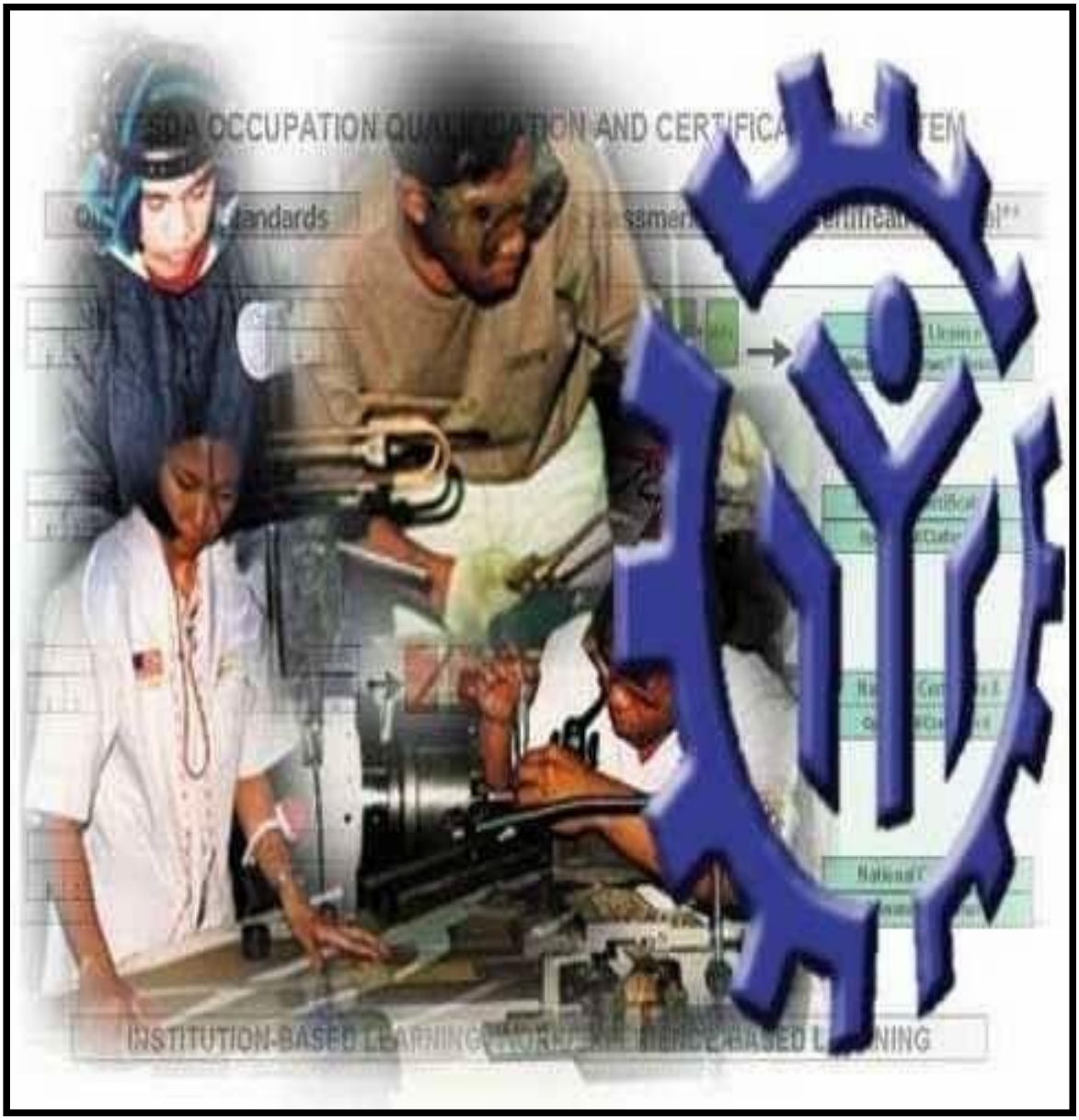
COMPETENCY STANDARDS

PLANT TISSUE CULTURE LEVEL II



AGRICULTURE AND FISHERIES SECTOR

Technical Education and Skills Development Authority
East Service Road, South Superhighway, Taguig City, Metro Manila

Technical Education and Skills Development Act of 1994 (Republic Act No. 7796)

Section 22, "Establishment and Administration of the National Trade Skills Standards" of RA 7796 known as the TESDA Act of 1994 mandates TESDA to establish national occupational skill standards. The Authority shall develop and implement a certification and accreditation program in which private industry groups and trade associations are accredited to conduct approved trade tests, and the local government units to promote such trade testing activities in their respective areas in accordance with the guidelines to be set by the Authority.

The Competency Standards (CS) serve as basis for the:

1. Institutional Competency assessment and training certification;
2. Registration and delivery of training programs; and
3. Development of curriculum and assessment instruments.

Each CS has two sections:

Section 1 Definition of **Competency Standards** - refers to the group of competencies that describes the different functions of the qualification.

Section 2 The Competency Standards - gives the specifications of competencies required for effective work performance.

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PLANT TISSUE CULTURE LEVEL II

COMPETENCY STANDARDS FOR
PLANT TISSUE CULTURE LEVEL II

SECTION 1. COMPETENCY STANDARDS DESCRIPTION

The Plant Tissue Culture Level II consists of competencies that a person must achieve in plant propagation techniques. Specifically, it involves competencies in making decision and carrying out competencies in relation to establishment, maintenance of laboratory, sterilization techniques, media preparation and micro propagation techniques at this level would be working autonomously and likely to contribute effectively to research, agriculture, and biotechnology application and to own a small enterprise or work within a cooperative structure.

The Units of Competency comprising this Competency Standards include the following:

Code	BASIC COMPETENCIES
400311210	Participate in workplace communication
400311211	Work in team environment
400311212	Address general workplace problems
400311213	Develop career and life decisions
400311214	Contribute to workplace innovation
400311215	Present relevant information
400311216	Practice occupational safety and health policies and procedures
400311217	Exercise efficient and effective sustainable practices in the workplace
400311218	Practice entrepreneurial skills in the workplace

Code	COMMON COMPETENCIES
AFF321201	Apply safety measures in farm operations
AFF321202	Use farm tools and equipment
AFF321203	Perform estimation and calculations
AFF321206	Process farm wastes
SOC413206	Perform record keeping

Code	CORE COMPETENCIES
AB-AFF0105500611301	Maintain Laboratory Integrity
AB-AFF0105500611302	Prepare Aseptic Processing, environmental set-up including all equipment/supplies
AB-AFF0105500611303	Perform Series of Reflasking of Mother flasks
AB-AFF0105500611304	Perform Final (Rooting) Reflasking of Mother Flasks
AB-AFF0105500611305	Perform Deflasking
AB-AFF0105500611306	Manage Nursery/Grow-Out

A person who has achieved this Qualification is competent to be:

- Plant Tissue Culture Laboratory Technician
- Plant Tissue Culturist

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common and core units of competency required in **PLANT TISSUE CULTURE LEVEL II.**

BASIC COMPETENCIES

UNIT OF COMPETENCY : PARTICIPATE IN WORKPLACE COMMUNICATION

UNIT CODE : 400311210

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Obtain and convey workplace information	1.1. Specific and relevant information is accessed from ***appropriate sources***. 1.2. Effective questioning, active listening and speaking skills are used to gather and convey information. 1.3. Appropriate ***medium*** is used to transfer information and ideas. 1.4. Appropriate non- verbal communication is used. 1.5. Appropriate lines of communication with supervisors and colleagues are identified and followed. 1.6. Defined workplace procedures for	1.1. Effective verbal and nonverbal communication 1.2. Different modes of communication 1.3. Medium of communication in the workplace 1.4. Organizational policies 1.5. Communication procedures and systems 1.6. Lines of Communication 1.7. Technology relevant to the enterprise and the individual's work responsibilities 1.8. Workplace etiquette	1.1. Following simple spoken language 1.2. Performing routine workplace duties following simple written notices 1.3. Participating in workplace meetings and discussions 1.4. Preparing work- related documents 1.5. Estimating, calculating and recording routine workplace measures 1.6. Relating/ Interacting with people of various levels in the workplace 1.7. Gathering and providing basic information in response to workplace requirements

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	the location and ***storage*** of information are used. 1.7. Personal interaction is carried out clearly and concisely		1.8. Basic business writing skills 1.9. Interpersonal skills in the workplace 1.10. Active-listening skills

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Perform duties following workplace instructions	2.1. Written notices and instructions are read and interpreted in accordance with organizational guidelines. 2.2. Routine written instruction is followed based on established procedures. 2.3. Feedback is given to workplace supervisor-based instructions/ information received. 2.4. ***Workplace interactions*** are conducted in a courteous manner. 2.5. Where necessary, clarifications about routine workplace procedures and matters. Concerning conditions of employment are sought and asked from ***appropriate sources***. 2.6. Meetings outcomes are interpreted and implemented.	2.1. Effective verbal and non-verbal communication 2.2. Different modes of communication 2.3. Medium of communication in the workplace 2.4. Organizational/ Workplace policies 2.5. Communicatio n procedures and systems 2.6. Lines of communication 2.7. Technology relevant to the enterprise and the individual's work responsibilities 2.8. Effective questioning techniques (clarifying and probing) 2.9. Workplace etiquette	2.1. Following simple spoken instructions 2.2. Performing routine workplace duties following simple written notices 2.3. Participating in workplace meetings and discussions 2.4. Completing work- related documents 2.5. Estimating, calculating and recording routine workplace measures 2.6. Relating/ Responding to people of various levels in the workplace 2.7. Gathering and providing information in response to workplace requirements 2.8. Basic questioning/ querying 2.9. Skills in reading for information 2.10. Skills in locating

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Complete relevant work-related documents	3.1. Range of ***forms*** relating to conditions of employment are completed accurately and legibly. 3.2. Workplace data is recorded on standard workplace forms and documents. 3.3. Errors in recording information on forms/ documents are identified and acted upon. 3.4. Reporting requirements to supervisor are completed according to organizational guidelines.	3.1. Effective verbal and non-verbal communication 3.2. Different modes of communication 3.3. Workplace forms and documents 3.4. Organizational/ Workplace policies 3.5. Communication procedures and systems 3.6. Technology relevant to the enterprise and the individual's work responsibilities	3.1. Completing work- related documents 3.2. Applying operations of addition, subtraction, division and multiplication 3.3. Gathering and providing information in response to workplace requirements 3.4. Effective record keeping skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Appropriate sources	May include: 1.1. Team members 1.2. Supervisor/Department Head 1.3. Suppliers 1.4. Trade personnel 1.5. Local government 1.6. Industry bodies
2. Medium	May include: 2.1. Memorandum 2.2. Circular 2.3. Notice 2.4. Information dissemination 2.5. Follow-up or verbal instructions 2.6. Face-to-face communication 2.7. Electronic media (disk files, cyberspace)
3. Storage	May include: 3.1. Manual filing system 3.2. Computer-based filing system
4. Workplace interactions	May include: 4.1. Face-to-face 4.2. Telephone 4.3. Electronic and two-way radio 4.4. Written including electronic means, memos, instruction and forms 4.5. Non-verbal including gestures, signals, signs and diagrams
5. Forms	May include: 5.1 HR/Personnel forms 5.2 telephone message forms 5.3 safety reports

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Prepared written communication following standard format of the organization 1.2. Accessed information using workplace communication equipment/systems 1.3. Made use of relevant terms as an aid to transfer information effectively 1.4. Conveyed information effectively adopting formal or informal communication
2. Resource Implications	The following resources should be provided: 2.1. Telephone/Cellphone 2.2. Notebook 2.3. Writing materials 2.4. Computer with Internet connection
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Demonstration with oral questioning 3.2. Interview 3.3. Written test 3.4. Third-party report
4. Context for Assessment	Competency may be assessed individually in the actual workplace or through an accredited institution

UNIT OF COMPETENCY : WORK IN TEAM ENVIRONMENT

UNIT CODE : 400311211

UNIT DESCRIPTOR : This unit covers the skills, knowledge and attitudes to identify one's roles and responsibilities as a member of a team.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Describe team role and scope	1.1. The ***role and objective of the team*** is identified from available ***sources of information***. 1.2. Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources.	1.1. Group structure 1.2. Group development 1.3. Sources of information	1.1. Communicating with others, appropriately consistent with the culture of the workplace 1.2. Developing ways in improving work structure and performing respective roles in the group or organization

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Identify one's role and responsibility within a team	2.1. Individual roles and responsibilities within the team environment are identified. 2.2. Roles and objectives of the team is identified from available sources of information. 2.3. Team parameters, reporting relationships and responsibilities are identified based on team discussions and appropriate external sources	2.1. Team roles and objectives 2.2. Team structure and parameters 2.3. Team development 2.4. Sources of information	2.1. Communicating with others, appropriately consistent with the culture of the workplace 2.2. Developing ways in improving work structure and performing respective roles in the group or organization

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Work as a team member	3.1. Effective and appropriate forms of communications are used and interactions undertaken with team members based on company practices. 3.2. Effective and appropriate contributions made to complement team activities and objectives, based on ***workplace context***. 3.3. Protocols in reporting are observed based on standard company practices. 3.4. Contribute to the development of team work plans based on an understanding of team's role and objectives.	3.1. Communication Process 3.2. Workplace communication protocol 3.3. Team planning and decision making 3.4. Team thinking 3.5. Team roles 3.6. Process of team development 3.7. Workplace context	3.1. Communicating appropriately, consistent with the culture of the workplace 3.2. Interacting effectively with others 3.3. Deciding as an individual and as a group using group think strategies and techniques 3.4. Contributing to Resolution of issues and concerns

RANGE OF VARIABLES

VARIABLE	RANGE
1. Role and objective of team	May include: 1.1. Work activities in a team environment with enterprise or specific sector 1.2. Limited discretion, initiative and judgement maybe demonstrated on the job, either individually or in a team environment
2. Sources of information	May include: 2.1. Standard operating and/or other workplace procedures 2.2. Job procedures 2.3. Machine/equipment manufacturer's specifications and instructions 2.4. Organizational or external personnel 2.5. Client/supplier instructions 2.6. Quality standards 2.7. OHS and environmental standards
3. Workplace context	May include: 3.1. Work procedures and practices 3.2. Conditions of work environments 3.3. Legislation and industrial agreements 3.4. Standard work practice including the storage, safe handling and disposal of chemicals 3.5. Safety, environmental, housekeeping and quality guidelines

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Worked in a team to complete workplace activity 1.2. Worked effectively with others 1.3. Conveyed information in written or oral form 1.4. Selected and used appropriate workplace language 1.5. Followed designated work plan for the job
2. Resource Implications	The following resources should be provided: 2.1. Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2. Materials relevant to the proposed activity or tasks
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Role play involving the participation of individual member to the attainment of organizational goal 3.2. Case studies and scenarios as a basis for discussion of issues and strategies in teamwork 3.3. Socio-drama and socio-metric methods 3.4. Sensitivity techniques 3.5. Written Test
4. Context for Assessment	4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

UNIT OF COMPETENCY : ADDRESS GENERAL WORKPLACE PROBLEMS

UNIT CODE : 400311212

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to apply problem-solving techniques to determine the origin of problems and plan for their resolution. It also includes addressing procedural problems through documentation, and referral.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify routine problems	1.1. Routine ***problems or procedural problem*** areas are identified. 1.2. Problems to be investigated are defined and determined. 1.3. Current conditions of the problem are identified and documented.	1.1. Current industry hardware and software products and services 1.2. Industry maintenance, service and helpdesk practices, processes and procedures 1.3. Industry standard diagnostic tools 1.4. Malfunctions and resolutions	1.1. Identifying current industry hardware and software products and services 1.2. Identifying current industry maintenance, services and helpdesk practices, processes and procedures. 1.3. Identifying current industry standard diagnostic tools 1.4. Describing common malfunctions and resolutions. 1.5. Determining the root cause of a routine malfunction

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Look for solutions to routine problems	2.1. Potential solutions to problem are identified. 2.2. Recommendations about possible solutions is developed, ***documented***, ranked and presented to ***appropriate person*** for decision.	2.1. Current industry hardware and software products and services 2.2. Industry service and helpdesk practices, processes and procedures 2.3. Operating systems 2.4. Industry standard diagnostic tools 2.5. Malfunctions and resolutions. 2.6. Root cause analysis	2.1. Identifying current industry hardware and software products and services Identifying services and helpdesk practices, processes and procedures. 2.2. Identifying operating system 2.3. Identifying current industry standard diagnostic tools 2.4. Describing common malfunctions and resolutions. 2.5. Determining the root cause of a routine malfunction
3. Recommend solutions to problems	3.1. Implementation of solutions are ***planned***. 3.2. Evaluation of implemented solutions are planned. 3.3. Recommended solutions are documented and submit to appropriate person for confirmation.	3.1. Standard procedures 3.2. Documentation produce	3.1. Producing documentation that recommends solutions to problems 3.2. Following established procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Problems/Procedural Problem	May include: 1.1. Routine/non – routine processes and quality problems 1.2. Equipment selection, availability and failure 1.3. Teamwork and work allocation problem 1.4. Safety and emergency situations and incidents 1.5. Work-related problems outside of own work area
2. Document	May include: 2.1. Electronic mail 2.2. Briefing notes 2.3. Written report 2.4. Evaluation report
3. Appropriate person	May include: 3.1. Supervisor or manager 3.2. Peers/work colleagues 3.3. Other members of the organization
4. Plan	May include: 4.1. Priority requirements 4.2. Co-ordination and feedback requirements 4.3. Safety requirements 4.4. Risk assessment 4.5. Environmental requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Determined the root cause of a routine problem. 1.2. Identified solutions to procedural problems. 1.3. Produced documentation that recommends solutions to problems. 1.4. Followed established procedures. 1.5. Referred unresolved problems to support persons.
2. Resource Implications	2.1. Assessment will require access to a workplace over an extended period, or a suitable method of gathering evidence of operating ability over a range of situations.
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Case Formulation 3.2. Life Narrative Inquiry 3.3. Standardized test The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
4. Context for Assessment	Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : DEVELOP CAREER AND LIFE DECISIONS

UNIT CODE : 400311213

UNIT DESCRIPTOR : This unit covers the knowledge, skills, and attitudes in managing one's emotions, developing reflective practice, and boosting self-confidence and developing self-regulation.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Manage one's emotion	1.1. ***Self-management strategies*** are identified. 1.2. Skills to work independently and to show initiative, to be conscientious, and persevering in the face of setbacks and frustrations are developed. 1.3. Techniques for effectively handling negative emotions and ***unpleasant situation*** in the workplace are examined.	1.1. Self-management strategies that assist in regulating behavior and achieving personal and learning goals (e.g. Nine self-management strategies according to Robert Kelley) 1.2. Enablers and barriers in achieving personal and career goals 1.3. Techniques in handling negative emotions and unpleasant situation in the workplace such as frustration, anger, worry, anxiety, etc.	1.1. Managing properly, one's emotions and recognizing situations that cannot be changed and accept them and remain professional 1.2. Developing self-discipline, working independently and showing initiative to achieve personal and career goals 1.3. Showing confidence, and resilience in the face of setbacks and frustrations and other negative emotions and unpleasant situations in the workplace

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Develop reflective practice	2.1. Personal strengths and achievements, based on self-assessment strategies and teacher feedback are contemplated 2.2. Progress when seeking and responding to feedback from teachers to assist them in consolidating strengths, addressing weaknesses and fulfilling their potential are monitored. 2.3. Outcomes of personal and academic challenges by reflecting on previous problem solving and decision-making strategies and feedback from peers and teachers are predicted.	2.1. Basic SWOT analysis 2.2. Strategies to improve one's attitude in the workplace 2.3. Gibbs' Reflective Cycle/Model (Description, Feelings, Evaluation, Analysis, Conclusion, and Action plan)	2.1. Using the basic SWOT analysis as self-assessment strategy 2.2. Developing reflective practice through realization of limitations, likes/ dislikes; through showing of self-confidence 2.3. Demonstrating self-acceptance and being able to accept challenges
3. Boost self-confidence and develop self-regulation	3.1. Efforts for continuous self-improvement are demonstrated. 3.2. Counter-productive tendencies at work are eliminated. 3.3. Positive outlook in life is	3.1. Four components of self-regulation based on Self-Regulation Theory (SRT) 3.2. Personality development concepts 3.3. Self-help concepts (e. g., 7 Habits by	3.1. Performing effective communication skills – reading, writing, conversing skills 3.2. Showing affective skills – flexibility, adaptability, etc.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	maintained.	Stephen Covey, transactional analysis, psycho-spiritual concepts)	3.3. Self-assessment for determining one's strengths and weaknesses

RANGE OF VARIABLES

VARIABLE	RANGE
1. Self-management strategies	May include: 1.1. Seeking assistance in the form of job coaching or mentoring 1.2. Continuing dialogue to tackle workplace grievances 1.3. Collective negotiation/bargaining for better working conditions 1.4. Share your goals to improve with a trusted co- worker or supervisor 1.5. Make a negativity log of every instance when you catch yourself complaining to others 1.6. Make lists and schedules for necessary activities
2. Unpleasant situation	May include: 2.1. Job burn-out 2.2. Drug dependence 2.3. Sulking

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Express emotions appropriately 1.2. Work independently and show initiative 1.3. Consistently demonstrate self-confidence and self- discipline
2. Resource Implications	The following resources should be provided: 2.1. Access to workplace and resource s 2.2. Case studies
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Demonstration or simulation with oral questioning 3.2. Case problems involving work improvement and sustainability issues 3.3. Third-party report
4. Context for Assessment	Competency assessment may occur in workplace or any appropriately simulated environment.

UNIT OF COMPETENCY : CONTRIBUTE TO WORKPLACE INNOVATION

UNIT CODE : 400311214

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to make a pro-active and positive contribution to workplace innovation.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify opportunities to do things better	1.1. ***Opportunities for improvement*** are identified proactively in own area of work. 1.2. ***Information*** is gathered and reviewed which may be relevant to ideas and which might assist in gaining support for idea.	1.1. Roles of individuals in suggesting and making improvement 1.2. Positive impacts and challenges in innovation 1.3. Types of changes and responsibility 1.4. Seven habits of highly effective people	1.1. Identifying opportunities to improve and to do things better. Involvement 1.2. Identifying the positive impacts and the challenges of change and innovation 1.3. Identifying examples of the types of changes that are within and outside own scope of responsibility
2. Discuss and develop ideas with others	2.1. ***People who could provide input*** to ideas for improvements are identified. 2.2. Ways of approaching people to begin sharing ideas are selected. 2.3. Meeting is set with relevant people. 2.4. Ideas for follow up are review and selected based on feedback. 2.5. ***Critical inquiry method*** is used to	2.1. Roles of individuals in suggesting and making improvements 2.2. Positive impacts and challenges in innovation 2.3. Types of changes and responsibility 2.4. Seven habits of highly effective people	2.1. Identifying opportunities to improve and to do things better. Involvement 2.2. Identifying the positive impacts and the challenges of change and innovation 2.3. Providing examples of the types of changes that are within and outside own

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	discuss and develop ideas with others.		scope of responsibility 2.4. Communicating ideas for change through small group discussions and meetings
3. Integrate ideas for change in the workplace	3.1. Critical inquiry method is used to integrate different ideas for change of key people. 3.2. Summarizing, analyzing and generalizing skills are used to extract salient points in the pool of ideas. 3.3. ***Reporting skills*** are likewise used to communicate results. 3.4. Current Issues and concerns on the systems, processes and procedures, as well as the need for simple innovative practices are identified.	3.1. Roles of individuals in suggesting and making improvements 3.2. Positive impacts and challenges in innovation 3.3. Types of changes and responsibility 3.4. Seven habits of highly effective people 3.5. Basic research skills	3.1. Identifying opportunities to improve and to do things better. Involvement 3.2. Identifying the positive impacts and the challenges of change and innovation 3.3. Providing examples of the types of changes that are within and outside own scope of responsibility 3.4. Communicating ideas for change through small group discussions and meetings 3.5. Demonstrating skills in analysis and interpretation of data

RANGE OF VARIABLES

VARIABLE	RANGE
1. Opportunities for improvement	May include: 1.1. Systems 1.2. Processes 1.3. Procedures 1.4. Protocols 1.5. Codes 1.6. Practices
2. Information	May include: 2.1. Workplace communication problems 2.2. Performance evaluation results 2.3. Team dynamics issues and concerns 2.4. Challenges on return of investment 2.5. New tools, processes and procedures 2.6. New people in the organization
3. People who could provide input	May include: 3.1. Leaders 3.2. Managers 3.3. Specialists 3.4. Associates 3.5. Researchers 3.6. Supervisors 3.7. Staff 3.8. Consultants (external) 3.9. People outside the organization in the same field or similar expertise/industry 3.10. Clients
4. Critical inquiry method	May include: 4.1. Preparation 4.2. Discussion 4.3. Clarification of goals 4.4. Negotiate towards a Win-Win outcome 4.5. Agreement 4.6. Implementation of a course of action 4.7. Effective verbal communication. See our pages: Verbal Communication and Effective Speaking 4.8. Listening 4.9. Reducing misunderstandings is a key part of effective negotiation 4.10. Rapport Building 4.11. Problem Solving 4.12. Decision Making 4.13. Assertiveness 4.14. Dealing with Difficult Situations

5. Reporting skills	May include: 5.1. Data management 5.2. Coding 5.3. Data analysis and interpretation 5.4. Coherent writing 5.5. Speaking

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Identified opportunities to do things better. 1.2. Discussed and developed ideas with others on how to contribute to workplace innovation. 1.3. Integrated ideas for change in the workplace. 1.4. Analyzed and reported rooms for innovation and learning in the workplace.
2. Resource Implications	The following resources should be provided: 2.1. Pens, papers and writing implements 2.2. Cartolina 2.3. Manila papers
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Psychological and behavioral Interviews 3.2. Performance Evaluation 3.3. Life Narrative Inquiry 3.4. Review of portfolios of evidence and third-party workplace reports of on-the-job performance 3.5. Sensitivity analysis 3.6. Organizational analysis 3.7. Standardized assessment of character strengths and virtues applied
4. Context for Assessment	Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : PRESENT RELEVANT INFORMATION

UNIT CODE : 400311215

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to present data/information appropriately.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Gather data/ information	1.1. Evidence, facts and information are collected. 1.2. Evaluation, terms of reference and conditions are reviewed to determine whether data/information falls within project scope.	1.1. Organizational protocols 1.2. Confidentiality 1.3. Accuracy 1.4. Business mathematics and statistics 1.5. Data analysis techniques/ procedures 1.6. Reporting requirements to a range of audiences 1.7. Legislation, policy and procedures relating to the conduct of evaluations 1.8. Organizational values, ethics and codes of conduct	1.1. Describing organizational protocols relating to client liaison 1.2. Protecting confidentiality 1.3. Describing accuracy 1.4. Computing business mathematics and statistics 1.5. Describing data analysis techniques/ procedures 1.6. Reporting requirements to a range of audiences 1.7. Stating legislation, policy and procedures relating to the conduct of evaluations 1.8. Stating organizational values, ethics and codes of conduct
2. Assess gathered data/ information	2.1. Validity of data/ information is assessed. 2.2. Analysis techniques are applied to assess data/	2.1. Business mathematics and statistics 2.2. Data analysis techniques/ procedures 2.3. Reporting	2.1. Computing business mathematics and statistics 2.2. Describing data analysis techniques/

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	information. 2.3. Trends and anomalies are identified. 2.4. ***Data analysis techniques*** and procedures are documented. 2.5. Recommendations are made on areas of possible improvement.	requirements to a range of audiences 2.4. Legislation, policy and procedures relating to the conduct of evaluations 2.5. Organizational values, ethics and codes of conduct	procedures 2.3. Reporting requirements to a range of audiences 2.4. Stating legislation, policy and procedures relating to the conduct of evaluations 2.5. Stating organizational values, ethics and codes of conduct
3. Record and present information	3.1. Studied data/information are recorded. 3.2. Recommendations is analyzed for action to ensure they are compatible with the project's scope and terms of reference. 3.3. Interim and final reports are analyzed and outcomes are compared to the criteria established at the outset. 3.4. Findings are presented to stakeholders.	3.1. Data analysis techniques/ procedures 3.2. Reporting requirements to a range of audiences 3.3. Legislation, policy and procedures relating to the conduct of evaluations 3.4. Organizational values, ethics and codes of conduct	3.1. Describing data analysis techniques/ procedures 3.2. Reporting requirements to a range of audiences 3.3. Stating legislation, policy and procedures relating to the conduct of evaluations 3.4. Stating organizational values, ethics and codes of conduct practices

RANGE OF VARIABLES

VARIABLE	RANGE
1. Data analysis techniques	May include: 1.1. Domain analysis 1.2. Content analysis 1.3. Comparison technique

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Determine data / information 1.2. Studied and applied gathered data/information 1.3. Recorded and studied data/information These aspects may be best assessed using a range of scenarios what ifs as a stimulus with a walk-through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.
2. Resource Implications	Specific resources for assessment 2.1. Evidence of competent performance should be obtained by observing an individual in an information management role within the workplace or operational or simulated environment.
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Written Test 3.2. Interview 3.3. Portfolio The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.
4. Context for Assessment	In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

UNIT OF COMPETENCY : **PRACTICE OCCUPATIONAL SAFETY AND HEALTH POLICIES AND PROCEDURES**

UNIT CODE : **400311216**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to identify OSH compliance requirements, prepare OSH requirements for compliance, perform tasks in accordance with relevant OSH policies and procedures.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify OSH compliance requirements	1.1. Relevant ***OSH requirements, regulations, policies and procedures*** are identified in accordance with workplace policies and procedures. 1.2. OSH activity non-conformities are conveyed to ***appropriate personnel***. 1.3. ***OSH preventive and control requirements*** are identified in accordance with OSH work policies and procedures.	1.1. OSH preventive and control requirements 1.2. Hierarchy of Controls 1.3. Hazard Prevention and Control 1.4. General OSH principles 1.5. Work standards and procedures 1.6. Safe handling procedures of tools, equipment and materials 1.7. Standard emergency plan and procedures in the workplace	1.1. Communication skills 1.2. Interpersonal skills 1.3. Critical thinking skills 1.4. Observation skills
2. Prepare OSH requirements for compliance	2.1. OSH work activity material, tools and equipment requirements are identified in accordance with workplace policies and procedures. 2.2. Required OSH	2.1. Resources necessary to execute hierarchy of controls 2.2. General OSH principles 2.3. Work standards and procedures 2.4. Safe handling	2.1. Communication skills 2.2. Estimation skills 2.3. Interpersonal skills 2.4. Critical thinking skills 2.5. Observation skills 2.6. Material, tool

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	materials, tools and equipment are acquired in accordance with workplace policies and procedures. 2.3. Required OSH materials, tools and equipment are arranged/ placed in accordance with OSH work standards.	procedures of tools, equipment and materials 2.5. Different OSH control measures	and equipment identification skills
3. Perform tasks in accordance with relevant OSH policies and procedures	3.1. Relevant OSH work procedures are identified in accordance with workplace policies and procedures. 3.2. Work Activities are executed in accordance with OSH work standards. 3.3. ***Non-OSH compliance work activities*** are reported to appropriate personnel.	3.1. OSH work standards 3.2. Industry related work activities 3.3. General OSH principles 3.4. OSH Violations Non-compliance work activities	3.1. Communication skills 3.2. Interpersonal skills 3.3. Troubleshooting skills 3.4. Critical thinking skills 3.5. Observation skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. OSH Requirements, Regulations, Policies and Procedures	May include: 1.1. Clean Air Act 1.2. Building code 1.3. National Electrical and Fire Safety Codes 1.4. Waste management statutes and rules 1.5. Permit to Operate 1.6. Philippine Occupational Safety and Health Standards 1.7. Department Order No. 13 (Construction Safety and Health) 1.8. ECC regulations
2. Appropriate Personnel	May include: 2.1. Manager 2.2. Safety Officer 2.3. EHS Offices 2.4. Supervisors 2.5. Team Leaders 2.6. Administrators 2.7. Stakeholders 2.8. Government Official 2.9. Key Personnel 2.10. Specialists 2.11. Himself
3. OSH Preventive and Control Requirements	May include: 3.1. Resources needed for removing hazard effectively 3.2. Resources needed for substitution or replacement 3.3. Resources needed to establishing engineering controls 3.4. Resources needed for enforcing administrative controls 3.5. Personal Protective equipment
4. Non-OSH Compliance Work Activities	May include: 4.1. Violations that may lead to serious physical harm or death 4.2. Fall Protection 4.3. Hazard Communication 4.4. Respiratory Protection 4.5. Power Industrial Trucks 4.6. Lockout/Tag-out 4.7. Working at heights (use of ladder, scaffolding) 4.8. Electrical Wiring Methods 4.9. Machine Guarding 4.10. Electrical General Requirements 4.11. Asbestos work requirements 4.12. Excavations work requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Convey OSH work non-conformities to appropriate personnel 1.2. Identify OSH preventive and control requirements in accordance with OSH work policies and procedures 1.3. Identify OSH work activity material, tools and equipment requirements in accordance with workplace policies and procedures 1.4. Arrange/Place required OSH materials, tools and equipment in accordance with OSH work standards 1.5. Execute work activities in accordance with OSH work standards 1.6. Report OSH activity non-compliance work activities to appropriate personnel
2. Resource Implications	The following resources should be provided: 2.1. Facilities 2.2. materials tools and equipment necessary for the activity
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Observation/Demonstration with oral questioning 3.2. Third party report
4. Context for Assessment	Competency may be assessed in the workplace or in a simulated work place setting

UNIT OF COMPETENCY : **EXERCISE EFFICIENT AND EFFECTIVE SUSTAINABLE PRACTICES IN THE WORKPLACE**

UNIT CODE : **400311217**

UNIT DESCRIPTOR : This unit covers knowledge, skills and attitude to identify the efficiency and effectiveness of resource utilization, determine causes of inefficiency and/or ineffectiveness of resource utilization and convey inefficient and ineffective environmental practices.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify the efficiency and effectiveness of resource utilization	1.1. Required resource utilization in the workplace is measured using appropriate techniques. 1.2. Data are recorded in accordance with workplace protocol. 1.3. Recorded data are compared to determine the efficiency and effectiveness of resource utilization according to established ***environmental work procedures***.	1.1. Importance of Environmental Literacy 1.2. Environmental Work Procedures 1.3. Waste Minimization 1.4. Efficient Energy Consumptions	1.1. Recording Skills 1.2. Writing Skills 1.3. Innovation Skills
2. Determine causes of inefficiency and/or ineffectiveness of resource utilization	2.1. Potential causes of inefficiency and/or ineffectiveness are listed. 2.2. Causes of inefficiency and/or ineffectiveness are identified	2.1. Causes of environmental inefficiencies and ineffectiveness	2.1. Deductive Reasoning Skills 2.2. Critical thinking 2.3. Problem Solving 2.4. Observation Skills

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	through deductive reasoning. 2.3. Identified causes of inefficiency and/or ineffectiveness are validated thru established environmental procedures.		
3. Convey inefficient and ineffective environmental practices	3.1. Efficiency and effectiveness of resource utilization are reported to ***appropriate personnel***. 3.2. Concerns related resource utilization are discussed with appropriate personnel. 3.3. Feedback on information/ concerns raised are clarified with appropriate personnel.	3.1. Appropriate Personnel to address the environmental hazards 3.2. Environmental corrective actions	3.1. Written and Oral Communication Skills 3.2. Critical thinking 3.3. Problem Solving 3.4. Observation Skills 3.5. Practice Environmental Awareness

RANGE OF VARIABLES

VARIABLE	RANGE
1. Environmental Work Procedures	May include: 1.1. Utilization of Energy, Water, Fuel Procedures 1.2. Waster Segregation Procedures 1.3. Waste Disposal and Reuse Procedures 1.4. Waste Collection Procedures 1.5. Usage of Hazardous Materials Procedures 1.6. Chemical Application Procedures 1.7. Labeling Procedures
2. Appropriate Personnel	May include: 2.1. Manager 2.2. Safety Officer 2.3. EHS Offices 2.4. Supervisors 2.5. Team Leaders 2.6. Administrators 2.7. Stakeholders 2.8. Government Official 2.9. Key Personnel 2.10. Specialists 2.11. Himself

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Measured required resource utilization in the workplace using appropriate techniques 1.2. Recorded data in accordance with workplace protocol 1.3. Identified causes of inefficiency and/or ineffectiveness through deductive reasoning 1.4. Validate the identified causes of inefficiency and/or ineffectiveness thru established environmental procedures 1.5. Report efficiency and effectives of resource utilization to appropriate personnel 1.6. Clarify feedback on information/concerns raised with appropriate personnel
2. Resource Implications	The following resources should be provided: 2.1. Workplace 2.2. Tools, materials and equipment relevant to the tasks 2.3. PPE 2.4. Manuals and references
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Demonstration 3.2. Oral questioning 3.3. Written examination
4. Context for Assessment	4.1. Competency assessment may occur in workplace or any appropriately simulated environment 4.2. Assessment shall be observed while task is being undertaken whether individually or in-group

UNIT OF COMPETENCY : **PRACTICE ENTREPRENEURIAL SKILLS IN THE WORKPLACE**

UNIT CODE : **400311218**

UNIT DESCRIPTOR : This unit covers the outcomes required to apply entrepreneurial workplace best practices and implement cost-effective operations.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Apply entrepreneurial workplace best practices	1.1. ***Good practices*** relating to workplace operations are observed and selected following workplace policy. 1.2. Quality procedures and practices are complied with according to workplace requirements. 1.3. Cost-conscious habits in ***resource utilization*** are applied based on industry standards.	1.1. Workplace best practices, policies and criteria 1.2. Resource utilization 1.3. Ways in fostering entrepreneurial attitudes: 1.3.1. Patience 1.3.2. Honesty 1.3.3. Quality-consciousness 1.3.4. Safety-consciousness 1.3.5. Resource fulness	1.1. Communication skills 1.2. Complying with quality procedures
2. Communicate entrepreneurial workplace best practices	2.1. Observed good practices relating to workplace operations are communicated to ***appropriate person***. 2.2. Observed quality procedures and practices are communicated to appropriate	2.1. Workplace best practices, policies and criteria 2.2. Resource utilization 2.3. Ways in fostering entrepreneurial attitudes: 2.3.1. Patience 2.3.2. Honesty 2.3.3. Quality-	2.1 Communication skills 2.2 Complying with quality procedures 2.3 Following workplace communication protocol

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	person 2.3. Cost-conscious habits in resource utilization are communicated based on industry standards.	conscious ness 2.3.4. Safety-conscious ness 2.3.5. Resource fulness	
3. Implement cost-effective operations	3.1. Preservation and optimization of workplace resources is implemented in accordance with enterprise policy 3.2. Judicious use of workplace tools, equipment and materials are observed according to manual and work requirements. 3.3. Constructive contributions to office operations are made according to enterprise requirements. 3.4. Ability to work within one's allotted time and finances is sustained.	3.1. Optimization of workplace resources 3.2. 5S procedures and concepts 3.3. Criteria for cost-effectiveness 3.4. Workplace productivity 3.5. Impact of entrepreneuria l mindset to workplace productivity 3.6. Ways in fostering entrepreneuria l attitudes: 3.6.1. Quality-consciou sness 3.6.2. Safety-consciou sness	3.1. Implementing preservation and optimizing workplace resources 3.2. Observing judicious use of workplace tools, equipment and materials 3.3. Making Constructive contributions to office operations 3.4. Sustaining ability to work within allotted time and finances

RANGE OF VARIABLES

VARIABLE	RANGE
1. Good practices	May include: 1.1. Economy in use of resources 1.2. Documentation of quality practices
2. Resources utilization	May include: 2.1. Consumption/ use of consumables 2.2. Use/Maintenance of assigned equipment and furniture 2.3. Optimum use of allotted /available time
3. Appropriate Personnel	May include: 3.1. Manager 3.2. Safety Officer 3.3. EHS Offices 3.4. Supervisors 3.5. Team Leaders 3.6. Administrators 3.7. Stakeholders 3.8. Government Official 3.9. Key Personnel 3.10. Specialists 3.11. Himself

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Demonstrated ability to identify and sustain cost-effective activities in the workplace 1.2. Demonstrated ability to practice entrepreneurial knowledge, skills and attitudes in the workplace.
2. Resource Implications	The following resources should be provided: 2.1. Simulated or actual workplace 2.2. Tools, materials and supplies needed to demonstrate the required tasks 2.3. References and manuals 2.3.1. Enterprise procedures manuals 2.3.2. Company quality policy
3. Methods of Assessment	Competency in this unit should be assessed through: 3.1. Interview 3.2. Third-party report
4. Context of Assessment	4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while tasks are being undertaken whether individually or in-group

COMMON COMPETENCIES

UNIT OF COMPETENCY : **APPLY SAFETY MEASURES IN FARM OPERATIONS**

UNIT CODE : **AFF321201**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to perform safety measures effectively and efficiently. It includes identifying areas, tools, materials, time and place in performing safety measures.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Determine areas of concern for safety measures	1.1. ***Work tasks*** are identified in line with farm operations 1.2. ***Place*** for safety measures is determined in line with farm operations 1.3. ***Time*** for safety measures is determined in line with farm operations 1.4. Appropriate ***tools, materials and outfits*** are prepared in line with job requirements	1.1. Different work tasks in farm operations 1.2. Place and time for implementation of safety measures 1.3. Different hazards in the workplace 1.4. Types of tools, materials and outfits	1.1. Identifying work tasks in farm operations 1.2. Determining place and time for implementation of safety measures 1.3. Reading labels, manuals and other basic safety information 1.4. Identifying effective/ functional tools, materials and outfit 1.5. Preparing tools, materials and outfits 1.6. Discarding defective tools, and materials

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Apply appropriate safety measures	2.1. Tools and materials are used according to specifications and procedures 2.2. Outfits are worn according to farm requirements 2.3. Effectivity/shelf life/expiration of materials are strictly observed 2.4. ***Emergency procedures*** are known and followed to ensure a safe work requirement 2.5. ***Hazards*** in the workplace are identified and reported in line with farm guidelines	2.1. Uses and functions of tools 2.2. Outfits and how to wear it. 2.3. Expiration/shelf life of materials 2.4. Proper disposal of expired materials 2.5. Environmental rules and regulation 2.6. Emergency procedures 2.7. Hazards Identification and reporting 2.8. Communication skills 2.9. OSHS	2.1. Using tools and materials in the workplace 2.2. Wearing of outfits 2.3. Observing expiration/ shelf life of materials 2.4. Disposing of expired materials 2.5. Following emergency procedures 2.6. Identifying and reporting of hazards in workplace area.
3. Safe keep of tools, materials and outfit and disposal of wastes	3.1. Used tools and outfit are cleaned after use and stored in designated areas 3.2. Unused materials are properly labeled and stored according to manufacturer's recommendation and farm requirements 3.3. Waste materials are disposed according to manufacturers, government and farm requirements	3.1. Procedures of cleaning used tools and outfits 3.2. Label and storage unused materials 3.3. Disposal of wastes materials 3.4. Manufacturers recommendation on keeping materials 3.5. Environmental rules and regulations	3.1. Cleaning used tools and outfit 3.2. Labelling and storing unused materials 3.3. Disposing waste materials

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work tasks	May include: 1.1. Crop Production 1.2. Post-harvest 1.3. Agri-marketing 1.4. Farm Equipment
2. Place	May include: 2.1. Stock room/storage areas/warehouse 2.2. Field/farm/orchard
3. Time	May include: 3.1. Fertilizer and pesticides application 3.2. Feed mixing and feeding 3.3. Harvesting and hauling
4. Tools, materials and outfits	May include: 4.1. Tools 4.1.1. Wrenches 4.1.2. Screw driver 4.1.3. Pliers 4.2. Outfit 4.2.1. Masks 4.2.2. Gloves 4.2.3. Boots 4.2.4. Overall coats 4.2.5. Hat 4.2.6. Eye goggles
5. Emergency procedures	May include: 5.1. Location of first aid kit 5.2. Evacuation 5.3. Agencies contract 5.4. Farm emergency procedures
6. Hazards	May include: 6.1. Chemical 6.2. Electrical 6.3. Falls

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Determined areas of concern for safety measures 1.2. Applied appropriate safety measures according to industry requirements 1.3. Performed proper safe keep of tools, materials and outfit used 1.4. Performed proper disposal of used materials
2. Resource Implications	The following resources should be provided: 2.1. Farm location 2.2. Tools, equipment and outfits appropriate in applying safety measures
3. Method of Assessment	Competency in this unit must be assessed through: 3.1. Practical demonstration 3.2. Third Party Report
4. Context of Assessment	Competency maybe assessed in actual workplace or at the designated TESDA Accredited Assessment Center.

UNIT OF COMPETENCY : USE FARM TOOLS AND EQUIPMENT

UNIT CODE : AFF321202

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to use farm tools and equipment. It includes selection, operation and preventive maintenance of farm tools and equipment.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Select and use farm tools	1.1. Appropriate farm tools are identified according to requirement/use 1.2. ***Farm tools*** are checked for faults and defective tools reported in accordance with farm procedures 1.3. Appropriate tools are safely used according to job requirements and manufacturers conditions	1.1. Types and uses of farm tools 1.2. Characteristics of functional tools 1.3. Check tools for defects/fault 1.4. Segregate and report defective tools 1.5. Uses of tools and equipment	1.1. Identifying farm tools for the work 1.2. Checking the conditions of tools 1.3. Reporting defective tools 1.4. Using tools
2. Select and operate farm equipment	2.1. Identify appropriate ***farm equipment*** 2.2. Instructional manual of the farm tools and equipment are carefully read prior to operation 2.3. ***Pre-operation check-up*** is conducted in line with manufacturers manual 2.4. Faults in farm equipment are identified and reported in line with farm procedures 2.5. Farm equipment used according to its function	2.1. Types and operations of farm equipment 2.2. Standard operating procedures of farm equipment 2.3. Instructional manual of equipment 2.4. Pre-operation check-up 2.5. Equipment Specification 2.6. Procedures in calibrating and use of equipment 2.7. Equipment faults identification	2.1. Identifying appropriate farm equipment for the work 2.2. Reading instructional manual. 2.3. Conducting pre-operation check-up 2.4. Identifying faults/defects of farm equipment 2.5. Reporting on defective farm equipment 2.6. Operating farm equipment

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.6. Safety procedures are followed.	and reporting 2.8. Operation of equipment 2.9. Codes and Regulations on environmental protection 2.10. Safety and keeping of equipment every after use 2.11. Safety measures	2.7. Following safety procedures.
3. Perform preventive maintenance	3.1. Tools and equipment are cleaned immediately after use in line with farm procedures 3.2. Routine check-up and maintenance are performed 3.3. Tools and equipment are stored in designated areas in line with farm procedures	3.1. Cleaning procedures of tools and equipment 3.2. Maintenance procedures of farm equipment 3.3. Storage of tools and equipment 3.4. Designated storage areas	3.1. Cleaning tools and equipment 3.2. Performing routinary check-up of tools and equipment 3.3. Maintaining farm equipment 3.4. Storing tools and equipment

RANGE OF VARIABLES

VARIABLE	RANGE
1. Farm tools	May include: 1.1. Sickle 1.2. Cutters 1.3. Weighing scales 1.4. Hand tools 1.5. Measuring tools 1.6. Garden tools
2. Farm equipment	May include: 2.1. Engine 2.2. Pumps 2.3. Generators 2.4. Sprayers
3. Pre-operation check-up	May include: 3.1. Tires 3.2. Brake fluid 3.3. Fuel 3.4. Water 3.5. Oil 3.6. Lubricants 3.7. Battery

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Identified and selected correctly appropriate farm tools and equipment 1.2. Selected and operated farm equipment 1.3. Performed preventive maintenance
2. Resource Implications	The following resources should be provided: 2.1. Service/operational manual of farm tools and equipment 2.2. Tools and equipment 2.3. Farm implements
3. Method of Assessment	Competency in this unit must be assessed through: 3.1. Direct observation 3.2. Practical demonstration 3.3. Third Party Report
4. Context of Assessment	Competency maybe assessed in actual workplace or at the designated TESDA Accredited Assessment Center.

UNIT OF COMPETENCY : **PERFORM ESTIMATION AND BASIC CALCULATION**

UNIT CODE : **AFF321203**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to perform basic workplace calculations.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Perform estimation	1.1. Job requirements are identified from written or oral communications. 1.2. Quantities of materials and resources required to complete a work task are estimated. 1.3. The time needed to complete a work activity is estimated. 1.4. Work completion made is accurate estimated 1.5. Estimate of materials and resources are reported to appropriate person.	1.1. Job requirements/ labor needs 1.2. Calculation of quantities of materials and resources required 1.3. Calculation of time for job completion 1.4. Preparation of estimate report 1.5. Basic mathematical operations 1.6. Percentage and ratios 1.7. Unit Conversion	1.1. Identifying job requirements / labor 1.2. Estimating quantities of materials and resources required 1.3. Estimating time for job completion 1.4. Performing basic calculation 1.5. Computing percentage 1.6. Converting English to Metric systems of measurement 1.7. Preparing estimate report
2. Perform basic workplace calculation	2.1. ***Systems and units of measurement*** to be followed are ascertained. 2.2. Calculation needed to complete work tasks are performed using the ***four basic mathematical***	2.1. Four basic mathematical operations 2.2. System and units of measurements 2.3. Fraction, percentage and ratio 2.4. Material take-off 2.5. Materials costing	2.1. Computing bill of materials 2.2. Computing project cost

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	operation. 2.3. Calculate whole fraction, percentage and mixed when are used to complete the instructions. 2.4. Number computed is checked following work requirements.		

RANGE OF VARIABLES

VARIABLE	RANGE
1. Four basic mathematical operations	May include: 1.1. Addition 1.2. Subtraction 1.3. Multiplication 1.4. Division
2. Systems and units of measurement	May include: 2.1. Systems of measurement 1.1.1. English 1.1.2. Metric 2.2. Units of Measurement 2.1.1. Area 2.1.2. Volume 2.1.3. Weight 2.1.4. Length

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Performed estimation 1.2. Performed basic workplace calculation
2. Resource Implications	The following resources should be provided: 2.1. Relevant tools and equipment for basic calculation 2.2. Recommended data
3. Method of Assessment	Competency in this unit must be assessed through: 3.1. Practical demonstration 3.2. Written examination
4. Context of Assessment	Competency maybe assessed in actual workplace or at the designated TESDA Accredited Assessment Center.

UNIT OF COMPETENCY : PROCESS FARM WASTES

UNIT CODE : AFF321205

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to process farm wastes. It comprises functions such as collecting farm wastes, conducting waste identification and segregation, treating and processing farm wastes and performing housekeeping duties.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Collect farm wastes	1.1. ***Tools and materials*** are prepared for collection of farm wastes. 1.2. Wastes are collected following OSHS and waste collection requirements and plan. 1.3. Dangerous and hazardous wastes are collected following the HAZMAT (hazardous material) protocol. 1.4. Appropriate personal protective equipment (PPE) is worn as prescribed by Occupational Safety and Health 1.5. Standards (OSHS)	1.1. Tools and materials use in wastes management 1.2. Categories of farm wastes 1.3. Waste collection and segregation procedures 1.4. Farm-waste handling, storage and disposal procedures 1.5. Dangerous and hazardous wastes, hazardous materials (hazmat) protocols 1.6. Personal Protective Equipment (PPE)	1.1. Performing occupational health and safety 1.2. Using tools and equipment skillfully 1.3. Calculating 1.4. Communicating effectively

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Identify and segregate wastes	2.1. Wastes are identified by categories according to industry standards and environmental legislation. 2.2. Wastes are segregated according to organizational requirements and relevant legislation. 2.3. Sorted waste is placed into labelled container to avoid littering and prevent cross-contamination. 2.4. Information on waste is obtained by asking authority to ensure correct identification.	2.1. Tools and materials use in wastes management 2.2. Categories of farm wastes 2.3. Waste collection and segregation procedures 2.4. Farm-waste handling, storage and disposal procedures 2.5. Dangerous and hazardous wastes, hazardous materials (hazmat) protocols 2.6. Personal Protective Equipment (PPE)	2.1. Performing occupational health and safety 2.2. Using tools and equipment skillfully 2.3. Calculating 2.4. Communicating effectively
3. Treat and process farm wastes	3.1. ***Dangerous and hazardous wastes*** are handled according to organizational requirements and relevant legislation following OSHS procedures. 3.2. **Processing of farm wastes** is done following environmental legislation and codes. 3.3. ***Principles of 3Rs*** are applied	3.1. Tools and materials use in wastes management 3.2. Categories of farm wastes 3.3. Waste collection and segregation procedures 3.4. Farm-waste handling, storage and disposal procedures 3.5. Dangerous and hazardous wastes,	3.1. Performing occupational health and safety 3.2. Using tools and equipment skillfully 3.3. Calculating 3.4. Communicating effectively

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	accordingly. 3.4. ***Farm wastes*** are disposed of according to environmental legislation and codes.	hazardous materials (hazmat) protocols 3.6. Personal Protective Equipment (PPE)	
4. Perform housekeeping	4.1. Appropriate warning signs and labels are displayed in conspicuous places around the workplace. 4.2. Work area is cleaned according to 5S principles. 4.3. Tools are checked, cleaned and stowed according to established industry procedures and following user's manual. 4.4. Materials are stored following industry standard procedures and manufacturer's specifications. 4.5. PPE is checked for damage prior to ensuring that clean and undamaged equipment is stored. 4.6. Storage facility is checked to ensure no contamination in the area according to Organizational requirements and legislation and	4.1. Tools and materials use in wastes management 4.2. Categories of farm wastes 4.3. Waste collection and segregation procedures 4.4. Farm-waste handling, storage and disposal procedures 4.5. Dangerous and hazardous wastes, hazardous materials (hazmat) protocols 4.6. Personal Protective Equipment (PPE)	4.1. Performing occupational health and safety 4.2. Using tools and equipment skillfully 4.3. Calculating 4.4. Communicating effectively

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	codes. 4.7. ***Record keeping*** is done according to industry requirements.		

RANGE OF VARIABLES

VARIABLE	SCOPE
1. Tools and materials	May include: 1.1. Tools 1.1.1. Spade 1.1.2. Wheel borrows 1.1.3. Broomstick 1.1.4. Sprayer or pressurized pump 1.2. Materials 1.2.1. Sacks 1.2.2. Containers 1.2.3. Disinfectants 1.2.4. Detergents 1.2.5. First-aid kit 1.2.6. Chemical spill kit 1.2.7. Personal Protective Equipment 1.2.7.1. Goggles 1.2.7.2. Disposal gloves 1.2.7.3. Face mask 1.2.7.4. Rubber boots 1.2.7.5. Overall
2. Dangerous and hazardous wastes	May include: 2.1. Pesticides 2.2. Syringes 2.3. Expired biologics 2.4. Expired veterinary drugs 2.5. Spoiled milk 2.6. Diseased plant and plant parts 2.7. Empty veterinary bottles/syringes
3. Processing of Farm wastes	May include: 3.1. Composting 3.2. Compacting 3.3. Liquefying 3.4. Shredding 3.5. Carbonizing 3.6. Charcoaling
4. Principles of 3Rs	May include: 4.1. Re-usable 4.2. Recyclable 4.3. Reduce

VARIABLE	SCOPE
5. Farm wastes	May include: 5.1. Plant materials 5.2. Hay 5.3. Weeds 5.4. Twigs 5.5. Twines 5.6. Empty wooden crates 5.7. Animal manure 5.8. Feed refuse 5.9. Spoiled feeds (Forage and feed supplements) 5.10. Spent bedding materials 5.11. Empty sacks 5.12. Trash fish 5.13. Fish meal 5.14. Effluent
6. Record Keeping	May include: 6.1. Record of farm wastes generated and disposed 6.2. Record of incidence of infection and accidents 6.3. Record of chemical spillage 6.4. Record of destroyed carcasses 6.5. Inventory of tools, materials and equipment

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Collected farm waste 1.2. Identified and segregated farm wastes 1.3. Treated and processed farm wastes 1.4. Performed housekeeping
2. Resource Implications	The following resources should be provided: 2.1. Farm area 2.2. Different farm wastes 2.3. Farm-waste processing area 2.4. Tools, supplies and materials use in farm wastes collection, segregation, and processing 2.5. Housekeeping tools and supplies 2.6. Personal Protective Equipment
3. Method of Assessment	Competency in this unit may be assessed through: 3.1. Observation and questioning 3.2. Third-Party Report 3.3. Demonstration and oral questioning
4. Context of Assessment	Competency maybe assessed individually in the actual workplace or in accredited farms or institution.

UNIT OF COMPETENCY : PERFORM RECORD KEEPING
UNIT CODE : SOC413206

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to carry-out inventory activities, maintain production record and prepare financial records.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Carry out inventory activities	1.1. ***Inventory inputs*** are determined according to enterprise requirements. 1.2. Defective tools and equipment are determined according to operation manuals 1.3. Facilities are inspected according to according to standard codes and laws.	1.1. Kinds of tools and equipment 1.2. Defects of tools and equipment 1.3. Monitoring method 1.4. Farm planning and budgeting 1.5. Methods and process of production 1.6. Quality control 1.7. Basic bookkeeping 1.8. Practice 3Rs and 5S 1.9. Implement Program of work activities as scheduled	1.1. Working safely 1.2. Determining defective tools and equipment 1.3. Measuring and calculating 1.4. Estimating 1.5. Basic mathematical skills 1.6. Preparing of reports 1.7. Bookkeeping 1.8. Communicating orally and written

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Maintain production record	2.1. Production plan is prepared according to enterprise requirements. 2.2. Schedule for ***production activities*** is prepared based from enterprise requirements and plan. 2.3. ***Production report*** is prepared in 2.4. accordance with enterprise reporting procedures ***Inputs*** and ***production*** are monitored using monitoring chart	2.1. Kinds of tools and equipment 2.2. Defects of tools and equipment 2.3. Monitoring method 2.4. Farm planning and budgeting 2.5. Methods and process of production 2.6. Quality control 2.7. Basic bookkeeping 2.8. Practice 3Rs and 5S 2.9. Implement program of work activities as scheduled	2.1. Working Safely 2.2. Determining Defective Tools and Equipment 2.3. Measuring and Calculating 2.4. Estimating 2.5. Basic Mathematical Skills 2.6. Preparing of Reports 2.7. Bookkeeping 2.8. Communicating Orally and Written
3. Prepare financial records	3.1. ***Production cost*** is computed using established computation procedures. 3.2. Revenue is computed using established computation procedures.	3.1. Kinds of tools and equipment 3.2. Defects of tools and equipment 3.3. Monitoring method 3.4. Farm planning and budgeting 3.5. Methods and process of production 3.6. Quality control 3.7. Basic bookkeeping 3.8. Practice 3Rs and 5S	3.1. Working safely 3.2. Determining defective tools and equipment 3.3. Measuring and calculating 3.4. Estimating 3.5. Basic mathematical skills 3.6. Preparing of reports 3.7. Bookkeeping 3.8. Communicating orally and written

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		3.9. Implement program of work activities as scheduled	

RANGE OF VARIABLES

VARIABLE	SCOPE
1. Inventory inputs	May include: 1.1. Plant 1.1.1. Planting materials 1.1.2. Fertilizer 1.1.3. Concoctions (Pesticides and insecticides) 1.1.4. Beneficial microorganisms 1.2. Animals 1.2.1. Stocks 1.2.2. Feeds 1.2.3. Concoctions 1.2.4. Medications 1.2.5. Beneficial microorganisms 1.3. Miscellaneous materials
2. Production activities	May include: 2.1. Plant 2.1.1. Planting 2.1.2. Fertilizer application 2.1.3. Pesticides application 2.1.4. Implementation of bio-security measures 2.1.5. Irrigation/watering 2.1.6. Weeding 2.1.7. Harvesting 2.1.8. Post-harvesting 2.2. Animal 2.2.1. Feeding 2.2.2. Cleaning and Sanitation 2.2.3. Implementation of bio-security measures 2.2.4. Growth and health condition 2.2.5. Harvesting 2.2.6. Post harvesting 2.3. Miscellaneous activities
3. Production report	May include: 3.1. Categorize and record quality of harvest 3.2. Volume /quantity of products harvested
4. Inputs	May include: 4.1. Input(plant) 4.1.1. Fertilizer 4.1.2. Concoctions (Pesticides and insecticides) 4.1.3. Beneficial microorganisms 4.2. Input(animal) 4.2.1. Feeds 4.2.2. Concoctions 4.2.3. Medication 4.2.4. Beneficial microorganisms 4.3. Miscellaneous inputs

VARIABLE	SCOPE
5. Production	May include: 5.1. Growth rate 5.2. Survival rate
6. Production cost	May include: 6.1. Labor 6.2. Inputs 6.3. Tools, equipment and facility depreciation cost 6.4. Administrative cost 6.5. Miscellaneous

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Performed inventory activities 1.2. Maintained production records 1.3. Prepared financial records
2. Resource Implications	The following resources should be provided: 2.1. All supplies, materials and farm implements needed during farm operations should be readily available at the farm site: 2.1.1. Farm site 2.1.2. Office supplies, materials, tools and farm equipment 2.2. Protective clothing equipment and materials. 2.3. Technical supervisors should have skills and ability in the successful implementation of work program activities.
3. Method of Assessment	Competency in this unit may be assessed through: 3.1. Demonstration with questioning 3.2. Written examination
4. Context of Assessment	Assessment may occur in an appropriately simulated environment through TESDA accredited assessment centers.

CORE COMPETENCIES

UNIT OF COMPETENCY : MAINTAIN LABORATORY INTEGRITY

UNIT CODE : AB-AFF0105500611301

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to maintain laboratory integrity which includes the tasks such as maintaining septic condition of the laboratory and environmental parameters, checking the safety nets and performing planned tissue culture.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Maintain aseptic condition of the laboratory	1.1 Laboratory facilities are inspected and evaluated in accordance to ***laboratory parameters*** 1.2 ***Personnel sanitary measures*** are observed according to ***aseptic protocols*** 1.3 Equipment and stocks are stored according to ***category*** 1.4 Facility is sanitized according to aseptic protocols 1.5 ***Tools and equipment*** are sterilized according to aseptic protocols 1.6 Unauthorized personnel are not allowed in the laboratory premises according to laboratory parameters	1.1 Procedures for inspection, evaluation and maintenance of laboratory facility integrity 1.2 Procedures for observing and monitoring personal sanitary measures 1.3 Arrangement, placement conditions/ labeling of equipment/ stocks 1.4 Methods and procedures for sanitizing lab facilities, tools and equipment 1.5 Regulations for limiting the entry of unauthorized personnel in the lab	1.1 Inspecting and evaluating facility integrity 1.2 Observing and maintaining personnel sanitary measures 1.3 Arranging, placing, labeling and evaluating condition of equipment and stocks 1.4 Sanitizing the lab following the required procedures 1.5 Sanitizing and sterilizing of tools and equipment 1.6 Limiting of unauthorized personnel 1.7 Enumerating and identifying sources of

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		1.6 Facility integrity conditions 1.7 Dress code standards 1.8 Proper hand and arm washing technique 1.9 Sources of Contamination 1.10 Categorization of equipment and stocks 1.11 Sanitation agents' safety warnings 1.12 Procedures for aseptic protocols 1.13 Basic Aseptic Theory 1.14 Possible Aerobic Contamination 1.15 Relevant OHS environmental protection	contamination 1.8 Categorizing of equipment and stocks 1.9 Identifying and using the required sanitation agents 1.10 Explaining the Basics of Aseptic Theory 1.11 Observing relevant health and safety environmental
2. Maintain environmental parameters	2.1 Environmental sensors are assured to be operational according to ***environmental parameters*** 2.2 Environmental sensor readings are read and recorded as indicated by the hygrometer 2.3 Environmental conditions are adjusted according to environmental	2.1 Procedures for operating environmental sensors 2.2 Procedure for reading and recording hygrometer 2.3 Acceptable range for photoperiod and other growth parameters	2.1 Operating environmental sensors 2.2 Reading and recording hygrometer 2.3 Adjusting light equipment to match appropriate photoperiod 2.4 Adjusting environmental controls to match

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	parameters		appropriate growth parameters
3. Check safety nets	3.1 Fire extinguishers are located in strategic location according to the ***OHS standards*** 3.2 Emergency exits are identified according to OHS standards 3.3 First aid kits are available and strategically located according to OHS Standard	3.1 What to check in fire extinguishers? 3.2 Occupational Health and Safety Standard 3.3 Familiarity with emergency exits 3.4 Fire Safety Tips	3.1 Checking functionality of fire extinguishers
4. Perform planned Tissue Culture tasks	4.1 Tasks assignments are understood in accordance to ***laboratory operating procedures*** 4.2 Necessary laboratory materials are prepared before performing the assigned task 4.3 Planned Tissue Culture tasks are efficiently performed according to laboratory operating procedures	4.1 Interpretation of task assignments 4.2 Identification of required materials 4.3 Aseptic Tissue Culture Techniques	4.1 Interpreting task assignment 4.2 Identifying required materials 4.3 Performing aseptic tissue culture techniques

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
5. Re-check aseptic condition of the laboratory	5.1 Laboratory facilities are inspected and evaluated in accordance to laboratory parameters 5.2 Personnel sanitary measures are observed according to aseptic protocols 5.3 Equipment and stocks are stored according to category 5.4 Facility is sanitized according to aseptic protocols 5.5 Tools and equipment are sterilized according to aseptic protocols 5.6 Limit entry of unauthorized persons in the laboratory according to laboratory parameters	5.1 Procedures for inspection, evaluation and maintenance of Lab facility integrity 5.2 Procedures for observing and monitoring personal sanitary measures 5.3 Arrangement, placement conditions /labeling of equipment/stocks 5.4 Procedures or methods for sanitizing lab facilities, tools and equipment 5.5 Regulations for limiting the entry of unauthorized personnel in the lab 5.6 Facility integrity conditions 5.7 Dress code standards 5.8 Proper hand and arm washing technique 5.9 Sources of Contamination 5.10 Categorization of equipment and stocks 5.11 Sanitation	5.1 Inspecting and evaluating facility integrity 5.2 Observing and maintaining personnel sanitary measures 5.3 Arranging, placing, labeling and evaluating condition of equipment and stocks 5.4 Sanitizing the lab following the required procedures 5.5 Sanitizing and sterilizing of tools and equipment 5.6 Limiting of unauthorized personnel 5.7 Enumerating and identifying sources of contamination 5.8 Categorizing of equipment and stocks 5.9 Identifying and using the required sanitation agents 5.10 Explaining the Basics of

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		agents' safety warnings 5.12 Procedures for aseptic protocols 5.13 Basic Aseptic Theory 5.14 Possible Aerobic Contamination 5.15 Relevant OHS environmental protection	Aseptic Theory 5.11 Observing relevant health and safety environmental

RANGE OF VARIABLES

VARIABLE	SCOPE
1. Laboratory Parameters	May include: 1.1 Internal Laboratory Facility 1.1.1 Media Prep Area 1.1.2 Culture Room 1.1.3 Deflasking Room 1.1.4 Transfer Room Area 1.2 External Laboratory Facility 1.2.1 Decontamination Area 1.2.2 Grow/out nursery area 1.2.3 Acclimatization Area 1.2.4 No damage, flooding, mechanical walls, doors, windows 1.2.5 Running utilities
2. Personnel Sanitary Measures	May include: 2.1 Hand and arm washing 2.2 Dress code basics 2.3 Unacceptable/ rejected personal sanitary conditions 2.4 Foot Decontamination
3. Aseptic Protocols	May include: 3.1 Floor sanitation procedures 3.2 UV surfaces sterilization 3.3 Proper waste disposal
4. Category	May include: 4.1 Tools 4.2 Equipment 4.3 Chemicals 4.4 Consumables 4.5 Non-consumables
5. Tools and Equipment	May include: 5.1 Tools 5.1.1 beaker/container 5.1.2 weighing scale 5.1.3 blender 5.1.4 graduated cylinder 5.1.5 forceps 5.1.6 scalpel blade 5.1.7 scalpel holder 5.1.8 alcohol lamp 5.1.9 casserole 5.1.10 spatula scoop 5.1.11 spoon

VARIABLE	SCOPE
	5.1.12 funnel 5.1.13 lighter 5.1.14 saucers 5.1.15 plates/utensil holder 5.1.16 pail 5.1.17 basin 5.1.18 LED light 5.1.19 Petri dish 5.1.20 paint brush 5.1.21 Erlenmeyer flask 5.1.22 microwavable box 5.1.23 (pressure) sprayer 5.1.24 Scissors 5.1.25 syringe 5.1.26 glass bottle with autoclavable 5.1.27 plastic cups/box of 24 pcs 5.1.28 pot holder 5.2 Equipment 5.2.1 Pressure Cooker 5.2.2 LPG Gas 5.2.3 Triple Burner 5.2.4 Transfer Case Shelves 5.2.5 UV Box 5.2.6 Chairs 5.2.7 Tables 5.2.8 Cabinets 5.2.9 nursery/bench bed
6. Environmental parameters	May include: 6.1 Lighting (12-16 hours) 6.2 Temperature (24-30 °C) 6.3 Humidity (40-60 %)
7. OHS Standards	May include: 7.1 Occupational Health Services 7.2 Fire Safety and Control
8. Laboratory Operating Procedures	May include: 8.1. Day plan 8.2. Week-to-week plan 8.3. 1-3 Month Plan 8.4. Optional 6-12 Month Plan

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Maintained aseptic condition of the laboratory 1.2. Maintained environmental parameters 1.3. Checked safety nets 1.4. Performed planned tissue culture tasks 1.5. Re-checked aseptic condition of the laboratory
2. Resource Implications	The following resources should be provided: 2.1. Appropriate supplies and materials 2.2. Applicable equipment and tools 2.3. Workplace or assessment area
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Direct Observation and questioning 3.2. Demonstration 3.3. Oral interview 3.4. Written test
4. Context of Assessment	4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

UNIT OF COMPETENCY **PREPARE ASEPTIC PROCESSING, ENVIRONMENTAL SET-UP INCLUDING ALL EQUIPMENT/SUPPLIES**

UNIT CODE : **AB-AFF0105500611302**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to prepare aseptic processing, environmental set-up including all equipment and supplies which include the tasks such as preparing tissue culture growth media, applying and performing sterilization protocols, In-post vitro culture activities and evaluating cultured performance.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare Tissue Culture growth media	1.1. Stock solutions are prepared according to **Tissue Culture Media Formulation Protocols** 1.2. **Growth media components** are prepared according to Tissue Culture Media Formulation Protocols 1.3. Growth media is poured immediately into bottles according to Tissue Culture Media Formulation Protocols	1.1 Identification and characterization of chemicals and materials 1.2 Safety precautions in handling chemicals 1.3 Preparation of stock solution 1.4 Preparation of growth media components	1.1 Identifying and characterizing of chemicals and materials 1.2 Practicing safety precautions in handling chemicals 1.3 Preparing stock solution 1.4 Preparing growth media components
2. Prepare Tissue Culture growth media for sterilization	2.1 Growth media bottles are prepared for sterilization according to ***Tissue Culture Growth Media Sterilization***	2.1 Importance of growth media pre-sterilization protocols 2.2 Importance of growth media bottles sterilization	2.1 Performing growth media pre-sterilization protocols 2.2 Performing growth media sterilization protocols

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	Protocols 2.2 Growth media bottles are sterilized according to Tissue Culture Growth Media Sterilization Protocols 2.3 Sterile growth media bottles are stored according to according to Tissue Culture Media Formulation Protocols	protocols 2.3 Importance of proper storage of sterile growth media	2.3 Storing sterile growth media
3. Apply workstation sterilization protocols	3.1 ***Personnel sanitary measures*** are observed according to aseptic protocols 3.2 Workstation is sterilized according to sterilization protocols 3.3 Alcohol lamp is correctly used according to ***Workstation Sterilization Protocols***	3.1 Procedures for observing and maintaining personal sanitary measures 3.2 Proper hand and arm washing techniques 3.3 Relevant health and safety environmental standards 3.4 Dress code standards 3.5 Procedures for sanitizing and sterilizing workstation 3.6 Alcohol Lamp Uses, fuel sources, igniting and extinguishing	3.1 Observing and maintaining personal sanitary measures 3.2 Observing relevant health and safety environmental standards. 3.3 Sanitizing and sterilizing work workstation 3.4 Proper use and handling of alcohol lamp

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
4. Prepare planting materials	4.1 Plants are selected according to laboratory goals 4.2 ***Explants*** are initially washed according to laboratory sterilization protocols 4.3 Explants are initially cut according to appropriate size	4.1 Identification of explants 4.2 Importance of initial washing in sterilization 4.3 Importance of initial cutting to appropriate sizes of explants 4.4 Relevant health and safety environmental standards 4.5 Dress code standards	4.1 Identifying explants 4.2 Performing initial washing 4.3 Performing initial cutting of explants 4.4 Practicing health and environmental standards 4.5 Observing dress code standards
5. Perform sterilization protocol on different planting materials	5.1 Explants are sterilized according to ***Explant Sterilization Protocols*** 5.2 Explants are placed in sterile petri dish according to *Explant Sterilization Protocols* 5.3 Explants are trimmed in sterile petri dish according to Explant Sterilization Protocols 5.4 Explants are finally trimmed according to Explant Sterilization Protocols 5.5 Explants are soaked in a sterile water according to Explant Sterilization Protocols	5.1. Importance of explant sterilization 5.2. Importance in placing explants in sterile petri dish 5.3. Importance of trimming and sterilizing of explants 5.4. Importance of final trimming of explants 5.5. Importance of soaking of explants to sterile water 5.6. Relevant health and safety environmental standards 5.7. Dress code standards	5.1. Performing explant sterilization 5.2. Placing explants in sterile petri dish 5.3. Performing trimming and sterilizing of explants 5.4. Performing final trimming of explants 5.5. Performing soaking of explant to sterile water 5.6. Practicing health and environmental standards 5.7. Observing dress code standards

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
6. Perform In-Vitro Culture	6.1. Growth media are placed inside the transfer case observing workstation sterilization protocols 6.2. Uncapped, alcohol free growth media is individually flamed along bottle threads according to workstation sterilization protocols 6.3. Forceps are exposed to flame of alcohol lamp according to workstation sterilization protocols 6.4. Explant from sterile water is transferred with sterile forceps to growth medium according to workstation sterilization protocols	6.1. Importance of maintaining sterile condition of growth media 6.2. Procedure for exposing possibly contaminated surfaces to alcohol lamp flame and proper cap storage handling 6.3. Correct placement of explant in sterile growth media 6.4. Relevant health and safety environmental standards 6.5. Dress code standards	6.1 Maintaining sterile condition of growth media 6.2 Exposing points of possible to contamination to flame of alcohol and proper handling of cap 6.3 Placing of explant in sterile growth media 6.4 Practicing health and environmental standards 6.5 Observing dress code standards
7. Perform Post In-Vitro Culture Activity and Evaluate Cultured Plant Performance	7.1 Culture flasks are labeled based on ***standard operating procedures*** 7.2 Culture flasks are recorded based on standard operating procedure 7.3 Saturated copper sulfate is prepared according to ***saturated copper sulfate protectant***	7.1 Importance of labeling and coding of flask 7.2 Importance of record keeping 7.3 Importance of proper mixing of saturated copper sulfate protectant 7.4 Importance of paper towel brushed with	7.1 Labeling and coding of flasks 7.2 Record keeping 7.3 Mixing of saturated copper sulfate 7.4 Protecting tissue culture flasks using paper towel brushed with

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	protocols 7.4 The culture flasks are protected using the required size of paper towel brushed with saturated copper sulfate 7.5 Culture flasks are stored in ***designated shelves*** according to laboratory policy 7.6 Stored cultures flasks are evaluated according to ***contamination occurrence monitoring protocols (COMP)*** 7.7 Sterile cultured plants are evaluated for growth and viability according to ***viability monitoring protocols (VMP)*** 7.8 Viable cultured flasks are evaluated for next Tissue Cultured action according to ***micro propagation process (MP)***	saturated copper sulfate 7.5 Importance of storing Tissue Culture in designated shelves 7.6 Relevant health and safety environmental standards 7.7 Dress code standards 7.8 Importance of Evaluating contamination 7.9 Importance of evaluating growth and viability of culture flasks 7.10 Importance of evaluating viable cultured flasks 7.11 Relevant health and safety environmental standards 7.12 Dress code standards	copper sulfate 7.5 Storing Tissue Culture flasks in designated shelves 7.6 Practicing health and environmental standards 7.7 Observing dress code standards 7.8 Performing Evaluation of contaminated culture flasks 7.9 Performing evaluation of growth and viability of culture flask 7.10 Performing evaluation inviable cultured flasks 7.11 Practicing health and environmental standards 7.12 Observing dress code standards

RANGE OF VARIABLES

VARIABLE	SCOPE
1. Tissue Culture Media Formulation Protocols	May include: 1.1. Stock Solution: Prepare four (4) empty 1L containers and label it as 1, 2, 3, and 4. • Bottle 1: Weigh 20g of Calcium, Nitrate and dissolve in 1L of water. Add ½ L more to make it 1L bottle • Bottle 2: Weigh 10g of Ammonium Sulfate and 5g of Magnesium Sulfate respectively. Dissolve and combine the two (2) compounds in a bottle with ½ L of water. Once dissolved, add ½ L more to make it 1 L full. • Bottle 3: Weigh 5g of Monopotassium phosphate and dissolve in ½ L of water. Once dissolved, add 1L of water more to make it 1L stock solution. Bottle 4: Weigh 1g of trace elements and dissolve in ½ L of water inside the bottle. Once dissolved, add ½ L of water more to make it 1L stock solution.
2. Growth Media Components	May include: 2.1. Growth Media Components: 2.1.1. Stock Solution 2.1.2. Refined Sugar 2.1.3. Coconut Water 2.1.4. Tomato 2.1.5. Plain Agar/ Gulaman Bars 2.1.6. Potassium Hydroxide 2.1.7. pH Meter/ pH Paper 2.1.8. Breaker (2L) 2.1.9. Scoop 2.1.10. Culture Media Bottles 2.1.11. Graduated Cylinder 2.1.12. Blender 2.2. Steps in preparation: 2.2.1. Weighing 2.2.2. Blending 2.2.3. Mixing 2.2.4. Dissolving 2.2.5. Transferring

VARIABLE	SCOPE
3. Tissue Culture Growth Media Sterilization Protocols	May include: Step 1: Covering 1.1. Cover the bottles symmetrically with paper 1.2. Fold the edges and make an ear-like fold 1.3. Do the same at the other side of the bottle 1.4. Use a rubber bond to secure the cover 1.5. Lastly, the bottles are now ready for sterilization Step 2: Sterilization of Growth Media 2.1. Familiarize with manufacturer's specifications on equipment safety and operations Standard operating procedure for TC 2.2. Pressure cooker or canner can be used 2.3. Place mounting piece /guard to raise bottles above bottom of canner/cooker. Bottles should not touch bottom of vessel, and secure against shaking 2.4. Pour tap clean water into vessel covering mounting piece/guard, and in 1/2 inch of water above guard 2.5. Layer unsterilized prepared growth media bottles ensuring snug fit, until vessel is filled complying with manufacturer's specifications. Ensure that bottles are not lose to prevent breakage. 2.6. Lock pressure cooker according to manufacturer's specification and ensure tight fit. Use 15 p.s.i. if possible. 2.7. Apply heat to pressure cooker following manufacturer's specification. When desired p.s.i reached usually when whistling properly for 30-40 minutes at 121 degree celsius. If vessel does not reach 15 p.s.i., increase timer under maximum pressure: 7-8 p.s.i. increase time to 60-80 minutes, 12 p.s.i. increase time to 40-60 minutes.

VARIABLE	SCOPE
	2.8. After required time under appropriate pressure, DO NOT OPEN until pressure gauge is at 0 p.s.i. 2.9. Growth media bottles may still be hot. Waiting entire vessel to cool into room temperature does not compromise Growth Media bottles. 2.10. Store growth media bottles in a cool dry place away from direct sunlight. Discard bottle with breakage. If proper cover is compromise, growth media maybe be also compromised.
4. Personnel Sanitary Measures	May include: 4.1. Wet hands and arms (up to elbow) and apply soap under running water. 4.2. Rub with soap the palms together. 4.3. Rub with soap the arms up to the elbow. 4.4. Rub the back of hands. 4.5. Rub the back of the fingers. 4.6. Rub and clean the thumbs. 4.7. Rub and clean the tips of the finger. 4.8. Rinse the hands up to the elbow with clean water 4.9. Wear clean white shirt 4.10. Remove any exposed accessories from the body 4.11. Wear securely fitted face mask 4.12. Wear securely fitted hair net
5. Workstation Sterilization Protocols	May include: 5.1. Workstation Placement 5.2. Properly isolated from sources of contamination (non-window/door nearby) 5.3. No negative air pressure (no wind towards workstation) 5.4. Comfortable height while seated 5.5. Dedicated workbench, stable, extra area for storing tools
6. Explants	May include: 6.1. Meristem 6.2. Bud 6.3. Leaf/Leaves 6.4. Roots 6.5. Seeds

VARIABLE	SCOPE
	6.6. Bulb/corm
7. Explant Sterilization Protocols	May include: 7.1. Meristem 7.2. Bud 7.3. Leaf/Leaves 7.4. Roots
8. Standard Operating Procedures	May include: 8.1. Labeling Format: 8.1.1. date format (yymmdd) 8.1.2. plant code: 8.2. Record Keeping May include 8.2.1. hard copy 8.2.2. soft copy
9. Saturated Copper Sulfate Protectant Protocol	May include: 9.1. Dissolve 300 grams of copper sulfate powder in 1 liter of tap water 9.2. Add 10mL dishwashing liquid soap
10. Designated Shelves	May include but not limited to: 10.1. Date 10.2. Code 10.3. Variety of Plants
11. Contamination Occurrence Monitoring Protocols (COMP)	May include but not limited to: 11.1. Bacterial Contamination 11.2. Fungal Contamination 11.3. Over Sterilized
12. Viability Monitoring Protocols (VMP)	May include: 12.1. Germinated Cultures 12.2. Ungerminated Cultures
13. Micro Propagation Process (MP)	May include: 13.1. Establishment of Explant 13.2. Multiplication Stage 13.3. Rooting Stage

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Prepared Tissue Culture growth media 1.2. Prepared Tissue Culture growth media for sterilization 1.3. Applied workstation sterilization protocols 1.4. Prepared planting materials 1.5. Performed sterilization protocol for different planting materials 1.6. Performed in-vitro mother plant sub-culture 1.7. Performed Post In-Vitro Culture Activity 1.8. Evaluated Cultured Plant Performance
2. Resource Implications	The following resources should be provided: 2.1 Writing device 2.2 Logbooks 2.3 References 2.4 Laboratory equipment, tools, and materials or consumables 2.5 Workplace or assessment area
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Direct Observation and questioning 3.2. Demonstration 3.3. Oral interview 3.4. Written test
4. Context of Assessment	4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

UNIT OF COMPETENCY : **PERFORM SERIES OF REFLASKING OF MOTHER FLASKS**

UNIT CODE : **AB-AFF0105500611303**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to perform series of reflasking of mother flasks by applying workplace sterilization protocols, performing in-vitro culture, performing post in-vitro culture activity and evaluate cultured plant performance.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Apply workplace sterilization protocols	1.1 Personnel Sanitary Measures are observed according to aseptic protocols 1.2 Workstation is sterilized according to ***sterilization protocols*** 1.3 ***Alcohol Lamp*** is correctly used according to workstation sterilization protocols	1.1 Procedures for observing and monitoring personal sanitary measures 1.2 Proper Hand and arm washing techniques 1.3 Relevant Health and safety environment standards 1.4 Dress code standards 1.5 Procedures for sanitizing and sterilizing workstation 1.6 Alcohol lamp uses, fuel sources, igniting and extinguishing	1.1 Observing relevant health and safety environmental standards 1.2 Observing and maintaining personal sanitary measures 1.3 Sanitizing and sterilizing workstation 1.4 Demonstrating correct uses/handling of alcohol lamp

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Perform In-Vitro Culture	2.1 Growth media are placed inside the transfer case observing workstation sterilization protocols 2.2 Uncapped, alcohol free growth media is individually flamed along bottle threads according to workstation sterilization protocols 2.3 Forceps are exposed to flames of alcohol lamp according to workstation sterilization protocols 2.4 Explant from sterile water is transferred with sterile forceps to growth medium according to workstation sterilization protocols	2.1 Importance of maintaining sterile condition of growth media 2.2 Procedure for exposing possibly contaminated surfaces to alcohol lamp flame and proper handling of cap 2.3 Correct placement of explant in sterile growth media 2.4 Relevant health and environmental standards 2.5 Dress code standards	2.1 Maintaining sterile condition of growth media 2.2 Exposing possibly contaminated surfaces to alcohol lamp flame and proper cap 2.3 Placing of explant in sterile growth media 2.4 Practicing health and environmental standards 2.5 Observing dress code standards
3. Perform Post In-Vitro Culture Activity	3.1 Cultured flasks are labeled based on ***standard operating procedures*** 3.2 Culture flasks are recorded based on standard operating	3.1 Importance of labeling and coding of flask 3.2 Importance of record keeping 3.3 Importance of proper mixing of saturated copper sulfate protectant	3.1 Labeling and coding of flasks Record keeping 3.2 Mixing of saturated copper sulfate 3.3 Protecting tissue culture

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	procedure 3.3 Saturated copper sulfate is prepared according to ***saturated copper sulfate protectant protocols*** 3.4 The culture flasks are protected using the required size of paper towel brushed with saturated copper sulfate Culture flasks are stored in ***designated shelves*** according to laboratory policy	3.4 Importance of paper towel brushed with saturated copper sulfate 3.5 Importance of storing Tissue Culture in designated shelves 3.6 Relevant health and environmental standards 3.7 Dress code standards	flasks using paper towel brushed with copper sulfate 3.4 Storing Tissue Culture flasks in designated 3.5 Practicing health and environmental standards 3.6 Observing dress code standards
4. Evaluate cultured plant performance	3.1 Stored cultured flasks are evaluated according to ***contamination occurrence monitoring protocols (COMP)*** 3.2 Sterile cultured plants are evaluated for growth and viability according to ***viability monitoring protocols (VMP)*** 3.3 Viable cultured flasks are evaluated for	3.1 Importance of Evaluating contamination 3.2 Importance of evaluating growth and viability of culture flasks 3.3 Importance of evaluating viable cultured flasks	3.1 Performing Evaluation of contaminated culture flasks 3.2 Performing evaluation of growth and viability of culture flask 3.3 Performing evaluation inviable cultured flasks

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	next Tissue Cultured action according to ***micro propagation process (MP)***		

RANGE OF VARIABLES

VARIABLE	SCOPE
1. Sterilization Protocols	May include: 1.1. Workstation Placement 1.2. Properly isolated from sources of contamination (non-window/door nearby) 1.3. No negative air pressure (no wind towards workstation) 1.4. Comfortable height while seated 1.5. Dedicated workbench, stable, extra area for storing tools
2. Alcohol Lamp	May include: 1.1. Alcohol selection criteria: 2.1.1. 95% or 70% fragrance free 2.1.2. No moisturizer, 2.1.3. Do not use isopropyl 2.1.4. Denatured 2.1.5. Methyl alcohol and/or less than 95% 1.1. Alcohol Lamp safety concern: 2.2.1. Refilling, fuel selection, igniting with long nose lighter, extinguishing 2.2.2. Proper use of lamp to flame-sterilize tools bottles other materials 5% bleaching agent sizzle signal. 2.2.3. Fire safety is most important
3. Standard Operating Procedures	May include: 3.1. Labeling Format: 3.1.1. date format (yymmdd) 3.1.2. plant code 3.2. Record Keeping: 3.2.1. hard copy 3.2.2. soft copy
4. Saturated Copper Sulfate Protectant Protocols	May include: 4.1 Dissolve 300 grams of copper sulfate powder in 1 liter of tap water 4.2 Add 10mL dishwashing liquid soap
5. Designated Shelves	May include: 5.1 Date 5.2 Code 5.3 Variety of Plants
6. Contamination Occurrence Monitoring Protocols (COMP)	May include: 6.1 Bacterial Contamination

	6.2 Fungal Contamination 6.3 Over Sterilized
7. Viability Monitoring Protocols (VMP)	May include: 7.1 Germinated Cultures 7.2 Ungerminated Cultures
8. Micro Propagation Process (MP)	May include: 8.1. Establishment of Explant 8.2. Multiplication Stage 8.3. Rooting Stage

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Applied workplace sterilization protocols 1.2. Perform in-vitro mother plant sub-culture 1.3. Performed post-invitro culture activity 1.4. Evaluated cultured plant performance
2. Resource Implications	The following resources should be provided: 2.1. Writing device 2.2. Logbooks 2.3. References 2.4. Laboratory equipment, tools, and materials or consumables 2.5. Workplace or assessment area
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Direct Observation and questioning 3.2. Demonstration 3.3. Oral interview 3.4. Written test
4. Context of Assessment	4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

UNIT OF COMPETENCY : PERFORM FINAL (ROOTING) REFLASKING OF MOTHER FLASKS

UNIT CODE : AB-AFF0105500611304

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to perform final rooting of reflasking of mother flasks by applying workplace sterilization protocols, performing in-vitro culture, performing post-in-vitro culture activity and evaluating cultured plant performance.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Apply workplace sterilization protocols	1.1 Personnel Sanitary Measures are observed according to aseptic protocols 1.2 Workstation is sterilized according to sterilization protocols 1.3 ***Alcohol Lamp*** is correctly used according to workstation sterilization protocols	1.1 Procedures for observing and monitoring personal sanitary measures 1.2 Proper Hand and arm washing techniques 1.3 Relevant Health and safety environment standards 1.4 Dress code standards 1.5 Procedures for Sanitizing and Sterilizing workstation 1.6 Alcohol lamp uses, fuel sources, igniting and extinguishing	1.1 Observing relevant health and safety environmental standards 1.2 Observing and maintaining personal sanitary measures 1.3 Sanitizing and sterilizing workstation 1.4 Demonstrating correct uses/handling of alcohol lamp

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Perform in-vitro culture	2.1 Growth media are placed inside the transfer case observing ***workstation sterilization protocols*** 2.2 Uncapped, alcohol free growth media is individually flamed along bottle threads according to workstation sterilization protocols 2.3 Forceps are exposed to alcohol lamp flame in according to workstation sterilization protocols 2.4 Explant from sterile water is transferred with sterile forceps to growth medium according to workstation sterilization protocols	2.1 Importance of maintaining sterile condition of growth media 2.2 Procedure for exposing possibly contaminated surfaces to alcohol lamp flame and proper cap storage handling 2.3 Correct placement of explant in sterile growth media 2.4 Relevant health and environmental standards 2.5 Dress code standards	2.1 Maintaining sterile condition of growth media 2.2 Exposing possibly contaminated surfaces to alcohol lamp flame and proper cap 2.3 Placing of explant in sterile growth media 2.4 Practicing health and environmental standards 2.5 Observing dress code standards
3. Perform post-In-Vitro Culture Activity	3.1 Culture flasks are labeled based on ***standard operating procedures*** 3.2 Culture flasks are recorded based on standard operating procedure 3.3 Saturated copper sulfate is prepared	3.1 Importance of labeling and coding of flask 3.2 Importance of record keeping 3.3 Importance of proper mixing of saturated copper sulfate protectant 3.4 Importance of paper towel	3.1 Labeling and coding of flasks 3.2 Record keeping 3.3 Mixing of saturated copper sulfate 3.4 Protecting tissue culture flasks using

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	according to ***saturated copper sulfate protectant protocols*** 3.4 The culture flasks are protected using the required size of paper towel brushed with saturated copper sulfate 3.5 Culture flasks are stored in ***designated shelves*** according to laboratory policy	brushed with saturated copper sulfate 3.5 Importance of storing Tissue Culture in designated shelves 3.6 Relevant health and environmental standards 3.7 Dress code standards	paper towel brushed with copper sulfate 3.5 Storing Tissue Culture flasks in designated shelves 3.6 Practicing health and environmental standards 3.7 Observing dress code standards
4. Evaluate cultured plant performance	4.1 Stored cultures flasks are evaluated according to ***contamination occurrence monitoring protocols (COMP)*** 4.2 Sterile cultured plants are evaluated for growth and viability according to ***viability monitoring protocols (VMP)*** 4.3 Viable cultured flasks are evaluated for next Tissue Cultured action according to ***micro propagation process (MP)***	4.1 Importance of Evaluating contamination 4.2 Importance of evaluating growth and viability of culture flasks 4.3 Importance of evaluating viable cultured flasks 4.4 Relevant health and environmental standards 4.5 Dress code standards	4.1 Performing Evaluation of contaminated culture flasks 4.2 Performing evaluation of growth and viability of culture flask 4.3 Performing evaluation inviable cultured flasks 4.4 Practicing health and environmental standards 4.5 Observing dress code standards

RANGE OF VARIABLES

VARIABLE	SCOPE
1. Alcohol Lamp	May include: 1.1. Alcohol selection criteria: 1.1.1. 95% or 70% fragrance free 1.1.2. No moisturizer, 1.1.3. Do not use isopropyl 1.1.4. Denatured 1.1.5. Methyl alcohol and/or less than 95% 1.2. Alcohol Lamp safely concern: 1.2.1. Refilling, fuel selection, igniting with long nose lighter, extinguishing 1.2.2. Proper use of lamp to flame-sterilize tools bottles other materials 5% bleaching agent sizzle signal. 1.2.3. Fire safety is most important
2. Workstation Sterilization Protocols	May include: 2.1. Workstation Placement 2.2. Properly isolated from sources of contamination (non-window/door nearby) 2.3. No negative air pressure (no wind towards workstation) 2.4. Comfortable height while seated 2.5. Dedicated workbench, stable, extra area for storing tools
3. Standard Operating Procedures	May include: 3.1. Labeling Format: 3.1.1. date format (yymmdd) 3.1.2. plant code 3.2. Record Keeping: 3.2.1. hard copy 3.2.2. soft copy
4. Saturated Copper Sulfate Protectant Protocols	May include: 4.1 Dissolve 300 grams of copper sulfate powder in 1 liter of tap water 4.2 Add 10mL dishwashing liquid soap
5. Designated Shelves	May include but not limited to: 5.1 Date 5.2 Code 5.3 Variety of Plants

6. Contamination Occurrence Monitoring Protocols (COMP)	May include: 6.1 Bacterial Contamination 6.2 Fungal Contamination 6.3 Over Sterilized
7. Viability Monitoring Protocols (VMP)	May include: 7.1 Germinated Cultures 7.2 Ungerminated Cultures
8. Micro Propagation Process (MP)	May include: 8.1. Establishment of Explant 8.2. Multiplication Stage 8.3. Rooting Stage

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Applied workplace sterilization protocols 1.2. Performed in-vitro mother plant sub-culture 1.3. Performed post-invitro culture activity 1.4. Evaluated cultured plant performance
2. Resource Implications	The following resources should be provided: 2.1. Writing device 2.2. Logbooks 2.3. References 2.4. Laboratory equipment, tools, and materials or consumables 2.5. Workplace or assessment area
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1. Direct Observation and questioning 3.2. Demonstration 3.3. Oral interview 3.4. Written test
4. Context of Assessment	4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

UNIT OF COMPETENCY : PERFORM DEFLASKING

UNIT CODE : AB-AFF0105500611305

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to perform deflasking through acclimatizing deflasked plants in container, storing plantlets in acclimatization area and monitoring plantlets in acclimation area.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Acclimatize deflasked plants in container	1.1 Cultured flasks are selected according to ***plant condition criteria*** 1.2 Mericlones are washed with water o remove excess agar 1.3 Mericlones are categorized according to ***size*** and quantity 1.4 Mericlones are planted in a container according to ***Acclimatization Media Protocols***	1.1 Importance of cultured flasks selection 1.2 Importance of Deflasking 1.3 Importance of categorizing mericlones 1.4 Importance of planting in a container with acclimatizatio n medium 1.5 Relevant health and environmenta l standards 1.6 Dress code standards	1.1 Performing selection of cultured flasks 1.2 Deflasking 1.3 Washing mericlones 1.4 Categorizing of mericlones 1.5 Performing planting in a container with acclimatization medium 1.6 Practicing health and environmental standards 1.7 Observing dress code standards
2. Store plantlets in acclimatization area	2.1 Plantlets are kept in acclimatization area according to acclimatization protocol 2.2 Plantlets containers are gradually opened according to ***acclimatization protocols***	2.1 Importance of keeping plantlets in acclimatizatio n area 2.2 Procedure in gradually opening of the plantlets containers 2.3 Procedure in	2.1 Keeping plantlets in acclimatization area 2.2 Demonstrating gradually opening of the plantlets containers 2.3 Demonstrating Nursery

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.3 Plantlets are maintained according to ***nursery management protocols***	maintaining plantlets using nursery management protocol 2.4 Relevant health and environmental standards 2.5 Dress code standards	Management Protocol 2.4 Practicing health and environmental standards 2.5 Observing dress code standards
3. Monitor plantlets in acclimation area	3.1 Environmental sensors are ensured to be operational according to ***environmental parameters*** 3.2 Environmental senses is read and recorded as indicated by hygrometer 3.3 Environmental conditions are adjusted according to environmental parameters	3.1 Acceptable range for photoperiod and other growth parameters 3.2 Procedure for reading and recording hygrometer 3.3 Procedure for operating environment sensors 3.4 Relevant health and environmental standards 3.5 Dress code standards	3.1 Operating environmental sensors 3.2 Reading and recording hygrometer 3.3 Adjusting light requirement using garden nets 3.4 Practicing health and environmental standards 3.5 Observing dress code standards

RANGE OF VARIABLES

VARIABLE	SCOPE
1. Plant Condition Criteria	May include: 1.1. Root Condition 1.2. Shoot condition
2. Size	May include: 2.1. Small 2.2. Medium 2.3. Large
3. Acclimatization media protocol	May include: 3.1. Boiling of 50:50 ratio of sphagnum moss and perlite for 15min 3.2. Rinsing with water 3.3. Molding the medium in a container
4. Acclimatization protocol	May include: 4.1. 2 weeks' storage 4.2. Daily opening of lid in an inch 4.3. Opening of lid an inch daily after two weeks storage
5. Nursery Management Protocol	May include: 5.1. Nursery Protocol 5.2. Green House 5.3. Site Selection 5.4. Water Source/Access 5.5. Potting Medium 5.6. Fertilizers 5.7. Tools and Materials
6. Environmental parameters	May include: 6.1. Lighting: 8 hours 6.2. Temperature: 29-32 ^{o}C 6.3. Humidity: 40-70% 6.4. Shade Net: 40-60%

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Acclimatized deflasked plants in container 1.2. Stored plantlets in acclimatization area 1.3. Monitored plantlets in acclimation area
2. Resource Implications	The following resources should be provided: 2.1 Writing device 2.2 Logbooks 2.3 References 2.4 Laboratory equipment, tools, and materials or consumables 2.5 Workplace or assessment area
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Direct Observation and questioning 3.2 Demonstration 3.3 Oral interview 3.4 Written test
4. Context of Assessment	4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

UNIT OF COMPETENCY : MANAGE NURSERY/GROW-OUT

UNIT CODE : AB-AFF0105500611306

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude required to manage nursery/grow-out by preparation of potting mix, pot individual acclimated plants and label the plants and apply plant care management

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare of Potting Mix according to plant variety	1.1 Plants are selected according to ***plant size*** 1.2 Materials are prepared for potting mixture according to ***plant variety*** 1.3 Potting Mixture is prepared in a mixing tub according to ***potting mix protocols***	1.1 Importance of selection of matured plants 1.2 Importance of selection of materials 1.3 Importance of preparing appropriate potting mixture 1.4 Relevant health and environmental standards 1.5 Dress code standards	1.1 Selecting of matured plants 1.2 Selecting of materials 1.3 Preparing potting mixture 1.4 Practicing health and environmental standards 1.5 Observing dress code standards
2. Pot individual acclimated plants and label plants	2.1 Plants from microwavable box is transferred individually to a pot according to ***nursery potting protocols*** 2.2 Potted plants are labeled based on ***Standard Operating Procedures*** 2.3 Potted plant data are recorded based on standard operating procedure	2.1 Importance of individual potting 2.2 Importance of labeling and coding potted plants 2.3 Importance of record keeping of potted plant 2.4 Relevant health and environmental standards 2.5 Dress code standards	2.1 Planting of plants in individual pots 2.2 Labeling and coding of potted plants 2.3 Record Keeping of potted plants 2.4 Practicing health and environmental standards 2.5 Observing dress code standards

3. Apply Plant Care Management	3.1 Potted Plants are fertilized according to ***nursery fertilization protocols*** 3.2 Potted plants are observed for presence of pests according to ***Pest Management Protocols*** 3.3 Potted plants are watered according to Nursery ***watering Schedule Protocols*** 3.4 Potted Plants are packed according to ***maturity of plants***	3.1 Nutrient Management 3.2 Pest Management 3.3 Water Management 3.4 Demonstration of Packaging 3.5 Relevant health and environmental standards 3.6 Dress code standards	3.1 Demonstrating Nutrient Management 3.2 Demonstrating Pest Management 3.3 Demonstrating Water Management 3.4 Demonstrating Packaging 3.5 Practicing health and environmental standards 3.6 Observing dress code standards

RANGE OF VARIABLES

VARIABLE	SCOPE
1. Plant size	May include: 1.1. Small 1.2. Medium 1.3. Large
2. Plant variety	May include: 2.1. High Value 2.2. Ornamental 2.3. Conservation plant materials
3. Potting Mix Protocols	May include: 3.1. Coco Coir- 50% w/w (weight/weight) 3.2. Coco Chunks- 30% w/w 3.3. Pumice- 10% w/w 3.4. Acacia Leaves- 10% w/w
4. Nursery Potting Protocol	May include: 4.1 Ingredients: 4.1.1. Coco Coir (50%) 4.1.2. Coco Chunks (30%) 4.1.3. Perlite / Pumice (10%) 4.1.4. Dried Acacia Leaves (10%) 4.2 Material(s): 4.2.1. Basin 4.2.2. Hand Shovel 4.2.3. Used Sack or Any Covering Materials 4.3 Procedure: 4.3.1. Prepare all the necessary ingredients and materials 4.3.2. Mix all the ingredients in a basin using garden shovel 4.3.3. Potting Mix Ready to Use.
5. Standard Operating Procedures	May include: 5.1. Labeling Format: 5.1.1. date format (yymmdd) 5.1.2. plant code: 5.2. Record Keeping 5.2.1. hard copy 5.2.2. soft copy

6. Nursery Fertilization Protocol	May include: 6.1. Slow releasing of fertilizer (apply every 3 minutes) 6.2. Complete fertilizer (liquid form) every two weeks
7. Pest Management Protocol	May include: 7.1. Physical test 7.2. Ocular test
8. Watering Schedule Protocol	May include: 8.1. Physical test 8.2. Ocular test
9. Maturity of Plants	May include: 9.1. Number of leaves 9.2. Root System

EVIDENCE GUIDE

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1. Prepared of Potting Mix according to plant variety 1.2. Potted individual acclimated plants and label plants 1.3. Applied Plant Care Management
2. Resource Implications	The following resources should be provided: 2.1 Writing device 2.2 Logbooks 2.3 References 2.4 Laboratory equipment, tools, and materials or consumables 2.5 Workplace or assessment area
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Direct Observation and questioning 3.2 Demonstration 3.3 Oral interview 3.4 Written test
4. Context of Assessment	4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while task is being undertaken whether individually or in group

GLOSSARY OF TERMS

- **A plantlet** is a young or small plant, produced on the leaf margins or the aerial stems of another plant.
- **Acclimatization or acclimatisation** (also called acclimation or acclimatation) is the process in which an individual organism adjusts to a change in its environment (such as a change in altitude, temperature, humidity, photoperiod, or pH), allowing it to maintain fitness across a range of environmental conditions.
- **Aseptic system** is a combination of processing and packaging whereby presterilized and cooled product is filled into sterilized container and sealed with a sterile cover under sterile (aseptic) condition.
- **Aseptic technique** is a technique designed to set a barrier between microorganisms in the environment and sterile cell culture. Aseptic technique refers to practices that help reduce the risk of infection by preventing the transfer of microorganisms. There are two main types - medical asepsis, which aims to reduce microorganisms, and surgical asepsis, which aims to eliminate them
- **Cell culture flasks** are specifically designed for successful growth and propagation of microbial, insect, or mammalian cells. Most common varieties include flat-sided tissue culture flasks, Erlenmeyer flasks, and spinner flasks.
- **Contamination** is the presence of a constituent, impurity, or some other undesirable element that renders something unsuitable, unfit or harmful
- **Copper sulfate** is an inorganic compound that combines sulfur with copper. It can kill bacteria, algae, roots, plants, snails, and fungi. The toxicity of copper sulfate depends on the copper content. Copper is an essential mineral.
- **Deflasking:** The removal and sticking process of tissue culture plantlets. Ex Agar: Without agar; plants can be shipped in containers that do not contain agar. Flask/Vessel/Bag: Containers used to house and produce plantlets. These may also be used to ship plantlets.
- **Deflasking**: The removal and sticking process of tissue culture plantlets. Ex Agar: Without agar; plants can be shipped in containers that do not contain agar. Flask/Vessel/Bag: Containers used to house and produce plantlets. These may also be used to ship plantlets.
- **Environmental sensors** are devices that monitor various environment factors, such as temperature, humidity, air quality, and more. Environmental sensors include: soil sensors, temperature and humidity sensors, gas sensors, rainfall sensors, light sensors, wind speed and direction sensors, etc.
- **Explant** is referred to as the cell or tissue which is taken from a particular body and then placed in a culture medium for growth. In terms of plants, the explant is the small pieces of plant part and issues that are aseptically cut and then they are kept in a nutrient medium.
- **Greenhouse** is a glass building in which you grow plants that need to be protected from bad weather.
- **Growth media** - refers to the prepared and sterilized container along with

nutrient requirements that provide an aseptic environment for the plant tissue culture, sometimes used interchangeably with growth media bottle, flask, or culture flask. Should be distinguished from growing media or potting soil which is not aseptic.

- **Horticultural maturity** is the stage of development at which a plant or plant part possesses the prerequisites for use by consumers for a particular purpose.
- **Hygrometer** instrument used in meteorological science to measure the humidity, or amount of water vapour in the air.
- **In-Vitro Culture** In vitro (Latin for "in glass"; often not italicized in English usage) studies are conducted using components of an organism that have been isolated from their usual biological surroundings, such as microorganisms, cells, or biological molecules. For example, microorganisms or cells can be studied in artificial culture media, and proteins can be examined in solutions. Colloquially called "test-tube experiments", these studies in biology, medicine, and their sub disciplines are traditionally done in test tubes, flasks, Petri dishes, etc. They now involve the full range of techniques used in molecular biology, such as the omics.
- **Maturation** is a sign of fruit ready to harvest. At this point the edible part of the fruit or vegetable is fully developed in shape and size, even though it may not be ready for immediate consumption. In most cases, ripening follows or overlaps with maturation and the produce becomes edible.
- **Media preparation room (area)** is the basis and backbone of a microbiology laboratory. It is a place where all the media i.e. the nutritional components required for growing and visualizing microorganisms is prepared.
- **Mericlones** literally means meristem cloning and meristematic tissues (or actively growing tissues) like the shoot tips, buds etc are used from the donor plant. These tissues are then grown on a semi-solid medium supplemented with minerals, under clean and sterile conditions.
- **Meristem**- a plant tissue made up of cells that are not specialized for a particular purpose, are capable of dividing any number of times, and can produce cells that specialize to form the fully developed plant tissues and organs. meristematic.
- **Micropropagation** is a method of plant propagation using extremely small pieces of plant tissue taken from a carefully chosen and prepared mother plant, and growing these under laboratory conditions to produce new plants. It is widely used in commercial horticulture.
- **Nursery** place where plants are grown for transplanting, for use as stock for budding and grafting, or for sale. A nursery is a man-made place for nurturing plants and selling them. Plants are grown naturally as well as artificially in a nursery under controlled environment. These plants are grown through seeding or the saplings.
- **Nutrient management** involves using crop nutrients as efficiently as possible to improve productivity while protecting the environment. The key principle behind nutrient management is balancing soil nutrient inputs with crop requirements.
- **Pest management** is a system of integrated preventive and corrective

measures to reduce or prevent pests from causing significant harm to humans or the environment

- **Petri dishes** are circular plastic or glass plates with lids used to culture microorganisms like bacteria, fungi, and cells. They provide a sterile, enclosed environment for cells to grow in the laboratory. Disposable polystyrene and reusable glass varieties exist.
- **Plant photoperiod** is the length of the light period in the diurnal cycle of 24 h, is an important environmental signal. Plants have evolved sensitive mechanisms to measure the length of the photoperiod.
- **Plant tissue culture** is a propagation method that grows plant parts in an artificial medium under a microorganism-free and controlled environment. This method is widely used for large scale multiplication, disease elimination, plant improvement, and production of secondary metabolites which are used as components for medicines, flavorings, pigments, and recreational drugs. A single explant can be multiplied into several thousand plants in a relatively short time and space under controlled conditions all year-round. Tissue culture/micropropagation has also been successfully used for the conservation of rare, endangered, and threatened species.
- **Plantlets** so produced are called tissue-culture raised plants. These plantlets are a true copy of the mother plant and show characteristics identical to the mother plant. For example, if the mother plant is a high yielding plant the plantlets will also be high yielding.
- **Plants** become a mature plant and starts flowering when it has enough growth. Flowers will attract bees and pollinate insects and helps in pollination and fertilization, and the formation of fruit and seeds.
- **Potting soil or growing media**, also known as potting mix or potting compost (UK), is a substrate used to grow plants in containers.
- **Proper plant care** requires maintaining healthy soil to support plant growth and deter pests and diseases. Investing in plant health care through soil management makes a big difference in how vigorous and long plants will survive. Plant care involves supplying the right amount of light, water and fertilizer to your plants. These maintenance practices help extend the life of your plants and ultimately the beauty of your garden. Learn how to give your plants the attention they deserve with proper plant care.
- **Sanitizing agents** are chemical substances, such as alcohols, chlorine, or quaternary ammonium compounds, used to reduce or eliminate microorganisms on surfaces to prevent the spread of infections.
- **Soaking** the process of becoming softened and saturated as a consequence of being immersed in water (or other liquid)
- **Stock solutions** can best be described as concentrated solutions of known, accurate concentrations that will be diluted for future laboratory use. While you may choose not to prepare stock solutions, doing so can help streamline your operation and save you a lot of time and resources in the process
- **Superior plant/Mother Plant** is identified, checked, and verified to have all of the growth characteristics particular to the variety. We designate these plants to

be the mother plants or the donor of plant tissues to start the tissue culture process. The mother plant should be healthy and free from all microorganisms.

- **Tissue culture (TC)** is the cultivation of plant cells, tissues, or organs on specially formulated nutrient media. Under the right conditions, an entire plant can be regenerated from a single cell. Plant tissue culture is a technique that has been around for more than 30 years.
- **Trimming** means the removal of living plant matter from any type of vegetation and includes limbing, thinning, shaping, tree pruning and topping.
- **Vitro Culture** is a method applied for the growth and development of plant cells, tissues, and organs that uses a nutritive culture medium under controlled sterilized conditions

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