PRODUCTION OF HERBS AND SPICES IN PROTECTED ENVIRONMENT

ISCED UNIT CODE: 0812 251 04A

TVETCDACC UNIT CODE: HO/CU/HP/CR/04/3/MA

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce Herbs and Spices in protected environment

Duration of Unit: 60 Hours

Unit Description

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

The trainer to choose any three high value herbs and spices in the range. Consider choice of trainees and market demands. Visit to herbs and spices farm in protected environment is recommended.

Summary of Learning Outcomes

SNO	Learning Outcome	Duration (hours)
1.	Set up protected environment	15
2.	Grow Herbs and Spices	15
3.	Harvest Herbs and Spices	10
4.	Undertake Post Harvest Activities	5
5.	Undertake Value Addition Processes	10
6.	Undertake Marketing Activities	5

Learning Outcomes, Content, and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Set up protected environment	1.1 Procedures for occupational safety and health. 1.2 Tools, equipment, supplies and materials • Identification • Sourcing • Use • Maintenance • Storage 1.3 Different production structure • Greenhouse • Shed nets 1.4 Types of propagation media 1.5 Media sampling and results interpretation 1.6 Soil and water conservation measures 1.7 Types of seedlings trays 1.8 Propagating media preparation 1.9 Potting the media 1.10 Sowing of the planting material 1.11 Food safety measures 1.12 Nursery Management practices • Weeding • Watering/ Irrigation – Types of irrigation • Pricking out 1.13 Pest and diseases control 1.14 Hardening off 1.15 Record keeping 1.16 Waste management practices • 3Rs of waste disposal 1.17 Emerging trends • Automated irrigation systems	• Observation • Oral assessment • Portfolio of evidence • Third party report • Written assessment • Practical
2. Grow Herbs and Spices	2.1 Procedures for occupational safety and health 2.2 Tools, equipment, supplies and materials	5.8 Observation 5.9 Oral assessment 5.10 Portfolio of evidence

Learning Outcome	Content	Suggested Assessment Methods
	• Identification • Sourcing • Use • Maintenance • Storage 2.3 Planting/transplanting procedure 2.4 Protected environment crop agronomic practices • Spacing • Gapping • Irrigation • Thinning • Weeding • Pruning • Intercropping • Crop rotation • Pinching 2.5 Structure management practices 2.6 Crop protection • Types of pests and diseases • Methods of controlling pests and diseases • Integrated Pest and Diseases Management • Efficient use of crop protection products 2.7 Crop nutrition • Types of fertilizers • Method of fertilizer application • Fertigation 2.8 Record keeping 2.9 Wastes management practices • 3Rs of waste disposal 2.10 Emerging trends • Precision Technologies for pests and diseases control • Automated Climate control and fertigation • Use of applications and tracking	5.11 Third party report 5.12 Written assessment

Learning Outcome	Content	Suggested Assessment Methods
	tools	
3. Harvest Herbs and Spices	3.1 Procedures for occupational safety and health 3.2 Tools, equipment, supplies and materials • Identification • Sourcing • Use • Maintenance • Storage 3.3 Maturity indices • Horticultural maturity • Physiological maturity 3.4 Methods of harvesting • Pinching • Uprooting • Cutting 3.5 Food safety measures 3.6 Record keeping 3.7 Wastes management practice • 3Rs of waste disposal 3.8 Emerging trends • Precision harvesting • Blockchain and traceability	• Observation • Oral assessment • Portfolio of evidence • Third party report • Written assessment • Practical
4. Undertake Post Harvest Activities	4.1 Procedures for occupational safety and health 4.2 Tools, equipment, supplies and materials • Identification • Sourcing • Use • Maintenance • Storage 4.3 Post harvest handling practices • Weighing • Cleaning • Sorting • Grading • Packaging	• Observation • Oral assessment • Portfolio of evidence • Third party report • Written assessment 5.13 Practical

Learning Outcome	Content	Suggested Assessment Methods
	• Storage 4.4 Food safety measures 4.5 Record keeping 4.6 Wastes management practice • 3Rs of waste disposal 4.7 Emerging trends- • Automated grading • Packaging innovations	
5. Undertake Value Addition Processes	5.1 Procedures for occupational safety and health 5.2 Tools, equipment, supplies and materials • Identification • Sourcing • Use • Maintenance • Storage 5.3 Meaning of value addition 5.4 Importance of Value addition 5.5 Food safety during value addition 5.6 Value addition techniques and methods • Drying • Blanching • Canning • Freezing • Powder form • Basic Products processing - blending 5.7 Record keeping 5.8 Wastes management practice • 3Rs of waste disposal 5.9 Emerging trends • Solar dehydrators • Blockchain and traceability	• Observation • Oral assessment • Portfolio of evidence • Third party report • Written assessment • Practical

Learning Outcome	Content	Suggested Assessment Methods
6. Undertake Marketing Activities	6.1 Procedures for occupational safety and health 6.2 Market survey techniques 6.3 Pricing techniques • Customer value-based pricing • Cost – based pricing • Competition based pricing • New- product pricing 6.4 The 4Ps in marketing • Product • Place • Price • Promotion 6.5 Wastes management practice • 3Rs of waste disposal 6.6 Record keeping 6.7 Emerging trends • e – marketing • Functional and health boosting products • Product certification	• Observation • Oral assessment • Portfolio of evidence • Third party report • Written assessment

Suggested Methods of Instruction

- Instructor-led facilitation
- Demonstration by trainer
- Practical work by trainees
- Group discussions
- Presentations
- Projects
- Case studies
- Problem based learning
- Experiential learning
- Question and answer
- Team training

- Team learning
- E-learning
- Academic trips

Recommended Resources for 25 Trainees

S/No.	Category/Item	Description/ Specifications	Quantity	Recommended Ratio (Item: Trainee)
A	**Learning Materials**			
1.	GAP guidelines manuals		5 pcs	1:5
2.	MoALF Herbs and spices production manual		5 pcs	1:5
3.	KALRO training manuals		5 pcs	1:5
B	**Learning Facilities & infrastructure**			
1.	Lecture/theory room	40 M^2	1	1:25
2.	Tools and Equipment storage facility		1	1:25
3.	Chemical and fertilizer storage facility		1	1:25
4.	Greenhouse		2	2:25
5.	Shade nets		5	1:5
C	**Consumable materials**			
1.	Manure	Tonnes of farmyard manure	2	2:25
2.	Soilless media	Assorted		
3.	Fertilizers	Planting 2 top dressing	3 bags of 50kg	3:25
4.	Planting materials	Seeds, seedling, vegetative material	1kg of seeds/acre	1:25
5.	Mulching materials	Organic and inorganic of 30microns	20 bales of organic mulch 4rolls of inorganic mulch	20:25 4:25
6.	Khaki paper bags and stickers	0.5kg bag	4 packets of khaki bag and 200	4:25

			stickers	
7.	Seedling trays	66 cells tray	50 trays	2:25
8.	Layout string	Sisal twine	2 rolls	2:25
9.	Stationery	Assorted	1 rim of printing papers 1 packet of pens 1packet of maker pens	1:25
10.	Nails	3'' and 4'' nails	1 each	1:25
11.	Pesticides	Herbicides Insecticides Nematicides Fungicides	1Litre of each	1:25
12.	Rooting hormones	Powder	200grams	1:25
13.	Pheromones+traps	2pheromones Tuta absoluta and fruit fly	50 pieces	2:1
14.	Scouting flags	3 fabric ribbon-Red, yellow, green	75	3:1
15.	Pest control traps	Sticky traps	2	2:1
16.	Personal protective Equipment (PPEs)	Set-(overall, gloves, respirator, gumboot, goggles) Spray suit	25 5	1:1 1:5
17.	Packaging materials	Assorted-3 different packaging materials	1	3:1
D	**Tools and Equipment**			
1.	Hoes/jembe		25 pcs	1:1
2.	Panga		10 pcs	1:3
3.	Slasher		10 pcs	1:3
4.	Secateurs		15 pcs	1:2
5.	Spade		15 pcs	1:2
6.	Soil augur		5 pcs	1:5
7.	Pegs		100 pcs	4:1
8.	Hammer		15 pcs	1:2

9.	Saw		15 pcs	1:2
10.	Bucket		15 pcs	1:2
11.	Dibbler		15 pcs	1:2
12.	Garden trowel		15 pcs	1:2
13.	Measuring tape		10 pcs	1:3
14.	Knapsack's sprayers		5 pcs	1:5
15.	Irrigation equipment	A complete set of irrigation system	1 set	1:25
16.	Storage tanks	3, 000 litres capacity	1	1:25
17.	Watering can	5litre can-plastic/metallic	5 pcs	1:5