PRODUCTION OF VEGETABLE CROPS IN PROTECTED ENVIRONMENT

ISCED UNIT CODE: 0812 251 02A

TVET CDACC UNIT CODE: HO/CU/HP/CR/02/3/MA

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce Vegetable Crops in protected environment

Duration of Unit: 80 Hours

Unit Description

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

NOTE: The trainer to choose at least one vegetable in each category in the range. The choice should be based on market demand and interest of trainee.

Summary of Learning Outcomes

SNO	Learning Outcome	Duration (Hours)
1.	Set up protected environment	15
2.	Establish Vegetable Crop	15
3.	Harvest Vegetable Crop	15
4.	Undertake Post Harvest Activities	10
5.	Undertake Value Addition Processes	15
6.	Undertake Marketing Activities	10
	TOTAL	**80**

Learning Outcomes, Content, and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Set up protected environment	1.1 Production structures
	    1.1.1 Greenhouse
	    1.1.2 Shed nets
	1.2 Procedures for occupational safety and health.
	1.3 Planting materials
	    1.3.1 Types
	    1.3.2 Sources
	    1.3.3 Preparation
	1.4 Tools, equipment, supplies and materials
	    1.4.1 Identification
	    1.4.2 Sourcing
	    1.4.3 Use
	    1.4.4 Maintenance
	    1.4.5 Storage
	1.5 Types of propagation media
	    1.5.1 Soil
	    1.5.2 Soilless media
	    1.5.3 Peatmoss
	    1.5.4 Cocopeat
	    1.5.5 Vermiculite
	    1.5.6 Rock wool
	1.6 Propagating media preparation
	1.7 Potting the media
		• Observation
		• Oral assessment
		• Portfolio of evidence
		• Third party report
		• Written assessment
		• Practical

Learning Outcome	Content	Suggested Assessment Methods

	1.8 Sowing the seeds
	
	 1.8.1 Types of seedlings trays
	
	1.9 Nursery Management practices
	
	    1.9.1 Weeding
	
	    1.9.2 Watering/ Irrigation – Types of irrigation
	
	    1.9.3 Pricking out
	
	    1.9.4 Pest and diseases control
	
	    1.9.5 Hardening off
	
	1.10 Record keeping
	
	1.11 Waste management practices
	
	  • 3Rs of waste disposal
	
	1.12 Emerging trends
	
	  • Automated sowing machine	

2. Establish Vegetable Crop	2.1 Procedures for occupational safety and health
	
	2.2 Tools, equipment, supplies and materials
	
	    2.2.1 Identification
	
	    2.2.2 Sourcing
	
	    2.2.3 Use
	
	    2.2.4 Maintenance
	
	    2.2.5 Storage
	
	2.3 Food safety measures
	
	2.4 Planting/transplanting procedure
	
	2.5 Protected environment crop agronomic practices
	
	    2.5.1 Spacing
		5.1 Observation
		
		5.2 Oral assessment
		
		5.3 Portfolio of evidence
		
		5.4 Third party report
		
		5.5 Written assessment
		
		5.6 Project

Learning Outcome	Content	Suggested Assessment Methods
	2.5.2 Gapping	
	2.5.3 Watering/Irrigation	
	2.5.4 Thinning	
	2.5.5 Weeding	
	2.5.6 Pruning	
	2.5.7 Trellising	
	2.5.8 Intercropping	
	2.5.9 Crop rotation	
	2.6 Structure management practices	
	2.7 Crop protection	
	2.7.1 Types of pests and diseases	
	2.7.2 Methods of controlling pests and diseases	
	2.7.3 Integrated Pest and Diseases Management	
	2.7.4 Efficient use of crop protection products	
	2.8 Crop nutrition	
	2.8.1 Types of fertilizers	
	2.8.2 Method of fertilizer application	
	2.8.3 Fertigation	
	2.9 Record keeping	
	2.10 Wastes management practices	
	2.10.1 3Rs of waste disposal	
	2.11 Emerging trends	
	2.11.1 Technologies for pests and	

Learning Outcome	Content	Suggested Assessment Methods
	diseases control 2.11.2 Automated Climate control and fertigation systems	

3. Harvest Vegetable Crop	3.1 Procedures for occupational safety and health
	3.2 Tools, equipment, supplies and materials
	    3.2.1 Identification
	    3.2.2 Sourcing
	    3.2.3 Use
	    3.2.4 Maintenance
	    3.2.5 Storage
	3.3 Maturity indices
	    3.3.1 Horticultural maturity
	    3.3.2 Physiological maturity
	3.4 Methods of harvesting
	    3.4.1 Pinching
	    3.4.2 Uprooting
	    3.4.3 Cutting
	3.5 Food safety measures
	3.6 Record keeping
	3.7 Wastes management practice
	    3.7.1 3Rs of waste disposal
	3.8 Emerging trends:
	    3.8.1 Use of A.I
	    3.8.2 Technologies for harvesting
		• Observation
		• Oral assessment
		• Portfolio of evidence
		• Third party report
		• Written assessment
		• Practical

Learning Outcome	Content	Suggested Assessment Methods

4. Post Harvest Activities	4.1 Procedures for occupational safety and health
	4.2 Measures for food safety
	4.3 Tools, equipment, supplies and materials
	    4.3.1 Identification
	    4.3.2 Sourcing
	    4.3.3 Use
	    4.3.4 Maintenance
	    4.3.5 Storage
	4.4 Post harvest handling practices
	    4.4.1 Weighing
	    4.4.2 Cleaning
	    4.4.3 Sorting
	    4.4.4 Grading
	    4.4.5 Packaging
	    4.4.6 Storage
	4.5 Record keeping
	4.6 Wastes management practice
	    • 3Rs of waste disposal
	4.7 Emerging trends-
	    4.7.1 Technologies for packaging
	    4.7.2 Technologies for grading
	    4.7.3 Technologies for cleaning
		• Observation
		• Oral assessment
		• Portfolio of evidence
		• Third party report
		• Written assessment
		5.7 Practical

5. Undertake Value Addition Processes	5.1 Procedures for occupational safety and health 5.2 Tools, equipment, supplies and materials	• Observation • Oral assessment • Portfolio of evidence

Learning Outcome	Content	Suggested Assessment Methods
	5.2.1 Identification 5.2.2 Sourcing 5.2.3 Use 5.2.4 Maintenance 5.2.5 Storage 5.3 Meaning of value addition 5.4 Importance of value addition 5.5 Value addition techniques and methods 5.5.1 Drying 5.5.2 Blanching 5.5.3 Canning 5.5.4 Freezing 5.5.5 Waxing 5.5.6 Basic Products processing-blending 5.6 Record keeping 5.7 Wastes management practice • 3Rs of waste disposal 5.8 Emerging trends • Solar dehydrators	• Third party report • Written assessment • Practical
6. Undertake Marketing Activities	6.1 Market survey techniques 6.2 Pricing techniques 6.2.1 Customer value-based pricing 6.2.2 Cost – based pricing 6.2.3 Competition based pricing 6.2.4 New- product pricing 6.3 The 4Ps in marketing	• Observation • Oral assessment • Portfolio of evidence • Third party report • Written

Learning Outcome	Content	Suggested Assessment Methods

	6.3.1 Product
	6.3.2 Place
	6.3.3 Price
	6.3.4 Promotion
	6.4 Wastes management practice
	   • 3Rs of waste disposal
	6.5 Record keeping
	6.6 Emerging trends
	   • e – marketing
		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 Vegetable production manual		5 pcs	1:5
3.	Fruit Production handbook Manual		5 pcs	1:5
4.	KALRO training manuals		5 pcs	1:5
B	**Learning Facilities & infrastructure**			
5.	Lecture/theory room	40 M^2	1	1:25
6.	Tools and Equipment storage facility		1	1:25
7.	Chemical and fertilizer storage facility		1	1:25
8.	Greenhouse		2	2:25
9.	Shade nets		5	1:5
C	**Consumable materials**			
20.	Manure	Tonnes of farm yard manure	2 tonnes	1:13
21.	Soilless medium	Assorted		
22.	Fertilizers	Planting 2 top dressing	3 bags of 50kg	3:25
23.	Planting materials	Seeds, seedling,	1kg of	1:25

		vegetative material	seeds/acre	
24.	Mulching materials	Organic and inorganic of 30microns	20 bales of organic mulch 4rolls of inorganic mulch	4:5 4:25
25.	Khaki paper bags and stickers	0.5kg bag	4 packets of khaki bag and 200 stickers	4:25
26.	Seedling trays	66 cells tray	50 trays	2:25
27.	Layout string	Sisal twine	2 rolls	2:25
28.	Twining string	Nylon	5 rolls	1:5
29.	Binding wire	Staking binding wire	50kg	2:1
30.	Stationery	Assorted	1 rim of printing papers 1 packet of pens 1packet of maker pens	1:25
31.	Staking sticks	Wooden sticks 1.5m long	250 sticks	10:1
32.	Nails	3'' and 4'' nails	1 each	1:25
33.	Pesticides	Herbicides Insecticides Nematicides	1Litre of each	1:25

		Fungicides		
34.	Rooting hormones	Powder	200grams	1:25
35.	Pheromones + traps	2pheromones Tuta absoluta and fruit fly	50 pieces	2:1
36.	Scouting flags	3 fabric ribbon-Red, yellow, green	75	3:1
37.	Pest control traps	Sticky traps	2	2:1
38.	Personal protective Equipment (PPEs)	Set-(overall, gloves, respirator, gumboot, goggles) Spray suit	25 5	1:1 1:5
39.	Packaging materials	Assorted-3 different packaging materials	1	3:1
D	**Tools and Equipment**			
18.	Hoes/jembe		25 pcs	1:1
19.	Panga		10 pcs	1:3
20.	Slasher		10 pcs	1:3
21.	Secateurs		15 pcs	1:2
22.	Spade		15 pcs	1:2
23.	Soil augur		5 pcs	1:5
24.	Pegs		100 pcs	4:1
25.	Hammer		15 pcs	1:2
26.	Saw		15 pcs	1:2
27.	Bucket		15 pcs	1:2

28.	Dibbler		15 pcs	1:2
29.	Garden trowel		15 pcs	1:2
30.	Measuring tape		10 pcs	1:3
31.	Knapsacks sprayers		5 pcs	1:5
32.	Irrigation equipment	A complete set of irrigation system	1 set	1:1
33.	Storage tanks	3, 000 litres capacity	1	1:1
34.	Watering can	5litre can-plastic/metalic	5 pcs	1:5