DEVELOPMENT AND STANDARDIZATION OF AN INSTRUMENT FOR ASSESSING PRACTICALS AMONG STUDENTS IN COLLEGES OF AGRICULTURE IN NIGERIA

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Abstract

The purpose of the study was to develop and standardize an instrument for assessing practical skills in Crop Production in Colleges of Agriculture. The study specifically determined observable psychomotor skills in crop production as well as validated and determined the reliability of the developed instrument. Three research questions based on the purpose of the study were formulated to guide the study. All the Colleges of Agriculture in the north east states of Nigeria were considered for the study. The instrumentation research design was adopted. From a population of 892, a sample of 99 students of crop production selected through the random sampling technique was used for the study. The developed skill assessment instrument for crop production practical comprised ten observable skills for each of the main farm operations. The findings of the study revealed that the practical skills assessment instrument for crop production was valid and reliable with 30 observable psychomotor skills to be assessed with 8 main farm operations and 34 sub-operation tasks. The rater validity index of the instrument was found to be 0.75 and construct validity index of 0.254 was obtained. Reliability of the instrument which was determined by use of split half reliability estimate and by spearman correction formula was found to be 0.782. The psychometric properties and standardization of the developed instrument was ensured. It was recommended that the National Board for Technical Education should integrate the use of the instrument in Nigerian Colleges of Agriculture for assessment of crop production practical. Also, the instrument should be adapted for use in other practical-oriented courses for process assessment of students.

Keywords: Assessment, Development, Instrument, Practical Standardization

1. Introduction

The inability of crop production practices to be properly assessed at National Diploma level in Colleges of Agriculture is of great concern. Assessment is the process of judging the adequacy of the amount of knowledge or skills acquired by students (Okoro, 2005). Assessment is carried out using objective tests, projects, assignments and written reports. Assessment is closely related to

measurement but broader than it. Omole and Yepwi (2001) conceptualized assessment as a process of ascertaining or judging the value or amount of something by use of a standard appraisal; it includes judgment by merit and seen as a value judgment.. Adamu (2001) sees assessment in general as having to do with a formal way of establishing what has been acquired through a process of training. Adamu further stated that assessment in education in particular could be regarded as testing or examining the student in different academic tasks domains. This enables the teacher to compare the outcomes of tests or examination of the students with those of their classmates and be used for decision making as well. In assessment, a teacher intends to measure the performance of the students in the various subjects with the aim of estimating the average performance of the students, comparing the performance with either those from similar institution or class with those of previous years and for other records; all the processes involved in all these tasks sum up to what is seen as assessment. By implication assessment can take place when some form of measurement has been carried out. In educational context, the process of observing, describing, collecting, recording, scoring and interpreting information about a student's learning is known as assessment (John, 2008)

Abubakar (2009) reported that assessment involves the collection of data and the use of such data to determine the effectiveness or quality of a programme or performance. Abubakar further stated that it is the function of educational assessment to determine the extent to which the purposes of the programme are being achieved. It is obvious from the definition that assessment involves measurement that enhances value judgment in education. Assessment therefore has to do with processes involved in investigating the status of an individuals or group usually with reference to expected results or outcomes. Assessment in education plays a great role and so becomes very important as it determines how far set educational objectives are being achieved. The statement "if you don't have any goal you do not have anything to assess" expresses the close relationship between goals and effective assessment. It is goal achievement that effective assessment is generally designed to detect. .However, the assessment of manipulative skills like those in Crop Production Practice (CPP) in Nigerian Colleges of Agriculture seems to be bedeviled by poor and ineffective instruments. Teachers in this area seem to concentrate on product assessment instead of process assessment. This has left the course and other practically-based courses in the area of agriculture not properly assessed. .

CPP is a compulsory course at the National Diploma level in Agricultural Technology Department in Colleges of Agriculture in Nigeria. The course is aimed at developing students' skills in crop production. Crop production is very relevant in the economy of the country, hence the need for inclusion into the National Diploma Curriculum. The National Board for Technical Education (NBTE) stipulates that CPP is aimed at developing in the students the right attitude to go into farming. It prepares the students for farming as an occupation. When the interest of the students is stimulated in CPP they are able to acquire basic knowledge and practical skills in crop production. With the basic knowledge, students are equipped for further studies in crop production and in related fields of Agriculture. Chukudi (2009) opines that activities specific for CPP are field activities aimed at ensuring the development of practical skills in crop production by the students. Chukudi further commented that teaching of CPP and other courses such as Basic Soil Science, Animal production and Animal Health should therefore be complemented with adequate methods of assessing the acquisition of the relevant psychomotor skills. Psychomotor objectives involve motor and skilled activities and such objectives being able to follow specific procedures which can be assessed through observation. This assessment by observation to give the measure of skills

possessed by the students and the student's ability to apply the skills learned can best be done by the development of a performance based test.

It is for this reason that Jimba (2011) maintained that development in science and technology refers to the work required to determine the best production technique aimed at bringing new process or piece of equipment. It is aimed at satisfying the efficacy of an instrument for the measurement and assessment of given skills. The primary purpose of development is the production of a new or improved assessment package for educational purposes which are related to test development. Mehrens (2011) commented that test development is a construction, building up or preparing a test for the purpose of assessing students in academic content areas. Instrument development in assessment of agricultural practices and CPP in particular in recent times has not been encouraging as assessment is often carried out without any standard guide. The missing link in attempts to assess CPP in Colleges of Agriculture is the lack of standardized assessment instruments.

Chukudi (2009) is of the view that farm operations in crop production refers to all activities carried out on the farm from land clearing to the time the crops are harvested. Such farm operations are classified as pre-planting, planting and post-planting operations. The manner with which each of these farm operations are carried out affects the yields of the crop positively or negatively. There is therefore need for the students of Crop production to ensure that the operations are carried out as at when due. At the same time the need to be mindful of the skills involved in CPP requiring effective assessment is necessary. Thus, carrying out the right operation at the right time equally demands that the right skill be used.

The researchers observed that there is lack of standard assessment instruments for crop production practices in Colleges of Agriculture. It is however common to see practical activities being assessed based on the completed work only, that is product assessment rather than process assessment which constitutes serious errors. Where there are attempts to have the assessment instruments, the instruments are not valid and reliable. This is the basis for which the study is carried out. Effective assessment therefore becomes a thing of great concern especially for practical courses in our schools. This great concern for assessment of manipulative skills is to meet up with the requirements of the curriculum of such courses in order to achieve the national objective of food for all. Students' assessment in colleges of Agriculture in Nigeria has been replete of cognitive measures and neglecting the psychomotor skills. The validity, reliability and usability of available instruments used for assessment of practicals in these schools over the years is of big concern. It is against this background that this study is poised to develop and standardize a cost effective instrument capable of assessing practicals among crop production students in colleges of agriculture in Nigeria.

The main purpose of the study is to develop and standardize an instrument for assessing practicals in crop production in Colleges of Agriculture. The study specifically:

1. determined the main psychomotor skills in the operations which CPP lecturers at National Diploma level assessed during practicals.

2. developed an instrument used in process assessment of CPP students.

3. determined the validity and reliability of the instrument.

4. Standardized the developed instrument.

2. Research Questions

The following research questions have been formulated to guide the study:

1. What are the main farm operations expected to be carried out by CPP students?
2. What are the main psychomotor skills assessed by teachers during CPP practicals?
3. What are the psychometric indices of the developed instrument?

3. Literature Review

Olaitan and Ali (1997) stated that assessment is one of such concepts to which many people have attached different meanings. In some cases, people are contented with giving only one aspect or two of assessment. While teachers and students may regard it as a means of grading, some people see it as a type of research. Many other people believe that assessment is synonymous with educational measurement. From the teacher's point of view assessment can be explained as a process of finding information from a number of different sources for the purpose of making judgments about a particular pupil or a group of pupils.

Yalams (2001) stated that assessment means a process of ascertaining whether or not the objectives of a programme are being achieved. The scope of application of assessment depends on the purpose for which it is intended. According to Dabi (2001) assessment is more than one dimensional measurement. It should be regular and multi dimensional. It is based on a number of variables which are believed to be important and can be utilized. It employs a number of techniques which are tests, questionnaires, interviews, rating scales etc.; techniques may also be multi source, for instance, to assess students' performance, data may be collected from different sources using different methods and programme content can as well be assessed. Data are gathered, analyzed, interpreted and reported. It could be coded with number or letter or a comment such as satisfactory or needs improvement. According to Gillis and Bateman (1999) assessment is the purposeful process of gathering appropriate and sufficient evidence of competence and the interpretation of that evidence to enable the outcomes to be communicated to key stakeholders.

Several researchers have carried out researches on the development of instruments. Some of such works are reviewed in this section of the study. Ibrahim (2012) carried out a study on the development and validation of an instrument for assessing students' manipulative skills in bricklaying and block laying practice at technical colleges in Niger State. The study was designed to develop and validate an instrument for assessing students' manipulative skills. Specifically the study determined the competencies appropriate for inclusion in the instrument for assessing students' manipulative skills in brick laying and block laying practice. Two research questions and one hypothesis guided the study. A total of 67 respondents comprising 47 teachers and 20 registered builders were used. as the population of the study. Cronbach Alpha, mean and standard deviation were used as the statistical tool to analyze the data. The t-test statistics was employed to test the null hypothesis of the study at 0.05 level of significance. The findings of the study revealed among others that all the manipulative skills were considered appropriate for inclusion into the final instrument for assessing students' manipulative skills in brick laying and block laying practices (LASMSBBP). This study on the development and validation of assessment instrument of students' manipulative skills in bricklaying and block laying is related to the study on the development and

standardization of an assessment instrument for crop production in that they all have to do with assessment of practical skills.

Also, Jimba (2011) carried out a study on the development, validation and testing of an instrument for measuring process skills in electrical machines and power for NCE (technical) students. Seven research questions and three hypotheses were formulated to guide the research. The research design adopted for the study was instrumentation research design with Bauchi State as the Geographical area of study. A target population for the study was 60 NCE III students with purposive sampling technique as the sampling method for the study and the draft copy of the instrument validated by six experts. The reliability of the process skill measuring instrument was found to be 0.79.
Literature into the study of development and standardization of assessment instruments in the area of practicals are limited. It is this essential gap that this study sought to fill.

4. Methodology

The study adopted instrumentation research design and cross sectional survey design. Obodo (1987) stated that a study is called an Instrumentation research if its primary purpose is to produce a new or modified instrument for educational practices. Similarly Ali (1996) stated that any study that is geared towards the development of an instrument in education is an instrumentation research since its target is to develop a new instrument. Kukwi and Amuche (2013) posit that cross sectional survey design is a research design in which sample data from respondents with similar properties at different locations are collected.

The study was carried out in all the Colleges of Agriculture in the North East Zone of Nigeria. This consisted of both State and Federal Government-owned schools. The States are Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe. The target population for the study involved Agricultural technology students taught CPP at National Diploma Level in Colleges of Agriculture. The population of the study comprise of 892 students from the six colleges. This is presented in Table 1.

Table 1: Population of the Study

State	College	CPP Students
Adamawa	College of Agriculture Ganye	190
Bauchi	School of Agric Tatari Ali Polytechnic Bauchi	151
Borno	College of Agriculture Maiduguri	89
Borno	College of Agriculture Federal Institute of Fisheries Baga	98
Gombe	Federal College of Horticulture Dadin Kowa	56
Taraba	Taraba State College of Agriculture Jalingo	236
Yobe	Yobe State College of Agriculture Gujiba	72
Total		892

A sample of 99 students was used for the study. The random sampling design was adopted generally for the study. By this, all the respondents in the population were given a chance of being selected for the study. The hat and draw sampling technique was employed to sample the states for the study. Five states out of the six states in the study area were selected for the study by the use of the hat-and-draw sampling technique. Purposive sampling technique was employed to select four Colleges of Agriculture used for the tryouts of the developed instrument.

4.1 Procedure for Development of Instrument

In order to develop a valid and reliable instrument for the assessment of practicals in crop production the procedure employed entailed a comprehensive study of the NBTE CPP curriculum. The various students' activities were identified from the curriculum and a table of specification drawn based on the content of the curriculum. This included farm operations, sub-operations and skills to be observed and assessed. The procedure for the development was identification of psychomotor skills in the CPP curriculum, development of a test blue print, writing out of the items, development of a rating scale, validation of the instrument, final selection of the items to be included in the final copy of the instrument, rating of reliability and finally the tryout of the instrument.

Table 2. Performance Operation Table for PSAICP

Performance Operation Numbers	Curriculum specification of Operation	Number of items Developed	Item
Tillage	Demonstrate sample of seed Bed preparation for different Crops using different types of Implements	**7**	1,2,3,4,5,6,7
Plant Propagation	Identify different methods of plant Propagation. How to determine the The viability of seeds.	**6**	8,9,10,11, 12,13
Weeding	Identify and classy weeds, prepare Weed album	**4**	14,15,16,17
Fertilizer application	Identify different manures and	**4**	18,19,20,21

	Fertilizers. Demonstrate different Application methods of fertilizer		
Crop Protection	Identify common pests and diseases Of crops. Perform pests and disease Control measures.	**5**	22,23,24, 25,26
Harvesting	Identify harvesting tools and carry Out harvesting operations.	**3**	27,28,29
Storage	Identify storage structures and Construct local ones.	**3**	30,31,32
Handling	Identify crop handling equipment	**2**	33,34

Source: NBTE, 1988

The PSAICP was administered to 20 CPP and 20 non CPP students. Data was generated for the determination of construct validity of the PSAICP. The generated data for determination of the construct validity in presented in appendices L and M. The data was analysed by use of SPSS to get a correlation for CPP and non CPP students. This was obtained from the Scores for CPP and non CPP students. Reliability of the PSAICP was determined during pilot test by use of split half reliability estimate and the Spearman correction formula. After the determination of the reliability of the instrument, the instrument was tried out in the various colleges within the study area to further establish the reliability of the instrument.

5. Results

5.1 Research Question 1

What are the main psychomotor skills assessed in CPP practicals?

Table 3: Main Psychomotor Skills assessed in CPP Practical

S/N	Skills to be observed and Assessed
1	Selection of tools
2	Manipulation of tools
3	Kinesthetic posture on the job
4	Promptness to starting a given job
5	Care of tools during work
6	Observance of safety precautions during work
7	Timeliness in completing the job
8	Care of tools after work
9	Quality of the completed job

10	Ability to use right planting spacing
11	Ability to use correct seed rate
12	Ability to use correct planting depth
13	Ability to handle seedlings well
14	Ability to transplant on time
15	Ability to identify weeds
16	Ability to weed at the right time
17	Ability to thin at the proper time
18	Ability to identify fertilizer type
19	Ability to use right method of application
20	Ability to know right time of application
21	Ability to identify pests
22	Ability to identify disease
23	Ability to select chemicals
24	Ability to mix chemicals
25	Ability to use knapsack sprayer
26	Ability to identify mature crops
27	Ability to use proper harvesting method
28	Ability to use correct storage facility
29	Ability to use right preservative
30	Ability to handle materials well

Source: Field Study, 2013

Table 3 shows the basic skills most valued and assessed during CPP practical work. The skills ranged from selection of tools to ability to handle materials. Other skills include manipulation of tools, kinesthetic posture on the job, promptness to starting a given task, care of tools during work, observance of safety precautions, timeliness in completing a given job and care of tools after work. Others include quality of completed job, ability to use right planting spacing , ability to use correct seed rate and planting depth; ability to handle seedlings well, ability to transplant on time, ability to identify weed and control weed at the right time; ability to identify fertilizer type and use right method and time of application. Other observable skills include ability to identify pests and disease; ability to select and mix chemicals, ability to use knapsack sprayer, ability to identify mature crops, ability to use proper harvesting method, ability to use correct storage facility and right preservative and handle the materials well.

5.2 Research Question 2

What are the psychometric properties of the developed instrument?

The main psychometric properties of the PSAICP are the validity and reliability. The rater (Logical) Validity index of the PSAICP was determined by the assessment of the instrument by the four experts who validated the instrument. From the analysis of the data scored by the four assessors the instrument was found to have a rater validity index of 0.75. The determination of the rater validity index is presented in appendix K. The construct validity index of the PSAICP was equally determined by administration of the instrument to 20 CPP and 20 non CPP students. The results of the descriptive statistics between CPP and non CPP students indicated that CPP students had a mean

score of 301.595 while the non CPP students had 223.8995. The results of the correlation showed that CPP students had a construct of 1 while the non CPP students had a construct of 0.254.
Also, the split half reliability estimate was adopted for correlation coefficient for internal consistency of the instrument. Used with the Spearman's correction formula to obtain the reliability of the full test. The reliability of the PSAICP was found to be 0.782. The PSAICP was administered to the four Colleges of Agriculture in the study area to further confirm the reliability and subsequently standardized. Reliability (r), mean scores, Standard error of measurements (SE) and standard errors of measurements (SEM) of mean scores according to the different colleges of Agriculture (COA) were obtained.

Table 4: Reliability and Standard Errors of Measurement of Mean Scores According to Colleges

College	Mean	r	SE	SEM
COA Ganye	301.6330	0.82	2.82	6.44
COA Bauchi	296.1904	0.93	2.67	3.39
COA Gujiba	307.4700	0.89	3.87	4.25
FCH.Dadinkowa	292.6825	0.88	5.57	5.46

Source: Field Study, 2013

5.3 Standardization

The same data collected during the tryout of the PSAICP was used with the aid of the SPSS version 17 to standardize the instrument. Results of the analysis of standardization gave reliabilities of 0.82, 0.93, 0.89 and 0.88 for each of the Colleges during try out.

6. Discussion of Results

The findings of the study were arranged and discussed in the same order with which the research questions that guided the study are arranged. The order of discussion therefore includes main farm operations, observable psychomotor skills, validity and reliability. Based on the findings from research question one, farm operations carried out by CPP students at National Diploma level were identified as tillage, plant propagation, weeding, fertilizer application, harvesting, storage and handling. These main farm operations identified agrees with Chukwudi (2009) that farm operations are those operations carried out on the farm from land preparation to harvesting and storage. Other farm operations that are not main operations such as stumping, cutting of grasses, raking, farm layout, seed bed preparation, boring of holes and placement of seeds; striking of weeds, thinning, mulching, spraying and drying were considered as sub-operational tasks for inclusion in the PSAICP as supported by Yalams (2001). Also, results of the study identified thirty basic skills mostly valued and assessed during practicals. Nine of the observable skills are relevant to all the

practical operations, these include, selection of tools, manipulation of tools, kinesthetic posture on the job, promptness to starting a given task, care of tolls during work, observance of safety precautions during work, timeliness in completing the job, care of tools after work and quality of the completed job. Since process assessment has to do with observation of performance and passing of judgment; Okoro (2005) stated that the best way to go about it is through observation and rating skills. It is not therefore in order to identify the observable skills in this study of process assessment. This is so because of the great need to consider for instance selection and manipulation of tools for any instrument developed for practical subjects like crop production; you do not expect any good result if a wrong tool is used for any operation and in the same way if a right tool is wrongly manipulated the same poor results is the outcome. Jimba (2011) stated that correct manipulation of tools through proper kinesthetic posture(body movement) when carrying out any specific operation must be ensured. In carrying out any task in crop production, it is very important to observe safety precautions, this is the reason why care of tools as well as safety of workers around is reflected in the observable skills in the PSAICP. This finding agrees with Ibrahim (2012) who stated that where safety is ignored or compromised for speed, accuracy of the final product as well as danger of equipment damage and human injury is brought close. Hence including safety of workers in the instrument is not out of place.

The rater validity index of the PSAICP was found to be 0.75 and the construct validity for CPP student and non CPP student found to be 1.0 and 0.254 respectively. The PSAICP had a reliability index of 0.782. This reliability is in agreement with the recommendations of Wolansky (1984) that the acceptable reliability index of an instrument is generally in the range of 0.80 and 0.95. Mean while the result of the validation of the draft copy indicated that the instrument possesses high face validity when compared with the findings of Abubakar (2009) whose instrument for evaluating Administrative skills in technical colleges had a reliability of 0.96. Sakiyo (2009) developed a Biology achievement test with a reliability of 0.78 and Ibrahim (2012) determined a reliability of 0.87 for an instrument for assessing manipulative skills in bricklaying practices. The result of the construct validity indicated a very low construct for non CPP students and a construct of 1.0 for CPP students. This means that the PSAICP is useful for people with ability and interest in CPP. It therefore implies that non CPP students as a matter of fact do not seem to know the requirements of the instrument. This reflects clearly in the raw scores collected for the non CPP students, it presented very poor performance. It is good sign that the PSAICP is sensitive to construct.

7. Conclusion and Recommendations

Based on the results of this study, the following conclusions were drawn. The PSAICP is capable of effectively assessing students' psychomotor skills in CPP. The Practical Skill Assessment Instrument for Crop Production developed and standardized has been found to be valid and reliable and standardized. It has also satisfied other psychometric properties and could be used for assessment of students' performances in crop production practicals in Colleges of Agriculture in Nigeria. Based on the findings, conclusion and implications of this study, the following recommendations are made by the research.

1. The NBTE should integrate the use of PSAICP for uniform assessment in colleges of agriculture.
2. Crop production teachers should use the PSAICP for assessing students performance in CPP

3. Workshop should be organized for teachers on how to use the PSAICP for the assessment of students.

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PRACTICAL SKILL ASSESSMENT INSTRUMENT FOR CROP PRODUCTION

STUDENT ID NUMBER _____

SCORE

INSTRUCTION: RATE THE STUDENT'S SKILLS ON THE FOLLOWING FARM OPERATIONS THROUGH CAREFUL OBSERVATION OF THE TASK. PLEASE RATE STUDENT ON THE FOLLOWING SCALES: **1** = WEAK, **2** = FAIR, **3** = GOOD, **4** = EXCELLENT

A: OPERATION 1(TILLAGE)

		Operations/ Task							
S/n	**Skill to be Assessed**	Stumping	Gathering of stumps	Cutting of grasses	Raking of Debris	Farm Layout	Measurement of bed	Seed bed preparation	**TOTAL**
1	Selection of tool								
2	Manipulation of tool								
3	Kinesthetic posture on the task								
4	Promptness to begin the task								
5	Care of tool during task								
6	Observance of safety precautions during task								
7	Timeliness in completing task								
8	Care of tools after task								
9	Ability to use right space								
10	Quality of completed task								
TOTAL									/280

B: OPERATION 2(PLANT PROPAGATION)

		Operations/ Task							
S/n	**Skill to be Assessed**	Boring Holes	Placement of seed	Firmness with the soil	Lifting of seedlings	Transportation	Placement of seedlings	----------	**TOTAL**
11	Selection of tool								
12	Manipulation of tool								
13	Kinesthetic posture on the task								
14	Promptness to begin the task								
15	Care of tool during task								
16	Observance of safety precautions during task								
17	Timeliness in completing task								
18	Ability to use correct seed rate								
19	Ability to use right space								
20	Ability to use correct planting depth								
TOTAL									/240

C: OPERATION 3(WEEDING)

		Operations/ Task							
S/n	**Skill to be Assessed**	Striking the weeds	Relocation of weeds	Shaking weeds	Effective weeding	--------	----------	----------	**TOTAL**
21	Selection of tool								
22	Manipulation of tool								
23	Kinesthetic posture on the task								
24	Promptness to begin the task								
25	Care of tool during task								
26	Observance of safety precautions during task								
27	Timeliness in completing task								
28	Ability to identify weeds								
29	Ability to weed at the right time								
30	Ability to thin at the proper time								
TOTAL									/160

D: OPERATION 4(FERTILIZER APPLICATION)

		Operations/ Task							
S/n	**Skill to be Assessed**	Fetching	Placement	Mulching	Placement of mulches	----------	----------	----------	**TOTAL**
31	Selection of tool								
32	Manipulation of tool								
33	Kinesthetic posture on the task								
34	Promptness to begin the task								
35	Care of tool during task								
36	Observance of safety precautions during task								
37	Timeliness in completing task								
38	Ability to identify fertilizer type								
39	Ability to use right method of application								
40	Ability to identify right time of application								
TOTAL									/160

F: OPERATION 5 (CROP PROTECTION)

		Operations/ Task							
S/n	**Skill to be Assessed**	Pest identification	Disease identification	Selection of chemicals	Mixing of chemicals	Use of sprayer	----------	----------	**TOTAL**
41	Selection of tool								
42	Manipulation of tool								
43	Care for tools during task								
44	Kinesthetic posture on the task								
45	Ability to select chemicals								
46	Care of tool during task								

47	Observance of safety precautions during task								
48	Ability to identify pest								
49	Ability to identify disease								
50									
TOTAL									/200

G: OPERATION 6 (HARVESTING)

		Operations/ Task							
S/n	**Skill to be Assessed**	Cutting down of stem	Plucking of crop	Removing of crop	---------	----------	--------	----------	**TOTAL**
51	Selection of tool								
52	Manipulation of tool								
53	Care for tools during task								
54	Kinesthetic posture on the task								
55	Promptness of beginning a given task								
56	Care of tool during task								
57	Observance of safety precautions during task								
58	Quality of completed task								
59	Ability to identify mature crop								
60	Ability to use appropriate harvesting method								
TOTAL	Ability to use knapsack sprayer								/120

H: OPERATION 7 (STORAGE)

		Operations/ Task							
S/n	**Skill to be Assessed**	Construction of storage facility	Preservation	Drying	---------	-----	----------	----------	**TOTAL**
61	Selection of tool								
62	Manipulation of tool								
63	Care for tools during task								
64	Kinesthetic posture on the task								
65	Ability to select chemicals								
66	Care of tool during task								
67	Observance of safety precautions during task								
68	Quality of completed task								
69	Ability to use appropriate storage facility								
70	Ability to use right preservative								
TOTAL									/120

I: OPERATION 8 (HANDLING)

		Operations/ Task							
S/n	**Skill to be Assessed**	Gathering of crops	Loading	----------	----------	----------	----------	----------	**TOTAL**
71	Selection of tool								
72	Manipulation of tool								
73	Care for tools during task								
74	Kinesthetic posture on the task								
75	Ability to select chemicals								
76	Care of tool during task								
77	Observance of safety precautions during task								
78	Ability to identify pest								
79	Ability to identify disease								
80	Ability to use knapsack sprayer								
TOTAL									/80

MAXIMUM OBTAINABLE MARKS = 1360
TRUE SCORE = (OBTAINED MARKS/MAX. OBTAINABLE MARKS) * 100