneurship skills training modules in regulated starch production.*
 - (2) Nine (9) skill clusters made up of 88 skills and facilities were required for the development of entrepreneurship skills training modules in regulated flour production occupation,*
 - (3) Nine (9) clusters of skills made up of 89 skills and were required for the development of entrepreneurship skills modules in regulated garri production occupation and*
 - (4) Ten (10) clusters of skills consisting of 99 skills and facilities were required for the development of entrepreneurship skills modules in regulated cassava chips production occupation. In the hypotheses tested, the result also revealed that: there was no significant difference between the mean performance of youth trained in the industry and those trained in the field. It was recommended that*
- (1) Government of the Southeastern States should integrate the developed*

entrepreneurship skills training modules into their skill- Acquisition programme to train youths on short course basis to enable them acquire entrepreneurship skills in cassava processing occupations for employment.

- (2) Entrepreneurs in cassava processing should make use of the developed entrepreneurship skills training modules during interview for selecting qualified employees in order to improve their production.*
- (3) Universities colleges and teachers of agriculture could adopt the training modules in their farmer education programmes. It guided the researcher in selecting some aspects of the methodology to use for the study and also guided the researcher in structuring the questionnaire.*

In another study carried out by Okafor and Ogbazi (2009) on work-skills required by secondary school graduates for success in cassava production enterprises in Imo State. Two research questions were developed to guide the study. Two hypotheses were formulated and tested at the probability of 0.05 level of significance. The study was carried out in Imo States of Nigeria. The study made use of descriptive survey research design. The population for the study comprised all the 521 teachers of agriculture and 50 extension agents. The sample for the study was 110 respondents, made up of 89 teachers of agricultural science and 21 extension agents. The instrument used for data collection was a 27 skill item questionnaire. The instrument used a four-point likert-type scale for rating the response options Highly Required (HR), Required (R), Moderately Required (MR) and Not Required (NR) as well as numerical values of 4, 3, 2, and 1 respectively. The instrument was subjected to face validation by three experts. The reliability of the

instrument was established using Cronbach Alpha formula to find out the internal consistency of the validated instruments. A reliability coefficient obtained was 0.89. 110 copies of the instrument were administered and retrieved.

The data collected for the study were analyzed using mean and standard deviation to answer the research questions. The study found out that 19 work-skills were required in cassava production and 8 work-skills required in processing cassava roots into garri. The study also found out that there was no significant difference in mean ratings of the responses of teachers of Agricultural science and extension agents. The researcher recommended that the skills identified should be integrated into the secondary school curriculum and skill acquisition centers for used in training unemployed secondary school graduates in cassava production enterprises for employment. It guided the researcher in selecting the methodology to use for the study such as the design which is survey research design.

Empirical Studies on Improvement Need of Farmers

In an exploratory study carried out by Meier, Williams, Humphreys and Centko (1999) to assess competency gaps in science, Mathematics, Engineering, and technological (SMET) Education, the study sought out to: identify competencies required of the 21st century work force and identify the work force competencies that need to be targeted for curricular reform.

Three research questions were developed. A structured questionnaire with 30 items was generated from the literature reviewed and developed for the study. The questionnaire was administered on two different groups of business industry managers.

Group number one (N = 9) was located in central Iowa and represented small business firms employing less than 50 people. Group number two (N=10) was located in central Illinois and represented fortune 500 companies. The first collection of data was conducted using a paper and pencil survey containing the original 30 item pool. The second collection of data was conducted listing a focus group methodology from each of the business industry groups.

The findings from the study revealed what industry practitioners perceived to be critical issues to be addressed by curriculum reform in technological education programmes. The results of this exploratory study indicated that advanced technological programmes (SMET) must continue to emphasize such issues as group project skills and quality concepts. But they must also be sure to emphasize co-operation among co-workers, the welfare of the group over self, customer satisfaction over task completion, interpersonal communications skills, and team working skills in all aspects of their curriculum. Industrial Technology Programmes that want to elevate their programmes to the next level must now begin to examine how to improve their graduates' abilities to understand items such as: (a). How a firms vision, strategies and performance out-comes effect overall organizational performance, (b) How the organizations culture influences individual behaviours and (c) How the welfare of group over self must be instilled into organizational culture. These last items (a-c) need to be integrated and synthesized into the entire curriculum not just specific courses. It guided the researcher in selecting the methodology to use for the study.

A study was carried out by Olaitan, Amusa and Nwobu (2009) on Quality

Assurance of instructors in teaching Cocoyam production to students in schools of Agriculture in Southwestern Nigerian. Four research questions guided the study; survey research design was adopted. The study was carried out in south western Nigeria; specifically in Ondo and Oyo states. The population for the study was 200 instructors from the two schools of agriculture in the area. The sample of the study was 46 instructors purposively sample from the departments of crop production and agricultural engineering with interest in tillage operations. Two sets of instrument were developed for the study; they were 25-psycho-productive multiple choice test item in cocoyam production for determining quality assurance of the instructors and 45-competency cluster structured questionnaire item for identifying areas where instructors require improvement.

The questionnaire was divided into two categories of needed and performance. The needed category has a 4 point response scale of Highly Needed, Averagely Needed, Slightly Needed and Not Needed; while the performance category also has 4-point response scale of High Performance, Average Performance, Low Performance and No Performance with a corresponding value of 4, 3, 2 and 1 for the two groups of scale respectively. The two sets of instrument were validated by three experts. Split-half technique and Cronbach alpha reliability method were adopted to determine the internal constituency of the competency questionnaire item with a reliability coefficient of 0.81 obtained.

Forty six copies of 25-psycho-productive multiple choice test item were administered to the instructors of one to one basis with 30 minutes duration for providing answers to the multiple choice test items. This was carried out personally by

the researchers in the two schools of agriculture. Three weeks later, forty-six copies of the 45-competency cluster item questionnaire were administered on the same instructors in the schools of agriculture with a two day interval for the completion of the questionnaire. The entire forty six copies administered were retrieved and analyzed. Frequency and percentage were used to analyze data from the psycho-productive multiple choice test items to determine the quality assurance of the instructors while improvement needed index (INI) was employed to analyze data from the competency cluster questionnaire item in order to identify areas where instructors require improvement in teaching cocoyam production to students. In taking decisions on the level of quality assurance and competence of the instructor, the following percentage range were used: 70% and above = Very High competence; 60 - 67% = High competence; 50-59% = Average Competence; 40 - 49% = Low competence; and below 40 % = No competence.

Improvement needed index (INI) was used for taking decision on areas where improvement is required by instructors in teaching cocoyam production to students in schools of agriculture in south western Nigeria. The improvement needed index (INI) was determined as follows:

- i. The mean (x_n) of the needed category was determined for each item,*
- ii. The mean (x_p) of the performance category was also determined for each item.*
- iii. The performance gap (PG) was therefore determined by finding the difference*

between x_n and x_p for each item; that is $PG = x_n - x_p$.

Where the value of PG is positive (+), it means improvement is needed because,

the level at which the instructors were performing in teaching the item to students is lower than what is required where PG is negative (-), it means improvement is not needed because, the instructors are performing the teaching of the item more than what is required. Where PG value is zero (0), it means improvement is also not needed because; the level at which the instructors were performing the teaching of the item is equal to the level that was required. It was found out that the quality assurance of the instructors in teaching cocoyam production was average. The study also found out that the instructors required improvement on teaching the planning, pre-planting, post planting, harvesting and marketing operations of cocoyam to students of schools of agriculture in south western Nigeria. Therefore the researcher recommended that, the required competencies identified by this study be package and use to retain the instructors in cocoyam production to enable them the training needs of students and justifiably motivate their interest in farming profession. The study adopted survey research design which guided the researcher and an aspect of method of analyses which is Improvement Need Index (INI).

A study was carried out by Olaitan, Alaribe and Ellah (2009) on capacity building Needs of palm oil and kernel marketers for Enhancing Economic Returns from oil palm industry in South Eastern Nigeria. Four research questions were developed to guide the study. Survey research design was used for the study. The study was carried out in South Eastern Nigeria. The population for the study was 1,099 made up of 920 teachers of agricultural science and 179 palm oil and kernel marketers. Sample for the study was

456. Sample for the teachers was obtained from 3% of the population of teachers from the states covered by the study. This is in conformity with the statement of Boll and Gall in Uzoagulu (1988) that if a population is up to 1000, 20% or less could be used as sample for obtaining data to minimize sampling error.

A 45 skill item questionnaire that covers planning, reprocessing and marketing of palm oil and kernel was developed for collecting data from the teachers of agricultural science and marketers. The questionnaire had two (2) type of response scale: needed and performance scales. The needed type of scale had a 4 point response of; Highly Needed (HN), Averagely Needed (AN), Slightly Needed (SN) and Not Needed (NN) with the corresponding value of 4,3,2 and 1. This aspect of the questionnaire was designed to collect data from the teachers of agricultural science and marketers of palm, oil and kernel, to determine the skills needed by palm oil and kernel marketers in the enterprise. The performance type of scale had a 4 point response of; High performance, Average performance, Low performance and No performance, with a corresponding value of 4, 3, 2, and 1. This aspect of the questionnaire was designed to collect data from palm oil and kernel marketers only, to determine their level of performance of each skill item.

The questionnaire was validated by three (3) experts; two from Crop Science Department and one from vocational Teacher Education Department (VTE); University of Nigeria, Nsukka. Their corrections and suggestions were used to produce the final copy of the questionnaire. Split half technique and Cronbach alpha method were used to determine the reliability of the questionnaire which yielded a co-efficiency of 0.83. Four hundred and fifty six (456) copies of the questionnaire were administered on the

respondents with the help of five research assistants. All the copies of the questionnaire were retrieved after two weeks. The data collected was analyzed using weighted mean and improvement Needed Index (INI) to answer the research questions. Capacity building need was determined as follows:

1. The mean X_n of the needed category was determined for each item.
2. The mean X_p of the perform category was determine for each item.
3. The performance gap (PG) was determined by finding the difference between the values of the two means. That is, $X_n - X_p = PG$

Where PG is zero (0), it means that capacity building is not needed for that item because the level at which the marketers performed the skill is needed. Where PG is negative (-), it means capacity building is not needed for hat item because the level at which the marketers performed the skill is higher than the level at which it is needed. Where PG is positive (+), it means capacity building is needed because the level at which the marketers performed the skills is lower than the level at which it is needed. It was found out that palm oil and kernel marketers needed capacity building in planning, reprocessing and marketing skills in palm oil and kernel enterprise. It was recommended by the researcher that the findings of this study be utilized to develop capacity building programs for retraining marketers of palm oil and kernel for greater efficiency. It guided the researcher in selecting some aspects of the methodology to use for the study and also guided the researcher in structuring the questionnaire.

In another study conducted by Nwaodo (2009) on workshop management competencies improvement needs of auto-mechanics teachers in the south eastern states

of Nigeria. Three research questions guided the study. Survey research design was used for the study and area of the study covered all the technical colleges that offer auto-mechanics in the south eastern states of Nigeria. The population for the study was made up of 18 auto-mechanic NCE (technical) teachers and 33 auto-mechanic B.Sc (ed) (technical) teachers in the five states of the zone. The total population used for the study was therefore 51. The instrument used for data collection was a structured questionnaire and it was based on a five-point Likert scale of Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. The instrument was face validated by five experts. Cronbach Alpha was used to test the reliability and 0.72 was obtained as the reliability co-efficient. A total of 51 copies of questionnaire were distributed while 47 copies were returned and used for data analysis. The data collected was analyzed using mean. A mean of 3.50 and above indicated that the respondents agreed to the statement while a mean score below 3.50 indicated disagreement to the statement. The study identified thirty-three competencies needed for improvement by auto-mechanic teachers in the south eastern Nigeria to manage auto-mechanic workshops. The researcher made the following recommendations based on the findings of study:

- 1. Automechanic teachers must be acquainted with competency based training on workshop management.*
- 2. Expose Automechanic teachers to intensive practice on workshop management.*
- 3. Arrange workshops, seminars and conferences for Automechanic teachers on workshop management.*

It guided the researcher in selecting some aspects of the methodology to use for

the study and also in obtaining information to support the findings of the study during discussion.

A study was carried out by Olaitan, Alawa, and Ekong (2009) on improvement/capacity building needs of farmers in improving soil nutrients for enhancing crop production in cross river state, Nigeria. Three research questions were developed to guide the study. The study adopted survey research design. The study and the population for the study was 5,560 respondents comprising 5,500 registered crop farmers and 60 Extension agents. The total sample for the study was 335 respondents (Proportionate sampling technique was involved to obtain a sample of 275 registered crop farmers while the entire sub-population of Extension Agents (60) was involved in the study because it was small. The choice of 5% proportionate is in agreement with the opinion of Boll and Gall in Uzoagulu (1998) that when a defined population is greater than 5,000 respondents, 10% or less of the population could be used.

A 71 competency questionnaire covering skills in soil testing and analysis, manure and manuring and fertilizer application was used in collecting data for the study. The questionnaire had two categories - Needed and Performance. The Needed category had a 4 point response scale of Highly Needed, Averagely Needed, Slightly Needed and Not Needed with corresponding scores of 4, 3, 2, and 1 respectively. The performance category has a response scale of High Performance, Average Performance, Low Performance and No Performance with corresponding scores of 4, 3, 2, and 1 respectively. The instrument was face validated by three experts. Cronbach Alpha reliability method was adopted in determining the internal consistency of the instrument

and a reliability coefficient of 0.85 was obtained. Three hundred and thirty five (335) copies of the questionnaire were administered on the respondent with the help of the hired research assistants on a face to face basis and retrieved with a 100% return rate. The data collected were analyzed using weighted mean and Improvement Needed Index (INI) to answer the research questions. The weighted mean of needed category was represented by (N) while the weighted mean performance of respondents for each item was represented by (P). The difference between the two means that is (N-P) was determined to indicate Performance Gap (PG) which could yield a zero (0), negative or positive value.

- a. A difference of zero (0) indicated that there is no need for capacity building because the level at which the competency is required is the same as the level at which the farmers could perform,*
- b. A negative (-) difference implies that there is no need for capacity building because the level at which the farmer could perform the competency is higher than the level at which it is required,*
- c. A positive (+) PG indicates that there is need for capacity building because the level at which the competency is required is higher than the level at which the farmers could perform. This difference may range from low to average depending on the value of the performance gap.*

It was found out that farmers required capacity building in soil testing and analysis, manure and manuring and fertilizer application methods. The researchers recommended therefore that the skills identified in soil testing and analysis, manure and

manuring, fertilizer application should be packaged and used for retraining these farmers through workshops and seminars improving soil nutrients for enhancing crop production. It guided the researcher in selecting some aspects of the methodology to use for the study and also in obtaining information to support the findings of the study during discussion.

Another study carried out by Olaitan, Alaribe and Nwobu (2009) on capacity building needs of Teachers of agriculture for effective teaching in Upper Basic Schools in Abia State. Two research questions guided the study Evaluation and survey research designs were used for collecting data for the study. Evaluation, as explained by Nwanna (2007), is an act of deciding whether the end product can be described as adequate or inadequate through testing, measurement and assessment. Psycho-productive test was developed for collecting data from respondents. The study was carried out in Abia state. Population for the study was 384 teachers of Agriculture at the junior secondary level in the area of study. The sample for the study was 200 NCE graduates teachers of Agriculture obtained through random sampling techniques (balloting).

A 40 item psycho-productive multiple choice test that covers the pedagogical skills and technical areas of agriculture was developed for collecting data from the teachers of agriculture on their performance in the content of agricultural education curriculum they have learnt in the College of Education. The psycho-productive multiple choice test was based on Simpson's taxonomy of psychomotor domain which are perception (4 items) set (5 items), guided response (6 items) mechanism (10 items) complex overt response (10 items), and adaptation (5 items).

A 20-cluster item questionnaire covering all the areas of Agricultural education curriculum was developed for collecting data from the teachers of Agriculture about areas of Agricultural education program where they needed capacity building. The questionnaire had two types of response scale; the needed and performance scale. The needed type of scale had a four point response of Highly Needed (HN), Averagely Needed (AN), Slightly Needed (SN), and Not Needed (NN) with a corresponding nominal value of 4, 3, 2, and 1 respectively; the performance type of scale had a 4 response points of High Performance (HP), Average Performance (AP), Low Performance (LP), and No Performance with a corresponding value of 4, 3, 2 and 1 corresponding value of 4, 3, 2 and 1 respectively. The two types of instrument were face validated by 3 experts two from Agricultural Education and one from measurement and Evaluation, University of Nigeria Nsukka.

Cronbach alpha technique was used to determine internal consistency of the instruments. The test yielded a co-efficient of 0.85 while the questionnaire yielded a co-efficient of 0.83. The psycho-Productive test was administered to 200 respondents on one to one basis for 40 minutes. 200 copies of the questionnaire were administered to the respondents through three research assistants and 196 copies were retrieved after two weeks. The test was analyzed using frequency and percentage of the teachers in the program of Agricultural education they have learnt in the College of Education. Performance score was interpreted as follow: 70% or above very high, 60-69% high, 50-59 Average, 40-49 low and below 40% poor performance.

The capacity building needs of the teachers on the curriculum of Agricultural

Education program of the Colleges of Education was determined thus:

- i. The weighted mean (\bar{X}_n) of the need scale was determined for each cluster;*
- ii. The weighted mean (\bar{X}_p) of the performance scale was also determined for each cluster,*
- iii. The performance gap (PG) was determined by finding the difference between (\bar{X}_n and \bar{X}_p , that is $(\bar{X}_n - \bar{X}_p) = PG$*

Where PG is positive (+), it means capacity building is required because the rate at which teachers performed is lower than what is expected. Where PG is negative (-), it means capacity building is not required because the rate at which teachers performed is greater than what is needed. Where PG is zero (0), capacity building is not required because the rate at which teaches performed is equal to what is needed, Olaitan and Ndomic in Ellah (2007). The study found out that teachers obtained low performance (49%), in the curriculum content of Agricultural Education Program and also required capacity building in the same program. The researcher recommended that the findings of this study be utilized to develop capacity building programs for teachers of Agriculture in Junior Secondary Schools in the area of study. The study guided the researcher in selecting some aspects of the methodology to use for the study and also in obtaining information to support the findings of the study during discussion.

In a study carried out by Uga (2006) on the identification of work-skill improvement needs of farmers in rice production in Ebonyi State, 6 research questions were developed and 4 null hypotheses were formulated and tested at 0.05 level of

significance at relevant degrees of freedom. A structured questionnaire was generated from the literature reviewed and developed for the study. The questionnaire was administered on 138 respondents. The same copies of questionnaire was administered on 138 respondents. The same copies of questionnaire was retrieved analyzed using mean, SD and improvement require index (IRI) to answer the research questions. The t-test statistic was used for testing the hypotheses. The major findings of the study revealed that the following work skill items are needed for success hi rice productions. Nursery establishment - 9 skills, field establishment - 40 skills; harvesting, threshing & winnowing - 19 skills; processing and storage - 58 skills & marketing - 9 skills. It was found out that out of 35 skills identified as needed in rice production farmers require improvement in III of them. It was also found out that there was no significance different in the mean ratings of the responses of the registered rice farmers & the agric extension agents in 129 skills out of 135 in is rice farmers needed improvement in rice production. In view of the above, it was recommended that the identified work-skill modules and their correspondence skill items in rice production be packaged into programmes by the government and retraining farmers for improved rice production. The study guided the researcher in selecting the methodology to use for the study and also in obtaining information to support the findings of the study during discussion.

In a study carried out by Asogwa, Uko and Omeh (2010) on quality assurance of teachers for teaching oil palm production to students in senior secondary schools in Enugu State. Four research questions guided the study, survey research design was adopted. The study was carried out in Enugu State. The population of the study was 484

teachers of agricultural science in senior secondary schools in Enugu State. The sample for the study was 107 teachers of agricultural science. A random sampling technique was used for the study. A forty-five structured skilled item questionnaire was developed from the literature and used for the data collection. Five experts validated the instrument; split half technique and Cronbach Alpha reliability method were involved in determining the internal consistency of the instrument. A reliability method was involved in determining the internal consistency of the instrument. A reliability coefficient of 0.85 was obtained. The data was analyzed using mean and improvement required index (IRI) to answer the research questions. The findings of the study revealed that teachers in Enugu state require capacity building for quality assurance in teaching oil palm production to students in senior secondary schools in areas of nursery, pre-planting and planting, post planting and post harvesting operations. It was recommended that the identified skills were teachers maintained low to average quality assurance, be packaged into a training programme to be utilized in retraining the teachers to improve their quality in teaching oil palm production to students in senior secondary schools. The study guided the researcher in selecting the methodology to use for the study and also in obtaining information to support the findings of the study during discussion.

Summary of Review of Related Literature

Literature was reviewed on conceptual framework which covered job analysis, task analysis, modular analysis, competency based analysis, occupational area analysis, function of industry approach, need assessment, need gap and improvement. The literature reviewed on conceptual framework guided the researcher in identifying and

selecting appropriate approaches to be used; it also guided the researcher in selecting the appropriate technique to be used in determining the improvement needs of the farmers and it made the trend of research clearer through the schema.

Literature on the theoretical framework of the study covered occupational and training theories. The theories guided the researcher in identifying and selecting appropriate competency elements in planning, plantain production and marketing, also it guided the research in selecting suitable competency elements and methodology that could be involved in training secondary school graduates in plantain production for employment and retraining farmers for proficiency on the job. Literature was reviewed on competencies in plantain nursery, plantain plantation management, processing and marketing; and material resources needed in different plantain production enterprises. The reviewed literature in the above areas guided the researcher to select competency elements in each of the plantain production enterprises which were arranged into tasks. Empirical studies reviewed guided the researcher in selecting some suitable aspects of the methodology used for the study; structuring the questionnaire and also in obtaining information to support the findings of the study during discussion. The literature reviewed on modules and functions of industries guided the researcher in packaging the identified plantain production competencies into programmes which would be used to fill the gaps as follows:

- a. lack of jobs among secondary school graduates due to absence or lack of competencies needed for employment in any plantain production enterprise, if the competencies identified and packaged by this study could be used to train these*

- secondary school graduates for employment thereby filling the existing gap.*
- b. *the existing gap among the plantain farmers is the discrepancy between possessed and what they need to possess to be proficient in plantain production. The competencies identified and packaged by this study could be utilized to retrain the farmers for proficiency on the job thereby reducing to the barest minimum the existing discrepancies.*

CHAPTER THREE

METHODOLOGY

This chapter presented the procedure used for carrying out this study. It was organized under the following subheadings: Design of the Study, Area of the Study, Population of the Study, Sample and Sampling Technique. It also described the Instrument for Data Collection, Validation of the Instrument, Reliability of the Instrument, Method of Data Collection and Method of Data Analysis.

Design of the Study

The study made use of descriptive survey research design. A descriptive survey research in the opinion of Nworgu (2006) is a design in which a group of people or items

is studied by collecting and analyzing data from a few people or items considered to be representative of the entire group. Olaitan, Ali, Eyoh and Sowande (2000) explained descriptive survey as a research design that employs the study of large and small populations by selecting and analyzing data collected from the group through the use of questionnaire, personal or telephone interview. The design was considered appropriate for this study since it obtained data from a group of agricultural science teachers, extension agents and registered plantain farmers through the use of structured questionnaire to obtain data on entrepreneurial competencies needed by secondary school graduates for employment in plantain production enterprises and farmers for proficiency on the job.

Area of the Study

The area of the study was Abia and Imo States. Abia state is made up of three senatorial zones: Aba, Ohafia and Umuahia; Imo state comprises of three senatorial zones which are Okigwe, Orlu and Owerri. The two states were located in the tropical rain forest zone which favours the production of plantain in large quantities and plantain has a quick turn over; that is within one year plantain can mature while its suckers can replaced the harvested plant.

Population of the Study

The population of the study was 1,490. This was made up of 644 teachers of Agriculture comprising 184 Agricultural Science Teachers from Abia and 460 from Imo State) (Sources: Secondary Education Management Board (SEMB) Abia and Imo States) (See Appendix B page 229); 766 extension agents comprising 512 from Abia State and 254 extension agents from Imo State (See appendix C page 230), 80 registered plantain farmers made up of 20 nursery farmers (15 nursery from Abia and 5 nursery farmers

from Imo), 34 plantain plantation management farmers (24 plantain plantation management farmers from Abia State and 10 from Imo States), 26 plantain processing farmers (16 from Abia and 10 from Imo states) See Appendix D page 231 (Source:, Agricultural Development Programme (ADP) Abia and Imo States).

Sample and Sampling Technique

The sample of the study was 362 which comprised 129 Agricultural science teachers (37 and 92 Agricultural science teachers from Abia and Imo States, respectively), 153 extension agents (102 and 51 extension agents from Abia and Imo States, respectively) (See Appendices E and F on pages 232 and 233 respectively) and all the 80 registered plantain farmers. The population of registered 20 plantain nursery farmers, 34 plantain plantation managers and 26 plantain processors -were very small hence the population for each group was not sampled.

Sample for agricultural science teachers and extension agents were obtained using 20 per cent proportionate random sampling technique of the population of Agricultural science teachers and Extension agents from the States covered by the study. This was in conformity with the statement of Boll and Gall in Uzoagulu (1998) that if a population is 1000, 20 per cent or less could be used as sample.

Instruments for Data Collection

The researcher visited Agricultural Development Programme (ADP) Owerri where activities in plantain nursery, plantation management, processing and marketing take place; National Institute of Horticultural Research and Training (NIHORT) Okigwe and Imo State Polytechnics Umuagwo were also visited by the researcher where research and training in plantain nursery, plantain management, processing and marketing of plantain products take place (See Appendix A page 226).

The researcher:

1. *Observed the available facilities for performing various activities in require enterprise.*
2. *Observed the training activities of each of the enterprise.*
3. *Wrote down step by step activities carried out by the instructor in each of the enterprise.*

The records obtained from each of the research centres helped the researcher in addition to review of literature, develop four sets of structured questionnaire in relevant areas.

Four sets of structured questionnaire were used to collect data for this study. The four sets of questionnaire were developed through literature review and information from the industry. Each of the three sets of the questionnaire covering the three enterprises were divided into two parts A and B. Part A was used for collecting personal data from the respondents. Part B was divided into four sections. For example, the nursery enterprise was divided into the following sections:

1. *Planning for plantain nursery enterprise.*
2. *Plantain nursery enterprise.*
3. *Marketing of plantain nursery seedlings*
4. *Material for effective management in nursery enterprise.*

Similarly, the questionnaire on plantain plantation management and plantain processing and marketing also have their relevant parts, sections and responses components.

Each item has two response categories of needed and performance. The needed

category had five response options of *Very Highly Needed (VHN)*, *Highly Needed (HN)*, *Averagely Needed (AN)*, *Slightly Needed (SN)*, *Not Needed (NN)* with corresponding nominal values of 5, 4, 3, 2 and 1 respectively. The performance category also has five response options of *Very High Performance (VHP)* *High Performance (HP)*, *Average Performance (AP)*, *Slight Performance (SP)* and *No Performance (NP)* with corresponding nominal values of 5, 4, 3, 2 and 1 respectively. The Agricultural science Teachers, Extension agents and registered plantain farmers all responded to the needed category while only the registered plantain farmers answered the performance category (See Appendix G page 234).

The fourth set of the questionnaire was on training competencies needed by trainers at skill acquisition centres with five response options of *Very Highly Needed (VHN)*, *Highly Needed (HN)*, *Averagely Needed (AN)*, *Slightly Needed (SN)*, *Not Needed (NN)* with corresponding nominal values of 5, 4, 3, 2 and 1 respectively. This instrument was answered by agricultural science teachers and extension agents only (See Appendix H page 280).

Validation of the Instrument

The questionnaire for data collection was face validated by five experts: one from Agricultural Education unit of the Department of Vocational Teacher Education of the University of Nigeria, Nsukka, one from Crop Science Department, Federal University of Technology Owerri, one from Crop Science Department of Imo State Polytechnic, Umuagwo, Owerri, one from National Institute of Horticultural Research and Training (NIHORT), Okigwe and one from Agricultural Development Programme (ADP) Owerri. Each expert was served with a copy of each of the four sets of the questionnaire and was requested to check the competency items for clarity,

ascertain the relevance of each item to the enterprise, supply any missing items and make suggestions that could help to improve the quality of the questionnaire. The validated instruments from the experts were retrieved. Their suggestions were utilized to produce a final copy of the questionnaire for the study.

Reliability of the Instrument

To obtain the reliability coefficient of the instrument, the questionnaire was administered on 88 respondents selected from Ebonyi State. This was made up of 31 agricultural science teachers, 35 extension agents and 22 registered plantain farmers of nursery, plantation management, plantain processing and marketing. The choice of Ebonyi State was informed by a number of factors which include the prevalence of plantain production in the state and the existence of Ebonyi state within the same southeast geopolitical zone with the study area.

Cronbach Alpha reliability method was used to determine the internal consistency of the items. The reliability coefficient of 0.88 was obtained for plantain nursery enterprise, 0.95 for plantain plantation management enterprise, 0.90 for processing and marketing enterprise and 0.84 was obtained for training competencies in plantain production enterprises.

Method of Data Collection

Six research assistants were hired (three from Abia State and three from Imo state); they were instructed on how to administer the questionnaire to the respondents. Each of the 129 agricultural science teachers and 153 extension agents was given four sets of the questionnaire while each of the 20 nursery, 34 plantain plantation farmers and

26 plantain processors was given one set relevant to the farmers' enterprise. The researcher monitored the research assistants very closely while administering the questionnaire to the respondents. Three hundred and sixty two (362) completed copies of questionnaire were retrieved after four weeks by researcher from the research assistants at an agreed place in the headquarter of each State; this indicated 100% return rate.

Method of Data Analysis

The data collected from the respondents were analyzed using weighted Mean to answer research questions 1, 2, 3 and 7 and Improvement Need Index (INI) to answer the research questions 4-6 while Analysis of Variance (ANOVA) was used to test the null hypotheses of no significant difference at probability of <0.05 level of significance.

In deciding on the competency items needed, the real limit of numbers was utilized for decision making as follows:

Very Highly Needed (VHN)	4.50 - 5.00
Highly Needed (HN)	3.50-4.49
Averagely Needed (AN)	2.50 - 3.49
Slightly Needed (SN)	1.50 - 2.49
Not Needed (NN)	1.00 - 1.49

Any competency item with a Mean value of 1.50 or above was regarded as needed. Any item with a mean value less than 1.50 was regarded as not needed. The standard deviation was used to decide on the closeness or otherwise of the respondents to the Mean in their responses. Any item with standard deviation of less than 1.96 indicated that the respondents were not too far from the mean or from one another in their

responses.

In deciding on the need gap value that constitutes the improvement needed, the Improvement Needed Index (INI) was utilized. The Improvement Needed Index (INI) is as follows: 0,1,2, 3,4 (Ellah, 2007).

Where: 0 = No Improvement (NI).

1 = Little Improvement (LI).

2 = Average Improvement (AI).

3 = High Improvement (HI).

4 = Very High Improvement (VHI).

The need gap value is computed as follows:

1. *The mean of each item in the Needed (X_n) category of each item was calculated.*
2. *The mean of each item in the performance (X_p) category was calculated.*
3. *The Need gap (NG) was calculated by finding difference between X_n and X_p for each item, that is ($NG = X_n - X_p$).*
 - A. *Where NG is zero (0) for any competency item, it indicates that there is no need for improvement because the level at which the competency is needed is equal to the level at which the farmers could perform the competency items.*
 - B. *Where the NG is negative (-) for any item, there is no need for improvement because the level at which the competency item was needed was less than the level at which the farmer could perform the competency item.*
 - C. *Where the NG is positive (+) for any competency item, there is need for improvement because the level at which the farmers could perform the competency item is lower than the level at which it is needed (Olaitan and Ndomi*

in Ellah, 2007).

Decision Rule on Hypothesis Testing:

In testing the hypotheses, a hypothesis of no significant difference was accepted where F-calculated is lower than F-table value or where p-value is greater than 0.05 ; the hypothesis of no significant difference was rejected where the F-calculated is greater than the F-table or p-value is less than 0.05. Where there is difference post hoc analysis was carried out to decide on the direction of the difference.

The identified entrepreneurial competencies by this study were packaged into programmes 1, 2 and 3 (See Appendices J, K and L respectively).

- (a) Plantain nursery production, (Appendix J page 283)*
- (b) Plantain plantation management (Appendix K, page 290)*
- (c) Plantain processing and marketing enterprise (Appendix L, page 297)*

The format used for packaging the programme was that of Uko (2010) with the following steps:

- Name of programme*
- Objectives of the programme*
- Modules and their corresponding competencies*
- Materials needed*
- Assessment techniques for effectiveness (for farm managers only)*
- Training competencies.*

The packages were subjected to validation by three experts from the following training institutions.

1. *National Institute of Horticultural Research and Training (NIHORT), Okigwe, Imo State (Fruits Department).*
2. *Imo State Polytechnics Umuagwu, Imo State (Crop Science Department).*
3. *Agricultural Development Programme, Abia State.*

CHAPTER FOUR
PRESENTATION AND ANALYSIS OF DATA

This chapter presented the data analyzed and their interpretations for the purpose of answering research questions and testing the hypotheses.

Research Question 1:

What are the entrepreneurial competencies needed by secondary school graduates for employment in plantain nursery enterprise?

The data that answered research question 1 were presented in Table 1.

Table 1: Mean ratings of the responses of Agricultural science teachers, extension agents and farmers on entrepreneurial competencies needed by secondary school graduates for employment in plantain nursery enterprise. N = 302.

(Agricultural science teachers=129, Extension agents=153 and Nursery farmers=20)

Module	Module Statements.	\bar{X}	SD	Remarks
	Competencies in:			
<i>A</i>	<i>Planning for plantain Nursery enterprise items)</i>	4.64	0.63	VHN
<i>B</i>	Plantain Pre-nursery			
	<i>i. Sliced corn Technique (12 items)</i>	4.68	0.92	VHN
	<i>ii. Whole corn Technique (10 items)</i>	4.62	0.76	VHN
<i>C</i>	<i>Plantain main nursery (22 items)</i>	4.67	0.73	VHN
<i>D</i>	<i>Marketing of plantain nursery seedlings (8 items)</i>	4.47	0.63	HN
<i>E</i>	<i>Materials for effective management of nursery (33 items)</i>	4.67	0.58	VHN

Key: \bar{X} = Mean, SD = Standard Deviation, N = No of respondents, VHN = Very Highly Needed; HN = Highly Needed.

The data in table 1 revealed that the five modules (A-E) had their mean values ranged from 4.47 to 4.68, which were above the real unit of 1.50. This indicated that all the five modules were needed by secondary school graduates for employment in plantain nursery enterprise in Abia and Imo States. The five modules had their standard deviations ranged from 0.58 - 0.92 and are positive, these were less than 1.96 indicating that the respondents were not too far from the mean and were close to one another in their opinions. This helped to add value to the mean.

The five modules had 98 corresponding competency items (See Appendix N, page 308). The mean values of these items ranged from 3.96 - 4.88. The mean values of each item was greater than the real limit of 1.50 indicating that the 98 competency items were needed by secondary school graduates for employment in plantain nursery enterprise in Abia and Imo States. The 98 competency items had their standard deviation ranged from 0.65 to 1.45 and were positive, each of these values were less than 1.96 indicating that the respondents were not too far from the mean and were close to one another in their responses. This makes the mean more dependable.

Research Question 2

What are the entrepreneurial competencies needed by secondary school graduates for employment in plantain plantation management enterprise?

The data that answered research question 2 were presented in Table 2.

Table 2: Mean ratings of the responses of Agricultural science teachers, extension agents and plantain farmers on entrepreneurial competencies needed by secondary school graduates for employment in plantain plantation enterprise.
N = 316.

(Agricultural science teachers=129, Extension agents=153 and Nursery farmers=34)

<i>Module</i>	<i>Module Statements</i>	\bar{X}	<i>SD</i>	<i>Remark</i>
Competencies in:				
<i>A</i>	<i>Planning for plantain plantation management enterprise (14 items)</i>	4.64	0.59	VHN
<i>B</i>	<i>Plantain plantation establishment land selection and preparation (9 items)</i>	4.65	0.59	VHN
<i>i.</i>	<i>Planting plantain in the field (11 items)</i>	4.63	0.63	VHN
<i>ii.</i>	<i>Weeding and fertilizer application i. weeding (3 items)</i>	4.43	0.83	HN
<i>iii.</i>	<i>ii. Fertilizer application (3 items)</i>	4.62	0.73	VHN
<i>iv.</i>	<i>Pest and disease control (7 items)</i>	4.68	0.57	VHN
<i>v.</i>	<i>Debudding and propping (4 items)</i>	4.68	0.65	VHN
<i>vi.</i>	<i>Harvesting (9 items)</i>	4.69	0.54	VHN
<i>C.</i>	<i>Marketing of plantain fruits (11 items) utilization of</i>	4.63	0.65	VHN
<i>D</i>	<i>Material resources in plantain plantation enterprise (18 items)</i>	4.63	0.61	VHN

Key: \bar{X} = Mean, SD = Standard Deviation, N = No of respondents, VHN = Very Highly Needed; HN = High Needed.

The data in table 2 revealed that the 4 modules (A-D) had their mean values ranged from 4.43 to 4.69 which were above the real limit of 1.50. This indicated that all the four modules were needed by secondary school graduates for employment in

plantain plantation enterprise in 89 Abia and Imo States. The four modules had their standard deviations ranged from 0.54 to 0.83, these were less than 1.96 indicating that the respondents were not too far from the mean and were close to one another in their responses. This adds value to the mean.

The four modules had 89 corresponding competency items (See Appendix N, page 313). The mean values of these items ranged from 4.23 - 4.82. The mean values of each item was greater than the real limit of 1.50 indicating that the 89 competency items were needed by secondary school graduates for employment in plantain plantation enterprise in Abia and Imo States. The 89 items had their standard deviation ranged from 0.571 - 0.989 each of these values were less than 1.96 indicating that the respondents were not too far from the mean and were close to one another in their responses. This adds value to the reliability of the mean.

Research Question 3

What are the entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprise?

The data that answered research question 3 were presented in Table 3.

Table 3: Mean ratings of the responses of Agricultural Science teachers, extension agents and processors on entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprises in Abia and Imo States **N = 308.**

(Agricultural science teachers=129, Extension agents=153 and Nursery farmers=26)

Module	Module Statements	\bar{X}	SD	Remarks
	Competencies in:			
<i>A</i>	<i>Planning activities for plantain fruits processing (11 items)</i>	4.57	0.68	VHN
<i>B</i>	Plantain fruit processing:			
<i>i.</i>	<i>Plantain fruit processing into floor (8 items)</i>	4.63	0.61	VHN
<i>ii.</i>	<i>Plantain fruit processing into chips (12 items)</i>	4.54	0.61	VHN
<i>iii.</i>	<i>Malt (Non alcoholic plantain drink processing (7 items)</i>	4.62	0.57	VHN
<i>iv.</i>	<i>Plantain Jam processing (6 items)</i>	4.55	0.62	VHN
<i>v.</i>	<i>Plantain fruits processing into juice (6 items)</i>	4.59	0.75	VHN
<i>vi.</i>	<i>Plantain fruits processing into ice cream (7 items)</i>	4.52	0.75	VHN
<i>vii.</i>	<i>Plantain fruits processing into wine (23 items)</i>	4.55	0.64	VHN
<i>C</i>	<i>Marketing of processed plantain fruits (flour, chips, malt, jam etc (9 items)</i>	4.57	0.70	VHN
<i>D</i>	<i>Materials needed for plantain processing and marketing enterprises (12 items)</i>	4.59	0.85	VHN

Key: \bar{X} = Mean, SD = Standard Deviation, N = No of respondents, VHN = Very Highly Needed

The data presented in table 3 revealed that the four modules (A-D) had their mean values ranged from 4.52 to 4.63; which were above the real limit of 1.50. This indicated that all the four modules were needed by secondary school graduates for employment in plantain processing and marketing enterprise in Abia and Imo States.

The four modules had their standard deviations ranged from 0.57 to 0.85 each of these values was less than 1.96 indicating that the respondents were not too far from the mean and were close to one another in their responses. This adds value to the reliability of the mean.

The four modules had 101 corresponding competency items (See Appendix N, page 318). The mean values of these items ranged from 3.89 to 4.80. The mean value of each item was greater than the real limit of 1.50 indicating that 101 competency items were needed by secondary school graduates for employment in plantain processing and marketing enterprise in Abia and Imo states. The 101 competency items had their standard deviation ranged from 0.591 to 1.748, each of these values was less than 1.96 indicating that the respondents were not too far from the mean and were close to one another in their responses. This adds value to the reliability of the mean.

Research Question 4

What are the entrepreneurial competency improvement needs of farmers in plantain nursery practice enterprise?

The data that answered research question 4 were presented in Table 4.

Table 4: Need gap analysis of the Mean ratings of the responses of nursery farmers on entrepreneurial competencies in plantain nursery practice where they needed improvement.
N = 20

<i>Module</i>	<i>Module Statements</i>	\bar{X}_n	\bar{X}_p	$\frac{NG}{(\bar{X}_n - \bar{X}_p)}$	<i>Remarks</i>
Competencies in:					
<i>A</i>	<i>Planning for plantain nursery enterprise (13 items)</i>	4.64	2.70	1.94	LIN
<i>B</i>	Plantain pre-nursery				
<i>i.</i>	<i>Sliced corn Technique (12 items)</i>	4.68	2.89	1.79	LIN
<i>ii.</i>	<i>Whole corn technique (10 items)</i>	4.62	2.90	1.72	LIN
<i>C</i>	<i>Plantain main nursery (22 items)</i>	4.67	2.83	1.84	LIN
<i>D</i>	<i>Marketing of plantain nursery seedlings (8 items)</i>	4.47	2.87	1.60	LIN
<i>E</i>	<i>Utilization of resource materials in Nursery Enterprise (33 items)</i>	4.67	2.85	1.82	LIN

Key: *LIN* = Little Improvement Needed
NG = Need Gap

Data in table 4 revealed that the 5 modules had their need gap values ranged from 1.72 to 1.94. The need gap values for each of the modules was positive. This indicated that the plantain nursery farmers need improvement in the 5 modules. The 5 modules had 98 corresponding competency items (See Appendix N, page 323). The 98 competency items had their need gap values ranged from 1.00 to 3.40 and were positive indicating that plantain nursery farmers need improvement in all the 98 competency items

Research Question 5

What are the entrepreneurial competency improvement needs of farmers in plantain management enterprise?

The data that answered research question 5 were presented in Table 5.

Table 5: Need gap analysis of the mean ratings of the responses of plantain plantation farmers on entrepreneurial competencies in plantain plantation management where they needed improvement N = 34

Module	Module Statement	\bar{X}_n	\bar{X}_p	$\frac{NG}{(\bar{X}_n - \bar{X}_p)}$	Remarks
	Competencies in:				
A	Planning for plantation management (14 items)	4.64	2.67	1.97	LIN
B	Plantain plantation establishment:				
i.	Land selection and preparation (9)	4.65	2.73	1.92	LIN
ii.	Planting in the field (11 items)	4.63	2.95	1.68	LIN
iii.	Weeding and fertilizer Application:				
a.	Weeding (3 items)	4.43	2.64	1.75	LIN
b.	Fertilizer application (3 items)	4.62	2.40	2.22	LIN
iv.	Pests and diseases control (7 items)	4.68	2.48	2.20	LIN
v.	Debudding and propping (4 items)	4.68	2.96	1.72	LIN
vi.	Harvesting (9 items)	4.69	2.96	1.73	LIN
C.	Marketing of plantain fruits (11 items)	4.63	2.71	1.92	LIN
D	Utilization of resource materials in plantain plantation enterprise (18 items)	4.63	2.82	1.81	LIN

Key: N = No of respondents, AIN = Average Improvement Needed, LIN = Little Improvement Needed.

The data presented in table 5 revealed that the 4 modules had their need gap values ranged from 1.68 to 2.22. The need gap values for each of the modules was positive. This indicated that the plantain plantation management farmers need improvement in each of the 4 modules. The 4 modules had 89 corresponding competency items (See Appendix N, page 328). The 98 competency items had their need gap values ranged from 0.82 to 3.71 and were positive indicating that the plantain plantation management farmers need improvement in all the 89 competency items.

Research Question 6

What are the entrepreneurial competency improvement needs of farmers in plantain processing and marketing enterprise?

The data that answered research question 6 are presented in Table 6.

Table 6: Need Gap Analysis of the Mean Ratings of the Responses of Plantain Processors where they Needed Improvement. **N = 26.**

Module	Module Statements	\bar{X}_n	\bar{X}_p	PG ($X_n - X_p$)	Remarks
	Competencies in:				
A.	Planning activities for plantain fruits processing (11 items)	4.57	2.50	2.07	AIN
B	Plantain Fruit Processing:				
i.	Plantain fruits processing into flour (8 items)	4.63	2.87	1.76	LIN
ii.	Plantain fruit processing into chips items)	4.54	2.91	1.63	LIN
iii.	Plantain fruit processing into Malt alcoholic plantain drink) (7 items)	4.62	2.44	2.18	AIN
iv.	Plant fruits processing into jam (6	4.55	2.44	2.11	AIN
v.	Plantain fruits processing into juice (6 items)	4.59	2.28	2.36	AIN
vi.	Plantain fruits processing into creams (7 items)	4.52	2.74	1.74	LIN
vii.	Wine production, preparation of the slurring and primary (Aerobic) and secondary fermentation (Anaerobic) (23 items)	4.55	2.64	1.91	LIN
C	Marketing of processed plantain fruits (flour, chips, malt, jam etc (9 items)	4.57	2.88	1.69	LIN
D	Utilization of resource materials plantain processing and enterprises (12 items)	4.59	2.66	1.93	LIN

Key: N = No of respondents
 AIN = Average Improvement Needed
 LIN = Little Improvement Needed

The data presented in table 6 revealed that the 4 modules had their need gap values ranged from 1.63 to 2.36. The need gap values for each of the modules was positive. This indicated that the plantain processors need improvement in each of 4 modules. The 4 modules had 101 corresponding competency items (See Appendix N, page 333). The 101 competency items had their need gap values ranged from 0.76 to 3.54 and were positive indicating that the plantain processors need improvement in all the 101 competency items.

Research Question 7

What are the competencies in training needed by trainers for training secondary school graduates for success in employment and retraining farmers for proficiency in any plantain enterprise?

The data that answered research question 7 were presented in Table 7.

Table 7: Mean ratings of the responses of Agricultural science teachers and extension agents on competencies in training needed by trainers for training secondary school graduates and retraining farmers plantain enterprise (N = 282)

SN	Item Statements	\bar{X}	SD	Rmks
A	Planning for training			
1.	Structure the plantain programme (nursery, plantation, processing and marketing) contents into topics or units.	4.28	0.989	HN
2.	Arrange the topics or units sequentially in order of presentation	4.26	1.058	HN
3.	State the objectives to be achieved by each topic or unit for any plantain enterprise	4.21	0.958	HN
4.	Identify materials needed for training in each unit of the enterprise	4.22	0.984	HN
5.	Select relevant available materials for training in each units of the plantain enterprise	4.09	0.964	HN
6.	Identify relevant methods for teaching each topic or unit	4.16	1.040	HN
7.	Select relevant methods for teaching each topic or unit	4.26	0.925	HN
8.	Write down the plantain programme concepts, facts or generalizations to be learnt.	4.36	1.064	HN
9	Identify competency performance of plantain programme units needed to develop	4.01	1.043	HN
10	State instructors and learners activities.	4.25	0.994	HN
11	Identify appropriate evaluation technique for each content area	4.09	0.893	HN
B	Training procedure to be adopted by trainers			
12	Teach trainees from known to unknown using plantain programme units or topics	4.39	0.929	HN
13	Explain the facilities to be used by the trainer for training each trainee in each competency area of the plantain programme	4.13	0.925	HN
14	Deliver the contents step by step in logical order to the trainees	4.25	0.965	HN
15	Demonstrate the competencies while the trainees observed during step by step teaching	4.45	0.775	HN
16	Request the trainees to practice what the instructor demonstrated while the instructor observes them	4.23	0.845	HN
17	Correct wrong practices made by the trainees	4.29	0.834	HN
18	Encourage repetitive practice of knowledge and skills learnt	4.39	0.706	HN
19	Test the practice of a group of related competencies toward achieving of the objectives	4.35	0.793	HN
20	Provide the trainees information about their performance	4.30	0.773	HN
21	Encourage visit to other plantain programme establishments, write a report and submit to the instructor for a feedback system	4.16	0.851	HN
22	Teach the trainee money management and investment procedure into their enterprise	4.34	0.815	HN
23	Teach the trainees sources of fund for investment into the enterprise/programme	4.35	0.733	HN
24	Teach the trainees how to manage risk in the enterprises through insurance policy	4.35	0.695	HN
25	Teach trainee salvage value of materials that can be resold for improving investment into the enterprise	4.26	0.795	HN
26	Teach the trainees knowledge of profit and loss account	4.31	0.833	HN

Key: HN = Highly Needed

The data presentation in table 7 revealed that training in any plantain enterprise had 26 corresponding competency items. The mean values of these items ranged from 4.01 - 4.45. The mean value of each item was greater than the real limit of 1.50 indicating that 26 competency items were needed by trainers for training of secondary school graduates for success in employment and retraining of farmers for proficiency in any plantain enterprises in Abia and Imo states. The 26 competency items had their standard deviation ranged from 0.69 - 1.06 each of these values was less than 1.96 indicating that the respondents were not too far from the mean and were close to one another in their responses. This adds value to the reliability of the mean.

Hypotheses

Ho1:

There is no significant difference in the Mean ratings of the responses of Agricultural science teachers, extension agents and farmers on the entrepreneurial competencies needed by secondary school graduates for employment in plantain nursery enterprise.

The data for testing hypothesis 1 were presented in table 8:

Table 8 Analysis of variance (ANOVA) of the Mean Ratings of the Agricultural Science Teachers, Extension Agents and Farmers on the Entrepreneurial competencies Needed by secondary school graduates for Employment in plantain nursery enterprise N=302
(Agric science teachers=129, Extension agents=153 and Nursery farmers=20)

Module	Module statements	Total sum of square	df	Mean sum of square (residual)	F-Ratio	P-value (sig)	Remarks
A	Planning for plantain nursery enterprise (13 items)	175.73	301	0.58	0.18	0.84	NS
B	Plantain pre-nursery						
	i. technique:	144.52	301	0.48	0.19	0.82	NS
	ii. Slice corn technique (12items)	177.72	301	0.59	0.56	0.73	NS
C.	Plantain main nursery (22 items)	181.99	301	0.60	0.19	0.82	NS
D.	Marketing of plantain nursery seedlings (8 items)	125.36	301	0.41	0.02	0.87	NS
E.	Material for effective management of plantain nursery (33 items)	151.98	301	0.50	0.08	0.92	NS

Key: NS = Not Significant
Table value = 3.00.

Data in table 8 revealed that modules A - E had their F-cal values ranged from 0.02 to 0.56 which were less than the F-table value of 3.00 and their P-values ranged from 0.73 to 0.92 which were greater than 0.05 indicating that there was no significant difference in the Mean ratings of the responses of Agricultural science teachers, Extension agents and plantain nursery farmers on the five entrepreneurial competency modules needed by secondary school graduates for employment in plantain nursery enterprise. Therefore, the null hypothesis of no significant difference was upheld for the five entrepreneurial competency modules A - E. The five modules had 98 corresponding competency items, out of which 96 items had their f-cal values ranged from 0.00 - 2.60 less than F-tab value of 3.00 and then P-values ranged from 0.73 - 0.93 which were greater than 0.05 indicating that there was no significant difference in the mean ratings of the responses of Agricultural science teachers, Extension agents and plantain nursery farmers on 96 out of 98 entrepreneurial competencies needed by secondary school graduates for employment in plantain nursery enterprises. Therefore, the hypotheses of no significant difference were upheld for the 96 entrepreneurial competency items. Two out of the 98 competency items had their F-cal greater than 3.00 and their P-values less than 0.05, (See Appendix O page 341). Item 8 in module B (ii), the F-cal is 4.03 and P-value is 0.04 and item 6 in module D the F-cal is 3.28 and P-value is 0.03 indicating that there was a significant difference in the mean ratings of the respondents on each of the 2 competency items. Therefore the hypothesis of no significant difference was rejected for the 2 competency items.

Post hoc analysis with sheffe test of multiple comparison was used to show the

direction of the significant difference in the mean ratings of the responses of the three groups of respondents that is Agricultural science teachers, Extension agents and Plantain nursery farmers on item 8 in module B and on item 6 in modules D. it was revealed that for item 8 in module B, the significant difference in the mean ratings of the responses of the respondents was between the Agricultural science teachers and Plantain nursery farmers with a P-value of 0.04 but there is no significant difference in the mean ratings of Agricultural science teachers and Extension agents. For item 6 in module D, the significant difference in the mean ratings of the responses of the respondents was between Agricultural science teachers and Extension agents with P-value of 0.03 and therefore, there was no significant difference between the mean ratings of Extension agents and the plantain nursery farmers (P-value=0.539).

Ho2:

There is no significant difference in the mean ratings of the responses of Agricultural science teachers, Extension agents and Farmers on the entrepreneurial competencies needed by secondary school graduates for employment in plantain plantation management enterprise. The data for testing hypothesis 2 were presented in table 9:

Table 9: Analysis of Variance (ANOVA) of the Mean Ratings of the Agricultural science Teachers, Extension Agents and Farmers on the Entrepreneurial competencies Needed by secondary school graduates for Employment in Plantain Plantation Management Enterprise.

N=316

<i>Module</i>	<i>Module statements</i>	<i>Total sum of square</i>	<i>df</i>	<i>Mean sum of square (residual)</i>	<i>F-Ratio</i>	<i>P-value (sig)</i>	<i>Remarks</i>
<i>A</i>	<i>Competencies in: Planning for plantain plantation management enterprise (14 items)</i>	176.31	315	0.56	0.28	0.75	NS
B	Plantain plantation establishment:						
<i>i.</i>	<i>Land selection and preparation (9 items)</i>	183.63	315	0.58	0.57	0.56	NS
<i>ii.</i>	<i>Planting plantain in the field (11 items)</i>	148.72	315	0.47	0.22	0.79	NS
<i>iii.</i>	<i>Weeding and fertilizer Application (6 items)</i>	240.38	315	0.77	0.15	0.86	NS
<i>iv.</i>	<i>Pest and Disease Control (7 items)</i>	234.12	315	0.73	0.27	0.76	NS
<i>v.</i>	<i>Debudding and propping (4 items)</i>	135.98	315	0.43	0.38	0.69	NS
<i>vi.</i>	<i>Harvesting (9 items)</i>	176.07	315	0.56	0.18	0.84	NS
<i>C</i>	<i>Marketing of plantain fruits (11 items)</i>	104.40	315	0.33	0.30	0.74	NS
<i>D</i>	<i>Materials for plantain plantation management enterprise (18 items)</i>	184.93	315	0.59	0.14	0.87	NS

Key: *N.S* = Not Significant; *Table value* = 3.00

Data in table 9 revealed that modules A - D had their *f-cal* ranged from 0.14 - 0.57 which were less than *t-table* value of 3.00 and their *P-values* ranged from 0.56 - 0.87 which were greater than 0.05 indicating that there was no significant difference in the mean ratings of the responses of Agricultural science teachers, Extension agents and plantain plantation management farmers on the four entrepreneurial competency

modules needed by secondary school graduates for employment in plantain plantation management enterprise. Therefore, hypothesis of no significant difference was upheld for the four entrepreneurial competency modules. The four modules had 89 corresponding competency items, out of which 86 items had their F-cal values ranged from 0.00 - 0.82 less than F-table value of 3.00 and their P-values ranged from 0.56 - 0.87 which were greater than 0.05 indicating that there was no significant difference in the mean ratings of the responses of Agricultural science teachers, Extension agents and plantain plantation farmers on 86 out of 89 entrepreneurial competencies needed by secondary school graduates for employment in plantain plantation management enterprise. Therefore the hypotheses of no significant difference were upheld for the 86 entrepreneurial competency items. Three out of the 89 competency items had their F-cal values greater than 3.00 and their P-values less than 0.05, (See Appendix O, page 348). Items 7 and 8 in module B (i) have their F-cal values to be 3.21 and 4.15; item 1 in module B (v) the F-cal is 5.21 and their P-values are 0.04, 0.02 and 0.01 respectively indicating that there was a significant difference in the mean ratings of the respondents. Therefore, the hypotheses of no significant difference were rejected for the 3 competency items.

Post hoc analysis with scheffe test of multiple comparison was used to show the direction of the significant difference in the mean ratings of the responses of the three groups of respondents that is Agricultural science teachers, Extension agents and Plantain plantation farmers on items 7, 8 in module B (i) and item 1 in module B (v). It was revealed that items 7 and 8 in module B (i) and item 1 in module B (v) the significant

difference in the mean ratings of the responses of the respondents was between Agricultural science teachers and plantain plantation farmers with a P-values of 0.046, 0.03 and 0.01 but there is no significant difference between Farmers and Extension agents, with p-values of 0.76, 0.74 and 0.90 respectively.

Ho3:

There is no significant difference in the mean ratings of the responses of Agricultural science teachers, Extension agents and Farmers on the entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprise.

The data for testing hypothesis 3 were presented in table 10:

Table 10: Analysis of variance (ANOVA) of the Mean Ratings of the Agricultural science teachers, Extension Agents and Processors on the entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprise. N=308

(Agricultural science teachers=129, Extension agents=153 and Processor=26)

<i>Module</i>	<i>Module statements</i>	<i>Total sum of square</i>	<i>Df</i>	<i>Mean sum of square (residual)</i>	<i>F-Ratio</i>	<i>P-value (sig)</i>	<i>Rmks</i>
Competencies in:							
A.	<i>Planning for plantain fruit processing enterprise (11 items)</i>	162.06	307	0.53	0.05	0.94	NS
B.	Plantain Fruit Processing:						
i.	<i>Processing plantain into flour (8 items)</i>	203.43	307	0.66	0.05	0.94	
ii.	<i>Processing plantain into chips (12 items)</i>	148.02	307	0.48	0.07	0.99	NS
iii.	<i>Processing plantain into malt (7 items)</i>	226.25	307	0.74	0.05	0.94	
iv.	<i>Processing plantain into jam (6 items)</i>	232.95	307	0.76	0.03	0.96	NS
v.	<i>Processing plantain into juice (6 items)</i>	144.88	307	0.47	0.00	1.00	NS
vi.	<i>Processing plantain into ice cream (7 items)</i>	133.15	307	0.43	0.02	0.97	NS
vii.	<i>Processing plantain into wine (primary fermentation) Aerobic (15 items)</i>	129.02	307	0.42	0.07	0.93	NS
gii.	<i>Processing plantain into wine (secondary fermentation) Anaerobic (8 items)</i>	177.19	307	1.58	0.00	0.99	NS
C.	<i>Marketing processed plantain fruits (9 items)</i>	212.55	307	0.69	0.06	0.94	NS
D.	<i>Material resources for plantain processing and marketing (12 items)</i>	269.80	307	0.41	0.30	0.97	NS

Key: NS = Not Significant
T-table value = 3.00

Data in table 10 revealed that modules A - D had their F-cal ranged from 0.00 - 0.07 which were less than 3.00 and their P-values ranged from 0.93 - 1.00 which were

greater than 0.05 indicating that there was no significant difference in the mean ratings of the responses of Agricultural science teachers, Extension agents and plantain processors on four entrepreneurial competency modules needed by secondary school graduates for employment in plantain processing and marketing enterprise. Therefore, the null hypothesis of no significant difference was upheld for the four entrepreneurial competencies modules. The four modules had 101 corresponding competency items, out of which 99 items had their F -cal values ranged from 0.00-1.10 less than F -tab value of 3.00 and their P -values ranged from 0.20 - 1.00 which were greater than 0.05 (See Appendix O, page 354) indicating that there was no significant difference in the mean ratings of the responses of Agricultural science teachers, Extension agents and plantain processors on 99 out of 101 entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprise. Therefore, the hypotheses of no significant difference was upheld for the 99 entrepreneurial competency items. Two (2) out of the 101 competency items had their F -cal values greater than 3.00 and their P -values less than 0.05, these include item 2 in module B (iv), with F -cal value of 4.04 and item 3 in the same module has F -cal of 5.11 and their P -values are 0.03 for item 2 and 0.01 for item 3 indicating that there was a significant difference in the mean rating of the respondents on each of the 2 competency items. Therefore, the hypotheses of no significant difference was rejected for the 2 competency items.

Post hoc analysis with Sheffe test of multiple comparison was used to show the direction of the significant difference in the mean ratings of the responses of the three

groups of respondents that is Agricultural science teachers, Extension agents and plantain processors on items 2 and 3 in module B (iv). It was revealed that for items 2 and 3 in module B (iv), the significant difference in the mean ratings of the responses of the respondents was between Agricultural science teachers and Plantain processors with a P-value of 0.03 for item 2 and 0.01 for item 3 but there is no significant difference in the mean ratings of Plantain farmers and Extension agents with p-values of 0.99 and 0.91.

Findings of the Study

The following findings emerged from the study based on the research questions answered and hypothesis tested.

Findings on the entrepreneurial competency needs of secondary school graduates in plantain nursery enterprise.

Enterprise 1

It was found out that the 5 entrepreneurial competency modules with their 98 corresponding competency items in plantain nursery were needed by the secondary school graduates for employment in plantain nursery enterprise. The 5 competency modules and tier 98 corresponding items were listed below:

Module A: Planning for Plantain Nursery Enterprise

1. *Formulate specific objectives for the nursery enterprise*
2. *Review the objectives periodically based on market demand and supply*
3. *Draw up programme plan of activities to cover*
4. *Decide on the type (small, medium, or large) of nursery enterprise to adopt*

5. *Identify sources of credit for nursery enterprise*
6. *Make budget for the nursery enterprise*
7. *Identify the relevant material inputs and their locations*
8. *Identify different levels of man power needed for the nursery enterprise*
9. *Establish time for plantain nursery*
10. *Make rules and regulations for successful nursery practice*
11. *Identify market outlet for the nursery products*
12. *Identify relevant records to keep for nursery enterprise*
13. *Identify site to purchase for nursery enterprise*

Module B: Plantain Pre-nursery

i. Sliced Corm Technique

- 1 *Choose a flat site, free from pests and diseases for pre-nursery*
- 2 *Make a shade with materials toward off excess heat.*
- 3 *Prepare pre-nursery beds or boxes or trays with polythene bags.*
- 4 *Mix carefully top soil and poultry manure (8:1) that is 8 head pans of top soil to 1 head pan of poultry manure*
- 5 *Fill the boxes, trays, poly bags with mixed top soil and poultry manure.*
- 6 *Water the soil in the boxes, trays and polybags.*
- 7 *Arrange the poly bags in rows to form beds*
- 8 *Acquire the corms to nurse*
- 9 *Slice the corms into sizes of not more than 2 - 3cm.*
- 10 *Arrange the sliced corms in rows in the boxes or trays and one per polybags.*
- 11 *Apply water at alternate days especially during dry season.*

12 *Transfer sprouting corms into the nursery.*

ii. Whole Corm Technique

- 1 *Prepare the pre-nursery as in Bi (1 to 7) above*
- 2 *Dig out whole corms to nurse and wash with water.*
- 3 *Stripped back the outer leaf sheaths of each corm with knife.*
- 4 *Loose any cover on the bud surface*
- 5 *Arrange whole corms in poly bags or in trays or boxes and cover with soil or saw dust.*
- 6 *Apply water at alternate days.*
- 7 *Mulch with dry grasses*
- 8 *Observe the buds for sprouting after 6-8 days.*
- 9 *Remove any weeds on the beds or trays or polythene bags.*
- 10 *Transfer sprouted beds into nursery.*

Module C: Plantain Main Nursery

1. *Select site that is flat well drained and easily accessible.*
2. *Clear the bush, level and fill depressions with appropriate technologies*
3. *Pack and burn all the thrashes or heap them in the farm or out of the site.*
4. *Prepare a shade over the nursery*
5. *Construct a fence with 1.20 mesh poultry wire.*
6. *Collect 8 head pans of top soil to 1 head pan of poultry manure as standard mixture.*
7. *Mix the top soil and poultry manure together very well with shovel or spade.*

- 8 *Provide 400 or 500 gauge black polythene bags with a centrally placed perforation at the bottom.*
- 9 *Fill the bags with the mixture of top soil and poultry manure.*
- 10 *Arrange the poly bags in rows of beds on the cleared land*
11. *Apply water to the soil for one day and leave for at least one week to consolidate*
12. *Open the middle of soil in the polythene bags.*
- 13 *Select the differentiated young seedlings from pre-nursery (B i or ii above)*
- 14 *Place the sprouted corm with ball of earth into the hole in the polythene bags carefully and close up the base of the sprouted corms with earth*
- 15 *Apply water in the morning and evening daily.*
- 16 *Apply NPK fertilizer 20:10:10 (10gm/plant)*
- 17 *Spray with benomil or ash slurry around the pseudostem base and around plants to prevent insects from eating the foliage*
- 18 *Mulch with partially decomposed refuse or dry grass.*
- 19 *Weed with hoe and hand pick pests regularly .*
- 20 *Prune dead leaves from the base of the seedlings.*
- 21 *Harden the seedlings through gradual removal of the shade.*
- 22 *Transfer the seedlings after 6 to 8 weeks into the main plantation and market the products.*

Module D: Marketing of Plantain Nursery Seedlings

1. *Carryout market survey for sale of nursery seedlings*
2. *Assemble the seedlings into sides or groups according to viability and vigour*
3. *Fix price on the seedlings based on sides and vigour*
4. *Advertise the seedlings for sale*

5. *Sell the seedlings to different buyers*
6. *Transport the purchased seedlings to the buyer's field if necessary*
7. *Keep records of purchase and sales made*
8. *Reconcile sales and expenditure to determine profit or loss.*

Module E: Materials Needed for Effective Management in Nursery Enterprise.

1. *Land for selection and preparation*
2. *Top soil or organic matter for filling in the polyethene bag for planting corms.*
3. *Temporary shade for protecting the corm in the pre-nursery.*
4. *Corm as planting materials to be raised in polyethene bags or tray or boxes.*
5. *Saw dust or dry grasses to be used as light mulch on top of the polyethene bags.*
6. *Water tank to be used to store water for watering the nursery seedlings.*
7. *Water can to be used for watering the seedlings.*
8. *Hose to be used to guide water from tank to nursery shade.*
9. *Cutlass for cutting grasses and preparing the shade.*
10. *Hoe or shovel for scoping top soil or organic matter in the container and for weeding*
11. *Knife for pruning or removing scales or slicing the corms from the nursery*
12. *Wheel barrow for carrying soil or organic matter to the nursery shade*
13. *Polyethene bags/trays/boxes for holding soil for planting*
14. *Wire nets for fencing the pre-nursery off rodents or predators*
15. *Rake for removing cut grasses out of the site*
16. *Palm fronds used to make shade for nursery seedlings*
17. *Shade for protecting the plantain seedlings in the nursery*
18. *Knife for opening the middle of soil in the polyethene bags*

- 19 *NPK fertilizer to be applied on the nursery seedlings*
- 20 *Ash slurry to be spread around the seedlings to prevent insects from eating the foliage*
- 21 *Chemicals e.g. pesticides for controlling insects pest*
- 22 *Borne hole to be used as water source for irrigation*
- 23 *Head pan for carrying soil or organic matter or plantain seedlings*
- 24 *Hand fork for pulverizing the soil or mixing of soil and organic matter before filling in polyethene bags*
- 25 *Hand trowel for transplanting of plantain seedlings from trays or boxes into large polyethene bags*
- 26 *Secateurs for pruning dead leaves from the base of the seedlings*
- 27 *Polyethene bags/trays/boxes for putting soil*
- 28 *Basket for carrying plantain seedlings*
- 29 *Booth to be wore as protection*
- 30 *Hand glove to be wore as protection*
- 31 *Gorgles to be wore as protection*
- 32 *Nose mask or respirator to be wore as protection*
- 33 *Knap sac sprayer for spraying chemicals*

Enterprise 2

Findings on the entrepreneurial competency needs of secondary school graduates in plantain plantation management enterprise.

It was found out that the entrepreneurial competency modules with their 89 corresponding competency items in plantain management were needed by the secondary school graduates for employment in plantain plantation management enterprise. The 4 competency modules and their 89 corresponding items were listed below.

Module A: Planning for Plantain Plantation Management Enterprise

1. *Formulation of specific objectives for plantain plantation management*
2. *Review the objectives of the plantain plantation enterprise periodically based on changes in market demand and supply*
3. *Draw up programme plan for the plantain plantation enterprise –*
4. *Decide on the type (small, medium or large) of plantain plantation management enterprise to adopt*
5. *Identify sources of credit for plantain plantation enterprise*
6. *Budget for plantain plantation management.*
7. *Identify relevant material inputs and their location (seedlings fertilizers, pesticides, herbicides) for plantain plantation enterprise*
8. *Provide relevant tools and equipment (vehicles, cutlass, hoe etc) for use in plantain plantation enterprise.*
9. *Identify different levels of man power needed for plantain plantation management.*
10. *Plan all farm operations to make most efficient use of the available money.*
11. *Make rules and regulations for successful plantain operation*

- 12 *Identify market outlet for the plantain products.*
- 13 *Identify relevant records to keep for plantain plantation enterprise*
- 14 *Identify a site for plantain plantation enterprise*

Module B: Plantain Plantation Establishment

i. Land Selection and Preparation:

1. *Select well drained soil rich in organic matter.*
2. *Clear the undergrowth of the selected land with appropriate technologies.*
3. *Cut down the trees with appropriate technologies.*
4. *Park residues and burn*
5. *Stump the stems, park off, level and fill depressions with appropriate technologies.*
6. *Lay out the blocks to specification*
7. *Lay the plots in planting spacing of 3m by 2m along and within the rows for digging.*
8. *Dig holes of 30cm by 30cm by 30cm for each plantain sucker.*
9. *Keep the top soil separate from bottom soil of the dug holes.*

ii. Planting Plantain in the Field

1. *Select well differentiated seedling after 7-8 weeks in the nursery.*
2. *Remove bottom portion of the polythene bag with seedlings to 2cm from the base.*
3. *Cut the polyethene bag with seedlings from the top to the bottom.*
4. *Place seedlings centrally into the hole with the two hands and remove the polyethene bag.*
5. *Remove the polyethene bag away from the seedlings.*
6. *Fill back the hole first with top soil and then with bottom soil*
7. *Support the seedlings with top soil and add more soil if not enough.*
8. *Press the soil firmly around the seedlings*

9 *Place mulch materials around each planted seedlings*

10 *Water the seedlings daily.*

11 *Put wire net at the collar of each seedling if necessary.*

iii. Weeding and Fertilizer Application

c. Weeding

1 *Weed as weeds appear with cutlass or machet or row weed about three to four months interval based on the nature of soil fertility.*

2 *Intercrop with legumes or cocoyam in rows at the young age of plantain or spray weeds with appropriate herbicides.*

3 *Prune the dry leaves and use them as mulch around the base of the plant.*

d. Fertilizer application

1 *Apply 300kg/ha of Nitrogen in form of urea to seedlings one month after planting at the rate of milk tin per plantain plant.*

2 *Apply 500kg/ha of muriate of potash 30 days after the first application of urea at the rate of small tomato tin per plantain plant*

3 *Apply mixed fertilizer of 250gm (N), 100gm (P₂O₅) and 200gm (k) at the rate of 50gm/plant when it starts to maiden.*

iv. Pests and Diseases Control

1 *Handpick pests or insects on green leaves of plantain plant.*

2 *Maintain clean weeding of plantain plantation.*

3 *Use bird scaring gun to scare away birds or animals such as money*

4 *Plant resistant variety to guide against diseases*

5 *Spray insecticides to destroy insect or pests.*

6 *Remove insect or disease infested leaves and burn.*

7 *Maintain correct spacing*

v. ***Debudding and Propping***

1 *Cut the male bud after the fruit has being set when the fingers are not coming out.*

2 *Get a stick that has Y shape*

3 *Hook the Y stick shape on fruit stalk*

4 *Dug the stick firmly into the soil to provide support of trunk or fruit until harvesting.*

vi. ***Harvesting:***

1 *Identify mature plantain fruits for harvesting*

2 *Harvest with sharp machet by bending down to cut the pseudostem*

3 *Place with a forked stick or a helper to receive the bunch*

4 *Cut the pseudostem half way, then cut the bunch.*

5 *Cut down the entire pseudostem and chop together with the foliage of the main plant.*

6 *Spread chooped pseudostem and foliage over the soil as mulch for ratooncrops.*

7 *Collect the harvested bunches together for airing.*

8 *Cover the bunch with leaves half way to allow air inside the heap.*

9 *Sell to buyers if it is for marketing or process if necessary.*

Module C: Marketing of Plantain Fruits

1. *Carryout marke't survey for sale of plantain bunches*

2. *Advertise the sales of plantain fruits*

3. *Identify your customers and invite them for supply and search for market*

4. *Inform customers on the arrival of plantain products*

5. *Identify suitable whole sellers and retail agents*

6. *Sort the bunches to sizes in the weigh house.*
7. *Fix prices based on the weight or size of the bunches.*
8. *Sell the plantain bunches to the buyers .*
9. *Transport the purchased bunches to buyers if necessary.*
10. *Keep records of purchase and sales made*
11. *Reconcile sales with cost of resource input to determine profit or loss.*

Module D: Materials for Effective Management in Plantain Plantation Enterprise

1. *Land for planting plantain seedlings: identification, selection and preparation*
2. *Plantain seedlings/suckers to be used as planting materials in the field*
3. *Pegs for holdings ropes for laying blocks*
4. *Ropes for determining straight lines for blocks laying*
5. *Measuring tape for determining areas to be used in the plantation*
6. *Buildings for storing resource materials and for administrative purposes*
7. *Bore hole to be used as sources of water for irrigation*
8. *Watering can to be used for watering the plantation*
9. *Cutlass for cutting grasses*
10. *Hoe for removing weeds*
11. *Wheel barrow for carrying organic manure and fertilizer to the plantation site*
12. *Spade/shovel for carrying soil used to cover the root of the plantain*
13. *Fertilizer to be applied on the plantation for increasing the fertility of the soil*
14. *Herbicides for controlling weeds*
15. *Pesticides and insecticides for controlling pests and insects*
16. *knap Sac prayer or boom sprayer for spraying chemicals e.g. pesticides, insecticides and herbicides*

- 17 *Sharp machet for harvesting plantain bunch*
- 18 *Pick ups or trucks for carrying harvested bunchy to the market.*

Enterprise 3

Findings on the entrepreneurial competency needs of secondary school graduates in plantain processing and marketing enterprise.

It was found out that the 4 entrepreneurial competency modules with their 101 corresponding competency items in plantain processing and marketing were needed by the secondary school graduates for employment in plantain processing and marketing enterprise. The 4 competency modules and their 101 corresponding items were listed below:

Module A: Planning Activities for Plantain Fruits Processing

1. *Formulate specific objectives for plantain fruit processing*
2. *Review the objectives of plantain fruits processing periodically based on market demands and supply*
3. *Draw up programme plan of activities to cover different processing enterprise*
4. *Decide on the type (small, medium or large) of plantain processing enterprise to adopt*
5. *Identify sources of credit for processing enterprise*
6. *Make budget for plantain processing enterprise*
7. *Identify relevant material inputs and their locations*
8. *Identify different levels of man power needed for the plantain processing and marketing.*

9. *Make rules and regulations for successful processing enterprise*
10. *Identify market outlet for the processed plantain fruits*
11. *Identify relevant records to keep for the plantain processing and marketing enterprise*

Module B: Plantain Fruit Processing

i. Plantain Fruits Processing into Flour

1. *Select unripe plantain fruits*
2. *Wash the unripe plantain fruits with water to remove dirt and spray residues*
3. *Peel the unripe plantain to obtain pulp and keep pulps in a bowl containing water to avoid turning black*
4. *Sliced the pulp using knife.*
5. *Sun-dried the sliced pulp for 2-3 days.*
6. *Mill the sliced dried pulp using domestic grinding machines.*
7. *Sieve the ground pulp to obtain flour*
8. *Pack the sieve flour and sold to the market*

ii. Plantain Fruit Processing into Chips

1. *Select unripe plantain fruits as required.*
2. *Peel the plantain fruits with knife*
3. *Immerse in a bowl containing water*
4. *Cut/sliced peeled plantain fruits according to the desired sizes using appropriate technologies*
5. *Salt the sliced plantain fruits to taste*

- 6 *Heat vegetable oil or palm oil in a frying pan or electric fryer to about 170°C.*
- 7 *Put sliced plantain fruits into the hot oil and fry.*
- 8 *Stir constantly until crispy or golden yellow appear (Plantain chips).*
- 9 *Remove the plantain chips into plastic sieve to allow the oil to drain.*
- 10 *Spread chips on clean material to allow the plantain chips to cool*
- 11 *Sort and bag the plantain chips into various sizes*
- 12 *Seal with candle flame with the aid of kitchen knife and Market the products.*

iii. *Plantain Fruits Processing into malt (Non-alcoholic Plantain Drink)*

- 1 *Select figs from plantain*
- 2 *Mill the figs with appropriate technologies into powder and keep until required.*
- 3 *Reconstitute about 55g (2 heaped tablespoon) of fig powder in 0.3 litres of water and mix.*
- 4 *Set the mixture aside for 5-10 minutes to enable the component of powder to leach into the water.*
- 5 *Filter through muslin clothes, bottled and keep to sediment allow to sediment.*
- 6 *Decant or filter again, add vanilla flavor and granulated or icing sugar to sweeten the "malt"*
- 7 *Finally bottle, refrigerate and Market the products*

iv. *Plantain Fruits Processing into Jam*

- 1 *Select 2 or 3 riped plantain*
- 2 *Blend the ripe plantain with harmer mill and mixed together withl cup of granulated sugar*
- 3 *Add 200ml or 2 cups of water and mix together.*

- 4 *Add 30-35ml lime juice in the mixture.*
- 5 *Boil the mixture and allow the formed gel to cool*
- 6 *Preserved the gel with sorbic acid and market the products*

v. *Plantain Fruits Processing into Juice*

- 1 *Select some ripe plantain fruits*
- 2 *Peel the ripe plantain fruits and blend the pulp with appropriate technologies.*
- 3 *Soak slurry (blended pulp) in hot water for 10 -15 minutes for optimum juice extraction*
- 4 *Filter the extracted juice through white muslin (akamu) cloth*
- 5 *Pasteurize the juice by boiling and simmer for 3 minutes*
- 6 *Allow to cool, add colour and fill into sterilized bottles and market the products*

vi. *Plantain Fruits Processing into Ice Cream*

- 1 *Select 20-24 ripe plantain fruits*
- 2 *Peel the ripe plantain fruits and blend the pulp with appropriate technologies*
- 3 *Soak slurry (blended pulp) in 500ml hot water for 10-15 minutes for optimum juice extraction*
- 4 *Filter the slurring through white muslin (akamu) cloth.*
- 5 *Add 12 eggs (albumen, whisked), 1 cup of icing sugar, a pinch of vanilla powder or few drops of liquid vanilla flavor essence, 1 tin of milk and mix thoroughly.*
- 6 *Pour the mixture into cream cups or seal in polyethylene bag.*
- 7 *Place in a freezer until required and market the products*

vii. *Plantain Fruits Processing into Wine*

- 1 *Select 2kg ripe/over ripe plantain and 250g plantain skins (peel's)*
- 2 *Slice peeled ripe plantain fruits and the peels with knife*
- 3 *Place in a clean, sterilized white cloth bag.*
- 4 *Tie the bag and "place into a saucepan (preferably aluminum)*
- 5 *Add 4 litres of water, boil and simmer for 20-30 minutes.*
- 6 *Add granulated sugar and fruit juice in the boiled liquid*
- 7 *Apply pressure to extract as much juice as possible when the bag is cooled.*
- 8 *Add the extracted juice to sugar liquor*
- 9 *Shake to dissolve the sugar and cool in cold water.*
- 10 *Add 1 table spoon or 1 sachet (3g) of yeast and juice of 1 ripe grape fruit as yeast nutrient at 27-30°C to extracted juice*
- 11 *Record the initial temperature and specific gravity.*
- 12 *Keep the extracted juice in jar for a week in a room temperature.*
- 13 *Agitate the jar occasionally by giving it a shake*
- 14 *Record the data of temperature, PH and specific gravity.*
- 15 *Collect data until fermentation quickens after about 1 week*
- 16 *Plug air lock (fermentation trap) to the fermenter.*
- 17 *Put few drops of sterilizing solution into the air lock to form a U shape*
- 18 *Plug the top of the trap with cotton wool to enables the yeast to undergo an anaerobic method of self-reproduction.*
- 19 *Rack occasionally by siphoning the wine off the lees of yeast and deposited solids.*
- 20 *Sieve the wine with musline cloth to clear of its own accord; given time, when it*

does not, you may have to filter.

- 21 *Bottled the sieve wine as required.*
- 22 *Store wine in sterilized bottles and corks.*
- 23 *Store finished wine in a rack or bin at 13°C or in a refrigerator and market the products*

Module C: Marketing of Processed Plantain Fruits (Flour, Chips, Malt, Jam, etc)

1. *Carryout market survey for sale of processed plantain fruits.*
2. *Package the processed plantain fruits into bags and grade.*
3. *Fix prices on the bags based on size and quality*
4. *Advertise the sales of the processed plantain fruits*
5. *Identify your customers and invite them for supply.*
6. *Sell the processed plantain fruits to different buyers according to grades and quality*
7. *Help customers transport their goods to their nearest destination if necessary.*
8. *Keep record of sales made*
9. *Reconcile sales and expenditure record to determine profit or loss.*

Module D: Material for Effective management in Plantain Processing and Marketing Enterprise

- 1 *Mature plantain bunches to be used as raw material for processing*
- 2 *Knife for peeling the plantain fruits*

3. *Mechanical slicer for slicing peeled plantain fruits*
4. *Water for washing peeled plantain fruits*
5. *Cabinet drier for drying sliced plantain fruits*
6. *Salt for spreading on sliced plantain fruits*
7. *Sterilized bottles used for keeping juice*
8. *Bowls for putting water used for washing peeled plantain fruits*
9. *Frying pan used for frying plantain chips*
10. *Hammer mill used for milling the dried sliced plantain fruits.*
11. *Sealer or candle knife for sealing the cellophane bag.*
12. *Trucks for conveyance of processed products to market.*

Findings on entrepreneurial competency improvement needs of farmers in plantain nursery practice enterprise. It was found out that plantain nursery farmers needed improvement in 5 entrepreneurial competency modules in plantain nursery practice enterprise with 98 corresponding competency items. The competency modules and their 98 items were listed below:

Module A: Planning for Plantain Nursery Enterprises

1. *Formulate specific objectives for the nursery enterprise*
2. *Review the objectives periodically based on market demand and supply*
3. *Draw up programme plan of activities to cover*
4. *Decide on the type (small, medium, or large) of nursery enterprise to adopt*
5. *Identify sources of credit for nursery enterprise*

6. *Make budget for the nursery enterprise*
7. *Identify the relevant material inputs and their locations*
8. *Identify different levels of man power needed for the nursery enterprise*
9. *Establish time for plantain nursery*
10. *Make rules and regulations for successful nursery practice*

11. *Identify market outlet for the nursery products*
12. *Identify relevant records to keep for nursery enterprise*
13. *Identify site to purchase for nursery enterprise*

Module B: Plantain Pre-nursery i. Sliced Corm Technique

- 1 *Choose a fiat site, free from pests and diseases for pre-nursery*
- 2 *Make a shade with materials toward off excess heat.*
- 3 *Prepare pre-nursery beds or boxes or trays with polythene bags.*
- 4 *Mix carefully top soil and poultry manure (8:1) that is 8 head pans of top soil to 1 head pan of poultry manure*
- 5 *Fill the boxes, trays, poly bags with mixed top soil and poultry manure.*
- 6 *Water the soil in the boxes, trays and polybags.*
- 7 *Arrange the poly bags in rows to form beds*
- 8 *Acquire the corms to nurse*
- 9 *Slice the corms into sizes of not more than 2 - 3cm.*
- 10 *Arrange the sliced corms in rows in the boxes or trays and one per polybags.*
- 11 *Apply water at alternate days especially during dry season*
- 12 *Transfer sprouting corms into the nursery.*

ii. Whole Corm Technique

- 1 *Prepare the pre-nursery as in Bi (1 to 7) above*
- 2 *Dig out whole corms to nurse and wash with water.*
- 3 *Stripped back the outer leaf sheaths of each corm with knife.*

- 4 *Loose any cover on the bud surface*
- 5 *Arrange whole corns in poly bags or in trays or boxes and cover with soil or saw dust.*
6. *Apply water at alternate days.*
7. *Mulch with dry grasses*
8. *Observe the buds for sprouting after 6-8 days.*
9. *Remove any weeds on the beds or trays or polythene bags.*
10. *Transfer sprouted beds into nursery.*

Module C: Competencies in Plantain Main Nursery

- 1 *Select site that is flat, well drained and easily accessible.*
- 2 *Clear the bush, level and fill depressions with appropriate technologies*
- 3 *Pack and burn all the thrashes or heap them in the form or out of the site.*
- 4 *Prepare a shade over the nursery*
- 5 *Construct a fence with 1.20 mesh poultry wire.*
- 6 *Collect 8 head pans of top soil to 1 head pan of poultry manure as standard mixture.*
- 7 *Mix the top soil and poultry manure together very well with shovel or spade.*
- 8 *Provide 400 or 500 gauge black polythene bags with a centrally placed perforation at the bottom.*
- 9 *Fill the bags with the mixture of top soil and poultry manure.*
- 10 *Arrange the poly bags in rows of beds on the cleared land*
- 11 *Apply water to the soil for one day and leave for at least one week to consolidate*

- 12 *Open the middle of soil in the polythene bags.*
- 13 *Select the differentiated young seedlings from pre-nursery (i or ii above)*
- 14 *Place the sprouted corm with ball of earth into the hole in the polythene bags carefully and close up the base of the sprouted corms with earth.*
- 15 *Apply water in the morning and evening daily.*
- 16 *Apply NPK fertilizer 20:10:10 (10gm/plant)*
- 17 *Spray with benomil or ash slurry around the pseudostem base and around plants to prevent insects from eating the foliage*
- 18 *Mulch with partially decomposed refuse or dry grass.*
- 19 *Weed with hoe and hand pick pests regularly*
- 20 *Prune dead leaves from the base of the seedlings.*
- 21 *Harden the seedlings through gradual removal of the shade.*
- 22 *Transfer the seedlings after 6 to 8 weeks into the main plantation and market the products.*

Module D: Marketing of Plantain Nursery Seedlings

1. *Carryout market survey for sale of nursery seedlings*
2. *Assemble the seedlings into sides or groups according to viability and vigour*
3. *Fix price on the seedlings based on sides and vigour*
4. *Advertise the seedlings for sale*
5. *Sell the seedlings to different buyers*
6. *Transport the purchased seedlings to the buyer's field if necessary*

7. *Keep records of purchase and sales made*
8. *Reconcile sales and expenditure to determine profit or loss.*

Module E: Materials Needed for Effective Management in Nursery Enterprise.

1. *Land for nursery establishment: Identification, selection and preparation.*
2. *Top soil or organic matter for filling in the polyethene bag for planting corms.*
3. *Temporary shade for protecting the corm in the pre-nursery.*
4. *Corm as planting materials to be raised in polyethene bags or tray or boxes.*
5. *Saw dust or dry grasses to be used as light mulch on top of the polyethene bags.*
6. *Water tank to be used to store water for watering the nursery seedlings.*
7. *Water can to be used for watering the seedlings.*
8. *Hose to be used to guide water from tank to nursery shade.*
9. *Cutlass for cutting grasses and preparing the shade.*
10. *Hoe or shovel for scoping top soil or organic matter in the container and for weeding*
11. *Knife for pruning or removing scales or slicing the corms from the nursery*
12. *Wheel barrow for carrying soil or organic matter to the nursery shade*
13. *Polyethene bags/trays/boxes for holding soil for planting*
14. *Wire nets for fencing the pre-nursery off rodents or predators*
15. *Rake for removing cut grasses out of the site*
16. *Palm fronds used to make shade for nursery seedlings*
17. *Shade for protecting the plantain seedlings in the nursery*
18. *Knife for opening the middle of soil in the polyethene bags*
19. *NPK fertilizer to be applied on the nursery seedlings*

- 20 *Ash slurry to be spread around the seedlings to prevent insects from eating the foliage*
- 21 *Chemicals e.g. pesticides for controlling insects pest*
- 22 *Borne hole to be used as water source for irrigation*
- 23 *Head pan for carrying soil or organic matter or plantain seedlings*
- 24 *Hand fork for pulverizing the soil or mixing of soil and organic matter before filling in polyethene bags*
- 25 *Hand trowel for transplanting of plantain seedlings from trays or boxes into large polyethene bags*
- 26 *Secateurs for pruning dead leaves from the base of the seedlings*
- 27 *Polyethene bags/trays/boxes for putting soil*
- 28 *Basket for carrying plantain seedlings*
- 29 *Booth to be wore as protection*
- 30 *Hand glove to be wore as protection*
- 31 *Gorgles to be wore as protection*
- 32 *Nose mask or respirator to be wore as protection*
- 33 *Knap sac sprayer for spraying chemicals*

Findings on entrepreneurial competency improvement needs of farmers in plantain plantation management enterprise. It was found out that plantain nursery farmers needed improvement in 4 entrepreneurial competency modules in plantain plantation management enterprise with 89, corresponding competency items. The competency modules and their 89 items were listed below:

Module A: Planning for Plantain Plantation Management Enterprise

- 1. Formulation of specific objectives for plantain plantation management*
- 2. Review the objectives of the plantain plantation enterprise periodically based on changes in market demand and supply*
- 3. Draw up programme plan for the plantain plantation enterprise*
- 4. Decide on the type (small, medium or large) of plantain plantation management enterprise to adopt*
- 5. Identify sources of credit for plantain plantation enterprise*
- 6. get for plantain plantation management.*
- 7. Identify relevant material inputs and their location (seedlings fertilizers, pesticides, herbicides) for plantain plantation enterprise*
- 8. Provide relevant tools and equipment (vehicles, cutlass, hoe etc) for use in plantain plantation enterprise.*
- 9. Identify different levels of man power needed for plantain plantation management.*
- 10. Plan all farm operations to make most efficient use of the available money.*
- 11. Make rules and regulations for successful plantain operations.*

12. *Identify market outlet for the plantain products.*
13. *Identify relevant records to keep for plantain plantation enterprise*
14. *Identify a site for plantain plantation enterprise*

Module B: Plantain Plantation Establishment

i. Land Selection and Preparation:

1. *Select well drained soil rich in organic matter.*
2. *Clear the undergrowth of the selected land with appropriate technologies.*
3. *Cut down the trees with appropriate technologies.*
4. *Park residues and burn*
5. *Stump the stems, park off, level and fill depressions with appropriate technologies.*
6. *Lay out the blocks to specification*
7. *Lay the plots in planting spacing of 3m by 2m along and within the rows for digging.*
8. *Dig holes of 30cm by 30cm by 30cm for each plantain sucker.*
9. *Keep the top soil separated from bottom soil of the dug holes.*

ii. Planting Plantain in the Field

1. *Select well differentiated seedling after 7-8 weeks in the nursery.*
2. *Remove bottom portion of the polythene bag with seedlings to 2cm from the base.*
3. *Cut the polyethene bag with seedlings from the top to the bottom.*
4. *Place seedlings centrally into the hole with the two hands and remove the polyethene bag.*
5. *Remove the polyethene bag away from the seedlings.*
6. *Fill back the hole first with top soil and then with bottom soil*

- 7 *Support the seedlings with top soil and add more soil if not enough.*
- 8 *Press the soil firmly around the seedlings*
- 9 *Place mulch materials around each planted seedlings*
- 10 *Water the seedlings daily.*
- 11 *Put wire net at the collar of each seedling if necessary.*

iii. Weeding and Fertilizer Application

i. Weeding

- 1 *Weed as weeds appear with cutlass or machet or row weed about three to four months interval based*
- 2 *Intercrop with legumes or cocoyam in rows at the young age of plantain or spray weeds with appropriate herbicides.*
- 3 *Prune the dry leaves and use them as mulch around the base of the plant.*

ii. Fertilizer application

- 1 *Apply 300kg/ha of Nitrogen in form of urea to seedlings one month after planting at the rate of milk*
- 2 *Apply 500kg/ha of muriate of potash 30 days after the first application of urea at the rate of small*
- 3 *Apply mixed fertilizer of 250gm (N), 100gm (P_2O_5) and 200gm (k) at the rate of 50 gm/plant when it starts to maiden.*

iv. Pests and Diseases Control

- 1 *Hand picks pests or insects on green leaves of plantain plant.*
- 2 *Maintain clean weeding of plantain plantation.*

3 *Use bird scaring gun to scare away birds or animals such as money*

4 *Plant resistant variety to guide against diseases*

5 *Spray insecticides to destroy insect or pests.*

6 *Remove insect or disease infested leaves and burn.*

7 *Maintain correct spacing*

v. *Debudding and Propping*

1 *Cut the male bud after the fruit has being set when the fingers are not coming out.*

2 *Get a stick that has Y shape*

3 *Hook the Y stick shape on fruit stalk*

4 *Dug the stick firmly into the soil to provide support of trunk or fruit until harvesting.*

vi. *Harvesting:*

1 *Identify mature plantain fruits for harvesting*

2 *Harvest with sharp machet by bending down to cut the pseudostem*

3 *Place with a forked stick or a helper to receive the bunch*

4 *Cut the pseudostem half way, then cut the bunch.*

5 *Cut down the entire pseudostem and chop together with the foliage of the main plant.*

6 *Spread chooped pseudostem and foliage over the soil as mulch for ratoon crop.*

7 *Collect the harvested bunches together for airing.*

8 *Cover the bunch with leaves half way to allow air inside the heap.*

9 *Sell to buyers if it is for marketing or process if necessary.*

Module C: Marketing of Plantain Fruits

1. *Carryout market survey for sale of plantain bunches*

2. *Advertise the sales of plantain fruits*
3. *Identify your customers and invite them for supply and search for market*
4. *Inform customers on the arrival of plantain products*
5. *Identify suitable whole sellers and retail agents*
6. *Sort the bunches to sizes in the weigh house.*
7. *Fix prices based on the weight or size of the bunches.*
8. *Sell the plantain bunches to the buyers.*
9. *Transport the purchased bunches to buyers if necessary.*
10. *Keep records of purchase and sales made*
11. *Reconcile sales with cost of resource input to determine profit or loss.*

Module D: Materials for Effective Management in Plantain Plantation Enterprise

1. *Land for planting plantain seedlings: identification, selection and preparation*
2. *Plantain seedlings/suckers to be used as planting materials in the field*
3. *Pegs for holdings ropes for laying blocks*
4. *Ropes for determining straight lines for blocks laying*
5. *Measuring tape for determining areas to be used in the plantation*
6. *Buildings for storing resource materials and for administrative purposes*
7. *Bore hole to be used as sources of water for irrigation*
8. *Watering can to be used for watering the plantation*
9. *Cutlass for cutting grasses*
10. *Hoe for removing weeds*
11. *Wheel barrow for carrying organic manure and fertilizer to the plantation site*

- 12 *Spade/shovel for carrying soil used to cover the root of the plantain*
- 13 *Fertilizer to be applied on the plantation for increasing the fertility of the soil*
- 14 *Herbicides for controlling weeds*
- 15 *Pesticides and insecticides for controlling pests and insects*
- 16 *Knap Sac prayer or boom sprayer for spraying chemicals e.g. pesticides, insecticides and herbicides*
- 17 *Sharp machet for harvesting plantain bunch*
- 18 *Pickups or trucks for carrying harvested bunchy to the market.*

Findings on entrepreneurial competency improvement needs of farmers in plantain processing and marketing enterprise. It was found out that plantain processors needed improvement in 4 entrepreneurial competency modules in plantain processing and marketing enterprise with 101 corresponding competency items. The competency modules and their 101 items were listed below:

Module A: Planning Activities for Plantain Fruits Processing

1. *Formulate specific objectives for plantain fruit processing*
2. *Review the objectives of plantain fruits processing periodically based on market demands and supply*
3. *Draw up programme plan of activities to cover different processing enterprise*
4. *Decide on the type (small, medium or large) of plantain processing enterprise to adopt*
5. *Identify sources of credit for processing enterprise*
6. *Make budget for plantain processing enterprise*

7. *Identify relevant material inputs and their locations*
8. *Identify different levels of man power needed for the plantain processing and marketing*
9. *Make rules and regulations for successful processing enterprise*
10. *Identify market outlet for the processed plantain fruits*
11. *Identify relevant records to keep for the plantain processing and marketing enterprise*

Module B: Plantain Fruit Processing i. Plantain Fruits Processing into Flour

1. *Select unripe plantain fruits*
2. *Wash the unripe plantain fruits with water to remove dirt and spray residues*
3. *Peel the unripe plantain to obtain pulp and keep pulps in a bowl containing water to avoid turning black*
4. *Sliced the pulp using knife.*
5. *Sun-dried the sliced pulp for 2-3 days.*
6. *Mill the sliced dried pulp using domestic grinding machines.*
7. *Sieve the ground pulp to obtain flour*
8. *Pack the sieve flour and sold to the market*

ii. Plantain Fruit Processing into Chips

1. *Select unripe plantain fruits as required.*
2. *Peel the plantain fruits with knife*
3. *Immerse in a bowl containing water*
4. *Cut/sliced peeled plantain fruits according to the desired sizes using appropriate technologies*
5. *Salt the sliced plantain fruits to taste*

- 6 *Heat vegetable oil or palm oil in a frying pan or electric fryer to about 170°C.*
- 7 *Put sliced plantain fruits into the hot oil and fry.*
- 8 *Stir constantly until crispy or golden yellow appear (Plantain chips).*
- 9 *Remove the plantain chips into plastic sieve to allow the oil to drain.*
- 10 *Spread chips on clean material to allow the plantain chips to cool*
- 11 *Sort and bag the plantain chips into various sizes*
- 12 *Seal with candle flame with the aid of kitchen knife and*
Market the products.

iii. Plantain Fruits Processing into malt (Non-alcoholic Plantain Drink)

- 1 *Select figs from plantain*
- 2 *Mill the figs with appropriate technologies into powder and keep until required.*
- 3 *Reconstitute about 55g (2 heaped tablespoon) of fig powder in 0.3 litres of water and mix.*
- 4 *Set the mixture aside for 5-10 minutes to enable the component of*
powder to leach into the water.
- 5 *Filter through muslin clothes, bottled and keep to sediment allow to sediment.*
- 6 *Decant or filter again, add vanilla flavor and granulated or icing sugar to sweeten*
the "malt"
- 7 *Finally bottle, refrigerate and Market the products*

iv. Plantain Fruits Processing into Jam

- 1 *Select 2 or 3 riped plantain*
- 2 *Blend the ripe plantain with harmer mill and mixed together with 1 cup of*
granulated sugar

- 3 *Add 200ml or 2 cups of water and mix together.*
- 4 *Add 30-35ml lime juice in the mixture.*
- 5 *Boil the mixture and allow the formed gel to cool*
- 6 *Preserved the gel with sorbic acid and market the products*

v. *Plantain Fruits Processing into Juice*

- 1 *Select some ripe plantain fruits*
- 2 *Peel the ripe plantain fruits and blend the pulp with appropriate technologies.*
- 3 *Soak slurry (blended pulp) in hot water for 10 -15 minutes for optimum juice extraction*
- 4 *Filter the extracted juice through white muslin (akamu) cloth*
- 5 *Pasteurize the juice by boiling and simmer for 3 minutes*
- 6 *Allow to cool, add colour and fill into sterilized bottles and market the products*

vi. *Plantain Fruits Processing into Ice Cream*

1. *Select 20-24 ripe plantain fruits.*
- 2 *Peel the ripe plantain fruits and blend the pulp with appropriate technologies*
- 3 *Soak slurry (blended pulp) in 500ml hot water for 10-15 minutes for optimum juice extraction*
- 4 *Filter the slurring through white muslin (akamu) cloth.*
- 5 *Add 12 eggs (alburnum, whisked), 1 cup of icing sugar, a pinch of vanilla powder or few drops of liquid vanilla flavor essence, 1 tin of milk and mix thoroughly.*
- 6 *Pour the mixture into cream cups or seal in polyethylene bag.*
- 7 *Place in a freezer until required and market the products*

vii. Plantain Fruits Processing into Wine

- 1 *Select 2kg ripe/over ripe plantain and 250g plantain skins (peels)*
- 2 *Slice peeled ripe plantain fruits and the peels with knife*
- 3 *Place in a clean, sterilized white cloth bag.*
- 4 *Tie the bag and place into a saucepan (preferably aluminum)*
- 5 *Add 4 litres of water, boil and simmer for 20-30 minutes.*
- 6 *Add granulated sugar and fruit juice in the boiled liquid*
- 7 *Apply pressure to extract as much juice as possible when the bag is cooled.*
- 8 *Add the extracted juice to sugar liquor*
- 9 *Shake to dissolve the sugar and cool in cold water.*
- 10 *Add 1 table spoon or 1 sachet (3g) of yeast and juice of one ripe grape fruit as yeast nutrient at 27-30°C to extracted juice*
- 11 *Record the initial temperature and specific gravity.*
- 12 *Keep the extracted juice in jar for a week in a room temperature.*
- 13 *Agitate the jar occasionally by giving it a shake*
- 14 *Record the data of temperature, PH and specific gravity.*
- 15 *Collect data until fermentation quickens after about 1 week*
- 16 *Plug air lock (fermentation trap) to the fermenter.*
- 17 *Put few drops of sterilizing solution into the air lock to form a U shape*
- 18 *Plug the top of the trap with cotton wool to enables the yeast to undergo an anaerobic method of self-reproduction.*
- 19 *Rack occasionally by siphoning the wine off the lees of yeast and deposited solids.*

- 20 *Sieve the wine with musline cloth to clear of its own accord; given time, when it does not, you may have to filter.*
- 21 *Bottled the sieve wine as required.*
- 22 *Store wine in sterilized bottles and corks.*
- 23 *Store finished wine in a rack or bin at 13°C or in a refrigerator and market the products*

Module C: Marketing of Processed Plantain Fruits (Flour, Chips, Malt, Jam, etc)

1. *Carryout market survey for sale of processed plantain fruits.*
2. *Package the processed plantain fruits into bags and grade.*
3. *Fix prices on the bags based on size and quality*
4. *Advertise the sales of the processed plantain fruits*
5. *Identify your customers and invite them for supply.*
6. *Sell the processed plantain fruits to different buyers according to grades and quality*
7. *Help customers transport their goods to their nearest destination if necessary.*
8. *Keep record of sales made*
9. *Reconcile sales and expenditure record to determine profit or loss.*

Module D: Material for Effective management in Plantain Processing and Marketing Enterprise

- 1 *Mature plantain bunches to be used as raw material for processing*
- 2 *Knife for peeling the plantain fruits*
- 3 *Mechanical sheer for slicing peeled plantain fruits*
4. *Water for washing peeled plantain fruits*

5. *Cabinet drier for drying sliced plantain fruits*
6. *Salt for spreading on sliced plantain fruits*
7. *Sterilized bottles used for keeping juice*
8. *Bowls for putting water used for washing peeled plantain fruits*
9. *Frying pan used for frying plantain chips*
10. *Hammer mill used for milling the dried sliced plantain fruits.*
11. *Sealer or candle knife for sealing the cellophane bag*
12. *Trucks for conveyance of processed products to market*

Finding on the competencies in training needed by trainers for training secondary school graduates for employment and retraining farmers for proficiency on the job in any plantain production enterprise. It was found out that the 26 competency items in training were needed by secondary school graduates for employment and retraining farmers for proficiency on the job.

i. Planning for Training

1. *Structure the plantain programme (nursery, plantation, processing and marketing) contents into topics or units*
2. *Arrange the topics or units sequentially in order of presentation*
3. *State the objectives to be achieved by each topic or unit for any plantain enterprise*
4. *Identify materials needed for training in each unit of the enterprise*
5. *Select relevant available materials for training in each units of the plantain enterprise*
6. *Identify relevant methods for teaching each topic or unit*
7. *Select relevant methods for teaching each topic or unit*

8. *Write down the plantain programme concepts, facts or generalizations to be learnt.*
- 9 *Identify competency performance of plantain programme units needed to develop*
- 10 *State instructors and learners activities.*
- 11 *Identify appropriate evaluation technique for each content area*
- ii. *Training procedure to be adopted by trainers***
- 12 *Teach trainees from known to unknown using plantain programme units or topics*
- 13 *Explain the facilities to be used by the trainer for training each trainee in each in competency area of the plantain programme*
- 14 *Deliver the contents step by step in logical order to the trainees*
- 15 *Demonstrate the competencies while the trainees observed during step by step teaching*
- 16 *Request the trainees to practice what the instructor demonstrated while the instructor observes them*
- 17 *Correct wrong practices made by the trainees*
- 18 *Encourage repetitive practice of knowledge and skills learnt*
- 19 *Test the practice of a group of related competencies toward achieving of the objectives*
- 20 *Provide the trainees information about their performance*
- 21 *Encourage visit to other plantain programme establishments, write - a report and submit to the instructor for a feedback system*
- 22 *Teach the trainee money management and investment procedure into their enterprise*
- 23 *Teach the trainees sources of fund for investment into the enterprise/programmes*
- 24 *Teach the trainees how to manage risk in the enterprises through insurance policy*
- 25 *Teach trainee salvage value of materials that can be resold for improving*

investment into the enterprise

26 *Teach the trainees knowledge of profit and loss account*

Findings on the Hypotheses Tested

The following findings emerged from the hypotheses tested:

Ho1:

It was found out from the hypotheses tested that there was no significant difference in the mean ratings of the responses of the teachers of agriculture, extension agents and plantain farmers on 96 out of 98 competency items needed by secondary school graduates for employment in plantain nursery enterprise but there was significant difference on two items.

Ho2:

It was found out that there was no significant difference in the mean ratings of the responses of teachers of agriculture, extension agents and plantain farmers on 86 out of 89 competency items in plantain plantation management needed by secondary school graduates for employment in plantain plantation management enterprise but there was significant difference on 3 items.

Ho3:

It was found out that there was no significant difference in the mean rating of the responses of teachers of agriculture, extension agents and plantain processors on 99 out of 101 competency items in plantain processing and marketing needed by secondary school graduates for employment in plantain processing and marketing enterprise but there was significant difference on 2 items.

Discussion of Findings

The findings of the study are discussed based on the research questions answered and hypotheses tested.

Discussion of findings on research questions

1. Entrepreneurial competencies needed by secondary school graduates for employment in plantain nursery enterprise.

The study found out that five modules with their 98 corresponding competency items in plantain nursery were needed by secondary school graduates for employment in plantain nursery enterprise. The modules are: planning for plantain nursery enterprise (13 competency items); plantain pre-nursery technique (22 competency items); plantain main nursery (22 competency items); marketing of plantain nursery seedlings (8 competency items); materials for effective management of plantain nursery (33 competency items) (see Appendix N, page 308).

Findings on planning for plantain nursery enterprise were in consonance with the Olaitan and Mama (2001) who identified competencies in farm planning to include: formulation of specific objectives for the farm, revising the objectives of the farm periodically based on the demand and supply of products, deciding on the farming and cropping system to adopt on the farm among others. The findings on planning was also in line with the findings of Ellah (2001) in a study carried out on principles and skills relevant to effective utilization of school farm in Cross River State where it was found out that the following competencies are needed for planning of farms as follows: identifying difference levels of manpower needed for the school farm, planning all farm operations to

make most efficient use of available money among others.

Findings on competencies in plantain pre-nursery (22 competency items) were in agreement with IITA (2008) report that the following competencies are needed in plantain pre-nursery: Choose a flat site, free from pests and diseases, make a shade with materials to ward off excess heat among others. The findings was also in line with the views of Adelaja (2005) who outlined pre-nursery competencies as: uprooting corm of a freshly harvest plantain stand, remove roots on the corm, wash corn and treat with appropriate fungicides among others.

Findings on plantain main nursery (22 competency items) was in consonance with findings of Eze (2006) in a study carried out on economics assessment of rapid multiplication of banana/plantain in Imo State where it was found out that the following competencies were needed for plantain main nursery as follows selection of flat and well dried site clear all vegetables, pack and burn all the thrashes among others. The findings was also in agreements with the report of FAO (2005) on world musa production which stated the competencies on plantain main nursery practice as follows: use of 400 or 500 gauge black polythene bags with a centrally placed perforation at the bottom, filling the bags with top soil from the nursery for the plantain surkers among others.

The findings on marketing of plantain nursery seedlings were in consonance with the view of Ugo (2005) who stated that marketing competencies are as follows: advertise the goods and services for buyers, carry out market survey to know the best time to sell products for profits among others. The findings were also in line with findings of Onuka (2003) in a study carried out on work-skill modules for improving the employment

opportunities of secondary school graduates in poultry occupation in Abia state, where it was found out that the following marketing competencies were needed: Keep records of purchase and sales, fix price on the seedlings based on sizes and vigour.

Findings on materials for effective management of plantain nursery were in line with the view of Imo ADP (2007) that the following materials and their usage are needed for plantain nursery as: land for identification, selection and preparation, top soil or organic matter for filling in the polyethene bag for planting corn among others. The views and opinions of the authors cited above add value to the competencies on plantain nursery enterprise identification by this study.

2. *Entrepreneurial competencies needed by secondary school graduates for employment in plantain plantation employment in plantain plantation management enterprise.*

The study found out that four modules with their 89 corresponding competency items in plantain plantation management were needed by secondary school graduates for employment in plantain plantation management enterprise. The modules are: planning for plantain plantation management enterprise (14 competency items); plantain plantation establishment (i) land selection and preparation (9 competency items); (ii) planting plantain in the field (11 competency items); (iii) weeding 3 competency items); (d) fertilizer application (3 competency items); (iv) pests and disease control (7 competency items); (v) Debudding and propping (4 competency items); harvesting 167; marketing of plantain fruits (11 competency items); materials for plantain plantation enterprise (18 competency items) (see Appendix N, page 313).

Findings on planning for plantain plantation management enterprise were in agreement with the views of Anyanwu, et al (2004) who outlined competencies in farm planning to include: reviewing of the farm objectives, establishing rules and regulation for workers, identifying manpower and market outlet among others. The findings on planning was also in consonance with the opinions of Bernard and Nix (1997) who outlined competencies in farming as: identifying sources of credit for farm operations, plan all farm operations to make most efficient use of the available money, identifying relevant records to keep for farm operations among others.

The findings on plantain plantation establishment: land selection and preparation were in agreement with the views of Chadha (2007) who listed competencies on land selection and preparation as: selection of suitable site that is well drained loamy soil, under brushing of the under growth, stumping of all trees among others. The findings were also in line with the views of Aturoti Tenkouano, Lemchi and Nnaji (2006) who outlined competencies in land selection and preparation as: lay out the blocks of 4 hectares, dig holes of 30cm by 30cm by 30cm for each of the plantain sucker among others.

The findings on planting plantain in the field were in line with report of FAO (2003) on Banana/plantain multiplication which stated that the competencies on planting plantain in the field as: selecting a well develop seedling when the seedling is about 7-8 weeks old, Remove bottom portion of the polyethene bag by to 2cm among others. The findings were also in agreement with the opinions of Rasheed (2003) that the following competencies on planting plantain in the field were: removing the polybag away from the

seedlings, place mulch materials around each planted seedlings among others.

Findings on weeding were in agreement with the views of Ekunwe and Ajayi (2010) who listed competencies in controlling weeds as: Intercropping with legumes or cocoyam in rows at young age of plantain, prune the leaves and use as mulch around the base of the plant among others. Findings on fertilizer were in consonance with the IITA (2006) report that the following competencies were needed in fertilizer application as: apply 300kg/ha of nitrogen (urea) at the rate of milk tin per plantain plant, apply 500kg/ha of potassium (as muriate of potash) 30days after the first application at the rate of small tin tomato per plant.

The findings on pests and diseases control were in agreement with the views of National Institute of Horticultural Research and Training (NIHORT) (2006) report which outlined pest and diseases competencies as follows: hand pick pests or insects on green leaves of plantain plant, application of insecticides to destroy insect pests, use bird scaring gun to scarce away birds among others. The findings were also in line with the report of IITA (2008) on plantain cultivation that stated the competencies on pest and disease control as follows: plant resistance variety to guide against diseases, maintain correct spacing, remove insect or disease infested leaves and burn among others.

The findings on debudding and propping in plantain plantation management were in conformity with the IITA (2006) report that the following competencies were needed as: cut the male bud after the fruit has being set when the fingers are not coming out, get a stick that has "Y" shape, the "Y" shaped stick is hooked on to the fruit among others.

Findings on harvesting in plantain plantation production were in agreement with

the view of Imo ADP (2007) that the following competencies were needed in harvesting as: identify mature plantain fruits for harvesting, Harvest using sharp machet among others. The findings were also in line with the NIHORT (2006) report that outlined competencies in harvest of plantain as: cut down the entire pseudostem and chop together with foliage of the main plant, collect the harvested bunches together for airing.

Findings on marketing of plantain fruits were in line with the views of Stanton (1996) who stated that marketing competencies include: carryout market survey for sale of plantain bunches, identify customers and invite them for supply. The findings on marketing were also in consonance with the opinions of Danielles, Engiberger and Lovens (2010) who outline marketing competencies as: sort the goods to sizes in the weigh house, fix their prices based on production cost among others.

Findings on the materials needed for plantain plantation enterprise were in agreement with the IITA (2006) report that the following materials and their utilization were needed in plantain plantation establishment as: land for planting seedlings, cutlass for clearing bushes, hoes used for removing weeds among others. The views and opinions of the authors cited above add value to the competencies on plantain plantation management enterprise identified by this study.

3. Entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprise

The study found out that four modules with their 101 corresponding competency items in plantain processing and marketing were needed by secondary school graduates for employment in plantain processing and marketing enterprise. The

modules are: planning for plantain fruits processing and marketing (11 competency items); plantain fruit processing into: (i) flour (8 competency items); (ii) Chips (13 competency items); (iii) malt (8 competency items); (iv) jam (7 competency items); (v) Juice (7 competency items); (vi) ice cream (8 competency items); (vii) Wine preparation (23 competency items); Marketing of processed plant fruits (9 competency items); Materials for plantain processing and marketing enterprise (See Appendix N, page, 318).

Findings on planning for plantain fruits processing and marketing were in consonance with the views of Anyanwu, Nzewi and Kudolu (2004) who highlighted planning competencies to include: formulating specific objectives of farm activities, draw up programme or plan for the farm activities, identifying sources of credit for farming among others. The findings on plantain fruit processing into flour were in line with Akinyemi (2005) who identified competencies in flour production to include: Obtain unripe, green plantain fruits, peel to remove the peels, slice the plantain pulp using knife or automatic dicing machine among others. The findings were in agreement with IITA (2006) report which outlined competencies in plantain flour making as: the sliced diced pulp are dried under sun or oven, milled the dried pulp using hammer mill, sieve, packed and sold to the market among others.

Findings on plantain fruits processing into chips were in conformity with view of Imo ADP (2007) that competencies in processing plantain fruits are as follows: peeling the plantain fruits, hand slicing using knife among others. The findings were also in the

line with the Adeniyi, Tenkouano, Lemchi and Faturoti (2008) who stated that competencies in plantain fruits processing to chips include: select unripe plantain fruits, immerse in a bowl containing water among others.

Findings on competencies in plantain fruits production into malt were in agreement with the views of IITA (2008) report that outlined malt competencies as: obtain figs from plantain, mill the figs into powder, and keep until required among others. Findings of plantain fruits processing into Jam were in line with IITA (2008) report who outlined the competencies in preparing jam to involve: select 2 or 3 ripe plantain, blend the ripe plantain with harmer mill and mixed together with 1 cup of granulated sugar among others.

Findings on plantain fruits processing into juice were in agreement with the views of Adeniyi, et al (2008) who outlined competencies of plantain fruits processing into juice as: obtain some ripe plantain fruits, peel and blend the pulp, soak slurring in hot water for 10 - 15 minutes for optimum juice extraction among others. Findings on plantain fruits processing into ice cream were in agreement with IITA (2008) report that enumerated competencies in ice cream production as: obtain 20 - 24 ripe plantain fruits, peel and blend the pulp, soak slurring in hot water for 10 - 15 minutes for optimum juice extraction among others.

The findings on wine production were in line with the views of IITA (2008) report that stated the competencies in wine production (aerobic) as: obtain 2kg ripe/over ripe plantain and 250 plantain skin (peel), slice peeled plantain and the peels, place in a clean, sterilized white cloth bag, tie the bag and place into a source pan among others.

The findings on marketing of processed plantain fruits were in consonance with the views of George (2002) who stated competencies in marketing processed plantain fruits as: packagings of the farm products, helping customers transport their goods to their nearest destination if necessary among others. The findings on materials for usage in plantain processing and marketing were in agreement with the opinions of IITA (2007) report that listed materials needed in plantain fruits processing as: mature plantain bunches to be used as raw materials for processing, knife for peeling the plantain fruits among others. The views and opinions of the authors cited above add value to the competencies on plantain processing and marketing enterprises identified by this study.

4. Findings on entrepreneurial competencies in plantain nursery practice where nursery farmers needed improvement

The study found out that nursery farmers needed improvement in 13 competency items in planning for plantain nursery enterprise; 22 competency items in plantain pre-nursery; 22 competency items in plantain main nursery; 8 competency items in marketing of plantain nursery seedlings; 33 competency items in utilization of materials in nursery (see Appendix N, page 323).

The findings of the study were in agreement with the findings of Asogwa, Uko and Umeh (2010) on quality assurance of teachers for teaching oil palm production to schools in senior secondary schools in Enugu State, where it was found out that teachers in Enugu State require capacity building for quality assurance in teaching oil palm production to student in senior secondary schools in areas of nursery, pre-planting, planting, post planting and post harvest operations. The findings of the study were in agreement with the

findings of Uga (2006) in a study carried out on identification of work-skill improvement needs of farmers in rice production in Ebonyi State. The study found out that farmers requires improvement in 111 out of the 135 skills identified as needed in rice production. The findings of the authors above help to add value to the validity of the findings.

5. Findings on entrepreneurial competencies in plantain plantation management were plantation management farmers needed improvement

The study found out that plantain plantation farmers need improvement in 14 competency items in planning; 9 competency items in selection and preparation; 11 competency items in planting in the field; 3 competency items in weeding; 3 competency items in fertilizers application; 7 competency items in pests and diseases control; 4 competency items in debudding and propping; 9 competency items in harvesting; 11 competency items in marketing of plantain products; 18 competency items in utilization of resource materials in plantain plantation enterprise (See Appendix N, page 328).

The findings in this study were in conformity with findings of Olaitan, Amusa and Nwobu (2009) in a study on Quality assurance of instructors in teaching cocoyam production to students in schools of agriculture in South Western Nigeria. The study found out that the instructors required improvement on teaching the planning, pre-planting, post planting, harvesting and marketing operations of cocoyam to students in schools of agriculture in South Western Nigeria. The findings also were in agreement with findings of Olaitan, Alawa and Ekong (2009) in a study on capacity building needs of farmers in improving soil nutrients for enhancing crop, production in Cross River State, Nigeria.

The study found out that farmers required capacity building in soil testing and

analysis, manure and manuring and fertilizer application methods. The findings of the authors above helped to add value to the validity of findings of this aspect of the study.

6. Findings on entrepreneurial competencies in plantain processing and marketing were plantain processors needed improvement

The study found out that plantain processors need improvement in 11 competency items in planning for plantain processing; 8 competency items in plantain fruits processing into flour; 12 competency items into chips; 7 competency items into malt; 6 competency items into juice; 7 competency items into jam; 11 competency items into ice cream; 23 competency items into wine (aerobic and anaerobic); 9 competency items in marketing of processed plantain fruits; 12 competency items in utilization of resource materials in plantain processing and marketing enterprises (See Appendix N, page 333).

The findings on this study were in consonance with findings of Olaitan, Alaribe and Ellah (2009) on capacity building needs of palm oil and kernel marketers for enhancing Economic Returns from oil palm industry in south Eastern Nigeria. The study found out that palm oil and kernel marketers needed capacity building in planning, processing and marketing skills in palm oil and kernel enterprise. The findings of the authors cited above helped to add credence to the findings of the study on improvement needs of plantain processors in plantain processing and marketing enterprise.

7. Competencies in training needed by trainers for training secondary school graduates for employment and retraining plantain farmers for proficiency in any of the plantain enterprises (nursery, plantation, processing and marketing).

The study found out that 26 corresponding competency items in training were needed by trainers for training secondary school graduates for success in employment and retraining farmers for proficiency in any plantain enterprise.

Findings on training for any plantain enterprise (nursery, plantation, processing and marketing) page 162 were in line with findings of Aguolu (2007) in a study carried out on competency improvement needed of supervisors of teachers of agriculture in primary and post primary schools in federal capital territory Abuja where it was found out that the following training competencies were needed: structure the content into topics or units, identification and selection of instructional materials for teaching in each unit area, write down the concepts, facts or generation to be learnt among others. The findings were also in agreement with the findings of Olaitain and Onuka (2007) in a study carried out on entrepreneurship skills required for economic empowerment of youths in broiler production in Abia state where it was found out that the following training competencies were needed: start teaching trainees from known to unknown, explain the facilities to be used by the trainer for training each trainee, correct any mistake made by the trainee among others. The views and opinions of the authors cited above add value to the competencies on training identified by this study.

Discussion of Hypotheses

Ho1: *Finding of the study in hypothesis one revealed that there was no significant difference in the mean ratings of the agricultural science teachers, extension agents and*

farmers on the five modules (A-E) with their 96 out of 98 competency items needed by secondary school graduates in commercial plantain nursery practice (See Appendix O page 341). The implication of the above finding is that the occupational experience and professional training of the three groups of respondents did not significantly influence their opinions on the 5 modules and their 96 out of the 98 competency items needed for employment of secondary school graduates in commercial plantain nursery but significantly influence their opinions on the remaining 2 competency items.

Ho2: *Finding of the study in hypothesis two revealed that there was no significant difference in the mean ratings of the agricultural science teachers, extension agents and farmers on the four modules (A-D) with their 86 out 89 competency items needed by secondary school graduates in commercial plantain plantation management (See Appendix O page 482). The implication of the above finding is that the occupational experience and professional training of the three groups of respondents did not significantly influence their opinion on the 4 modules and the 86 out of 89 competency items needed for employment of the secondary school graduates in commercial plantain plantation management but significantly influence their opinions on the remaining 3 competency items.*

Ho3: *Finding of the study in hypothesis three revealed that there was no significant difference in the mean ratings of the agricultural science teachers, extension agents and farmers on the four modules (A-D) with their 99 out of 101 competency items needed by secondary school graduates in commercial plantain processing and marketing (See Appendix O page 354). The indication of the above finding is that the occupational*

experience and professional training of the three groups of respondents did not significantly influence their opinions on the 4 modules and their 99 out of 101 competency items needed for employment of the secondary school graduates in commercial plantain processing and marketing but significantly influence their opinions on the remaining 2 competency items.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter presented the summary of restatement of the problems, purpose of the study, procedure used as well as the findings of the study; conclusion, educational implications, recommendations and suggestions for further study were also presented.

Restatement of the Problem

Plantain is a crop plant with green leaves and herbaceous stem. It is used as food by man and animal. The materials are used to manage health. In agriculture, their peels are used as organic manure by farmers. Presently, in the area of study, farmers who were involved in plantain production grow plantain as intercrop with little care. The crop continues to compete with weeds for nutrients and struggle with insects and pests for survival and at the end resulted into low yield with poor quality. Government of Abia and Imo states had assisted the farmers through extension agents by providing farm inputs such as fertilizers, financial assistance among others to boost plantain production; but the farmers diverted these inputs to growing cassava, cocoyam and yam that have almost the same maturing periods with plantain, while still growing plantain as an intercrop. Therefore, the low yield and poor quality of plantain still persist. Government of both states did not relent in their efforts to boost plantain production therefore mandated secondary school teachers to teach students as a major crop in order to improve its availability. Due to congestion of the curriculum, the objectives of the government could not being achieved, students graduates without the needed competencies in plantain production. The government of both states established skill acquisition centres in various

locations of the states like Aba, Umuahia, Owerri, Okigwe among others for unemployed secondary school graduates and others; in order to equip them with ethical jobs and for retraining farmers for proficiency on the job. It was observed that there were skill jobs such as barbing, hair dressing, sewing among others in the acquisition centres established but there were no programme on plantain production for empowering the unemployed secondary school graduates or retraining farmers in commercial plantain production. This motivated the researcher to embark on this study.

Purpose of the Study

Specifically, the study sought to identify:

- 1. Entrepreneurial competencies needed by secondary school graduates for employment in plantain nursery practice enterprise.*
- 2. Entrepreneurial competencies needed by secondary school graduates for employment in plantain plantation management enterprise*
- 3. Entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprise.*
- 4. Entrepreneurial competencies in plantain nursery where farmers needed improvement.*
- 5. Entrepreneurial competencies in plantain plantation management were farmers needed improvement.*
- 6. Entrepreneurial competencies in plantain processing and market where farmers needed improvement.*
- 7. Competencies in training needed by trainers for training secondary school*

graduates for success in employment and retrain farmers for improvement.

8. *Package the competencies identified for each enterprise for training secondary school graduates and training farmers in commercial plantain production.*

Summary of the Procedure used for the Study

The study adopted descriptive survey research and function of industry designs. The study was carried out in Abia and Imo states. The population of the study was 1,490 made up of 644 agricultural science teachers (184 teachers from Abia state and 460 teachers from Imo state), 766 extension agents (512 extension agents from Abia state and 254 extension agents from Imo state), 20 nursery farmers (15 nursery farmers from Abia and 5 nursery farmers from Imo), 34 plantain plantation management farmers (24 from Abia and 10 from Imo), 26 plantain processors (16 from Abia and 10 from Imo). The sample was 362 made up of 129 agricultural science teachers, 153 extension agents and 80 registered plantain farmers. The population size of the groups of farmers was small and therefore, all of them constituted the sample. The population size of agricultural science teachers and extension agents were large and therefore, 20% proportionate sampling technique was used for the sampling.

Four (4) sets of structured questionnaire were developed to obtain data from the respondents on plantain nursery, plantation, processing and marketing enterprises and training needs respectively. The four sets of questionnaire were face validated by five (5) experts. Cronbach alpha reliability method was used to determine the internal consistency of the four sets of questionnaires. The reliability coefficient of 0.88, 0.95, 0.90 and 0.84 were obtained for the four sets of questionnaires respectively.

Six (6) research assistants helped to administer four (4) sets of questionnaire to 3 groups of respondent made up of agricultural science teachers, extension agents and fanners. The data collected were analyzed using weighted mean and improvement Need Index to answer the research questions while Analysis of Variance (ANOVA) statistic were used to test the hypothesis at 0.05 level of significance.

Major Findings of the Study

The following were the major findings of the study:

- 1. Five (5) modules with their 98 corresponding competency items in plantain nursery enterprise were needed by secondary school graduates for employment.*
- 2. Four (4) modules with their 89 corresponding competency items in plantation management enterprise were needed by secondary school graduates for employment.*
- 3. Four (4) modules with their 101 corresponding competency items in plantain processing and marketing enterprise were needed by secondary school graduates for employment.*
- 4. Plantain nursery farmers needed improvement in five (5) modules with 98 corresponding competency items in plantain nursery enterprise.*
- 5. Plantain plantation management farmers needed improvement in four (4) modules with 89 corresponding competency items in plantain plantation management enterprise.*
- 6. Plantain processors needed improvement in four (4) modules with their 101 corresponding competency items in plantain processing and marketing enterprise.*

7. *Twenty-six (26) competency items in training were needed by trainers for training secondary school graduates for employment and retraining farmers for proficiency in plantain production enterprises.*
8. *The entrepreneurial competencies identified by this study were packaged into three (3) enterprises namely:*
 - (i). Plantain Nursery Enterprises,*
 - (ii). Plantain Plantation Management Enterprise*
 - (iii). Plantain Processing and Marketing Enterprise to training secondary school graduates for employment and retraining plantain farmers for improvement on the plantain production farming.*

Major Findings of the Hypotheses

1. *It was found out that there was no significant difference in the mean ratings of agricultural science teachers, extension agents and plantain nursery farmers on 96 out of 98 competency items in plantain nursery enterprise needed by secondary school graduates for employment in plantain nursery enterprise but there was significant difference in 2 items.*
2. *It was found out that there was no significant difference in the mean ratings of agricultural science teachers, extension agents and plantain plantation farmers on 86 out of 89 competency items in plantain plantation management needed by secondary school graduates for employment in plantain plantation management enterprise but there was significant difference in 3 items.*
3. *It was found out that there was no significant difference in the mean ratings of*

agricultural science teachers, extension agents and plantain processors on 99 out of 101 competency items in plantain processing and marketing needed by secondary school graduates for employment in plantain processing and marketing enterprise but there was significant difference in 2 items.

Conclusion

The government of Abia and Imo states made efforts to boost plantain production through Agricultural Developmental Programme (ADP) and schools but the results were not very favourable. Hence, the government established skill acquisition centres for training secondary school graduates for occupation but these skill centres were devoid of competency training programme for training secondary school graduates for employment in the plantain production enterprise and retraining of plantain farmers for proficiency on the job.

This study therefore focused on identification and packaging of entrepreneurial competencies in commercial plantain production for training secondary school graduates for employment and retraining farmers for proficiency on the job in Abia and Imo States. The study therefore found that entrepreneurial competencies were needed by secondary school graduates for employment in plantain nursery, plantain plantation management and plantain processing and marketing enterprises. Addition, the study found that plantain farmers needed improvement in plantain nursery, plantain plantation management and plantain processing and market enterprises.

Educational Implications of the Study

- 1. If Abia and Imo state governments make use of the direct the identified and*

- packaged plantain production programmes (nursery, plantation, processing and marketing) see Appendices J, K and L on pages 283, 290 and 297 respectively through their skill acquisition centres to train secondary school graduates and retrain farmers for competency. It will increase plantain production to meet demands, increase economy of the states and provide jobs for unemployed secondary school graduates and other interested youths.*
2. *If the identified and packaged plantain programmes (nursery, plantation, processing and marketing) are integrated into skill acquisition centres. It will provide an avenue for training secondary school graduates and retraining farmers for competency.*
 3. *If the identified and packaged plantain programmes are integrated into the programmes of schools and colleges or universities of agricultures by curriculum planners it will help for effective training of students who are interested in future employment with in plantain production enterprises.*
 4. *If the identified and packaged programmes competencies in plantain production enterprises are utilized for retraining the farmers through small plot adoption techniques by extension agents of ministry of education from the states. It will help farmers to improve their techniques and production thereby earning higher income from plantain production.*

Limitations of the Study

The researcher did not try test the identified competencies in plantain production enterprises (nursery, plantation, processing and marketing before packaging them as

required by modular approach which this study identified with. Try testing the identified competencies before packaging them into plantain programme will entail high resources beyond what the researcher could afford. These are:

- (1) Finance: Trial testing the package will involved experiences on land to be acquired for try testing; payment and maintenance of secondary school graduates to be involved for the try testing for a period of time, payment for other material resources like plantain suckers, farm implements, irrigation if there is no water and security for the period of time taken for the nursery trial testing to plantation to processing and marketing.*
- (2) Time-It will take along period to obtain results from the experiment which is not conducive for the researcher on the job. Alternatively, to obtain a similar result like trial testing, the researcher adopted the functions of industry approach. The researcher visited National Institute for Horticultural Researcher and Training Okigwe, Agricultural Development Programme (ADP) Owerri and Imo state polytechnic Umuagwo to understudy the training facilities and activities of each of the enterprise as carried out by the instructors. The researcher identified the competencies in each of the enterprise, arranged them sequentially as was practiced in the research centres and have them validated by the experts in the centres. The findings of this study will yield similar result as the practice of the industry from where the instrument of this study was developed and administered for collecting data analysis*

Recommendations for Implementation

Based on the findings and implications of the study, the following recommendations were made for implementation.

- 1. Abia and Imo States government should direct the acquisition centres to integrate the identified and packaged programmes in plantain production enterprises (nursery, plantation, processing and marketing) into skill acquisition centres for training secondary school graduates for employment and retraining farmers for competency on the job.*
- 2. The administrators of skill acquisition centres should integrate the identified and packaged competencies in training programme of their centres and used them in training secondary school graduates for employment and retraining farmers for competency in plantain production enterprises (nursery, plantation processing and marketing).*
- 3. The curriculum planners should use these findings to advise the schools and colleges or universities of agriculture to adopt the packaged programmes into their training programmes for preparing youths for employment in the field of agriculture.*
- 4. The extension agents should utilize the identified and packaged programmes in plantain production enterprises (nursery plantation, processing and marketing) for retraining farmers through small plot adoption techniques to make them improve their production practices and earn higher income in plantain production.*

Suggestions for further studies

The following suggestions were made for further studies:

1. *An Assessment of industrial demand for plantain products as raw materials for producing commercial products.*
2. *An Assessment of supply of plantain for industrial use in order to enhance employment of school graduates in marketing in Abia and Imo states.*
3. *Capacity building needs of unified extension agents in retraining farmers on innovations in plantain production enterprises.*

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APPENDICES

APPENDIX A

EVIDENCES OF VISITS TO INDUSTRIES FOR FUNCTIONS OF INDUSTRY

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IMO STATE POLYTECHNIC UMUAGWIO
Office of the Rector

P.M.B. 1472, Owerri
Imo State,
Nigeria

Rev. Fr. W. C. Madu,
CMF, Bsc (Hons), Msc, PhD.

Mrs S. Njemanze
B. Arts (Hons), FCAI, FIIA

Date: 07/03/2012

Centre for Research, Entrepreneurship
employment and Production (CREEP)
ITA - Collaborative Projects 4
Mantains/Bananas.

TO WHOM IT MAY CONCERN

This is to certify that Mrs Okafor, Chichi E. of the
Department of Vocational, Technical Education - Agric
section, University of Nigeria, Nsukka was indefatigably
trained in various aspects of ITA - Mantains/Bananas
Production Technology while carrying out her PhD
field work from 2009 to 2010.

She was very conscious of her goal, very teachable and
showed high level of researchfulness all through her
visits to the institution.

Regards always.

[Signature]
Dr. Nwachin, E.C.C.
(Director, CREEP)

IMO STATE AGRICULTURAL DEVELOPMENT PROGRAMME

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ADP HEADQUARTERS:
OKIGWE ROAD SECRETARIAT
P. O. BOX 1977, OWERRI
IMO STATE, NIGERIA.
TEL: 083-234089

Our Ref.....
Date: 10th August 2010

TO WHOM IT MAY CONCERN

This is to certify that the researcher (MRS
Ifeoluwa Oluchi E) visited our organisation (Imo
State Agricultural Development Programme) Ekekele
Camp in the year 2010 where activities on
plantain enterprises are carried out.

The understudied step by step program activities
include plantain nursery, plantain management,
harvesting and marketing enterprises.

The Centre Manager took time to instruct
on the activities of the programme.

So please give her anticipated maximum pro-
blems and assistance.

Thanks

REGIONAL MANAGER
Signature: [Handwritten Signature]
Date: 10/8/10

Centre Manager / Supervisor

NHORT
P.M.B. 1076
Mbato station
Okigwe.
7/03/11.

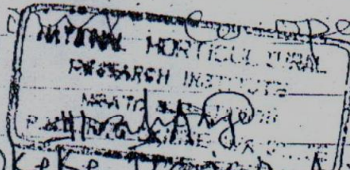
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TO WHOM IT MAY CONCERN

Re: Okafor Oluchi Erimma

This is to certify that the above named researcher visited our research centre NHORT Okigwe where she understudied the programme events on plantain enterprises (nursery, plantation, processing and marketing). The programme officer instructed her on the step by step activities carried out in the centre, and a questionnaire formed from the programme activities on plantain production enterprises written down was later validated.

Thanks for your cooperation.



Okeke Francis A. O
Chief Agric. Suprintendent

ERL \$T

NHORT 7/03/2012

APPENDIX B***Population Distribution of Teachers of Agriculture in Abia and Imo States.***

ABIA STATE		
<i>S/N</i>	<i>Zone</i>	<i>Population of Teachers of Agriculture</i>
1	<i>Aba</i>	82
2	<i>Ohafia</i>	46
3	<i>Umuahia</i>	56
	Total	184

IMO STATE		
<i>S/N</i>	<i>Zone</i>	<i>Population of Teachers of Agriculture</i>
1	<i>Okigwe</i>	80
2	<i>Orlu</i>	112
3	<i>Owerri</i>	268
	Total	460

Source: Secondary Education Management Board (SEMB) Abia and Imo States.

*APPENDIX C**Population Distribution of Extension Agents in Abia and Imo States**ABIA STATE*

<i>S/N</i>	<i>Zone</i>	<i>Extension Agents</i>
<i>1</i>	<i>Aba</i>	<i>181</i>
<i>2</i>	<i>Ohafia</i>	<i>152</i>
<i>3</i>	<i>Umuahia</i>	<i>179</i>
	<i>Total</i>	<i>512</i>

IMO STATE

<i>S/N</i>	<i>Zone</i>	<i>Extension Agents</i>
<i>1</i>	<i>Okigwe</i>	<i>56</i>
<i>2</i>	<i>Orlu</i>	<i>78</i>
<i>3</i>	<i>Owerri</i>	<i>130</i>
	<i>Total</i>	<i>254</i>

Source: Agricultural Development Programme (ADP Abia and Imo states)

APPENDIX D***Population Distribution of Plantain Farmers in Abia and Imo States***

<i>State</i>	<i>Population of Plantain Nursery Farmers</i>	<i>Population of Plantain Plantation Management farmers</i>	<i>Population of Plantain Processors</i>	<i>Total</i>
<i>Abia</i>	<i>15</i>	<i>24</i>	<i>16</i>	<i>55</i>
<i>Imo</i>	<i>5</i>	<i>10</i>	<i>10</i>	<i>25</i>
<i>Total</i>	<i>20</i>	<i>34</i>	<i>26</i>	<i>80</i>

Source: ADP (Abia and Imo States)

APPENDIX E***Samples from the Population Distribution of Teachers of Agriculture***

<i>State</i>	<i>Population Distribution of Teachers of Agriculture</i>	<i>Sample from the Population of Teachers of Agriculture</i>
<i>Abia</i>	<i>184</i>	<i>37</i>
<i>Imo</i>	<i>460</i>	<i>92</i>
<i>Total</i>	<i>644</i>	<i>129</i>

Source: Secondary Education Management Board (Abia and Imo States)

APPENDIX F***Samples from the Population Distribution of Extension Agents***

<i>State</i>	<i>Population Distribution of Extension Agents</i>	<i>Sample from the Population of Extension Agents</i>
<i>Abia</i>	<i>512</i>	<i>102</i>
<i>Imo</i>	<i>254</i>	<i>51</i>
<i>Total</i>		<i>153</i>

Source: ADP (Abia and Imo states)

APPENDIX G**RESEARCH INSTRUMENTS**

*Department of Vocational Teacher Education
(Agricultural Education Unit)
University of Nigeria, Nsukka*

Date

Dear Sir,

REQUEST FOR VALIDATION OF RESEARCH INSTRUMENT

I am a postgraduate student in the above Department and University, currently undertaking a research project aimed at identifying Entrepreneurial competency training programme required by secondary school graduates and farmers for economic success in plantain production enterprises in Abia and Imo States.

The attached is a draft cope of the questionnaire designed for the study. You are please requested to vet the items for clarity, relevance and total coverage for use in collecting data for the study you are also requested to put down your comments and suggestions for improving the quality of the instrument.

A copy each of the purpose of the study and research questions guiding the study are attached with this letter.

Thanks for your cooperation.

Yours faithfully,

***Okafor, Oluchi Erinma
(Researcher)***

*Department of Vocational Teacher Education
(Agricultural Education Unit)
University of Nigeria, Nsukka
Date*

Dear Sir,

REQUEST TO RESPOND TO A QUESTIONNAIRE

I am a postgraduate student in the above Department in the university, currently undertaking research project titled "Entrepreneurial competency Training Programme Required by Secondary School Graduates and Farmers for economic success in plantain production Enterprises in Abia and Imo States".

The attach schedule is to elicit the necessary information. You are please requested to respond to the items as confidential and will be used strictly for this research.

Thanks for your cooperation.

Yours faithfully

Okafor Oluchi, E
PG/Ph.D/07/43141
(Researcher)

ENTERPRISE (A)**PLANTAIN NURSERY ENTERPRISE**

PROJECT FOCUS: *Entrepreneurial competencies in Plantain Nursery Practice Enterprise.*

PART ONE: *General information and personal Data:*

Please, you are requested to supply all relevant information to items below:

1. **Name of your establishment or school** _____

2. **Sex:** Male Female

3. **Nature of work**

a. *Teacher of agriculture*

b. *Extension Agent*

4. **Qualification of Respondent**

Ph.D

M.Ed

M.Sc

PDGE

B.Ed

B.Sc

HND

OND

PART TWO: *(Teachers of Agriculture and Extension Agents only)*

Introduction: Please check the response options on the level at which each item below is

required in plantain production enterprise. The response options are:

Very Highly Needed (VHN) = 5 points

Highly Needed (HN) = 4 points

Average Needed (AN) = 3 points

Slightly Needed (SN) = 2 points

Not Needed (NR) = 1 point

Module A: Competencies in Planning Needed for Plantain Nursery Enterprises

SN	Item Statement	Teachers & Ext Agents				
		VHN	HN	AN	SN	NN
1.	<i>Formulate specific objectives for the nursery enterprise</i>					
2.	<i>Review the objectives periodically based on market demand and supply</i>					
3.	<i>Draw up programme plan of activities to cover</i>					
4.	<i>Decide on the type (small, medium, or large) of nursery enterprise to adopt</i>					
5.	<i>Identify sources of credit for nursery enterprise</i>					
6.	<i>Make budget for the nursery enterprise</i>					
7.	<i>Identify the relevant material inputs and their locations</i>					
8.	<i>Identify different levels of man power needed for the nursery enterprise</i>					
9.	<i>Establish time for plantain nursery</i>					
10.	<i>Make rules and regulations for successful nursery practice</i>					
11.	<i>Identify market outlet for the nursery products</i>					
12.	<i>Identify relevant records to keep for nursery enterprise</i>					
13.	<i>Identify site to purchase for nursery enterprise</i>					

Module B: Competencies in Plantain Nursery Enterprise

Competencies in Plantain Pre-nursery

i. Sliced Corm Technique

SN	Item Statement	Teachers and Extension Agents				
		VHN	HN	MN	SN	NN
1	<i>Choose a flat site, free from pests and diseases for pre-nursery</i>					
2	<i>Make a shade with materials to ward off excess heat.</i>					
3	<i>Prepare pre-nursery beds or boxes or trays with polythene bags.</i>					
4	<i>Mix carefully top soil and poultry manure (8:1) that is</i>					

	<i>8 head pans of top soil to 1 head pan of poultry manure</i>					
5	<i>Fill the boxes, trays, poly bags with mixed top soil and poultry manure.</i>					
6	<i>Water the soil in the boxes, trays and polybags.</i>					
7	<i>Arrange the poly bags in rows to form beds</i>					
8	<i>Acquire the corms to nurse</i>					
9	<i>Slice the corms into sizes of not more than 2 – 3cm.</i>					
10	<i>Arrange the sliced corms in rows in the boxes or trays and one per polybags.</i>					
11	<i>Apply water at alternate days especially during dry season.</i>					
12	<i>Transfer sprouting corms into the nursery.</i>					

ii. Whole Corm Technique

		Teachers and Extension Agents				
SN	Item Statement	VHN	HN	MN	SN	NN
1	<i>Prepare the pre-nursery as in Bi (1 to 7) above</i>					
2	<i>Dig out whole corms to nurse and wash with water.</i>					
3	<i>Stripped back the outer leaf sheaths of each corm with knife.</i>					
4	<i>Loose any cover on the bud surface</i>					
5	<i>Arrange whole corm in poly bags or in trays or boxes and cover with soil or saw dust.</i>					
6	<i>Apply water on alternate days.</i>					
7	<i>Mulch with dry grasses</i>					
8	<i>Observe the buds for sprouting after 6 – 8 days.</i>					
9	<i>Remove any weeds on the beds or trays or polythene bags.</i>					
10	<i>Transfer sprouted beds into nursery.</i>					

C Competencies in Plantain Main Nursery

		Teachers and Extension Agents				
S/N	Item Statement	VHN	HN	MN	SN	NN
1	<i>Select site that is flat well drained and easily accessible.</i>					
2	<i>Clear the bush, level and fill depressions with appropriate technologies</i>					

3	<i>Pack and burn all the thrashes or heap them in the farm or out of the site.</i>					
4	<i>Prepare a shade over the nursery</i>					
5	<i>Construct a fence with 1.20 mesh poultry wire.</i>					
6	<i>Collect 8 head pans of top soil to 1 head pan of poultry manure as standard mixture.</i>					
7	<i>Mix the top soil and poultry manure together very well with shovel or spade.</i>					
8	<i>Provide 400 or 500 gauge black polythene bags with a centrally placed perforation at the bottom.</i>					
9	<i>Fill the bags with the mixture of top soil and poultry manure.</i>					
10	<i>Arrange the poly bags in rows of beds on the cleared land</i>					
11	<i>Apply water to the soil for one day and leave for at least one week to consolidate</i>					
12	<i>Open the middle of soil in the polythene bags.</i>					
13	<i>Select the differentiated young seedlings from pre-nursery (B i or ii above)</i>					
14	<i>Place the sprouted corm with ball of earth into the hole in the polythene bags carefully and close up the base of the sprouted corms with earth</i>					
15	<i>Apply water in the morning and evening daily.</i>					
16	<i>Apply NPK fertilizer 20:10:10 (10gm/plant)</i>					
17	<i>Spray with benomil or ash slurry around the pseudostem base and around plants to prevent insects from eating the foliage</i>					
18	<i>Mulch with partially decomposed refuse or dry grass.</i>					
19	<i>Weed with hoe and hand pick pests regularly</i>					
20	<i>Prune dead leaves from the base of the seedlings.</i>					
21	<i>Harden the seedlings through gradual removal of the shade.</i>					
22	<i>Transfer the seedlings after 6 to 8 weeks into the main plantation and market the products.</i>					

Module D: Competencies Needed for Marketing of Plantain Nursery Seedlings

<i>SN</i>	<i>Item Statement</i>	<i>Teachers and Extension Agents</i>				
		<i>VHN</i>	<i>HN</i>	<i>MN</i>	<i>SN</i>	<i>NN</i>
1.	<i>Carryout market survey for sale of nursery seedlings</i>					
2.	<i>Assemble the seedlings into sides or groups according to viability and vigour</i>					
3.	<i>Fix price on the seedlings based on sizes and vigour</i>					
4.	<i>Advertise the seedlings for sale</i>					
5.	<i>Sell the seedlings to different buyers</i>					
6.	<i>Transport the purchased seedlings to the buyer's field if necessary</i>					
7.	<i>Keep records of purchase and sales made</i>					
8.	<i>Reconcile sales and expenditure to determine profit or loss.</i>					

Module E: Materials Needed for Effective Management in Nursery Enterprise.

<i>SN</i>	<i>Item Statement</i>	<i>Teachers and extension agent</i>				
		<i>VHN</i>	<i>HN</i>	<i>MN</i>	<i>SN</i>	<i>NN</i>
1.	<i>Land for nursery establishment: Identification, selection and preparation.</i>					
2.	<i>Top soil or organic matter for filling in the polyethene bag for planting corms.</i>					
3.	<i>Temporary shade for protecting the corm in the pre-nursery.</i>					
4.	<i>Corm as planting materials to be raised in polyethene bags or tray or boxes.</i>					
5.	<i>Saw dust or dry grasses to be used as light mulch on top of the polyethene bags.</i>					
6.	<i>Water tank to be used to store water for watering the nursery seedlings.</i>					
7.	<i>Water can to be used for watering the seedlings.</i>					
8.	<i>Hose to be used to guide water from tank to nursery shade.</i>					
9	<i>Cutlass for cutting grasses and preparing the shade.</i>					
10	<i>Hoe or shovel for scoping top soil or organic matter in the container and for weeding</i>					
11	<i>Knife for pruning or removing scales or detaching the corms from the nursery</i>					

12	<i>Wheel barrow for carrying soil or organic matter to the nursery shade</i>					
13	<i>Polyethene bags/trays/boxes for holding soil for planting</i>					
14	<i>Wire nets for fencing the pre-nursery off rodents or predators</i>					
15	<i>Rake for removing cut grasses out of the site</i>					
16	<i>Palm fronts used to make shade for nursery seedlings</i>					
17	<i>Shade for protecting the plantain seedlings in the nursery</i>					
18	<i>Knife for opening the middle of soil in the polyethene bags</i>					
19	<i>NPK fertilizer to be applied on the nursery seedlings</i>					
20	<i>Ash slurry to be spread around the seedlings to prevent insects from eating the foliage</i>					
21	<i>Chemicals e.g. pesticides for controlling insects pest</i>					
22	<i>Borne hole to be used as water source for irrigation</i>					
23	<i>Head pan for carrying soil or organic matter or plantain seedlings</i>					
24	<i>Hand fork for pulverizing the soil or mixing of soil and organic matter before filling in polyethene bags</i>					
25	<i>Hand trowel for transplanting of plantain seedlings from trays or boxes into large polyethene bags</i>					
26	<i>Secateurs for pruning dead leaves from the base of the seedlings</i>					
27	<i>Polyethene bags/trays/boxes for putting soil</i>					
28	<i>Basket for carrying plantain seedlings</i>					
29	<i>Booth to be wore as protection</i>					
30	<i>Hand glove to be wore as protection</i>					
31	<i>Gorgles to be wore as protection</i>					
32	<i>Nose mask or respirator to be wore as protection</i>					
33	<i>Knap sac sprayer for spraying chemicals</i>					

ENTERPRISE (B)**PLANTAIN PLANTATION MANAGEMENT ENTERPRISE**

PROJECT FOCUS: *Entrepreneurial competencies in plantain plantation management enterprise*

PART ONE: *General information and personal Data:*

Please, you are requested to supply all relevant information to items below:

1. **Name of your establishment or school** _____

2. **Sex:** Male Female

3. **Nature of work**

a. *Teacher of agriculture*

b. *Extension Agent*

4. **Qualification of Respondent**

Ph.D

M.Ed

M.Sc

PDGE

B.Ed

B.Sc

HND

OND

PART TWO: (Teachers of Agriculture and Extension Agents only)

Introduction: Please check the response options on the level at which each item below is required in plantain production enterprise. The response options are:

Very Highly Needed (VHN) = 5 points

Highly Needed (HN) = 4 points

Moderately Needed (MN) = 3 points

Slightly Needed (SN) = 2 points

Not Needed (NR) = 1 point

Module A: Competencies in Planning for Plantain Plantation Management Enterprise

<i>SN</i>	<i>Item Statement</i>	<i>Teachers and Ext Agents</i>				
		<i>VHN</i>	<i>HN</i>	<i>MN</i>	<i>SN</i>	<i>NN</i>
1.	<i>Formulation of specific objectives for plantain plantation management</i>					
2.	<i>Review the objectives of the plantain plantation enterprise periodically based on changes in market demand and supply</i>					
3.	<i>Draw up programme plan for the plantain plantation enterprise</i>					
4.	<i>Decide on the type (small, medium or large) of plantain plantation management enterprise to adopt</i>					
5.	<i>Identify sources of credit for plantain plantation enterprise</i>					
6.	<i>Budget for plantain plantation management.</i>					
7	<i>Identify relevant material inputs and their location (seedlings fertilizers, pesticides, herbicides) for plantain plantation enterprise</i>					
8	<i>Provide relevant tools and equipment (vehicles, cutlass, hoe etc) for use in plantain plantation enterprise.</i>					
9	<i>Identify different levels of man power needed for plantain plantation management.</i>					
10	<i>Plan all farm operations to make most efficient use of the available money.</i>					
11	<i>Make rules and regulations for successful plantain operations.</i>					

12	Identify market outlet for the plantain products.					
13	Identify relevant records to keep for plantain plantation enterprise					
14	Identify a site for plantain plantation enterprise					

Module B: Competencies in Plantain Plantation Establishment

i. Land Selection and Preparation:

S/N	Item Statement	Teachers and Extension Agents				
		VHN	HN	MN	SN	NN
1.	Select well drained soil rich in organic matter.					
2.	Clear the undergrowth of the selected land with appropriate technologies.					
3.	Cut down the trees with appropriate technologies.					
4.	Park residues and burn					
5.	Stump the stems, park off, level and fill depressions with appropriate technologies.					
6.	Lay out the blocks to specification					
7	Lay the plots in planting spacing of 3m by 2m along and within the rows for digging.					
8	Dig holes of 30cm by 30cm by 30cm for each plantain sucker.					
9	Keep the top soil separated from bottom soil of the dug holes.					

ii. Planting Plantain in the Field

1	Select well differentiated seedling after 7-8 weeks in the nursery.					
2	Remove bottom portion of the polythene bag with seedlings to 2cm from the base.					
3	Cut the polythene bag with seedlings from the top to the bottom.					
4	Place seedlings centrally into the hole with the two hands and remove the polythene bag.					
5	Remove the polythene bag away from the seedlings.					
6	Fill back the hole first with top soil and then with bottom soil					
7	Support the seedlings with top soil and add more soil if not enough.					
8	Press the soil firmly around the seedlings					

9	<i>Place mulch materials around each planted seedlings</i>					
10	<i>Water the seedlings daily.</i>					
11	<i>Put wire net at the collar of each seedling if necessary.</i>					
iii. Weeding and Fertilizer Application						
i Weeding						
1	<i>Weed as weeds appear with cutlass or machet or row weed about three to four months interval based on the nature of soil fertility.</i>					
2	<i>Intercrop with legumes or cocoyam in rows at the young age of plantain or spray weeds with appropriate herbicides.</i>					
3	<i>Prune the dry leaves and use them as mulch around the base of the plant.</i>					
ii. Fertilizer application						
1	<i>Apply 300kg/ha of Nitrogen in form of urea to seedlings one month after planting at the rate of milk tin per plantain plant.</i>					
2	<i>Apply 500kg/ha of muriate of potash 30 days after the first application of urea at the rate of small tomato tin per plantain plan</i>					
3	<i>Apply mixed fertilizer of 250gm (N), 100gm (P₂O₅) and 200gm (k) at the rate of 50gm/plant when it starts to maiden.</i>					
iv. Pests and Diseases Control						
1	<i>Handpick pests or insects on green leaves of plantain plant.</i>					
2	<i>Maintain clean weeding of plantain plantation.</i>					
3	<i>Use bird scaring gun to scare away birds or animals such as money</i>					
4	<i>Plant resistant variety to guide against diseases</i>					
5	<i>Spray insecticides to destroy insect or</i>					

	<i>pests.</i>					
6	<i>Remove insect or disease infested leaves and burn.</i>					
7	<i>Maintain correct spacing</i>					
v. <i>Debudding and Propping</i>						
1	<i>Cut the male bud after the fruit has being set when the fingers are not coming out.</i>					
2	<i>Get a stick that has Y shape</i>					
3	<i>Hook the Y stick shape on fruit stalk</i>					
4	<i>Dug the stick firmly into the soil to provide support of trunk or fruit until harvesting.</i>					
vi. <i>Harvesting:</i>						
1	<i>Identify mature plantain fruits for harvesting</i>					
2	<i>Harvest with sharp machet by bending down to cut the pseudostem</i>					
3	<i>Place with a forked stick or a helper to receive the bunch</i>					
4	<i>Cut the pseudostem half way, then cut the bunch.</i>					
5	<i>Cut down the entire pseudostem and chop together with the foliage of the main plant.</i>					
6	<i>Spread chooped pseudostem and foliage over the soil as mulch for ratoon crop.</i>					
7	<i>Collect the harvested bunches together for airing.</i>					
8	<i>Cover the bunch with leaves half way to allow air inside the heap.</i>					
9	<i>Sell to buyers if it is for marketing or process if necessary.</i>					

Module C: Competencies in Marketing of Plantain Fruits

<i>S/N</i>	<i>Item Statement</i>	Teachers and Extension Agents				
		<i>VHN</i>	<i>HN</i>	<i>MN</i>	<i>SN</i>	<i>NN</i>
1.	<i>Carryout market survey for sale of plantain bunches</i>					
2.	<i>Advertise the sales of plantain fruits</i>					
3.	<i>Identify your customers and invite them for supply and search for market</i>					
4.	<i>Inform customers on the arrival of plantain products</i>					
5.	<i>Identify suitable whole sellers and retail agents</i>					
6.	<i>Sort the bunches to sizes in the weigh house.</i>					
7	<i>Fix prices based on the weight or size of the bunches.</i>					
8	<i>Sell the plantain bunches to the buyers .</i>					
9	<i>Transport the purchased bunches to buyers if necessary.</i>					
10	<i>Keep records of purchase and sales made</i>					
11	<i>Reconcile sales with cost of resource input to determine profit or loss.</i>					

Module D: Materials Needed For Plantain Plantation Enterprise

<i>S/N</i>	<i>Item Statement</i>	Teachers and Extension Agents				
		<i>VHN</i>	<i>HN</i>	<i>MN</i>	<i>SN</i>	<i>NN</i>
1.	<i>Land for planting plantain seedlings: identification, selection and preparation</i>					
2.	<i>Plantain seedlings/suckers to be used as planting materials in the field</i>					
3.	<i>Pegs for holdings ropes for laying blocks</i>					
4.	<i>Ropes for determining straight lines for blocks laying</i>					
5.	<i>Measuring tape for determining areas to be used in the plantation</i>					
6.	<i>Buildings for storing resource materials and for administrative purposes</i>					
7	<i>Bore hole to be used as sources of water for irrigation</i>					
8	<i>Watering can to be used for watering the plantation</i>					
9	<i>Cutlass for cutting grasses</i>					

10	<i>Hoe for removing weeds</i>					
11	<i>Wheel barrow for carrying organic manure and fertilizer to the plantation site</i>					
12	<i>Spade/shovel for carrying soil used to cover the root of the plantain</i>					
13	<i>Fertilizer to be applied on the plantation for increasing the fertility of the soil</i>					
14	<i>Herbicides for controlling weeds</i>					
15	<i>Pesticides and insecticides for controlling pests and insects</i>					
16	<i>knap Sac prayer or boom sprayer for spraying chemicals e.g. pesticides, insecticides and herbicides</i>					
17	<i>Sharp machet for harvesting plantain bunch</i>					
18	<i>Pick ups or trucks for carrying harvested bunchy to the market.</i>					

ENTERPRISE (C)**PLANTAIN FRUIT PROCESSING ENTERPRISE**

PROJECT FOCUS: *Entrepreneurial competencies in plantain fruit processing enterprise.*

PART ONE: *General information and personal Data:*

Please, you are requested to supply all relevant information to items below:

1. **Name of your establishment or school** _____

2. **Sex:** Male Female

3. **Nature of work**

a. *Teacher of agriculture*

b. *Extension Agent*

4. **Qualification of Respondent**

Ph.D

M.Ed

M.Sc

PDGE

B.Ed

B.Sc

HND

OND

PART TWO: (Teachers of Agriculture and Extension Agents only)

Introduction: Please check the response options on the level at which each item below is required in plantain production enterprise. The response options are:

Very Highly Needed (VHN) = 5 points

Highly Needed (HN) = 4 points

Moderately Needed (MN) = 3 points

Slightly Needed (SN) = 2 points

Not Needed (NR) = 1 point

Module A: Competencies in Planning Activities for Plantain Fruits Processing

SN	Item Statement	Teachers and Ext Agents				
		VHN	HN	MN	SN	NN
1.	Formulate specific objectives for plantain fruit processing					
2.	Review the objectives of plantain fruits processing periodically based on market demands and supply					
3.	Draw up programme plan of activities to cover in different processing enterprise					
4.	Decide on the type (small, medium or large) of plantain processing enterprise to adopt					
5.	Identify sources of credit for processing enterprise					
6.	Make budget for plantain processing enterprise					
7.	Identify relevant material inputs and their locations					
8.	Identify different levels of man power needed for the plantain processing and marketing					
9.	Make rules and regulations for successful processing enterprise					
10.	Identify market outlet for the processed plantain fruits					
11.	Identify relevant records to keep for the plantain processing and marketing enterprise					

Module B: Competencies in Plantain Fruit Processing

i. Plantain Fruits Processing into Flour						
	Item Statement	Teachers and Extension Agents				
		VHN	HN	MN	SN	NN
1.	Select unripe plantain fruits					
2.	Wash the unripe plantain fruits with water to remove dirt and spray residues					
3.	Peel the unripe plantain to obtain pulp and keep pulps in a bowl containing water to avoid turning black					
4.	Sliced the pulp using knife.					
5	Sun-dried the sliced pulp for 2-3 days.					
6	Mill the sliced dried pulp using domestic grinding machines.					
7	Sieve the ground pulp to obtain flour					
8	Pack the sieve flour and sold to the market					
ii. Plantain Fruit Processing into Chips						
1	Select unripe plantain fruits as required.					
2	Peel the plantain fruits with knife					
3	Immerse in a bowl containing water					
4	Cut/sliced peeled plantain fruits according to the desired sizes using appropriate technologies					
5	Salt the sliced plantain fruits to taste					
6	Heat vegetable oil or palm oil in a frying pan or electric fryer to about 170°C.					
7	Put sliced plantain fruits into the hot oil and fry.					
8	Stir constantly until crispy or golden yellow appear (Plantain chips).					
9	Remove the plantain chips into plastic sieve to allow the oil to drain.					
10	Spread chips on clean material to allow the plantain chips to cool					
11	Sort and bag the plantain chips into various sizes					
12	Seal with candle flame with the aid of kitchen knife and Market the products.					

iii. Competencies in malt (Non-alcoholic Plantain Drink) Processing						
1	Select figs from plantain					
2	Mill the figs with appropriate technologies into powder and keep until required.					
3	Reconstitute about 55g (2 heaped tablespoon) of fig powder in 0.3 litres of water and mix.					
4	Set the mixture aside for 5-10 minutes to enable the component of powder to leach into the water.					
5	Filter through muslin clothes, bottled and keep to sediment allow to sediment.					
6	Decant or filter again, add vanilla flavor and granulated or icing sugar to sweeten the "malt"					
7	Finally bottle, refrigerate and Market the products					
iv. Competencies in Plantain Jam Processing						
1	Select 2 or 3 riped plantain					
2	Blend the ripe plantain with harmer mill and mixed together with 1 cup of granulated sugar					
3	Add 200ml or 2 cups of water and mix together.					
4	Add 30-35ml lime juice in the mixture.					
5	Boil the mixture and allow the formed gel to cool					
6	Preserved the gel with sorbic acid and market the products					
v. Competencies in Plantain Fruits Processing into Juice						
1	Select some ripe plantain fruits					
2	Peel the ripe plantain fruits and blend the pulp with appropriate technologies.					
3	Soak slurry (blended pulp) in hot water for 10 -15 minutes for optimum juice extraction					
4	Filter the extracted juice through white muslin (akamu) cloth					
5	Pasteurize the juice by boiling and simmer for 3 minutes					
6	Allow to cool, add colour and fill into sterilized bottles and market the products					
vi. Competencies in Plantain Fruits Processing into Ice Cream						
1	Select 20-24 ripe plantain fruits					

2	<i>Peel the ripe plantain fruits and blend the pulp with appropriate technologies</i>					
3	<i>Soak slurry (blended pulp) in 500ml hot water for 10-15 minutes for optimum juice extraction</i>					
4	<i>Filter the slurring through white muslin (akamu) cloth.</i>					
5	<i>Add 12 eggs (albumum, whisked), 1 cup of icing sugar, a pinch of vanilla powder or few drops of liquid vanilla flavor essence, 1 tin of milk and mix thoroughly.</i>					
6	<i>Pour the mixture into cream cups or seal in polyethylene bag.</i>					
7	<i>Place in a freezer until required and market the products</i>					
vii. Competencies in Plantain Fruits Processing into Wine						
1	<i>Select 2kg ripe/over ripe plantain and 250g plantain skins (peels)</i>					
2	<i>Slice peeled ripe plantain fruits and the peels with knife</i>					
3	<i>Place in a clean, sterilized white cloth bag.</i>					
4	<i>Tie the bag and place into a saucepan (preferably aluminum)</i>					
5	<i>Add 4 litres of water, boil and simmer for 20-30 minutes.</i>					
6	<i>Add granulated sugar and fruit juice in the boiled liquid</i>					
7	<i>Apply pressure to extract as much juice as possible when the bag is cooled.</i>					
8	<i>Add the extracted juice to sugar liquor</i>					
9	<i>Shake to dissolve the sugar and cool in cold water.</i>					
10	<i>Add 1 table spoon or 1 sachet (3g) of yeast and juice of 1 ripe grape fruit as yeast nutrient at 27-30^oC to extracted juice</i>					
11	<i>Record the initial temperature and specific gravity.</i>					
12	<i>Keep the extracted juice in jar for a week in a room temperature.</i>					

13	<i>Agitate the jar occasionally by giving it a shake</i>					
14	<i>Record the data of temperature, PH and specific gravity.</i>					
15	<i>Collect data until fermentation quickens after about 1 week</i>					
16	<i>Plug air lock (fermentation trap) to the fermenter.</i>					
17	<i>Put few drops of sterilizing solution into the air lock to form a U shape</i>					
18	<i>Plug the top of the trap with cotton wool to enables the yeast to undergo an anaerobic method of self-reproduction.</i>					
19	<i>Rack occasionally by siphoning the wine off the lees of yeast and deposited solids.</i>					
20	<i>Sieve the wine with musline cloth to clear of its own accord; given time, when it does not, you may have to filter.</i>					
21	<i>Bottled the sieve wine as required.</i>					
22	<i>Store wine in sterilized bottles and corks.</i>					
23	<i>Store finished wine in a rack or bin at 13⁰C or in a refrigerator and market the products</i>					

Module C: Competencies in Marketing of Processed Plantain Fruits (Flour, Chips, Malt, Jam, etc)

		Teachers and Ext Agents				
SN	Item Statement	VHN	HN	MN	SN	NN
1.	<i>Carryout market survey for sale of processed plantain fruits.</i>					
2.	<i>Package the processed plantain fruits into bags and grade.</i>					
3.	<i>Fix prices on the bags based on size and quality</i>					
4.	<i>Advertise the sales of the processed plantain fruits</i>					
5.	<i>Identify your customers and invite them for supply.</i>					
6.	<i>Sell the processed plantain fruits to different buyers according to grades and quality</i>					
7.	<i>Help customers transport their goods to their nearest destination if necessary.</i>					
8.	<i>Keep record of sales made</i>					
9.	<i>Reconcile sales and expenditure record to determine</i>					

	<i>profit or loss.</i>					
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Module D: Material Needed for Plantain Processing Enterprise

<i>SN</i>	<i>Item Statement</i>	<i>Teachers and Extension Agents</i>				
		<i>VHN</i>	<i>HN</i>	<i>MN</i>	<i>SN</i>	<i>NN</i>
1	<i>Mature plantain bunches to be used as raw material for processing</i>					
2	<i>Knife for peeling the plantain fruits</i>					
3	<i>Mechanical slicer for slicing peeled plantain fruits</i>					
4.	<i>Water for washing peeled plantain fruits</i>					
5.	<i>Cabinet drier for drying sliced plantain fruits</i>					
6.	<i>Salt for spreading on sliced plantain fruits</i>					
7.	<i>Sterilized bottles used for keeping juice</i>					
8.	<i>Bowls for putting water used for washing peeled plantain fruits</i>					
9.	<i>Frying pan used for frying plantain chips</i>					
10.	<i>Hammer mill used for milling the dried sliced plantain fruits.</i>					
11.	<i>Sealer or candle knife for sealing the cellophane bag</i>					
12.	<i>Trucks for conveyance of processed products to market</i>					

PROJECT FOCUS:**ENTERPRISE (A)****PLANTAIN NURSERY PRACTICE ENTERPRISE**

Part One: General Information and personal data:

Please, you are requested to supply all relevant information to items below:

1. **Name of your establishment or school** -----
2. **Sex:** Male Female
3. **Nature of work**
 - a. *Plantain nursery Farmers*
 - b. *Plantain plantation management farming*
 - c. *Plantain processor*
4. **Qualification of Respondent**

Part Two

As a plantain farmer, please check the response options that best represents your option on the level at which each competency item is required by plantain farmers. This categories is made up of column I and II column I is made up of 5 response scale of:

- Very Highly Needed (VHN) = 5*
- Highly Needed (HN) = 4*
- Moderately Needed (MN) = 3*
- Slightly Needed (SN) = 2*
- Not Needed (NN) = 1*

Column II – it requires information on the level of performance, of farmer; the response options are:

PROJECT FOCUS:**ENTERPRISE (B)****PLANTAIN PLANTATION MANAGEMENT ENTERPRISE**

Part One: General Information and personal data:

Please, you are requested to supply all relevant information to items below:

1. **Name of your establishment or school** -----
2. **Sex:** Male Female
3. **Nature of work**
 - a. *Plantain nursery Farmers*
 - b. *Plantain plantation management farming*
 - c. *Plantain processor*
4. **Qualification of Respondent**

Part Two

As a plantain farmer, please check the response options that best represents your option on the level at which each competency item is required by plantain farmers. This categories is made up of column I and II column I is made up of 5 response scale of:

Very High Needed (VHN) = 5

Highly Needed (HN) = 4

Moderately Needed (MN) = 3

Slightly Needed (SN) = 2

Not Needed (NN) = 1

Column II – it requires information on the level of performance, of farmer; the response options

	<i>application of urea at the rate of small tomato tin per plantain plant</i>										
3	<i>Apply mixed fertilizer of 250gm (N), 100gm (P₂O₅) and 200gm (k) at the rate of 50gm/plant when it starts to maiden.</i>										
iv. Pests and Diseases Control											
1	<i>Hand pick pests or insects on green leaves of plantain plant.</i>										
2	<i>Maintain clean weeding of plantain plantation.</i>										
3	<i>Use bird scaring gun to scare away birds or animals such as money</i>										
4	<i>Plant resistant variety to guide against diseases</i>										
5	<i>Spray insecticides to destroy insect or pests.</i>										
6	<i>Remove insect or disease infested leaves and burn.</i>										
7	<i>Maintain correct spacing</i>										
v. Debudding and Propping											
1	<i>Cut the male bud after the fruit has being set when the fingers are not coming out.</i>										
2.	<i>Get a stick that has Y shape</i>										
3.	<i>Hook the Y stick shape on fruit stalk</i>										
4.	<i>Dug the stick firmly into the soil to provide support of trunk or fruit until harvesting.</i>										
vi. Harvesting:											

PROJECT FOCUS:**ENTERPRISE (C)****PLANTAIN FRUITS PROCESSING ENTERPRISE**

Part One: General Information and personal data:

Please, you are requested to supply all relevant information to items below:

1. **Name of your establishment or school** -----
2. **Sex:** Male Female
3. **Nature of work**
 - a. *Plantain nursery Farmers*
 - b. *Plantain plantation management farming*
 - c. *Plantain processor*
4. **Qualification of Respondent**

Part Two

As a plantain farmer, please check the response options that best represents your option on the level at which each competency item is required by plantain farmers. This categories is made up of column I and II column 1 is made up of 5 response scale of:

- | | | |
|---------------------------|----------------|----------|
| <i>Very Highly Needed</i> | <i>(VHN) =</i> | <i>5</i> |
| <i>Highly Needed</i> | <i>(HN) =</i> | <i>4</i> |
| <i>Moderately Needed</i> | <i>(MN) =</i> | <i>3</i> |
| <i>Slightly Needed</i> | <i>(SN) =</i> | <i>2</i> |
| <i>No Needed</i> | <i>(NN) =</i> | <i>1</i> |

Column II – it requires information on the level of performance, of farmer; the response options are:

APPENDIX H

INSTRUMENT ON TRAINING MODULE

**Competencies in Training Needed by Trainers for Training Secondary School
Graduates for success in employment and retraining farmers in any
Plantain Enterprise**

A. Planning for Training

<i>S/N</i>	<i>Item Statement</i>	<i>Teachers and Extension Agents</i>				
		<i>VHN</i>	<i>HN</i>	<i>MN</i>	<i>SN</i>	<i>NN</i>
1.	<i>Structure the plantain programme (nursery, plantation, processing and marketing) contents into topics or units</i>					
2.	<i>Arrange the topics or units sequentially in order of presentation</i>					
3.	<i>State the objectives to be achieved by each topic or unit for any plantain enterprise.</i>					
4.	<i>Identify materials needed for training in each unit of the enterprise</i>					
5.	<i>Select relevant available materials for training in each units of the plantain enterprise</i>					
6.	<i>Identify relevant methods for teaching each topic or unit</i>					
7.	<i>Select relevant methods for teaching each topic or unit</i>					
8.	<i>Write down the plantain programme concepts, facts or generalizations to be learnt.</i>					
9	<i>Identify competency performance of plantain programme units needed to develop</i>					
10	<i>State instructors and learners activities.</i>					
11	<i>Identify appropriate evaluation technique for each content area</i>					
B	<i>Training procedure to be adopted by trainers</i>					
12	<i>Teach trainees from known to unknown using plantain programme units or topics</i>					
13	<i>Explain the facilities to be used by the trainer for training each trainee in each in competency area of the plantain programme</i>					

14	<i>Deliver the contents step by step in logical order to the trainees</i>					
15	<i>Demonstrate the competencies while the trainees observed during step by step teaching</i>					
16	<i>Request the trainees to practice what the instructor demonstrated while the instructor observes them</i>					
17	<i>Correct wrong practices made by the trainees</i>					
18	<i>Encourage repetitive practice of knowledge and skills learnt</i>					
19	<i>Test the practice of a group of related competencies toward achieving of the objectives</i>					
20	<i>Provide the trainees information about their performance</i>					
21	<i>Encourage visit to other plantain programme establishments, write a report and submit to the instructor for a feedback system</i>					
22	<i>Teach the trainee money management and investment procedure into their enterprise</i>					
23	<i>Teach the trainees sources of fund for investment into the enterprise/programmes</i>					
24	<i>Teach the trainees how to manage risk in the enterprises through insurance policy</i>					
25	<i>Teach trainee salvage value of materials that can be resold for improving investment into the enterprise</i>					
26	<i>Teach the trainees knowledge of profit and loss account</i>					

APPENDIX I

FORMAT FOR PACKAGING THE PROGRAMMES

The format used for packaging the 3 plantain programmes namely (plantain nursery, plantation management processing and marketing) enterprise were as follows:

- ❖ *Name of programme*
- ❖ *Objective of the programme*
- ❖ *Modules and their corresponding competencies*
- ❖ *Materials needed*
- ❖ *Assessment techniques for effectiveness (for farm managers only)*
- ❖ *Training competencies*

APPENDIX J

PROGRAMME 1:

PACKAGED PROGRAMME ON ENTREPRENEURIAL COMPETENCY IN PLANTAIN NURSERY ENTERPRISE

1. *Name of Programme: Plantain Nursery enterprise*
2. *objectives of the programme: The objectives of the programme are:*
 - i. *To train secondary school graduates for employment in plantain nursery*
 - ii. *To retrain farmers in nursery for proficiency on the job*
3. *Content of the programme: Modules and their corresponding competencies.*

Module A: Planning for plantain nursery enterprise

Competency elements:

1. *Formulation of specific objectives for plantain plantation management*
2. *Review the objectives of the plantain plantation enterprise periodically based on changes in market demand and supply*
3. *Draw up programme plan for the plantain plantation enterprise*
4. *Decide on the type (small, medium or large) of plantain plantation management enterprise to adopt*
5. *Identify sources of credit for plantain plantation enterprise*
6. *Budget for plantain plantation management.*
7. *Identify relevant material inputs and their location (seedlings fertilizers, pesticides, herbicides) for plantain plantation enterprise*
8. *Provide relevant tools and equipment (vehicles, cutlass, hoe etc) for use in plantain plantation enterprise.*
9. *Identify different levels of man power needed for plantain plantation management.*
10. *Plan all farm operations to make most efficient use of the available money.*
11. *Make rules and regulations for successful plantain operations.*
12. *Identify market outlet for the plantain products.*
13. *Identify relevant records to keep for plantain plantation enterprise*

14 Identify a site for plantain plantation enterprise

Module B: Plantain Pre-nursery

Bi. Sliced corn techniques

Competency Elements:

- 1 Choose a flat site, free from pests and diseases for pre-nursery
- 2 Make a shade with materials toward off excess heat.
- 3 Prepare pre-nursery beds or boxes or trays with polythene bags.
- 4 Mix carefully top soil and poultry manure (8:1) that is 8 head pans of top soil to 1 head pan of poultry manure
- 5 Fill the boxes, trays, poly bags with mixed top soil and poultry manure.
- 6 Water the soil in the boxes, trays and polybags.
- 7 Arrange the poly bags in rows to form beds
- 8 Acquire the corms to nurse
- 9 Slice the corms into sizes of not more than 2 – 3cm.
- 10 Arrange the sliced corms in rows in the boxes or trays and one per polybags.
- 11 Apply water at alternate days especially during dry season.
- 12 Transfer sprouting corms into the nursery.

Bii. Whole corm Techniques

Competency Elements:

- 1 Prepare the pre-nursery as in Bi (1 to 7) above
- 2 Dig out whole corms to nurse and wash with water.
- 3 Stripped back the outer leaf sheaths of each corm with knife.
- 4 Loose any cover on the bud surface
- 5 Arrange whole corns in poly bags or in trays or boxes and cover with soil or saw dust.
- 6 Apply water at alternate days.
- 7 Mulch with dry grasses
- 8 Observe the buds for sprouting after 6 – 8 days.

- 9 *Remove any weeds on the beds or trays or polythene bags.*
- 10 *Transfer sprouted beds into nursery.*

Module C: Plantain Main Nursery

Competency Elements:

- 1 *Select site that is flat, well drained and easily accessible.*
- 2 *Clear the bush, level and fill depressions with appropriate technologies*
- 3 *Pack and burn all the thrashes or heap them in the form or out of the site.*
- 4 *Prepare a shade over the nursery*
- 5 *Construct a fence with 1.20 mesh poultry wire.*
- 6 *Collect 8 head pans of top soil to 1 head pan of poultry manure as standard mixture.*
- 7 *Mix the top soil and poultry manure together very well with shovel or spade.*
- 8 *Provide 400 or 500 gauge black polythene bags with a centrally placed perforation at the bottom.*
- 9 *Fill the bags with the mixture of top soil and poultry manure.*
- 10 *Arrange the poly bags in rows of beds on the cleared land*
- 11 *Apply water to the soil for one day and leave for at least one week to consolidate*
- 12 *Open the middle of soil in the polythene bags.*
- 13 *Select the differentiated young seedlings from pre-nursery (i or ii above)*
- 14 *Place the sprouted corm with ball of earth into the hole in the polythene bags carefully and close up the base of the sprouted corms with earth*
- 15 *Apply water in the morning and evening daily.*
- 16 *Apply NPK fertilizer 20:10:10 (10gm/plant)*
- 17 *Spray with benomil or ash slurry around the pseudostem base and around plants to prevent insects from eating the foliage*
- 18 *Mulch with partially decomposed refuse or dry grass.*
- 19 *Weed with hoe and hand pick pests regularly*
- 20 *Prune dead leaves from the base of the seedlings.*
- 21 *Harden the seedlings through gradual removal of the shade.*
- 22 *Transfer the seedlings after 6 to 8 weeks into the main plantation and market the*

products.

Module D: Marketing of Plantain Nursery Seedlings

1. *Carryout market survey for sale of nursery seedlings*
2. *Assemble the seedlings into sides or groups according to viability and vigour*
3. *Fix price on the seedlings based on sides and vigour*
4. *Advertise the seedlings for sale*
5. *Sell the seedlings to different buyers*
6. *Transport the purchased seedlings to the buyer's field if necessary*
7. *Keep records of purchase and sales made*
8. *Reconcile sales and expenditure to determine profit or loss.*

4. Materials Needed:

a. Personnel needed for the programme: *Plantain managers, trainers, technicians, labour providers, marketers, clerical officers, messengers/attendants*

b. Material Resources Needed

1. *Land for nursery establishment: Identification, selection and preparation.*
2. *Top soil or organic matter for filling in the polyethene bag for planting corms.*
3. *Temporary shade for protecting the corm in the pre-nursery.*
4. *Corm as planting materials to be raised in polyethene bags or tray or boxes.*
5. *Saw dust or dry grasses to be used as light mulch on top of the polyethene bags.*
6. *Water tank to be used to store water for watering the nursery seedlings.*
7. *Water can to be used for watering the seedlings.*
8. *Hose to be used to guide water from tank to nursery shade.*
9. *Cutlass for cutting grasses and preparing the shade.*
10. *Hoe or shovel for scoping top soil or organic matter in the container and for weeding*
11. *Knife for pruning or removing scales or slicing the corms from the nursery*
12. *Wheel barrow for carrying soil or organic matter to the nursery shade*
13. *Polyethene bags/trays/boxes for holding soil for planting*

- 14 *Wire nets for fencing the pre-nursery off rodents or predators*
- 15 *Rake for removing cut grasses out of the site*
- 16 *Palm fronds used to make shade for nursery seedlings*
- 17 *Shade for protecting the plantain seedlings in the nursery*
- 18 *Knife for opening the middle of soil in the polyethene bags*
- 19 *NPK fertilizer to be applied on the nursery seedlings*
- 20 *Ash slurry to be spread around the seedlings to prevent insects from eating the foliage*
- 21 *Chemicals e.g. pesticides for controlling insects pest*
- 22 *Borne hole to be used as water source for irrigation*
- 23 *Head pan for carrying soil or organic matter or plantain seedlings*
- 24 *Hand fork for pulverizing the soil or mixing of soil and organic matter before filling in polyethene bags*
- 25 *Hand trowel for transplanting of plantain seedlings from trays or boxes into large polyethene bags*
- 26 *Secateurs for pruning dead leaves from the base of the seedlings*
- 27 *Polyethene bags/trays/boxes for putting soil*
- 28 *Basket for carrying plantain seedlings*
- 29 *Booth to be wore as protection*
- 30 *Hand glove to be wore as protection*
- 31 *Goggles to be wore as protection*
- 32 *Nose mask or respirator to be wore as protection*
- 33 *Knap sac sprayer for spraying chemicals*

5. *Assessment techniques for effectiveness (for farm managers only)*

Assessing trainees for effectiveness at the discretion of trainers using the following:

- i. Observation*
- ii. Rating scale on individual basis*
- iii. Use quality of production to judge performance*

6. *Training Modules (for trainers at skill acquisition centres only)*

- 1. Structure the plantain programme (nursery, plantation, processing and marketing)*

- contents into topics or units*
2. *Arrange the topics or units sequentially in order of presentation*
 3. *State the objectives to be achieved by each topic or unit for any plantain enterprise*
 4. *Identify materials needed for training in each unit of the enterprise*
 5. *Select relevant available materials for training in each units of the plantain enterprise*
 6. *Identify relevant methods for teaching each topic or unit*
 7. *Select relevant methods for teaching each topic or unit*
 8. *Write down the plantain programme concepts, facts or generalizations to be learnt.*
 - 9 *Identify competency performance of plantain programme units needed to develop*
 - 10 *State instructors and learners activities.*
 - 11 *Identify appropriate evaluation technique for each content area*
 - 12 *Teach trainees from known to unknown using plantain programme units or topics*
 - 13 *Explain the facilities to be used by the trainer for training each trainee in each in competency area of the plantain programme*
 - 14 *Deliver the contents step by step in logical order to the trainees*
 - 15 *Demonstrate the competencies while the trainees observed during step by step teaching*
 - 16 *Request the trainees to practice what the instructor demonstrated while the instructor observes them*
 - 17 *Correct wrong practices made by the trainees*
 - 18 *Encourage repetitive practice of knowledge and skills learnt*
 - 19 *Test the practice of a group of related competencies toward achieving of the objectives*
 - 20 *Provide the trainees information about their performance*
 - 21 *Encourage visit to other plantain programme establishments, write a report and submit to the instructor for a feedback system*
 - 22 *Teach the trainee money management and investment procedure into their enterprise*
 - 23 *Teach the trainees sources of fund for investment into the enterprise/programmes*
 - 24 *Teach the trainees how to manage risk in the enterprises through insurance policy*
 - 25 *Teach trainee salvage value of materials that can be resold for improving investment*

into the enterprise

26 *Teach the trainees knowledge of profit and loss account*

APPENDIX K

PROGRAMME 2:

PACKAGED PROGRAMME ON ENTREPRENEURIAL COMPETENCY IN PLANTAIN PLANTATION ENTERPRISE

1. *Name of Programme: Plantain Plantation Management*
2. *Objectives of the Programme: The objectives of the programme are:*
 - a. *To train secondary school graduates for employment in plantain plantation management*
 - b. *To retrain farmers in plantain plantation management for proficiency on the job*
3. *Content of the programme: Modules and their corresponding competencies*

Module A: Planning for plantain plantation management enterprise

Competency Elements:

1. *Formulation of specific objectives for plantain plantation management*
2. *Review the objectives of the plantain plantation enterprise periodically based on changes in market demand and supply*
3. *Draw up programme plan for the plantain plantation enterprise*
4. *Decide on the type (small, medium or large) of plantain plantation management enterprise to adopt*
5. *Identify sources of credit for plantain plantation enterprise*
6. *Budget for plantain plantation management.*
7. *Identify relevant material inputs and their location (seedlings fertilizers, pesticides, herbicides) for plantain plantation enterprise*
8. *Provide relevant tools and equipment (vehicles, cutlass, hoe etc) for use in plantain plantation enterprise.*
9. *Identify different levels of man power needed for plantain plantation management.*
10. *Plan all farm operations to make most efficient use of the available money.*
11. *Make rules and regulations for successful plantain operations.*

- 12 Identify market outlet for the plantain products.
- 13 Identify relevant records to keep for plantain plantation enterprise
- 14 Identify a site for plantain plantation enterprise

Module B: Plantain Plantation Establishment

i. Land selection and preparation

Competency Elements:

1. Select well drained soil rich in organic matter.
2. Clear the undergrowth of the selected land with appropriate technologies.
3. Cut down the trees with appropriate technologies.
4. Park residues and burn
5. Stump the stems, park off, level and fill depressions with appropriate technologies.
6. Lay out the blocks to specification
- 7 Lay the plots in planting spacing of 3m by 2m along and within the rows for digging.
- 8 Dig holes of 30cm by 30cm by 30cm for each plantain sucker.
- 9 Keep the top soil separated from bottom soil of the dug holes.

ii. Planting plantain in the field

Competency Elements:

- 1 Select well differentiated seedling after 7-8 weeks in the nursery.
- 2 Remove bottom portion of the polythene bag with seedlings to 2cm from the base.
- 3 Cut the polyethene bag with seedlings from the top to the bottom.
- 4 Place seedlings centrally into the hole with the two hands and remove the polyethene bag.
- 5 Remove the polyethene bag away from the seedlings.
- 6 Fill back the hole first with top soil and then with bottom soil
- 7 Support the seedlings with top soil and add more soil if not enough.
- 8 Press the soil firmly around the seedlings

- 9 *Place mulch materials around each planted seedlings*
- 10 *Water the seedlings daily.*
- 11 *Put wire net at the collar of each seedling if necessary.*

C. Weeding and fertilizer application

i. Weeding

Competency Elements:

- 1 *Weed as weeds appear with cutlass or machet or row weed about three to four months interval based on the nature of soil fertility.*
- 2 *Intercrop with legumes or cocoyam in rows at the young age of plantain or spray weeds with appropriate herbicides.*
- 3 *Prune the dry leaves and use them as mulch around the base of the plant.*

b. Fertilizer Application

Competency Elements:

- 1 *Apply 300kg/ha of Nitrogen in form of urea to seedlings one month after planting at the rate of milk tin per plantain plant.*
- 2 *Apply 500kg/ha of muriate of potash 30 days after the first application of urea at the rate of small tomato tin per plantain plant*
- 3 *Apply mixed fertilizer of 250gm (N), 100gm (P₂O₅) and 200gm (k) at the rate of 50gm/plant when it starts to maiden.*

iv. Pest and diseases control

Competency Elements:

- 1 *Hand pick pests or insects on green leaves of plantain plant.*
- 2 *Maintain clean weeding of plantain plantation.*
- 3 *Use bird scaring gun to scare away birds or animals such as money*
- 4 *Plant resistant variety to guide against diseases*
- 5 *Spray insecticides to destroy insect or pests.*
- 6 *Remove insect or disease infested leaves and burn.*
- 7 *Maintain correct spacing*

v. Debudding and Probbing

Competency Elements:

- 1 *Cut the male bud after the fruit has being set when the fingers are not coming out.*
- 2 *Get a stick that has Y shape*
- 3 *Hook the Y stick shape on fruit stalk*
- 4 *Dug the stick firmly into the soil to provide support of trunk or fruit until harvesting.*

vi. Harvesting**Competency Elements:**

- 1 *Identify mature plantain fruits for harvesting*
- 2 *Harvest with sharp machet by bending down to cut the pseudostem*
- 3 *Place with a forked stick or a helper to receive the bunch*
- 4 *Cut the pseudostem half way, then cut the bunch.*
- 5 *Cut down the entire pseudostem and chop together with the foliage of the main plant.*
- 6 *Spread chooped pseudostem and foliage over the soil as mulch for ratoon crop.*
- 7 *Collect the harvested bunches together for airing.*
- 8 *Cover the bunch with leaves half way to allow air inside the heap.*
- 9 *Sell to buyers if it is for marketing or process if necessary.*

Module C: Marketing of plantain fruits**Competency Elements**

- 1 *Identify mature plantain fruits for harvesting*
- 2 *Harvest with sharp machet by bending down to cut the pseudostem*
- 3 *Place with a forked stick or a helper to receive the bunch*
- 4 *Cut the pseudostem half way, then cut the bunch.*
- 5 *Cut down the entire pseudostem and chop together with the foliage of the main plant.*
- 6 *Spread chooped pseudostem and foliage over the soil as mulch for ratoon crop.*
- 7 *Collect the harvested bunches together for airing.*
- 8 *Cover the bunch with leaves half way to allow air inside the heap.*

9 *Sell to buyers if it is for marketing or process if necessary.*

4. *Materials Needed*

i Personnel needed for the programme:

Planning managers, trainers technicians/labour providers, marketers, clerical officers, messengers/attendants

ii. Material resource inputs needed

1. *Land for planting plantain seedlings: identification, selection and preparation*

2. *Plantain seedlings/suckers to be used as planting materials in the field*

3. *Pegs for holdings ropes for laying blocks*

4. *Ropes for determining straight lines for blocks laying*

5. *Measuring tape for determining areas to be used in the plantation*

6. *Buildings for storing resource materials and for administrative purposes*

7. *Bore hole to be used as sources of water for irrigation*

8. *Watering can to be used for watering the plantation*

9. *Cutlass for cutting grasses*

10. *Hoe for removing weeds*

11. *Wheel barrow for carrying organic manure and fertilizer to the plantation site*

12. *Spade/shovel for carrying soil used to cover the root of the plantain*

13. *Fertilizer to be applied on the plantation for increasing the fertility of the soil*

14. *Herbicides for controlling weeds*

15. *Pesticides and insecticides for controlling pests and insects*

16. *knap Sac prayer or boom sprayer for spraying chemicals e.g. pesticides, insecticides and herbicides*

17. *Sharp machet for harvesting plantain bunch*

18. *Pick ups or trucks for carrying harvested bunchy to the market.*

5. ***Assessment techniques for effectiveness (for farm managers only)***

Assessing trainers for effectiveness at the discretion of trainers using the following:

- i. *Observation*
- ii. *Rating Scale on individual basis*

C. Use quality of production to judge farmers

6. ***Training Modules (for trainers at skill acquisition centres only)***

1. *Structure the plantain programme (nursery, plantation, processing and marketing) contents into topics or units*
2. *Arrange the topics or units sequentially in order of presentation*
3. *State the objectives to be achieved by each topic or unit for any plantain enterprise*
4. *Identify materials needed for training in each unit of the enterprise*
5. *Select relevant available materials for training in each units of the plantain enterprise*
6. *Identify relevant methods for teaching each topic or unit*
7. *Select relevant methods for teaching each topic or unit*
8. *Write down the plantain programme concepts, facts or generalizations to be learnt.*
9. *Identify competency performance of plantain programme units needed to develop*
10. *State instructors and learners activities.*
11. *Identify appropriate evaluation technique for each content area*
12. *Teach trainees from known to unknown using plantain programme units or topics*
13. *Explain the facilities to be used by the trainer for training each trainee in each in competency area of the plantain programme*
14. *Deliver the contents step by step in logical order to the trainees*
15. *Demonstrate the competencies while the trainees observed during step by step teaching*
16. *Request the trainees to practice what the instructor demonstrated while the instructor observes them*
17. *Correct wrong practices made by the trainees*
18. *Encourage repetitive practice of knowledge and skills learnt*

- 19 *Test the practice of a group of related competencies toward achieving of the objectives*
- 20 *Provide the trainees information about their performance*
- 21 *Encourage visit to other plantain programme establishments, write a report and submit to the instructor for a feedback system*
- 22 *Teach the trainee money management and investment procedure into their enterprise*
- 23 *Teach the trainees sources of fund for investment into the enterprise/programmes*
- 24 *Teach the trainees how to manage risk in the enterprises through insurance policy*
- 25 *Teach trainee salvage value of materials that can be resold for improving investment into the enterprise*
- 26 *Teach the trainees knowledge of profit and loss account*

APPENDIX L

PROGRAMME 3:

PACKAGED PROGRAMME ON ENTREPRENEURIAL COMPETENCY IN PLANTAIN FRUITS PROCESSING & MARKETING ENTERPRISE

1. *Name of programme: Plantain processing and marketing*
2. *Objectives of the Programme: The objectives of the programme are:*
 - a. *To train secondary school graduates for employment in processing and marketing plantain products*
 - b. *To retrain farmers in plantain processing and marketing for proficiency on the job.*

Module A: *Planning for plantain processing and marketing enterprise competency elements:*

1. *Formulate specific objectives for plantain fruit processing*
2. *Review the objectives of plantain fruits processing periodically based on market demands and supply*
3. *Draw up programme plan of activities to cover different processing enterprise*
4. *Decide on the type (small, medium or large) of plantain processing enterprise to adopt*
5. *Identify sources of credit for processing enterprise*
6. *Make budget for plantain processing enterprise*
7. *Identify relevant material inputs and their locations*
8. *Identify different levels of man power needed for the plantain processing and marketing*
9. *Make rules and regulations for successful processing enterprise*
10. *Identify market outlet for the processed plantain fruits*
11. *Identify relevant records to keep for the plantain processing and marketing enterprise*

Module B: Plantain fruit processing

i. Plantain fruit processing into flour

Competency Elements:

1. Select unripe plantain fruits
2. Wash the unripe plantain fruits with water to remove dirt and spray residues
3. Peel the unripe plantain to obtain pulp and keep pulps in a bowl containing water to avoid turning black
4. Sliced the pulp using knife.
5. Sun-dried the sliced pulp for 2-3 days.
6. Mill the sliced dried pulp using domestic grinding machines.
7. Sieve the ground pulp to obtain flour
8. Pack the sieve flour and sold to the market

ii. Plantain Fruits processing into chips

Competency Elements:

ii. Plantain Fruit Processing into Chips

1. Select unripe plantain fruits as required.
2. Peel the plantain fruits with knife
3. Immerse in a bowl containing water
4. Cut/sliced peeled plantain fruits according to the desired sizes using appropriate technologies
5. Salt the sliced plantain fruits to taste
6. Heat vegetable oil or palm oil in a frying pan or electric fryer to about 170°C.
7. Put sliced plantain fruits into the hot oil and fry.
8. Stir constantly until crispy or golden yellow appear (Plantain chips).
9. Remove the plantain chips into plastic sieve to allow the oil to drain.
10. Spread chips on clean material to allow the plantain chips to cool
11. Sort and bag the plantain chips into various sizes
12. Seal with candle flame with the aid of kitchen knife and Market the products.

iii. Plantain fruit processing into Malt (Non-alcoholic drink)

Competency Elements:

- 1 *Select figs from plantain*
- 2 *Mill the figs with appropriate technologies into powder and keep until required.*
- 3 *Reconstitute about 55g (2 heaped tablespoon) of fig powder in 0.3 litres of water and mix.*
- 4 *Set the mixture aside for 5-10 minutes to enable the component of powder to leach into the water.*
- 5 *Filter through muslin clothes, bottled and keep to sediment allow to sediment.*
- 6 *Decant or filter again, add vanilla flavor and granulated or icing sugar to sweeten the ‘malt’*
- 7 *Finally bottle, refrigerate and Market the products*

iv. Plantain Fruits Processing into Jam**Competency Elements**

- 1 *Select 2 or 3 riped plantain*
- 2 *Blend the ripe plantain with harmer mill and mixed together with 1 cup of granulated sugar*
- 3 *Add 200ml or 2 cups of water and mix together.*
- 4 *Add 30-35ml lime juice in the mixture.*
- 5 *Boil the mixture and allow the formed gel to cool*
- 6 *Preserved the gel with sorbic acid and market the products*

v. Plantain Fruits Processing into Juice**Competency Elements**

- 1 *Select some ripe plantain fruits*
- 2 *Peel the ripe plantain fruits and blend the pulp with appropriate technologies.*
- 3 *Soak slurry (blended pulp) in hot water for 10 -15 minutes for optimum juice extraction*
- 4 *Filter the extracted juice through white muslin (akamu) cloth*
- 5 *Pasteurize the juice by boiling and simmer for 3 minutes*
- 6 *Allow to cool, add colour and fill into sterilized bottles and market the products*

vi. Plantain Fruits Processing into Ice Cream**Competency Elements:**

- 1 *Select 20-24 ripe plantain fruits*
- 2 *Peel the ripe plantain fruits and blend the pulp with appropriate technologies*
- 3 *Soak slurry (blended pulp) in 500ml hot water for 10-15 minutes for optimum juice extraction*
- 4 *Filter the slurring through white muslin (akamu) cloth.*
- 5 *Add 12 eggs (albumum, whisked), 1 cup of icing sugar, a pinch of vanilla powder or few drops of liquid vanilla flavor essence, 1 tin of milk and mix thoroughly.*
- 6 *Pour the mixture into cream cups or seal in polyethylene bag.*
- 7 *Place in a freezer until required and market the products*

vii. Plantain Fruits Processing into Wine

Competency Elements:

- 1 *Select 2kg ripe/over ripe plantain and 250g plantain skins (peels)*
- 2 *Slice peeled ripe plantain fruits and the peels with knife*
- 3 *Place in a clean, sterilized white cloth bag.*
- 4 *Tie the bag and place into a saucepan (preferably aluminum)*
- 5 *Add 4 litres of water, boil and simmer for 20-30 minutes.*
- 6 *Add granulated sugar and fruit juice in the boiled liquid*
- 7 *Apply pressure to extract as much juice as possible when the bag is cooled.*
- 8 *Add the extracted juice to sugar liquor*
- 9 *Shake to dissolve the sugar and cool in cold water.*
- 10 *Add 1 table spoon or 1 sachet (3g) of yeast and juice of 1 ripe grape fruit as yeast nutrient at 27-30⁰C to extracted juice*
- 11 *Record the initial temperature and specific gravity.*
- 12 *Keep the extracted juice in jar for a week in a room temperature.*
- 13 *Agitate the jar occasionally by giving it a shake*
- 14 *Record the data of temperature, PH and specific gravity.*
- 15 *Collect data until fermentation quickens after about 1 week*
- 16 *Plug air lock (fermentation trap) to the fermenter.*
- 17 *Put few drops of sterilizing solution into the air lock to form a U shape*

- 18 Plug the top of the trap with cotton wool to enables the yeast to undergo an anaerobic method of self-reproduction.
- 19 Rack occasionally by siphoning the wine off the lees of yeast and deposited solids.
- 20 Sieve the wine with musline cloth to clear of its own accord; given time, when it does not, you may have to filter.
- 21 Bottled the sieve wine as required.
- 22 Store wine in sterilized bottles and corks.
- 23 Store finished wine in a rack or bin at 13⁰C or in a refrigerator and market the products

Module C: Marketing of processed plantain fruits (flour, chips malt etc)

Competency Elements:

1. Carryout market survey for sale of processed plantain fruits.
2. Package the processed plantain fruits into bags and grade.
3. Fix prices on the bags based on size and quality
4. Advertise the sales of the processed plantain fruits
5. Identify your customers and invite them for supply.
6. Sell the processed plantain fruits to different buyers according to grades and quality
7. Help customers transport their goods to their nearest destination if necessary.
8. Keep record of sales made
9. Reconcile sales and expenditure record to determine profit or loss.

4. Material Needed:

- i. Personnel needed for the programme plantain managers, trainers, technicians/labour providers, marketers/clerical officer, messengers/attendants

Material resources needed:

- 1 Mature plantain bunches to be used as raw material for processing
- 2 Knife for peeling the plantain fruits
- 3 Mechanical slicer for slicing peeled plantain fruits
- 4 Water for washing peeled plantain fruits
- 5 Cabinet drier for drying sliced plantain fruits
- 6 Salt for spreading on sliced plantain fruits

- 7 Sterilized bottles used for keeping juice
- 8 Bowls for putting water used for washing peeled plantain fruits
- 9 Frying pan used for frying plantain chips
- 10 Hammer mill used for milling the dried sliced plantain fruits.
- 11 Sealer or candle knife for sealing the cellophane bag
- 12 Trucks for conveyance of processed products to market

5. Assessment techniques for effectiveness (for farm managers only)

Assessing trainers for effectiveness at the discretion of trainers using the following

- i. Observation
 - ii. Rating scale on individual basis
 - iii. Quality of production to judge performance
6. Training modules (for trainers at skill acquisition centres only)

Competency Element

1. Structure the plantain programme (nursery, plantation, processing and marketing) contents into topics or units
2. Arrange the topics or units sequentially in order of presentation
3. State the objectives to be achieved by each topic or unit for any plantain enterprise
4. Identify materials needed for training in each unit of the enterprise
5. Select relevant available materials for training in each units of the plantain enterprise
6. Identify relevant methods for teaching each topic or unit
7. Select relevant methods for teaching each topic or unit
8. Write down the plantain programme concepts, facts or generalizations to be learnt.
9. Identify competency performance of plantain programme units needed to develop
10. State instructors and learners activities.
11. Identify appropriate evaluation technique for each content area.
12. Teach trainees from known to unknown using plantain programme units or topics
13. Explain the facilities to be used by the trainer for training each trainee in each in competency area of the plantain programme
14. Deliver the contents step by step in logical order to the trainees

- 15 *Demonstrate the competencies while the trainees observed during step by step teaching*
- 16 *Request the trainees to practice what the instructor demonstrated while the instructor observes them*
- 17 *Correct wrong practices made by the trainees*
- 18 *Encourage repetitive practice of knowledge and skills learnt*
- 19 *Test the practice of a group of related competencies toward achieving of the objectives*
- 20 *Provide the trainees information about their performance*
- 21 *Encourage visit to other plantain programme establishments, write a report and submit to the instructor for a feedback system*
- 22 *Teach the trainee money management and investment procedure into their enterprise*
- 23 *Teach the trainees sources of fund for investment into the enterprise/programmes*
- 24 *Teach the trainees how to manage risk in the enterprises through insurance policy*
- 25 *Teach trainee salvage value of materials that can be resold for improving investment into the enterprise*
- 26 *Teach the trainees knowledge of profit and loss account*

APPENDIX M

*EVIDENCE OF VALIDATION OF THE PACKAGED PLANTAIN
ENTERPRISE PROGRAMES*

APPENDIX N

Item by Item Analysis of Research Questions

Research Question 1:

Mean ratings of the responses of Agricultural science teachers, extension agents and farmers on entrepreneurial competencies needed by secondary school graduates for employment in plantain nursery enterprise. (N = 302)

<i>S/N</i>	<i>Item Statement</i>	<i>Mean</i>	<i>SD</i>	<i>Rmks</i>
1.	<i>Formulate specific objectives for the nursery enterprise</i>	4.65	0.680	VHN
2.	<i>Review the objectives periodically based on market demand and supply</i>	4.53	0.648	VHN
3.	<i>Draw up programme plan of activities to cover</i>	4.63	0.879	VHN
4.	<i>Decide on the type (small, medium, or large) of nursery enterprise to adopt</i>	4.58	0.898	VHN
5.	<i>Identify sources of credit for nursery enterprise</i>	4.40	0.744	HN
6.	<i>Make budget for the nursery enterprise</i>	4.27	0.813	HN
7.	<i>Identify the relevant material inputs and their locations</i>	4.41	0.760	HN
8.	<i>Identify different levels of man power needed for the nursery enterprise</i>	4.68	0.897	VHN
9.	<i>Establish time for plantain nursery</i>	4.67	0.919	VHN
10.	<i>Make rules and regulations for successful nursery practice</i>	4.26	0.924	HN
11.	<i>Identify market outlet for the nursery products</i>	4.12	1.013	HN
12.	<i>Identify relevant records to keep for nursery enterprise</i>	4.51	0.959	VHN
13.	<i>Identify site to purchase for nursery enterprise</i>	4.65	0.935	VHN

Module B: Competencies in Plantain Nursery Enterprise

i. Sliced Corm Technique

<i>S/N</i>	<i>Item Statement</i>	<i>Mean</i>	<i>SD</i>	<i>Rmks</i>
1	<i>Choose a flat site, free from pests and diseases for pre-nursery</i>	4.31	0.992	HN
2	<i>Make a shade with materials toward off excess heat.</i>	4.53	1.060	VHN
3	<i>Prepare pre-nursery beds or boxes or trays with polythene bags.</i>	4.38	1.137	HN
4	<i>Mix carefully top soil and poultry manure (8:1) that is 8 head pans of top soil to 1 head pan of poultry manure</i>	4.58	1.121	VHN
5	<i>Fill the boxes, trays, poly bags with mixed top soil and poultry</i>	4.09	1.026	HN

	<i>manure.</i>			
6	<i>Water the soil in the boxes, trays and polybags.</i>	4.83	0.991	VHN
7	<i>Arrange the poly bags in rows to form beds</i>	3.96	1.175	HN
8	<i>Acquire the corms to nurse</i>	4.71	1.079	VHN
9	<i>Slice the corms into sizes of not more than 2 – 3cm.</i>	4.16	1.057	HN
10	<i>Arrange the sliced corms in rows in the boxes or trays and one per polybags.</i>	4.59	1.106	VHN
11	<i>Apply water at alternate days especially during dry season.</i>	4.40	1.090	HN
12	<i>Transfer sprouting corms into the nursery.</i>	3.96	1.032	HN

i. Whole Corm Technique

S/N	Item Statement	Mean	SD	Rmks
1	<i>Prepare the pre-nursery as in Bi (1 to 7) above</i>	4.41	1.451	HN
2	<i>Dig out whole corms to nurse and wash with water.</i>	4.88	0.923	VHN
3	<i>Stripped back the outer leaf sheaths of each corm with knife.</i>	4.51	0.876	VHN
4	<i>Loose any cover on the bud surface</i>	4.32	0.887	HN
5	<i>Arrange whole corm in poly bags or in trays or boxes and cover with soil or saw dust.</i>	4.43	0.906	HN
6	<i>Apply water at alternate days.</i>	4.77	0.959	VHN
7	<i>Mulch with dry grasses</i>	4.59	0.960	VHN
8	<i>Observe the buds for sprouting after 6 – 8 days.</i>	4.85	0.912	VHN
9	<i>Remove any weeds on the beds or trays or polythene bags.</i>	4.65	0.861	VHN
10	<i>Transfer sprouted beds into nursery.</i>	4.53	0.881	VHN

C Competencies in Plantain Main Nursery

S/N	Item Statement	Mean	SD	Rmks
1	<i>Select site that is flat well drained and easily accessible.</i>	4.44	0.912	HN
2	<i>Clear the bush, level and fill depressions with appropriate technologies</i>	4.53	0.915	VHN
3	<i>Pack and burn all the thrashes or heap them in the farm or out of the site.</i>	4.42	0.952	HN
4	<i>Prepare a shade over the nursery</i>	4.66	0.858	VHN
5	<i>Construct a fence with 1.20 mesh poultry wire.</i>	4.69	0.956	VHN
6	<i>Collect 8 head pans of top soil to 1 head pan of poultry manure as standard mixture.</i>	4.72	1.028	VHN

7	Mix the top soil and poultry manure together very well with shovel or spade.	4.29	0.967	HN
8	Provide 400 or 500 gauge black polythene bags with a centrally placed perforation at the bottom.	4.64	0.892	VHN
9	Fill the bags with the mixture of top soil and poultry manure.	4.30	0.907	HN
10	Arrange the poly bags in rows of beds on the cleared land	4.43	0.992	HN
11	Apply water to the soil for one day and leave for at least one week to consolidate	4.39	0.896	HN
12	Open the middle of soil in the polythene bags.	4.21	0.933	HN
13	Select the differentiated young seedlings from pre-nursery (B i or ii above)	4.60	0.863	VHN
14	Place the sprouted corm with ball of earth into the hole in the polythene bags carefully and close up the base of the sprouted corms with earth	4.55	0.887	VHN
15	Apply water in the morning and evening daily.	4.38	0.925	HN
16	Apply NPK fertilizer 20:10:10 (10gm/plant)	4.66	0.849	VHN
17	Spray with benomil or ash slurry around the pseudostem base and around plants to prevent insects from eating the foliage	4.36	0.926	HN
18	Mulch with partially decomposed refuse or dry grass.	4.40	0.805	HN
19	Weed with hoe and hand pick pests regularly	4.61	0.913	VHN
20	Prune dead leaves from the base of the seedlings.	4.39	1.405	HN
21	Harden the seedlings through gradual removal of the shade.	4.57	1.124	VHN
22	Transfer the seedlings after 6 to 8 weeks into the main plantation and market the products.	4.79	1.081	VHN

Module D: Competencies Needed for Marketing of Plantain Nursery Seedlings

S/N	Item Statement	Mean	SD	Rmks
1.	Carryout market survey for sale of nursery seedlings	4.56	0.794	VHN
2.	Assemble the seedlings into sides or groups according to viability and vigour	4.57	0.869	VHN
3.	Fix price on the seedlings based on sides and vigour	4.51	0.792	VHN
4.	Advertise the seedlings for sale	4.30	0.824	HN
5.	Sell the seedlings to different buyers	4.49	0.899	HN
6.	Transport the purchased seedlings to the buyer's field if necessary	4.15	0.777	HN

7.	<i>Keep records of purchase and sales made</i>	4.56	0.824	VHN
8.	<i>Reconcile sales and expenditure to determine profit or loss.</i>	4.42	0.770	HN

Module E: Materials Needed for Effective Management in Nursery Enterprise.

S/N	Item Statement	Mean	SD	Rmks
1.	<i>Land for nursery establishment: Identification, selection and preparation.</i>	4.59	0.851	VHN
2.	<i>Top soil or organic matter for filling in the polyethene bag for planting corms.</i>	4.39	0.812	HN
3.	<i>Temporary shade for protecting the corm in the pre-nursery.</i>	4.41	0.751	HN
4.	<i>Corm as planting materials to be raised in polyethene bags or tray or boxes.</i>	4.65	0.763	VHN
5.	<i>Saw dust or dry grasses to be used as light mulch on top of the polyethene bags.</i>	4.41	0.716	HN
6.	<i>Water tank to be used to store water for watering the nursery seedlings.</i>	4.56	0.812	VHN
7.	<i>Water can to be used for watering the seedlings.</i>	4.44	0.739	HN
8.	<i>Hose to be used to guide water from tank to nursery shade.</i>	4.53	0.726	VHN
9	<i>Cutlass for cutting grasses and preparing the shade.</i>	4.34	0.758	HN
10	<i>Hoe or shovel for scoping top soil or organic matter in the container and for weeding</i>	4.57	0.873	VHN
11	<i>Knife for pruning or removing scales or slicing the corms from the nursery</i>	4.34	0.863	HN
12	<i>Wheel barrow for carrying soil or organic matter to the nursery shade</i>	4.63	0.827	VHN
13	<i>Polyethene bags/trays/boxes for holding soil for planting</i>	4.39	0.748	HN
14	<i>Wire nets for fencing the pre-nursery off rodents or predators</i>	4.29	0.706	HN
15	<i>Rake for removing cut grasses out of the site</i>	4.61	0.951	VHN
16	<i>Palm fronts used to make shade for nursery seedlings</i>	4.58	1.155	VHN
17	<i>Shade for protecting the plantain seedlings in the nursery</i>	4.61	0.808	VHN
18	<i>Knife for opening the middle of soil in the polyethene bags</i>	4.28	0.788	HN
19	<i>NPK fertilizer to be applied on the nursery seedlings</i>	4.46	0.685	HN
20	<i>Ash slurry to be spread around the seedlings to prevent insects from eating the foliage</i>	4.63	0.753	VHN
21	<i>Chemicals e.g. pesticides for controlling insects pest</i>	4.40	0.791	HN
22	<i>Borne hole to be used as water source for irrigation</i>	4.26	0.680	HN
23	<i>Head pan for carrying soil or organic matter or</i>	4.68	0.878	VHN

	<i>plantain seedlings</i>			
24	<i>Hand fork for pulverizing the soil or mixing of soil and organic matter before filling in polyethene bags</i>	4.25	0.719	HN
25	<i>Hand trowel for transplanting of plantain seedlings from trays or boxes into large polyethene bags</i>	4.63	0.687	VHN
26	<i>Secateurs for pruning dead leaves from the base of the seedlings</i>	4.55	0.852	VHN
27	<i>Polyethene bags/trays/boxes for putting soil</i>	4.72	0.770	VHN
28	<i>Basket for carrying plantain seedlings</i>	4.25	0.780	HN
29	<i>Booth to be wore as protection</i>	4.45	0.864	HN
30	<i>Hand glove to be wore as protection</i>	4.25	0.748	HN
31	<i>Gorgles to be wore as protection</i>	4.73	0.842	VHN
32	<i>Nose mask or respirator to be wore as protection</i>	4.67	0.782	VHN
33	<i>Knap sac sprayer for spraying chemicals</i>	4.31	0.868	HN

Key: \bar{X} = Mean, SD = Standard Deviation, N = No of respondents, VHN = Very Highly Needed; HN = High Needed.

Research Question 2:

Mean ratings of the responses of Agricultural science teachers, extension agents and plantain farmers on entrepreneurial competencies needed by secondary school graduates for employment in plantain plantation enterprise. N = 316

<i>S/N</i>	<i>Item Statement</i>	<i>Mean</i>	<i>SD</i>	<i>Rmks</i>
1.	<i>Formulation of specific objectives for plantain plantation management</i>	4.56	0.750	VHN
2.	<i>Review the objectives of the plantain plantation enterprise periodically based on changes in market demand and supply</i>	4.78	0.716	VHN
3.	<i>Draw up programme plan for the plantain plantation enterprise</i>	4.65	0.765	VHN
4.	<i>Decide on the type (small, medium or large) of plantain plantation management enterprise to adopt</i>	4.35	0.641	HN
5.	<i>Identify sources of credit for plantain plantation enterprise</i>	4.63	0.741	VHN
6.	<i>Budget for plantain plantation management.</i>	4.54	0.723	VHN
7	<i>Identify relevant material inputs and their location (seedlings fertilizers, pesticides, herbicides) for plantain plantation enterprise</i>	4.51	0.768	VHN
8	<i>Provide relevant tools and equipment (vehicles, cutlass, hoe etc) for use in plantain plantation enterprise.</i>	4.38	0.718	HN
9	<i>Identify different levels of man power needed for plantain plantation management.</i>	4.64	0.785	VHN
10	<i>Plan all farm operations to make most efficient use of the available money.</i>	4.31	0.706	HN
11	<i>Make rules and regulations for successful plantain operations.</i>	4.73	0.755	VHN
12	<i>Identify market outlet for the plantain products.</i>	4.29	0.713	HN
13	<i>Identify relevant records to keep for plantain plantation enterprise</i>	4.36	0.571	HN
14	<i>Identify a site for plantain plantation enterprise</i>	4.71	0.735	VHN

Module B: Competencies in Plantain Plantation Establishment**i. Land Selection and Preparation:**

<i>S/N</i>	<i>Item Statement</i>	<i>Mean</i>	<i>SD</i>	<i>Rmks</i>
1.	<i>Select well drained soil rich in organic matter.</i>	4.56	0.705	VHN
2.	<i>Clear the undergrowth of the selected land with appropriate technologies.</i>	4.76	0.754	VHN
3.	<i>Cut down the trees with appropriate technologies.</i>	4.44	0.572	HN
4.	<i>Park residues and burn</i>	4.59	0.727	VHN

5.	<i>Stump the stems, park off, level and fill depressions with appropriate technologies.</i>	4.67	0.740	VHN
6.	<i>Lay out the blocks to specification</i>	4.23	0.706	HN
7	<i>Lay the plots in planting spacing of 3m by 2m along and within the rows for digging.</i>	4.67	0.655	VHN
8	<i>Dig holes of 30cm by 30cm by 30cm for each plantain sucker.</i>	4.28	0.665	HN
9	<i>Keep the top soil separated from bottom soil of the dug holes.</i>	4.71	0.736	VHN
ii. Planting Plantain in the Field				
1	<i>Select well differentiated seedling after 7-8 weeks in the nursery.</i>	4.66	0.727	VHN
2	<i>Remove bottom portion of the polythene bag with seedlings to 2cm from the base.</i>	4.59	0.658	VHN
3	<i>Cut the polyethene bag with seedlings from the top to the bottom.</i>	4.71	0.741	VHN
4	<i>Place seedlings centrally into the hole with the two hands and remove the polyethene bag.</i>	4.64	0.749	VHN
5	<i>Remove the polyethene bag away from the seedlings.</i>	4.39	0.725	HN
6	<i>Fill back the hole first with top soil and then with bottom soil</i>	4.54	0.881	VHN
7	<i>Support the seedlings with top soil and add more soil if not enough.</i>	4.31	0.692	HN
8	<i>Press the soil firmly around the seedlings</i>	4.63	0.857	VHN
9	<i>Place mulch materials around each planted seedlings</i>	4.38	0.902	HN
10	<i>Water the seedlings daily.</i>	4.59	0.764	VHN
11	<i>Put wire net at the collar of each seedling if necessary.</i>	4.72	0.900	VHN
iii. Weeding and Fertilizer Application				
i Weeding				
1	<i>Weed as weeds appear with cutlass or machet or row weed about three to four months interval based on the nature of soil fertility.</i>	4.58	0.927	VHN
2	<i>Intercrop with legumes or cocoyam in rows at the young age of plantain or spray weeds with appropriate herbicides.</i>	4.41	0.700	HN
3	<i>Prune the dry leaves and use them as mulch around the base of the plant.</i>	4.34	0.831	HN
ii. Fertilizer application				
1	<i>Apply 300kg/ha of Nitrogen in form of urea to seedlings one month after planting at the rate of milk tin per plantain</i>	4.66	0.889	VHN

	<i>plant.</i>			
2	<i>Apply 500kg/ha of muriate of potash 30 days after the first application of urea at the rate of small tomato tin per plantain plant</i>	4.51	0.677	VHN
3	<i>Apply mixed fertilizer of 250gm (N), 100gm (P₂O₅) and 200gm (k) at the rate of 50gm/plant when it starts to maiden.</i>	4.63	0.712	VHN
iv. Pests and Diseases Control				
1	<i>Hand pick pests or insects on green leaves of plantain plant.</i>	4.55	0.786	VHN
2	<i>Maintain clean weeding of plantain plantation.</i>	4.47	0.675	HN
3	<i>Use bird scaring gun to scare away birds or animals such as money</i>	4.69	0.805	VHN
4	<i>Plant resistant variety to guide against diseases</i>	4.37	0.814	HN
5	<i>Spray insecticides to destroy insect or pests.</i>	4.64	0.743	VHN
6	<i>Remove insect or disease infested leaves and burn.</i>	4.34	0.699	HN
7	<i>Maintain correct spacing</i>	4.72	0.724	VHN
v. Debudding and Propping				
1	<i>Cut the male bud after the fruit has being set when the fingers are not coming out.</i>	4.68	0.775	VHN
2	<i>Get a stick that has Y shape</i>	4.63	0.679	VHN
3	<i>Hook the Y stick shape on fruit stalk</i>	4.54	0.780	VHN
4	<i>Dug the stick firmly into the soil to provide support of trunk or fruit until harvesting.</i>	4.71	0.636	VHN
vi. Harvesting:				
1	<i>Identify mature plantain fruits for harvesting</i>	4.63	0.647	VHN
2	<i>Harvest with sharp machet by bending down to cut the pseudostem</i>	4.69	0.759	VHN
3	<i>Place with a forked stick or a helper to receive the bunch</i>	4.73	0.708	VHN
4	<i>Cut the pseudostem half way, then cut the bunch.</i>	4.59	0.716	VHN
5	<i>Cut down the entire pseudostem and chop together with the foliage of the main plant.</i>	4.32	0.989	HN

6	<i>Spread chooped pseudostem and foliage over the soil as mulch for ratoon crop.</i>	4.60	0.850	VHN
7	<i>Collect the harvested bunches together for airing.</i>	4.55	0.658	VHN
8	<i>Cover the bunch with leaves half way to allow air inside the heap.</i>	4.54	0.728	VHN
9	<i>Sell to buyers if it is for marketing or process if necessary.</i>	4.36	0.699	HN

Module C: Competencies in Marketing of Plantain Fruits

S/N	Item Statement	Mean	SD	Rmks
1.	<i>Carryout market survey for sale of plantain bunches</i>	4.56	0.695	VHN
2.	<i>Advertise the sales of plantain fruits</i>	4.62	0.851	VHN
3.	<i>Identify your customers and invite them for supply and search for market</i>	4.33	0.793	HN
4.	<i>Inform customers on the arrival of plantain products</i>	4.61	0.782	VHN
5.	<i>Identify suitable whole sellers and retail agents</i>	4.58	0.875	VHN
6.	<i>Sort the bunches to sizes in the weigh house.</i>	4.58	0.764	VHN
7	<i>Fix prices based on the weight or size of the bunches.</i>	4.62	0.797	VHN
8	<i>Sell the plantain bunches to the buyers .</i>	4.63	0.874	VHN
9	<i>Transport the purchased bunches to buyers if necessary.</i>	4.67	0.878	VHN
10	<i>Keep records of purchase and sales made</i>	4.65	0.801	VHN
11	<i>Reconcile sales with cost of resource input to determine profit or loss.</i>	4.64	0.689	VHN

Module D: Materials Needed For Plantain Plantation Enterprise

S/N	Item Statement	Mean	SD	Rmks
1.	<i>Land for planting plantain seedlings: identification, selection and preparation</i>	4.31	0.725	HN
2.	<i>Plantain seedlings/suckers to be used as planting materials in the field</i>	4.78	0.851	VHN
3.	<i>Pegs for holdings ropes for laying blocks</i>	4.43	0.687	HN
4.	<i>Ropes for determining straight lines for blocks laying</i>	4.62	0.849	VHN
5.	<i>Measuring tape for determining areas to be used in the plantation</i>	4.63	0.834	VHN
6.	<i>Buildings for storing resource materials and for administrative purposes</i>	4.33	0.691	HN
7	<i>Bore hole to be used as sources of water for irrigation</i>	4.59	0.739	VHN
8	<i>Watering can to be used for watering the plantation</i>	4.48	0.752	HN
9	<i>Cutlass for cutting grasses</i>	4.72	0.699	VHN

10	Hoe for removing weeds	4.58	0.709	VHN
11	Wheel barrow for carrying organic manure and fertilizer to the plantation site	4.78	0.833	VHN
12	Spade/shovel for carrying soil used to cover the root of the plantain	4.34	0.854	HN
13	Fertilizer to be applied on the plantation for increasing the fertility of the soil	4.82	0.989	VHN
14	Herbicides for controlling weeds	4.34	0.829	HN
15	Pesticides and insecticides for controlling pests and insects	4.66	0.858	VHN
16	knap Sac prayer or boom sprayer for spraying chemicals e.g. pesticides, insecticides and herbicides	4.37	0.938	HN
17	Sharp machet for harvesting plantain bunch	4.67	0.891	VHN
18	Pickups or trucks for carrying harvested bunchy to the market.	4.77	0.965	VHN

Key: \bar{X} = Mean, SD = Standard Deviation, N = No of respondents, VHN = Very Highly Needed; HN = High Needed.

Research Question 3:

Mean ratings of the responses of Agricultural Science teachers, extension agents and processors on entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprises in Abia and Imo States
N = 308.

S/N	Item Statement	Mean	SD	Rmks
1.	Formulate specific objectives for plantain fruit processing	4.58	0.788	VHN
2.	Review the objectives of plantain fruits processing periodically based on market demands and supply	4.27	0.872	HN

3.	<i>Draw up programme plan of activities to cover in different processing enterprise</i>	4.66	0.877	VHN
4.	<i>Decide on the type (small, medium or large) of plantain processing enterprise to adopt</i>	4.26	0.847	HN
5.	<i>Identify sources of credit for processing enterprise</i>	4.58	0.810	VHN
6.	<i>Make budget for plantain processing enterprise</i>	4.67	0.799	VHN
7.	<i>Identify relevant material inputs and their locations</i>	4.32	0.846	HN
8.	<i>Identify different levels of man power needed for the plantain processing and marketing</i>	4.15	0.825	HN
9.	<i>Make rules and regulations for successful processing enterprise</i>	4.37	0.791	HN
10.	<i>Identify market outlet for the processed plantain fruits</i>	4.50	0.835	VHN
11.	<i>Identify relevant records to keep for the plantain processing and marketing enterprise</i>	4.67	0.777	VHN

Module B: Competencies in Plantain Fruit Processing

i.	Plantain Fruits Processing into Flour			
	Item Statement	Mean	SD	Rmks
1.	<i>Select unripe plantain fruits</i>	4.61	0.768	VHN
2.	<i>Wash the unripe plantain fruits with water to remove dirt and spray residues</i>	4.44	0.724	HN
3.	<i>Peel the unripe plantain to obtain pulp and keep pulps in a bowl containing water to avoid turning black</i>	4.74	0.679	VHN
4.	<i>Sliced the pulp using knife.</i>	4.55	0.813	VHN
5.	<i>Sun-dried the sliced pulp for 2-3 days.</i>	4.57	0.721	VHN
6.	<i>Mill the sliced dried pulp using domestic grinding machines.</i>	4.56	0.694	VHN
7.	<i>Sieve the ground pulp to obtain flour</i>	4.61	0.802	VHN
8.	<i>Pack the sieve flour and sold to the market</i>	4.67	0.751	VHN
ii.	Plantain Fruit Processing into Chips			
1	<i>Select unripe plantain fruits as required.</i>	4.61	0.716	VHN
2	<i>Peel the plantain fruits with knife</i>	4.43	0.650	HN
3	<i>Immerse in a bowl containing water</i>	4.63	0.722	VHN
4	<i>Cut/sliced peeled plantain fruits according to the desired sizes using appropriate technologies</i>	4.39	0.758	HN
5	<i>Salt the sliced plantain fruits to taste</i>	4.79	0.679	VHN
6	<i>Heat vegetable oil or palm oil in a frying pan or electric fryer to about 170°C.</i>	4.33	0.727	HN
7	<i>Put sliced plantain fruits into the hot oil and fry.</i>	4.50	0.734	VHN

8	<i>Stir constantly until crispy or golden yellow appear (Plantain chips).</i>	4.68	0.656	VHN
9	<i>Remove the plantain chips into plastic sieve to allow the oil to drain.</i>	4.52	0.729	VHN
10	<i>Spread chips on clean material to allow the plantain chips to cool</i>	4.34	0.807	HN
11	<i>Sort and bag the plantain chips into various sizes</i>	4.69	0.735	VHN
12	<i>Seal with candle flame with the aid of kitchen knife and Market the products.</i>	4.70	0.859	VHN
iii. Competencies in malt (Non-alcoholic Plantain Drink) Processing				
1	<i>Select figs from plantain</i>	3.89	1.748	HN
2	<i>Mill the figs with appropriate technologies into powder and keep until required.</i>	4.57	0.929	VHN
3	<i>Reconstitute about 55g (2 heaped tablespoon) of fig powder in 0.3 litres of water and mix.</i>	4.78	0.783	VHN
4	<i>Set the mixture aside for 5-10 minutes to enable the component of powder to leach into the water.</i>	4.44	0.668	HN
5	<i>Filter through muslin clothes, bottled and keep to sediment allow to sediment.</i>	4.66	0.742	VHN
6	<i>Decant or filter again, add vanilla flavor and granulated or icing sugar to sweeten the “malt”</i>	4.61	0.665	VHN
7	<i>Finally bottle, refrigerate and Market the products</i>	4.78	0.736	VHN
iv. Competencies in Plantain Jam Processing				
1	<i>Select 2 or 3 riped plantain</i>	4.50	0.767	VHN
2	<i>Blend the ripe plantain with harmer mill and mixed together with 1 cup of granulated sugar</i>	4.75	0.691	VHN
3	<i>Add 200ml or 2 cups of water and mix together.</i>	4.51	0.795	VHN
4	<i>Add 30-35ml lime juice in the mixture.</i>	4.45	0.709	HN
5	<i>Boil the mixture and allow the formed gel to cool</i>	4.69	0.891	VHN
6	<i>Preserved the gel with sorbic acid and market the products</i>	4.47	0.843	HN
v. Competencies in Plantain Fruits Processing into Juice				
1	<i>Select some ripe plantain fruits</i>	4.61	0.832	VHN
2	<i>Peel the ripe plantain fruits and blend the pulp with appropriate technologies.</i>	4.65	0.788	VHN
3	<i>Soak slurry (blended pulp) in hot water for 10 -15 minutes for optimum juice extraction</i>	4.35	0.835	HN
4	<i>Filter the extracted juice through white muslin (akamu) cloth</i>	4.55	0.900	VHN
5	<i>Pasteurize the juice by boiling and simmer for 3 minutes</i>	4.63	0.853	VHN
6	<i>Allow to cool, add colour and fill into sterilized bottles and</i>	4.61	0.864	VHN

	<i>market the products</i>			
vi. Competencies in Plantain Fruits Processing into Ice Cream				
1	<i>Select 20-24 ripe plantain fruits</i>	4.73	0.769	VHN
2	<i>Peel the ripe plantain fruits and blend the pulp with appropriate technologies</i>	4.37	0.688	HN
3	<i>Soak slurry (blended pulp) in 500ml hot water for 10-15 minutes for optimum juice extraction</i>	4.67	0.591	VHN
4	<i>Filter the slurring through white muslin (akamu) cloth.</i>	4.40	0.852	HN
5	<i>Add 12 eggs (albumum, whisked), 1 cup of icing sugar, a pinch of vanilla powder or few drops of liquid vanilla flavor essence, 1 tin of milk and mix thoroughly.</i>	4.54	0.692	HN
6	<i>Pour the mixture into cream cups or seal in polyethylene bag.</i>	4.54	0.868	VHN
7	<i>Place in a freezer until required and market the products</i>	4.27	0.726	HN
vii. Competencies in Plantain Fruits Processing into Wine				
1	<i>Select 2kg ripe/over ripe plantain and 250g plantain skins (peels)</i>	4.57	0.860	VHN
2	<i>Slice peeled ripe plantain fruits and the peels with knife</i>	4.38	0.878	HN
3	<i>Place in a clean, sterilized white cloth bag.</i>	4.80	0.593	VHN
4	<i>Tie the bag and place into a saucepan (preferably aluminum)</i>	4.39	0.879	HN
5	<i>Add 4 litres of water, boil and simmer for 20-30 minutes.</i>	4.55	0.685	VHN
6	<i>Add granulated sugar and fruit juice in the boiled liquid</i>	4.33	0.879	HN
7	<i>Apply pressure to extract as much juice as possible when the bag is cooled.</i>	4.47	0.857	HN
8	<i>Add the extracted juice to sugar liquor</i>	4.67	0.867	VHN
9	<i>Shake to dissolve the sugar and cool in cold water.</i>	4.24	0.903	HN
10	<i>Add 1 table spoon or 1 sachet (3g) of yeast and juice of 1 ripe grape fruit as yeast nutrient at 27-30°C to extracted juice</i>	4.30	0.775	HN
11	<i>Record the initial temperature and specific gravity.</i>	4.57	0.803	VHN
12	<i>Keep the extracted juice in jar for a week in a room temperature.</i>	4.36	0.974	HN
13	<i>Agitate the jar occasionally by giving it a shake</i>	4.59	0.772	VHN
14	<i>Record the data of temperature, PH and specific gravity.</i>	4.41	0.973	HN
15	<i>Collect data until fermentation quickens after about 1 week</i>	4.75	0.827	VHN
16	<i>Plug air lock (fermentation trap) to the fermenter.</i>	4.42	0.837	HN
17	<i>Put few drops of sterilizing solution into the air lock to form a U shape</i>	4.40	0.705	HN
18	<i>Plug the top of the trap with cotton wool to enables the yeast to undergo an anaerobic method of self-reproduction.</i>	4.59	0.849	VHN

19	<i>Rack occasionally by siphoning the wine off the lees of yeast and deposited solids.</i>	4.45	0.766	HN
20	<i>Sieve the wine with musline cloth to clear of its own accord; given time, when it does not, you may have to filter.</i>	4.39	0.845	HN
21	<i>Bottled the sieve wine as required.</i>	4.23	0.731	HN
22	<i>Store wine in sterilized bottles and corks.</i>	4.46	0.813	HN
23	<i>Store finished wine in a rack or bin at 13^oC or in a refrigerator and market the products</i>	4.56	0.708	VHN

Module C: Competencies in Marketing of Processed Plantain Fruits (Flour, Chips, Malt, Jam

S/N	Item Statement	Mean	SD	Rmks
1.	<i>Carryout market survey for sale of processed plantain fruits.</i>	4.68	0.819	VHN
2.	<i>Package the processed plantain fruits into bags and grade.</i>	4.34	0.868	HN
3.	<i>Fix prices on the bags based on size and quality</i>	4.27	0.740	HN
4.	<i>Advertise the sales of the processed plantain fruits</i>	4.71	0.883	VHN
5.	<i>Identify your customers and invite them for supply.</i>	4.27	0.725	HN
6.	<i>Sell the processed plantain fruits to different buyers according to grades and quality</i>	4.53	0.954	VHN
7.	<i>Help customers transport their goods to their nearest destination if necessary.</i>	4.42	0.819	HN
8.	<i>Keep record of sales made</i>	4.55	0.997	VHN
9.	<i>Reconcile sales and expenditure record to determine profit or loss.</i>	4.49	0.841	HN

Module D: Material Needed for Plantain Processing Enterprise

S/N	Item Statements	Mean	SD	Rmks
1	<i>Mature plantain bunches to be used as raw material for processing</i>	4.52	1.027	VHN
2	<i>Knife for peeling the plantain fruits</i>	4.55	0.902	VHN
3	<i>Mechanical slicer for slicing peeled plantain fruits</i>	4.67	1.014	VHN
4	<i>Water for washing peeled plantain fruits</i>	3.96	0.857	HN
5	<i>Cabinet drier for drying sliced plantain fruits</i>	4.78	1.011	VHN
6	<i>Salt for spreading on sliced plantain fruits</i>	3.95	0.836	VHN
7	<i>Sterilized bottles used for keeping juice</i>	4.50	1.039	VHN
8	<i>Bowls for putting water used for washing peeled plantain fruits</i>	4.49	0.950	HN
9	<i>Frying pan used for frying plantain chips</i>	4.60	1.025	VHN
10	<i>Hammer mill used for milling the dried sliced plantain fruits.</i>	4.58	0.902	VHN

11	<i>Sealer or candle knife for sealing the cellophane bag</i>	4.48	1.096	HN
12	<i>Trucks for conveyance of processed products to market</i>	4.61	0.989	VHN

Key: \bar{X} = Mean, SD = Standard Deviation, N = No of respondents,
VHN = Very Highly Needed; HN = High Needed.

Research Question 4:

Need Gap Analysis of the mean ratings of the responses of plantain nursery farmers on entrepreneurial competencies in plantain nursery where they needed improvement.

N = 20

S/N	Item Statement	\bar{X}_n	\bar{X}_p	NG ($\bar{X}_n - \bar{X}_p$)	Rmks
1.	Formulate specific objectives for the nursery enterprise	4.75	1.35	3.40	HIN
2.	Review the objectives periodically based on market demand and supply	4.30	1.50	2.80	AIN
3.	Draw up programme plan of activities to cover	4.75	1.95	2.80	AIN
4.	Decide on the type (small, medium, or large) of nursery enterprise to adopt	4.70	2.75	1.95	LIN
5.	Identify sources of credit for nursery enterprise	4.65	3.20	1.45	LIN
6.	Make budget for the nursery enterprise	4.50	2.55	1.95	LIN
7.	Identify the relevant material inputs and their locations	4.70	1.75	2.95	AIN
8.	Identify different levels of man power needed for the nursery enterprise	4.70	2.85	1.85	LIN
9.	Establish time for plantain nursery	4.75	1.80	2.95	AIN
10.	Make rules and regulations for successful nursery practice	4.65	1.70	2.95	AIN
11.	Identify market outlet for the nursery products	4.80	2.45	2.35	AIN
12.	Identify relevant records to keep for nursery enterprise	4.45	1.50	2.95	AIN
13.	Identify site to purchase for nursery enterprise	4.65	2.55	2.10	AIN

Module B: Competencies in Plantain Nursery Enterprise**i. Sliced Corm Technique**

S/N	Item Statement	\bar{X}_n	\bar{X}_p	NG ($\bar{X}_n - \bar{X}_p$)	Rmks
1	Choose a flat site, free from pests and diseases for pre-nursery	4.60	2.00	2.60	AIN
2	Make a shade with materials toward off excess heat.	4.70	1.95	2.75	AIN
3	Prepare pre-nursery beds or boxes or trays with polythene bags.	4.60	3.60	1.00	LIN
4	Mix carefully top soil and poultry manure (8:1) that is 8 head pans of top soil to 1 head pan of poultry manure	4.80	2.50	2.30	AIN
5	Fill the boxes, trays, poly bags with mixed top soil and poultry manure.	4.60	1.70	2.90	AIN
6	Water the soil in the boxes, trays and polybags.	4.75	3.20	1.55	LIN

7	Arrange the poly bags in rows to form beds	4.75	1.90	2.85	AIN
8	Acquire the corms to nurse	4.85	1.45	3.40	HIN
9	Slice the corms into sizes of not more than 2 – 3cm.	4.55	2.90	1.65	LIN
10	Arrange the sliced corms in rows in the boxes or trays and one per polybags.	4.65	1.70	2.95	AIN
11	Apply water at alternate days especially during dry season.	4.80	2.35	2.45	AIN
12	Transfer sprouting corms into the nursery.	4.55	1.90	2.65	AIN

ii. Whole Corm Technique

1	Prepare the pre-nursery as in Bi (1 to 7) above	4.74	3.10	1.65	LIN
2	Dig out whole corms to nurse and wash with water.	4.45	2.95	1.50	LIN
3	Stripped back the outer leaf sheaths of each corm with knife.	4.60	2.60	2.00	AIN
4	Loose any cover on the bud surface	4.70	1.55	3.15	HIN
5	Arrange whole corm in poly bags or in trays or boxes and cover with soil or saw dust.	4.65	2.35	2.30	AIN
6	Apply water at alternate days.	4.65	2.25	2.40	AIN
7	Mulch with dry grasses	4.70	2.45	2.25	AIN
8	Observe the buds for sprouting after 6 – 8 days.	4.55	2.55	2.00	AIN
9	Remove any weeds on the beds or trays or polythene bags.	4.65	1.75	2.90	AIN
10	Transfer sprouted beds into nursery.	4.45	2.65	1.80	LIN

C. Competencies in Plantain Main Nursery

S/N	Item Statement	\bar{X}_n	\bar{X}_p	NG ($\bar{X}_n - \bar{X}_p$)	Rmks
1	Select site that is flat well drained and easily accessible.	4.95	2.15	2.80	AIN
2	Clear the bush, level and fill depressions with appropriate technologies	4.35	2.15	2.20	AIN
3	Pack and burn all the thrashes or heap them in the farm or out of the site.	4.70	2.15	2.55	AIN
4	Prepare a shade over the nursery	4.50	1.95	2.55	AIN
5	Construct a fence with 1.20 mesh poultry wire.	4.65	3.30	1.35	LIN
6	Collect 8 head pans of top soil to 1 head pan of poultry manure as standard mixture.	4.70	2.30	2.40	AIN
7	Mix the top soil and poultry manure together very well with shovel or spade.	4.95	3.10	1.85	LIN
8	Provide 400 or 500 gauge black polythene			2.60	

	<i>bags with a centrally placed perforation at the bottom.</i>	4.50	1.90		<i>AIN</i>
9	<i>Fill the bags with the mixture of top soil and poultry manure.</i>	4.45	2.70	1.75	<i>LIN</i>
10	<i>Arrange the poly bags in rows of beds on the cleared land</i>	4.75	2.70	2.05	<i>AIN</i>
11	<i>Apply water to the soil for one day and leave for at least one week to consolidate</i>	4.65	1.50	3.15	<i>HIN</i>
12	<i>Open the middle of soil in the polythene bags.</i>	4.80	2.25	2.55	<i>AIN</i>
13	<i>Select the differentiated young seedlings from pre-nursery (B i or ii above)</i>	4.55	1.90	2.65	<i>AIN</i>
14	<i>Place the sprouted corm with ball of earth into the hole in the polythene bags carefully and close up the base of the sprouted corms with</i>	4.75	1.80	2.95	<i>AIN</i>
15	<i>Apply water in the morning and evening daily.</i>	4.65	2.45	2.20	<i>AIN</i>
16	<i>Apply NPK fertilizer 20:10:10 (10gm/plant)</i>	4.65	1.55	3.10	<i>HIN</i>
17	<i>Spray with benomil or ash slurry around the pseudostem base and around plants to prevent insects from eating the foliage</i>	4.80	2.45	2.35	<i>AIN</i>
18	<i>Mulch with partially decomposed refuse or dry grass.</i>	4.60	1.90	2.70	<i>AIN</i>
19	<i>Weed with hoe and hand pick pests regularly</i>	4.70	2.20	1.50	<i>LIN</i>
20	<i>Prune dead leaves from the base of the seedlings.</i>	4.65	2.45	2.20	<i>AIN</i>
21	<i>Harden the seedlings through gradual removal of the shade.</i>	4.80	2.45	2.35	<i>AIN</i>
22	<i>Transfer the seedlings after 6 to 8 weeks into the main plantation and market the products.</i>	4.65	1.95	2.70	<i>AIN</i>

Module D: Competencies Needed for Marketing of Plantain Nursery Seedlings

S/N	Item Statement	\bar{X}_n	\bar{X}_p	NG ($\bar{X}_n - \bar{X}_p$)	Rmks
1.	<i>Carryout market survey for sale of nursery seedlings</i>	4.65	1.70	2.95	<i>AIN</i>
2.	<i>Assemble the seedlings into sides or groups according to viability and vigour</i>	4.30	2.30	2.00	<i>AIN</i>
3.	<i>Fix price on the seedlings based on sides and vigour</i>	4.40	1.85	2.55	<i>AIN</i>
4.	<i>Advertise the seedlings for sale</i>	4.40	2.80	1.60	<i>LIN</i>
5.	<i>Sell the seedlings to different buyers</i>	4.50	1.85	2.65	<i>AIN</i>
6.	<i>Transport the purchased seedlings to the buyer's field if necessary</i>	4.55	2.55	2.00	<i>AIN</i>
7.	<i>Keep records of purchase and sales made</i>	4.30	3.15	1.15	<i>LIN</i>

8.	<i>Reconcile sales and expenditure to determine profit or loss.</i>	4.70	2.40	2.30	<i>AIN</i>
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Module E: Materials Needed for Effective Management in Nursery Enterprise.

<i>S/N</i>	<i>Item Statement</i>	\bar{X}_n	\bar{X}_p	<i>NG</i> $(\bar{X}_n - \bar{X}_p)$	<i>Rmks</i>
1.	<i>Land for nursery establishment: Identification, selection and preparation.</i>	4.67	3.10	1.57	<i>LIN</i>
2.	<i>Top soil or organic matter for filling in the polyethene bag for planting corms.</i>	4.50	2.60	1.90	<i>LIN</i>
3.	<i>Temporary shade for protecting the corm in the pre-nursery.</i>	4.65	3.25	1.40	<i>LIN</i>
4.	<i>Corm as planting materials to be raised in polyethene bags or tray or boxes.</i>	4.55	2.40	2.15	<i>AIN</i>
5.	<i>Saw dust or dry grasses to be used as light mulch on top of the polyethene bags.</i>	4.60	2.50	2.10	<i>AIN</i>
6.	<i>Water tank to be used to store water for watering the nursery seedlings.</i>	4.70	2.60	2.10	<i>AIN</i>
7.	<i>Water can to be used for watering the seedlings.</i>	4.70	2.55	2.15	<i>AIN</i>
8.	<i>Hose to be used to guide water from tank to nursery shade.</i>	4.65	2.70	1.95	<i>LIN</i>
9	<i>Cutlass for cutting grasses and preparing the shade.</i>	4.70	3.15	1.55	<i>LIN</i>
10	<i>Hoe or shovel for scoping top soil or organic matter in the container and for weeding</i>	4.75	2.50	2.25	<i>AIN</i>
11	<i>Knife for pruning or removing scales or slicing the corms from the nursery</i>	4.30	1.90	2.40	<i>AIN</i>
12	<i>Wheel barrow for carrying soil or organic matter to the nursery shade</i>	4.55	3.30	1.25	<i>LIN</i>
13	<i>Polyethene bags/trays/boxes for holding soil for planting</i>	4.65	3.20	1.45	<i>LIN</i>
14	<i>Wire nets for fencing the pre-nursery off rodents or predators</i>	4.60	3.55	1.05	<i>LIN</i>
15	<i>Rake for removing cut grasses out of the site</i>	4.50	2.30	2.20	<i>AIN</i>
16	<i>Palm fronts used to make shade for nursery seedlings</i>	4.75	2.35	2.40	<i>AIN</i>
17	<i>Shade for protecting the plantain seedlings in the nursery</i>	4.70	3.35	1.35	<i>LIN</i>
18	<i>Knife for opening the middle of soil in the polyethene bags</i>	4.72	2.55	2.17	<i>AIN</i>
19	<i>NPK fertilizer to be applied on the nursery seedlings</i>	4.55	3.15	1.40	<i>LIN</i>
20	<i>Ash slurry to be spread around the seedlings to prevent insects from eating the foliage</i>	4.75	2.20	2.55	<i>AIN</i>
21	<i>Chemicals e.g. pesticides for controlling</i>	4.70	3.30	1.40	<i>LIN</i>

	<i>insects pest</i>				
22	<i>Borne hole to be used as water source for irrigation</i>	4.65	2.40	2.25	AIN
23	<i>Head pan for carrying soil or organic matter or plantain seedlings</i>	4.60	2.60	2.00	AIN
24	<i>Hand fork for pulverizing the soil or mixing of soil and organic matter before filling in polyethene bags</i>	4.65	2.65	2.00	AIN
25	<i>Hand trowel for transplanting of plantain seedlings from trays or boxes into large polyethene bags</i>	4.75	3.1000	1.65	LIN
26	<i>Secateurs for pruning dead leaves from the base of the seedlings</i>	4.80	3.35	1.45	LIN
27	<i>Polyethene bags/trays/boxes for putting soil</i>	4.75	2.30	2.45	AIN
28	<i>Basket for carrying plantain seedlings</i>	4.65	3.30	1.35	LIN
29	<i>Booth to be wore as protection</i>	4.60	2.45	2.15	AIN
30	<i>Hand glove to be wore as protection</i>	4.50	3.20	1.30	LIN
31	<i>Gorgles to be wore as protection</i>	4.58	2.25	2.33	AIN
32	<i>Nose mask or respirator to be wore as protection</i>	4.65	3.20	1.45	LIN
33	<i>Knap sac sprayer for spraying chemicals</i>	4.50	3.05	1.45	LIN

Key: **LIN** = Little Improvement Needed
AIN = Average Improvement Needed
HIN = High Improvement Needed

Research Question 5:**Need Gap Analysis of the mean ratings of the responses of plantain plantation farmers on entrepreneurial competencies in plantain plantation where they needed improvement****N = 34**

S/N	Item Statement	\bar{X}_n	\bar{X}_p	NG ($\bar{X}_n - \bar{X}_p$)	Rmks
1.	Formulation of specific objectives for plantain plantation management	4.85	2.52	2.32	AIN
2.	Review the objectives of the plantain plantation enterprise periodically based on changes in market demand and supply	4.70	1.97	2.73	AIN
3.	Draw up programme plan for the plantain plantation enterprise	4.47	2.38	2.09	AIN
4.	Decide on the type (small, medium or large) of plantain plantation management enterprise to adopt	4.61	1.44	3.17	HIN
5.	Identify sources of credit for plantain plantation enterprise	4.55	2.88	1.67	LIN
6.	Budget for plantain plantation management.	4.67	1.85	2.82	AIN
7	Identify relevant material inputs and their location (seedlings fertilizers, pesticides, herbicides) for plantain plantation enterprise	4.58	2.58	2.00	AIN
8	Provide relevant tools and equipment (vehicles, cutlass, hoe etc) for use in plantain plantation enterprise.	4.70	3.04	1.66	LIN
9	Identify different levels of man power needed for plantain plantation management.	4.55	1.94	2.61	AIN
10	Plan all farm operations to make most efficient use of the available money.	4.52	2.58	1.94	LIN
11	Make rules and regulations for successful plantain operations.	4.64	1.64	3.00	HIN
12	Identify market outlet for the plantain products.	4.58	2.97	1.62	LIN
13	Identify relevant records to keep for plantain plantation enterprise	4.82	2.00	2.82	AIN
14	Identify a site for plantain plantation enterprise	4.64	1.61	3.03	HIN

Module B: Competencies in Plantain Plantation Establishment

i. Land Selection and Preparation:

S/N	Item Statement	\bar{X}_n	\bar{X}_p	NG ($\bar{X}_n - \bar{X}_p$)	Rmks
1.	Select well drained soil rich in organic matter.	4.82	2.88	1.94	LIN
2.	Clear the undergrowth of the selected land with appropriate technologies.	4.67	2.76	1.91	LIN
3.	Cut down the trees with appropriate technologies.	4.41	2.91	1.49	LIN
4.	Park residues and burn	4.67	2.82	1.85	LIN
5.	Stump the stems, park off, level and fill depressions with appropriate technologies.	4.55	2.91	1.64	LIN
6.	Lay out the blocks to specification	4.58	2.05	2.53	AIN
7.	Lay the plots in planting spacing of 3m by 2m along and within the rows for digging.	4.73	2.91	1.82	LIN
8.	Dig holes of 30cm by 30cm by 30cm for each plantain sucker.	4.64	1.52	3.12	HIN
9.	Keep the top soil separated from bottom soil of the dug holes.	4.70	3.10	1.61	LIN

ii. Planting Plantain in the Field

1	Select well differentiated seedling after 7-8 weeks in the nursery.	4.70	2.26	2.44	AIN
2	Remove bottom portion of the polythene bag with seedlings to 2cm from the base.	4.58	2.67	1.91	LIN
3	Cut the polyethene bag with seedlings from the top to the bottom.	4.67	2.79	1.88	LIN
4	Place seedlings centrally into the hole with the two hands and remove the polyethene bag.	4.55	2.58	1.97	LIN
5	Remove the polyethene bag away from the seedlings.	4.58	1.52	3.06	HIN
6	Fill back the hole first with top soil and then with bottom soil	4.70	1.58	3.12	HIN
7	Support the seedlings with top soil and add more soil if not enough.	4.61	2.79	1.82	LIN
8	Press the soil firmly around the seedlings	4.52	3.08	1.44	LIN
9	Place mulch materials around each planted seedlings	4.61	2.52	2.09	AIN
10	Water the seedlings daily.	4.70	3.00	1.71	LIN
11	Put wire net at the collar of each seedling if necessary.	4.64	2.70	1.94	LIN

iii. Weeding and Fertilizer Application

i Weeding					
1	<i>Weed as weeds appear with cutlass or machet or row weed about three to four months interval based on the nature of soil</i>	4.26	3.14	1.12	LIN
2	<i>Intercrop with legumes or cocoyam in rows at the young age of plantain or spray weeds with appropriate herbicides.</i>	4.23	2.79	1.44	LIN
3	<i>Prune the dry leaves and use them as mulch around the base of the plant.</i>	4.79	2.47	2.32	AIN
ii. Fertilizer application					
1	<i>Apply 300kg/ha of Nitrogen in form of urea to seedlings one month after planting at the rate of milk tin per plantain plant.</i>	4.76	2.67	2.09	AIN
2	<i>Apply 500kg/ha of muriate of potash 30 days after the first application of urea at the rate of small tomato tin per plantain plant</i>	4.58	1.94	2.65	AIN
3	<i>Apply mixed fertilizer of 250gm (N), 100gm (P₂O₅) and 200gm (k) at the rate of 50gm/plant when it starts to maiden.</i>	4.50	2.11	2.38	AIN
iv. Pests and Diseases Control					
1	<i>Hand pick pests or insects on green leaves of plantain plant.</i>	4.76	2.35	2.41	AIN
2	<i>Maintain clean weeding of plantain plantation.</i>	4.60	2.58	2.02	AIN
3	<i>Use bird scaring gun to scare away birds or animals such as money</i>	4.70	2.50	2.21	AIN
4	<i>Plant resistant variety to guide against diseases</i>	4.55	1.76	2.79	AIN
5	<i>Spray insecticides to destroy insect or pests.</i>	4.52	1.97	2.55	AIN
6	<i>Remove insect or disease infested leaves and burn.</i>	4.64	2.64	2.00	AIN
7	<i>Maintain correct spacing</i>	4.82	2.14	2.68	AIN
v. Debudding and Propping					
1	<i>Cut the male bud after the fruit has being set when the fingers are not coming out.</i>	4.67	3.05	1.62	LIN
2	<i>Get a stick that has Y shape</i>	4.64	3.03	1.61	LIN
3	<i>Hook the Y stick shape on fruit stalk</i>	4.58	3.15	1.44	LIN
4	<i>Dug the stick firmly into the soil to provide support of trunk or fruit until harvesting.</i>	4.36	3.54	0.82	LIN

vi. Harvesting:					
1	Identify mature plantain fruits for harvesting	4.85	3.23	1.62	LIN
2	Harvest with sharp machet by bending down to cut the pseudostem	4.91	2.88	2.03	AIN
3	Place with a forked stick or a helper to receive the bunch	4.65	3.08	1.56	LIN
4	Cut the pseudostem half way, then cut the bunch.	4.47	2.50	1.97	LIN
5	Cut down the entire pseudostem and chop together with the foliage of the main plant.	4.65	2.38	2.26	AIN
6	Spread chooped pseudostem and foliage over the soil as mulch for ratoon crop.	4.61	2.64	1.97	LIN
7	Collect the harvested bunches together for airing.	4.76	2.91	1.85	LIN
8	Cover the bunch with leaves half way to allow air inside the heap.	4.70	2.94	1.76	LIN
9	Sell to buyers if it is for marketing or process if necessary.	4.55	2.70	1.85	LIN

Module C: Competencies in Marketing of Plantain Fruits

S/N	Item Statement	\bar{X}_n	\bar{X}_p	NG ($\bar{X}_n - \bar{X}_p$)	Rmks
1.	Carryout market survey for sale of plantain bunches	4.88	2.58	2.29	AIN
2.	Advertise the sales of plantain fruits	4.70	2.74	1.96	LIN
3.	Identify your customers and invite them for supply and search for market	4.52	2.74	1.79	LIN
4.	Inform customers on the arrival of plantain products	4.52	3.11	1.41	LIN
5.	Identify suitable whole sellers and retail agents	4.64	3.00	1.65	LIN
6.	Sort the bunches to sizes in the weigh house.	4.52	2.79	1.74	LIN
7	Fix prices based on the weight or size of the bunches.	4.61	2.97	1.60	LIN
8	Sell the plantain bunches to the buyers.	4.5588	2.82	1.73	LIN
9	Transport the purchased bunches to buyers if necessary.	4.67	2.30	2.38	AIN
10	Keep records of purchase and sales made	4.67	2.30	2.38	AIN
11	Reconcile sales with cost of resource input to determine profit or loss.	4.65	2.85	1.79	LIN

Module D: Materials Needed For Plantain Plantation Enterprise

S/N	Item Statement	\bar{X}_n	\bar{X}_p	NG ($\bar{X}_n - \bar{X}_p$)	Rmks
1.	Land for planting plantain seedlings:	4.76	2.53	2.24	AIN

	<i>identification, selection and preparation</i>				
2.	<i>Plantain seedlings/suckers to be used as planting materials in the field</i>	4.76	2.24	2.53	<i>AIN</i>
3.	<i>Pegs for holdings ropes for laying blocks</i>	4.61	3.32	1.29	<i>LIN</i>
4.	<i>Ropes for determining straight lines for blocks laying</i>	4.50	2.65	1.85	<i>LIN</i>
5.	<i>Measuring tape for determining areas to be used in the plantation</i>	4.52	2.62	1.91	<i>LIN</i>
6.	<i>Buildings for storing resource materials and for administrative purposes</i>	4.41	2.55	1.85	<i>LIN</i>
7.	<i>Bore hole to be used as sources of water for irrigation</i>	4.53	3.41	1.12	<i>LIN</i>
8.	<i>Watering can to be used for watering the plantation</i>	4.47	3.50	0.97	<i>LIN</i>
9.	<i>Cutlass for cutting grasses</i>	4.38	2.79	1.59	<i>LIN</i>
10.	<i>Hoe for removing weeds</i>	4.47	2.88	1.58	<i>LIN</i>
11.	<i>Wheel barrow for carrying organic manure and fertilizer to the plantation site</i>	4.56	2.65	1.90	<i>LIN</i>
12.	<i>Spade/shovel for carrying soil used to cover the root of the plantain</i>	4.29	2.94	1.35	<i>LIN</i>
13.	<i>Fertilizer to be applied on the plantation for increasing the fertility of the soil</i>	4.62	3.05	1.56	<i>LIN</i>
14.	<i>Herbicides for controlling weeds.</i>	4.41	3.50	0.91	<i>LIN</i>
15.	<i>Pesticides and insecticides for controlling pests and insects</i>	4.62	2.85	1.76	<i>LIN</i>
16.	<i>knap Sac prayer or boom sprayer for spraying chemicals e.g. pesticides, insecticides and herbicides</i>	4.35	3.03	1.32	<i>LIN</i>
17.	<i>Sharp machet for harvesting plantain bunch</i>	4.65	2.97	1.68	<i>LIN</i>
18.	<i>Pickups or trucks for carrying harvested bunchy to the market.</i>	4.59	2.85	1.74	<i>LIN</i>

Key: *LIN* = Little Improvement Needed

AIN = Average Improvement Needed

HIN = High Improvement Needed

Research Question 6:

Need gap analysis of the mean ratings of the responses of plantain processors on entrepreneurial competencies in plantain processing and marketing where they needed improvement. $N = 26$

<i>S/N</i>	<i>Item Statement</i>	\bar{X}_n	\bar{X}_p	<i>NG</i> $(\bar{X}_n - \bar{X}_p)$	<i>Rmks</i>
1.	<i>Formulate specific objectives for plantain fruit processing</i>	4.62	2.69	1.93	<i>LIN</i>

2.	<i>Review the objectives of plantain fruits processing periodically based on market demands and supply</i>	4.26	1.80	2.46	AIN
3.	<i>Draw up programme plan of activities to cover in different processing enterprise</i>	4.65	2.84	1.81	LIN
4.	<i>Decide on the type (small, medium or large) of plantain processing enterprise to adopt</i>	4.61	1.19	3.42	HIN
5.	<i>Identify sources of credit for processing enterprise</i>	4.61	2.96	1.65	LIN
6.	<i>Make budget for plantain processing enterprise</i>	4.50	1.92	2.58	AIN
7.	<i>Identify relevant material inputs and their locations</i>	4.53	1.57	2.96	AIN
8.	<i>Identify different levels of man power needed for the plantain processing and marketing</i>	4.53	2.65	1.88	LIN
9.	<i>Make rules and regulations for successful processing enterprise</i>	4.30	1.91	2.39	AIN
10.	<i>Identify market outlet for the processed plantain fruits</i>	4.53	2.34	2.19	AIN
11.	<i>Identify relevant records to keep for the plantain processing and marketing enterprise</i>	4.73	2.84	1.88	LIN

Module B: Competencies in Plantain Fruit Processing

i. Plantain Fruits Processing into Flour					
	Item Statement	\bar{X}_n	\bar{X}_p	NG $(\bar{X}_n - \bar{X}_p)$	Rmks
1.	<i>Select unripe plantain fruits</i>	4.76	3.02	1.74	LIN
2.	<i>Wash the unripe plantain fruits with water to remove dirt and spray residues</i>	4.42	2.61	1.80	LIN
3.	<i>Peel the unripe plantain to obtain pulp and keep pulps in a bowl containing water to avoid turning black</i>	4.85	2.23	2.61	AIN
4.	<i>Sliced the pulp using knife.</i>	4.62	1.26	3.34	HIN
5.	<i>Sun-dried the sliced pulp for 2-3 days.</i>	4.54	2.84	1.69	LIN
6.	<i>Mill the sliced dried pulp using domestic grinding machines.</i>	4.38	1.46	2.92	AIN
7.	<i>Sieve the ground pulp to obtain flour</i>	4.88	1.53	3.34	HIN
8.	<i>Pack the sieve flour and sold to the market</i>	4.57	2.61	1.96	LIN
ii. Plantain Fruit Processing into Chips					
1	<i>Select unripe plantain fruits as required.</i>	4.50	2.15	2.34	AIN
2	<i>Peel the plantain fruits with knife</i>	4.23	1.88	2.34	AIN

3	<i>Immerse in a bowl containing water</i>	4.69	3.11	1.57	LIN
4	<i>Cut/sliced peeled plantain fruits according to the desired sizes using appropriate technologies</i>	4.58	1.53	3.04	HIN
5	<i>Salt the sliced plantain fruits to taste</i>	4.46	1.69	2.76	AIN
6	<i>Heat vegetable oil or palm oil in a frying pan or electric fryer to about 170°C.</i>	4.53	1.50	3.03	HIN
7	<i>Put sliced plantain fruits into the hot oil and fry.</i>	4.42	2.73	1.69	LIN
8	<i>Stir constantly until crispy or golden yellow appear (Plantain chips).</i>	4.60	2.69	1.91	LIN
9	<i>Remove the plantain chips into plastic sieve to allow the oil to drain.</i>	4.53	2.69	1.84	LIN
10	<i>Spread chips on clean material to allow the plantain chips to cool</i>	4.46	2.30	2.15	AIN
11	<i>Sort and bag the plantain chips into various sizes</i>	4.34	1.76	2.58	AIN
12	<i>Seal with candle flame with the aid of kitchen knife and Market the products.</i>	4.65	2.53	2.12	AIN
iii. Competencies in malt (Non-alcoholic Plantain Drink) Processing					
1	<i>Select figs from plantain</i>	4.53	2.38	2.15	AIN
2	<i>Mill the figs with appropriate technologies into powder and keep until required.</i>	4.65	1.89	2.76	AIN
3	<i>Reconstitute about 55g (2 heaped tablespoon) of fig powder in 0.3 litres of water and mix.</i>	4.70	2.88	1.82	LIN
4	<i>Set the mixture aside for 5-10 minutes to enable the component of powder to leach into the water.</i>	4.26	1.57	2.69	AIN
5	<i>Filter through muslin clothes, bottled and keep to sediment allow to sediment.</i>	4.56	1.84	2.72	AIN
6	<i>Decant or filter again, add vanilla flavor and granulated or icing sugar to sweeten the “malt”</i>	4.42	1.46	2.96	AIN
7	<i>Finally bottle, refrigerate and Market the products</i>	4.69	1.80	2.88	AIN
iv. Competencies in Plantain Jam Processing					
1	<i>Select 2 or 3 riped plantain</i>	4.19	3.00	1.19	LIN
2	<i>Blend the ripe plantain with harmer mill and mixed together with1 cup of granulated sugar</i>	4.70	2.46	2.25	AIN
3	<i>Add 200ml or 2 cups of water and mix together.</i>	4.69	1.50	3.19	HIN
4	<i>Add 30-35ml lime juice in the mixture.</i>	4.80	1.84	2.96	AIN
5	<i>Boil the mixture and allow the formed gel to cool</i>	4.30	2.54	1.77	LIN
6	<i>Preserved the gel with sorbic acid and market the products</i>	4.50	2.23	2.27	AIN

v. Competencies in Plantain Fruits Processing into Juice					
1	Select some ripe plantain fruits	4.53	2.65	1.88	LIN
2	Peel the ripe plantain fruits and blend the pulp with appropriate technologies.	4.80	2.61	2.19	AIN
3	Soak slurry (blended pulp) in hot water for 10 -15 minutes for optimum juice extraction	4.34	2.80	1.54	LIN
4	Filter the extracted juice through white muslin (akamu) cloth	4.88	1.69	3.19	HIN
5	Pasteurize the juice by boiling and simmer for 3 minutes	4.31	2.91	1.39	LIN
6	Allow to cool, add colour and fill into sterilized bottles and market the products	4.65	1.69	2.96	AIN
vi. Competencies in Plantain Fruits Processing into Ice Cream					
1	Select 20-24 ripe plantain fruits	4.26	2.73	1.53	LIN
2	Peel the ripe plantain fruits and blend the pulp with appropriate technologies	4.76	2.81	1.96	LIN
3	Soak slurry (blended pulp) in 500ml hot water for 10-15 minutes for optimum juice extraction	4.34	1.92	2.42	AIN
4	Filter the slurring through white muslin (akamu) cloth.	4.73	1.96	2.76	AIN
5	Add 12 eggs (albumum, whisked), 1 cup of icing sugar, a pinch of vanilla powder or few drops of liquid vanilla flavor essence, 1 tin of milk and mix	4.38	2.19	2.19	AIN
6	Pour the mixture into cream cups or seal in polyethylene bag.	4.65	2.23	2.42	AIN
7	Place in a freezer until required and market the products	4.46	1.65	2.80	AIN
vii. Competencies in Plantain Fruits Processing into Wine					
1	Select 2kg ripe/over ripe plantain and 250g plantain skins (peels)	4.42	2.73	1.69	LIN
2	Slice peeled ripe plantain fruits and the peels with knife	4.31	2.03	2.26	AIN
3	Place in a clean, sterilized white cloth bag.	4.53	3.11	1.42	LIN
4	Tie the bag and place into a saucepan (preferably aluminum)	4.42	1.53	2.88	AIN
5	Add 4 litres of water, boil and simmer for 20-30 minutes.	4.68	2.42	2.26	AIN
6	Add granulated sugar and fruit juice in the boiled liquid	4.53	1.57	2.96	AIN
7	Apply pressure to extract as much juice as possible when the bag is cooled.	4.60	2.11	2.49	AIN
8	Add the extracted juice to sugar liquor	4.53	1.46	3.07	HIN
9	Shake to dissolve the sugar and cool in cold water.	4.57	2.73	1.84	LIN

10	Add 1 table spoon or 1 sachet (3g) of yeast and juice of 1 ripe grape fruit as yeast nutrient at 27-30°C to extracted juice	4.53	1.96	2.57	AIN
11	Record the initial temperature and specific gravity.	4.38	2.65	1.73	LIN
12	Keep the extracted juice in jar for a week in a room temperature.	4.57	3.02	1.55	LIN
13	Agitate the jar occasionally by giving it a shake	4.57	1.46	3.11	HIN
14	Record the data of temperature, PH and specific gravity.	4.57	1.03	3.54	HIN
15	Collect data until fermentation quickens after about 1 week	4.76	2.00	2.76	AIN
16	Plug air lock (fermentation trap) to the fermenter.	4.52	3.23	1.29	LIN
17	Put few drops of sterilizing solution into the air lock to form a U shape	4.07	2.42	1.65	LIN
18	Plug the top of the trap with cotton wool to enables the yeast to undergo an anaerobic method of self-reproduction.	4.73	1.50	3.23	HIN
19	Rack occasionally by siphoning the wine off the lees of yeast and deposited solids.	4.42	2.46	1.96	LIN
20	Sieve the wine with musline cloth to clear of its own accord; given time, when it does not, you may have to filter.	4.76	2.42	2.34	AIN
21	Bottled the sieve wine as required.	4.38	1.46	2.92	AIN
22	Store wine in sterilized bottles and corks.	4.61	2.53	2.07	AIN
23	Store finished wine in a rack or bin at 13°C or in a refrigerator and market the products	4.34	1.65	2.69	AIN

Module C: Competencies in Marketing of Processed Plantain Fruits (Flour, Chips, Malt, Jam

S/N	Item Statement	\bar{X}_n	\bar{X}_p	NG ($\bar{X}_n - \bar{X}_p$)	Rmks
1.	Carryout market survey for sale of processed plantain fruits.	4.65	3.23	1.42	LIN
2.	Package the processed plantain fruits into bags and grade.	4.69	2.23	2.46	AIN
3.	Fix prices on the bags based on size and quality	4.77	1.94	2.83	AIN
4.	Advertise the sales of the processed plantain fruits	4.42	2.00	2.42	AIN
5.	Identify your customers and invite them for supply.	4.42	1.92	2.50	AIN
6.	Sell the processed plantain fruits to different buyers according to grades and quality	4.38	3.61	0.76	LIN
7.	Help customers transport their goods to their nearest destination if necessary.	4.61	1.81	2.81	AIN

8.	Keep record of sales made	4.65	2.92	1.73	LIN
9.	Reconcile sales and expenditure record to determine profit or loss.	4.50	2.07	2.42	AIN

Module D: Material Needed for Plantain Processing Enterprise

S/N	Item Statements	\bar{X}_n	\bar{X}_p	NG $(\bar{X}_n - \bar{X}_p)$	Rmks
1	Mature plantain bunches to be used as raw material for processing	4.73	2.54	2.19	AIN
2	Knife for peeling the plantain fruits	4.31	2.58	1.73	LIN
3	Mechanical slicer for slicing peeled plantain fruits	4.54	2.78	1.77	LIN
4	Water for washing peeled plantain fruits	4.58	1.96	2.61	AIN
5	Cabinet drier for drying sliced plantain fruits	4.77	1.73	3.03	HIN
6	Salt for spreading on sliced plantain fruits	4.50	2.61	1.88	LIN
7	Sterilized bottles used for keeping juice	4.65	1.62	3.03	HIN
8	Bowls for putting water used for washing peeled plantain fruits	4.27	1.65	2.61	AIN
9	Frying pan used for frying plantain chips	4.69	1.50	3.19	HIN
10	Hammer mill used for milling the dried sliced plantain fruits.	4.42	3.31	1.12	LIN
11	Sealer or candle knife for sealing the cellophane bag	4.85	1.62	3.23	HIN
12	Trucks for conveyance of processed products to market	4.73	2.42	2.31	AIN

Key: **LIN** = Little Improvement Needed

AIN = Average Improvement Needed

HIN = High Improvement Needed

Research Question 7:

**Competencies in Training Needed by Trainers for Training Secondary School
Graduates for success in employment in any Plantain Enterprise N = 282**

S/N	Item Statement	Mean	SD	Rmks
1.	<i>Structure the plantain programme (nursery, plantation, processing and marketing) contents into topics or units</i>	4.28	0.989	HN
2.	<i>Arrange the topics or units sequentially in order of presentation</i>	4.26	1.058	HN
3.	<i>State the objectives to be achieved by each topic or unit for any plantain enterprise.</i>	4.21	0.958	HN
4.	<i>Identify materials needed for training in each unit of the enterprise</i>	4.22	0.984	HN
5.	<i>Select relevant available materials for training in each units of the plantain enterprise</i>	4.09	0.964	HN
6.	<i>Identify relevant methods for teaching each topic or unit</i>	4.16	1.040	HN
7.	<i>Select relevant methods for teaching each topic or unit</i>	4.26	0.925	HN
8.	<i>Write down the plantain programme concepts, facts or generalizations to be learnt.</i>	4.37	1.064	HN
9	<i>Identify competency performance of plantain programme units needed to develop</i>	4.01	1.043	HN
10	<i>State instructors and learners activities.</i>	4.25	0.994	HN
11	<i>Identify appropriate evaluation technique for each content area</i>	4.09	0.893	HN
B	Training procedure to be adopted by trainers			
12	<i>Teach trainees from known to unknown using plantain programme units or topics</i>	4.39	0.929	HN
13	<i>Explain the facilities to be used by the trainer for training each trainee in each in competency area of the plantain programme</i>	4.13	0.925	HN
14	<i>Deliver the contents step by step in logical order to the trainees</i>	4.25	0.965	HN
15	<i>Demonstrate the competencies while the trainees observed during step by step teaching</i>	4.45	0.775	HN
16	<i>Request the trainees to practice what the instructor demonstrated while the instructor observes them</i>	4.23	0.845	HN
17	<i>Correct wrong practices made by the trainees</i>	4.29	0.834	HN
18	<i>Encourage repetitive practice of knowledge and skills learnt</i>	4.39	0.706	HN
19	<i>Test the practice of a group of related competencies toward achieving of the objectives</i>	4.35	0.793	HN
20	<i>Provide the trainees information about their performance</i>	4.30	0.773	HN
21	<i>Encourage visit to other plantain programme establishments, write a report and submit to the instructor for a feedback system</i>	4.17	0.851	HN

22	<i>Teach the trainee money management and investment procedure into their enterprise</i>	4.34	0.815	HN
23	<i>Teach the trainees sources of fund for investment into the enterprise/programmes</i>	4.35	0.733	HN
24	<i>Teach the trainees how to manage risk in the enterprises through insurance policy</i>	4.35	0.695	HN
25	<i>Teach trainee salvage value of materials that can be resold for improving investment into the enterprise</i>	4.26	0.795	HN
26	<i>Teach the trainees knowledge of profit and loss account</i>	4.31	0.833	HN

Key: **HN** = Highly Needed

APPENDIX O

Item by Item Analysis of Hypothesis Testing

Hypothesis One:

Analysis of variance (ANOVA) of the Mean Ratings of the Agricultural Science Teachers, Extension Agents and Farmers on the Entrepreneurial competencies Needed by secondary school graduates for Employment in plantain nursery enterprise.

<i>S/N</i>	<i>Item Statement</i>	<i>Total sum of square</i>	<i>df</i>	<i>Mean sum of square</i>	<i>F-Ratio</i>	<i>P-value (sig)</i>	<i>Rmks</i>
1.	<i>Formulate specific objectives for the nursery enterprise</i>	137.858	301	0.460	0.264	0.768	NS
2.	<i>Review the objectives periodically based on market demand and supply</i>	220.861	301	0.738	1.039	0.462	NS
3.	<i>Draw up programme plan of activities to cover</i>	253.275	301	0.847	0.101	0.904	NS
4.	<i>Decide on the type (small, medium, or large) of nursery enterprise to adopt</i>	146.136	301	0.488	0.137	0.872	NS
5.	<i>Identify sources of credit for nursery enterprise</i>	232.609	301	0.778	0.949	0.252	NS
6.	<i>Make budget for the nursery enterprise</i>	149.805	301	0.501	0.113	0.693	NS
7.	<i>Identify the relevant material inputs and their locations</i>	257.272	301	0.857	0.686	0.505	NS
8.	<i>Identify different levels of man power needed for the nursery enterprise</i>	144.437	301	0.483	0.892	0.512	NS
9.	<i>Establish time for plantain nursery</i>	305.550	301	1.019	0.363	0.696	NS
10.	<i>Make rules and regulations for successful nursery practice</i>	262.834	301	0.879	0.028	0.872	NS
11.	<i>Identify market outlet for the nursery products</i>	195.050	301	0.652	1.565	0.280	NS
12.	<i>Identify relevant records to keep for nursery enterprise</i>	355.699	301	1.186	0.470	0.625	NS
13.	<i>Identify site to purchase for nursery enterprise</i>	410.586	301	1.371	0.201	0.818	NS

Module B: Competencies in Plantain Nursery Enterprise**Competencies in Plantain Pre-nursery****i. Sliced Corm Technique**

S/N	Item Statement	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1	Choose a flat site, free from pests and diseases for pre-nursery	157.086	301	0.525	0.213	0.608	NS
2	Make a shade with materials toward off excess heat.	96.543	301	0.322	0.943	0.170	NS
3	Prepare pre-nursery beds or boxes or trays with polythene bags.	283.351	301	0.945	0.457	0.634	NS
4	Mix carefully top soil and poultry manure (8:1) that is 8 head pans of top soil to 1 head pan of poultry manure	259.881	301	0.865	0.705	0.495	NS
5	Fill the boxes, trays, poly bags with mixed top soil and poultry manure.	437.023	301	1.459	0.314	0.731	NS
6	Water the soil in the boxes, trays and polybags.	306.586	301	1.025	2.145	0.096	NS
7	Arrange the poly bags in rows to form beds	173.579	301	0.580	0.916	0.190	NS
8	Acquire the corms to nurse	189.023	301	0.632	0.129	0.879	NS
9	Slice the corms into sizes of not more than 2 – 3cm.	315.222	301	1.052	0.327	0.721	NS
10	Arrange the sliced corms in rows in the boxes or trays and one per polybags.	179.659	301	0.601	0.028	0.593	NS
11	Apply water at alternate days especially during dry season.	71.272	301	0.238	0.259	0.772	NS
12	Transfer sprouting corms into the nursery.	153.470	301	0.512	0.297	0.643	NS

ii. Whole Corm Technique

1	Prepare the pre-nursery as in Bi (1 to 7) above	315.844	301	1.056	0.181	0.622	NS
2	Dig out whole corms to nurse and wash with water.	303.868	301	1.016	0.621	0.379	NS
3	Stripped back the outer leaf sheaths of each corm with knife.	267.540	301	0.894	0.982	0.151	NS
4	Loose any cover on the bud surface	161.593	301	0.532	1.474	0.123	NS
5	Arrange whole corm in poly bags or in trays or boxes and cover with soil or saw dust.	78.874	301	0.264	0.327	0.693	NS
6	Apply water at alternate days.	171.232	301	0.572	0.113	0.893	NS

7	<i>Mulch with dry grasses</i>	151.338	301	0.772	2.570	0.074	NS
8	<i>Observe the buds for sprouting after 6 – 8 days.</i>	123.447	301	0.389	4.034	0.045	S*
9	<i>Remove any weeds on the beds or trays or polythene bags.</i>	298.189	301	0.996	0.182	0.834	NS
10	<i>Transfer sprouted beds into nursery.</i>	308.172	301	1.030	0.037	0.963	NS

C Competencies in Plantain Main Nursery

S/N	Item Statement	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1	<i>Select site that is flat well drained and easily accessible.</i>	420.997	301	1.405	0.304	0.738	NS
2	<i>Clear the bush, level and fill depressions with appropriate technologies</i>	229.510	301	0.767	0.025	0.975	NS
3	<i>Pack and burn all the thrashes or heap them in the farm or out of the site.</i>	127.444	301	0.426	0.201	0.818	NS
4	<i>Prepare a shade over the nursery</i>	356.930	301	1.194	0.017	0.984	NS
5	<i>Construct a fence with 1.20 mesh poultry wire.</i>	327.947	301	1.095	0.197	0.822	NS
6	<i>Collect 8 head pans of top soil to 1 head pan of poultry manure as standard mixture.</i>	511.417	301	1.705	0.464	0.629	NS
7	<i>Mix the top soil and poultry manure together very well with shovel or spade.</i>	333.434	301	1.112	0.362	0.697	NS
8	<i>Provide 400 or 500 gauge black polythene bags with a centrally placed perforation at the bottom.</i>	159.338	301	0.533	0.033	0.967	NS
9	<i>Fill the bags with the mixture of top soil and poultry manure.</i>	357.881	301	1.194	0.416	0.660	NS
10	<i>Arrange the poly bags in rows of beds on the cleared land</i>	264.599	301	0.884	0.093	0.912	NS
11	<i>Apply water to the soil for one day and leave for at least one week to consolidate</i>	297.987	301	0.995	0.276	0.759	NS
12	<i>Open the middle of soil in the polythene bags.</i>	179.470	301	0.600	0.145	0.865	NS
13	<i>Select the differentiated young seedlings from pre-nursery (B i or ii above)</i>	410.440	301	1.369	0.364	0.696	NS

14	Place the sprouted corm with ball of earth into the hole in the polythene bags carefully and close up the base of the sprouted corms with earth	437.699	301	1.461	0.343	0.710	NS
15	Apply water in the morning and evening daily.	122.742	301	0.410	0.064	0.938	NS
16	Apply NPK fertilizer 20:10:10 (10gm/plant)	89.222	301	0.298	0.105	0.901	NS
17	Spray with benomil or ash slurry around the pseudostem base and around plants to prevent insects from eating the foliage	243.262	301	0.813	0.022	0.978	NS
18	Mulch with partially decomposed refuse or dry grass.	194.374	301	0.649	0.169	0.844	NS
19	Weed with hoe and hand pick pests regularly	367.046	301	1.225	0.263	0.769	NS
20	Prune dead leaves from the base of the seedlings.	218.755	301	0.731	0.054	0.947	NS
21	Harden the seedlings through gradual removal of the shade.	263.179	301	0.877	0.520	0.595	NS
22	Transfer the seedlings after 6 to 8 weeks into the main plantation and market the products.	171.046	301	0.572	0.098	0.907	NS

Module D: Competencies Needed for Marketing of Plantain Nursery Seedlings

S/N	Item Statement	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1.	Carryout market survey for sale of nursery seedlings	146.318	301	0.489	0.973	0.130	NS
2.	Assemble the seedlings into sides or groups according to viability and vigour	242.202	301	0.810	0.760	0.441	NS
3.	Fix price on the seedlings based on sides and vigour	113.417	301	0.379	0.635	0.465	NS
4.	Advertise the seedlings for sale	108.887	301	0.364	0.107	0.599	NS
5.	Sell the seedlings to different buyers	86.546	301	0.069	1.240	0.087	NS
6.	Transport the purchased seedlings to the buyer's field if necessary	284.719	301	0.550	3.288	0.036	S*
7.	Keep records of purchase and	173.735	301	0.580	0.230	0.795	NS

	<i>sales made</i>						
8.	<i>Reconcile sales and expenditure to determine profit or loss.</i>	141.672	301	0.474	0.039	0.762	NS

Module E: Materials Needed for Effective Management in Nursery Enterprise.

S/N	Item Statement	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1.	<i>Land for nursery establishment: Identification, selection and preparation.</i>	201.288	301	0.673	0.095	0.910	NS
2.	<i>Top soil or organic matter for filling in the polyethene bag for planting corms.</i>	116.427	301	0.388	0.519	0.596	NS
3.	<i>Temporary shade for protecting the corm in the pre-nursery.</i>	138.719	301	0.464	0.075	0.928	NS
4.	<i>Corm as planting materials to be raised in polyethene bags or tray or boxes.</i>	66.344	301	0.222	0.130	0.878	NS
5.	<i>Saw dust or dry grasses to be used as light mulch on top of the polyethene bags.</i>	62.993	301	0.210	0.420	0.657	NS
6.	<i>Water tank to be used to store water for watering the nursery seedlings.</i>	127.894	301	0.427	0.088	0.915	NS
7.	<i>Water can to be used for watering the seedlings.</i>	195.099	301	0.652	0.092	0.912	NS
8.	<i>Hose to be used to guide water from tank to nursery shade.</i>	130.967	301	0.437	0.192	0.825	NS
9	<i>Cutlass for cutting grasses and preparing the shade.</i>	286.795	301	0.959	0.041	0.960	NS
10	<i>Hoe or shovel for scoping top soil or organic matter in the container and for weeding</i>	138.652	301	0.464	0.002	0.998	NS
11	<i>Knife for pruning or removing scales or slicing the corms from the nursery</i>	355.659	301	1.186	0.428	0.653	NS
12	<i>Wheel barrow for carrying soil or organic matter to the nursery shade</i>	359.593	301	1.201	0.242	0.785	NS
13	<i>Polyethene bags/trays/boxes for holding soil for planting</i>	190.040	301	0.635	0.037	0.964	NS
14	<i>Wire nets for fencing the pre-nursery off rodents or predators</i>	424.437	301	1.418	0.148	0.862	NS
15	<i>Rake for removing cut grasses out of the site</i>	295.523	301	0.988	0.042	0.959	NS
16	<i>Palm fronts used to make shade</i>	118.175	301	0.394	0.542	0.582	NS

	<i>for nursery seedlings</i>						
17	<i>Shade for protecting the plantain seedlings in the nursery</i>	133.222	301	0.445	0.107	0.899	NS
18	<i>Knife for opening the middle of soil in the polyethene bags</i>	135.023	301	0.451	0.224	0.799	NS
19	<i>NPK fertilizer to be applied on the nursery seedlings</i>	311.020	301	1.040	0.046	0.955	NS
20	<i>Ash slurry to be spread around the seedlings to prevent insects from eating the foliage</i>	185.868	301	0.618	0.771	0.463	NS
21	<i>Chemicals e.g. pesticides for controlling insects pest</i>	381.394	301	1.274	0.170	0.844	NS
22	<i>Borne hole to be used as water source for irrigation</i>	393.368	301	1.314	0.172	0.842	NS
23	<i>Head pan for carrying soil or organic matter or plantain seedlings</i>	156.202	301	0.522	0.214	0.807	NS
24	<i>Hand fork for pulverizing the soil or mixing of soil and organic matter before filling in polyethene bags</i>	323.540	301	1.080	0.327	0.721	NS
25	<i>Hand trowel for transplanting of plantain seedlings from trays or boxes into large polyethene bags</i>	210.795	301	0.705	0.055	0.946	NS
26	<i>Secateurs for pruning dead leaves from the base of the seedlings</i>	262.043	301	0.876	0.004	0.996	NS
27	<i>Polyethene bags/trays/boxes for putting soil</i>	319.351	301	1.068	0.030	0.970	NS
28	<i>Basket for carrying plantain seedlings</i>	204.172	301	0.682	0.099	0.905	NS
29	<i>Booth to be wore as protection</i>	276.609	301	0.925	0.047	0.954	NS
30	<i>Hand glove to be wore as protection</i>	175.894	301	0.588	0.080	0.923	NS
31	<i>Gorgles to be wore as protection</i>	227.089	301	0.759	0.001	0.999	NS
32	<i>Nose mask or respirator to be wore as protection</i>	90.834	301	0.304	0.008	0.992	NS
33	<i>Knap sac sprayer for spraying chemicals</i>	212.917	301	0.712	0.034	0.967	NS

Key: **NS** = Not Significant

S* = Significant

Level of Significance = 0.05

Table value (t-tab) = 3.00.

Hypothesis Two:

Analysis of Variance (ANOVA) of the Mean Ratings of the Agricultural science Teachers, Extension Agents and Farmers on the Entrepreneurial competencies Needed by secondary school graduates for Employment in Plantain Plantation Management Enterprise.

A.

S/N	Item Statement	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1.	<i>Formulation of specific objectives for plantain plantation management</i>	146.237	315	0.466	0.492	0.612	NS
2.	<i>Review the objectives of the plantain plantation enterprise periodically based on changes in market demand and supply</i>	229.595	315	0.732	0.333	0.717	NS
3.	<i>Draw up programme plan for the plantain plantation enterprise</i>	260.440	315	0.830	0.387	0.679	NS
4.	<i>Decide on the type (small, medium or large) of plantain plantation management enterprise to adopt</i>	149.047	315	0.476	0.039	0.962	NS
5.	<i>Identify sources of credit for plantain plantation enterprise</i>	243.304	315	0.776	0.208	0.812	NS
6.	<i>Budget for plantain plantation management.</i>	154.288	315	0.491	0.538	0.585	NS
7	<i>Identify relevant material inputs and their location (seedlings fertilizers, pesticides, herbicides) for plantain plantation enterprise</i>	265.722	315	0.847	0.390	0.677	NS
8	<i>Provide relevant tools and equipment (vehicles, cutlass, hoe etc) for use in plantain plantation enterprise.</i>	152.747	315	0.488	0.139	0.870	NS
9	<i>Identify different levels of man power needed for plantain plantation management.</i>	311.418	315	0.993	0.319	0.727	NS
10	<i>Plan all farm operations to make most efficient use of the available money.</i>	270.595	315	0.864	0.087	0.917	NS
11	<i>Make rules and regulations for successful plantain operations.</i>	200.592	315	0.639	0.443	0.643	NS
12	<i>Identify market outlet for the plantain products.</i>	366.592	315	1.169	0.242	0.785	NS
13	<i>Identify relevant records to keep for plantain plantation enterprise</i>	415.326	315	1.327	0.011	0.990	NS
14	<i>Identify a site for plantain plantation enterprise</i>	159.342	315	0.507	0.671	0.512	NS

Module B: Competencies in Plantain Plantation Establishment**i. Land Selection and Preparation:**

S/N	Item Statement	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1.	Select well drained soil rich in organic matter.	99.177	315	0.317	0.625	0.476	NS
2.	Clear the undergrowth of the selected land with appropriate technologies.	293.022	315	0.933	0.551	0.577	NS
3.	Cut down the trees with appropriate technologies.	285.544	315	0.905	1.329	0.266	NS
4.	Park residues and burn	454.693	315	1.451	0.212	0.809	NS
5.	Stump the stems, park off, level and fill depressions with appropriate technologies.	315.858	315	1.007	0.293	0.746	NS
6.	Lay out the blocks to specification	180.111	315	0.575	0.197	0.821	NS
7.	Lay the plots in planting spacing of 3m by 2m along and within the rows for digging.	168.175	315	0.550	3.207	0.046	S*
8.	Dig holes of 30cm by 30cm by 30cm for each plantain sucker.	247.858	315	0.808	4.156	0.027	S*
9.	Keep the top soil separated from bottom soil of the dug holes.	194.718	315	0.619	0.827	0.438	NS
ii. Planting Plantain in the Field							
1	Select well differentiated seedling after 7-8 weeks in the nursery.	71.835	315	0.229	0.179	0.836	NS
2	Remove bottom portion of the polythene bag with seedlings to 2cm from the base.	156.684	315	0.500	0.038	0.963	NS
3	Cut the polyethene bag with seedlings from the top to the bottom.	339.418	315	1.083	0.274	0.761	NS
4	Place seedlings centrally into the hole with the two hands and remove the polyethene bag.	330.835	315	1.054	0.442	0.643	NS
5	Remove the polyethene bag away from the seedlings.	276.465	315	0.883	0.078	0.925	NS
6	Fill back the hole first with top soil and then with bottom soil	452.418	315	1.445	0.007	0.993	NS
7	Support the seedlings with top soil and add more soil if not enough.	79.722	315	0.254	0.199	0.820	NS
8	Press the soil firmly around the seedlings	174.190	315	0.555	0.387	0.680	NS
9	Place mulch materials around each planted seedlings	154.380	315	0.491	0.613	0.542	NS

10	<i>Water the seedlings daily.</i>	167.089	315	0.533	0.228	0.796	NS
11	<i>Put wire net at the collar of each seedling if necessary.</i>	305.225	315	0.974	0.109	0.897	NS
iii. Weeding and Fertilizer Application							
i Weeding							
1	<i>Weed as weeds appear with cutlass or machet or row weed about three to four months interval based on the nature of soil fertility.</i>	324.734	315	1.036	0.277	0.758	NS
2	<i>Intercrop with legumes or cocoyam in rows at the young age of plantain or spray weeds with appropriate herbicides.</i>	434.465	315	1.386	0.206	0.814	NS
3	<i>Prune the dry leaves and use them as mulch around the base of the plant.</i>	234.038	315	0.748	0.017	0.983	NS
ii. Fertilizer application							
1	<i>Apply 300kg/ha of Nitrogen in form of urea to seedlings one month after planting at the rate of milk tin per plantain plant.</i>	136.304	315	0.434	0.584	0.558	NS
2	<i>Apply 500kg/ha of muriate of potash 30 days after the first application of urea at the rate of small tomato tin per plantain</i>	366.085	315	1.170	0.008	0.992	NS
3	<i>Apply mixed fertilizer of 250gm (N), 100gm (P₂O₅) and 200gm (k) at the rate of 50gm/plant when it starts to maiden.</i>	335.949	315	1.072	0.184	0.832	NS
iv. Pests and Diseases Control							
1	<i>Hand pick pests or insects on green leaves of plantain plant.</i>	535.326	315	1.708	0.200	0.630	NS
2	<i>Maintain clean weeding of plantain plantation.</i>	343.554	315	1.096	0.289	0.283	NS
3	<i>Use bird scaring gun to scare away birds or animals such as money</i>	162.380	315	0.518	0.282	0.762	NS
4	<i>Plant resistant variety to guide against diseases</i>	365.380	315	1.165	0.288	0.538	NS
5	<i>Spray insecticides to destroy insect or pests.</i>	274.468	315	0.876	0.143	0.443	NS

6	<i>Remove insect or disease infested leaves and burn.</i>	305.684	315	0.976	0.140	0.195	NS
7	<i>Maintain correct spacing</i>	182.949	315	0.583	0.339	0.465	NS
v. Debudding and Propping							
1	<i>Cut the male bud after the fruit has being set when the fingers are not coming out.</i>	268.136	315	0.869	5.215	0.008	S*
2	<i>Get a stick that has Y shape</i>	452.418	315	1.439	0.680	0.507	NS
3	<i>Hook the Y stick shape on fruit stalk</i>	124.038	315	0.396	0.199	0.820	NS
4	<i>Dug the stick firmly into the soil to provide support of trunk or fruit until harvesting.</i>	90.718	315	0.290	0.002	0.998	NS
vi. Harvesting:							
1	<i>Identify mature plantain fruits for harvesting</i>	247.858	315	0.791	0.202	0.818	NS
2	<i>Harvest with sharp machet by bending down to cut the pseudostem</i>	201.934	315	0.645	0.019	0.981	NS
3	<i>Place with a forked stick or a helper to receive the bunch</i>	378.608	315	1.210	0.013	0.987	NS
4	<i>Cut the pseudostem half way, then cut the bunch.</i>	222.797	315	0.711	0.210	0.811	NS
5	<i>Cut down the entire pseudostem and chop together with the foliage of the main plant.</i>	269.772	315	0.861	0.091	0.913	NS
6	<i>Spread chooped pseudostem and foliage over the soil as mulch for ratoon crop.</i>	178.440	315	0.568	0.537	0.585	NS
7	<i>Collect the harvested bunches together for airing.</i>	148.430	315	0.473	0.348	0.706	NS
8	<i>Cover the bunch with leaves half way to allow air inside the heap.</i>	247.554	315	0.789	0.337	0.714	NS
9	<i>Sell to buyers if it is for marketing or process if necessary.</i>	116.987	315	0.372	0.733	0.481	NS

Module C: Competencies in Marketing of Plantain Fruits

S/N	Item Statement	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1.	<i>Carryout market survey for sale of plantain bunches</i>	110.354	315	0.352	0.444	0.642	NS
2.	<i>Advertise the sales of plantain fruits</i>	87.984	315	0.280	0.368	0.692	NS

3.	<i>Identify your customers and invite them for supply and search for market</i>	289.959	315	0.924	0.387	0.680	NS
4.	<i>Inform customers on the arrival of plantain products</i>	174.722	315	0.557	0.360	0.698	NS
5.	<i>Identify suitable whole sellers and retail agents</i>	143.680	315	0.458	0.201	0.818	NS
6.	<i>Sort the bunches to sizes in the weigh house.</i>	204.288	315	0.652	0.102	0.903	NS
7.	<i>Fix prices based on the weight or size of the bunches.</i>	119.022	315	0.380	0.240	0.787	NS
8.	<i>Sell the plantain bunches to the buyers .</i>	140.592	315	0.448	0.315	0.730	NS
9.	<i>Transport the purchased bunches to buyers if necessary.</i>	66.772	315	0.213	0.118	0.889	NS
10	<i>Keep records of purchase and sales made</i>	63.304	315	0.202	0.576	0.563	NS
11	<i>Reconcile sales with cost of resource input to determine profit or loss.</i>	129.937	315	0.415	0.103	0.903	NS

Module D: Materials Needed For Plantain Plantation Enterprise

S/N	Item Statement	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1.	<i>Land for planting plantain seedlings: identification, selection and preparation</i>	197.975	315	0.632	0.024	0.977	NS
2.	<i>Plantain seedlings/suckers to be used as planting materials in the field</i>	133.680	315	0.427	0.078	0.925	NS
3.	<i>Pegs for holdings ropes for laying blocks</i>	292.430	315	0.933	0.163	0.850	NS
4.	<i>Ropes for determining straight lines for blocks laying</i>	142.744	315	0.455	0.505	0.604	NS
5.	<i>Measuring tape for determining areas to be used in the plantation</i>	370.718	315	1.184	0.083	0.920	NS
6.	<i>Buildings for storing resource materials and for administrative purposes</i>	381.418	315	1.215	0.440	0.644	NS
7.	<i>Bore hole to be used as sources of water for irrigation</i>	194.380	315	0.621	0.053	0.948	NS
8.	<i>Watering can to be used for watering the plantation</i>	430.608	315	1.374	0.148	0.863	NS
9.	<i>Cutlass for cutting grasses</i>	303.949	315	0.969	0.264	0.768	NS
10	<i>Hoe for removing weeds</i>	120.693	315	0.385	0.041	0.960	NS
11	<i>Wheel barrow for carrying</i>	134.718	315	0.430	0.245	0.783	NS

	<i>organic manure and fertilizer to the plantation site</i>						
12	<i>Spade/shovel for carrying soil used to cover the root of the plantain</i>	138.190	315	0.441	0.016	0.984	NS
13	<i>Fertilizer to be applied on the plantation for increasing the fertility of the soil</i>	317.430	315	1.014	0.083	0.920	NS
14	<i>Herbicides for controlling weeds</i>	192.136	315	0.612	0.501	0.607	NS
15	<i>Pesticides and insecticides for controlling pests and insects</i>	386.339	315	1.234	0.021	0.979	NS
16	<i>knap Sac prayer or boom sprayer for spraying chemicals e.g. pesticides, insecticides and herbicides</i>	400.136	315	1.278	0.060	0.942	NS
17	<i>Sharp matchet for harvesting plantain bunch</i>	158.009	315	0.504	0.325	0.723	NS
18	<i>Pickups or trucks for carrying harvested bunchy to the market.</i>	330.339	315	1.055	0.057	0.945	NS

Key: **NS** = Not Significant;

S* = Significant

Level of Significance = 0.05

Table value = 3.00

Hypothesis Three:

Analysis of variance (ANOVA) of the Mean Ratings of the Agricultural science teachers, Extension Agents and Processors on the entrepreneurial competencies needed by secondary school graduates for employment in plantain processing and marketing enterprise.

A.

S/N	Item Statement	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1.	<i>Formulate specific objectives for plantain fruit processing</i>	138.701	307	0.454	0.290	0.749	NS
2.	<i>Review the objectives of plantain fruits processing periodically based on market demands and supply</i>	230.532	307	0.755	0.258	0.773	NS
3.	<i>Draw up programme plan of activities to cover in different processing enterprise</i>	255.698	307	0.838	0.092	0.912	NS
4.	<i>Decide on the type (small, medium or large) of plantain processing enterprise to adopt</i>	154.114	307	0.505	0.201	0.818	NS
5.	<i>Identify sources of credit for processing enterprise</i>	242.633	307	0.793	0.425	0.654	NS
6.	<i>Make budget for plantain processing enterprise</i>	151.828	307	0.498	0.015	0.985	NS
7.	<i>Identify relevant material inputs and their locations</i>	263.698	307	0.864	0.090	0.914	NS
8.	<i>Identify different levels of man power needed for the plantain processing and marketing</i>	152.312	307	0.499	0.049	0.953	NS
9.	<i>Make rules and regulations for successful processing enterprise</i>	314.818	307	1.028	0.561	0.571	NS
10.	<i>Identify market outlet for the processed plantain fruits</i>	270.987	307	0.888	0.044	0.957	NS
11.	<i>Identify relevant records to keep for the plantain processing and marketing enterprise</i>	199.221	307	0.653	0.064	0.938	NS

Module B: Competencies in Plantain Fruit Processing

i. Plantain Fruits Processing into Flour							
	Item Statement	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1.	Select unripe plantain fruits	373.519	307	1.222	0.353	0.703	NS
2.	Wash the unripe plantain fruits with water to remove dirt and spray residues	429.792	307	1.409	0.027	0.974	NS
3.	Peel the unripe plantain to obtain pulp and keep pulps in a bowl containing water to avoid turning black	158.971	307	0.521	0.161	0.852	NS
4.	Sliced the pulp using knife.	98.269	307	0.322	0.082	0.922	NS
5	Sun-dried the sliced pulp for 2-3 days.	289.675	307	0.949	0.163	0.849	NS
6	Mill the sliced dried pulp using domestic grinding machines.	259.883	307	0.849	0.495	0.610	NS
7	Sieve the ground pulp to obtain flour	440.532	307	1.444	0.060	0.942	NS
8	Pack the sieve flour and sold to the market	314.675	307	1.031	0.180	0.835	NS
ii. Plantain Fruit Processing into Chips							
1	Select unripe plantain fruits as required.	180.857	307	0.591	0.454	0.739	NS
2	Peel the plantain fruits with knife	190.364	307	0.624	0.069	0.474	NS
3	Immerse in a bowl containing water	318.883	307	1.044	0.252	0.811	NS
4	Cut/sliced peeled plantain fruits according to the desired sizes using appropriate technologies	184.062	307	0.602	0.303	0.874	NS
5	Salt the sliced plantain fruits to taste	71.519	307	0.233	0.748	0.890	NS
6	Heat vegetable oil or palm oil in a frying pan or electric fryer to about 170°C.	154.919	307	0.507	0.209	0.982	NS
7	Put sliced plantain fruits into the hot oil and fry.	327.312	307	1.072	0.135	0.998	NS
8	Stir constantly until crispy or golden yellow appear (Plantain chips).	314.633	307	1.031	0.117	0.920	NS
9	Remove the plantain chips into plastic sieve to allow the oil to drain.	284.269	307	0.932	0.019	0.983	NS
10	Spread chips on clean material to	465.179	307	1.525	0.002	0.739	NS

	<i>allow the plantain chips to cool</i>						
11	<i>Sort and bag the plantain chips into various sizes</i>	79.750	307	0.261	0.083	0.474	NS
12	<i>Seal with candle flame with the aid of kitchen knife and Market the products.</i>	174.883	307	0.573	0.017	0.811	NS
iii. Competencies in malt (Non-alcoholic Plantain Drink) Processing							
1	<i>Select figs from plantain</i>	169.805	307	0.556	0.129	0.879	NS
2	<i>Mill the figs with appropriate technologies into powder and keep until required.</i>	324.221	307	1.062	0.158	0.854	NS
3	<i>Reconstitute about 55g (2 heaped tablespoon) of fig powder in 0.3 litres of water and mix.</i>	324.273	307	1.061	0.321	0.726	NS
4	<i>Set the mixture aside for 5-10 minutes to enable the component of powder to leach into the water.</i>	429.883	307	1.408	0.171	0.843	NS
5	<i>Filter through muslin clothes, bottled and keep to sediment allow to sediment.</i>	238.169	307	0.780	0.170	0.844	NS
6	<i>Decant or filter again, add vanilla flavor and granulated or icing sugar to sweeten the “malt”</i>	131.675	307	0.431	0.087	0.917	NS
7	<i>Finally bottle, refrigerate and Market the products</i>	376.247	307	1.233	0.014	0.986	NS
iv. Competencies in Processing Plantain into Jam							
1	<i>Select 2 or 3 riped plantain</i>	524.997	307	1.718	0.284	0.753	NS
2	<i>Blend the ripe plantain with harmer mill and mixed together with 1 cup of granulated sugar</i>	337.714	307	0.808	4.042	0.025	S*
3	<i>Add 200ml or 2 cups of water and mix together.</i>	239.338	307	0.776	5.111	0.009	S*
4	<i>Add 30-35ml lime juice in the mixture.</i>	362.971	307	1.189	0.093	0.911	NS
5	<i>Boil the mixture and allow the formed gel to cool</i>	282.971	307	0.927	0.167	0.847	NS
6	<i>Preserved the gel with sorbic acid and market the products</i>	303.987	307	0.996	0.078	0.925	NS
v. Competencies in Plantain Fruits Processing into Juice							
1	<i>Select some ripe plantain fruits</i>	418.948	307	1.372	0.151	0.860	NS
2	<i>Peel the ripe plantain fruits and blend the pulp with appropriate technologies.</i>	444.519	307	1.453	0.503	0.605	NS

3	<i>Soak slurry (blended pulp) in hot water for 10 -15 minutes for optimum juice extraction</i>	123.698	307	0.404	0.452	0.637	NS
4	<i>Filter the extracted juice through white muslin (akamu) cloth</i>	91.519	307	0.299	0.303	0.739	NS
5	<i>Pasteurize the juice by boiling and simmer for 3 minutes</i>	250.078	307	0.820	0.022	0.978	NS
6	<i>Allow to cool, add colour and fill into sterilized bottles and market the products</i>	202.633	307	0.664	0.001	0.999	NS
vi. Competencies in Plantain Fruits Processing into Ice Cream							
1	<i>Select 20-24 ripe plantain fruits</i>	229.429	307	0.752	0.018	0.982	NS
2	<i>Peel the ripe plantain fruits and blend the pulp with appropriate technologies</i>	273.987	307	0.898	0.027	0.974	NS
3	<i>Soak slurry (blended pulp) in 500ml hot water for 10-15 minutes for optimum juice extraction</i>	173.221	307	0.567	0.156	0.856	NS
4	<i>Filter the slurring through white muslin (akamu) cloth.</i>	150.455	307	0.493	0.017	0.983	NS
5	<i>Add 12 eggs (albumum, whisked), 1 cup of icing sugar, a pinch of vanilla powder or few drops of liquid vanilla flavor essence, 1 tin of milk and mix thoroughly.</i>	253.828	307	0.830	0.320	0.726	NS
6	<i>Pour the mixture into cream cups or seal in polyethylene bag.</i>	114.841	307	0.376	0.021	0.979	NS
7	<i>Place in a freezer until required and market the products</i>	111.205	307	0.364	0.398	0.672	NS
vii. Competencies in Plantain Fruits Processing into Wine							
1	<i>Select 2kg ripe/over ripe plantain and 250g plantain skins (peels)</i>	291.273	307	0.954	0.181	0.835	NS
2	<i>Slice peeled ripe plantain fruits and the peels with knife</i>	174.633	307	0.572	0.224	0.799	NS
3	<i>Place in a clean, sterilized white cloth bag.</i>	143.675	307	0.470	0.293	0.746	NS
4	<i>Tie the bag and place into a saucepan (preferably aluminum)</i>	204.919	307	0.672	0.012	0.988	NS
5	<i>Add 4 litres of water, boil and simmer for 20-30 minutes.</i>	118.169	307	0.386	0.455	0.635	NS
6	<i>Add granulated sugar and fruit juice in the boiled liquid</i>	139.805	307	0.458	0.098	0.906	NS
7	<i>Apply pressure to extract as much juice as possible when the bag is</i>	66.532	307	0.218	0.351	0.704	NS

	<i>cooled.</i>						
8	<i>Add the extracted juice to sugar liquor</i>	63.130	307	0.207	0.140	0.869	NS
9	<i>Shake to dissolve the sugar and cool in cold water.</i>	129.880	307	0.425	0.191	0.826	NS
10	<i>Add 1 table spoon or 1 sachet (3g) of yeast and juice of 1 ripe grape fruit as yeast nutrient at 27-30^oC to extracted juice</i>	196.737	307	0.643	0.550	0.578	NS
11	<i>Record the initial temperature and specific gravity.</i>	132.062	307	0.432	0.412	0.662	NS
12	<i>Keep the extracted juice in jar for a week in a room temperature.</i>	296.221	307	0.971	0.042	0.959	NS
13	<i>Agitate the jar occasionally by giving it a shake</i>	141.828	307	0.465	0.131	0.877	NS
14	<i>Record the data of temperature, PH and specific gravity.</i>	370.792	307	1.215	0.077	0.926	NS
15	<i>Collect data until fermentation quickens after about 1 week</i>	371.828	307	1.216	0.358	0.699	NS
16	<i>Plug air lock (fermentation trap) to the fermenter.</i>	200.455	307	0.657	0.006	0.994	NS
17	<i>Put few drops of sterilizing solution into the air lock to form a U shape</i>	431.542	307	1.413	0.172	0.842	NS
18	<i>Plug the top of the trap with cotton wool to enables the yeast to undergo an anaerobic method of self-reproduction.</i>	304.062	307	0.996	0.093	0.911	NS
19	<i>Rack occasionally by siphoning the wine off the lees of yeast and deposited solids.</i>	119.429	307	0.391	0.051	0.951	NS
20	<i>Sieve the wine with musline cloth to clear of its own accord; given time, when it does not, you may have to filter.</i>	137.828	307	0.451	0.193	0.824	NS
21	<i>Bottled the sieve wine as required.</i>	136.675	307	0.447	0.299	0.742	NS
22	<i>Store wine in sterilized bottles and corks.</i>	320.971	307	1.052	0.041	0.960	NS
23	<i>Store finished wine in a rack or bin at 13^oC or in a refrigerator and market the products</i>	186.737	307	0.612	0.028	0.973	NS

Module C: Competencies in Marketing of Processed Plantain Fruits (Flour, Chips, Malt, Jam

S/N	Item Statement	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1.	Carryout market survey for sale of	407.542	307	1.336	0.010	0.990	NS

	<i>processed plantain fruits.</i>						
2.	<i>Package the processed plantain fruits into bags and grade.</i>	158.312	307	0.518	0.309	0.735	NS
3.	<i>Fix prices on the bags based on size and quality</i>	332.062	307	1.088	0.064	0.938	NS
4.	<i>Advertise the sales of the processed plantain fruits</i>	213.519	307	0.699	0.295	0.745	NS
5.	<i>Identify your customers and invite them for supply.</i>	267.568	307	0.877	0.041	0.960	NS
6.	<i>Sell the processed plantain fruits to different buyers according to grades and quality</i>	327.828	307	1.075	0.041	0.960	NS
7.	<i>Help customers transport their goods to their nearest destination if necessary.</i>	209.312	307	0.686	0.136	0.873	NS
8.	<i>Keep record of sales made</i>	278.675	307	0.912	0.303	0.739	NS
9.	<i>Reconcile sales and expenditure record to determine profit or loss.</i>	177.023	307	0.580	0.211	0.810	NS

Module D: Material Needed for Plantain Processing Enterprise

S/N	Item Statements	Total sum of square	df	Mean sum of square	F-Ratio	P-value (sig)	Rmks
1	<i>Mature plantain bunches to be used as raw material for processing</i>	236.555	307	0.775	0.102	0.603	NS
2	<i>Knife for peeling the plantain fruits</i>	220.737	307	0.300	0.133	0.875	NS
3	<i>Mechanical slicer for slicing peeled plantain fruits</i>	176.675	307	0.723	0.184	0.832	NS
4	<i>Water for washing peeled plantain fruits</i>	154.062	307	0.579	0.127	0.881	NS
5	<i>Cabinet drier for drying sliced plantain fruits</i>	216.997	307	0.504	0.354	0.702	NS
6	<i>Salt for spreading on sliced plantain fruits</i>	126.078	307	0.711	0.065	0.937	NS
7	<i>Sterilized bottles used for keeping juice</i>	74.805	307	0.413	0.002	0.998	NS
8	<i>Bowls for putting water used for washing peeled plantain fruits</i>	260.633	307	0.244	0.518	0.596	NS
9	<i>Frying pan used for frying plantain chips</i>	383.130	307	0.854	0.028	0.572	NS
10	<i>Hammer mill used for milling the dried sliced plantain fruits.</i>	260.130	307	1.256	0.071	0.732	NS
11	<i>Sealer or candle knife for sealing the cellophane bag</i>	269.805	307	0.852	0.080	0.823	NS
12	<i>Trucks for conveyance of processed products to market</i>	236.555	307	0.884	0.129	0.879	NS

Key: *NS* = Not Significant;
*S** = Significant
Level of Significance = 0.05
Table value = 3.00