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**REPUBLIC OF KENYA**

**NATIONAL OCCUPATIONAL STANDARD**

**FOR**

**HORTICULTURE FARM OPERATOR**

**KNQF LEVEL: 3**

**ISCED CODE:** **0812 254 A**

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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 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. The education sector had to be aligned to the Constitution of Kenya 2010 and this resulted to the formulation of the Policy Framework for Reforming Education and Training (Sessional Paper No. 4 of 2016). 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 shall be competency based, curriculum development shall be industry led, certification shall be based on demonstration of competence and mode of delivery shall allow for multiple entry and exit in TVET programmes.

These reforms 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 the purpose of developing a competency-based curriculum for Horticulture Farm Operator. These Occupational Standards will also be the basis for assessment of an individual for competence certification.

It is my conviction that these Occupational Standards will play a great role towards development of competent human resource for the agriculture sector’s growth and 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. 1 of 2019 on Reforming Education and Training in Kenya, emphasized the need to reform curriculum development, assessment and certification in TVET. This called for shift to CBET in order to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

The TVET Curriculum Development, Assessment and Certification Council (TVET CDACC), in conjunction with Horticulture Sector Skills Advisory Committee (SSAC), Zizi Afrique Foundation, Fresh Produce Consortium of Kenya, Kenya Agriculture Employers Association and Kenya Plant Health Inspectorate Service (KEPHIS) have developed these Occupational Standards for a Horticulture Operator. These standards will be the bases for development of competency-based curriculum for Horticulture Farm Operator Level 3.

The occupational standards are designed and organized with clear performance criteria for each element of a unit of competency. These standards also outline the required knowledge and skills as well as evidence guide.

I am grateful to the Council members, Council Secretariat, Horticulture SSAC, Food Safety SSAC, expert workers and all those who participated in the development and review of these occupational standards.

**ACKNOWLEDGEMENTS**

These occupational standards were developed through the combined efforts of various stakeholders from private and public organizations. We wish to acknowledge the invaluable contribution received from the stakeholders comprising of members of Kenya Agriculture Employers’ Association, Kenya Plant Health Inspectorate Service (KEPHIS), Fresh produce Consortium of Kenya and Zizi Afrique Foundation who provided inputs towards the development of these occupational standards against which this curriculum was developed.

We are most sincerely thankful to the heads of these institutions who released their staff to join in this important course. Our gratitude goes to the various facilitators that moderated several workshops and ensured that all deliberations and outputs were captured and compiled. These persons did not only demonstrate patience, but also provided leadership by motivating and guiding the groups towards the finalization of this curriculum. We cannot forget to thank the government agencies that regulate the Technical and Vocational Education and Training (TVET) system namely TVET Authority and CDACC through whom guidance and support was provided on this curriculum development.

Much gratitude goes to Zizi Afrique Foundation who initiated and sponsored the review process.

Last but not least, we are grateful to any other person, institution, organization or company who played any role in making this process successful but has not been mentioned. We dearly acknowledge your contribution and support.

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# ABBREVIATIONS AND ACRONYMS

ATVET Agricultural Technical and Vocational Education and Training

BC Basic Competency

CAADP Comprehensive Africa Agricultural Development Programme

CDACC Curriculum Development, Assessment and Certification Council

CR Core Competency

DANIDA Danish International Development Agency

GIZ German International Cooperation

HP Horticulture Processor

ICT Information Communication Technology

KCSE Kenya Certificate of Secondary Education

KNQA Kenya National Qualifications Authority

MESPT Micro Enterprises Support Programme Trust

OSH Occupation Safety and Health

OSHA Occupation Safety and Health Act

OSHS Occupational Safety and Health Standards

PPE Personal Protective Equipment

SSAC Sector Skills Advisory Committee

TVET Technical and Vocational Education and Training

**KEY TO ISCED UNIT CODE**



# OVERVIEW

Horticulture Level 3 qualification consists of competencies that an individual must have to operate a horticulture farm. It involves producing vegetable crops in both open and protected environments. It also involves producing herbs and spices in open and protected environments.

The units of competency comprising Horticulture farm operation Level 3 qualification include the following core units:

**CORE UNITS OF COMPETENCY**

|  |  |
| --- | --- |
| **ISCED Unit Code** | **Unit Title** |
| 0812 251 01A | Produce Vegetable Crops in open environment |
| 0812 251 02A | Produce Vegetable Crops in protected environment |
| 0812 251 03A | Produce Herbs and Spices in open environment |
| 0812 251 04A | Produce Herbs and Spices in protected environment |

# PRODUCE VEGETABLE CROPS IN OPEN ENVIRONMENT

**ISCED UNIT CODE:** 0812 251 01A

**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**

**ISCED UNIT CODE:** 0812 251 02A

**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 03A

**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, and undertaking post-harvest 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 04A

**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
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| 1. Context of Assessment
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| 1. Guidance information for assessment
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