



# **THE KISII NATIONAL POLYTECHNIC**

**P.O. BOX 222-40200,**

**KISII, KENYA.**

**COMPETENCY BASED CURRICULUM**

**FOR**

**DIPLOMA IN HORTICULTURE PRODUCTION**

**LEVEL 6**

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## COURSE OVERVIEW

This course is designed to equip an individual with competencies for horticulture production. It further aims at equipping the individual with competencies for the storage of various horticultural produce, processing fruits, vegetables, flowers, nuts as well as herbs and spices.

The course is also designed to equip the individual with competencies to set up and manage a horticultural farm.

This course consists of the following basic and core units of learning:

### Basic Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit factor
KNP/HP/B01/6/	Communication skills	48	4.8
KNP/HP/B02/6/	Basic mathematics	60	6.0
KNP/HP/B03/6/	Introduction to computer	60	6.0
KNP/HP/B04/6/	Entrepreneurial skills	48	4.8
KNP/HP/B05/6/	Environmental literacy	60	6.0
KNP/HP/B06/6/	Occupational safety and health practices	30	3.0
<b>Total</b>		<b>306</b>	<b>30.6</b>

### Core Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit factor
KNP/HP/C01/6/	Tropical fruit production	100	10
KNP/HP/C02/6/	Sub-tropical fruits production	100	10
KNP/HP/C03/6/	Temperate fruits production	90	9
KNP/HP/C04/6/	Vine fruits production	100	10
KNP/HP/C05/6/	Mushrooms production	80	8
KNP/HP/C06/6/	Herbs and spices production	100	10
KNP/HP/C07/6/	Horticultural nuts production	90	9
KNP/HP/C08/6/	Ornamental plants production	100	10
KNP/HP/C09/6/	Cut flowers production	100	10
KNP/HP/C10/6/	Vegetables production	120	12
KNP/HP/C10/6	Horticultural production farm management	100	10
KNP/HP/C12/6/	Industrial attachment	360	36
<b>Total</b>		<b>1746</b>	<b>17.6</b>

The total duration of the course for an average trainee is 1746 hours which is equivalent to forty eight (58) weeks at 30 hours of learning per week plus twelve (12) weeks Industrial Attachment

### **Entry Requirements**

An individual entering this course should have any of the following minimum requirements:

- a) Kenya Certificate of Secondary Education (KCSE) mean grade of C- (C minus)

**Or**

- a) Certificate in Horticulture Production Level 5

**Or**

- b) Equivalent qualifications as determined by Kenya National Qualifications Authority (KNQA)

### **Industrial attachment**

An individual enrolled in this course will undergo twelve (12) weeks industrial attachment in a horticultural processing firm.

An individual enrolled in one of the core units of learning will undergo a two weeks attachment in a horticultural farm.

### **Assessment**

The course will be assessed at two levels: internal and external.

- a) **Internal assessment** conducted continuously by the trainer (internal assessor) who is monitored by an accredited internal verifier.
- b) **External assessment** conducted by an external assessor who is monitored by an accredited external verifier.

The assessors and verifiers are accredited by TVET CDACC which also coordinates external assessment.

### **Certification**

An individual will be awarded a Record of Achievement on demonstration of competence in a unit of competency. To be awarded Certificate in Horticulture processing Level 6, an individual must demonstrate competence in all the units of competency. This certificate will be awarded by KISII NATIONAL POLYTECHNIC.

## **BASIC UNITS OF LEARNING**

## COMMUNICATION SKILLS

**UNIT CODE:**KNP/HP/B01/6/

### Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstrate communication skills

**Duration of Unit:** 40 hours

### Unit Description

This unit covers the competencies required in meeting communication needs of clients and colleagues and developing, establishing, maintaining communication pathways and strategies. It also covers competencies for conducting interview, facilitating group discussion and representing the organization in various forums.

### Summary of Learning Outcomes

1. Utilize specialized communication skills processes
2. Develop communication strategies
3. Establish and maintain communication pathways
4. Promote use of communication strategies
5. Conduct interview
6. Facilitate group discussion
7. Represent the organization

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Utilize specialized communication skills processes	<ul style="list-style-type: none"><li>• Communication process</li><li>• Modes of communication</li><li>• Medium of communication</li><li>• Effective communication</li><li>• Barriers to communication</li><li>• Flow of communication</li><li>• Sources of information</li><li>• Organizational policies</li><li>• Organization requirements for written and electronic communication methods</li><li>• Report writing</li></ul>	<ul style="list-style-type: none"><li>• Written</li><li>• Oral</li></ul>

	<ul style="list-style-type: none"> <li>• Effective questioning techniques (clarifying and probing)</li> <li>• Workplace etiquette</li> <li>• Ethical work practices in handling communication</li> <li>• Active listening</li> <li>• Feedback</li> <li>• Interpretation</li> <li>• Flexibility in communication</li> <li>• Types of communication strategies</li> <li>• Elements of communication strategy</li> </ul>	
2. Develop communication strategies	<ul style="list-style-type: none"> <li>• Dynamics of groups</li> <li>• Styles of group leadership</li> <li>• Openness and flexibility in communication</li> <li>• Communication skills relevant to client groups</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written</li> </ul>
3. Establish and maintain communication pathways	<ul style="list-style-type: none"> <li>• Types of communication pathways</li> </ul>	<ul style="list-style-type: none"> <li>• Written</li> <li>• Observation</li> </ul>
4. Promote use of communication strategies	<ul style="list-style-type: none"> <li>• Application of elements of communication strategies</li> <li>• Effective communication techniques</li> </ul>	<ul style="list-style-type: none"> <li>• Written</li> <li>• Observation</li> </ul>
5. Conduct interview	<ul style="list-style-type: none"> <li>• Types of interview</li> <li>• Establishing rapport</li> <li>• Facilitating resolution of issues</li> <li>• Developing action plans</li> </ul>	<ul style="list-style-type: none"> <li>• Written</li> <li>• Observation</li> </ul>
6. Facilitate group discussion	<ul style="list-style-type: none"> <li>• Identification of communication needs</li> <li>• Dynamics of groups</li> <li>• Styles of group leadership</li> <li>• Presentation of information</li> <li>• Encouraging group members participation</li> <li>• Evaluating group communication strategies</li> </ul>	<ul style="list-style-type: none"> <li>• Written</li> <li>• Observation</li> </ul>

7. Represent the organization	<ul style="list-style-type: none"> <li>• Presentation techniques</li> <li>• Development of a presentation</li> <li>• Multi-media utilization in presentation</li> <li>• Communication skills relevant to client groups</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written</li> </ul>
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#### **Suggested Delivery Methods**

- Role playing
- Observation

#### **Recommended Resources**

- Desktop computers/laptops
- Internet connection
- Projectors
- Telephone

## BASIC MATHEMATICS

**UNIT CODE:** KNP/HP/B02/6/

### Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstrate numeracy skills

**Duration of Unit:** 60 hours

### Unit Description

This unit describes the competencies required by a worker in order to apply a wide range of mathematical calculations for work; apply ratios and proportions to solve problems; perform geometrical calculations; use algebraic and graphical techniques to analyse mathematical problems; apply concepts of probability for work; perform commercial calculations and collect, organise and analyse statistical data.

### Summary of Learning Outcomes

1. Apply a wide range of mathematical calculations for work
2. Apply ratios and proportions to solve problems
3. Perform geometrical calculations
4. Use algebraic and graphical techniques to analyze mathematical problems for work
5. Use introductory matrices for work
6. Apply concepts of probability for work
7. Perform commercial calculations
8. Collect and present data
9. Apply measures of central tendency in work
10. Apply measures of dispersion in work
11. Apply sampling in work

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply a wide range of mathematical calculations for work	<input type="checkbox"/> Fundamentals of mathematics <ul style="list-style-type: none"><li>• Addition, subtraction, multiplication and division of positive and negative numbers</li><li>• Algebraic expressions manipulation</li></ul>	<input type="checkbox"/> Written tests <input type="checkbox"/> Assignments <input type="checkbox"/> Supervised exercises
2. Apply ratios and proportions to	<input type="checkbox"/> Ratios and proportions <ul style="list-style-type: none"><li>• Meaning</li></ul>	<input type="checkbox"/> Written tests <input type="checkbox"/> Oral questioning

solve problems	<ul style="list-style-type: none"> <li>• Conversions into percentages</li> <li>• Direct and inverse proportions determination</li> </ul>	<input type="checkbox"/> Assignments <input type="checkbox"/> Supervised exercises
3. Perform geometrical calculations	<input type="checkbox"/> Units of measurements and their symbols <input type="checkbox"/> Conversion of units of measurement <input type="checkbox"/> Perimeters of regular figures <input type="checkbox"/> Areas of regular figures <input type="checkbox"/> Volumes of regular figures	<input type="checkbox"/> Assignments <input type="checkbox"/> Supervised exercises <input type="checkbox"/> Written tests
4. Use algebraic and graphical techniques to analyze mathematical problems for work	<input type="checkbox"/> Solving linear equations <input type="checkbox"/> Linear graphs <ul style="list-style-type: none"> <li>• Plotting</li> <li>• Interpretation</li> </ul> <input type="checkbox"/> Applications of linear graphs <input type="checkbox"/> Curves of first and second degree <ul style="list-style-type: none"> <li>• Plotting</li> <li>• Interpretation</li> </ul>	<input type="checkbox"/> Assignments <input type="checkbox"/> Supervised exercises <input type="checkbox"/> Written tests
5. Use introductory matrices for work	<input type="checkbox"/> Meaning of matrix <input type="checkbox"/> Types of matrices <input type="checkbox"/> Matrix operations <ul style="list-style-type: none"> <li>• Compatibility</li> <li>• Addition/subtraction</li> <li>• Multiplication</li> </ul> <input type="checkbox"/> Determination of inverse of a matrix <input type="checkbox"/> Solution of simultaneous equations with two unknowns <input type="checkbox"/> Applications of matrices	<input type="checkbox"/> Assignments <input type="checkbox"/> Supervised exercises <input type="checkbox"/> Written tests
6. Apply concepts of probability for work	<input type="checkbox"/> Meaning of probability <input type="checkbox"/> Types of probability events <ul style="list-style-type: none"> <li>• Dependent</li> <li>• Independent</li> <li>• Mutually exclusive</li> </ul> <input type="checkbox"/> Laws of probability <input type="checkbox"/> Counting techniques <ul style="list-style-type: none"> <li>• Permutation</li> <li>• Combination</li> <li>• Tree diagrams</li> </ul>	<input type="checkbox"/> Written tests <input type="checkbox"/> Assignments <input type="checkbox"/> Supervised exercises

<p>7. Perform commercial calculations</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Conversion of one currency to another</li> <li><input type="checkbox"/> Exchange rates calculation <ul style="list-style-type: none"> <li>• Devaluation</li> <li>• Revaluation</li> </ul> </li> <li><input type="checkbox"/> Product pricing</li> <li><input type="checkbox"/> Profit calculation</li> <li><input type="checkbox"/> Average sales determination</li> <li><input type="checkbox"/> Stock turnover</li> <li><input type="checkbox"/> Calculation of incomes</li> <li><input type="checkbox"/> Salaries <ul style="list-style-type: none"> <li>• Gross</li> <li>• Net</li> </ul> </li> <li><input type="checkbox"/> Wages <ul style="list-style-type: none"> <li>• Time rate</li> <li>• Flat rate and overtime</li> <li>• Piece rate</li> <li>• Commission</li> <li>• Percentage</li> <li>• Bonus</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Oral</li> <li><input type="checkbox"/> Written tests</li> <li><input type="checkbox"/> Assignments</li> <li><input type="checkbox"/> Supervised exercises</li> </ul>
<p>8. Collect and present data</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Classification of data <ul style="list-style-type: none"> <li>• Grouped data</li> <li>• Ungrouped data</li> </ul> </li> <li><input type="checkbox"/> Data collection <ul style="list-style-type: none"> <li>• Observation</li> <li>• Recording</li> </ul> </li> <li><input type="checkbox"/> Tabulation of data <ul style="list-style-type: none"> <li>• Class intervals</li> <li>• Class boundaries</li> <li>• Frequency tables</li> <li>• Cumulative frequency</li> </ul> </li> <li><input type="checkbox"/> Diagrammatic and graphical presentation of data e.g. <ul style="list-style-type: none"> <li>• Histograms</li> <li>• Frequency polygons</li> <li>• Bar charts</li> <li>• Pie charts</li> <li>• Cumulative frequency curves</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Assignments</li> <li><input type="checkbox"/> Supervised exercises</li> <li><input type="checkbox"/> Written tests</li> </ul>

9. Apply measures of central tendency in work	<input type="checkbox"/> Meaning of measures of central tendency <input type="checkbox"/> Measures <ul style="list-style-type: none"> <li>• Properties</li> <li>• Calculation and interpretation of mean, mode and median</li> </ul>	<input type="checkbox"/> Written tests <input type="checkbox"/> Oral <input type="checkbox"/> Supervised exercises
10. Apply measures of dispersion in work	<input type="checkbox"/> Meaning of measures of dispersion <input type="checkbox"/> Types, merits and demerits of absolute and relative measures <input type="checkbox"/> Calculation and interpretation of measures of dispersion <ul style="list-style-type: none"> <li>• Range</li> <li>• Mean deviation</li> <li>• Quartiles, deciles, percentiles and interquartile range</li> <li>• Variance and standard deviation</li> </ul>	<input type="checkbox"/> Assignments <input type="checkbox"/> Supervised exercises <input type="checkbox"/> Written tests
11. Apply sampling in work	<input type="checkbox"/> Distinguishing between sampling and census <input type="checkbox"/> Importance of sampling <input type="checkbox"/> Errors in sampling <input type="checkbox"/> Types of sampling and their limitations e.g <ul style="list-style-type: none"> <li>• Stratified random</li> <li>• Cluster</li> <li>• Judgmental</li> </ul>	<input type="checkbox"/> Written tests <input type="checkbox"/> Oral <input type="checkbox"/> Reports

### **Suggested Delivery Methods**

- Group discussions
- Demonstration by trainer
- Practical work by trainee
- Exercises

### **Recommended Resources**

- Calculators
- Rulers, pencils, erasers
- Charts with presentations of data
- Graph books

- Dice
- Internet

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## INTRODUCTION TO COMPUTER

**UNIT CODE:** KNP/HP/B03/6/

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Demonstrate computer literacy

**Duration of Unit:** 60 hours

### Unit Description

This unit describes competencies required to use a computer and other digital devices for the purposes of communication, work performance and management at the workplace.

### Summary of Learning Outcomes

1. Identify computer software and hardware
2. Apply security measures to data, hardware, software in automated environment
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace
5. Apply desktop publishing in official assignments
6. Prepare presentation packages

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify computer hardware and software	<ul style="list-style-type: none"><li>• Concepts of ICT</li><li>• Functions of ICT</li><li>• History of computers</li><li>• Components of a computer</li><li>• Classification of computers</li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral presentation</li><li>• Observation</li></ul>
2. Apply security measures to data, hardware and software	<ul style="list-style-type: none"><li>• Data security and control</li><li>• Security threats and control measures</li><li>• Types of computer crimes</li><li>• Detection and protection against computer crimes</li><li>• Laws governing protection of ICT</li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral presentation</li><li>• Observation</li><li>• Project</li></ul>
3. Apply computer software in solving tasks	<ul style="list-style-type: none"><li>• Operating system</li><li>• Word processing</li><li>• Spread sheets</li><li>• Data base design and manipulation</li></ul>	<ul style="list-style-type: none"><li>• Oral questioning</li><li>• Observation</li><li>• Project</li></ul>

	<ul style="list-style-type: none"> <li>• Data manipulation, storage and retrieval</li> </ul>	
4. Apply internet and email in communication at workplace	<ul style="list-style-type: none"> <li>• Computer networks</li> <li>• Network configurations</li> <li>• Uses of internet</li> <li>• Electronic mail (e-mail) concept</li> </ul>	<ul style="list-style-type: none"> <li>• Oral questioning</li> <li>• Observation</li> <li>• Oral presentation</li> <li>• Written report</li> </ul>
5. Apply desktop publishing in official assignments	<ul style="list-style-type: none"> <li>• Concept of desktop publishing</li> <li>• Opening publication window</li> <li>• Identifying different tools and tool bars</li> <li>• Determining page layout</li> <li>• Opening, saving and closing files</li> <li>• Drawing various shapes using DTP</li> <li>• Using colour pellets to enhance a document</li> <li>• Inserting text frames</li> <li>• Importing and exporting text</li> <li>• Object linking and embedding</li> <li>• Designing of various publications</li> <li>• Printing of various publications</li> </ul>	<ul style="list-style-type: none"> <li>• Oral questioning</li> <li>• Observation</li> <li>• Oral presentation</li> <li>• Written report</li> <li>• Project</li> </ul>
6. Prepare presentation packages	<ul style="list-style-type: none"> <li>• Types of presentation packages</li> <li>• Procedure of creating slides</li> <li>• Formatting slides</li> <li>• Presentation of slides</li> <li>• Procedure for editing objects</li> </ul>	<ul style="list-style-type: none"> <li>• Oral questioning</li> <li>• Observation</li> <li>• Oral presentation</li> <li>• Written report</li> <li>• Project</li> </ul>

### **Suggested Delivery Methods**

- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- Viewing of related videos
- Project
- Group discussions

### **Recommended Resources**

- Desk top computers

- Laptop computers
- Other digital devices
- Printers
- Storage devices
- Internet access
- Computer software

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## ENTREPRENEURIAL SKILLS

**UNIT CODE:** KNP/HP/B04/6/

### **Relationship to occupational standards**

This unit addresses the unit of competency: Demonstrate entrepreneurial skills

**Duration of unit:** 100 hours

### **Unit description**

This unit describes the competencies critical to demonstration of entrepreneurial aptitudes. It involves, developing business innovation strategies, developing new markets, customer base, expanding employed capital and undertaking regional/county expansion while retaining motivated staff.

### **Summary of Learning Outcomes**

1. Develop business innovation strategies
2. Develop new products/ markets
3. Expand customers and product lines
4. Motivate all staff/workers
5. Expand employed capital base
6. Undertake regional/county business expansion

### **Learning Outcomes, Content and Suggested Assessment Methods**

<b>Learning Outcome</b>	<b>Content</b>	<b>Suggested Assessment Methods</b>
1. Develop business Innovation strategies	<ul style="list-style-type: none"><li>• Innovation in business</li><li>• Business innovation strategies</li><li>• Creativity for business development</li><li>• New technologies in entrepreneurship</li><li>• Linkages with other entrepreneurs</li><li>• Setting strategic directions</li><li>• New ideas and approaches</li><li>• Entrepreneurial skills development</li><li>• Market trends</li><li>• Monitoring and anticipating market trends</li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/> Observation</li><li><input type="checkbox"/> Case studies</li><li><input type="checkbox"/> Individual/group assignments</li><li><input type="checkbox"/> projects</li><li><input type="checkbox"/> Written</li><li><input type="checkbox"/> Oral</li></ul>

	<ul style="list-style-type: none"> <li>• Products and processes in entrepreneurship</li> <li>• Business conventions and exhibitions</li> <li>• Business growth refocus</li> </ul>	
2. Develop new products/markets	<ul style="list-style-type: none"> <li>• Feasibility study for new products</li> <li>• Identifying new sources of raw material and resources</li> <li>• New target markets/customers</li> <li>• Increasing products and services</li> <li>• Marketing improvement</li> <li>• Intrapreneurship and business growth</li> </ul>	<input type="checkbox"/> Observation <input type="checkbox"/> Case studies <input type="checkbox"/> Individual/group assignments <input type="checkbox"/> projects <input type="checkbox"/> Written <input type="checkbox"/> Oral
3. Expand customers and product lines	<ul style="list-style-type: none"> <li>• Market demand</li> <li>• Regulatory environment</li> <li>• Creating product and services competitive advantages</li> <li>• Creating loyal client base</li> <li>• Identifying and maintain new customers and markets</li> <li>• Advance product/ service promotions</li> <li>• Advance market expansion</li> <li>• Small business records management</li> <li>• Book keeping and auditing for small businesses</li> <li>• Computer application software and programmes</li> <li>• ICT in customer and product diversification</li> </ul>	<input type="checkbox"/> Oral <input type="checkbox"/> Observation <input type="checkbox"/> Case studies <input type="checkbox"/> Individual/group assignments <input type="checkbox"/> projects <input type="checkbox"/> Written
4. Motivate staff/workers	<ul style="list-style-type: none"> <li>• Motivation of workers</li> <li>• Communication at workplace for motivation purpose</li> <li>• Problem solving</li> <li>• Conflict resolution at place of work</li> </ul>	<input type="checkbox"/> Observation <input type="checkbox"/> Case studies <input type="checkbox"/> Individual/group assignments <input type="checkbox"/> projects <input type="checkbox"/> Written

	<ul style="list-style-type: none"> <li>• Good staff/workers relation</li> <li>• Team building and team work</li> <li>• Staff development and enhancement</li> <li>• Culture of continuous improvement</li> </ul>	
5. Expand employed capital base	<ul style="list-style-type: none"> <li>• Employed capital in business</li> <li>• Business share holdings</li> <li>• Types of shares</li> <li>• Shares diversification</li> <li>• Role of shareholders</li> <li>• Intrapreneurship</li> <li>• Increasing products and services</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Observation</li> <li><input type="checkbox"/> Case studies</li> <li><input type="checkbox"/> Individual/group assignments</li> <li><input type="checkbox"/> projects</li> <li><input type="checkbox"/> Written</li> <li><input type="checkbox"/> Oral</li> </ul>
6. Undertake county/ regional business expansion	<ul style="list-style-type: none"> <li>• Region/ county identification process</li> <li>• Regional/ county laws and regulation</li> <li>• Business regional/county expansion</li> <li>• Regional/ County business expansion</li> <li>• Innovation in business</li> <li>• Business expansion and diversification</li> <li>• Resources for regional/county expansion</li> <li>• Small business Strategic Plan</li> <li>• Computer software in business development</li> <li>• ICT and business growth</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Observation</li> <li><input type="checkbox"/> Case studies</li> <li><input type="checkbox"/> Individual/group assignments</li> <li><input type="checkbox"/> projects</li> <li><input type="checkbox"/> Written</li> <li><input type="checkbox"/> Oral</li> </ul>

#### **Suggested Delivery Methods**

- Instructor led facilitation of theory
- Demonstration by trainer
- Practice by trainee
- Role play
- Case study

### **Recommended Resources**

- Case studies for small businesses
- Business plan templates
- Laptop/ desktop computers
- Internet
- Telephone
- Writing materials

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## ENVIRONMENTAL LITERACY

**UNIT CODE:** KNP/HP/B05/6/

### **Relationship to Occupational Standards:**

This unit addresses the unit standard: Demonstrate environmental literacy

**Duration of Unit:** 40 hours

### **Unit Description**

This unit describes the competencies required to control environmental hazard, control environmental pollution, comply with workplace sustainable resource use, evaluate current practices in relation to resource usage, identify environmental legislations/conventions for environmental concerns, implement specific environmental programs, monitor activities on environmental protection/programs, analyze resource use and develop resource conservation plans.

### **Summary of Learning Outcomes**

1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use
4. Evaluate current practices in relation to resource usage
5. Identify Environmental legislations/conventions for environmental concerns
6. Implement specific environmental programs
7. Monitor activities on Environmental protection/Programs
8. Analyze resource use
9. Develop resource conservation plans

### **Learning Outcomes, Content and Suggested Assessment Methods**

<b>Learning Outcome</b>	<b>Content</b>	<b>Suggested Assessment Methods</b>
1. Control environmental hazard	<ul style="list-style-type: none"><li>• Purposes and content of Environmental Management and Coordination Act 1999</li><li>• Storage methods for environmentally hazardous materials</li><li>• Disposal methods of hazardous wastes</li><li>• Types and uses of PPE in line with environmental regulations</li><li>• Occupational Safety and Health Standards (OSHS)</li></ul>	<ul style="list-style-type: none"><li>• Written questions</li><li>• Oral questions</li><li>• Observation of work procedures</li></ul>

2. Control environmental Pollution control	<ul style="list-style-type: none"> <li>• Types of pollution</li> <li>• Environmental pollution control measures</li> <li>• Types of solid wastes</li> <li>• Procedures for solid waste management</li> <li>• Different types of noise pollution</li> <li>• Methods for minimizing noise pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Written questions</li> <li>• Oral questions</li> <li>• Observation of work procedures</li> <li>• Role play</li> </ul>
3. Demonstrate sustainable resource use	<ul style="list-style-type: none"> <li>• Types of resources</li> <li>• Techniques in measuring current usage of resources</li> <li>• Calculating current usage of resources</li> <li>• Methods for minimizing wastage</li> <li>• Waste management procedures</li> <li>• Principles of 3Rs (Reduce, Reuse, Recycle)</li> <li>• Methods for economizing or reducing resource consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Written questions</li> <li>• Oral questions</li> <li>• Observation of work procedures</li> <li>• Role play</li> </ul>
4. Evaluate current practices in relation to resource usage	<ul style="list-style-type: none"> <li>• Collection of information on environmental and resource efficiency systems and procedures,</li> <li>• Measurement and recording of current resource usage</li> <li>• Analysis and recording of current purchasing strategies.</li> <li>• Analysis of current work processes to access information and data</li> <li>• Identification of areas for improvement</li> </ul>	<ul style="list-style-type: none"> <li>• Written questions</li> <li>• Oral questions</li> <li>• Observation of work procedures</li> <li>• Role play</li> </ul>
5. Identify Environmental legislations/conventions for environmental concerns	<ul style="list-style-type: none"> <li>• Environmental issues/concerns</li> <li>• Environmental legislations /conventions and local ordinances</li> <li>• Industrial standard /environmental practices</li> <li>• International Environmental Protocols (Montreal, Kyoto)</li> <li>• Features of an environmental strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Written questions</li> <li>• Oral questions</li> <li>• Observation of work procedures</li> </ul>
6. Implement specific environmental programs	<ul style="list-style-type: none"> <li>• Community needs and expectations</li> <li>• Resource availability</li> <li>• 5s of good housekeeping</li> <li>• Identification of programs/Activities</li> </ul>	<ul style="list-style-type: none"> <li>• Written questions</li> <li>• Oral questions</li> <li>• Observation of work procedures</li> </ul>

	<ul style="list-style-type: none"> <li>• Setting of individual roles /responsibilities</li> <li>• Resolving problems /constraints encountered</li> <li>• Consultation with stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• Role play</li> </ul>
7. Monitor activities on Environmental protection/Programs	<ul style="list-style-type: none"> <li>• Periodic monitoring and Evaluation of activities</li> <li>• Gathering feedback from stakeholders</li> <li>• Analyzing data gathered</li> <li>• Documentation of recommendations and submission</li> <li>• Setting of management support systems to sustain and enhance the program</li> <li>• Monitoring and reporting of environmental incidents to concerned /proper authorities</li> </ul>	<ul style="list-style-type: none"> <li>• Oral questions</li> <li>• Written tests</li> <li>• Practical test</li> <li>• Observation</li> </ul>
8. Analyze resource use	<ul style="list-style-type: none"> <li>• Identification of resource consuming processes</li> <li>• Determination of quantity and nature of resource consumed</li> <li>• Analysis of resource flow through different parts of the process.</li> <li>• Classification of wastes for possible source of resources.</li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Oral questions</li> <li>• Practical test</li> <li>• Observation</li> </ul>
9. Develop resource Conservation plans	<ul style="list-style-type: none"> <li>• Determination of efficiency of use/conversion of resources</li> <li>• Causes of low efficiency of use of resources</li> <li>• Plans for increasing the efficiency of resource use</li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Oral questions</li> <li>• Practical test</li> <li>• Observation</li> </ul>

### **Suggested Delivery Methods**

- Instructor led facilitation of theory
- Practical demonstration of tasks by trainer
- Practice by trainees
- Observations and comments and corrections by trainers

### **Recommended Resources**

- Standard operating and/or other workplace procedures manuals

- Specific job procedures manuals
- Environmental Management and Coordination Act 1999
- Machine/equipment manufacturer's specifications and instructions
- Personal Protective Equipment (PPE)
- ISO standards
- Company environmental management systems (EMS)
- Montreal Protocol
- Kyoto Protocol

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## OCCUPATIONAL SAFETY AND HEALTH PRACTICES

**UNIT CODE:** KNP/HP/B06/6/

### Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstrate occupational safety and health practices

**Duration of Unit:** 40 hours

### Unit Description

This unit describes the competencies required to comply with regulatory and organizational requirements for occupational safety and health.

### Summary of Learning Outcomes

1. Identify workplace hazards and risk
2. Identify and implement appropriate control measures to hazards and risks
3. Implement OSH programs, procedures and policies/guidelines

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify workplace hazards and risks	<ul style="list-style-type: none"><li>• Identification of hazards in the workplace and/or the indicators of their presence</li><li>• Evaluation and/or work environment measurements of OSH hazards/risk existing in the workplace</li><li>• Gathering of OSH issues and/or concerns</li></ul>	<ul style="list-style-type: none"><li>• Oral questions</li><li>• Written tests</li><li>• Observation of trainees identify hazards and risks</li></ul>
2. Identify and implement appropriate control measure to hazards and risks	<ul style="list-style-type: none"><li>• Prevention and control measures e.g. use of PPE</li><li>• Contingency measures</li></ul>	<ul style="list-style-type: none"><li>• Oral questions</li><li>• Written tests</li><li>• Practical tests</li><li>• Observation of implementation of control measures</li></ul>
3. Implement OSH programs, procedures and policies/guidelines	<ul style="list-style-type: none"><li>• Company OSH program, procedures and policies/guidelines</li><li>• Implementation of OSH</li></ul>	<ul style="list-style-type: none"><li>• Oral questions</li><li>• Written tests</li><li>• Practical test</li></ul>

	procedures and policies/ guidelines <ul style="list-style-type: none"> <li>• Training of team members and advice on OSH standards and procedures</li> <li>• Implementation of procedures for maintaining OSH-related records</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> </ul>
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### **Suggested Delivery Methods**

- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- Viewing of related videos

### **Recommended Resources**

- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Machine/equipment manufacturer's specifications and instructions
- Personal Protective Equipment (PPE) e.g.
  - Mask
  - Face mask/shield
  - Safety boots
  - Safety harness
  - Arm/Hand guard, gloves
  - Eye protection (goggles, shield)
  - Hearing protection (ear muffs, ear plugs)
  - Hair Net/cap/bonnet
  - Hard hat
  - Face protection (mask, shield)
  - Apron/Gown/coverall/jump suit
  - Anti-static suits

## **CORE UNITS OF LEARNING**

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## TROPICAL FRUIT PRODUCTION

**UNIT CODE:** KNP/HP/C01/6/

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce tropical fruits

**Duration of Unit:** 100 hours

### Unit Description

This unit specifies the competencies required to produce tropical fruits. It includes carrying out food safety risk assessment, developing food safety management plan, implementing the food safety management plan in preparing tropical fruits orchard, producing tropical fruits, harvesting tropical fruits, determining productivity and quality of fruits produced, carrying out post-harvest handling of the fruits, evaluating implementation of the food safety management plan and generating production report.

### Summary of Learning Outcomes

1. Apply food safety measures to produce tropical fruits
2. Prepare to produce tropical fruits
3. Produce tropical fruits
4. Evaluate production of tropical fruits
5. Complete production of tropical fruits

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures to produce sub-tropical fruits	<ul style="list-style-type: none"><li>• Meaning of food safety</li><li>• Importance of food safety</li><li>• Principles of food safety</li><li>• Pre-requisite programmes<ul style="list-style-type: none"><li>○ Meaning, importance, categories and establishment of prerequisite programmes</li><li>○ Relevant pre-requisite programmes<ul style="list-style-type: none"><li>▪ Good agricultural practices</li><li>▪ Standard Sanitary Operating</li></ul></li></ul></li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral questioning</li><li>• Observation</li><li>• Case study</li><li>• Practical report</li><li>• Third party report</li></ul>

	<p>Procedures</p> <ul style="list-style-type: none"> <li>• Food safety risk assessment <ul style="list-style-type: none"> <li>○ Meaning of risk assessment</li> <li>○ Difference between risks and hazards</li> <li>○ Steps to conduct a risk assessment <ul style="list-style-type: none"> <li>▪ Enterprise description</li> <li>▪ Layout of premises and surrounding environment</li> <li>▪ Product description</li> <li>▪ Intended uses and consumers</li> <li>▪ Development of a flow diagram</li> <li>▪ Hazard assessment</li> </ul> </li> </ul> </li> <li>• Development of a food safety management system <ul style="list-style-type: none"> <li>○ Development of the Food safety management plan <ul style="list-style-type: none"> <li>▪ Listing hazards</li> <li>▪ Identifying preventive measures and their control limit</li> <li>▪ Establishing monitoring procedures</li> <li>▪ Establishing corrective action</li> <li>▪ Records to be kept</li> <li>▪ Checking and reviewing the plan</li> </ul> </li> <li>○ Implementation of the food safety management plan <ul style="list-style-type: none"> <li>▪ Adoption</li> <li>▪ Communication</li> <li>▪ Resource allocation</li> <li>▪ Practices and procedures</li> </ul> </li> <li>○ Evaluation of the plan <ul style="list-style-type: none"> <li>▪ Verification</li> </ul> </li> </ul> </li> </ul>	
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	<ul style="list-style-type: none"> <li>▪ Validation</li> <li>• Standards and legislations in food safety during production of tropical fruits</li> </ul>	
2.Prepare to produce tropical fruits	<ul style="list-style-type: none"> <li>• Site selection and preparation</li> <li>• Types of tropical fruits</li> <li>• Selection of tropical fruit to produce</li> <li>• Tools, equipment, supplies and materials               <ul style="list-style-type: none"> <li>➤ Identification</li> <li>➤ Use</li> <li>➤ Servicing</li> <li>➤ Storage</li> </ul> </li> <li>• Farm planning</li> <li>• Soil sampling and testing</li> <li>• Soil conservation</li> <li>• Phyto-sanitary requirements for tropical fruits</li> <li>• Budgeting</li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
3. Produce tropical fruits	<ul style="list-style-type: none"> <li>• Agro Ecological zonation               <ul style="list-style-type: none"> <li>○ Zone mapping</li> <li>○ Matching fruits to AEZ</li> </ul> </li> <li>• Tropical fruits agronomic Practices:               <ul style="list-style-type: none"> <li>➤ Spacing</li> <li>➤ Planting</li> <li>➤ Nutrient application</li> <li>➤ Pruning and training</li> <li>➤ irrigation</li> <li>➤ Inducing flowering</li> <li>➤ Rotations/ cropping calendar</li> <li>➤ Intercropping</li> <li>➤ Mulching</li> <li>➤ Control of pests, diseases, physiological disorders and weeds</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
4.Evaluate production of tropical fruits	<ul style="list-style-type: none"> <li>• Harvesting/maturity index               <ul style="list-style-type: none"> <li>➤ Fruit skin colour change as indicator of maturity</li> <li>➤ Falling mature fruits</li> <li>➤ Fullness of fruits</li> <li>➤ Fruit textures</li> </ul> </li> <li>• Post-harvest handling               <ul style="list-style-type: none"> <li>➤ Sorting and grading</li> <li>➤ Cleaning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Written exercise</li> <li>• Oral questions</li> <li>• Third party report</li> <li>• Observation</li> </ul>

	<ul style="list-style-type: none"> <li>➤ packing</li> <li>• Evaluation of fruit productivity</li> <li>➤ Quality of fruits</li> <li>➤ Quantities of fruits</li> <li>• Record keeping</li> <li>• Report writing</li> <li>• Computation of Returns on Investment</li> <li>• Accounting principles</li> </ul>	
5.Complete production of tropical fruits	<ul style="list-style-type: none"> <li>• Maturity indices and harvesting <ul style="list-style-type: none"> <li>➤ Fruit skin colour change as indicator of maturity</li> <li>➤ Falling mature fruits</li> <li>➤ Fullness of fruits</li> <li>➤ Fruit textures</li> </ul> </li> <li>• Post-harvest handling of the tropical fruits.</li> <li>• Disposal of waste material</li> <li>• Storage of Tropical fruits</li> <li>• Preservation of tropical fruits are preserved</li> <li>• Record keeping</li> <li>• Report writing</li> <li>• Marketing principles</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>

#### **Suggested Methods of Delivery**

- On job training
- Demonstration by trainer
- Field trips
- Direct instruction
- Practice by the trainee
- Group discussions
- Instructor led facilitation of theory
- Role play

#### **Recommended Resources**

<b>A well established tropical fruit orchard with the following:</b>	
<b>Tools</b> <ul style="list-style-type: none"> <li>• Hoes</li> <li>• Machetes</li> <li>• Secateurs</li> <li>• Shovels</li> <li>• Soil augur</li> <li>• Pegs</li> </ul>	<b>Materials and supplies</b> <ul style="list-style-type: none"> <li>• Manures</li> <li>• Seedlings /planting materials</li> <li>• Khaki paper bags</li> <li>• Measuring tape</li> <li>• Layout string</li> <li>• Nets</li> </ul>

<ul style="list-style-type: none"> <li>• Hammer</li> <li>• Saw</li> <li>• Bucket</li> <li>• Secateurs</li> <li>• Shears</li> <li>• Dibbler</li> <li>• Pegs</li> </ul>	<ul style="list-style-type: none"> <li>• Translucent papers</li> <li>• Papers</li> <li>• Fencing wire</li> <li>• Staking sticks</li> <li>• Nails</li> <li>• Herbicides</li> <li>• Pesticides</li> <li>• Pheromones for arthropod traps</li> </ul>
<p>Farm machinery, implements and equipment</p> <ul style="list-style-type: none"> <li>• Plough</li> <li>• Harrows</li> <li>• Ridges</li> <li>• sprayers</li> <li>• Pruning saw</li> <li>• Wire strainer</li> <li>• Pest control traps</li> <li>• Irrigation equipment e.g. pipes, sprinkles, drip lines etc.</li> <li>• Pipes sprinkler</li> <li>• Scouting flags</li> <li>• Storage tanks</li> <li>• Gutters</li> <li>• Tractors</li> <li>• Bud count square</li> <li>• Meteorological equipment</li> </ul>	<p>Manuals</p> <ul style="list-style-type: none"> <li>• Good Agricultural Practices (GAP) guidelines</li> <li>• Ministry of Agriculture Livestock and Fishes (MoALF) Fruit production manual</li> </ul>

## SUB-TROPICAL FRUIT PRODUCTION

**UNIT CODE:** KNP/HP/C02/6/

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce sub-tropical fruits

**Duration of Unit:** 100 hours

### Unit Description

This unit specifies the competencies required to produce sub-tropical fruits. It includes carrying out food safety risk assessment, developing food safety management plan, implementing the food safety management plan in preparing sub-tropical fruits orchard, producing sub-tropical fruits, harvesting sub-tropical fruits, determining productivity and quality of fruits produced, carrying out post-harvest handling of the fruits, evaluating implementation of the food safety management plan and generating production report.

### Summary of Learning Outcomes

1. Apply food safety measures to produce sub-tropical fruits
2. Prepare to produce sub-tropical fruits
3. Produce sub-tropical fruits
4. Evaluate production of sub-tropical fruits
5. Complete production of sub-tropical fruits

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures to produce sub-tropical fruits	<ul style="list-style-type: none"><li>• Meaning of food safety</li><li>• Importance of food safety</li><li>• Principles of food safety</li><li>• Prerequisite programmes<ul style="list-style-type: none"><li>○ Meaning, importance, categories and establishment of prerequisite programmes</li><li>○ Relevant pre-requisite programmes<ul style="list-style-type: none"><li>▪ Good agricultural practices</li><li>▪ Standard Sanitary Operating Procedures</li></ul></li></ul></li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral questioning</li><li>• Observation</li><li>• Case study</li><li>• Practical report</li><li>• Thirty party report</li></ul>

	<ul style="list-style-type: none"> <li>• Food safety risk assessment <ul style="list-style-type: none"> <li>○ Meaning of risk assessment</li> <li>○ Difference between risks and hazards</li> <li>○ Steps to conduct a risk assessment <ul style="list-style-type: none"> <li>▪ Enterprise description</li> <li>▪ Layout of premises and surrounding environment</li> <li>▪ Product description</li> <li>▪ Intended uses and consumers</li> <li>▪ Development of a flow diagram</li> <li>▪ Hazard assessment</li> </ul> </li> </ul> </li> <li>• Development of a food safety management system <ul style="list-style-type: none"> <li>○ Development of the Food safety management plan <ul style="list-style-type: none"> <li>▪ Listing hazards</li> <li>▪ Identifying preventive measures and their control limit</li> <li>▪ Establishing monitoring procedures</li> <li>▪ Establishing corrective action</li> <li>▪ Records to be kept</li> <li>▪ Checking and reviewing the plan</li> </ul> </li> <li>○ Implementation of the food safety management plan <ul style="list-style-type: none"> <li>▪ Adoption</li> <li>▪ Communication</li> <li>▪ Resource allocation</li> <li>▪ Practices and procedures</li> </ul> </li> <li>○ Evaluation of the plan <ul style="list-style-type: none"> <li>▪ Verification</li> <li>▪ Validation</li> </ul> </li> </ul> </li> </ul>	
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	<ul style="list-style-type: none"> <li>Standards and legislations in food safety in production of sub-tropical fruits</li> </ul>	
2. Prepare to produce sub-tropical fruits	<ul style="list-style-type: none"> <li>Site selection and preparation</li> <li>Types of sub-tropical fruits</li> <li>Selection of sub-tropical fruit to produce</li> <li>Tools, equipment, supplies and materials               <ul style="list-style-type: none"> <li>➤ Identification</li> <li>➤ Use</li> <li>➤ Servicing</li> <li>➤ Storage</li> </ul> </li> <li>Farm planning</li> <li>Soil sampling and testing</li> <li>Soil conservation</li> <li>Phyto-sanitary requirements for tropical fruits</li> <li>Budgeting</li> </ul>	<ul style="list-style-type: none"> <li>Written tests</li> <li>Observation</li> <li>Oral questions</li> <li>Third party report</li> </ul>
3. Produce sub-tropical fruits	<ul style="list-style-type: none"> <li>Agro Ecological zonation               <ul style="list-style-type: none"> <li>○ Zone mapping</li> <li>○ Matching fruits to AEZ</li> </ul> </li> <li>Sub-tropical fruits agronomic Practices:               <ul style="list-style-type: none"> <li>➤ Spacing</li> <li>➤ Planting</li> <li>➤ Nutrient application</li> <li>➤ Pruning and training</li> <li>➤ Irrigation</li> <li>➤ Inducing flowering</li> <li>➤ Rotations/ cropping calendar</li> <li>➤ Intercropping</li> <li>➤ Mulching</li> <li>➤ Control of pests, diseases, physiological disorders and weeds</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Written tests</li> <li>Observation</li> <li>Oral questions</li> <li>Third party report</li> </ul>
4. Evaluate production of sub-tropical fruits	<ul style="list-style-type: none"> <li>Harvesting/maturity index               <ul style="list-style-type: none"> <li>➤ Fruit skin colour change as indicator of maturity</li> <li>➤ Falling mature fruits</li> <li>➤ Fullness of fruits</li> <li>➤ Fruit textures</li> </ul> </li> <li>Post-harvest handling               <ul style="list-style-type: none"> <li>➤ Sorting and grading</li> <li>➤ Cleaning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Written exercise</li> <li>Oral questions</li> <li>Third party report</li> <li>Observation</li> </ul>

	<ul style="list-style-type: none"> <li>➤ packing</li> <li>• Evaluation of fruit productivity</li> <li>➤ Quality of fruits</li> <li>➤ Quantities of fruits</li> <li>• Record keeping</li> <li>• Report writing</li> <li>• Computation of Returns on Investment</li> <li>• Accounting principles</li> </ul>	
5.Complete production of sub-tropical fruits	<ul style="list-style-type: none"> <li>• Maturity indices and harvesting <ul style="list-style-type: none"> <li>➤ Fruit skin colour change as indicator of maturity</li> <li>➤ Falling mature fruits</li> <li>➤ Fullness of fruits</li> <li>➤ Fruit textures</li> </ul> </li> <li>• Post-harvest handling of the tropical fruits.</li> <li>• Disposal of waste material</li> <li>• Storage of Tropical fruits</li> <li>• Preservation of tropical fruits are preserved</li> <li>• Record keeping</li> <li>• Report writing</li> <li>• Marketing principles</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>

### **Suggested Methods of Delivery**

- On job training
- Demonstration by trainer
- Field trips
- Direct instruction
- Practice by the trainee
- Group discussions
- Instructor led facilitation of theory
- Role play

### **Recommended Resources**

<b>A well established sub tropical fruit orchard with the following:</b>	
<b>Tools</b> <ul style="list-style-type: none"> <li>• Hoes</li> <li>• Machetes</li> <li>• Secateurs</li> <li>• Shovels</li> <li>• Soil augur</li> </ul>	<b>Materials and supplies</b> <ul style="list-style-type: none"> <li>• Manures</li> <li>• Seedlings /planting materials</li> <li>• Khaki paper bags</li> <li>• Measuring tape</li> <li>• Layout string</li> </ul>

<ul style="list-style-type: none"> <li>• Pegs</li> <li>• Hammer</li> <li>• Saw</li> <li>• Bucket</li> <li>• Secateurs</li> <li>• Shears</li> <li>• Dibbler</li> <li>• Pegs</li> </ul>	<ul style="list-style-type: none"> <li>• Nets</li> <li>• Translucent papers</li> <li>• Papers</li> <li>• Fencing wire</li> <li>• Staking sticks</li> <li>• Nails</li> <li>• Herbicides</li> <li>• Pesticides</li> <li>• Pheromones for arthropod traps</li> </ul>
<p>Farm machinery, implements and equipment</p> <ul style="list-style-type: none"> <li>• Plough</li> <li>• Harrows</li> <li>• Ridges</li> <li>• sprayers</li> <li>• Pruning saw</li> <li>• Wire strainer</li> <li>• Pest control traps</li> <li>• Irrigation equipment e.g. pipes, sprinkles, drip lines etc.</li> <li>• Pipes sprinkler</li> <li>• Scouting flags</li> <li>• Storage tanks</li> <li>• Gutters</li> <li>• Tractors</li> <li>• Bud count square</li> <li>• Meteorological equipment</li> </ul>	<p>Manuals</p> <ul style="list-style-type: none"> <li>• Good Agricultural Practices (GAP) guidelines</li> <li>• Ministry of Agriculture Livestock and Fishes (MoALF) Fruit production manual</li> </ul>

## TEMPERATE FRUITS PRODUCTION

**UNIT CODE:** KNP/HP/C03/6/

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce temperate fruits

**Duration of Unit:** 90 hours

### Unit Description

This unit specifies the competencies required to produce temperate fruits. It includes carrying out food safety risk assessment, developing food safety management plan, implementing the food safety management plan in preparing temperate fruits orchard, producing temperate fruits, harvesting temperate fruits, determining productivity and quality of fruits produced, carrying out post-harvest handling of the fruits, evaluating implementation of the food safety management plan and generating production reports.

### Summary of Learning Outcomes

1. Apply food safety measures to produce temperate fruits
2. Prepare to produce temperate fruits
3. Produce temperate fruits
4. Evaluate production of temperate fruits
5. Complete production of template fruit

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures to produce temperate fruits	<ul style="list-style-type: none"><li>• Meaning of food safety</li><li>• Importance of food safety</li><li>• Principles of food safety</li><li>• Prerequisite programmes<ul style="list-style-type: none"><li>○ Meaning, importance, categories and establishment of prerequisite programmes</li><li>○ Relevant pre-requisite programmes<ul style="list-style-type: none"><li>▪ Good agricultural practices</li><li>▪ Standard Sanitary Operating Procedures</li></ul></li></ul></li><li>• Food safety risk assessment<ul style="list-style-type: none"><li>○ Meaning of risk assessment</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral questioning</li><li>• Observation</li><li>• Case study</li><li>• Practical report</li><li>• Third party report</li></ul>

	<ul style="list-style-type: none"> <li>○ Difference between risks and hazards</li> <li>○ Steps to conduct a risk assessment <ul style="list-style-type: none"> <li>▪ Enterprise description</li> <li>▪ Layout of premises and surrounding environment</li> <li>▪ Product description</li> <li>▪ Intended uses and consumers</li> <li>▪ Development of a flow diagram</li> <li>▪ Hazard assessment</li> </ul> </li> <li>● Development of a food safety management system <ul style="list-style-type: none"> <li>○ Development of the Food safety management plan <ul style="list-style-type: none"> <li>▪ Listing hazards</li> <li>▪ Identifying preventive measures and their control limit</li> <li>▪ Establishing monitoring procedures</li> <li>▪ Establishing corrective action</li> <li>▪ Records to be kept</li> <li>▪ Checking and reviewing the plan</li> </ul> </li> <li>○ Implementation of the food safety management plan <ul style="list-style-type: none"> <li>▪ Adoption</li> <li>▪ Communication</li> <li>▪ Resource allocation</li> <li>▪ Practices and procedures</li> </ul> </li> <li>○ Evaluation of the plan <ul style="list-style-type: none"> <li>▪ Verification</li> <li>▪ Validation</li> </ul> </li> </ul> </li> <li>● Standards and legislations in food safety in production of temperate</li> </ul>	
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	fruits	
2. Prepare to produce temperate fruits	<ul style="list-style-type: none"> <li>• Site selection and preparation</li> <li>• Tools, equipment, supplies and materials <ul style="list-style-type: none"> <li>➤ Identification</li> <li>➤ Use</li> <li>➤ Servicing</li> <li>➤ Storage</li> </ul> </li> <li>• Farm planning</li> <li>• Soil sampling and testing</li> <li>• Soil conservation</li> <li>• Phyto-sanitary requirements for temperate fruits</li> <li>• Budgeting</li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
3. Produce temperate fruits	<ul style="list-style-type: none"> <li>• Classification of fruits</li> <li>• Types of temperate fruits</li> <li>• Agro-ecological zones <ul style="list-style-type: none"> <li>➤ Agro Ecological zonation</li> <li>➤ Matching fruits to AEZ</li> </ul> </li> <li>• Temperate fruits agronomic practices: <ul style="list-style-type: none"> <li>➤ Spacing</li> <li>➤ Planting</li> <li>➤ Nutrient application</li> <li>➤ Dormancy breaking</li> <li>➤ Pruning and training</li> <li>➤ irrigation</li> <li>➤ Inducing flowering</li> <li>➤ Rotations/ cropping calendar</li> <li>➤ Intercropping</li> <li>➤ Mulching</li> <li>➤ Control of pests, diseases, physiological disorders and weeds</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
4. Evaluate production of temperate fruits	<ul style="list-style-type: none"> <li>• Evaluation of fruit productivity <ul style="list-style-type: none"> <li>➤ Quality of fruits</li> <li>➤ Quantities of fruits</li> </ul> </li> <li>• Computation of Returns on Investment</li> <li>• Record keeping</li> <li>• Report writing</li> <li>• Accounting principles</li> </ul>	<ul style="list-style-type: none"> <li>• Written exercise</li> <li>• Oral questions</li> <li>• Third party report</li> <li>• Observation</li> </ul>

5. Complete production of temperate fruits	<ul style="list-style-type: none"> <li>• Maturity indices and harvesting <ul style="list-style-type: none"> <li>➤ Fruit skin colour change as indicator of maturity</li> <li>➤ Falling mature fruits</li> <li>➤ Fullness of fruits</li> <li>➤ Fruit textures</li> </ul> </li> <li>• Post-harvest handling of the tropical fruits.</li> <li>• Disposal of waste material</li> <li>• Storage of Tropical fruits</li> <li>• Preservation of tropical fruits are preserved</li> <li>• Marketing principles</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
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### Suggested Methods of Delivery

- On job training
- Demonstration by trainer
- Practice by the trainee
- Field trips
- Discussions
- Direct instruction
- Role play

### Recommended Resources

A well established temperate fruit orchard with the following:	
<b>Tools</b> <ul style="list-style-type: none"> <li>• Hoes</li> <li>• Machetes</li> <li>• Secateurs</li> <li>• Shovels</li> <li>• Soil augur</li> <li>• Pegs</li> <li>• Hammer</li> <li>• Saw</li> <li>• Bucket</li> <li>• Secateurs</li> <li>• Shears</li> <li>• Dibbler</li> <li>• Pegs</li> </ul>	<b>Materials and supplies</b> <ul style="list-style-type: none"> <li>• Manures</li> <li>• Seedlings /planting materials</li> <li>• Khaki paper bags</li> <li>• Measuring tape</li> <li>• Layout string</li> <li>• Nets</li> <li>• Translucent papers</li> <li>• Papers</li> <li>• Fencing wire</li> <li>• Staking sticks</li> <li>• Trellising wire and poles</li> <li>• Fencing wire</li> <li>• Staking sticks</li> <li>• Nails</li> <li>• Herbicides</li> <li>• Pesticides</li> </ul>

	<ul style="list-style-type: none"> <li>• Dormancy breaking chemicals</li> <li>• Pheromones for arthropod traps</li> </ul>
<b>Farm machinery, implements and equipment</b> <ul style="list-style-type: none"> <li>• Plough</li> <li>• Harrows</li> <li>• Ridges</li> <li>• sprayers</li> <li>• Pruning saw</li> <li>• Wire strainer</li> <li>• Pest control traps</li> <li>• Irrigation equipment e.g. pipes, sprinkles, drip lines etc.</li> <li>• Pipes sprinkler</li> <li>• Scouting flags</li> <li>• Storage tanks</li> <li>• Gutters</li> <li>• Tractors</li> <li>• Bud count square</li> <li>• Meteorological equipment</li> </ul>	<b>Manuals</b> <ul style="list-style-type: none"> <li>• GAP guidelines</li> <li>• MoALF fruit production manual</li> </ul>

## VINE FRUITS PRODUCTION

**UNIT CODE:** KNP/HP/C04/6

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce vine fruits

**Duration of Unit:** 100 hours

### Unit Description

This unit specifies the competencies required to produce vine fruits. It includes carrying out food safety risk assessment, developing food safety management plan, implementing the food safety management plan in preparing vine fruits orchard, producing vine fruits, harvesting vine fruits, determining productivity and quality of fruits produced, carrying out post-harvest handling of the fruits, evaluating implementation of the food safety management plan and generating production reports.

### Summary of Learning Outcomes

1. Apply food safety measures to produce vine fruits
2. Prepare to produce vine fruits
3. Produce vine fruits
4. Evaluate production of vine fruits
5. Complete production of vine fruits

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures to produce vine fruits	<ul style="list-style-type: none"><li>• Meaning of food safety</li><li>• Importance of food safety</li><li>• Principles of food safety</li><li>• Prerequisite programmes<ul style="list-style-type: none"><li>○ Meaning, importance, categories and establishment of prerequisite programmes</li><li>○ Relevant pre-requisite programmes<ul style="list-style-type: none"><li>▪ Good agricultural practices</li><li>▪ Standard Sanitary Operating Procedures</li></ul></li></ul></li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral questioning</li><li>• Observation</li><li>• Case study</li><li>• Practical report</li><li>• Thirty party report</li></ul>

	<ul style="list-style-type: none"> <li>• Food safety risk assessment <ul style="list-style-type: none"> <li>○ Meaning of risk assessment</li> <li>○ Difference between risks and hazards</li> <li>○ Steps to conduct a risk assessment <ul style="list-style-type: none"> <li>▪ Enterprise description</li> <li>▪ Layout of premises and surrounding environment</li> <li>▪ Product description</li> <li>▪ Intended uses and consumers</li> <li>▪ Development of a flow diagram</li> <li>▪ Hazard assessment</li> </ul> </li> </ul> </li> <li>• Development of a food safety management system <ul style="list-style-type: none"> <li>○ Development of the Food safety management plan <ul style="list-style-type: none"> <li>▪ Listing hazards</li> <li>▪ Identifying preventive measures and their control limit</li> <li>▪ Establishing monitoring procedures</li> <li>▪ Establishing corrective action</li> <li>▪ Records to be kept</li> <li>▪ Checking and reviewing the plan</li> </ul> </li> <li>○ Implementation of the food safety management plan <ul style="list-style-type: none"> <li>▪ Adoption</li> <li>▪ Communication</li> <li>▪ Resource allocation</li> <li>▪ Practices and procedures</li> </ul> </li> <li>○ Evaluation of the plan <ul style="list-style-type: none"> <li>▪ Verification</li> <li>▪ Validation</li> </ul> </li> </ul> </li> </ul>	
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	<ul style="list-style-type: none"> <li>Standards and legislations in food safety on production of vine fruits</li> </ul>	
2.Prepare to produce vine fruits	<ul style="list-style-type: none"> <li>Tools, equipment, supplies and materials               <ul style="list-style-type: none"> <li>➤ Identification</li> <li>➤ Use</li> <li>➤ Servicing</li> <li>➤ Storage</li> </ul> </li> <li>Farm planning</li> <li>Collection of soil samples</li> <li>Land preparation               <ul style="list-style-type: none"> <li>➤ Clearing</li> <li>➤ Soil conservation measures</li> <li>➤ Tillage methods</li> </ul> </li> <li>Procedures for occupational safety and health</li> <li>Phyto-sanitary requirements for vine fruits</li> <li>Budgeting</li> </ul>	<ul style="list-style-type: none"> <li>Written tests</li> <li>Observation</li> <li>Oral questions</li> <li>Third party report</li> </ul>
3.Produce vine fruits	<ul style="list-style-type: none"> <li>Types of fruit vines</li> <li>Agro-ecological zones</li> <li>agronomic practices:               <ul style="list-style-type: none"> <li>➤ Spacing</li> <li>➤ Trellis/ support system</li> <li>➤ Planting</li> <li>➤ Nutrient application</li> <li>➤ Dormancy breaking</li> <li>➤ Pruning and training</li> <li>➤ irrigation</li> <li>➤ Inducing flowering</li> <li>➤ Rotations/ cropping calendar</li> <li>➤ Intercropping</li> <li>➤ Mulching</li> <li>➤ Control of pests, diseases, physiological disorders and weeds</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Written tests</li> <li>Observation</li> <li>Oral questions</li> <li>Third party report</li> </ul>
4.Evaluate production of vine fruits	<ul style="list-style-type: none"> <li>Evaluation of fruit productivity               <ul style="list-style-type: none"> <li>➤ Quality of fruits</li> <li>➤ Quantities of fruits</li> </ul> </li> <li>Record keeping</li> <li>Report writing</li> <li>Computation of Returns on Investment</li> <li>Accounting principles</li> </ul>	<ul style="list-style-type: none"> <li>Written exercise</li> <li>Oral questions</li> <li>Third party report</li> <li>Observation</li> </ul>

5.Complete production of vine fruits	<ul style="list-style-type: none"> <li>• Harvesting/maturity index <ul style="list-style-type: none"> <li>➤ Fruit skin colour change as indicator of maturity</li> <li>➤ Falling mature fruits</li> <li>➤ Fullness of fruits</li> <li>➤ Fruit textures</li> </ul> </li> <li>• Post-harvest handling <ul style="list-style-type: none"> <li>➤ Sorting and grading</li> <li>➤ Cleaning</li> <li>➤ packing</li> </ul> </li> <li>• Preservation of vine fruits are preserved</li> <li>• Storage of vine fruits</li> <li>• Record keeping</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
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### **Suggested Methods of Delivery**

- On job training
- Demonstration by trainer
- Practice by the trainee
- Field trips
- Direct instruction
- Group discussions
- Instructor led facilitation of theory
- Role play

### **Recommended Resources**

<b>A well horticultural vine fruit orchard with the following:</b>	
<b>Tools</b> <ul style="list-style-type: none"> <li>• Hoes</li> <li>• Machetes</li> <li>• Secateurs</li> <li>• Shovels</li> <li>• Soil augur</li> <li>• Pegs</li> <li>• Hammer</li> <li>• Saw</li> <li>• Bucket</li> <li>• Secateurs</li> <li>• Shears</li> <li>• Dibbler</li> <li>• Pegs</li> </ul>	<b>Materials and supplies</b> <ul style="list-style-type: none"> <li>• Manures</li> <li>• Seedlings /planting materials</li> <li>• Khaki paper bags</li> <li>• Rope</li> <li>• Nets</li> <li>• Translucent papers</li> <li>• Papers</li> <li>• Trellising wire and poles</li> <li>• Fencing wire</li> <li>• Staking sticks</li> <li>• Nails</li> <li>• Herbicides</li> <li>• Pesticides</li> <li>• Pheromones</li> </ul>

Equipment	Manuals
<ul style="list-style-type: none"> <li>• Plough</li> <li>• Harrows</li> <li>• Ridges</li> <li>• Boom sprayer</li> <li>• Pruning saw</li> <li>• Wire strainer</li> <li>• Traps</li> <li>• Pipes sprinklers</li> <li>• Scouting flags</li> <li>• Storage tanks</li> <li>• Gutters</li> <li>• Tractors</li> <li>• Grading shed</li> <li>• Bud count square</li> <li>• Meteorological equipment</li> </ul>	<ul style="list-style-type: none"> <li>• MOLF fruits production manuals</li> <li>• GAP guidelines</li> </ul>

## MUSHROOMS PRODUCTION

**UNIT CODE:** KNP/HP/C05/6/

### Relationship to Occupational Standards

This unit addresses the unit of competency: Produce mushrooms

**Duration of Unit:** 80 hours

### Unit Description

This unit specifies the competencies required to produce mushrooms. It includes carrying out food safety risk assessment, developing food safety management plan, implementing the food safety management plan in preparing mushroom production structures and substrates, spawning, managing and harvesting the mushrooms, determining productivity and quality of mushrooms produced, evaluating implementation of the food safety management plan, carrying out post-harvest handling of mushrooms and generating production report.

### Summary of Learning Outcomes

1. Apply food safety measures to produce mushroom
2. Prepare to produce mushroom
3. Establish mushroom house
4. Evaluate mushroom produced
5. Complete mushroom production

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures to produce mushroom	<ul style="list-style-type: none"><li>• Meaning of food safety</li><li>• Importance of food safety</li><li>• Principles of food safety</li><li>• Prerequisite programmes<ul style="list-style-type: none"><li>○ Meaning, importance, categories and establishment of prerequisite programmes</li><li>○ Relevant pre-requisite programmes<ul style="list-style-type: none"><li>▪ Good agricultural practices</li><li>▪ Standard Sanitary Operating Procedures</li></ul></li></ul></li><li>• Food safety risk assessment<ul style="list-style-type: none"><li>○ Meaning of risk assessment</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral questioning</li><li>• Observation</li><li>• Case study</li><li>• Practical report</li><li>• Third party report</li></ul>

	<ul style="list-style-type: none"> <li>○ Difference between risks and hazards</li> <li>○ Steps to conduct a risk assessment <ul style="list-style-type: none"> <li>▪ Enterprise description</li> <li>▪ Layout of premises and surrounding environment</li> <li>▪ Product description</li> <li>▪ Intended uses and consumers</li> <li>▪ Development of a flow diagram</li> <li>▪ Hazard assessment</li> </ul> </li> <li>● Development of a food safety management system <ul style="list-style-type: none"> <li>○ Development of the Food safety management plan <ul style="list-style-type: none"> <li>▪ Listing hazards</li> <li>▪ Identifying preventive measures and their control limit</li> <li>▪ Establishing monitoring procedures</li> <li>▪ Establishing corrective action</li> <li>▪ Records to be kept</li> <li>▪ Checking and reviewing the plan</li> </ul> </li> <li>○ Implementation of the food safety management plan <ul style="list-style-type: none"> <li>▪ Adoption</li> <li>▪ Communication</li> <li>▪ Resource allocation</li> <li>▪ Practices and procedures</li> </ul> </li> <li>○ Evaluation of the plan <ul style="list-style-type: none"> <li>▪ Verification</li> <li>▪ Validation</li> </ul> </li> </ul> </li> <li>● Standards and legislations in food safety on production of mushrooms</li> </ul>	
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2.Prepare to produce mushrooms	<ul style="list-style-type: none"> <li>• Tools, equipment, supplies and materials <ul style="list-style-type: none"> <li>➤ Identification</li> <li>➤ Use</li> <li>➤ Servicing</li> <li>➤ Storage</li> </ul> </li> <li>• Mushroom house <ul style="list-style-type: none"> <li>➤ Siting</li> <li>➤ Construction</li> </ul> </li> <li>• Sourcing cultures</li> <li>• Hygienic and sanitary requirements</li> <li>• Budgeting for planting materials and inputs</li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Third party report</li> <li>• Oral questioning</li> </ul>
3.Produce mushrooms	<ul style="list-style-type: none"> <li>• Types of mushrooms</li> <li>• Starter culture <ul style="list-style-type: none"> <li>➤ Types</li> <li>➤ Establishment</li> <li>➤ Maintenance</li> </ul> </li> <li>• Mushroom growing substrate <ul style="list-style-type: none"> <li>➤ Types</li> <li>➤ Treatment</li> </ul> </li> <li>• Spawning <ul style="list-style-type: none"> <li>➤ Methods</li> </ul> </li> <li>• Mushroom growth conditions</li> <li>• Mushroom pests and diseases</li> <li>• Good Management Practices (GMP) for mushroom <ul style="list-style-type: none"> <li>➤ Determination of maturity</li> <li>➤ Harvesting techniques</li> <li>➤ Preparation of by products</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
4.Evaluate production of mushrooms	<ul style="list-style-type: none"> <li>• Assessment of mushroom quality</li> <li>• Calculation of quantities of mushrooms</li> <li>• Computation of return on investment</li> <li>• Accounting principles</li> <li>• Records keeping</li> </ul>	<ul style="list-style-type: none"> <li>• Oral questions</li> <li>• Written exercise</li> <li>• Observation</li> </ul>

5. Complete the production of mushrooms	<ul style="list-style-type: none"> <li>• Post-harvest handling of mushrooms <ul style="list-style-type: none"> <li>➤ Sorting</li> <li>➤ Cleaning</li> <li>➤ Cold treatment</li> <li>➤ Preservation</li> <li>➤ Storage</li> </ul> </li> <li>• Production records</li> <li>• Production reports</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
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### **Suggested Methods of Delivery**

- On job training
- Demonstration by trainer
- Practice by the trainee
- Field trips
- Discussions
- Direct instruction

### **Recommended Resources**

<b>A well maintained mush room production unit with the following:</b>	
<b>Tools</b> <ul style="list-style-type: none"> <li>• Weighing scale</li> <li>• Carpentry tools</li> </ul>	<b>Materials and supplies</b> <ul style="list-style-type: none"> <li>• Rice straw,</li> <li>• Maize stover</li> <li>• Baggase</li> <li>• Saw dust</li> <li>• Saw dust</li> <li>• Corncobs</li> <li>• Broiler chicken manure</li> <li>• Methylated spirit</li> <li>• Lime</li> <li>• Fuel for heating substrate</li> <li>• Molasses</li> <li>• Sisal twine</li> <li>• Soap Urea</li> <li>• Spawns</li> <li>• Bran</li> <li>• Polythene bags</li> <li>• Cotton seed cake</li> <li>• Sun flower seed cake</li> <li>• Pesticides</li> <li>• Fertilizers</li> <li>• Stationery</li> </ul>

	<ul style="list-style-type: none"> <li>• Molasses</li> </ul>
<b>Equipment</b> <ul style="list-style-type: none"> <li>• PPE –hand gloves, dust coat, dust masks</li> <li>• Hand spray equipment</li> <li>• Oven</li> <li>• Basin</li> <li>• Watering cans</li> <li>• Shelves</li> </ul>	<b>Reference materials</b> <ul style="list-style-type: none"> <li>• Farm plan</li> <li>• Soil sampling procedure</li> <li>• Procurement policy and procedure</li> <li>• Good Agricultural Practices manual</li> <li>• MoALF mushroom production manual</li> <li>• Accounting principles</li> <li>• Farm policy</li> </ul>

## HERBS AND SPICES PRODUCTION

**UNIT CODE:** KNP/HP/C/06/6/

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce herbs and spices

**Duration of Unit:** 100 hours

### Unit Description

This unit specifies the competencies required to produce quality and clean herbs and spices. It includes carrying out food safety risk assessment, developing food safety management plan, implementing the food safety management plan in preparing herbs and spices seedbed, producing herbs and spices while observing regulatory requirements and keeping accurate production records, determining productivity and quality of herbs and spices produced, carrying out post-harvest handling of the herbs and spices evaluating implementation of the food safety management plan and generating production reports.

### Summary of Learning Outcomes

1. Apply food safety measures to produce herbs and spices
2. Prepare to produce Herbs and Spices
3. Produce herbs and spices
4. Evaluate production of Herbs and Spices
5. Complete the production of Herbs and Spices

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures to produce herbs and spices	<ul style="list-style-type: none"><li>• Meaning of food safety</li><li>• Importance of food safety</li><li>• Principles of food safety</li><li>• Prerequisite programmes<ul style="list-style-type: none"><li>○ Meaning, importance, categories and establishment of prerequisite programmes</li><li>○ Relevant pre-requisite programmes<ul style="list-style-type: none"><li>▪ Good agricultural practices</li><li>▪ Standard Sanitary Operating Procedures</li></ul></li></ul></li><li>• Food safety risk assessment<ul style="list-style-type: none"><li>○ Meaning of risk assessment</li><li>○ Difference between risks</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral questioning</li><li>• Observation</li><li>• Case study</li><li>• Practical report</li><li>• Third party report</li></ul>

	<p>and hazards</p> <ul style="list-style-type: none"> <li>○ Steps to conduct a risk assessment <ul style="list-style-type: none"> <li>▪ Enterprise description</li> <li>▪ Layout of premises and surrounding environment</li> <li>▪ Product description</li> <li>▪ Intended uses and consumers</li> <li>▪ Development of a flow diagram</li> <li>▪ Hazard assessment</li> </ul> </li> <li>● Development of a food safety management system <ul style="list-style-type: none"> <li>○ Development of the Food safety management plan <ul style="list-style-type: none"> <li>▪ Listing hazards</li> <li>▪ Identifying preventive measures and their control limit</li> <li>▪ Establishing monitoring procedures</li> <li>▪ Establishing corrective action</li> <li>▪ Records to be kept</li> <li>▪ Checking and reviewing the plan</li> </ul> </li> <li>○ Implementation of the food safety management plan <ul style="list-style-type: none"> <li>▪ Adoption</li> <li>▪ Communication</li> <li>▪ Resource allocation</li> <li>▪ Practices and procedures</li> </ul> </li> <li>○ Evaluation of the plan <ul style="list-style-type: none"> <li>▪ Verification</li> <li>▪ Validation</li> </ul> </li> </ul> </li> <li>● Standards and legislations in food safety in production of herbs and spices</li> </ul>	
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2. Prepare to produce Herbs and Spices	<ul style="list-style-type: none"> <li>• Site selection and preparation</li> <li>• Selection of herbs and spices to produce</li> <li>• Tools, equipment, supplies and materials <ul style="list-style-type: none"> <li>➤ Identification</li> <li>➤ Use</li> <li>➤ Servicing</li> <li>➤ Storage</li> </ul> </li> <li>• Farm planning</li> <li>• Soil conservation</li> <li>• Seedbed preparation</li> <li>• Soil sampling procedure</li> <li>• Phyto-sanitary requirements for herbs and spices</li> <li>• Planting materials <ul style="list-style-type: none"> <li>○ types</li> <li>○ sources</li> <li>○ preparation</li> <li>○ seed rate</li> </ul> </li> <li>• Budgeting</li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
3. Produce Herbs and Spices	<ul style="list-style-type: none"> <li>• Agro Ecological zonation <ul style="list-style-type: none"> <li>➤ Zone mapping</li> <li>➤ Matching herbs and spices to AEZ</li> </ul> </li> <li>• Types of herbs and spices</li> <li>• Establishment of herbs and spices <ul style="list-style-type: none"> <li>➤ Planting</li> <li>➤ spacing</li> <li>➤ Fertilizer and manure application</li> </ul> </li> <li>• Management of herbs and spices <ul style="list-style-type: none"> <li>➤ Watering</li> <li>➤ Thinning</li> <li>➤ Gapping</li> <li>➤ Mulching</li> <li>➤ weeding</li> <li>➤ Fertilizer application</li> <li>➤ Pruning</li> <li>➤ Control pests, diseases, physiological disorders and weeds</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
4. Evaluate production of Herbs and Spices	<ul style="list-style-type: none"> <li>• Determination of yield of herbs and spices <ul style="list-style-type: none"> <li>➤ Quality of herbs and spices</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> </ul>

	<ul style="list-style-type: none"> <li>produced <ul style="list-style-type: none"> <li>➤ Quantity of herbs and spices produced</li> </ul> </li> <li>• Computation of Return on Investment</li> <li>• Record keeping</li> <li>• Report writing</li> </ul>	<ul style="list-style-type: none"> <li>• Third party report</li> </ul>
5. Complete production of Herbs and Spices	<ul style="list-style-type: none"> <li>• Maturity indices and harvesting of herbs and spices <ul style="list-style-type: none"> <li>➤ Fullness of the produce</li> <li>➤ Produce textures</li> </ul> </li> <li>• Post-harvest handling of herbs and spices <ul style="list-style-type: none"> <li>➤ Sorting</li> <li>➤ Cleaning</li> <li>➤ Cold treatment</li> <li>➤ Preservation</li> <li>➤ Storage</li> </ul> </li> <li>• Disposal of Waste material</li> <li>• Record keeping</li> <li>• Production records</li> <li>• Production reports</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>

#### **Suggested Methods of Delivery**

- On job training
- Demonstration by trainer
- Practice by the trainee
- Field trips
- Direct instruction
- Group discussions
- Instructor led facilitation of theory
- Role play

#### **Recommended Resources**

<b>A well managed herbs and spices farm with the following:</b>	
<b>Tools</b> <ul style="list-style-type: none"> <li>• Hoes</li> <li>• Machetes</li> <li>• Secateurs</li> <li>• Shovels</li> <li>• Soil augur</li> <li>• Pegs</li> <li>• Hammer</li> </ul>	<b>Materials and supplies</b> <ul style="list-style-type: none"> <li>• Manures</li> <li>• Seedlings /planting materials</li> <li>• Khaki paper bags</li> <li>• Measuring tape</li> <li>• Layout string</li> <li>• Nets</li> <li>• Translucent papers</li> </ul>

<ul style="list-style-type: none"> <li>• Saw</li> <li>• Bucket</li> <li>• Shears</li> <li>• Saw</li> <li>• Dibbler</li> <li>• Pegs</li> </ul>	<ul style="list-style-type: none"> <li>• Papers</li> <li>• Fencing wire</li> <li>• Staking sticks</li> <li>• Fencing wire</li> <li>• Staking sticks</li> <li>• Nails</li> <li>• Herbicides</li> <li>• Pesticides</li> <li>• Dormancy breaking chemicals</li> <li>• Pheromones for arthropod traps</li> </ul>
<p>Farm machinery, implements and equipment</p> <ul style="list-style-type: none"> <li>• Plough</li> <li>• Harrows</li> <li>• Ridges</li> <li>• sprayers</li> <li>• Pruning saw</li> <li>• Wire strainer</li> <li>• Pest control traps</li> <li>• Irrigation equipment e.g. pipes, sprinkles, drip lines etc.</li> <li>• Pipes sprinkler</li> <li>• Scouting flags</li> <li>• Storage tanks</li> <li>• Gutters</li> <li>• Tractors</li> <li>• Bud count square</li> <li>• Meteorological equipment</li> </ul>	<p>Manuals</p> <ul style="list-style-type: none"> <li>• GAP guidelines</li> <li>• MoALF fruit production manual</li> </ul>
<p>Tools</p> <ul style="list-style-type: none"> <li>• Hoes</li> <li>• Machetes</li> <li>• Secateurs</li> <li>• Shovels</li> <li>• Soil augur</li> <li>• Panga</li> <li>• Pegs</li> <li>• Hammer</li> <li>• Saw</li> <li>• Bucket</li> <li>• Secateurs</li> <li>• Shears</li> <li>• Dibbler</li> <li>• Pegs</li> </ul>	<p>Materials and supplies</p> <ul style="list-style-type: none"> <li>• Pesticides</li> <li>• Fertilizers</li> <li>• Stationery</li> <li>• Manures</li> <li>• Seedlings /planting materials</li> <li>• Khaki paper bags size 3</li> <li>• Rope</li> <li>• Nets</li> <li>• Translucent papers</li> <li>• Papers</li> <li>• Trellising wire and poles</li> <li>• Fencing wire</li> <li>• Staking sticks</li> <li>• Nails</li> </ul>

	<ul style="list-style-type: none"> <li>• Herbicides</li> <li>• Pesticides</li> <li>• Pheromones</li> </ul>
<p>Equipment</p> <ul style="list-style-type: none"> <li>• Spray pumps</li> <li>• Watering cans</li> <li>• Hose pipes</li> <li>• Plough</li> <li>• Harrows</li> <li>• Ridges</li> <li>• Boom sprayer</li> <li>• Pruning saw</li> <li>• Wire strainer</li> <li>• Traps</li> <li>• Pipe sprinklers</li> <li>• Scouting flags</li> <li>• Storage tanks</li> <li>• Tractors</li> <li>• Grading shed</li> <li>• Bud count square</li> <li>• Meteorological equipment</li> <li>• Cold room</li> </ul>	<p>Reference materials</p> <ul style="list-style-type: none"> <li>• Farm plan</li> <li>• Soil sampling guidelines</li> <li>• Procurement policy</li> <li>• Good Agricultural Practices manual</li> <li>• MoALF herbs and spices production manual</li> <li>• Farm policy</li> </ul>

## HORTICULTURAL NUTS PRODUCTION

**UNIT CODE:** KNP/HP/C07/6/

### **Relationship to Occupational Standards**

This unit addresses the Unit of Competency: Produce Nuts

**Duration of Unit:** 90 hours

### **Unit Description**

This unit specifies the competencies required in carrying out food safety risk assessment, developing food safety management plan, implementing the food safety management plan to produce quality and clean nuts by making adequate preparation before establishing, planting, carrying out husbandry practices and harvesting the nuts while observing regulatory requirements, keeping accurate production records, carrying out post-harvest handling of nuts, evaluating implementation of the food safety management plan and generating production reports.

### **Summary of Learning Outcomes**

1. Apply food safety measures to produce horticultural nuts
2. Prepare to produce Nuts
3. Produce nuts
4. Evaluate production of nuts
5. Complete the production of nuts

### **Learning Outcomes, Content and Suggested Assessment Methods**

<b>Learning Outcome</b>	<b>Content</b>	<b>Suggested Assessment Methods</b>
1. Apply food safety measures to produce horticultural nuts	<ul style="list-style-type: none"><li>• Meaning of food safety</li><li>• Importance of food safety</li><li>• Principles of food safety</li><li>• Prerequisite programmes<ul style="list-style-type: none"><li>○ Meaning, importance, categories and establishment of prerequisite programmes</li><li>○ Relevant pre-requisite programmes<ul style="list-style-type: none"><li>▪ Good agricultural practices</li><li>▪ Standard Sanitary Operating Procedures</li></ul></li></ul></li><li>• Food safety risk assessment</li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral questioning</li><li>• Observation</li><li>• Case study</li><li>• Practical report</li><li>• Third party report</li></ul>

	<ul style="list-style-type: none"> <li>○ Meaning of risk assessment</li> <li>○ Difference between risks and hazards</li> <li>○ Steps to conduct a risk assessment <ul style="list-style-type: none"> <li>▪ Enterprise description</li> <li>▪ Layout of premises and surrounding environment</li> <li>▪ Product description</li> <li>▪ Intended uses and consumers</li> <li>▪ Development of a flow diagram</li> <li>▪ Hazard assessment</li> </ul> </li> <li>● Development of a food safety management system <ul style="list-style-type: none"> <li>○ Development of the Food safety management plan <ul style="list-style-type: none"> <li>▪ Listing hazards</li> <li>▪ Identifying preventive measures and their control limit</li> <li>▪ Establishing monitoring procedures</li> <li>▪ Establishing corrective action</li> <li>▪ Records to be kept</li> <li>▪ Checking and reviewing the plan</li> </ul> </li> <li>○ Implementation of the food safety management plan <ul style="list-style-type: none"> <li>▪ Adoption</li> <li>▪ Communication</li> <li>▪ Resource allocation</li> <li>▪ Practices and procedures</li> </ul> </li> <li>○ Evaluation of the plan <ul style="list-style-type: none"> <li>▪ Verification</li> <li>▪ Validation</li> </ul> </li> </ul> </li> <li>● Standards and legislations in food</li> </ul>	
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	safety in production of horticultural nuts	
2. Prepare to produce nuts	<ul style="list-style-type: none"> <li>• Site selection and preparation</li> <li>• Tools, equipment, supplies and materials               <ul style="list-style-type: none"> <li>➤ Identification</li> <li>➤ Use</li> <li>➤ Servicing</li> <li>➤ Storage</li> </ul> </li> <li>• Farm Planning</li> <li>• Soil conservation</li> <li>• Soil sampling procedure</li> <li>• Phyto-sanitary requirements for herbs and spices</li> <li>• Planting materials               <ul style="list-style-type: none"> <li>➤ Types</li> <li>➤ Sources</li> <li>➤ Preparation</li> </ul> </li> <li>• Seed rate</li> <li>• Budgeting</li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
3. Produce nuts	<ul style="list-style-type: none"> <li>• Types of horticultural nuts</li> <li>• Agro Ecological zonation               <ul style="list-style-type: none"> <li>➤ Zone mapping</li> <li>➤ Matching nuts to AEZ</li> </ul> </li> <li>• Agronomic practices               <ul style="list-style-type: none"> <li>➤ Spacing</li> <li>➤ Planting</li> <li>➤ Nutrient application</li> <li>➤ Dormancy breaking</li> <li>➤ Pruning and training</li> <li>➤ irrigation</li> <li>➤ Inducing flowering</li> <li>➤ Rotations/ cropping calendar</li> <li>➤ Intercropping</li> <li>➤ Mulching</li> <li>➤ Control of pests, diseases, physiological disorders and weeds</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
4. Evaluate production of nuts	<ul style="list-style-type: none"> <li>• Determination of yield nuts               <ul style="list-style-type: none"> <li>➤ Quality of nuts</li> <li>➤ Quantity of nuts</li> </ul> </li> <li>• Computation of Return on investment</li> <li>• Record keeping</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>

	<ul style="list-style-type: none"> <li>• Report writing</li> </ul>	
5. Complete production of nuts	<ul style="list-style-type: none"> <li>• Maturity indices and harvesting <ul style="list-style-type: none"> <li>➢ Falling of mature nuts from the tree</li> <li>➢ Fullness of nuts</li> <li>➢ Nuts' textures</li> </ul> </li> <li>• Post-harvest handling of nuts <ul style="list-style-type: none"> <li>➢ Sorting</li> <li>➢ Cleaning</li> <li>➢ Cold treatment</li> <li>➢ Preservation</li> <li>➢ Storage</li> </ul> </li> <li>• Record keeping</li> <li>• Production records</li> <li>• Production reports</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>

#### **Suggested Methods of Delivery**

- On job training
- Demonstration by trainer
- Practice by the trainee
- Field trips
- Direct instruction
- Group discussions
- Instructor led facilitation of theory
- Role play

#### **Recommended Resources**

<b>A well managed horticultural nut farm with the following:</b>	
<b>Tools</b> <ul style="list-style-type: none"> <li>• Hoes</li> <li>• Machetes</li> <li>• Secateurs</li> <li>• Shovels</li> <li>• Soil augur</li> <li>• Pegs</li> <li>• Hammer</li> <li>• Saw</li> </ul>	<b>Materials and supplies</b> <ul style="list-style-type: none"> <li>• Manures</li> <li>• Seedlings /planting materials</li> <li>• Khaki paper bags</li> <li>• Measuring tape</li> <li>• Layout string</li> <li>• Nets</li> <li>• Translucent papers</li> <li>• Papers</li> </ul>

<ul style="list-style-type: none"> <li>• Bucket</li> <li>• Secateurs</li> <li>• Shears</li> <li>• Dibbler</li> <li>• Pegs</li> </ul>	<ul style="list-style-type: none"> <li>• Fencing wire</li> <li>• Staking sticks</li> <li>• Trellising wire and poles</li> <li>• Fencing wire</li> <li>• Staking sticks</li> <li>• Nails</li> <li>• Herbicides</li> <li>• Pesticides</li> <li>• Dormancy breaking chemicals</li> <li>• Pheromones for arthropod traps</li> </ul>
<b>Farm machinery, implements and equipment</b> <ul style="list-style-type: none"> <li>• Plough</li> <li>• Harrows</li> <li>• Ridges</li> <li>• sprayers</li> <li>• Pruning saw</li> <li>• Wire strainer</li> <li>• Pest control traps</li> <li>• Irrigation equipment e.g. pipes, sprinkles, drip lines etc.</li> <li>• Pipes sprinkler</li> <li>• Scouting flags</li> <li>• Storage tanks</li> <li>• Gutters</li> <li>• Tractors</li> <li>• Bud count square</li> <li>• Meteorological equipment</li> </ul>	<b>Manuals</b> <ul style="list-style-type: none"> <li>• GAP guidelines</li> <li>• MoALF fruit production manual</li> </ul>

## ORNAMENTAL PLANTS PRODUCTION

**UNIT CODE:** KNP/HP/C08/6/

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce ornamental plants

**Duration of Unit:** 100 hours

### Unit Description

This unit specifies the competencies required to produce quality and clean ornamental plants. It involves preparing the growing structures for ornamental plants, planting, carrying out husbandry practices on the ornamental plants while observing regulatory requirements and keeping production records, acclimatizing ornamental plants and generating production reports.

### Summary of Learning Outcomes

1. Prepare to produce ornamental plants
2. Produce ornamental plants
3. Evaluate production of ornamental plants
4. Complete the production of ornamental plants

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Prepare to ornamental plants	<ul style="list-style-type: none"><li>• Production Site selection and preparation</li><li>• Tools, equipment, supplies and materials<ul style="list-style-type: none"><li>➢ Identification</li><li>➢ Use</li><li>➢ Servicing</li><li>➢ Storage</li></ul></li><li>• Farm planning</li><li>• Soil conservation</li><li>• Seedbed preparation</li><li>• Soil sampling procedure</li><li>• Planting materials<ul style="list-style-type: none"><li>➢ types</li><li>➢ sources</li><li>➢ preparation</li></ul></li><li>• Budgeting for planting materials and inputs</li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Observation</li><li>• Oral questions</li><li>• Third party report</li></ul>

2. Produce ornamental plants	<ul style="list-style-type: none"> <li>• Type of ornamental plants</li> <li>• Agro Ecological zonation <ul style="list-style-type: none"> <li>➤ Zone mapping</li> <li>➤ Matching ornamental plants to AEZ</li> </ul> </li> <li>• Establishment of ornamental plants <ul style="list-style-type: none"> <li>➤ Planting</li> <li>➤ spacing</li> <li>➤ Fertilizer and manure application</li> </ul> </li> <li>• Management of ornamental plants <ul style="list-style-type: none"> <li>➤ Watering</li> <li>➤ Gapping</li> <li>➤ Mulching</li> <li>➤ Weeding</li> <li>➤ Fertilizer application</li> <li>➤ pruning</li> <li>➤ Control of pests, diseases, physiological disorders and weeds</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
3. Evaluate production of ornamental plants	<ul style="list-style-type: none"> <li>• Determination of yield ornamental plants <ul style="list-style-type: none"> <li>➤ Quality ornamental plants</li> <li>➤ Quantity of ornamental plants</li> </ul> </li> <li>• Computation of Return on investment</li> <li>• Record keeping</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
4. Complete production of ornamental plants	<ul style="list-style-type: none"> <li>• Post-harvest handling of ornamental plants <ul style="list-style-type: none"> <li>➤ Sorting</li> <li>➤ Cleaning</li> <li>➤ Cold treatment</li> <li>➤ Preservation</li> <li>➤ Storage</li> </ul> </li> <li>• Record keeping</li> <li>• Report writing</li> <li>• Production records</li> <li>• Production reports</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>

### **Suggested Methods of Delivery**

- On job training
- Demonstration by trainer
- Practice by the trainee
- Field trips
- Direct instruction

- Group discussions
- Instructor led facilitation of theory
- Role play

### Recommended Resources

A well established ornamental plants orchard with the following:	
<b>Tools</b> <ul style="list-style-type: none"> <li>• Hoes</li> <li>• Machetes</li> <li>• Secateurs</li> <li>• Pruning saws</li> <li>• Shovels</li> <li>• Soil augur</li> <li>• Panga</li> <li>• Pegs</li> <li>• Hammer</li> <li>• Saw</li> <li>• Bucket</li> <li>• Secateurs</li> <li>• Shears</li> <li>• Pegs</li> </ul>	<b>Materials and supplies</b> <ul style="list-style-type: none"> <li>• Water</li> <li>• Pesticides</li> <li>• Fertilizers</li> <li>• Stationery</li> <li>• Manures</li> <li>• Seedlings /planting materials</li> <li>• Khaki paper bags size 3</li> <li>• Rope</li> <li>• Nets</li> <li>• Translucent papers</li> <li>• Papers</li> <li>• Fencing wire</li> <li>• Nails</li> <li>• Herbicides</li> <li>• Pesticides</li> </ul>
<b>Equipment</b> <ul style="list-style-type: none"> <li>• Spray pumps</li> <li>• Watering cans</li> <li>• Hose pipes</li> <li>• Wheelbarrow</li> <li>• Cold rooms Tractors</li> <li>• Trailer</li> <li>• Ploughs</li> <li>• Harrows</li> <li>• Tillers</li> <li>• Sprayers</li> <li>• Cold room/store</li> </ul>	<b>Reference materials</b> <ul style="list-style-type: none"> <li>• Assessment location</li> <li>• Farm plan</li> <li>• Soil sampling guidelines</li> <li>• Laid down procurement policies</li> <li>• Good Agricultural Practices manual</li> <li>• Ornamental plants production manual</li> <li>• Farm policy</li> </ul>

## CUT FLOWERS PRODUCTION

**UNIT CODE:** KNP/HP/C09/6/

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce Cut flowers

**Duration of Unit:** 100 hours

### Unit Description

This unit specifies the competencies required to produce quality and clean cut flowers. It involves preparation of production structures, planting, carrying out husbandry practices while observing regulatory requirements and keeping accurate production records, carrying out postharvest handling of flowers and generating production reports.

### Summary of Learning Outcomes

1. Prepare to produce cut flowers
2. Produce cut flowers
3. Evaluate production of cut flowers
4. Complete the production of cut flowers

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Prepare to cut flowers	<ul style="list-style-type: none"><li>• Production site selection</li><li>• Tools, equipment, supplies and materials<ul style="list-style-type: none"><li>➤ Identification</li><li>➤ Use</li><li>➤ Servicing</li><li>➤ Storage</li></ul></li><li>• Farm Planning</li><li>• Soil conservation</li><li>• Preparation of growing structures</li><li>• Preparation of growing media</li><li>• Soil sampling procedure</li><li>• Planting materials<ul style="list-style-type: none"><li>➤ types</li><li>➤ sources</li><li>➤ preparation</li></ul></li><li>• Budgeting for planting materials and inputs</li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Observation</li><li>• Oral questions</li><li>• Third party report</li></ul>

2. Produce cut flowers	<ul style="list-style-type: none"> <li>• Types of cut flowers</li> <li>• Agro Ecological zonation <ul style="list-style-type: none"> <li>➤ Zone mapping</li> <li>➤ Matching cut flowers to AEZ</li> </ul> </li> <li>• Establishment of cut flowers <ul style="list-style-type: none"> <li>➤ Planting</li> <li>➤ Spacing</li> <li>➤ Fertigation and chemigation system</li> </ul> </li> <li>• Management of cut flowers <ul style="list-style-type: none"> <li>➤ Watering</li> <li>➤ Gapping</li> <li>➤ Mulching</li> <li>➤ Weeding</li> <li>➤ Pruning</li> <li>➤ Control of pests, diseases, physiological disorders and weeds</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
3. Evaluate production of cut flowers	<ul style="list-style-type: none"> <li>• Determination of yield of cut flowers <ul style="list-style-type: none"> <li>➤ Quality cut flowers</li> <li>➤ Quantity of cut flowers</li> <li>➤ Record keeping</li> <li>➤ Report writing</li> </ul> </li> <li>• Computation of Return on investment</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> </ul>
4. Complete production of cut flowers	<ul style="list-style-type: none"> <li>• Post-harvest handling of cut flowers <ul style="list-style-type: none"> <li>➤ Sorting</li> <li>➤ Cleaning</li> <li>➤ Cold treatment</li> <li>➤ Preservation</li> <li>➤ Storage</li> </ul> </li> <li>• Record keeping</li> <li>• Report writing</li> <li>• Production records</li> <li>• Production report writing</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>

### **Suggested Methods of Delivery**

- On job training
- Demonstration by trainer
- Practice by the trainee
- Field trips
- Discussions
- Direct instruction

- Role play

### Recommended Resources

A well managed cut flower farm with the following:	
<b>Tools</b> <ul style="list-style-type: none"> <li>• Hoes</li> <li>• Machetes</li> <li>• Secateurs</li> <li>• Shovels</li> <li>• Soil augur</li> <li>• Panga</li> <li>• Pegs</li> <li>• Hammer</li> <li>• Saw</li> <li>• Bucket</li> <li>• Secateurs</li> <li>• Shears</li> <li>• Dibbler</li> <li>• Pegs</li> </ul>	<b>Materials</b> <ul style="list-style-type: none"> <li>• water</li> <li>• Pesticides</li> <li>• Fertilizers</li> <li>• Stationery</li> <li>• Manures</li> <li>• planting materials</li> <li>• Khaki paper bags size 3</li> <li>• Rope</li> <li>• Nets</li> <li>• Translucent papers</li> <li>• Papers</li> <li>• Fencing wire</li> <li>• Nails</li> <li>• Herbicides</li> <li>• Pesticides</li> </ul>
<b>Equipment</b> <ul style="list-style-type: none"> <li>• Spray pumps</li> <li>• Watering cans</li> <li>• Hose pipes</li> <li>• Wheelbarrow</li> <li>• Cold rooms Tractors</li> <li>• Trailer</li> <li>• Ploughs</li> <li>• Harrows</li> <li>• Tillers</li> <li>• Sprayers</li> <li>• Cold room/store</li> </ul>	<b>Reference materials</b> <ul style="list-style-type: none"> <li>• Assessment location</li> <li>• Farm plan</li> <li>• Soils sampling guidelines</li> <li>• Laid down procurement policies</li> <li>• Good Agricultural Practices manual</li> <li>• KEPHIS guide</li> <li>• Cut flowers production manual</li> <li>• Farm policy</li> </ul>

## VEGETABLE CROPS PRODUCTION

**UNIT CODE:** KNP/HP/C10/6/

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Produce vegetable crops

**Duration of Unit:** 120 hours

### Unit Description

This unit specifies the competencies required to produce quality and clean vegetables. It involves carrying out food safety risk assessment, developing food safety management plan, implementing the food safety management plan in seedbed preparation, planting, carrying out husbandry practices on the vegetables while observing regulatory requirements and keeping accurate production records, carrying out post-harvest handling of vegetables, evaluating implementation of the food safety management plan and generating production reports.

### Summary of Learning Outcomes

1. Apply food safety measures to produce vegetable crops
2. Prepare to produce vegetables
3. Produce vegetables
4. Evaluate production of vegetables
5. Complete the production of vegetables

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures to produce vegetable crops	<ul style="list-style-type: none"><li>• Meaning of food safety</li><li>• Importance of food safety</li><li>• Principles of food safety</li><li>• Prerequisite programmes<ul style="list-style-type: none"><li>○ Meaning, importance, categories and establishment of prerequisite programmes</li><li>○ Relevant pre-requisite programmes<ul style="list-style-type: none"><li>▪ Good agricultural practices</li><li>▪ Standard Sanitary Operating Procedures</li></ul></li></ul></li><li>• Food safety risk assessment<ul style="list-style-type: none"><li>○ Meaning of risk assessment</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral questioning</li><li>• Observation</li><li>• Case study</li><li>• Practical report</li><li>• Third party report</li></ul>

	<ul style="list-style-type: none"> <li>○ Difference between risks and hazards</li> <li>○ Steps to conduct a risk assessment <ul style="list-style-type: none"> <li>▪ Enterprise description</li> <li>▪ Layout of premises and surrounding environment</li> <li>▪ Product description</li> <li>▪ Intended uses and consumers</li> <li>▪ Development of a flow diagram</li> <li>▪ Hazard assessment</li> </ul> </li> <li>● Development of a food safety management system <ul style="list-style-type: none"> <li>○ Development of the Food safety management plan <ul style="list-style-type: none"> <li>▪ Listing hazards</li> <li>▪ Identifying preventive measures and their control limit</li> <li>▪ Establishing monitoring procedures</li> <li>▪ Establishing corrective action</li> <li>▪ Records to be kept</li> <li>▪ Checking and reviewing the plan</li> </ul> </li> <li>○ Implementation of the food safety management plan <ul style="list-style-type: none"> <li>▪ Adoption</li> <li>▪ Communication</li> <li>▪ Resource allocation</li> <li>▪ Practices and procedures</li> </ul> </li> <li>○ Evaluation of the plan <ul style="list-style-type: none"> <li>▪ Verification</li> <li>▪ Validation</li> </ul> </li> </ul> </li> <li>● Standards and legislations in food safety in production of vegetable</li> </ul>	
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	crops	
2. Prepare to produce vegetables	<ul style="list-style-type: none"> <li>• Production Site selection and preparation</li> <li>• Tools, equipment, supplies and materials <ul style="list-style-type: none"> <li>➤ Identification</li> <li>➤ Use</li> <li>➤ Servicing</li> <li>➤ Storage</li> </ul> </li> <li>• Farm Planning</li> <li>• Soil conservation</li> <li>• sampling procedure</li> <li>• Preparation of growing structures</li> <li>• Preparation of growing media</li> <li>• Planting materials <ul style="list-style-type: none"> <li>➤ types</li> <li>➤ sources</li> <li>➤ preparation</li> </ul> </li> <li>• Budgeting for planting materials and inputs</li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
3. Produce vegetables	<ul style="list-style-type: none"> <li>• Types of vegetable</li> <li>• Establishment of vegetable crops</li> <li>• Planting</li> <li>• spacing</li> <li>• Fertilizer and manure application</li> <li>• Management of vegetables</li> <li>• Watering</li> <li>• Gapping</li> <li>• Mulching</li> <li>• Weeding</li> <li>• Fertilizer application</li> <li>• pruning</li> <li>• Control of pests, diseases, physiological disorders and weeds</li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
4. Evaluate production of vegetables	<ul style="list-style-type: none"> <li>• Determination of yield of vegetables <ul style="list-style-type: none"> <li>○ Quality vegetables</li> <li>○ Quantity of vegetables</li> </ul> </li> <li>• Report writing</li> <li>• Record keeping</li> <li>• Computation of Return on investment</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>

5.Complete production of vegetables	<ul style="list-style-type: none"> <li>• Post-harvest handling of vegetables <ul style="list-style-type: none"> <li>○ Sorting</li> <li>○ Cleaning</li> <li>○ Cold treatment</li> <li>○ Preservation</li> <li>○ Storage</li> </ul> </li> <li>• Production records</li> <li>• Production report writing</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
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### Suggested Methods of Delivery

- On job training
- Demonstration by trainer
- Field trips
- Discussions
- Direct instruction
- Practice by the trainee
- Instructor led facilitation of theory
- Role play

### Recommended Resources

A well managed vegetable crop farm with the following:	
<b>Tools</b> <ul style="list-style-type: none"> <li>• Hoes</li> <li>• Machetes</li> <li>• Secateurs</li> <li>• Pruning saws</li> <li>• Shovels</li> <li>• Soil augur</li> <li>• Panga</li> <li>• Pegs</li> <li>• Hammer</li> <li>• Saw</li> <li>• Bucket</li> <li>• Secateurs</li> <li>• Shears</li> <li>• Dibbler</li> <li>• Pegs</li> </ul>	<b>Materials and supplies</b> <ul style="list-style-type: none"> <li>• Water</li> <li>• Manures</li> <li>• Seedlings</li> <li>• Khaki paper bags size 3</li> <li>• Rope</li> <li>• Nets</li> <li>• Trellising wire</li> <li>• poles</li> <li>• Pesticides</li> <li>• Pheromones</li> <li>• Fertilizers</li> <li>• Stationery</li> <li>• Nails</li> <li>• Fencing wire</li> <li>• Fencing wire</li> <li>• Staking sticks</li> <li>• Pegs</li> </ul>
<b>Equipment</b>	<b>Reference materials</b>

<ul style="list-style-type: none"> <li>• Spray pumps</li> <li>• Watering cans</li> <li>• Hose pipes</li> <li>• Plough</li> <li>• Harrows</li> <li>• Ridges</li> <li>• Boom sprayer</li> <li>• Pruning saw</li> <li>• Wire strainer</li> <li>• Traps</li> <li>• Pipes sprinklers</li> <li>• Scouting flags</li> <li>• Storage tanks</li> <li>• Gutters</li> <li>• Tractors</li> <li>• Grading shed</li> <li>• Bud count square</li> <li>• Meteorological equipment</li> <li>• Cold room/store</li> </ul>	<ul style="list-style-type: none"> <li>• Assessment location</li> <li>• Farm plan</li> <li>• Procurement policies</li> <li>• Good Agricultural Practices manual</li> <li>• KEPHIS guide</li> <li>• MoALF vegetables production manual</li> <li>• Farm policy</li> </ul>
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## HORTICULTURAL PRODUCTION FARM MANAGEMENT

**UNIT CODE:** KNP/HP/C11/6/

### Relationship to Occupational Standards

This unit addresses the Unit of Competency: Manage horticultural production farm

**Duration of Unit:** 100 hours

### Unit Description

This unit specifies the competencies required to manage horticultural production farm. It involves carrying out food safety risk assessment, developing food safety management plan, implementing the food safety management plan in generating management tools, allocating resources, monitoring and evaluating the management process, evaluating implementation of the food safety management plan and generating management reports.

### Summary of Learning Outcomes

1. Apply food safety measures to manage horticultural farm
2. Prepare to manage horticultural production farm
3. Manage Horticultural Production Farm
4. Evaluate management of Horticultural Production Farm
5. Complete management of Horticultural Production Farm

### Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply food safety measures to manage horticultural farm	<ul style="list-style-type: none"><li>• Meaning of food safety</li><li>• Importance of food safety</li><li>• Principles of food safety</li><li>• Prerequisite programmes<ul style="list-style-type: none"><li>○ Meaning, importance, categories and establishment of prerequisite programmes</li><li>○ Relevant pre-requisite programmes<ul style="list-style-type: none"><li>▪ Good agricultural practices</li><li>▪ Standard Sanitary Operating Procedures</li></ul></li></ul></li><li>• Food safety risk assessment<ul style="list-style-type: none"><li>○ Meaning of risk assessment</li><li>○ Difference between risks</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Written tests</li><li>• Oral questioning</li><li>• Observation</li><li>• Case study</li><li>• Practical report</li><li>• Third party report</li></ul>

	<p>and hazards.</p> <ul style="list-style-type: none"> <li>○ Steps to conduct a risk assessment <ul style="list-style-type: none"> <li>▪ Enterprise description</li> <li>▪ Layout of premises and surrounding environment</li> <li>▪ Product description</li> <li>▪ Intended uses and consumers</li> <li>▪ Development of a flow diagram</li> <li>▪ Hazard assessment</li> </ul> </li> <li>● Development of a food safety management system <ul style="list-style-type: none"> <li>○ Development of the Food safety management plan <ul style="list-style-type: none"> <li>▪ Listing hazards</li> <li>▪ Identifying preventive measures and their control limit</li> <li>▪ Establishing monitoring procedures</li> <li>▪ Establishing corrective action</li> <li>▪ Records to be kept</li> <li>▪ Checking and reviewing the plan</li> </ul> </li> <li>○ Implementation of the food safety management plan <ul style="list-style-type: none"> <li>▪ Adoption</li> <li>▪ Communication</li> <li>▪ Resource allocation</li> <li>▪ Practices and procedures</li> </ul> </li> <li>○ Evaluation of the plan <ul style="list-style-type: none"> <li>▪ Verification</li> <li>▪ Validation</li> </ul> </li> </ul> </li> <li>● Standards and legislations in food safety in horticultural production farm management</li> </ul>	
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2. Prepare to manage horticultural production farm	<ul style="list-style-type: none"> <li>• Strategic Plan <ul style="list-style-type: none"> <li>○ Development</li> </ul> </li> <li>• Budget <ul style="list-style-type: none"> <li>○ Making</li> </ul> </li> <li>• Financial Plan <ul style="list-style-type: none"> <li>○ Development</li> </ul> </li> <li>• Resources <ul style="list-style-type: none"> <li>○ Identification</li> <li>○ Sources</li> <li>○ Stores establishment</li> <li>○ records</li> </ul> </li> <li>• Management Information System <ul style="list-style-type: none"> <li>○ Identification</li> <li>○ Sourcing</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
3. Manage Horticultural Production Farm	<ul style="list-style-type: none"> <li>• Farm Planning</li> <li>• Resources <ul style="list-style-type: none"> <li>○ Procurement</li> <li>○ Stores establishment</li> <li>○ Stores management</li> </ul> </li> <li>• Financial Plan <ul style="list-style-type: none"> <li>○ Implementation</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Written tests</li> <li>• Observation</li> <li>• Oral questions</li> <li>• Third party report</li> </ul>
4. Evaluate management of Horticultural Production Farm	<ul style="list-style-type: none"> <li>• Monitoring and Evaluation Report</li> <li>• Accounting principles <ul style="list-style-type: none"> <li>○ Return on investment report</li> <li>○ Gross margin analysis</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party interviews</li> </ul>
5. Complete management of Horticultural Production Farm	<ul style="list-style-type: none"> <li>• Management Report <ul style="list-style-type: none"> <li>○ Development</li> <li>○ Sharing</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Written tests</li> <li>• Oral questions</li> <li>• Third party interviews</li> </ul>

### **Suggested Methods of Delivery**

- On job training
- Demonstration by trainer
- Practice by the trainee
- Field trips
- Discussions
- Direct instruction
- Role play

### **Recommended Resources**

A well managed horticultural farm with the following:	
<b>Tools</b> <ul style="list-style-type: none"> <li>• Work contracts</li> <li>• Performance Appraisal guide</li> <li>• Strategic Plan</li> <li>• Financial Plan</li> <li>• Annual Implementation Plan</li> <li>• Business operating environment assessment report</li> </ul>	<b>Materials</b> <ul style="list-style-type: none"> <li>• Office space</li> <li>• stationery</li> </ul>
<b>Equipment</b> <ul style="list-style-type: none"> <li>• ICT equipment</li> </ul>	<b>Reference materials</b> <ul style="list-style-type: none"> <li>• Farm business plan</li> <li>• Standard Operations Procedures</li> <li>• Business operating environment assessment report</li> </ul>