



Citrus Orchard Foreman Occupational Learning

Work Scenario Guide

B1: New Orchard Establishment

Qualification:	110667 – Occupational Certificate: Orchard and Vineyard Foreman
Work Scenario:	B1: New Orchard Establishment
Learning Area:	B: Lead the establishment of new citrus orchard
Scenario Description:	You are working with management and the farm owner to plan the establishment of a new orchard. To do this, you need to participate in planning for the establishment, including scheduling activities, hiring contractors, purchasing tools and equipment, and hiring additional staff if necessary.

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Contents

Alignment Information	4
Qualification	4
Modules	4
Learning Outcomes	5
Chapter 1 Natural Resources	7
1. Introduction to Resource Management	7
2. Natural Resources	7
3. Climate	8
4. Climatic Conditions	8
4.1. Temperature	9
4.2. Wind	9
4.3. Rainfall	9
4.4. Hail	9
5. Indigenous Vegetation	10
6. Topography	10
7. Water	11
8. Soil	12

Alignment Information

Qualification

The content of this learner guide is aligned to the following occupational qualification:

SAQA QUAL ID	Qualification Title			
110667	Occupational Certificate: Orchard and Vineyard Foreman			
Originator				
Development Quality Partner – AgriSETA				
Primary Or Delegated Quality Assurance Functionary			NQF Sub-Framework	
-			OQSF - Occupational Qualifications Sub-Framework	
QUALIFICATION TYPE		FIELD		SUBFIELD
Occupational Certificate		Field 01 - Agriculture and Nature Conservation		Primary Agriculture
Abet Band	Minimum Credits	Pre-2009 NQF Level	NQF Level	Qual Class
Undefined	147	Not Applicable	NQF Level 04	Regular-ELOAC

Modules

The content of this learner guide is aligned to the following modules of the occupational qualification above.

Module Code	Module Title	Level	Credits
Knowledge Modules			
611202-001-00-KM-01	Plant Structure and Physiology	4	5
611202-001-00-KM-02	Vineyard or Orchard Establishment	3	2
611202-001-00-KM-03	Vineyard or Orchard Manipulation Processes	3	8
611202-001-00-KM-04	Harvesting	3	4
611202-001-00-KM-05	Basic Principles of Plant Nutrition	4	4
611202-001-00-KM-06	Crop Protection	3	3
611202-001-00-KM-07	Assets in Horticultural Production	3	2
611202-001-00-KM-08	Farm Business Management and Farming Process Management	4	8
611202-001-00-KM-09	Human Resource Management and Processes	4	8
611202-001-00-KM-10	Overseeing Farming Resource Utilisation	4	8
Practical Skill Modules			
611202-001-00-PM-01	Organise, Allocate and Monitor Availability and Productive Use of Resources	4	5
611202-001-00-PM-2a	Set Team and Individual Performance Goals to Enhancing Team Performance	4	10
611202-001-00-PM-2b	Control Vineyard or Orchard Practices	4	10

611202-001-00-PM-03	Supply Accurate Daily Orchard or Vineyard and Production Information	4	10
Work Experience Modules			
611202-001-00-WM-01	Vineyard or Orchard Resource Optimisation	4	20
611202-001-00-WM-02	Skilled and Motivated Work Team Output	4	20
611202-001-00-WM-03	Daily Orchard or Vineyard and Production Information Availability	4	20

Learning Outcomes

The content of this learner guide is aligned to the following learning outcomes of the modules above.

Knowledge Topics	
Outcome Code	Module Title
KM-08-KT06	Farm renewal strategy
IAC0601	The aspects to be considered in the establishment of new orchards/vineyards are evaluated in terms of their impact on farm renewal
IAC0602	The decision-making criteria in the farm renewal strategy are identified
IAC0603	Planning and costing aspects related to the establishment of new orchards/vineyards are discussed
IAC0604	Methods and operations to be applied in the establishment of new orchards/vineyards are discussed
IAC0605	The aspects to be considered in the replacement of orchards/vineyards are evaluated
IAC0606	Planning and costing aspects related to the replacement of orchards/vineyards are discussed
IAC0607	Methods and operations to be applied in the replacement of orchards/vineyards are discussed
Practical Skills	
PM-01-PS02	Determine agricultural input to support the production activities of the orchard related to the production stages of the crop
IAC0201	Correct agricultural calculations was applied
IAC0202	Costs within budgetary constraints or cost ratios
IAC0203	Standard agricultural norms are identified and applied
IAC0204	List of inputs and factors related to the activity are identified
IAC0205	Ratios and variances are correctly calculated
PA0201	Determine the agricultural input required for maintained orchard and crop quality.
PA0202	Determine the machinery, tools and equipment which will be needed to maintain orchard and crop quality throughout the different seasons of the year.
PA0203	Determine how different scenarios will influence the input.
PM-01-PS07	Describe the relationship between the farm and the environment in terms of resources
IAC0701	The map of the farm indicates all resources and infrastructure
IAC0702	The analysis of the resources, infrastructure and potential of the farm is an accurate representation
PA0701	Research and describe the history of the farm and the section of the farm
PA0702	Draft a map of the farm and the environment indicating all resources and infrastructure
PA0703	Research and describe the potential of the capacity of the farm or section of the farm
PA0704	Identify the infrastructural obstacles which will impact negatively on productivity

PM-01-PS10	Calculate the establishment cost of a Vineyard or orchard
IAC1001	The cost analysis for the establishment of a Vineyard or orchard is comprehensive and calculations are accurate
PA1001	Determine the input raw material quality and quantity
PA1002	Determine the work team input
PA1003	Determine other resource requirements
PA1004	Calculate the establishment cost of a Vineyard or orchard

Chapter 1

Natural Resources

learning outcomes

The content of this chapter is aimed at helping you to:

- Manage the natural resources on your farm during the planning process of a new orchard establishment.
- Layout an orchard to fit the natural surrounds and available resources.

1. Introduction to Resource Management

When planning the establishment of a new orchard, or the replacement of an old orchard, the first thing to consider are the natural resources on and around your farm. These natural resources will determine what the establishment of the orchard will look like, including what will be planted, where it will be planted, and how it will be planted.

As custodians of much of a nation's land, farmers have many responsibilities, including providing themselves and their employees an income while minimizing the long-term effects of their farming operations.

Realistically however, many decisions must necessarily be based on providing immediate income to the farming enterprise. The most obvious reason for operating any business is to make money and to provide income for owner and for the employees of the enterprise. This means that every decision cannot always serve all the responsibilities of the farmer. The reality is that the farming operation must generate enough income each year to pay operating costs, land lease costs, and machinery and equipment purchases, meet debt payments, cover insurance costs, and maintain farm infrastructure.

While the above costs must be covered each year if the enterprise is to stay in business, the other responsibilities must also be considered in making day-to-day decisions. Extensive investigation and planning have to form the basis of any new planting to ensure that all the responsibilities are considered.

2. Natural Resources

definition

Natural Resources

Natural resources are the various elements in any given farming environment which are found naturally in the environment and are used to produce citrus.

Natural resources in the farming environment include soil, water, climate, indigenous vegetation, and topography.

3. Climate

Climate, of all the natural resources available to us, is the factor that mostly determines the yield in citrus production. It is also the overriding factor influencing the type and quality of citrus that can be grown for export in a particular area.

definition

Climate

Climate is the average weather, usually taken over a multi-decade period, for a particular region and time period. Climate is different from weather, but is the average pattern of weather for a particular region. Climatic elements include precipitation, temperature, humidity, sunshine, wind velocity, phenomena such as fog, frost, and hailstorms, and other measures of the weather.

Weather

Weather is the specific condition of the atmosphere at a particular place and time. It is measured in terms of factors such as wind, temperature, humidity, atmospheric pressure, cloudiness, and precipitation. In most places, weather changes from hour to hour, day to day, and season to season.

Microclimate

Microclimate refers to the climate of a small site. It may differ from the climate large of the area due to aspect, tree cover (or the absence of tree cover), or exposure to winds.

4. Climatic Conditions

In South Africa, commercial citrus production is confined to areas with mild and almost frost-free winters and where temperatures seldom drop below -2 degrees Celsius. Factors limiting citrus production in some areas are high spring or summer temperatures, low relative humidity, water stress during critical growth periods due to poor availability, hail, or wind.

Climatic conditions that play a role in citrus production include:

- Temperature
- Wind
- Rainfall
- Hail

The type of information which is required for enterprise selection and planning for as long a period as possible, is the following:

- Average rainfall
- Relative humidity
- Average, maximum and minimum evapotranspiration
- Average, maximum and minimum wind speed and direction
- Average, maximum and minimum temperatures

All the above are available on an hourly, daily, monthly, and yearly basis and the information can be accessed at all times.

4.1. Temperature

Temperature is the most important factor that accounts for observed differences in vegetative and fruiting characteristics. It is, however, difficult to separate the influence of temperature from that of other factors.

Extreme heat during the blossom and fruit set periods can cause a severe drop of blossoms and fruitlets, which will have a direct effect on the crop yield. During the November drop period, severe heat can cause a moisture deficit in the tree which also leads to an excessive drop of fruitlets.

Very dry and hot periods during the early development stage of the fruit lead to smaller fruit and which will impact directly on income. Very low temperatures which may include frost very seldom damages trees or cause crop losses in the citrus producing areas of Southern Africa.

4.2. Wind

In Southern Africa citrus is produced inland and near the coast in a variation of climatic regions, all with varying degrees of wind. Production for the export market demands high standards in terms of cosmetic appearance of the fruit. Wind blemish is one of the main cull factors and causes of losses, with as much as 70% having been recorded in more windy areas.

Extremely windy conditions also detrimentally affect tree growth, tree development and yield. Windy conditions hamper orchard management practices such as spraying and irrigation. In the establishment of any production unit, prevailing winds, and the possible effects thereof on orchard development and subsequent income has to be considered carefully.

4.3. Rainfall

Sufficient rain to ensure enough water for irrigation purposes is one of the main requirements for successful citrus production. The effect of too much or too little rain can, depending on the intensity, vary from negligible to catastrophic.

Prolonged dry periods, which occur in most of the citrus producing areas, can have a severe effect on yield and fruit size, and subsequently profitability.

Prolonged rainy spells in the summer rainfall areas during the spring and summer hampers spray programs and can result in heavy pest and disease infestations. Late summer or autumn rains can also have a negative effect on internal fruit quality, which in turn influences export pack-out percentage and shelf-life, and reduces income.

Rain during the harvest season, which occurs regularly in the winter rainfall areas, hampers harvesting, affects fruit quality, and increases the potential for postharvest decay.

4.4. Hail

Hail damage is a real threat in the northern production areas. Hail causes extensive damage to both the crop and trees.

It is prudent to examine the incidence of hail in any of the northern areas before developing a new production unit. The information on the incidence in the various areas is available from the crop insurance companies, who can also provide information on costs of insurance against hail damage.

5. Indigenous Vegetation

South Africa is ranked as the third most biologically diverse country in the world, mainly due to the richness of plant life. It is important to know the indigenous vegetation of the area in which the farming enterprise is going to be established and identify the possible effects of such development on the environment.

There are two types of vegetation that one should be aware of when involved in agriculture, being indigenous and invasive vegetation.

Indigenous vegetation refers to trees, under-storey plants, groundcover and plants occurring naturally in a specific area. Examples of such vegetation in South Africa are proteas, fynbos, rhino veld, a wide variety of succulents, afro-montane and coastal forests, broadleaved forests in the Lowveld, and grasslands.

Generally, the indigenous vegetation types in citrus production areas are as follows:

- Western Cape – Fynbos
- Eastern Cape – Grassland/Savannah
- KwaZulu-Natal – Savannah/Bushveld
- Mpumalanga – Savannah/Bushveld
- Limpopo – Bushveld

Invasive vegetation is alien plants that have been brought into South Africa for their beauty, economic value, or for an ecological purpose. Invasive plants often do not have natural enemies and therefore tend to proliferate, competing with indigenous vegetation for resources.

When planning a citrus planting, a careful study must be made of the naturally occurring vegetation in the area, including a differentiation between indigenous and invasive vegetation. All land-users, and especially farmers, have a responsibility of maintaining indigenous flora as far as possible and eradicating invasive plants.

6. Topography

Topography refers to the "lie of the land," or the physio-geographic characteristics of land in terms of elevation, slope, and orientation, such as:

- Shape and lie of the land
- Relation to oceans and mountain ranges
- Geographical history
- Slope and direction
- Geographical location

An understanding of topography is critical for a number of reasons. In terms of environmental quality, agriculture, and hydrology, understanding the topography of an area enhances the understanding of watershed boundaries, drainage characteristics, water movement and water quality.

Understanding topography also aids in soil conservation, especially in agriculture. Contour ploughing, which is the practice of ploughing along the topographic lines, is an established practice of enabling sustainable agriculture on sloping land.

When planning orchards, an understanding of topography is important when deciding on placement of the orchard and row direction, keeping the effect of irrigation runoff and storm water management in mind. In the Western and Eastern Cape, the fruit in orchards on east-

facing slopes will be earlier than on west-facing slopes. In windy areas, an orchard at the top of a hill facing the prevailing winds will suffer much more wind damage than one on the lee side of the hill.

Topography is also important in determining weather patterns. Two areas in fairly close proximity may differ radically in climatic characteristics, such as rainfall, because of elevation differences or position relative to a nearby hill or mountain range. It is also well known that topography influences occurrence of hail with incidence of hail on two farms relatively near to each other differing greatly.

Knowledge of the possible effects of the topography on the development of a specific orchard or farm can therefore have a strong bearing on the eventual profitability of the plantings.

Although topography refers to a wide range of factors, the factors that are most important in terms of enterprise selection are the lie of the land, and its slope and direction.

The slope of a surface can be described as the degree of deviation from the horizontal. It can be nearly level, gently sloping, strongly sloping, undulating, or rolling. Soils with similar texture can differ a lot with regard to water absorption and erosion as result of differences in slope. Danger of erosion normally increases as the slope of the land increases.

The relationship between slope and suitability of land for crop production is determined by the relative importance of surface drainage, erosion, infiltration, and cultivation. Other factors which influence the effect of slope on production potential are the type of crop, stability of the topsoil, intensity, and duration of rainfall, as well as method and type of irrigation.

7. Water

Irrigation in agriculture is dependent on water of a suitable quality. Water quality is judged by the potential problems which can develop as result of long-term use. The level of potential problems varies and is determined by soil, climate, and crop, as well as skill and knowledge of the water-user. Judicial use of good quality water normally does not result in any problems.

The National Water Act (Act 36 of 1998) states that the government is the official protector of the country's water. Water is seen as a communal resource and access to water use is based on obtaining permission in the form of a permit. Farmers therefore have to register their water use with the Department of Water Affairs as an individual or through the local Water Users Association.

In practice however, a very large proportion of problems experienced in citrus production are directly related to water use and quality. The quality of the water used for irrigation can for instance vary greatly depending on the soluble salt content. Special management practices are necessary in this case to ensure acceptable yields.

In planning a citrus enterprise or orchard it is therefore most important to carefully assess the following aspects:

- The water source
- Irrigation capacity
- Water quality

These factors are all discussed in detail in the material regarding irrigation installation.

8. Soil

Soil is the result of soil formation processes over thousands of years. Soil types differ from one place on the surface of the earth to the other, as the result of the differences in the formation processes.

While selecting a farm or land on which to develop a citrus orchard, you should first perform a thorough land evaluation to determine which areas on the farm are suitable for citrus production. It should also include the potential for agricultural use of other areas on the farm as well as the management necessary to maintain and improve the immediately surrounding environment.

Soil testing, soil preparation and land evaluation are discussed in detail in the material on land preparation.

summary

Chapter 1 – Natural Resources

- Natural resources are the various elements in any given farming environment which are found naturally in the environment and are used to produce citrus.
- Natural resources in the farming environment include soil, water, climate, indigenous vegetation, and topography.
- Climate is the average weather, usually taken over a multi-decade period, for a particular region and time period.
- Weather is the specific condition of the atmosphere at a particular place and time.
- Microclimate refers to the climate of a small site.
- Climatic conditions that play a role in citrus production include temperature, wind, rainfall, and hail.
- Temperature is the most important factor that accounts for observed differences in vegetative and fruiting characteristics.
- Wind can negatively affect fruit through blemishing, and extremely windy conditions detrimentally affect tree growth, tree development and yield.
- Sufficient rain to ensure enough water for irrigation purposes is one of the main requirements for successful citrus production.
- Hail damage is a real threat in the northern production areas. Hail causes extensive damage to both the crop and trees.
- There are two types of vegetation that one should be aware of when involved in agriculture, being indigenous and invasive vegetation.
- Indigenous vegetation refers to plants occurring naturally in a specific area.
- Invasive vegetation are alien plants that do not naturally occur in an area but have been introduced there, usually through human action.
- Topography refers to the "lie of the land," or the physio-geographic characteristics of land in terms of elevation, slope, and orientation.

assessment activities

- ✓ **Activity P1:** Complete this activity to test your knowledge of natural resources.
- ✓ **Activity F1:** Complete this activity to test your knowledge of the entire module.