

**REPUBLIC OF KENYA**

**NATIONAL OCCUPATIONAL STANDARD**

**FOR**

**HORTICULTURAL FARM TECHNOLOGIST**

**LEVEL 6**

**PROGRAMME CODE: 0812 554 A**

# 

First published 2024

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**FOREWORD**

The provision of quality education and training is fundamental to the Government’s overall strategy for social-economic development. Quality education and training will contribute to the achievement of Kenya’s development blueprint, Vision 2030 and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. These reforms resulted to the formulation of the Policy Framework for Reforming Education and Training (Sessional Paper No.14 of 2012). A key feature of this policy is the radical change in the design and delivery of the TVET training. This policy document requires that training in TVET be competency based, certification be based on demonstration of competence and mode of delivery allows for multiple entry and exit in TVET programmes.

The reforms also demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that these Occupational Standards were developed for developing a Competency-Based Education and Training (CBET) curriculum for Horticultural Farm Technologist Level 6. These Occupational Standards will also be the basis for the assessment of an individual for competency certification.

It is my conviction that these Occupational Standards will play a great role in the development of a competent human resource for sustainable development.

**PREFACE**

Kenya Vision 2030 aims to transform the country into a newly industrializing, middle-income country providing a high-quality life to all its citizens by the year 2030. Kenya intends to create a globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills, and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency-Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 and Sessional Paper No. 14 of 2012 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification. This called for a shift to CBET to address the mismatch between skills acquired through training and skills needed by the industry as well as increase the global competitiveness of the Kenyan labour force.

The National Polytechnics, in conjunction with the industry experts through the Industry Advisory Board (IAB), sector regulator boards, TVETA authority, and qualification awarding institution has developed these Occupational Standards for Horticultural Farm Technologist Level 6. The occupational standards will be the basis for the development of a competency-based education and training curriculum for Horticultural Farm Technologist Level 6.

**ACKNOWLEDGMENT**

These Occupational Standards were developed through the combined effort of various stakeholders from private and public organizations. I am thankful to the management of these organizations for allowing their staff to participate in this course. I wish to acknowledge the invaluable contribution of industry players who provided input towards the development of these Occupational Standards.

I also thank all the individuals and organizations who participated in the validation of these Occupational Standards.

# ACRONYMS

PPE’S Personal protective equipment’s

HSE Health, safety and environment

OSHA Occupational Safety and Health Act

GIS Geographic Information Systems

CDACC Curriculum development, assessment and certification council

|  |  |
| --- | --- |
| TVET | Technical and Vocational Education Training |
| TVETA | Technical and Vocational Education Training Authority |

# KEY TO UNIT CODE

Sector / Industry

Sub Sector

Occupational Area

Version Control

Unit of Competence Number

ISCED level, Programme Orientation and Level of Completion

xx

x

xxx

x

x

x

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**OVERVIEW**

Horticulture Level 6 qualification consists of competencies that an individual must have to estasblish and manage a horticultural farm**.** It includes producing vegetables, herbs and spices, tropical fruits, cut flowers, temperate fruits, vine fruits, ornamental plants, sub-tropical fruits, edible mushrooms and oil crops. It also includes operating farm machinery and farm irrigation and drainage systems, constructing horticultural farm structures, performing plant breeding and hydroponic farm management.

Thus, the units of competency comprising Horticulture level 6 qualification include the following basic, common and core units:

**SUMMARY OF UNITS OF COMPETENCY**

|  |  |
| --- | --- |
| **BASIC UNITS** | |
| 0611 551 01A | Apply Digital Literacy |
| 0031 541 02A | Apply Communication Skills |
| 0031 541 03A | Apply work ethics and practices |
| 0413 541 04A | Apply Entrepreneurship Skills |
| **COMMON UNITS OF COMPETENCY** | |
| 0532 451 05A | Apply Geographic information systems |
| 0811 551 06A | Apply Soil Science Principles |
| 0512 551 07A | Apply Biochemistry Principles |
| 0531 551 08A | Apply Inorganic and Organic Chemistry |
| 0811 551 09A | Apply Farm Management Principles |
| 0111 551 10A | Apply Applied Research |
| **CORE UNITS OF COMPETENCY** | |
| 0811 351 11A | Operate farm irrigation and drainage systems |
| 0716 351 12A | Operate farm machinery |
| 0812 451 13A | Improve soilfertility |
| 0812 251 14A | Produce Vegetable Crops in open environment |
| 0812 251 15A | Produce Vegetable Crops in protected environment |
| 0812 251 16A | Produce Herbs and Spices in open environment |
| 0812 251 17A | Produce Herbs and spices in protected environment |
| 0812 351 18A | Produce tropical fruits Crops |
| 0812 351 19A | Produce Cut Flowers |
| 0812 451 20A | Produce Temperate Fruits |
| 0812 451 21A | Produce vine fruits |
| 0812 451 22A | Produce Ornamental Plants |
| 0812 451 23A | Produce sub-tropical fruits Crops |
| 0812 451 24A | Produce Edible mushrooms |
| 0812 551 25A | Produce Oil Crops |
| 0716 551 26A | Construct Horticultural Farm Structures and Farm roads |
| 0811 551 27A | Carry out Plant Breeding |
| 0811 551 28A | Manage Hydroponic Farm |

# 

# BASIC UNITS OF COMPETENCY

## APPLY DIGITAL LITERACY

**UNIT CODE:** 0611 541 01A

**UNIT DESCRIPTION:**

This unit covers the competencies required to demonstrate digital literacy. It involves operating computer devices, solving tasks using the Office suite, accessing online/offline data and information, performing online communication and collaboration, applying cyber-security skills and performing jobs online. It also involves applying job entry techniques.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the key outcomes that make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| --- | --- |
| 1. Operate computer devices | * 1. C***omputer device*** usage is determined as per workplace requirements.   2. ***Computer hardware*** is identified according to job requirements.   3. ***Computer software*** is identified according to workplace requirements.   4. Computer devices are turned on or off as per the correct workplace procedure.   5. ***Mouse techniques*** are applied in solving tasks as per workplace requirements.   6. Keyboardtechniques are applied in solving tasks as per workplace requirements.   7. Computer files and folders are created and managed as per workplace requirements.   8. ***Internet connection option***s are identified and applied in connecting computer devices to the Internet.   9. ***External devices*** are identified and connected to the computer devices as per the job requirement. |
| 1. Solve tasks using Office suite | 1. ***Word processing concepts***are applied in solving workplace tasks as per job requirements. 2. Worksheet data is entered and prepared in accordance with work procedures. 3. Worksheet data is built and edited in accordance with workplace procedures. 4. ***Data manipulation*** on a worksheet is undertaken in accordance with work requirements. 5. Worksheets are saved and printed in accordance with job requirements. 6. ***Electronic presentation concepts***are applied in solving workplace tasks as per job requirements. |
| 1. Manage data and information | * 1. Office ***internet services*** are identified and applied in accordance with office procedures.   2. ***Internet access applications*** are determined in accordance with office operation procedures.   3. Internet search is performed as per job requirements.   4. Online digital content is downloaded in accordance with workplace requirements.   5. Digital content is identified and backed up in accordance with workplace procedures. |
| 1. Perform online communication and collaboration | * 1. Netiquette principles are observed as per work requirements.   2. Electronic mail communication is executed in accordance with workplace policy.   3. Digital content copyright and licenses are identified and applied according to workplace policies and regulatory requirements.   4. ***Online*** ***collaboration tools*** are applied in accordance with workplace policies and regulatory requirements. |
| 1. Apply cyber-security skills | * 1. ***Data protection*** and ***privacy*** is classified in accordance with workplace policies and regulatory requirements.   2. ***Internet security threats*** are identified as per workplace policies and regulatory requirements.   3. Computer threats and crimes are detected in accordance to Information Management security guidelines   4. ***Cyber-security control measures*** are applied in accordance with workplace policies and regulatory requirements. |
| 1. Perform online jobs | * 1. ***Online job platforms*** are identified as per the job requirements.   2. Online accounts and profiles are created in accordance with the work requirements.   3. Online jobs are identified according to the bidder’s skillset.   4. Online digital identity is managed according to industry best practices.   5. Online job bidding is done as per the specific job requirements.   6. Online tasks are executed according to the job requirements.   7. Personal online payment account is managed in accordance with financial regulations. |
| 1. Apply job entry techniques | * 1. ***Job opportunities*** are sought based on competencies.   2. A winning resume/CV is developed as per job advertisement.   3. An application/cover letter is developed based on the job advertisement.   4. ***certificates and testimonials*** are organized as per resume.   5. ***Interview skills*** are demonstrated as per job advertisement. |

**RANGE**

This section provides a work environment and conditions to which the performance criteria apply. It allows for a different work environment and situations that will affect performance.

| **Variable** | **Range** |
| --- | --- |
| 1. Computer devices may include but are not limited to: | * Desktops * Laptops * Smartphones * Tablets * Smartwatches |
| 1. Computer hardware may include but are not limited to: | * The System Unit E.g., Motherboard, CPU, casing, * Input Devices e.g., Pointing, keying, scanning, voice/speech recognition, direct data capture devices. * Output Devices e.g., hardcopy output and softcopy output * Storage Devices e.g., main memory e.g., RAM, secondary storage (Solid state devices, Hard Drives, CDs & DVDs, Memory cards, Flash drives * Computer Ports e.g., HDMI, DVI, VGA, USB type C etc. |
| 1. Computer software may include but are not limited to: | * System software e.g., Operating System (Windows, Macintosh, Linux, Android, iOS) * Application Software e.g., Word Processors, Spreadsheets, Presentations etc. * Utility Software e.g., Antivirus programs |
| 1. External devices may include but are not limited to: | * Printers * Projectors * Smart Boards * Speakers * External storage drives * Digital/Smart TVs |
| 1. Word processing concepts may include but are not limited to: | * Creating word documents * Editing word documents * Formatting word documents * Saving word documents * Printing word documents |
| 1. Mouse techniques may include but are not limited to: | * Clicking * Double-clicking * Right-clicking * Drag and drop |
| 1. Internet connection options may include but are not limited to: | * Mobile Networks/Data Plans * Wireless Hotspots * Cabled (Ethernet/Fiber) * Dial-Up * Satellite * ISDN (Integrated Services Digital Network) |
| 1. Data manipulation may include but are not limited to: | * Use of formulae * Use of functions * Sorting * Filtering * Visual representation using charts |
| 1. Electronic presentation concepts may include but are not limited to: | * Creating slides * Editing slides * Formatting slides * Applying slide effects and transitions * Creating and playing slideshows * Saving presentations * Printing slides and handouts |
| 1. Internet services may include but are not limited to: | * Communication Services * Information Retrieval Services * File Transfer * World Wide Web Services * Web Services * Directory Services * Automatic Network Address Configuration * Newsgroup * Ecommerce |
| 1. Internet access applications/software may include but are not limited to: | * Browsers * Email Apps * eCommerce Apps |
| 1. Online collaboration tools may include but are not limited to: | * Online Storage * Online productivity applications * Online meetings, * Online learning environments, * Online calendars * Social networks |
| 1. Data protection and privacy may include but not limited to: | * Confidentiality of data/information * Integrity of data/information * Availability of data/information |
| 1. Internet security threats may include but not limited to: | * Malware attacks * Social engineering attacks * Software supply chain attacks * Advanced persistent threats (APT) * Distributed denial of service (DDoS) * Man-in-the-middle attack (MitM) * Password attacks * IoT Attacks * [Phishing Attacks](https://onlinedegrees.sandiego.edu/top-cyber-security-threats/#phishing-attacks) * [Ransomware](https://onlinedegrees.sandiego.edu/top-cyber-security-threats/#ransomware) |
| 1. Security threats control measures may include but not limited to: | * Counter measures against cyber terrorism * Physical Controls * Technical/Logical Controls * Operational Controls |
| 1. Online job platforms may include but are not limited to: | * Remo task * Data annotation’s * Cloud worker * Upwork * Oneforma * Appen |
| 1. Job opportunities may include but not limited to: | * Self-employment * Service provision * product development * salaried employment |
| 1. Certificates and testimonialsmay include but not limited to: | * Academic credentials * Letters of previous employments/ services rendered * Letters of commendation * Certifications of participation * Awards |
| 1. Interview skills may include but not limited to: | * Listening skills * Grooming * Language command * Articulation of issues * Body language * Time management * Honesty * Generally knowledgeable in current affairs and technical area |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Computer Hardware and Software Concepts
* Computer Security Concepts (Data security and privacy)
* Cyber security threats and control measures
* Understanding Computer Crimes
* Detection and protection against computer crimes
* Laws governing protection of ICT in Kenya
* Digital Identity Management
* Netiquette Principles
* Fundamentals of Copyright and Licenses
* Word processing;
* Functions and concepts of word processing;
* Documents and tables creation and manipulations;
* Document editing;
* Document formatting;
* Word processing utilities
* Spread sheets;
* Meaning, types and importance of spread sheets;
* Components of spread sheets;
* Functions, formulae, and charts, uses and layout;
* Data formulation, manipulation and application to cells;
* Editing & formatting spread sheets;
* Presentation Packages;
* Types of presentation Packages.
* Creating, formulating, running, editing, printing and presenting slides and hand outs
* Networking and Internet;
* Internet connectivity.
* Browser and digital content management;
* Managing data, information, and digital content
* Electronic mail and World Wide Web
* Fundamentals of Online Working;
* Online Profile Management;
* e-Portfolio Management;
* Online Jobs Bidding;
* Online Payment Systems;
* Job entry techniques
* Job searching sites
* Interview preparation skills
* Interview handling

**Required skills**

The individual needs to demonstrate the following skills:

* Active listening
* Keyboard Skills
* Mouse Skills
* Analytical skills
* Creativity
* Interpretation Skills
* Communication
* Spread sheet operations (applying fundamental operations such as addition, subtraction, division and multiplication)
* Computer Use Safety Skills
* Document Editing Skills
* Document Formatting Skills
* Document Printing Skills
* Netiquette Skills
* Internet Browsing Skills
* Problem Solving Skills
* Online Collaboration Skills
* Cyber-security Skills
* CV writing
* grooming

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge, and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | ***Assessment requires evidence that the candidate:***   * 1. Operated computer devices as per workplace policies and regulations.   2. Solved tasks using the office suite as per workplace policies and regulations.   3. Manage data and information as per workplace policies and regulations.   4. Performed online communication and collaboration as per workplace policies and regulations.   5. Applied cybersecurity skills in accordance with workplace policies and regulations.   6. Executed online tasks according to the job requirements.   7. Searched for job opportunity based on competencies.   8. Prepared job requirement documentations based on job opportunity.   9. Demonstrated interview skills based on the job opportunity. |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place.   2. Access to relevant work environments where assessment can take place.   3. Resources relevant to the proposed activities or task. |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Observation   2. Oral assessment   3. Portfolio of evidence   4. Interviews   5. Third party report   6. Written assessment   7. Practical assessment   8. Projects |
| 1. Context of assessment | Competency may be assessed:   * 1. Workplace   2. Simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# 

# APPLY COMMUNICATION SKILLS

**UNIT CODE:** 0031 541 02A

**UNIT DESCRIPTION**

This unit covers the competencies required to demonstrate communication skills. It involves applying communication channels, written, non-verbal, oral, and group communication skills.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the key outcomes that make up workplace function | **PERFORMANCE CRITERIA**  These are assessable statements that specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the Range*** |
| --- | --- |
| 1. Apply communication channels | 1. Specific communication channels are identified and applied based on workplace requirements. 2. Challenges are identified and addressed as per the operational standards of the organization. 3. Communication channels are evaluated to meet workplace needs. |
| 1. Apply written communication skills | * 1. Types of written communication are identified and applied according to the workplace requirements.   2. Written communication needs are identified and implemented according to workplace procedures.   3. Written communication guidelines are analysed, evaluated, and revised based on workplace needs. |
| 1. Apply non-verbal communication skills | 3.1 Existing non-verbal communication techniques are identified and applied based on organization policy.  3.2 Non-verbal communication techniques are articulated and modelled to enhance inclusivity according to workplace requirements. |
| 1. Apply oral communication skills | 4.1 Types of oral communication are identified and established as per organization policy.  4.2 Pathways of oral communication are identified and established as per organization policy.  4.3 Pathways of oral communication are reviewed according to organization procedures.  4.4 Pathways of oral communication are maintained according to the organization standards. |
| 1. Apply group communication skills | 1. Group communication strategies are appliedbased on the workplace needs. 2. Groups are organized in accordance with workplace procedures. 3. Effective questioning, listening and non-verbal communication techniques are used as per needs.   5.4 Group communication challenges are identified and addressed according to the workplace needs. |

**RANGE**

This section provides the work environment and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

| **Variable** | **Range** |
| --- | --- |
| 1. Communication strategies may include but are not limited to: | * Language switch * Comprehension check * Repetition * Asking confirmation * Paraphrasing * Clarification request * Translation * Restructuring * Generalization |
| 1. Effective group interaction may include but not limited to: | * Identifying and evaluating what is occurring within an interaction in a non-judgmental way. * Using active listening. * Making decision about appropriate words, behaviour. * Putting together response which is culturally appropriate. * Expressing an individual perspective. * Expressing own philosophy, ideology and background and exploring impact with relevance to communication |
| 1. Situations may include but are not limited to: | * Establishing rapport * Eliciting facts and information * Facilitating resolution of issues * Developing action plans |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

The individual needs to demonstrate the following skills:

* Active listening
* Interpretation
* Negotiation
* Writing
* Oral skills
* Creative thinking
* Critical thinking
* Decision making
* Analytical
* Innovation
* Conflict skills
* Leadership
* Problem solving skills
* Management
* Organizational
* Teamwork

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Communication process
* Dynamics of groups
* Styles of group leadership
* Key elements of communications strategy
* Principles of effective communication
* Turn-taking techniques
* Conflict resolution techniques
* Work planning
* Work organization
* Company policies
* Company operations and procedure standards
* Fundamental rights at the workplace
* Personal hygiene
* Accountability
* Workplace problems and how to deal with them

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills, knowledge, and range.

|  |  |
| --- | --- |
| 1. Critical aspects of Competency. | Assessment requires evidence that the candidate:   * 1. Identified and applied specific communication channels based on workplace requirements.   2. Identified and applied specific written communication correspondence according to the workplace requirements.   3. Applied and developed non-verbal strategies to communicate in all areas of the workplace requirements.   4. Established pathways of oral communication as per workplace policy.   5. Applied group communication strategies based on workplace needs. |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place. 2. Appropriately simulated environment where assessment can take place. 3. Resources relevant to the proposed activity or tasks. |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Observation   2. Oral assessment   3. Portfolio of evidence   4. Interviews   5. Third party report   6. Written assessment   7. Practical assessment   8. Projects |
| 1. Context of Assessment | Competency may be assessed:   * 1. Workplace   2. Simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## APPLY WORK ETHICS AND PRACTICES

**UNIT CODE:** 0417 541 03A

**UNIT DESCRIPTION**

This unit covers competencies required to effectively apply work ethics and practices. It involves the ability to: conduct self-management, promote ethical work practices and values, promote teamwork, manage workplace conflicts, maintain professional and personal development, apply problem-solving and promote customer care.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in Range*** |
| --- | --- |
| 1. Apply self-management skills | 1. Personal vision, mission and goals are formulated based on potential and concerning organization objectives and strategic plan 2. Self-esteem and a positive self-image are developed and maintained based on value 3. Emotional intelligence and stress management are demonstrated as per workplace requirements. 4. Assertiveness is developed and maintained based on the requirements of the job. 5. Accountability and responsibility for one's actions are demonstrated based on workplace instructions. 6. Time management, attendance and punctuality are observed as per the organization’s policy. 7. Personal goals are managed as per the organization’s objective 8. Self-strengths and weaknesses are identified based on personal objectives 9. Motivation, initiative and proactivity are utilized as per the organization policy 10. Individual performance is evaluated and monitored according to the agreed targets. |
| 1. Promote Team work | 3.1 ***Teams*** are formed to enhance productivity based on organization’s objectives  3.2 Duties are assigned to teams under the organization policy.  3.3 Team activities are managed and coordinated as per set objectives.  3.4 Team performance is evaluated based on set targets as per workplace policy.  3.5 ***Conflicts*** are resolved between team members in line with organization policy.  3.6 Gender and diversity-related issues are identified and mainstreamed in accordance with workplace policy.  3.7 Healthy ***relationships*** are developed and maintained in line with the workplace.  3.8 Adaptability and flexibility are applied in dealing with team members as per workplace policies |
| 1. Maintain professional and personal development | 4.1 ***Personal growth and development*** needs are identified and assessed in line with the requirements of the job.  ***4.2 Training and career opportunities*** are identified and utilized based on job requirements.  4.3 ***Resources*** for training are mobilized and allocated based on organizations and individual skills needs.  4.4 Licenses and certifications relevant to the job and career are obtained and renewed as per policy.  4.5 Recognitions are sought as proof of career advancement in line with professional requirements.  4.6 Work priorities and personal commitments are balanced and managed based on the requirements of the job and personal objectives.  4.7 Dynamism and on-the-job learning are embraced in line with the organization’s goals and objectives. |
| 1. Apply Problem solving skills | 5.1 ***Creative, innovative*** and practical solutions are developed based on the problem  5.2 Independence and initiative in identifying and solving problems are demonstrated based on the requirements of the job.  5.3 Team problems are solved as per the workplace guidelines  5.4 Problem-solving strategies are applied as per the workplace guidelines  5.5 Problems are analysed and assumptions tested as per the context of data and circumstances |
| 1. Promote Customer Care | 6.1 Customers' needs are identified based on their characteristics  6.2 Customer ***feedback*** is allowed and facilitated in line with organization policies.  6.3 Customer concerns and complaints are analysed and resolved in line with the set organizational culture.  6.4 Proactive customer outreach programs are implemented as per organizational policies  6.5 Customer retention strategies are developed and implemented in line with the organizational policy |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

| **Variable** | **Range** |
| --- | --- |
| 1. Feedback may include but not limited to: | * Verbal * Written * Informal * Formal |
| 1. Conflicts include but are not limited to: | * Interpersonal Conflict. * Intrapersonal Conflict. * Intergroup Conflict. * Intragroup Conflict. |
| 1. Relationships may include but not limited to: | * Man/Woman * Trainer/trainee * Employee/employer * Client/service provider * Husband/wife * Boy/girl * Parent/child * Sibling relationships |
| 1. Team may include but not limited to: | * Small work group * Staff in a section/department * Inter-agency group * Virtual teams |
| 1. Personal growth may include but not limited to: | * Growth in the job * Career mobility * Gains and exposure the job gives * Net workings * Benefits that accrue to the individual as a result of noteworthy performance |
| 1. Personal objectives may include but not limited to: | * Long term * Short term * Broad * Specific |
| 1. Trainings and career opportunities may include but not limited to | * Participation in training programs * Serving as Resource Persons in conferences and workshops * Capacity building |
| 1. Resource may include may but not limited to: | * Human * Financial * Technology |
| 1. Creative and innovative may include but not limited to: | * New ideas * Original ideas * Different ideas * Methods/procedures * Processes * New tools |
| 1. Emerging issues may include but not limited to: | * Artificial Intelligence * Data confidentiality * National cohesion * Open offices |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

The individual needs to demonstrate the following skills:

* Active listening
* Critical thinking
* Organizational
* Negotiation
* Monitoring
* Evaluation
* Problem solving
* Decision Making
* Leadership
* Creative/innovative thinking
* Adaptability
* Conflict management
* Emotional intelligence
* Teamwork

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Work values and ethics
* Company policies and procedures
* Company operations, procedures and standards
* Flexibility and adaptability
* Concept of time and leisure time
* Decision making
* Work planning
* Organizing work
* Monitoring and evaluation
* Record keeping
* Gender and diversity mainstreaming
* Drug and substance abuse
* Professional growth and development
* creativity
* Innovation
* problem solving
* customer care
* mentoring and coaching.
* Emerging issues

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical aspects of Competency | Assessment require evidence that the candidate:   * 1. Applied self-management skills as per organizational procedures.   2. Promoted ethical practices and values as per organizational procedures.   3. Promoted Teamwork as per workplace assignments.   4. Maintained professional and personal development as per organizational procedures.   5. Applied Problem-solving skills based on work requirements.   6. Identified customer needs based on their characteristics.   7. Gave back Customer feedback in line with organization policies. |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place. 3. Resources relevant to the proposed activity or tasks. |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   1. Observation 2. Oral questioning 3. Written test 4. Portfolio of Evidence 5. Interview 6. Third party report |
| 1. Context of Assessment | Competency may be assessed:   * 1. Workplace   2. Simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## APPLY ENTREPRENEURIAL SKILLS

**UNIT CODE :** 0413 541 04A

**UNIT DESCRIPTION**

This unit covers the competencies required to demonstrate an understanding of entrepreneurship. It involves demonstrating an understanding of financial literacy, applying entrepreneurial concepts identifying entrepreneurship opportunities, applying business legal aspects, developing business innovative strategies, and developing business plans.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the key outcomes that make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements that specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in Range*** |
| --- | --- |
| 1. Apply Financial Literacy Skills | 1. **Sources of personal and business** ***funds*** are identified as per financial procedures and standards 2. Personal finances are managed as per financial procedures and standards 3. Savings are managed as per financial procedures and standards 4. Debts are managed as per financial procedures and standards 5. Investments are undertaken as per financial procedures and standards 6. Insurance services are procured as per financial procedures and standards |
| 1. Apply entrepreneurial concept | 1. Entrepreneurs and Business persons are distinguished as per principles of entrepreneurship 2. ***Types of entrepreneurs*** are identified as per principles of entrepreneurship 3. Ways of becoming an entrepreneur are identified as per principles of Entrepreneurship 4. ***Characteristics of Entrepreneurs*** are identified as per principles of Entrepreneurship 5. Salaried employment and self-employment are distinguished as per principles of entrepreneurship 6. ***Requirements for entry into self-employment*** are identified according to business procedures and standards 7. Roles of an Entrepreneur in an enterprise are determined according to business procedures and standards 8. **Contributions of entrepreneurship** to National development are identified as per business procedures and standards |
| 1. Identify entrepreneurial opportunities | 1. Business ideas are identified as per business procedures and standards 2. Factors to consider when evaluating business opportunity viability are explored based on business procedure and standards 3. Entrepreneurial opportunities are evaluated as per business procedures and standards 4. Business ideas and opportunities are generated as per business procedures and standards 5. Business life cycle is analysed as per business procedures and standards |
| 1. Apply business legal aspects | 1. ***Forms of business ownership*** are identified as per legal procedures and practices 2. Business Registration and Licensing processes are identified as per legal procedures and practices 3. Types of Contracts and Agreements are analysed as per legal procedures and practices 4. Employment Laws are identified as per legal procedures and practices 5. Taxation laws are identified as per legal procedures and practices |
| 1. Innovate Business strategies | 1. Business innovation strategies are determined by the organization standards 2. Creativity in business development is demonstrated in accordance with business standards 3. ***Innovative business standards***  are developed as per business principles 4. Linkages with other entrepreneurs are created as per best practice 5. ICT is incorporated in business growth and development as per best practice |
| 1. Develop Business Plan | 1. Business idea is described as per business procedures and standards 2. Business description is developed as per business plan format 3. Marketing plan is developed as per business plan format 4. Organizational/Management plan is prepared in accordance with business plan format 5. Production/operation plan is prepared in accordance with business plan format 6. Financial plan is prepared in accordance with the business plan format 7. Executive summary is prepared in accordance with business plan format 8. Business plan is presented as per best practice 9. Business ideas are incubated as per institutional policy. |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

| **Variable** | **Range** |
| --- | --- |
| 1. Sources of personal funds mayinclude but not limited to: | * Salary/Wages * Investments * Savings * Inheritance * Government Benefits |
| 1. Sources of business finance mayinclude but not limited to: | * Equity Financing * Debt Financing, * Personal Savings/Investment * Retained Earnings * Grants and Subsidies * Crowdfunding * supplier Credit: * Leasing and Asset Financing: |
| 1. Types of entrepreneurs may include but not limited to: | * Innovators * Imitators * Craft * Opportunistic * Speculators |
| 1. Characteristics of Entrepreneurs may include but not limited to: | * Creative * Innovative * Planner * Risk taker * Networker * Confident * Flexible * Persistent * Patient * Independent * Future oriented * Goal oriented |
| 1. Requirements for entry into self-employment may include but not limited to | * Technical skills * Management skills * Entrepreneurial skills * Resources * Infrastructure |
| 1. Forms of businesses ownership may include but not limited to: | * Sole proprietorship * Partnership * Limited companies * Cooperatives |
| 1. Innovative business standards may include but not limited to: | * New products * New methods of production * New markets * New sources of supplies * Change in industrialization |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

The individual needs to demonstrate the following skills:

* Analytical
* Management
* Problem-solving
* Root-cause analysis
* Communication

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Decision making
* Business communication
* Change management
* Competition
* Risk
* Net working
* Time management
* Leadership
* Factors affecting entrepreneurship development
* Principles of Entrepreneurship
* Features and benefits of common operational practices, e. g., continuous improvement (kaizen), waste elimination,
* Conflict resolution
* Health, safety and environment (HSE) principles and requirements
* Customer care standards
* Basic financial management
* Business strategic planning
* Impact of change on individuals, groups and industries
* Government and regulatory processes
* Local and international market trends
* Product promotion standards
* Market and feasibility studies
* Government and regulatory processes
* Local and international business environment
* Relevant developments in other industries
* Regional/ County business expansion standards

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Identified Sources of personal and business finance as per financial procedures and standards 2. Managed Personal finances as per financial procedures and standards 3. Made Investment decisions as per financial procedures and standards 4. GeneratedBusiness ideas and opportunities based on business procedure and standards 5. Analysed business life cycle based on business procedure and standards 6. Determined business innovative standards as per business principles 7. Developed and presented a business plan as per regulatory framework. |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place |
| 1. Methods of Assessment | Competency may be assessed through:   1. Written tests 2. Oral questions 3. Third party report 4. Interviews 5. Portfolio |
| 1. Context of Assessment | Competency may be assessed:   * 1. Workplace   2. Simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

**COMMON UNITS OF COMPETENCY**

## APPLY GEOGRAPHIC INFORMATION SYSTEMS

**UNIT CODE:** 0532 551 16A

**UNIT DESCRIPTION**

This unit covers the competencies required to apply information systems It involves Applying GIS and remote sensing techniques, performing geo-graphic communication and producing geo-maps.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1 Apply GIS and remote sensing techniques | 1. Objectives and guiding principles are determined as per national environment policy, 2013 2. Management of ecosystems and sustainable natural resource use as per national environment policy, 2013 3. Environmental stewardship as per national environment policy, 2013 4. Environmental quality and health as per national environment policy, 2013 5. Environmental governance laws are determined as per national environment policy, 2013 |
| 2. Perform geo-graphic communication | 1. Digital maps developed to scale as per Open Geospatial Consortium 2. Digital maps presented to scale as per Open Geospatial Consortium 3. Graphs are generated as per Open Geospatial Consortium 4. Images are geo-referenced and processed as per Open Geospatial Consortium. 5. Digital models are generated from raw data as per Open Geospatial Consortium |
| 3. Generate geo-maps | 1. Maps are generated as per Federal Geographic Data Committee 2. ***Maps projected*** are designed and compiled as per Federal Geographic Data Committee 3. ***Coordinate reference systems*** are applied a per Federal Geographic Data Committee |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Map projections may include but are not limited to: | * UTM (Universal Transverse Mercator) * UPS (Universal Polar Stereographic) |
| 2. Coordinate reference systems may include but are not limited to: | * Geographical coordinates * Projected Coordinate system |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

The individual needs to demonstrate the following skills:

* ICT skills
* Operating GNSS receivers
* Geo-referencing
* Collecting data
* Taking aerial photographs
* Scanning maps
* Layering features
* Interpretation
* Presentation
* Mathematical skills
* Designing maps
* **Required knowledge**

The individual needs to demonstrate knowledge of:

* Map layout
* Geographical information systems
* Types of GNSS receivers
* Aerial photography
* Digital models
* Watershed delineation
* Remote sensing
* Data processing
* Data presentation
* Mapping scales
* Map projections
* Geo-referencing
* Map design
* Reference systems

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical aspects  of Competency | Assessment requires evidence that the candidate:  1.1 Collected data  1.2 Processed data  1.3 Mapped natural resources  1.4 Designed, developed and presented digital maps  1.5 Generated graphs  1.6 Geo-referenced and processed images  1.7 Generated digital models |
| · 2. Resource Implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 3.Methods of Assessment | Competency in this unit may be assessed through:  3.1 Practical test  3.2 Oral questioning  3.3 Written test  3.4 Portfolio of Evidence  3.5 Interview  3.6 Third party report |
| 4.Context of Assessment | Competency may be assessed:   1. Workplace 2. Simulated workplace |
| 5. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## APPLY SOIL SCIENCE PRINCIPLES

**UNIT CODE: 0811 551 17A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to apply soil science principles. It includes competencies for performing soil sampling and analysis and improving soil fertility.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the range.*** |
| * + - 1. Perform soil sampling | 1. ***Personal protective equipment’s*** are worn as per work requirement 2. ***Soil sampling tools*** and ***soil testing equipment*** are assembled as per work requirement 3. Soil samples are obtained as per work procedure 4. Composite soil samples are prepared and recorded for analysis as per ***sampling procedures*** |
| * + - 1. Perform soil analysis | * 1. Personal protective equipment’s are worn as per work requirement   2. Soil analysis equipment and materials are assembled according to work requirement   3. Soil samples are processed based on test requirement   4. ***Soil properties*** are analysed in accordance to work requirement   5. Soil analysis report is prepared as per work procedure |
| * + - 1. Improve soil fertility | * 1. Personal protective equipment’s are worn as per work requirement   2. Tools, equipment and materials are assembled according to work requirement   3. ***Fertilizers*** are prepared as per soil analysis report   4. ***Soil amendments*** are applied as per soil analysis report   5. ***Soil conservation measures*** are applied as per field condition |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Soil sampling tools may include but are not limited to: | * Hoes * Machetes * Secateurs * Shovels * Soil augur * Panga * Hammer * Saw * Bucket * Shears * Dibbler * Pegs |
| 1. Soil testing equipment may include but are not limited to: | * Digestion block * Kjeldahl apparatus * UV-VIS Spectrophotometer * Atomic absorption spectrophotometer (AAS) * Flame photometer * pH meter * EC meter * TDS meter * Fume chamber * Measuring cylinders * Assorted glassware for routine laboratory procedures * Mechanical stirrer * Electric shaker * Eureka cans * Meteorological equipment |
| 1. Personal protective equipment may include but are not limited to: | * Gloves * Safety goggles * Safety boots * Overalls * Dust coat * Ear muffs * Face masks |
| 1. Sampling procedures may include but are not limited to: | * Field layout * Sample collection * Compositing * Packaging * Processing * Storage |
| 1. Soil properties may include but are not limited to: | * Soil texture * Soil aggregation * Soil consistency * Soil colour * Soil moisture * Soil air * Soil bulk density * Water holding capacity * Soil pH * Soil EC * Cation exchange capacity * Percent base saturation * Salt index * Microbial activity * CN ratio * Nutrient’s concentration |
| 1. Fertilizers may include but are not limited to: | * Organic fertilizers * Inorganic fertilizers |
| 1. Soil amendments may include but are not limited to: | * Fertilizers * Agricultural lime * Gypsum |
| 1. Soil conservation measures may include but are not limited to: | * Cover cropping * Mulching * Strip cropping * Building of terraces * Minimum tillage * Contour ploughing |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required skills**

The individual needs to demonstrate the following skills:

* Measuring
* Nutrients deficiency scouting
* Equipment calibration
* Technical Report writing
* Soil sampling
* Soil testing
* Plant tissue analysis
* Fertilizer recommendation
* Computation of lime requirement
* Observation
* Digital literacy

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Essential plant nutrients
* Soil-plant relationship
* Types of fertilizers and their nutrition content
* Fertilizer formulation and use
* Sources of soil acidity
* Management of soil acidity
* Types of tools and equipment used in soil sampling and soil testing
* Soil sampling and testing
* Soil degradation
* Soil conservation
* Standard operating procedures
* Accounting principles
* Waste Management
* Occupational Safety and Health Procedures

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Observed safety measures by using Personal Protective Equipment (PPE) and correct tools 2. Assemble soil sampling tools and soil testing equipment 3. Collected soil samples as per soil sampling procedures 4. Processed soil samples for laboratory analysis in accordance to work procedures 5. Analysed soil physical, chemical and biological properties in accordance to work procedures 6. Computed fertilizer application rates as per crop nutrient requirement 7. Computed lime requirement as per soil analysis report and agronomic requirement 8. Applied soil amendments as per soil analysis report 9. Applied soil conservation measures as per field conditions |
| 1. Resource Implications (required for assessment) | The following resources must be provided during assessment:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of Assessment | Competency may be assessed through:   * 1. Practical test   2. Written tests   3. Oral questioning   4. Interviews |
| 1. Context of Assessment | Competency may be assessed:   1. Workplace 2. Simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended |

## 

## APPLY BIOCHEMISTRY PRINCIPLES

**UNIT CODE: 0512 551 18A**

**UNIT DESCRIPTIO N**

This unit specifies the competencies required by a Dairy Plant Technician level 6 to apply biochemistry principles. It involves measuring Enzyme kinetics, analyzing carbohydrates, proteins, lipids, vitamins and minerals.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Measure Enzyme kinetics | 1. Enzyme and substrate are prepared as per laboratory procedures. 2. Enzyme assay are set up as per laboratory procedures. 3. Enzyme reaction rate are measured as per laboratory procedures. |
| 1. Analyze carbohydrates | 1. Carbohydrates are identified based on chemical composition as per laboratory procedure. 2. ***Carbohydrates are classified*** based on chemical composition as per laboratory procedure. 3. Carbohydrates are classified based on chemical structure. 4. Carbohydrate functions are applied based on chemical structure. |
| 1. Analyze proteins | 1. Proteins are identified based on chemical composition as per laboratory procedure. 2. Proteins classify based on chemical structure. 3. Proteins functions are applied based on chemical structure. |
| 1. Analyze lipids | 1. ***Lipids*** are identified based on chemical composition as per laboratory procedure. 2. Lipids classified based on chemical structure. 3. Lipids functions are applied based on functional groups. |
| 1. Analyze Minerals and vitamins | 1. Minerals and vitamins are identified based on chemical composition as per laboratory procedure. 2. ***Minerals*** functions areapplied based on chemical structure. 3. ***Vitamins*** functions are appliedbased on chemical structure. |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Carbohydrates are classified may include but are not limited to; | * Monosaccharide’s * Disaccharides * Polysaccharides * Oligosaccharides |
| 1. Fats and lipids classified may include but are not limited to; | * Phospholipids * Triglycerides * Sphingolipids * Steroids |
| 1. Minerals are classified may include but are not limited to; | * Macro elements * Micro elements |
| 1. Vitamins classified may include but are not limited to; | * Water soluble vitamins * Fat soluble vitamins |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Hydrocarbons
* Chemical reaction
* Laboratory safety
* Laboratory apparatus
* Laboratory rules and regulation
* Basic cell biology

**Required skills**

The individual needs to demonstrate the following skills:

* Observation
* Analytical
* Critical thinking
* Writing
* Active listening
* Problem solving
* Numeracy
* Communication

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Measured enzyme reaction rate as per laboratory procedures. 2. Applied carbohydrate functions based on chemical structure. 3. Applied proteins functions based on chemical structure. 4. Applied lipids functions based on functional groups. 5. Applied minerals functions based on chemical structure. 6. Applied vitamins functions based on chemical structure. |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proposed activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:  Observation   1. Practical test 2. Oral questioning 3. Portfolio of evidence 4. Interviews 5. Third party report 6. Written tests |
| 1. Context of assessment | Competency may be assessed:   1. Workplace 2. Simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

## APPLY INORGANIC AND ORGANIC CHEMISTRY

**UNIT CODE: 0531 551 21A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by a Horticulture Farm Technologist level 6 to apply inorganic and organic chemistry. It involves applying physical chemistry principles, inorganic and organic chemistry concepts.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Apply physical chemistry principles | 1. Acid and bases properties are applied as per acid-base theory. 2. Salts properties are applied as per salt solubility rules 3. Ionic and chemical equilibrium properties are applied as per physical chemistry theory. 4. Reaction kinetics properties are applied as per physical chemistry theory. 5. Gas properties are applied as per kinetic theory of gases. |
| 1. Apply inorganic chemistry concepts | * 1. Knowledge of element is applied as per the periodic table.   2. ***Chemical bonds*** are determined according to Valence Shell Electron Pair Repulsion (VSEPR) theory.   3. Inorganic salts are tested as per solubility rules |
| 1. Apply organic chemistry concepts | * 1. ***Organic compounds classes*** are used according to International Union of Pure and Applied Chemistry (IUPAC) rules.   2. ***Physical properties*** of organic compounds are applied as per IUPAC rules.   3. ***Chemical properties*** organic compounds are applied as per IUPAC rules.   4. Synthesized compounds are purified as per organic laboratory manual   5. Purified compounds are used as per organic laboratory manual |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Chemical bonds may include but are not limited to: | * Ionic bonds * Covalent bonds * Metallic bonds * Hydrogen bonds |
| 2. Organic compounds classes may include but are not limited to: | * Carbohydrates * Proteins * Lipids * Hydrocarbons |
| 1. Physical properties may include but are not limited to: | * Colour * Hardness * Mass * Solubility * Density * Melting point |
| 1. Chemical properties may include but are not limited to: | * Ph * Chemical stability * Radioactivity * Flammability * Heat of combustion |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

Required knowledge

The individual needs to demonstrate knowledge of:

* Periodic table
* Hydrocarbons
* Chemical reaction
* Laboratory safety
* Laboratory apparatus
* Laboratory rules and regulation

**Required skills**

The individual needs to demonstrate the following skills:

* Observation
* Analytical
* Critical thinking
* Writing
* Active listening
* Problem solving

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Applied acid and bases properties as per acid-base theory.   2. Applied salts properties as per salt solubility rules   3. Applied Ionic and chemical equilibrium properties as per physical chemistry theory.   4. Applied reaction kinetics properties as per physical chemistry theory.   5. Applied gas properties as per kinetic theory of gases.   6. Tested inorganic salts as per solubility rules   7. Applied physical properties of organic compounds as per IUPAC rules.   8. Applied chemical properties organic compounds as per IUPAC rules.   9. Used purified compounds as per organic laboratory manual |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proposed activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Practical test 2. Oral questioning 3. Portfolio of evidence 4. Third party report 5. Written tests |
| 1. Context of assessment | Competency may be assessed:   1. Workplace 2. Simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

## 

## APPLY FARM MANAGEMENT PRINCIPLES

**UNIT CODE: 0811 541 25A**

**UNIT DESCRIPTION**

This unit specifies competencies required to apply farm management principles**.** It involves Apply farm Planning techniques, Control farm operations, manage farm resources and Organize farm operations

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the Range.*** |
| 1. Apply farm Planning techniques | 1. Goals and objectives of livestock enterprise are established as per workplace procedures 2. ***Organization plans*** for livestock farm are established as per type of plan 3. ***Resources*** required to achieve the goals in livestock farm are identified as per workplace requirements |
| 1. Control farm operations | 1. Motivation of employees to achieve organizational objectives is performed as per operational plan 2. Incorporation of different ***leadership styles*** is done as per workplace requirements 3. Evaluation of plan and making adjustments to ensure the organizational goals are conducted as per type of plan 4. Capacity building of the employees is performed as per workplace procedures 5. ***Performance appraisals*** are conducted as per workplace procedures 6. ***Resource adjustments*** is performed as per workplace procedures |
| 1. Manage farm resources | 1. Assessment of corporate social responsibilities and cultural opportunities is conducted as per workplace procedures 2. Costs and pricing of the livestock farm enterprise is as per cost-budget analysis 3. Quality control and customer service is conducted as per workplace procedures 4. Direction of resources and efforts of business towards opportunities for economically significant results is conducted as per workplace procedures |
| 1. Organize farm operations | 1. Resources distribution is performed as per workplace procedures 2. Achieve established goals as per workplace procedures 3. Livestock farm enterprise is budgeted as per workplace procedures 4. ***Staffing of workers*** in the livestock farm is executed as per workplace procedures |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

|  |  |
| --- | --- |
| **RANGE** | **VARIABLE** |
| 1. Organization plans may include but are not limited to: | * Strategic plan * Tactical plan * Operational plan   + Working plan |
| 1. Resources may include but are not limited to: | * + Human   + Financial   + Agricultural machines   + Agricultural inputs |
| 1. Leadership styles may include but are not limited to: | * + Authoritarian Leadership   + Democratic Leadership   + Transformational Leadership   + Laissez-Faire Leadership |
| 1. Performance appraisals may include but are not limited to: | * + Straight ranking appraisals   + Grading   + Management by objective appraisals   + Behavior-based appraisal   + Performance appraisal |
| 1. Resource adjustments may include but are not limited to: | * + Budget   + Staff |
| 1. Staffing of workers may include but are not limited to: | * + Advertisement of vacant   + Shortlisting   + Interview   + Recruitment   + Training   + Motivation |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required skills**

The individual needs to demonstrate the following knowledge:

* Strategic planning
* Monitoring and evaluation
* Business management function
* Human resources management
* Sales and Marketing
* Basic accounting
* Critical thinking
* Leadership skills

**Required s knowledge**

The individual needs to demonstrate the following skills:

* Basic numeracy
* Record Keeping
* Report writing
* Basic accounting

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Conducted assessment of corporate social responsibilities and cultural opportunities as per work place procedure 2. Conducted quality control and customer service as per work place procedure 3. Conducted ***Performance appraisals*** as per work place procedure 4. Performed ***Resource adjustments*** as per work place procedure |
| 1. Resource Implication | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Method of Assessment | Competency in this unit may be assessed through:   * 1. Practical test   2. Written tests   3. Oral questioning   4. Third party reports |
| 1. Context of assessment | * 1. Workplace   2. Simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## 

## APPLIED RESEARCH

**UNIT CODE: 0111 551 26A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by Horticulture Farm Technologist level 6 to conduct scientific research**.** It involves preparing scientific research proposal, carrying out laboratory research, analysing the laboratory research findings, documenting, and disseminating laboratory research findings.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function | **PERFORMANCE CRITERIA**  These are **assessable statements** which specify the required level of performance for each of the elements |
| 1. Prepare scientific research proposal | 1. Scientific research problem is identified based on existing research gap 2. Research objectives are developed according to research problem 3. Research questions are designed based on research objectives 4. Scientific research proposal is developed as per standard research procedures |
| 1. Apply scientific research methods | 1. ***Scientific study design*** is determined in accordance with research problem and research data 2. Sample size is determined based on the research methodology 3. ***Sampling techniques*** are determined in accordance with scope and research methodology 4. Ethical considerations are determined based on research methods utilized 5. Research materials are identified based on scope and research methodology 6. Data is collected in accordance with research methodology |
| 1. Analyse scientific research finding | 1. ***Data analysis methods*** are identified as per job requirement. 2. Data analysis is performed as per work procedure 3. Research report is prepared as per work procedure. |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

|  |  |
| --- | --- |
| **VARIABLE** | **RANGE** |
| 1. Scientific study design may include but not limited to: | * Qualitative designs * Quantitative designs |
| 1. Sampling techniques may include but are not limited to: | * Probability   + Non-probability |
| 1. Data analytical methods may include but are not limited to: | * ANOVA * Measures of central tendency * Measures of dispersal |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

The individual needs to demonstrate the following skills:

* Analytical
* Communication
* Computer
* Creativity
* Interpersonal
* Critical thinking
* Data collection
* Decision making
* Dissemination
* Observation
* Problem solving
* Report writing
* Statistical

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Introduction to research
* Problem identification
* Types of research
* Purposes of research
* Basic terms in research
* Problem identification
* Literature review
* Research design
* Data collection and analysis
* Research materials
* Statistics
* Mathematics
* Research proposal
* Research report

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Identified scientific research problem based on existing research gap 2. Developed scientific research proposal as per work requirement. 3. DeterminedScientific study design in accordance with research problem and research data 4. Collected data in accordance with research methodology 5. Applied data analysis techniques as per work requirement Compiled Research report as per work requirement |
| 1. Resource Implications | Th The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of Assessment | Competency may be assessed through:   1. Practical Test 2. Project-Based Assessment 3. Portfolio of Evidence 4. Third Party Reports 5. Written Assessment |
| 1. Context of Assessment | Competency may be assessed   1. Workplace 2. Simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

# CORE UNITS OF COMPETENCY

## OPERATE FARM IRRIGATION AND DRAINAGE SYSTEMS

**UNIT CODE: 0811 551 05A**

**UNIT DESCRIPTION**

This unit specifies the competencies required by an Agricultural Engineering Technician Level 6 to carry out farm irrigation and drainage. It involves designing farm irrigation and drainage systems, installing farm irrigation and drainage systems and maintaining farm irrigation and drainage systems.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms*** ***are elaborated in the Range.*** |
| 1. Design farm irrigation and drainage systems | 1. ***Farm irrigation and drainage system*** work drawingis prepared as per work requirement 2. Farm irrigation and drainage system design approvals is obtained as per work requirement 3. Farm irrigation and drainage system material costing is prepared as per approved designs and drawing 4. Farm irrigation and drainage system material schedule is prepared based on design and drawing |
| 1. Install farm irrigation and drainage systems | * 1. Personal protective equipment are worn based on OSHA   2. ***Farm irrigation and drainage system tools and equipment*** are assembled as per work requirements.   3. Farm irrigation and drainage system is installed as per approved designs and work drawings   4. Farm irrigation and drainage system is tested as per work requirements |
| 1. Maintain farm irrigation and drainage systems | 1. Personal protective equipment are worn based on OSHA 2. Farm irrigation and drainage systemmaintenance schedule is prepared as per irrigation and drainage system manuals 3. Farm irrigation and drainage system tools and equipmentare assembled as per work requirement. 4. Farm irrigation and drainage system is maintained as per work requirement |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Farm irrigation and drainage system may include but are not limited to: | * Surface * Sub surface * Sprinkler * Trickle * Centre pivot |
| 1. Farm irrigation and drainage system tools and equipment may include but are not limited to: | * Drip kit * Pipes * Fittings * Water meter * Flow meters * Pumps |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Data analysis and presentation
* Computer application packages
* Field assessment procedures
* Different land condition
* Different farm tools and materials
* Soil and water conservation
* Occupational safety and health procedures

**Required skills**

The individual needs to demonstrate the following skills:

* Record keeping
* Planning
* Technical report writing
* Digital literacy
* Measuring
* Decision making
* Communication skills

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Wornpersonal protective equipmentbased on OSHA 2. Prepared working drawings as per work requirements 3. Prepared bill of quantities as per approved designs and drawings 4. Prepared material schedule based on design and drawings 5. Installed irrigation and drainage systems according to designs and working drawings 6. Prepared maintenance schedule as per irrigation and drainage system 7. Maintained irrigation and drainage systems as per work requirement |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through: Practical   1. Project 2. Portfolio of evidence 3. Third party report 4. Written tests 5. Oral questioning |
| 1. Context of assessment | Competency may be assessed:   * 1. Workplace   2. Simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

## OPERATE FARM MACHINERY

**CODE: 0716 551 06A**

**UNIT DESCRIPTION**

This unit equips trainees with knowledge and skills to operate farm power and machinery. The unit entails description of the types and sources of farm power, demonstration of the working principles of the internal combustion engine and tractor systems and maintenance of the tractor and tractor systems. It also involves operation and maintenance of farm tools, equipment and machinery.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the **key outcomes** which make up **workplace function**. | **PERFORMANCE CRITERIA**  These are **assessable** statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the range.*** |
| 1. Operate hand tools and equipment | 1. Personal protective equipment is worn as per safety procedures 2. ***Hand tools*** and ***equipment*** are assembled as per work requirement 3. Hand tools and equipment are utilized as per work procedure 4. Hand tools and equipment are serviced as per work procedure 5. Hand tools and equipment are stored as per work procedure |
| 1. Operate tillage machinery | * 1. ***Personal protective equipment*** is worn as per safety procedures   2. ***Tillage machinery*** is operated as per work procedures   3. Tillage machinery is maintained as per work procedure   4. Tillage machinery is stored as per work procedure |
| 1. Operate planting machinery | * 1. Personal protective equipment is worn as per safety procedure   2. ***Planting machinery*** is calibrated as per work requirement   3. Planting machinery is operated as per work procedure   4. Planting machinery is maintained as per work procedure   5. Planting machinery is stored as per work procedure |
| 1. Operate crop protection machinery | * 1. Personal protective equipment is worn as per safety procedure   2. ***Crop protection machinery*** calibrated as per work requirement   3. Crop protection machinery is operated as per work requirement   4. Crop protection machinery is maintained as per work procedure   5. Crop protection machinery is stored as per work requirement |
| 1. Operate harvesting machinery | * 1. Personal protective equipment is worn as per safety procedures   2. Harvesting machinery is operated as per work procedures   3. Harvesting machinery is maintained as per work requirement   4. Harvesting machinery is stored as per work requirement |
| 1. Operate agro-processing machinery | * 1. Personal protective equipment is worn as per safety procedures   2. ***Agro-processing machinery*** is operated as per work requirement   3. Agro-processing machinery is maintained and repaired as per work requirement   4. Agro-processing machinery is stored as per work requirement |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Personal protective equipment may include but are not limited to: | * Eye protection equipment * Hearing protection equipment * Feet protection equipment * Respiratory protection equipment * Gloves * Full body suits |
| 1. Hand tools and equipment may include but are not limited to: | * Garden tools and equipment * Livestock handling tools and equipment * Cultivation tools and equipment * Harvesting tools and equipment * Crop protection tools and equipment |
| 1. Tillage machinery may include but are not limited to: | * Ploughs * Harrows * Tillers * Rotavators * Subsoilers |
| 1. Planting machinery may include but are not limited to: | * Seed drills * Planters * Ridgers * Fertilizer distributors * Manure spreaders |
| 1. Crop protection machinery may include but are not limited to: | * Sprayers * Dusters |
| 1. Harvesting machinery may include but are not limited to: | * Balers * Mowers * Combined harvesters * Potato harvester * Threshers |
| 1. Processing machinery may include but are not limited to: | * Mills * Grinders * Shellers * Dryers * Elevator’s conveyors |
| 1. Secondary tillage machinery may include but are not limited to: | * Harrows * rotary tillers |
| 1. Sowing machinery may include but are not limited to: | * seed drill * planters * potato planter |
| 1. Crop protection machinery may include but are not limited to: | * boom sprayer * dusters * knapsack sprayers |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

The individual needs to demonstrate the following skills:

* Identification
* Drawing
* Communication
* Demonstration
* Interpersonal
* Calculation
* Analytical
* Observation
* Problem solving
* First aid
* Innovation
* Creativity

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Types and sources of farm power
* Tractor engine
* Tractor systems and their principles of operation
* Power transmission in a tractor
* Tractor components, controls and features and operational functions
* Tractor steering systems and features
* Attached equipment, features and operational functions and procedures
* Operating principles and operating of farm machinery
* Maintenance of tractors
* Maintenance of farm tools, equipment and machinery

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | The evidence required to demonstrate competency in this unit must be relevant to workplace operations and satisfy holistically all of the requirements of the performance criteria and required skills and knowledge and include evidence of the following   1. Utilized hand tools and equipment 2. Serviced Hand tools and equipment 3. Operated ***Tillage machinery*** 4. Calibrated ***Planting machinery*** calibrated as per work requirement 5. Operated Planting machinery as per work procedure 6. calibrated ***Crop protection machinery*** as per work requirement 7. Operated Crop protection machinery as per work requirement 8. Operated Harvesting machinery as per work procedures 9. Wore Personal protective equipment per safety procedures 10. Operated ***Agro-processing machinery*** is as per work requirement |
| 1. Resource Implications | The following resources must be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of Assessment | Competency may be assessed through:   1. Written tests 2. Oral questioning 3. Interviewing |
| 1. Context of Assessment | Competency may be assessed:   1. Workplace 2. simulated workplace environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job roles is recommended. |

## IMPROVE SOIL FERTILITY

**UNIT CODE: 0812 551 07A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to improve soil fertility. It includes competencies for performing soil sampling, preparing organic manure and applying soil amendments.

**ELEMENTS AND PERFORMANCE CRITERIA**

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| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the range.*** |
| 1. Perform soil sampling | 1. ***Personal protective equipment’s*** are worn as per work requirement 2. ***Soil sampling tools, equipment and materials*** are assembled as per work requirement 3. Soil samples are obtained as per ***sampling procedures*** 4. Composite soil samples are prepared, recorded and sent for analysis as perwork requirement |
| 1. Prepare organic manure | * 1. Personal protective equipment’s are worn as per work requirement   2. Tools, equipment and materials are assembled as per work requirement   3. ***Organic manures*** are prepared as per work procedure |
| 1. Apply soil amendments | * 1. Personal protective equipment’s are worn as per work requirement   2. Tools, equipment and materials are assembled as per work requirement   3. ***Soil amendments*** are applied as per soil analysis report |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Personal protective equipment may include but are not limited to: | * Gloves * Safety goggles * Safety boots * Overalls * Dust coat * Ear muffs * Face masks |
| 1. Soil sampling tools, equipment and materials may include but are not limited to: | * Hoes * Machetes * Secateurs * Shovels * Soil augur * Panga * Hammer * Saw * Bucket * Shears * Dibbler * Pegs * Weighing balance * Sampling bags * Labels * Marker pens |
| 1. Sampling procedures may include but are not limited to: | * Field layout * Sample collection * Compositing * Packaging * Processing * Storage |
| 1. Organic manures may include but are not limited to: | * Green manure * Farmyard manure * Compost manure |
| 1. Soil amendments may include but are not limited to: | * Fertilizers * Agricultural lime * Gypsum |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required skills**

The individual needs to demonstrate the following skills:

* Measuring
* Nutrient’s deficiency scouting
* Equipment calibration
* Technical Report writing
* Soil sampling
* Computation of lime requirement
* Observation
* Digital literacy

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Essential plant nutrients
* Soil-plant relationship
* Types of fertilizers and their nutrition content
* Fertilizer formulation and use
* Sources of soil acidity and alkalinity
* Management of soil acidity and alkalinity
* Types of tools and equipment used in soil sampling
* Soil sampling procedures
* Causes of soil degradation
* Soil and water conservation measures
* Waste management practices
* Occupational safety and health procedure

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate:   1. Used personal protective equipment as per work requirement 2. Collected soil samples as per soil sampling procedures 3. Prepared organic manure as per work procedure 4. Applied soil amendments as per soil analysis report 5. Applied soil conservation measures as per work requirement |
| 1. Resource Implications (required for assessment) | The following resources should be provided during assessment:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of Assessment | Competency may be assessed through:   * 1. Written tests   2. Practical tests   3. Oral questioning   4. Interviews |
| 1. Context of Assessment | Competency may be assessed:   * 1. Workplace   2. Simulated workplace environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended |

# PRODUCE VEGETABLE CROPS IN OPEN ENVIRONMENT

**UNIT CODE:** 0812 251 09A

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce vegetable crops in open environment. It involves propagating vegetable crop seedlings, preparing land for vegetable crop, growing vegetable crop, harvesting vegetable crop, undertaking post-harvest activities and undertaking marketing activities.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the **key outcomes** which make up **workplace function.** | **PERFORMANCE CRITERIA**  These are **assessable** statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the range.*** |
| --- | --- |
| 1. Propagate vegetable crop seedlings in open environment | * 1. Market survey is undertaken as per vegetable crop type demand   2. Sources of finances are managed as per financial procedures   3. Business planning is undertaken as per resource implications   4. Vegetable crop seeds are selected for propagation as per ecological requirements   5. Work safety measures are observed as per the work requirements   6. Vegetable crop parts are identified as per vegetable crop type.   7. Tools and equipment are assembled as per work requirements   8. Suitable site is identified based on vegetable crop type   9. Water for irrigation is applied as per vegetable crop type   10. Crop nursery is prepared as per vegetable crop type   11. Tools and equipment are maintained as per type.   12. Crop nursery ***management practices*** are carriedoutas per vegetable crop type   13. Farm activities costs is documented as per task requirements   14. Waste is disposed in accordance with EMCA 2015 requirements   15. Emerging trends are applied in nursery preparation as per current technological development |
| 1. Prepare land for growing vegetable crop | * 1. Work safety measures are observed as per the work requirements   2. Tools, equipment and materials are assembled as per work requirements   3. Land is cleared as per agronomic requirements   4. ***Land tillage*** is carried out as per agronomic requirements.   5. Soil testing is carried out as per soil testing procedure.   6. ***Soil amendments*** is applied as per soil analysis report   7. Planting furrows are made as per vegetable crop type   8. Farm activities costs is documented as per task requirements   9. Tools and equipment are maintained as per type.   10. Waste is disposed in accordance with EMCA 2015 requirements   11. Records on land preparations are developed and shared based on workplace policy   12. Emerging trends are applied in preparing Land as per current technological development |
| 1. Grow vegetable crop | * 1. Work safety measures are observed as per the work requirements   2. Tools, equipment and materials are assembled as per work requirements   3. Land is watered as per vegetable crop type requirement   4. Vegetable seedlings are transplanted as per agronomics requirements   5. Vegetable seeds are planted as per agronomics requirements   6. ***Mulching*** of the vegetable crops is carried out as per agronomic requirements.   7. Vegetable crops are watered as per vegetable crop type requirement.   8. Vegetable crops are gapped and thinned based as per agronomic requirements   9. Vegetable crops are trained and pruned as per agronomic requirements   10. ***Crop protection measures*** are applied as per agronomic requirement   11. ***Crop nutrition measures*** are undertaken as per vegetable crop type requirement.   12. Food safety measures are implemented in conformity with assessment standards   13. Tools and equipment are maintained as per type.   14. Farm activities costs is documented as per task requirements   15. Waste is disposed in accordance with EMCA requirements   16. Emerging trends are applied in growing vegetable crop type as per current technological development |
| 1. Harvest vegetable crop | * 1. Work safety measures are observed as per the work requirements   2. Tools, equipment and materials are assembled as per work requirements   3. ***Maturity indices*** are observed as per vegetable crop type.   4. Food safety measures during harvesting are implemented in conformity to assessment standards   5. Crop ***Picking*** is carried out as per vegetable crop type   6. Produce is transported to the pack house as per vegetable crop type requirements   7. Tools and equipment are maintained as per type.   8. Farm activities costs is documented as per task requirements   9. Harvest records are developed and maintained as per   10. Waste is disposed in accordance with EMCA requirements   11. Emerging trends are applied in harvesting vegetable crop type as per current technological development |
| 1. Undertake post- harvest activities | * 1. Work safety measures are observed as per the work requirements.   2. Tools, equipment and materials are assembled as per work requirements.   3. Post harvest food safety measures are observed in in conformity to assessment standards   4. Harvested vegetables are received at the packhouse as per vegetable crop type requirement.   5. Vegetables are sorted as per vegetable crop type requirement.   6. Produce is cleaned as per the vegetable crop type requirements.   7. Vegetables are graded as per market requirements.   8. Vegetables are packaged as per market requirements.   9. Produce is stored as per vegetable crop type requirement.   10. Tools and equipment are maintained as per type.   11. Farm activities costs is documented as per task requirements.   12. Waste is disposed in accordance with EMCA requirements.   13. Emerging trends are applied in undertaking post-harvest activities as per current technological development. |
| 1. Undertake marketing activities | 1. Crop price is compared based on different markets. 2. Produce price range and market is decided based on the market demand. 3. Basic value addition is undertaken as per the market demand. 4. Farm activities costs is documented as per task requirements. 5. Waste is disposed in accordance with EMCA requirements. 6. Emerging trends are applied in undertaking Marketing activities as per current technological development. |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Vegetable crop include but not limited to: | * + Leaf vegetables * Kales * Cabbage * Black nightshade (Managu)   + Fruit vegetables * Tomatoes * Capsicum * Cucumber   + Root and Tuber * Onions * Carrots * Garlic |
| 1. Work safety measures   include but not limited to: | * + Personal Safety   + PPEs   + Warning signage   + Tools and equipment safety |
| 1. Land tillage include but not limited to: | * + Primary tillage   + Secondary tillage   + Tertiary tillage |
| 1. Management practices include but not limited to: | * + Watering   + Thinning   + Pricking out   + Shading   + Weeding   + Pest and diseases control   + Hardening off |
| 1. Soil amendment include but not limited to: | * + Manure application   + Gypsum and lime   + Fertilizer application |
| 1. Mulching include but not limited to: | * + Organic mulch   + Inorganic mulch |
| 1. Crop protection measuresinclude but not limited to: | * + Biological   + Cultural   + Mechanical   + Chemical |
| 1. Crop nutrition measures include but not limited to: | * + Chemical Fertilizers application   + Organic Fertilizers application |
| 1. Maturity indices include but not limited to: | * + Horticultural maturity   + Market maturity   + Physiological maturity |
| 1. Picking include but not limited to: | * + Cutting   + Uprooting   + Digging   + Pinching |
| 1. Basic value additions include but not limited to: | * + Waxing   + Packaging   + Product Processing |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

* Measuring skills
* Spraying skills
* Observation skills
* Record keeping skills
* Marketing skills
* Analytical skills
* Agronomic practices skills

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Crop husbandry practices
* Waste management practices
* Soil and water conservation measures
* Types of Soil
* Soil composition
* Plant anatomy
* Types of weeds and their control
* Safety measures
* Weather patterns
* Pests control measures
* Ecological zones
* Irrigation methods
* Food safety measures
* Basic financial literacy
* Greenhouse structures
* Crop nutrition measures

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Selected vegetable crop seeds for propagation as per ecological requirements   2. Observed work safety measures as per the work requirements   3. Assembled tools and equipment as per work requirements   4. Carried out crop nursery management practices as per vegetable crop type   5. Carried out Land tillage as per agronomic requirements.   6. Carried out soil testing as per soil testing procedure   7. Applied soil amendments as per soil analysis report   8. Applied crop protection measures as per agronomic practice procedure   9. Applied crop nutrition measures as per crop requirement.   10. Applied maturity indices as per vegetable crop type.   11. Stored produce as per vegetable crop type   12. Applied food safety measures as per conformity assessment standards   13. Disposed waste in accordance with EMCA 2015 requirements |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place. 2. Access to relevant work environments. 3. Resources relevant to the proposed activities or task. |
| 1. Methods of assessment | Competency may be assessed through:   * 1. Observation   2. Oral questioning   3. Written tests   4. Practical’s   5. Projects |
| 1. Context of Assessment | Competency may be assessed:   * 1. On-the-job   2. Simulated workplace environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

**PRODUCE VEGETABLE CROPS IN PROTECTED ENVIRONMENT**

**UNIT CODE:** 0812 251 10A

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce vegetable crops in protected environment. It involves setting up protected environment, growing vegetable crop in protected environment, harvesting vegetable crop, undertaking post-harvest activities, undertaking value addition processes and undertaking marketing activities.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the **key outcomes** which make up **workplace function**. | **PERFORMANCE CRITERIA**  These are **assessable** statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the range.*** |
| 1. Set up Protected Environment | * 1. Market survey is undertaken as per vegetable crop type demand.   2. ***High value Vegetable crops*** seeds are selected for propagation as per market demand.   3. Work safety measures are observed as per the work requirements.   4. Tools and equipment are assembled as per work requirements.   5. Suitable ***production structure*** is prepared as per work instructions.   6. Soil and water are conserved as per agronomic requirements.   7. Water for irrigation is applied as per water analysis report.   8. Crop nursery is established as per vegetable crop type.   9. Propagation media is prepared based on the crop requirement and work instructions.   10. Nursery trays are selected and treated as per safety requirements.   11. Crop nursery management practices are carried out as per vegetable crop type   12. Tools and equipment are maintained as per type   13. Farm activities costs is documented as per task requirements   14. Waste is disposed in accordance with EMCA 2015 requirements   15. Food safety measures are implemented as per conformity assessment standards |
| 1. Grow Vegetable Crop in protected environment | * 1. Work safety measures are observed as per the work requirements   2. Tools, equipment and materials are assembled as per work requirements   3. Mapal troughs are watered as per crop water requirements   4. Seedbed is prepared as per vegetable crop manual.   5. Vegetable crop is established as per crop requirement.   6. Mulching of the vegetable crops is carried out as per agronomic requirements.   7. Vegetable crops are watered as per crop requirement.   8. Vegetable crops are gaped and thinned based as per crop requirement.   9. Vegetable crops are trained, trellised and pruned as per crop requirement.   10. Pests and diseases are identified as per crop type   11. Crop protection measures are applied as per pests and diseases.   12. Crop nutrition measures are implemented as per crop requirement.   13. Food safety measures are implemented as per conformity assessment standards   14. Tools and equipment are maintained as per manufactures manual   15. Farm activities costs is documented as per task requirements and workplace policy.   16. Waste is disposed in accordance with EMCA 2015 requirements |
| 1. Harvest Vegetable Crop | * 1. Work safety measures are observed as per the work requirements   2. Tools, equipment and materials are assembled as per work requirements   3. ***Maturity indices*** are observed as per vegetable crop type.   4. ***Picking*** of the crop is carried out as per the vegetable type   5. Produce is transported to the pack house as per the Vegetable type requirements.   6. Tools and equipment are maintained as manufactures manual.   7. Farm activities costs is documented as per task requirement and workplace policy.   8. Waste is disposed in accordance with EMCA 2015 requirements   9. Emerging trends are applied in harvesting vegetable crop as per current technological development. |
| 1. Undertake Post Harvest Activities | 1. Work safety measures are observed as per the workplace policy. 2. Tools, equipment and materials are assembled as per work requirements. 3. Harvested vegetables are received at the packhouse as per workplace policy. 4. Vegetables are sorted as per vegetable type and workplace policy. 5. Produce is cleaned as per the vegetable crop requirements and workplace policy. 6. Vegetables are graded as per market requirements. 7. Vegetables are packaged as per market requirements. 8. Produce is Stored as per vegetable crop type 9. Tools and equipment are maintained as per manufactures manual. 10. Farm activities costs is documented as per task requirements 11. Waste is disposed in accordance with EMCA 2015 requirements 12. Emerging trends are applied in undertaking post-harvest activities as per current technological development |
| 1. Undertake Value Addition Processes | * 1. Work safety measures are observed as per the workplace policy.   2. Tools, equipment and materials are assembled as per work requirements.   3. vegetable crops are sorted and graded as per market product type.   4. Vegetable produce is cleaned as per crop type   5. Basic processing is undertaken as per market product type.   6. Tools and equipment are maintained as per manufactures’ manual   7. Farm activities costs is documented as per task requirements and workplace policy.   8. Waste is disposed in accordance with EMCA 2015 requirements   9. Emerging trendsin value addition as per current technological development |
| 1. Undertake Marketing Activities | 1. Crop price is compared based on different markets. 2. Produce price range and market is decided based on the market demand. 3. Basic value addition is undertaken as per the market demand and vegetable requirement. 4. Farm activities costs is documented as per task requirements 5. Waste is disposed in accordance with EMCA 2015 requirements 6. Emerging trends are applied in undertaking Marketing activities as per current technological development |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for a different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Vegetable crop include but not limited to: | * + Leafy vegetables * Lettuce * Spinach   + Fruit vegetables * Tomatoes * Capsicum * Cucumber   + Root and Tuber * Onions * Carrots * Garlic |
| 1. Production structure include but not limited to: | * + Greenhouse   + Shade nets |
| 1. Maturity indices include but not limited to: | * + Horticultural maturity   + Market maturity   + Physiological maturity |
| 1. Picking include but not limited to: | * + Cutting   + Uprooting   + Digging   + Pinching |
| 1. Basic value additions include but not limited to: | * + Waxing   + Packaging   + Product processing |
| 1. Plant physiology process include but not limited to: | * + Photosynthesis   + Transpiration   + Respiration   + Osmosis   + Diffusion |
| 1. Emerging trends include but not limited to: | * + New technologies for pests and diseases control   + Food system transformations   + Automated agriculture systems   + Climate smart agriculture   + Digital Agriculture |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

* Agronomic practices skills
* Measuring skills
* Spraying skills
* Observation skills
* Record keeping skills
* Marketing skills
* Analytical skills

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Types of soilless media
* Plant anatomy and physiology
* Crop husbandry practices
* Waste management practices
* Soil and water conservation measures
* Safety measures
* Weather patterns
* Pests and disease control measures
* Types of weeds and their control
* Ecological zones
* Irrigation methods
* Food safety measures
* Basic financial literacy
* Greenhouse structures
* Crop nutrition measures

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Selected vegetable crop seeds for propagation as per ecological requirements   2. Carried out vegetable crop nursery management practices as per vegetable crop type   3. Watered vegetable crops as per crop requirement   4. Identified the vegetable crop pests and diseases as per crop type   5. Applied Crop protection measures as per pests and diseases   6. Undertook crop nutrition measures as per crop requirement.   7. Observed maturity indices as per vegetable crop type.   8. Carried out picking of the crop as per maturity indices   9. Stored produce as per vegetable crop type   10. Applied vegetable food safety measures based on confirmation assessment standards |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place. 2. Access to relevant work environments. 3. Resources relevant to the proposed activities or task. |
| 1. Methods of assessment | Competency may be assessed through:   * 1. Observation   2. Oral questioning   3. Written tests   4. Practical’s   5. Projects |
| 1. Context of Assessment | Competency may be assessed:   * 1. On-the-job   2. Simulated workplace environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

**PRODUCE HERBS AND SPICES IN OPEN ENVIRONMENT**

**UNIT CODE:** 0812 251 11A

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce Herbs and Spices in open environment. It involves propagating herbs and spices seedlings in open environment, preparing land for herbs and spices, growing herbs and spices, harvesting herbs and spices, undertaking post-harvest activities and undertaking marketing activities.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**  These describe the **key outcomes** which make up **workplace function**. | **PERFORMANCE CRITERIA**  These are **assessable** statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the range.*** |
| --- | --- |
| 1. Propagate herbs and spices seedlings in open environment | * 1. Market survey is undertaken as per herbs and spices type demand   2. ***Herbs and spices*** seeds are selected for propagation as per ecological requirements   3. Work safety measures are observed as per the work requirements.   4. Herbs and spices parts are identified as per herbs and spices crop type.   5. Tools and equipment are assembled as per work requirements   6. Suitable site is Identified based on soil analysis report   7. Soil and water are conserved as per agronomic requirements.   8. Soil sterilization is undertaken as per soil analysis   9. Water for irrigation is applied as per crop type   10. Crop nursery is prepared as per herbs and spices crop type   11. Crop nursery ***management practices*** are carriedoutas per herbs and spices crop   12. Tools and equipment are maintained as per type.   13. Farm activities costs is documented as per task requirements   14. Waste is disposed in accordance with EMCA 2015 requirements   15. Emerging trends are applied in nursery preparation as per current technological development |
| 1. Prepare land for growing herbs and spices | * 1. Work safety measures are observed as per the work requirements.   2. Tools, equipment and materials are assembled as per work requirements   3. ***Land tillage*** is carried out as per agronomic requirements   4. Soil testing is carried out as per soil testing procedure.   5. Land is cleared as per agronomic requirements   6. Soil amendments is applied as per soil analysis report   7. Planting furrows are made as per herbs and spices crop type   8. Tools and equipment are maintained as per type.   9. Farm activities costs is documented as per task requirements   10. Waste is disposed in accordance with EMCA 2015 requirements   11. Emerging trends in preparing Land as per current technological development |
| 1. Grow herbs and spices | * 1. Work safety measures are observed as per the work requirements   2. Tools, equipment and materials are assembled as per work requirements   3. Land is watered as per herbs and spices crop type   4. Food safety measures are implemented in conformity with assessment standards   5. Herbs and spices seedlings are transplanted as per agronomics requirements   6. Herbs and spices seeds are planted as per agronomics requirements   7. ***Mulching*** of the herbs and spices crops is carried out as per agronomic requirements.   8. Herbs and spices crops are watered as per crop type requirement   9. Herbs and spices crop are gapped and thinned as per agronomic requirements   10. Herbs and spices crop are trained and pruned as per agronomic requirements   11. Weeds, pests and diseases are controlled as per agronomic requirement   12. ***Crop nutrition measures*** are undertaken as per crop type requirement   13. Food safety measures are implemented in conformity with assessment standards   14. Tools and equipment are maintained as per type.   15. Farm activities costs is documented as per task requirements   16. Waste is disposed in accordance with EMCA requirements   17. Emerging trends are applied in growing herbs and spices as per current technological development |
| 1. Harvest herbs and spices | * 1. Work safety measures are observed as per the work requirements.   2. Tools, equipment and materials are assembled as per work requirements   3. ***Maturity indices*** are observed as per herbs and spices crop type.   4. Food safety measures during harvesting are implemented in conformity to assessment standards   5. Crop ***Picking*** is carried out as per the herbs and spices type   6. Produce is transported to the pack house as per the herbs and spices type requirements   7. Tools and equipment are maintained as per type.   8. Farm activities costs is documented as per task requirements   9. Waste is disposed in accordance with EMCA requirements   10. Emerging trends are applied in harvesting herbs and spices as per current technological development |
| 1. Undertake post -harvest activities | * 1. Work safety measures are observed as per the work requirements.   2. Tools, equipment and materials are assembled as per work requirements   3. Post Harvest food safety measures are implemented in conformity to assessment standards   4. Harvested herbs and spices are received at the packhouse as per herbs and spices types   5. Herbs and spices are sorted as per herbs and spices type   6. Produce is cleaned as per the herbs and spices crop type requirements   7. Herbs and spices are graded as per market requirements   8. Herbs and spices are packaged as per market requirements   9. Produce is Stored as per herbs and spices crop type   10. Tools and equipment are maintained as per type   11. Farm activities costs is documented as per task requirements   12. Waste is disposed in accordance with EMCA requirements   13. Emerging trends are applied in post-harvest activities as per current technological development |
| 1. Undertake marketing activities | * 1. Crop price is compared based on different markets   2. Produce price range and market is decided based on the market demand   3. ***Basic value addition*** is undertaken as per the market demand   4. Farm activities costs is documented as per task requirements   5. Waste is disposed in accordance with EMCA requirements   6. Emerging trends are applied in undertaking marketing activities as per current technological development |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Herbs and spices include but not limited to: | * + Coriander   + Rosemary   + Mint   + Basil   + Ginger   + Turmeric |
| 1. Work safety measures   include but not limited to: | * + PPEs   + Warning signage   + Tools and equipment safety |
| 1. Management practices include but not limited to: | * + Watering   + Thinning   + Pricking out   + Shading   + Weeding   + Pest and diseases control   + Hardening off |
| 1. Soil Components | * + Physical properties of soil   + Chemical properties of soil   + Biological properties of soil |
| 1. Land tillage include but not limited to: | * + Primary tillage   + Secondary tillage   + Tertiary tillage |
| 1. Soil amendment include but not limited to: | * + Manure application   + Liming   + Fertilizer application |
| 1. Mulching include but not limited to: | * + Organic mulch   + Inorganic mulch |
| 1. Crop nutrition measures include but not limited to: | * + Chemical Fertilizers application   + Organic Fertilizers application |
| 1. Maturity indices include but not limited to: | * + Horticultural maturity   + Market maturity   + Physiological maturity |
| 1. Picking include but not limited to: | * + Cutting   + Uprooting   + Digging   + Pinching |
| 1. Basic value additions include but not limited to: | * + Waxing   + Packaging   + Product Processing |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

* Measuring skills
* Spraying skills
* Observation skills
* Record keeping skills
* Marketing skills
* Analytical skills
* Agronomic practices skills

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Crop husbandry practices
* Waste management practices
* Soil and water conservation measures
* Soil composition
* Plant anatomy
* Types of weeds and their control
* Types of Soil
* Safety measures
* Weather patterns
* Pests and diseases control measures
* Ecological zones
* Irrigation methods
* Food safety measures
* Basic financial literacy
* Crop nutrition measures

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires that candidates:   * 1. Observed Work safety measures as per the work requirements   2. Selected Herbs and spices seeds for propagation as per ecological requirement   3. Carried out crop nursery management practices as per vegetable crop type   4. Carried out soil testing as per soil testing procedures   5. Applied Soil amendments as per soil analysis report   6. Disposed waste in accordance with EMCA 2015 requirements   7. Applied crop protection measures as per agronomic requirement   8. Undertook crop nutrition measures as per herbs and spices crop type requirement.   9. Identified maturity indices as per herbs and spices crop type.   10. Stored produce as per herbs and spices crop type requirement   11. Implemented food safety measures for herbs and spices as per conformity assessment standards |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place. 2. Access to relevant work environments. 3. Resources relevant to the proposed activities or task. |
| 1. Methods of assessment | Competency may be assessed through:   * 1. Observation   2. Oral questioning   3. Written tests   4. Practicals   5. Projects |
| 1. Context of Assessment | Competency may be assessed:   * 1. On-the-job   2. Simulated workplace environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

**PRODUCE HERBS AND SPICES IN PROTECTED ENVIRONMENT**

**UNIT CODE:** 0812 251 12A

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce herbs and spices in protected environment. It involves setting up protected environment, growing herbs and spices in protected environment, harvesting herbs and spices, undertaking post harvesting activities and undertaking marketing activities.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the **key outcomes** which make up **workplace function**. | **PERFORMANCE CRITERIA**  These are **assessable** statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the range.*** |
| 1. Set up Protected Environment | * 1. Market survey is undertaken as per herbs and spices crop type demand   2. ***Herbs and Spices*** seeds are selected for propagation as per market demand   3. ***Work safety measures*** are observed as per the work requirements   4. Tools and equipment are assembled as per work requirements   5. Suitable ***production structure*** is prepared and managed as per work instructions   6. Crop nursery is prepared as per herbs and spices type   7. ***Propagation media*** is prepared based on work instructions   8. Nursery trays are Selected and treated as per work instructions   9. Water for irrigation is applied as per water analysis report   10. Crop nursery management practices are carried out as per herbs and spices crop type   11. Tools and equipment are maintained as per type   12. Farm activities costs is documented and shared as per task requirements   13. Waste is disposed in accordance with EMCA 2015 requirements   14. Emerging trends are applied in Nursery preparation as per current technological development |
| 1. Grow Herbs and Spices in protected environment | * 1. Work safety measures are observed as per the work requirements   2. Tools, equipment and materials are assembled as per work requirements   3. Plant parts identified as per crop type   4. ***Physiological processes*** are described as per plant part   5. Mapal troughs are watered as per crop water requirements   6. Herbs and Spices seedlings are transplanted as per agronomics requirements   7. Mulching of the Herbs and Spices is carried out as per agronomic requirements.   8. Herbs and Spices are watered as per crop requirement.   9. Herbs and Spices are gaped and thinned based as per agronomic requirements   10. Herbs and Spices are trained, trellised and pruned as per crop type   11. Pests and diseases are identified as per crop type   12. Crop protection measures are applied as per pests and diseases   13. Crop nutrition measures are undertaken as per crop requirement.   14. Tools and equipment are maintained as per type   15. Farm activities costs is documented as per task requirements   16. Waste is disposed in accordance with EMCA requirements   17. Emerging trends are applied in growing Herbs and Spices as per current technological development |
| 1. Harvest Herbs and Spices | * 1. Work safety measures are observed as per the work requirements.   2. Tools, equipment and materials are assembled as per work requirements   3. ***Maturity indices*** are observed as per Herbs and Spices crop type.   4. ***Picking*** of the crop is carried out as per the Herbs and Spices type   5. Produce is transported to the pack house as per the Herbs and Spices type requirements   6. Tools and equipment are maintained as per type   7. Farm activities costs is documented as per task requirements   8. Waste is disposed in accordance with EMCA 2015 requirements   9. Emerging trends are applied in harvesting Herbs and Spices as per current technological development |
| 1. Undertake Post Harvest Activities | * 1. Work safety measures are observed as per the work requirements.   2. Tools, equipment and materials are assembled as per work requirements   3. Harvested Herbs and Spices are received at the packhouse as per Herbs and Spices type   4. Herbs and Spices are sorted as per Herbs and Spices type   5. Produce is cleaned as per the Herbs and Spices crop requirements   6. Herbs and Spices are graded as per market requirements   7. Herbs and Spices are packaged as per market requirements   8. Produce is Stored as per Herbs and Spices crop type   9. Tools and equipment are maintained as per type   10. Farm activities costs is documented as per task requirements   11. Waste is disposed in accordance with EMCA 2015 requirements   12. Emerging trends are applied in post-harvest activities as per current technological development |
| 1. Undertake Value Addition Processes | * 1. Work safety measures are observed as per the work requirements   2. Tools, equipment and materials are assembled as per work requirements   3. Herbs and Spices are sorted and graded as per market product type   4. Herbs and Spices are cleaned as per crop type   5. Basic processing is undertaken as per market product type   6. Tools and equipment are maintained as per type   7. Farm activities costs is documented as per task requirements   8. Waste is disposed in accordance with EMCA 2015 requirements   9. Emerging trendsin value addition as per current technological development |
| 1. Undertake Marketing Activities | * 1. Crop price is compared based on different markets   2. Produce price range and market is decided based on the market demand   3. ***Basic value addition*** is undertaken as per the market demand   4. Farm activities costs is documented as per task requirements   5. Waste is disposed in accordance with EMCA 2015 requirements   6. ***Emerging trends*** are applied in undertaking marketing activities as per current technological development |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for a different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Herbs and spices crops include but not limited to: | * + Coriander   + Rosemary   + Mint   + Basil   + Ginger   + Turmeric   + Chives   + Lemon grass |
| 1. Propagation structure may include but not limited to: | * + Green houses   + Shed nets |
| 1. Work safety measures   include but not limited to: | * + PPEs   + Warning signage   + Tools and equipment safety |
| 1. Propagation media may include but not limited to: | * + Peat moss   + Coco peat   + Vermiculite |
| 1. Plant physiology process include but not limited to: | * + Photosynthesis   + Transpiration   + Respiration   + Osmosis   + Diffusion |
| 1. Maturity indices include but not limited to: | * + Horticultural maturity   + Market maturity   + Physiological maturity |
| 1. Picking include but not limited to: | * + Cutting   + Uprooting   + Digging   + Pinching |
| 1. Basic value additions include but not limited to: | * + Waxing   + Packaging   + Product processing |
| 1. Emerging trends include but not limited to: | * + New technologies for pests and diseases control   + Food system transformations   + Automated agriculture systems   + Climate smart agriculture   + Digital Agriculture |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required Skills**

* Agronomic practices skills
* Measuring skills
* Spraying skills
* Observation skills
* Record keeping skills
* Marketing skills
* Analytical skills

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Soil composition
* Plant anatomy and physiology
* Crop husbandry practices
* Waste management practices
* Soil and water conservation measures
* Types of Soil
* Safety measures
* Weather patterns
* Pests and disease control measures
* Types of weeds and their control
* Ecological zones
* Irrigation methods
* Food safety measures
* Basic financial literacy
* Greenhouse structures
* Crop nutrition measures

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Selected herbs and spices crop seeds for propagation as per market demand   2. Maintained protected environment propagation structure as per work instructions   3. Carried out crop nursery management practices as per Herbs and spices crop type   4. Established herbs and spices as per agronomic requirements   5. Watered herbs and spices crop as per crop requirement   6. Identified pests and diseases as per crop type   7. Applied crop protection measures as per pests and diseases   8. Undertook crop nutrition measures as per crop requirement.   9. Observed maturity indices as per Herbs and spices crop type.   10. Carried out harvesting of the crop as per the Herbs and spices type   11. Stored produce as per Herbs and spices crop type   12. Implemented herbs and spices safety measures as per conformity assessment standards |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place. 2. Access to relevant work environments. 3. Resources relevant to the proposed activities or task. |
| 1. Methods of assessment | Competency may be assessed through:   * 1. Observation   2. Oral questioning   3. Written tests   4. Practical’s   5. Projects |
| 1. Context of Assessment | Competency may be assessed:   * 1. On-the-job   2. Simulated workplace environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

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# PRODUCE TROPICAL FRUITS

**UNIT CODE: 0812 551 08 A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce quality and clean tropical fruits. It involves preparing tropical fruits planting materials, establishing tropical fruits, managing tropical fruits and performing tropical fruits post-harvest practices.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| * + - 1. Establish tropical fruits nursery | 1. ***Personal protective equipment*** are worn as per work requirement 2. Tools, equipment and materials are assembled as per work requirement. 3. Nursery site is marked based on farm layout 4. Nursery site soil sampling is performed as per work procedure 5. Nursery is prepared according to agronomic requirements of ***tropical fruits***. 6. Planting materials are raised in nursery as per agronomic requirement 7. Tropical fruits ***nursery management practices*** are performed as per agronomic requirements. |
| 2.Establish tropical fruits orchard | 1. Personal protective equipment are worn as per work requirement 2. Tools, equipment and materials are assembled as per work requirement 3. Orchard site is marked based on farm plan 4. Land clearing is performed as per agronomic requirements 5. ***Tillage practices*** are carried out as per agronomic requirements 6. Soil and water conservation measures are applied as per agronomic needs 7. ***Soil amendments*** are applied as per soil analysis report 8. Seedlings are transplanted based on agronomic requirements |
| 3.Manage tropical fruits | 1. Tools and equipment for carrying out management practices are assembled as per work requirement 2. Gapping is carried out on tropical fruits as per agronomic requirements 3. Training and pruning are carried out on tropical fruits as per agronomic requirements 4. ***Crop protection practices*** are carried out on tropical fruits as per agronomic requirement 5. Physiological disorders are managed as per agronomic requirement 6. ***Fertilizers*** are applied as per agronomic requirements 7. Tropical fruit trees are mulched as per agronomic requirements 8. Tropical fruit trees are watered as per agronomic requirements 9. Tropical fruit trees are induced to flower as per agronomic requirements 10. Tropical fruits are harvested as per agronomic requirement 11. Waste management is undertaken in accordance to work requirement |
| 4.Perform tropical fruits post-harvest practices | 1. Tools and equipment for carrying out post-harvest practices are assembled as per work requirement 2. Quality and quantity of tropical fruits is assessed as per work procedures 3. ***Post-harvest practices*** are carried out in accordance to work requirement 4. Tropical fruits ***Marketing techniques*** are applied as per organizational policy. 5. Waste management is undertaken in accordance to work requirement |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1.Tropical fruits may include but are not limited to: | * Mangoes * Oranges * Papaya * Pineapple * Pawpaw * Avocado * Bananas * Passion fruit * Tree tomatoes * Guava * Loquat * Lime * White sapote * Dragon fruit |
| 2.Tools may include but are not limited to: | * Hoes * Machetes * Secateurs * Shovels * Soil augur * Panga * Hammer * Saw * Bucket * Shears * Dibbler * Pegs |
| 3.Equipment may include but are not limited to: | * Spray pumps * Watering cans * Hose pipes * Plough * Harrows * Ridgers * Boom sprayer * Pruning saw * Wire strainer * Traps * Pipe sprinklers * Scouting flags * Storage tanks * Tractors * Grading shed * Bud count square * Meteorological equipment |
| 4.Planting materials may include but are not limited to: | * Seeds * Suckers * Seedlings * Cuttings * Tubers * Tissue culture * Buds * Corms * Suckers * Corms Pesticides * Fertilizers * Stationery * Manures * Rope * Nets * Papers * Fencing wire * Staking sticks * Nails * Herbicides |
| 5.Nursery management practices may include but are not limited to: | * Mulching * Gapping * Thinning * Pruning * Training * Watering * Fertilizer application * Pest and diseases control |
| 6.Personal protective equipment may include but are not limited to: | * Gumboots * Gloves * Overalls * Dust coats * Masks |
| 7.Tillage practices may include but are not limited to | * Primary tillage * Secondary tillage * Tertiary tillage |
| 8.Soil amendments may include but are not limited to: | * Organic and inorganic fertilizers * Agricultural lime * Agricultural gypsum |
| 9.Crop protection practices may include but are not limited to: | * Pest control * Disease control * Weed control |
| 10.Fertilizers may include but are not limited to | * Organic manure * Basal inorganic fertilizer * Foliar fertilizer * Fertigation fertilizer |
| 11.Post-harvest practices may include but are not limited to: | * Transportation * Cleaning * Sorting * Grading * Drying * Processing * Packaging * Branding * Storage |
| 12.Marketing techniques may include but are not limited to: | * Online marketing * Influencer marketing * Referrals * Advertisements * Auctioneering * Public relations * Cold calling * Content marketing * Invoicing * Loyalty programs |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Food safety in production of tropical fruits
* Sources of quality water
* Agro Ecological Zonation
* Types of tools and equipment used in production of tropical fruits
* Structures for production of tropical fruits
* Types of tropical fruits
* Physiology of tropical fruits
* Soil and water conservation measures
* Phyto-sanitary requirements
* Sources of quality planting materials for tropical fruits
* Husbandry practices in tropical fruits production
* Tropical fruits production Technologies
* Procedures for calibration of equipment
* Maturity indices in tropical fruits
* Harvesting and Post Harvesting Handling of tropical fruits
* Record keeping and accounting
* Waste Management
* Occupational Safety and Health Procedures

**Required skills**

The individual needs to demonstrate the following skills:

* Measuring
* Levelling
* Gaping
* Grafting
* Pruning
* Spraying
* Pests, diseases and nutrients deficiency scouting
* Equipment calibration
* Technical Report writing
* Observation
* Negotiation
* Digital literacy
* Soil sampling

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| * + - 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Used personal protective equipment as per work requirement   2. Treated planting materials based on agronomic requirements.   3. Prepared tropical fruits nursery as per agronomic requirement   4. Raised tropical fruits seedlings as per work procedure   5. Prepared land for establishing tropical fruits as per agronomic requirement   6. Applied soil amendments as per soil analysis report   7. Transplanted Seedlings based on agronomic requirements   8. Carried out crop protection practices on tropical fruits as per work procedure   9. Maintained plant population as per agronomic requirement   10. Carried out pruning, training and de-suckering based on crop requirement   11. Applied fertilizers in accordance to crop nutrient requirement   12. Harvested tropical fruits as per maturity indices   13. Carried out tropical fruits post-harvest practices in accordance to work requirement   14. Managed wastes generated in production process in accordance to work requirement |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * Practical * Project * Third party report * Portfolio of evidence * Written tests * Oral questioning |
| 1. Context of assessment | 1. This competency may be assessed in a workplace or in a simulated workplace. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# PRODUCE CUT FLOWERS

**UNIT CODE: 0812 551 09A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce quality and clean-cut flowers. It involves establishing cut flowersnursery, establishing cut flowers, managing cut flowers and performing cut flowers post-harvest practices.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the range.*** |
| 1. Establish cut flowers nursery | 1. ***Personal protective equipment’s*** are worn as per work requirement 2. ***Tools, equipment*** and ***materials*** are assembled as per work requirement 3. Nursery site is marked based on farm layout 4. Nursery site soil sampling is performed as per work procedure 5. Propagation media is prepared in accordance with ***agronomic requirements*** 6. Planting materials are treated based on agronomic requirements. 7. Planting materials are raised in nursery as per work procedure. 8. ***Cut flowers*** ***nursery management*** ***practices*** are performed as per agronomical requirements. |
| 1. Establish cut flowers | 1. Personal protective equipment are worn as per work requirement 2. Tools, equipment and materials are assembled as per work requirement 3. Land clearing is performed as per agronomic requirements 4. ***Tillage practices*** are carried out as per agronomic requirements 5. Soil and water conservation measures are applied as per agronomic needs 6. ***Soil amendments*** are applied as per soil analysis report 7. Seedlings are transplanted based on agronomic requirements |
| 1. Manage cut flowers | 1. Tools and equipment for carrying out management practices are assembled as per work requirement 2. Gapping is carried out as per agronomic requirements 3. Training and pruning are carried out as per agronomic requirements 4. ***Crop protection practices*** are carried out as per agronomic requirement 5. Physiological disorders are managed as per agronomic requirement 6. ***Fertilizers*** are applied as per agronomic requirements 7. Mulching is carried out as per agronomic requirements 8. Watering is carried out as per agronomic requirements 9. Cut flowers are harvested as per agronomic requirement 10. Waste management is undertaken in accordance to work requirement |
| 1. Perform cut flowers post-harvest practices | 1. Tools and equipment for carrying out post-harvest practices are assembled as per work requirement 2. Quality and quantity of cut flowers is assessed as per work procedures 3. ***Post-harvest practices*** are carried out in accordance to work requirement 4. Cut flower ***marketing techniques*** are applied as per organizational policy 5. Waste management is undertaken in accordance to work requirement |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Personal protective equipment may include but are not limited to: | * Gloves * Safety goggles * Safety boots * Overalls * Dust coat * Ear muffs * Face masks |
| 1. Cut flowers may include but are not limited to: | * Roses * Carnations * Chrysanthemum * Orchids * Alstromeria * Tulips * Marigold * Hibiscus * Gladiolus * Aster |
| 1. Tools, equipment and materials may include but are not limited to: | * Hoes * Machetes * Secateurs * Shovels * Soil augur * Panga * Pegs * Hammer * Saw * Bucket * Secateurs * Shears * Dibbler * Pegs * Spray pumps * Watering cans * Hose pipes * Plough * Harrows * Ridges * Boom sprayer * Pruning saw * Wire strainer * Traps * Pipe sprinklers * Scouting flags * Storage tanks * Tractors * Grading shed * Bud count square * Meteorological equipment * Pesticides * Fertilizers * Stationery * Manures * Planting materials * Rope * Nets * Translucent papers * Papers * Fencing wire * Staking sticks * Nails * Herbicides * Pesticides * Pheromones * Seeds * seedlings * splits * crowns * slips * Cuttings * Suckers * Plantlets |
| 1. Nursery management practices may include but are not limited to: | * Mulching * watering * fertilizer application * weed control * pest control * disease control * shading * hardening off |
| 1. Tillage practices may include but are not limited to: | * Primary tillage * Secondary tillage * Tertiary tillage |
| 1. Soil amendments may include but are not limited to: | * Agricultural Lime * Agricultural gypsum * Fertilizers |
| 1. Crop protection practices may include but are not limited to: | * Pest control * Disease control * Weed control * Integrated pest management * Integrated weed management |
| 1. Fertilizers may include but are not limited to: | * + Organic manure   + Basal inorganic fertilizer   + Foliar fertilizer * Fertigation fertilizer |
| 1. Post-harvest practices may include but are not limited to: | * Washing * Cleaning * Grading * Bunching * Packing * Storage |
| 1. Marketing techniques may include but are not limited to: | * Online marketing * Influencer marketing * Referrals * Advertisements * Auctioneering * Public relations * Cold calling * Content marketing * Invoicing * Loyalty programs |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required skills**

The individual needs to demonstrate the following skills:

* Land tilling
* Nursery preparation
* Planting
* Measuring
* Levelling
* Gaping
* Pruning
* Support
* Spraying
* Fertigation and chemigation in cut flowers production
* Pests, diseases and nutrients deficiency scouting
* Equipment calibration
* Technical Report writing
* Handling of cut flowers
* Soil sampling
* Observation
* Negotiation
* Digital literacy

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Sources of quality water
* Agro Ecological Zonation
* Cut flowers production tools and equipment
* Cut flowers production structures
* Types of cut flowers
* Physiology of cut flowers
* Soil sampling and testing
* Soil and water conservation measures
* Phyto-sanitary requirements
* Sources of quality planting materials for cut flowers
* Husbandry practices in cut flowers production
* Cut flowers production technologies
* Fertigation and chemigation in production of cut flowers
* Procedures for calibration of equipment
* Soilless growing medium
* Flower induction
* Maturity indices in cut flowers
* Harvesting and post harvesting handling of cut flowers
* Accounting principles
* Production records and reports
* Waste management practices
* Occupational safety and health procedures

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Used personal protective equipment as per work requirement 2. Treated planting materials based on agronomic requirements. 3. Prepared cut flower nursery as per agronomic requirement 4. Raised cut flower seedlings as per work procedure 5. Prepared land for establishing cut flower as per agronomic requirement 6. Applied soil amendments as per soil analysis report 7. Transplanted Seedlings based on agronomic requirements 8. Carried out crop protection practices on cut flower as per work procedure 9. Maintained plant population as per agronomic requirement 10. Carried out pruning, training and de-suckering based on crop requirement 11. Applied fertilizers in accordance to crop nutrient requirement 12. Harvested cut flower as per maturity indices 13. Performed cut flower post-harvest practices in accordance to work requirement 14. Managed wastes generated in production process in accordance to work requirement |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Observation 2. Oral questioning 3. Portfolio of evidence 4. Interviews 5. Third party report 6. Written tests 7. Practical tests |
| 1. Context of assessment | Competency may be assessed:   1. Workplace 2. Simulated workplace environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

## 

## PRODUCE TEMPERATE FRUITS

**UNIT CODE: 0812 551 11A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce quality and clean temperate fruits. It involves preparing temperate fruits planting materials, establishing temperate fruits, managing temperate fruits and performing temperate fruits post-harvest practices.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Establish Temperate fruits nursery | 1. Personal protective equipment’s are worn as per work requirement 2. ***Tools, equipment and materials*** are assembled as per work requirement. 3. Nursery site is marked based on farm layout 4. Nursery site soil sampling is performed as per work procedure 5. Nursery is prepared according to agronomic requirements of temperate fruits. 6. Planting materials are raised in nursery as per agronomic requirement 7. Temperate fruits ***nursery management*** ***practices*** are performed as per agronomic requirements. |
| 1. Establish Temperate fruits orchard | 1. Personal protective equipment’s are worn as per the work requirement 2. ***Tools, equipment*** and ***materials*** are assembled as per work requirement 3. Orchard site is marked based on farm plan 4. Land clearing is performed as per agronomic requirements 5. ***Tillage practices*** are carried out as per agronomic requirements 6. Soil and water conservation measures are applied as per agronomic needs 7. ***Soil amendments*** are applied as per soil analysis report 8. Seedlings are transplanted based on agronomic requirements |
| 1. Manage Temperate fruits | 1. ***Tools and equipment*** for carrying out management practices are assembled as per work requirement 2. Gapping is carried out on Temperate fruits as per agronomic requirements 3. Training and pruning are carried out on Temperate fruits as per agronomic requirements 4. ***Crop protection*** ***practices*** are carried out on Temperate fruits as per agronomic requirement 5. Physiological disorders are managed as per agronomic requirement 6. ***Fertilizers*** are applied as per agronomic requirements 7. Temperate fruit trees are mulched as per agronomic requirements 8. Temperate fruit trees are watered as per agronomic requirements 9. Temperate fruit trees are induced to flower as per agronomic requirements 10. Temperate fruits are harvested as per agronomic requirement 11. Waste management is undertaken in accordance to work requirement |
| 1. Perform Temperate fruits post-harvest practices | 1. Tools and equipment for carrying out post-harvest practices are assembled as per work requirement 2. Quality and quantity of temperate fruits is assessed as per work procedures 3. ***Post-harvest practices*** are carried out in accordance to work requirement 4. Temperate fruits ***marketing techniques*** are applied as per organizational policy 5. Waste management is undertaken in accordance to work requirement |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Temperate fruits may include but not limited to: | * Plums * Pears * Apples * Peaches * Apricot * Grapes * Raspberries * blackberries * Strawberries. |
| 1. Tools may include but are not limited to: | * Hoes * Machetes * Secateurs * Shovels * Soil augur * Panga * Hammer * Saw * Bucket * Shears * Dibbler * Pegs |
| 1. Equipment may include but are not limited to: | * Spray pumps * Watering cans * Hose pipes * Plough * Harrows * Ridgers * Boom sprayer * Pruning saw * Wire strainer * Traps * Pipe sprinklers * Scouting flags * Storage tanks * Tractors * Grading shed * Bud count square * Meteorological equipment |
| 1. Temperate fruits planting materials may include but are not limited to: | * Seeds * Suckers * Cuttings * Seedlings * Cuttings * Tubers * Tissue culture * Buds * Corms Pesticides * Fertilizers * Stationery * Manures * Rope * Nets * Papers * Fencing wire * Staking sticks * Nails * Herbicides |
| 1. Nursery management practices may include but are not limited to: | * Mulching * Gapping * Thinning * Pruning * Training * Watering * Fertilizer application * Pest and diseases control |
| 1. Tillage practices may include but are not limited to: | * Primary tillage * Secondary tillage * Tertiary tillage |
| 1. Soil amendments may include but are not limited to: | * Organic and inorganic fertilizers * Agricultural lime * Agricultural gypsum |
| 1. Fertilizers may include but are not limited to: | * Organic manure * Basal inorganic fertilizer * Foliar fertilizer * Fertigation fertilizer |
| 1. Crop protection practices may include but are not limited to: | * Pest control * Disease control * Weed control |
| 1. Post-harvest practices may include but are not limited to: | * Transportation * Cleaning * Sorting * Grading * Drying * Processing * Packaging * Branding * Storage |
| 1. Marketing techniques may include but are not limited to: | * Online marketing * Influencer marketing * Referrals * Advertisements * Auctioneering * Public relations * Cold calling * Content marketing * Invoicing * Loyalty programs |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Food safety in production of temperate fruits
* Sources of quality water
* Agro Ecological Zonation
* Types of tools and equipment used in production of temperate fruits
* Structures for production of temperate fruits
* Types of temperate fruits
* Physiology of temperate fruits
* Soil and water conservation measures
* Phyto-sanitary requirements
* Sources of quality planting materials for temperate fruits
* Husbandry practices in temperate fruits production
* Temperate fruits production Technologies
* Procedures for calibration of equipment
* Maturity indices in temperate fruits
* Harvesting and Post Harvesting Handling of temperate fruits
* Record keeping and accounting
* Waste Management practices
* Occupational Safety and Health Procedures

**Required skills**

The individual needs to demonstrate the following skills:

* Measuring
* Levelling
* Gaping
* Grafting
* Pruning
* Spraying
* Pests, diseases and nutrients deficiency scouting
* Equipment calibration
* Technical Report writing
* Observation
* Negotiation
* Digital literacy
* Soil sampling

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Used personal protective equipment as per work requirement 2. Treated planting materials based on agronomic requirements 3. Prepared temperate fruits nursery as per agronomic requirement 4. Raised temperate fruits seedlings as per work procedure 5. Prepared land for establishing temperate fruits as per agronomic requirement 6. Applied soil amendments as per soil analysis report 7. Transplanted seedlings based on agronomic requirements 8. Carried out crop protection practices on temperate fruits as per work procedure 9. Maintained plant population as per agronomic requirement 10. Carried out pruning, training and de-suckering based on crop requirement 11. Applied fertilizers in accordance to crop nutrient requirement 12. Harvested temperate fruits as per maturity indices 13. Carried out temperate fruits post-harvest handling in accordance to work requirement 14. Managed wastes generated in production process in accordance to work requirement |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Practical tests 2. Oral questioning 3. Portfolio of evidence 4. Third party report 5. Written tests |
| 1. Context of assessment | Competency may be assessed:   1. Workplace 2. simulated workplace environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

## PRODUCE VINE FRUITS

**UNIT CODE: 0812 551 12A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce quality and clean vine fruits. It involves establishing vine fruits nursery, establishing vine fruits orchard, managing vine fruits and performing vine fruits post-harvest practices.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the range.*** |
| 1. Establish vine fruits nursery | 1. ***Personal protective equipment’s*** are worn as per work requirement 2. Nursery site is selected based on farm layout 3. Nursery site soil analysis is performed as per work procedure 4. ***Tools, equipment*** and ***materials*** are assembled as per work requirement. 5. Nursery is prepared according to agronomic requirements of vine fruits. 6. Planting materials are raised in nursery as per work procedure. 7. Vine fruits ***nursery management practices*** are performed as per agronomic requirements. |
| 1. Establish Vine fruits orchard | 1. Personal protective equipment’sare worn as per work requirement 2. Orchard site is selected based on farm plan 3. ***Tools, equipment*** and ***materials*** are assembled as per work requirement 4. Land clearing is performed as per agronomic requirements 5. **Tillage practices** are carried out as per agronomic requirements 6. Soil and water conservation measures are applied as per agronomic needs 7. ***Soil amendments*** are applied as per soil analysis report 8. Seedlings are transplanted as per agronomic requirements |
| 1. Manage vine fruits | 1. ***Tools*** and ***equipment*** for carrying out management practices are assembled as per work requirement 2. Gapping is carried out on vine fruits as per agronomic requirements 3. Training, trellising and pruning is carried out on vine fruits as per agronomic requirements 4. ***Crop protection practices*** are carried out on vine fruits as per agronomic requirement 5. Physiological disorders are managed as per agronomic requirement 6. Fertilizers are applied as per agronomic requirements 7. Vine fruits are mulched as per agronomic requirements 8. Vine fruits are watered as per agronomic requirements 9. Vine fruits are induced to flower as per agronomic requirements 10. Vine fruits are harvested as per agronomic requirement 11. Waste management is undertaken in accordance to work requirement |
| 1. Perform vine fruits post-harvest practices | 1. ***Tools and equipment*** for carrying out post-harvest practices are assembled as per work requirement 2. Quality and quantity of vine fruits is assessed as per work procedures 3. ***Post-harvest practices*** are carried out in accordance to work requirement 4. Marketing of vine fruits is performed as per organizational policy. 5. Waste management is undertaken in accordance to work requirement |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Vine fruits may include but are not limited to: | * Passion fruit * Water melon * Kiwi * Straw berry * Cucumber * Grapes * Dragon fruit * Rasp berry |
| 1. Tools, equipment and materials may include but are not limited to: | * Hoes * Machetes * Secateurs * Shovels * Soil augur * Panga * Pegs * Hammer * Saw * Bucket * Secateurs * Shears * Dibbler * Pegs * Spray pumps * Watering cans * Hose pipes * Plough * Harrows * Ridges * Boom sprayer * Pruning saw * Wire strainer * Traps * Pipe sprinklers * Scouting flags * Storage tanks * Tractors * Grading shed * Bud count square * Meteorological equipment * Pesticides * Fertilizers * Stationery * Manures * Seedlings /planting materials * Khaki paper bags size 3 * Rope * Nets * Translucent papers * Papers * Fencing wire * Staking sticks * Nails * Herbicides * Pesticides * Pheromones * Seeds * Seedlings * Splits * Crowns * Slips * Cuttings * Suckers * Plantlets |
| 1. Nursery management practices may include but are not limited to: | * Mulching * Watering * Fertilizer application * Weed control * Pest control * Disease control * Shading * Hardening off |
| 1. Personal protective equipment may include but are not limited to: | * Dust coat/Apron * Gumboots * Gloves * Face mask |
| 1. Soil amendments may include but are not limited to: | * Organic fertilizers * Inorganic fertilizers * Liming agents * Agricultural gypsum |
| 1. Tillage practices may include but are not limited to: | * Primary Tillage * Secondary * Tertiary |
| 1. Crop protection practices may include but are not limited to: | * Weed control * Pest control * Disease control |
| 1. Post-harvest practices may include but are not limited to: | * Drying * Sorting * Grading * Packaging * Storage |
| 1. Marketing techniques may include but are not limited to: | * Online marketing * Influencer marketing * Referrals * Advertisement * Auctioneering * Public relation * Cold calling * Content marketing * Invoicing * Loyalty programs |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required skills**

The individual needs to demonstrate the following skills:

* Analytical
* Sampling
* Training
* Tilling
* Measuring
* Levelling
* Gaping
* Pruning
* Spraying
* Pests, diseases and nutrients deficiency scouting
* Equipment calibration
* Technical Report writing
* Produce handling
* Soil sampling
* Observation
* Negotiation
* Digital literacy

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Agro Ecological Zonation
* Vine fruit orchard establishment and management
* Types of vine fruits
* Physiology of vines
* Types of tools and equipment used in production of vine fruits
* Soil sampling and testing
* Soil conservation
* Phyto-sanitary requirements
* Good Agricultural Practices
* Sources of quality planting materials for vine fruit trees
* Husbandry practices in vine fruit production
* Vine fruit production Technologies
* Flower induction
* Maturity indices in vine fruits
* Harvesting and post harvesting handling of vine fruits
* Accounting principles
* Production records and reports
* Waste management
* Occupational Safety and Health Procedures
* General management of vine fruit production farm

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Selected and prepared nursery site according to agronomic requirements of the fruit 2. Performed Sowing of seeds/cuttings as per agronomical requirements 3. Prepared seedbed as per fruit tree agronomic requirements 4. Transplanted seedlings based on agronomic requirements 5. Carried out management practices on vine fruit trees which may include but are not limited to: watered, pest and diseases control, feeding, mulched and trained as per agronomic requirements 6. Harvested vine fruits and carried out post-harvest management practices as per agronomic requirement 7. Carried outpost-harvest practices in accordance to work requirement 8. Managed wastes generated in production process in accordance to work requirement |
| 1. Resource implications for competence certification | The following resources must be provided during assessment:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency may be assessed through:   1. Practical 2. Project 3. Third party report 4. Portfolio of evidence 5. Written tests 6. Oral questioning |
| 1. Context of assessment | 1. This competency may be assessed in a workplace or in a simulated workplace. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job roles is recommended. |

## PRODUCE ORNAMENTAL PLANTS

**UNIT CODE: 0812 551 13A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce ornamental plants. It involves preparing ornamental plants planting materials, establishing ornamental plants, managing ornamental plants and performing ornamental plants post-harvest practices.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Prepare ornamental plants planting materials | | * 1. ***Personal protective equipment*** are worn as per work requirement   2. Nursery site is selected based on farm layout   3. Nursery site soil analysis is performed as per work procedure.   4. ***Tools, equipment*** and ***materials*** are assembled as per work requirement.   5. Nursery is prepared according to ***agronomic requirements*** of ornamental plants.   6. ***Ornamental planting materials*** are raised in nursery as per work procedure.   7. ***Ornamental plants*** ***nursery management practices*** are performed as per agronomical requirements. |
| 1. Establish ornamental plants | | * 1. Personal protective equipment are worn as per work requirement   2. Tools, equipment and materials are assembled as per work requirement   3. **Tillage practices** are carried out as per agronomic requirements   4. Soil and water conservation measures are applied as per agronomic needs   5. ***Soil amendments*** are applied as per soil analysis report   6. Seedlings are transplanted based on agronomic requirements |
| 1. Manage ornamental plants | | * 1. Tools and equipment for carrying out management practices are assembled as per work requirement   2. Gapping is carried out as per agronomic requirements   3. Training and pruning is carried out as per agronomic requirements   4. ***Crop protection practices*** are carried out as per agronomic requirement   5. Physiological disorders are managed as per agronomic requirement   6. Soil amendments are applied as per soil analysis report   7. Mulching is carried out as per agronomic requirements   8. Watering is carried out as per agronomic requirements   9. Ornamental plants are harvested as per agronomic requirements   10. Waste management is undertaken in accordance to work requirement |
| 1. Perform ornamental plants post-harvest practices | | 1. Tools and equipment for carrying out post-harvest practices are assembled as per work requirement 2. Quality and quantity of ornamental plants is assessed as per work procedures 3. ***Post-harvest practices*** are carried out in accordance to work requirement 4. Waste management is undertaken in accordance to work requirement |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Personal protective equipment may include but are not limited to: | * Gloves * Safety goggles * Safety boots * Overalls * Dust coat * Ear muffs * Face masks |
| 1. Tools, equipment and materials may include but are not limited to: | * Hoes * Machetes * Secateurs * Shovels * Soil augur * Panga * Pegs * Hammer * Saw * Bucket * Secateurs * Shears * Dibbler * Pegs * Spray pumps * Watering cans * Hose pipes * Plough * Harrows * Ridges * Boom sprayer * Pruning saw * Wire strainer * Traps * Pipe sprinklers * Scouting flags * Storage tanks * Tractors * Grading shed * Bud count square * Meteorological equipment * Pesticides * Fertilizers * Stationery * Manures * Seedlings /planting materials * Khaki paper bags size 3 * Rope * Nets * Translucent papers * Papers * Fencing wire * Staking sticks * Nails * Herbicides * Pesticides * Pheromones * Seeds * Seedlings * Splits * Crowns * Slips * Cuttings * Suckers * Plantlets |
| 1. Ornamental plants planting materials may include but are not limited to: | * Seeds * Splits * Suckers * Buds * Cuttings * Seedlings * Cuttings * bulbs * Tubers * Corms * Tissue culture * Embryo culture |
| 1. Ornamentals plants include but not limited to | * Ornamental trees * Ornamental shrubs * Flowering annuals * Climbers and creepers * Cacti and succulent * Indoor plants * Water plants * Lawn grasses |
| 1. Agronomic requirements include but not limited to | * Seed bed preparation * Sowing * Mulching * Spacing * Gapping * Thinning * Pruning * Training * De- suckering * Watering * Cover cropping * Nutrient application |
| 1. Tillage practices may include but are not limited to: | * Primary Tillage * Secondary * Tertiary |
| 1. Crop protection practices may include but are not limited to: | * Pest control * Disease control * Weed control |
| 1. Tillage practices may include but are not limited to: | * Primary Tillage * Secondary * Tertiary |
| 1. Nursery management practices may include but are not limited to: | * Mulching * Watering * Fertilizer application * Weed control * Pest control * Disease control * Shading * Hardening off |
| 1. Marketing techniques may include but are not limited to: | * Online marketing * Influencer marketing * Referrals * Advertisement * Auctioneering * Public relation * Cold calling * Content marketing * Invoicing * Loyalty programs |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Sources of quality water
* Agro Ecological Zonation
* Types of tools and equipment used in production of ornamental plants
* Structures for production of ornamental plants
* Types of ornamental plants
* Physiology of ornamental plants
* Landscaping designs
* Soil conservation
* Phyto-sanitary requirements
* Sources of quality planting materials for ornamental plants
* Husbandry practices in ornamental plants production
* Ornamental plants production Technologies
* Procedures for calibration of equipment
* Record keeping and accounting
* Waste Management
* Occupational Safety and Health Procedures
* General management of ornamental plants farm

**Required skills**

The individual needs to demonstrate the following skills:

* Measuring
* Levelling
* Gaping
* Grafting
* Pruning
* Spraying
* Pests, diseases and nutrients deficiency scouting
* Equipment calibration
* Technical Report writing
* Observation
* Negotiation
* Digital literacy
* Soil sampling and testing

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Used personal protective equipment as per work requirement   2. Treated planting materials based on agronomic requirements.   3. Prepared planting materials in accordance to agronomic requirements.   4. Planted ornamental plants as per agronomic requirements.   5. Carried out crop protection practices on ornamental plants as per agronomic requirements   6. Carried out gapping and thinning on ornamental plants as per work requirements   7. Carried out pruning, training and de-suckering based on plant requirement   8. Applied fertilizers in accordance to plant nutrient requirement |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Observation   2. Oral questioning   3. Portfolio of evidence   4. Interviews   5. Third party report   6. Written tests |
| 1. Context of assessment | Competency may be assessed:   1. Workplace or simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

## PRODUCE SUB-TROPICAL FRUITS

**UNIT CODE: 0812 551 14A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce quality and clean tropical and sub-tropical fruits. It involves preparing sub-tropical fruits planting materials, establishing sub-tropical fruits, managing sub-tropical fruit orchard, performing post-harvest practices, operating agro-processing machinery and perform soil analysis

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| * + - 1. Establish sub-tropical fruits nursery | 1. Personal protective equipment are worn as per work requirement 2. Nursery site is selected based on farm layout 3. Nursery site soil analysis is performed as per work procedure 4. ***Tools, equipment*** and ***materials*** are assembled as per work requirement. 5. Nursery is prepared according to agronomic requirements of tropical and sub-tropical fruits. 6. Planting materials are raised in nursery as per agronomic requirement 7. Sub-tropical fruits ***nursery management*** ***practices*** are performed as per agronomic requirements. |
| * + - 1. Establish sub-tropical fruits orchard | 1. ***Personal protective equipment’s*** are worn as per work requirement 2. Orchard site is selected based on farm plan 3. Tools, equipment and materials are assembled as per work requirement 4. Land clearing is performed as per agronomic requirements 5. **Tillage practices** are carried out as per agronomic requirements 6. Soil and water conservation measures are applied as per agronomic needs 7. ***Soil amendments*** are applied as per soil analysis report 8. Seedlings are transplanted based on agronomic requirements |
| * + - 1. Manage sub-tropical fruits orchard | * 1. Tools and equipmentfor carrying out management practices are assembled as per work requirement   2. Gapping is carried out on sub-tropical fruits as per agronomic requirements   3. Training and pruning is carried out on sub-tropical fruits as per agronomic requirements   4. ***Crop protection*** ***practices*** are carried out on tropical and sub-tropical fruits as per agronomic requirement   5. Physiological disorders are managed as per agronomic requirement   6. Fertilizers are applied as per agronomic requirements   7. Sub-tropical fruit trees are mulched as per agronomic requirements   8. Sub-tropical fruit trees are watered as per agronomic requirements   9. Sub-tropical fruit trees are induced to flower as per agronomic requirements   10. Sub-tropical fruits are harvested as per agronomic requirement   11. Waste management is undertaken in accordance to work requirement |
| * + - 1. Perform sub-tropical fruits post-harvest practices | 1. Tools and equipment for carrying out post-harvest practices are assembled as per work requirement 2. Quality and quantity of tropical and sub-tropical fruits is assessed as per work procedures 3. ***Post-harvest practices*** are carried out in accordance to work requirement 4. Sub-tropical fruits ***marketing techniques*** are applied as per organizational policy. 5. Waste management is undertaken in accordance to work requirement |
| * + - 1. Operate agro-processing machinery | * 1. Personal protective equipment is worn as per safety procedures   2. ***Agro-processing machinery*** is operated as per work requirement   3. Agro-processing machinery is maintained and repaired as per work requirement   4. Agro-processing machinery is stored as per work requirement |
| 1. Perform soil analysis | * 1. Personal protective equipment’s are worn as per work requirement   2. Soil analysis equipment and materials are assembled according to work requirement   3. Soil samples are processed based on test requirement   4. ***Soil properties*** are analysed in accordance to work requirement   5. Soil analysis report is prepared as per work procedure |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Tropical and sub-tropical fruits may include but are not limited to: | * Mangoes * Oranges * Papaya * Pineapple * Pawpaw * Avocado * Bananas * Tree tomatoes * Straw berry * Guava * Loquat * Lime * White sapote |
| 1. Tools may include but are not limited to: | * Hoes * Machetes * Secateurs * Shovels * Soil augur * Panga * Hammer * Saw * Bucket * Shears * Dibbler * Pegs |
| 1. Equipment may include but are not limited to: | * Spray pumps * Watering cans * Hose pipes * Plough * Harrows * Ridgers * Boom sprayer * Pruning saw * Wire strainer * Traps * Pipe sprinklers * Scouting flags * Storage tanks * Tractors * Grading shed * Bud count square * Meteorological equipment |
| 1. Planting materials may include but are not limited to: | * Seeds * Suckers * Seedlings * Cuttings * Tubers * Tissue culture * Buds * Corms * Suckers * Corms Pesticides * Fertilizers * Stationery * Manures * Rope * Nets * Papers * Fencing wire * Staking sticks * Nails * Herbicides |
| 1. Tillage practices may include but are not limited to: | * Primary Tillage * Secondary * Tertiary |
| 1. Nursery management practices may include but are not limited to: | * Mulching * Gapping * Thinning * Pruning * Training * Watering * Fertilizer application * Pest and diseases control |
| 1. Personal protective equipment may include but are not limited to: | * Gumboots * Gloves * Overalls * Dust coats * Masks |
| 1. Soil amendments may include but are not limited to: | 1. Organic and inorganic fertilizers 2. Agricultural lime  * Agricultural gypsum |
| 1. Crop protection practices may include but are not limited to: | * Pest control * Disease control  1. Weed control |
| 1. Post-harvest practices may include but are not limited to: | * Transportation * Cleaning * Sorting * Grading * Drying * Processing * Packaging * Branding * Storage |
| 1. Marketing techniques may include but are not limited to: | * Online marketing * Influencer marketing * Referrals * Advertisement * Auctioneering * Public relation * Cold calling * Content marketing * Invoicing * Loyalty programs |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Food safety in production of tropical fruits and sub-tropical
* Sources of quality water
* Agro Ecological Zonation
* Types of tools and equipment used in production of tropical fruits
* Structures for production of tropical fruits and sub-tropical
* Types of tropical fruits and sub-tropical
* Physiology of tropical fruits and sub-tropical
* Soil and water conservation measures
* Phyto-sanitary requirements
* Good Agricultural Practices
* Sources of quality planting materials for tropical fruits and sub-tropical
* Husbandry practices in tropical fruits production and sub-tropical
* Tropical fruits production Technologies
* Procedures for calibration of equipment
* Maturity indices in tropical fruits
* Harvesting and Post Harvesting Handling of tropical fruits
* Record keeping and accounting
* Waste Management
* Occupational Safety and Health Procedures
* General management of tropical fruits and sub-tropical orchard

**Required skills**

The individual needs to demonstrate the following skills:

* Measuring
* Levelling
* Gaping
* Grafting
* Pruning
* Spraying
* Pests, diseases and nutrients deficiency scouting
* Equipment calibration
* Technical Report writing
* Observation
* Negotiation
* Digital literacy
* Soil sampling and testing

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| * + - 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Used personal protective equipment as per work requirement   2. Treated planting materials based on agronomic requirements.   3. Prepared propagation media in accordance with agronomic requirements.   4. Transplanted tropical fruits and sub-tropical as per agronomic requirements.   5. Carried out crop protection practices on tropical fruits and sub-tropical fruits as per work procedure   6. Carried out gapping and thinning on tropical fruits and sub-tropical fruits as per agronomic requirement   7. Maintained plant population as per agronomic requirement   8. Carried out pruning, training and de-suckering based on crop requirement   9. Applied fertilizers in accordance to crop nutrient requirement   10. Harvested tropical fruits and sub-tropical fruits as per maturity indices   11. Carried out tropical fruits and sub-tropical fruits post-harvest practices in accordance to work requirement   12. Managed waste generated in production process in accordance to work requirement |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Practical 2. Project 3. Third party report 4. Portfolio of evidence 5. Written tests 6. Oral questioning |
| 1. Context of assessment | 1. This competency may be assessed in a workplace or in a simulated workplace. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

**PRODUCE EDIBLE MUSHROOMS**

**UNIT CODE: 0812 551 15A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce quality and clean edible mushroom. It involves preparing edible mushrooms planting materials, establishing edible mushrooms, managing edible mushrooms and performing edible mushrooms post-harvest practices.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| * + - 1. Prepare edible mushrooms propagation materials | * 1. ***Personal protective equipment’s*** are worn as per work requirement   2. ***Tools, equipment*** and ***materials*** are assembled as per work requirement   3. ***Type of edible mushrooms*** to be established is determined in accordance with market demand.   4. Mushroom production structure is sited according to farm plan   5. Mushroom house is constructed according to work procedure   6. ***Starter culture*** for mushroom is treated as per agronomic requirement   7. ***Propagation media*** is prepared as per work procedure   8. Spawns are cultured as per work procedure |
| * + - 1. Establish edible mushrooms | * 1. Personal protective equipment’s are worn as per work requirement   2. Tools, equipment and materials are assembled as per work requirement   3. Substrate is prepared in accordance with mushroom production guidelines.   4. Spawning of mushroom on substrate is performed as per agronomic requirement. |
| * + - 1. Manage edible mushrooms | * 1. Personal protective equipment’s are worn as per work requirement   2. Tools, equipment and materials are assembled as per work requirement   3. Established mushroom are managed as per mushroom production guidelines.   4. ***Crop protection practices*** are carried out as per mushroom production guideline.   5. Established mushrooms are harvested as per mushroom production guideline.   6. Waste management is undertaken in accordance to work requirement |
| * + - 1. Perform edible mushrooms post-harvest practices | * 1. Personal protective equipment’s are worn as per work requirement   2. Tools, equipment and materials are assembled as per work requirement   3. ***Post-harvest practices*** are carried out in accordance to work requirement   4. Mushrooms are marketed as per organizational policy   5. Waste management is undertaken in accordance to work requirement |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Personal protective equipment may include but are not limited to: | * Gloves * Safety goggles * Safety boots * Overalls * Dust coat * Ear muffs * Face masks |
| 1. Tools, equipment and materials may include but are not limited to: | * Weighing scale * Poly tubes * Lockable drum * Table spoon * Sisal twines * Supplement –soya bean meal * Plant residues –stalks and bran * Polythene bags * Shelves * Shade * Spawn * Water * Substrate * PPE –hand gloves, dust coat, dust masks * Hand spray equipment * Oven * Basin * Methylated spirit * Lime * Fuel for heating substrate * Molasses * Sisal twine * Soap |
| 1. Type of edible mushrooms may include but are not limited to: | * White button * Oyster * Shitake * Portobello * Enoki * Morel * Straw * Lion`s Mane * Ganoderma |
| 1. Mushroom production structures may include but are not limited to: | * Mushroom House * Shelves * Plastic Bags * Heat Oven |
| 1. Starter culture may include but are not limited to: | * Organic soils, * Plant growth regulators, * Vitamins, * Amino acids and * Complex organic supplements, * Carbohydrates, * Water media matrix, and * Appropriate PH 7.2-7.5 |
| 1. Spawns may include but are not limited to: | * Spores * mycelia |
| 1. Propagation media may include but are not limited to: | * Grain * Liquid * Wood |
| 1. Spawning may include but are not limited to: | * Seeding the substrate with mushroom inoculums |
| 1. Crop protection practices may include but are not limited to: | * Pest control * Disease control |
| 1. Post-harvest practices may include but are not limited to: | * Transportation * Cleaning * Sorting * Grading * Cooling * Processing * Packaging * Branding * Storage * Drying |
| 1. Marketing techniques may include but are not limited to: | * Online marketing * Influencer marketing * Referrals * Advertisement * Auctioneering * Public relation * Cold calling * Content marketing * Invoicing * Loyalty programs |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Sources of quality water
* Types of tools and equipment used in production of edible mushrooms
* Structures for production of edible mushrooms
* Types of edible mushrooms
* Physiology of edible mushrooms
* Phyto-sanitary requirements
* Sources of quality propagation materials for edible mushrooms
* Husbandry practices in edible mushrooms production
* edible mushrooms production Technologies
* Procedures for calibration of equipment
* Record keeping and accounting
* Waste Management
* Occupational Safety and Health Procedures
* Determining mushroom maturity
* Harvesting and Post Harvesting Handling of mushrooms
* General management of mushroom production farm

**Required skills**

The individual needs to demonstrate the following skills:

* Measuring
* Levelling
* Spraying
* Pests and diseases scouting
* Equipment calibration
* Technical Report writing
* Observation
* Negotiation
* Digital literacy

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Used personal protective equipment as per work requirement 2. Treated starter culture for mushroom according to treatment guidelines 3. Prepared propagation media according to work requirements 4. Cultured mushroom spawns according to production guidelines. 5. Managed established mushroom as per mushroom production guidelines. 6. Carried out post-harvest handling of mushroom in accordance with work requirements |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Observation 2. Oral questioning 3. Portfolio of evidence 4. Interviews 5. Third party report 6. Written tests |
| 1. Context of assessment | Competency may be assessed:   1. Workplace or simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# PRODUCE OIL CROPS

**UNIT CODE: 0812 551 20A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to produce quality oil crops. It involves establishing oil crops nursery, establishing oil crops, performing oil crops post-harvest practices.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the range.*** |
| 1. Establish oil crops nursery | 1. ***Personal protective equipment*** are worn as per work requirement 2. Nursery site is selected based on the farm layout 3. ***Tools, equipment*** and ***materials*** are assembled as per work requirement 4. Nursery site soil analysis is performed as per work procedure 5. Nursery is prepared according to ***agronomic requirements*** of ***oil crops*** 6. Planting materials are obtained as per work procedure 7. Planting materials are established in the nursery as per work procedure 8. Oil crops ***nursery management*** ***practices*** are performed as per agronomical requirements |
| 1. Establish oil crops. | 1. Personal protective equipment are worn as per work requirement 2. Orchard site is selected based on farm plan 3. Tools, equipment and materials are assembled as per work requirement 4. Land clearing is performed as per agronomic requirements 5. ***Tillage practices*** are carried out as per agronomic requirements 6. Soil and water conservation measures are applied as per agronomic needs and field conditions 7. ***Soil amendments*** are applied as per soil analysis report 8. Seedlings are transplanted based on agronomic requirements |
| 1. Manage oil crops | 1. Tools and equipment for carrying out management practices are assembled as per work requirement 2. Gapping is carried out on oil crops as per agronomic requirements 3. Training and pruning is carried out as per agronomic requirements 4. ***Crop protection practices*** are carried out as per agronomic requirement 5. Physiological disorders are managed as per agronomic requirement 6. ***Fertilizers*** are applied as per agronomic requirements 7. Mulching is carried out as per agronomic requirements 8. Watering is carried out as per agronomic requirements 9. Oil crops are induced to flower as per agronomic requirements 10. Oil crops are harvested as per agronomic requirements 11. Waste management is undertaken in accordance to work requirement |
| 1. Perform oil crops post-harvest practices. | 1. Tools and equipment for carrying out post-harvest practices are assembled as per work requirement 2. Quality and quantity of oil crops is assessed as per work procedures 3. ***Post-harvest practices*** are carried out in accordance to work requirement 4. Oil crops ***marketing techniques*** is applied as per organizational policy 5. Waste management is undertaken in accordance to work requirement |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Personal protective equipment may include but are not limited to: | * Gloves * Safety goggles * Safety boots * Overalls * Dust coat * Ear muffs * Face masks |
| 1. Oil crops may include but are not limited to: | * Macadamia * Coconut * Ground nut * Cashew nuts * Chest nut * Hazel nut * Almond * Wal nuts * Sunflower |
| 1. Tools, equipment and materials may include but are not limited to: | * Hoes * Machetes * Secateurs * Shovels * Soil auger * Panga * Pegs * Hammer * Saw * Bucket * Shears * Dibbler * Pegs * Spray pumps * Watering cans * Hose pipes * Plough * Harrows * Ridges * Boom sprayer * Pruning saw * Wire strainer * Traps * Pipe sprinklers * Scouting flags * Storage tanks * Tractors * Grading shed * Bud count square * Meteorological equipment * Pesticides * Fertilizers * Stationery * Manures * Seedlings /planting materials * Khaki paper bags size 3 * Rope * Nets * Translucent papers * Papers * Fencing wire * Staking sticks * Nails * Herbicides * Pesticides * Pheromones * Seeds * Seedlings * Splits * Crowns * Slips * Cuttings * Suckers * Plantlets |
| 1. Agronomic requirements may include but are not limited to: | * Seed bed preparation * Sowing * Mulching * Spacing * Gapping * Thinning * Pruning * Training * De- suckering * Watering * Cover cropping * Nutrient application |
| 1. Tillage practices may include but are not limited to: | * Primary Tillage * Secondary tillage * Tertiary tillage |
| 1. Nursery management practices may include but are not limited to: | * Mulching * Watering * Fertilizer application * Weed control * Pest control * Disease control * Shading * Hardening off |
| 1. Soil amendment may include but are not limited to: | * Fertilizers * Liming * Soil treatment * Gypsum |
| 1. Fertilizers may include but are not limited to: | * Organic manure * Basal inorganic fertilizers * Foliar fertilizer * Fertigation fertilizer |
| 1. Post-harvest practices may include but are not limited to: | * Transportation * Cleaning * Sorting * Grading * Drying * Processing * Packaging * Branding * Storage |
| 1. Marketing techniques   may include but are not limited to: | * Online marketing * Influencer marketing * Referrals * Advertisement * Auctioneering * Public relation * Cold calling * Content marketing * Invoicing * Loyalty programs |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required skills**

The individual needs to demonstrate the following skills:

* Analytical
* Sampling
* Training
* Tilling
* Measuring
* Levelling
* Gapping
* Pruning
* Spraying
* Pests, diseases and nutrients deficiency scouting
* Equipment calibration
* Technical Report writing
* Produce handling
* Soil sampling
* Observation
* Negotiation
* Digital literacy

**Required knowledge**

The individual needs to demonstrate knowledge of

* Food safety in oil crops production
* Risk assessment
* Sources of quality water
* Agro Ecological Zonation
* Establishment and management of oil crops farm
* Types of oil crops
* Physiology of oil crops
* Oil crops production tools and equipment
* Soil sampling and testing
* Soil and water conservation measures
* Phyto-sanitary requirements
* Sources of quality planting materials for oil crops
* Husbandry practices in oil crops production
* Oil crops production Technologies
* Oil crops maturity indices
* Harvesting and post harvesting handling of oil crops
* Accounting principles
* Production records and reports
* Waste Management
* Occupational Safety and Health Procedures

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Used personal protective equipment as per work requirement 2. Treated planting materials based on agronomic requirements. 3. Prepared oil crops nursery as per agronomic requirement 4. Raised oil crops seedlings as per work procedure 5. Prepared land for establishing oil crops as per agronomic requirement 6. Applied soil amendments as per soil analysis report 7. Transplanted Seedlings based on agronomic requirements 8. Carried out crop protection practices on oil crops as per work procedure 9. Maintained plant population as per agronomic requirement 10. Carried out pruning, training and de-suckering based on crop requirement 11. Applied fertilizers in accordance to crop nutrient requirement 12. Harvested oil crops as per maturity indices 13. Carried out oil crops post-harvest practices in accordance to work requirement 14. Managed wastes generated in production process in accordance to work requirement |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Observation 2. Oral questioning 3. Portfolio of evidence 4. Interviews 5. Third party report 6. Written tests 7. Practical tests |
| 1. Context of assessment | Competency may be assessed:   1. Workplace or simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# CONSTRUCT HORTICULTURAL FARM STRUCTURES

**UNIT CODE: 0716 551 22A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to construct farm structures. It involves performing farm structures feasibility survey, designing farm structures and constructing farm structures.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| * + - 1. Perform farm structures feasibility survey | * 1. ***Personal protective equipment’s*** are worn as per work requirement   2. ***Tools, equipment*** and ***materials*** are assembled as per work requirement   3. Feasibility survey is conducted in line with work requirements   4. Feasibility study report is prepared as per standard operating procedure |
| * + - 1. Design farm structures | * 1. Farm structures are designed in line with feasibility survey report   2. Working drawings are prepared as per ***engineering standards***   3. Bill of quantity and budget is prepared as per work requirement   4. Material schedule is prepared in line with design and drawings   5. Approvals are obtained from ***construction regulatory bodies*** |
| * + - 1. Construct farm structures and farm roads | * 1. Construction tools and equipment are assembled as per work requirement.   2. Personal protective equipment’s are worn as per work requirement   3. ***Farm structures*** are constructed in according to working drawings |
| * + - 1. Maintain farm structures | 1. Personal protective equipment’s are worn as per work requirement 2. Tools, equipment and materials are assembled as per work requirement 3. Worn out ***farm structure parts*** are repaired or replaced as per work requirement 4. Waste management is undertaken in accordance to work requirement |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Personal protective equipment may include but are not limited to: | * Gloves * Helmet * Face shields * Safety goggles * Safety boots * Overalls * Dust coat * Ear muffs * Face masks |
| 1. Tools, equipment and materials may include but are not limited to: | * Hammer * Spirit levels * Wheelbarrows * Concrete mixer * Cement * Ballast * Pipe wrench * Welding kit * Craw bar * Nails * Mattock * Saw * Spade * Trowel * Sand * Iron sheets * Bricks * Barbed wire * Plain wire * Posts * Assorted timber |
| 1. Engineering standards may include but are not limited to: | * Standards in farm structures construction |
| 1. Construction regulatory bodies may include but are not limited to: | * NEMA * National Construction Authority * County governments |
| 1. Farm structures may include but are not limited to: | * Green house * Nursery shed * Mushroom house * Shade nets * Soil and water conservation structures * Biogas digester * Silos * Dryers * Pack house * Water pans |
| 1. Farm structures parts may include are but not limited to; | * Poly rose * Frames and hatches * Insect nets * Shade nets * Water pipes and fittings * Garden fence * Garden trellis * Surveillance gadgets * Ventilation system * Lighting system * Roof |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Field assessment procedures
* Different land condition
* Machinery operation
* Different farm tools, equipment and materials
* Waste management and disposal methods
* Agricultural Project management
* Analysis and design methods
* Occupational Safety and Health Procedures

**Required skills**

The individual needs to demonstrate the following skills:

* Technical report writing
* Digital literacy
* Concrete making
* Measuring
* Joinery
* Communication skills
* Observation
* Decision Making
* Planning skills

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Used personal protective equipment as per work requirement   2. Prepared a feasibility study report as per standard operating procedures   3. Designed farm structures in accordance with standard procedures   4. Prepared working drawings as per the engineering standards   5. Prepared bill of quantity in line with the designs   6. Prepared material schedule in line with the design and drawings   7. Assembled construction tools and equipment as per work requirement.   8. Constructed farm structures in accordance to working drawings   9. Managed wastes generated in production process in accordance to work requirement |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   1. Observation 2. Oral questioning 3. Portfolio of evidence 4. Interviews 5. Practical tests 6. Third party report 7. Written tests |
| 1. Context of assessment | Competency may be assessed:   1. Workplace or simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |

# CARRY OUT PLANT BREEDING

**UNIT CODE: 0811 551 23A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to carry out plant breeding to produce clean and quality planting materials. It involves performing asexual and sexual plant breeding and maintaining improved cultivars.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes, which make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements, which specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the range.*** |
| 1. Perform asexual plant breeding | 1. ***Personal protective equipment*** are worn as per work requirement 2. ***Tools, equipment*** and ***materials*** are assembled as per work requirement 3. ***Germplasm*** of asexually propagated crops are collected as per work requirement 4. Germplasm of asexual propagated crops are selected and evaluated as per work requirement 5. Asexually propagated crops are bred as per work procedure 6. ***Progeny*** ***desired characteristics*** are testedas per work requirement 7. Waste management is undertaken in accordance to work requirement |
| 1. Perform sexual plant breeding | 1. Personal protective equipment are worn as per work requirement 2. Tools, equipment and materials are assembled as per work requirement 3. Germplasm of sexually propagated crops are collected as per work requirement 4. Germplasm of sexual propagated crops are selected and evaluated as per work requirement 5. Sexually propagated crops are bred as per work procedure 6. Progeny desired characteristicsare testedas per work requirement 7. Waste management is undertaken in accordance to work requirement |
| 1. Maintain improved cultivars | 1. Personal protective equipment are worn as per work requirement 2. Tools, equipment and materials are assembled as per work requirement 3. Improved cultivars are multiplied as per work requirement 4. Improved cultivars ***marketing techniques*** are applied as per agro-ecological requirements |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Personal protective equipment may include but are not limited to: | * Gloves * Safety goggles * Safety boots * Overalls * Dust coat * Ear muffs * Face masks |
| 1. Tools, equipment and materials may include but are not limited to: | * Magnifying lens * Forceps * Scissors * Needles * Brushes * Bags * Ethyl alcohol * Markers, pencil, eraser. * Meter scale and measuring tag * Weighing balance * Field book * Microscope |
| 1. Germ plasm may include but are not limited to: | * Seeds * Cuttings * Cultures * Tissues |
| 1. Progeny desired characteristics may include but are not limited to: | * High yielding * Resistance to pest and diseases * Non- shattering * Improved quality * Change in maturation duration/ earliness * Desirable agronomic characteristics * Elimination of toxic substance * Wider adaptability * Varieties for new seasons |

**REQUIRED SKILLS AND KNOWLEDGE**

This section describes the skills and knowledge required for this unit of competency.

**Required skills**

The individual needs to demonstrate the following skills:

* Measuring
* Pruning
* Spraying
* Pests, diseases and nutrients deficiency scouting
* Equipment calibration
* Technical Report writing
* Soil sampling
* Observation
* Digital literacy
* Planning skills
* Networking skills

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Sources of quality water
* Agro Ecological Zonation
* Breeding tools and equipment
* Establishment and management of bred crops
* Soil and water conservation measures
* Phyto-sanitary requirements
* Soilless growing media
* Record keeping and accounting
* Waste Management practices
* Occupational Safety and Health Procedures

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   1. Used personal protective equipment as per work requirement 2. Assembled tools, equipment and materials as per work requirement 3. Collected germplasm of crops as per work requirement 4. Selected and evaluated the germplasm as per work requirement. 5. Bred crops as per work procedure. 6. Tested Progeny desired characteristics as per work procedure. 7. Managed waste generated in accordance to work requirement 8. Multiplied improved cultivars as per work requirement 9. Marketed improved cultivars as per agro-ecological requirements |
| 1. Resource Implications for competence certification | The following resources must be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency may be assessed through:   1. Practical test 2. Project 3. Portfolio of evidence 4. Written test 5. Oral questions 6. Third party report |
| 1. Context of assessment | This competency may be assessed   1. Workplace or in a simulated workplace. |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job roles is recommended. |

## MANAGE HYDROPONIC FARM

**UNIT CODE: 0811 551 24A**

**UNIT DESCRIPTION**

This unit specifies the competencies required to setup and run a hydroponic farm. It involves installing hydroponic system, preparing hydroponic plant media, establishing hydroponic plants, managing hydroponic plants and performing hydroponic crops post-harvest practices.

**ELEMENTS AND PERFORMANCE CRITERIA**

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| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
| 1. Install hydroponic system | 1. ***Personal protective equipment’s*** are worn as per work requirement 2. ***Tools, equipment*** and ***materials*** are assembled as per work requirement 3. Hydroponic systems are designed as per ***type of hydroponic system*** 4. A work schedule for installation of hydroponic system is prepared as per type of hydroponic system 5. Hydroponic system is setup as per work procedure |
| 1. Prepare hydroponic plant media | * 1. Personal protective equipment’s are worn as per work requirement   2. Tools, equipment and materials are assembled as per work requirement   3. ***Hydroponic planting media*** are prepared as per work requirement   4. Nutrient solutions to use at different growth stages are determined |
| 1. Establish hydroponic plants | * 1. Personal protective equipment’s are worn as per work requirement   2. Tools, equipment and materials are assembled as per work requirement   3. ***Hydroponic planting materials*** are prepared as per ***agronomic requirement***   4. Hydroponic plants are transplanted as per agronomic requirement |
| 1. Manage hydroponic plants | * 1. Personal protective equipment’s are worn as per work requirement   2. Tools, equipment and materials are assembled as per work requirement   3. ***Cultural practices*** are carried out as per agronomic requirements   4. ***Nutrient solutions*** are prepared and fed to hydroponic plants as per crop requirement   5. ***Chemical analysis of planting media*** is carried out as per work procedure   6. Pest and diseases are scouted and controlled as per agronomic requirement   7. Hydroponic plants are harvested as per crop maturity indices |
| 1. Perform hydroponic plants post-harvest practices | 1. Tools and equipment for carrying out post-harvest practices are assembled as per work requirement 2. Quality and quantity of cut flowers is assessed as per work procedures 3. ***Post-harvest practices*** are carried out in accordance to agronomic requirement 4. Hydroponics plants ***marketing techniques*** are applied as per organizational policy 5. Waste management is undertaken in accordance to work requirement |

**RANGE**

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

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| **Variable** | **Range** |
| 1. Personal protective equipment may include but are not limited to: | * Gloves * Safety goggles * Safety boots * Overalls * Dust coat * Ear muffs * Face masks |
| 1. Tools, equipment and materials may include but are not limited to: | * Hoes * Machetes * Secateurs * Shovels * Soil auger * Panga * Pegs * Hammer * Saw * Bucket * Secateurs * Shears * Dibbler * Pegs * Spray pumps * Watering cans * Hose pipes * Plough * Harrows * Ridges * Boom sprayer * Pruning saw * Wire strainer * Traps * Pipe sprinklers * Scouting flags * Storage tanks * Tractors * Grading shed * Bud count square * Meteorological equipment * Pesticides * Fertilizers * Stationery * Manures * Seedlings /planting materials * Khaki paper bags size 3 * Rope * Nets * Translucent papers * Papers * Fencing wire * Staking sticks * Nails * Herbicides * Pesticides * Pheromones * Seeds * Seedlings * Splits * Crowns * Slips * Cuttings * Suckers * Plantlets |
| 1. Hydroponic systems | * Deep water float system * Nutrient film technique (NFT) * Drip * Wick * Aeroponics * Ebb and Flow |
| 1. Hydroponic planting media may include but are not limited to | * Pumice * Vermiculite * Perlite * Cocoa peat * Peat moss * Rock wool |
| 1. Hydroponic planting materialsmay include but are not limited to: | * Seeds * Splits * Suckers * Buds * Bulbils * Cuttings * Corms * Tissue culture * Seedlings |
| 1. Agronomic requirements may include but are not limited to | * Gapping * Thinning * Pruning * Training * De- suckering * Watering * Nutrient application |
| 1. Crop protection practicesmay include but are not limited to: | * Pest control * Disease control * Weed control |
| 1. Cultural practicesmay include but are not limited to: | * Gapping * Thinning * Training * Weeding * Pruning |
| 1. Nutrient solution may include but are not limited to: | * Solution A (Calcium nitrate, iron) * Solution B (magnesium sulphate, potassium nitrate, mono potassium phosphate, manganese sulphate, zinc sulphate, copper sulphate and Borax 11%) |
| 1. Chemical analysis of planting media mayinclude but are not limited to: | * pH * Electrical conductivity * Nutrient concentration |
| 1. Post-harvest practices may include but are not limited to: | * Transportation * Cleaning * Sorting * Grading * Drying * Processing * Packaging * Branding * Storage |
| 1. Marketing techniques   may include but are not limited to: | * Online marketing * Influencer marketing * Referrals * Advertisement * Auctioneering * Public relation * Cold calling * Content marketing * Invoicing * Loyalty programs |

**REQUIRED KNOWLEDGE AND SKILLS**

This section describes the knowledge and skills required for this unit of competency.

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Components of hydroponic system
* Sources of quality water
* Hydroponic farming tools and equipment
* Physiology of hydroponic plants
* Phyto-sanitary requirements
* Sources of quality planting materials
* Husbandry practices in hydroponic farming
* Procedures for calibration of equipment
* Harvesting and Post Harvesting Handling of hydroponic plants
* Record keeping and accounting
* Waste Management practices
* Occupational Safety and Health Procedures

**Required skills**

The individual needs to demonstrate the following skills:

* Measuring
* Levelling
* Gapping
* Pruning
* Spraying
* Pests, diseases and nutrients deficiency scouting
* Equipment calibration
* Technical Report writing
* Observation
* Negotiation
* Digital literacy
* Networking

**EVIDENCE GUIDE**

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and skills range.

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| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Used personal protective equipment as per work requirement   2. Designed and setup hydroponic system as per hydroponic system requirements   3. Treated planting materials based on agronomic requirements.   4. Prepared propagation media in accordance to agronomic requirements.   5. Raised hydroponic plants as per agronomic requirements.   6. Carried out crop protection practices on hydroponic plants as per work procedure   7. Carried out fertigation in accordance to crop nutrient requirement   8. Carried out pruning, training and de-suckering based on crop requirement   9. Harvested hydroponics plants as per maturity indices   10. Carried out post-harvest handling of hydroponic plants in accordance to work requirement   11. Managed wastes generated in production process in accordance to work requirement |
| 1. Resource implications | The following resources should be provided:   1. Appropriately simulated environment where assessment can take place 2. Access to relevant work environment 3. Resources relevant to the proper activities or tasks |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Observation   2. Oral questioning   3. Portfolio of evidence   4. Interviews   5. Third party report   6. Written tests |
| 1. Context of assessment | Competency may be assessed:   1. Workplace or simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector and workplace job role is recommended. |