



Citrus Orchard Foreman Occupational Learning

Work Scenario Guide

L1: Sustainability and Environmental Management

Qualification:	110667 – Occupational Certificate: Orchard and Vineyard Foreman
Work Scenario:	L1: Sustainability and Environmental Management
Learning Area:	L: Manage production practices to minimise damage to the environment, promote sustainability and protect natural resources
Scenario Description:	You need to work with management to participate in sustainability and environmental management planning, to ensure market compliance and minimal environmental impact.

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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-KT01	The horticultural farm as a business
IAC0101	The types of legal entities are listed and the advantages and disadvantages in terms of the horticultural enterprise are named
IAC0102	The concept of sustainability in the horticultural sector is defined and argued
IAC0103	The concept of competition in the horticultural sector is defined and discussed
Practical Skills	
PM-01-PS08	Monitor the impact of agricultural activities on the environment
IAC0801	A comprehensive list of corrective and preventative solutions
IAC0802	Disposal measures applied are in compliance with IPM standards and environmental regulations
PA0801	Identify activities which will have an impact on the environment
PA0802	List possible actions to prevent and correct contamination and damage to the environment
PA0803	Identify correct disposal measures of waste according to IPM standards

Chapter 1

Sustainability

learning outcomes

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

- Understand the importance of sustainability and how to maintain it.

1. Sustainability

Citrus farming, as with all types of farming, changes the environment it takes place in. By introducing one species of plant (your citrus trees) and letting them dominate the area, this changes the ecosystem around the farm. If you want to be able to farm for a long time, in a way that is as friendly to the environment as possible, you need to think about sustainability.

definition

Sustainability

The practice of avoiding the depletion of natural resources to maintain ecological balance.

To simplify the definition above, sustainability (in farming) means farming in a way that we do not damage our environment to the point where we can no longer farm there. Your farm can only produce fruit if the surrounding environment and ecosystem are healthy, and it is the farmer's responsibility to make sure they stay that way.

The most common ways that irresponsible farming damages the ecosystem is through poor soil management, poor water management, poor waste management, loss of biodiversity, and excessive or poorly managed chemical use. All of these practices can damage the environment, and in turn, your farm.

Since we have already discussed water, waste, agrochemical and soil management in other material, this material will focus on two main parts of sustainability, namely biodiversity and natural resources.

2. Natural Resources

definition

Resources

A resource is a natural or man-made element that can be used to meet human needs. Resources can be renewable, meaning that they can't really run out (such as wind or sunlight), or non-renewable, meaning that they will eventually run out, such as oil.

Natural Resources

Natural resources are resources that occur in nature, and can be both renewable or non-renewable.

On the farm, the natural resources we will usually deal with are:

- Soil, which we grow our plants in.
- Water, which we and all living things need to live.
- Flora, which is another word for plants, like our trees.
- Fossil fuels, like coal or oil, which we use for energy.
- The sun, which provides solar energy to us and our plants.

3. Energy

definition

Energy

Energy is the ability to do work, and it comes in various forms.

Energy can come as electricity from the municipality, sunlight from the sun, from food eaten by people, and from burning gasoline inside an engine. In this chapter we will be referring to electricity or fossil fuel-based power used for machinery when we refer to energy.

As you know, some of these forms of energy are renewable, and some aren't. Sunlight will always be available (during the day at least), or at least for so far into the future that it is effectively forever. Fossil fuels, on the other hand, such as coal and gas, will run out eventually, as they are replaced too slowly compared to how fast we use them up.

More than 75% of South Africa's energy comes from coal. One half of this is used to generate electricity, a quarter is used to produce liquid fuels, and the other quarter is used as fuel to heat homes. South Africa is the country in the world that is the most dependent on coal, and therefore we need to look at generating energy from alternative sources.

4. Alternative Energy Sources

The most common alternative energy sources are:

- Solar energy
- Wind energy
- Water energy
- Nuclear energy
- Biodiesel

4.1. Solar Energy

The sun is a great source of energy, which is referred to as solar energy, which can be turned into electricity or heat. Solar energy is used in many ways, for example by simply keeping the curtains open during the day, sunlight can light and warm a room.

Technology has been developed to harness the energy of the sun, so that it can be stored and used by humans for heating or electricity generation. Solar energy systems, or solar collectors, produce energy without releasing pollution particles or chemicals into the air. This means that solar energy can be a great way to have renewable power, but it may not be feasible everywhere.

4.2. Wind Energy

When the power of wind is used to generate electricity, it is referred to as wind energy. The wind turns large fans that power a generator to make electricity. The power of the wind to generate electricity is proportional to the wind speed. Much more electricity can therefore be generated in places with high average winds speeds, and “wind farms” are often established in such places. The windier the location, the more kilowatt-hours can be generated.

4.3. Water Energy

Water is another renewable source of energy. A watermill or a hydro-electric scheme uses the force of water to generate electricity. Water moves across impellers, rotating them and generating electricity.

4.4. Nuclear Energy

Nuclear energy is generated by using special radioactive materials. Harmful substances are not released when nuclear energy is generated. However, once the radioactive material has been used to generate energy, the waste remains radioactive and hazardous to all living organisms. The waste material must be stored safely for thousands of years to avoid contamination.

4.5. Biodiesel

Biodiesel is a liquid fuel than can replace regular diesel. It is made from used vegetable oil from deep fryers or freshly grown grains, such as maize. The particles released from burning regular diesel can cause cancer, but by using biodiesel this hazard can be reduced. Biodiesel is a renewable energy source.

summary

Chapter 1 – Sustainability

- Sustainability means farming in a way that we do not damage our environment to the point where we can no longer farm there.
- Your farm can only produce fruit if the surrounding environment and ecosystem are healthy, and it is the farmer’s responsibility to make sure they stay that way.
- The most common ways that irresponsible farming damages the ecosystem is through poor soil management, poor water management, poor waste management, loss of biodiversity, and excessive or poorly managed chemical use.
- A resource is a natural or man-made element that can be used to meet human needs.
- Resources can be renewable, meaning that they can’t really run out, or non-renewable, meaning that they will eventually run out.
- Natural resources are resources that occur in nature, and can be both renewable or non-renewable.
- On the farm, the natural resources we will usually deal with are soil, water, flora, fossil fuels, and the sun.
- Energy is the ability to do work, and it comes in various forms, from various sources.
- South Africa is the country in the world that is the most dependent on coal, and therefore we need to look at generating energy from alternative sources.

- The most common alternative energy sources are solar, wind, water, nuclear, and biodiesel.
- Solar energy is harvested by solar cells and is pollution free, but it may not be feasible everywhere.
- Wind energy is captured by large fans, and is also pollution free, but also may not be feasible everywhere.
- Water energy is captured by a watermill, or a hydro-electric system, where it moves impellers, rotating them and generating electricity.
- Nuclear energy is generated by using special radioactive materials, and does not produce pollution until the radioactive material is used up, after which it has to be carefully stored for a very long time.
- Bio diesel is a liquid fuel similar to regular diesel, made from used vegetable oils or grains, and is a renewable alternative to diesel.

assessment activities

- ✓ **Activity P1:** Complete this activity to test your knowledge of sustainability.

Chapter 2

Biodiversity

learning outcomes

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

- Manage biodiversity and understand how it relates to sustainability.

1. Biodiversity

definition

Biodiversity

Biodiversity (or biological diversity) is a collective term that refers to the totality and variety of life on Earth.

Ecosystem

An ecosystem is a community of organisms (like bacteria, plants and animals) that inhabit specific a physical environment.

South Africa has a wealth of natural fauna and flora, with more than 20,000 different plants, or about 10% of all the known species of plants on Earth. This makes South Africa particularly rich in plant biodiversity.

To ensure that the plants and animals that occur naturally in your environment is protected, you need to be aware of the key types that occur and their environmental requirements. Biodiversity is necessary for the existence of ecosystems. You need a variety of different living organisms to keep ecosystems healthy.

For example, let's imagine if there were an ecosystem with only chickens, with no plants, seeds, or insects for the chickens to eat. These chickens would starve immediately, and there would be no ecosystem left. In the same way, if there were to be an ecosystem with only one type of plant, it would be extremely unhealthy.

This means that you need to make sure that you maintain the biodiversity on your farm as best as you can. You especially want to avoid letting naturally occurring species go extinct from the area where you are farming.

If even just one species becomes extinct in an ecosystem, it can have a knock-on effect on others it interacts with. Some species are so important to an ecosystem due to the part they play that their extinction can collapse the entire ecosystem. These are known as keystone species. The extinction of a keystone species causes a series of further extinctions.

Now that we know why biodiversity is important, let us discuss some of the leading threats to biodiversity, namely:

- Converting land for agricultural use
- Forest clearing

- Climate change
- Pollution
- Unsustainable harvesting of natural resources
- The introduction of alien species

These threats are more or less important depending on where you are located, but generally the biggest issues you will deal with are alien species and loss of habitat. Since we have already discussed alien species in the material on weed management, we will here talk about how farming can damage biodiversity.

2. Biodiversity and Agriculture

Farming is a major contributor to loss of biodiversity, because agriculture's basic goal is to purposefully let one species (your crop) dominate an ecosystem. There will of course be a variety of plants on a farm, but there will be more citrus trees than anything else.

In fact, other plant species may even be purposefully wiped out for weed control and the need for establishing infrastructure, such as roads. Establishing a majority of one plant species in an ecosystem also has a knock-on effect on the diversity of animal life found in the ecosystem.

Some animal species, specifically insect species that eat the now-dominant plant, will flourish and increase in numbers, while animal species who may have been present in the ecosystem before but that can no longer find food because of the loss of diversity in plant species, will disappear.

3. Sustainability in Agriculture

The best way to limit the damage caused by agriculture to the environment is to focus on farming sustainably. Sustainability is about ensuring that the practices that are used today will maintain the environment so that farming will still be possible in a hundred years from now. Every person that is involved in agriculture must have an awareness of the impact of agriculture on the environment, and especially of those practices that impact most severely on biodiversity.

The agricultural practices that have the biggest impact on biodiversity are:

- Picking the right site and preparing it properly
- Applying agrochemicals responsibly

3.1. Picking and Preparing a Site

Proper planning before the establishment of an orchard and effective management for the lifespan of the orchard is the most important aspect of maintaining biodiversity. For you to plan and manage your farm while minimising the environmental impact of his activities, you need to:

- Know about biodiversity and its importance in terms of conservation
- Know the types of fauna and flora that occur naturally in the environment of his farm
- Know the needs of those plants and animals
- Know the needs of citrus production
- Balance these needs carefully

For example, when a new planting is being planned, the orchards must be laid out in such a way that a balance is achieved between the planted crop and the naturally occurring plants of the area.

If the naturally occurring life is maintained, the natural balance of the ecosystem will actually make farming easier, as you will need less fertiliser, water, and pesticides. For more information on how to properly lay out a site look at the material on orchard establishment.

3.2. Agrochemical Applications

As you know, we use a wide range of agrochemicals, from fertilisers to pesticides to herbicides and more. These are an important part of farming, and in commercial farming, especially for export, their use is pretty much unavoidable.

This means that we need to manage them carefully and use them only when needed. More information on how to safely and properly apply agrochemicals is discussed in the material on agrochemical application.

summary

Chapter 2 – Biodiversity

- South Africa is particularly rich in plant biodiversity and the naturally occurring fauna and flora must be protected.
- Biodiversity is necessary for the existence of ecosystems, because a variety of organisms must exist in any given ecosystem for the sake of the health of the ecosystem.
- The leading threats to biodiversity are converting land to agricultural use, forest clearing, climate change, pollution, unsustainable harvesting of natural resources, and the introduction of alien species.
- Agriculture is a major contributor to loss of biodiversity, because agriculture in essence aims at establishing a majority of one species of plant or animal in an ecosystem.
- To limit the impact of agriculture as far as possible while ensuring that food security is not compromised, the principle of sustainability is essential.
- Proper planning before the establishment of an orchard, effective management for the orchard lifespan, and careful agrochemical usage are the most important aspects of maintaining biodiversity.
- Plant protection products and herbicides must be applied carefully, and care must be taken that only the target pest, disease or weeds are affected.

assessment activities

- ✓ **Activity P2:** Complete this activity to test your knowledge of biodiversity.
- ✓ **Activity F1:** Complete this activity to test your knowledge of the entire module.