



Citrus Orchard Foreman Occupational Learning

Work Scenario Guide

G2: Harvest Preparation

Qualification:	110667 – Occupational Certificate: Orchard and Vineyard Foreman
Work Scenario:	G2: Harvest Preparation
Learning Area:	G: Plan and oversee the harvesting of citrus crop
Scenario Description:	Harvest is approaching, and you need to prepare for harvesting, including scheduling activities, securing tools and equipment, creating and preparing necessary infrastructure, and managing staff.

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Contents

Alignment Information	4
Qualification	4
Modules	4
Learning Outcomes	5
Chapter 1 Harvesting Tools and Equipment	6
1. Introduction to Tools and Equipment	6
2. Ordering Tools and Equipment	7
3. Specific Tools and Equipment	8
3.1. Clippers	8
3.2. Picking Bags	8
3.3. Ladders	9
3.4. Bulk Bins	9
3.5. Picking Trailers	9
3.6. Tractors	9
Chapter 2 New Technologies	11
1. New Technologies	11
2. Research Areas	11
2.1. Technology	11
2.2. GAP Systems	11
2.3. Government Incentives	12
3. Evaluating Results	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-04-KT04	Logistics and availability of equipment
IAC0401	The number of people and equipment needed to harvest a specific block is calculated based on a set of data supplied based on crop estimates, labour requirements of the cultivar and specific market requirements
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-PS03	Organise and allocate equipment and agri-chemicals to the work team to perform vineyard or orchard practices
PA0303	Describe the process to issue equipment and tools relevant to the operation to workers
PM-2a-PS04	Determine personnel requirements to meet production schedules
IAC0401	The estimations and utilisation plans are correct
PA0402	Estimate requirements
PA0403	Identify human resources shortages
PA0405	Determine labour requirements to achieve production objectives
PA0406	Plan utilisation and allocate human resources in order to achieve consistent production to meet production targets

Chapter 1

Harvesting Tools and Equipment

learning outcomes

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

- Identify and obtain tools and equipment for harvesting.

1. Introduction to Tools and Equipment

After designing your harvest plan and calculating the personnel and equipment we will need for harvest, you can begin buying the necessary equipment. This material discusses the various tools and equipment used for harvesting, as well how to order them. The specifics of how the equipment is used is discussed in the other harvesting material. We will also briefly discuss the process of adapting and incorporating new technology into your harvesting.

Producing citrus is not cheap and as we get to the final production processes, such as harvesting, it is understandable that producers might start looking for ways to save money. Often, the first way that producers try to cut costs is by buying lower quality tools and equipment. This is something you should avoid doing, as a lot of perfectly produced fruit has been ruined and made worthless by being harvested with cheap or badly maintained equipment.

In this chapter we look how to develop a plan that ensures that we procure the necessary equipment and tools, of good quality, in good time and in the correct quantities.

As is the case with most orchard farming, citrus harvesting is still done manually. Although there are constantly new developments in mechanical harvesting technology, no machine has been developed yet that can harvest citrus without damaging the fruit and the tree, because of the irregularity in size and shape of fruit trees. Citrus fruit needs to be handled with care while being harvested, as injuries to fruit can lead to the development of postharvest diseases and blemishes.

In some countries where labour costs are high, mechanical equipment, such as hydraulic positioning platforms, are used as labour saving devices. In South Africa, though, the costs involved in using such machinery are not worth it. You should however do research before each season to see if any new technology might save you costs, for more information see the next chapter.

As part of harvesting planning and preparation, the correct tools and equipment of the right quality must be bought in sufficient quantities. The citrus harvesting plan you developed will give an indication of the number and type of tools needed. The tools and equipment that you purchase must be of good quality, so that they will last the season without needing replacing or constant repairs.

Harvesting tools and equipment that were used during harvesting in the previous season also need to be inspected and repaired where needed. Plans must also be developed indicating where and how tools and equipment should be used to ensure safe and sufficient operations.

2. Ordering Tools and Equipment

When you order tools and equipment for harvest, you should make sure that you do it early enough that delivery takes place at least three weeks before picking starts. This will give you adequate time to obtain more equipment if necessary or to replace equipment if you receive the wrong order or broken equipment.

You should try to create a good relationship with at least two or three different suppliers for the same tools and equipment, so that you won't have a problem if one supplier is unable to deliver on time or in sufficient quantities.

Equipment such as gloves, clippers, picking bags and ladders can be obtained from local suppliers such as farming corporations and other tool suppliers. Bulk bins, both wooden and plastic, are usually leased from the manufacturers on a seasonal basis.

Mechanical equipment such as picking trailers and tractors can be bought from approved vehicle suppliers, although in some instances picking trailers are manufactured by private suppliers by modifying other existing trailers. In some areas, tractors and trailers can be rented during the harvesting period. All tractors and picking trailers used for harvesting citrus should always be roadworthy and licensed.

When receiving tools and equipment, you must perform checks to make sure that the tools and equipment are in good working order, and of good quality. You must also check existing equipment that might have been used in the previous season to ensure that they are still in a serviceable condition.

The table below gives a list of citrus harvesting tools and equipment and the quality checks that should be performed on equipment:

information

Pre-Season Equipment Checks

<i>Equipment</i>	<i>Part</i>	<i>Check for:</i>
Picking Clippers	Blades	➤ Blades should be sharp ➤ Blades should be aligned
	Spring	➤ Spring should open blades after they have been closed ➤ Spring should not be too stiff
	Finger Loop	➤ Loop should be strong but pliable as to not injure pickers
Gloves	Overall	➤ Gloves should be strong and durable but soft enough not to damage fruit ➤ Used gloves should be checked for holes
Picking Bags	Overall	➤ Picking bags should be made of a sturdy material that is resistant to tears
	Strap	➤ Straps should be strong and securely attached to the bag ➤ Used bags should be checked for holes and tear, and any holes or tears should be repaired using thread, not wire ➤ Straps should be long enough to handle a full load of fruit in the bag

	Quick Release Hinges	➤ Some picking bags will have quick release hinges that open the bags at the bottom, and these should be strong and easily workable
Ladders	Hinges	➤ Hinges should be stable and strong ➤ Hinges should open and close easily
	Overall	➤ Ladders should be smooth, with no sharp protruding parts or splinters that can harm fruit or workers
Bulk Bins	Overall	➤ Bulk bins should be dry and clean ➤ Bulk bins should be smooth inside ➤ Bulk bins should have no protruding screws that can damage fruit ➤ Bulk bins should be whole with no damage

3. Specific Tools and Equipment

To add to the list above, the most commonly used tools and equipment when harvesting citrus are:

- Gloves
- Clippers
- Ladders
- Picking Bags
- Bulk bins
- Picking trailers
- Tractors

Let's discuss each of their tools and equipment in more detail, including their general use, and what types of these tools and equipment are best suited for citrus. For specific information on how to use them, refer to the material on harvesting management.

3.1. Clippers

The most common tools used for removing fruit from trees are steel clippers. They are used to cut the stem of the fruit as close to the button (calyx) as possible without injuring the shoulder of the fruit.

There are other types of pruning shears and similar equipment available, but these are not designed for harvesting, so it is not recommended that you use them. Clippers fit comfortably into the palm of the hand, have a rounded point and curved blade to avoid damaging the fruit. A spring keeps the blade in an open position and ensures fast recovery for efficient picking.

3.2. Picking Bags

Various receptacles can be used to collect picked fruit, but the most common is a picking bag. Picking bags are generally made from canvas or polyvinyl. They have a single strap and are slung over the shoulder of the picker. As the picker picks the fruit, it is placed inside the bag until it is full. It is then taken to a general collection point in the orchard where the bags are emptied into bulk bins or picking trailers.

Some picking bags have closed bottoms, in which case the bags must be upended when being emptied into the picking trailer or bulk bin. Other types are open at the bottom with a flap that seals while fruit is being picked. There are also various designs of bags, including some that have a frame around the top to keep the bag open for the picker. Bags with adjustable straps are preferable as they will increase ease of use for pickers.

Picking buckets, lugs and other receptacles were also used in the past but are not commonly used anymore unless they are needed for some specific reason. These receptacles are less user-friendly and generally harsher on fruit.

3.3. Ladders

Ladders are used during harvesting to reach higher into the canopy when dealing with trees that are taller than workers can reach. Ladders are placed alongside trees or rested against the canopy in the case of larger trees.

Ladders vary from home-made, single-sided, two-legged ladders made from locally grown wood to factory-manufactured, two- or three-legged ladders generally made from aluminium or wood. Aluminium is generally preferable as it is easier to keep sanitised and won't rot or grow mouldy.

3.4. Bulk Bins

Bulk bins are used to collect and transport fruit after picking in the orchard back to the packhouse for treating and packing. These wooden or plastic bulk bins generally have a capacity of 350kg. In small operations, crates with a capacity of 15kg to 20kg capacity are used. Picking bags are emptied into the bulk bins or trailers at a central collection point in the orchard. Trailers are pulled by tractors, while bulk bins are transported on specially designed bin trailers.

Bin trailers are designed to carry between two and four bins. Bulk bins are mostly placed on the trailer and removed from the trailer by a forklift, but to improve productivity and turn-around, adaptations are sometimes made to allow bins to roll off on the trailer on roller channels.

The most sophisticated method presently used to move bins around is by using specifically designed pneumatic lift trailers which move down orchard rows and pneumatically clamp and transport bins out.

3.5. Picking Trailers

Picking trailers are usually made of steel and have hinged sides that can be opened to release fruit at specifically designed off-loading ramps at the packhouse. In some cases, as a space-saving practice, the main fruit holding section of the picking trailer can be detached from its wheeled undercarriage by a gantry hoist and stacked on top of other trailers outside the packhouse.

3.6. Tractors

Tractors are used to haul fruit out of the orchard to the loading bay and sometimes to transport pickers to the orchard. Either converted tractors or forklifts are required for stacking bins if bulk bins are being used for transporting harvested fruit. Tractors are large vehicles, and can be dangerous when mishandled. Tractors must therefore always be operated by experienced staff that are tested and checked before the season start.

summary

Chapter 1 – Harvesting Tools and Equipment

- The tools and equipment requirement for harvesting are determined by the number of picking teams and pickers that is required for the picking operation.
- The number of picking teams and pickers that are required is determined by the size of the farm, the cultivar spread, the picking period and the capacity of the packhouse.
- Tools and equipment used commonly during citrus harvesting are clippers, picking bags, ladders, bulk bins or picking trailers, and tractors.
- Clippers are used to cut the stem of the fruit to remove it from the tree.
- Fruit is placed into picking bags, which are emptied into bulk bins or picking trailers.
- Tractors are used to transport the picking trailers, or bulk bins on trailers to the packhouse.
- The blade alignment and spring action of clippers must be checked before harvesting and regularly during picking.
- Picking bags must be checked before and during harvesting for holes and tears.
- Ladders must be checked for sharp edges, splinters, and loose components.
- Bulk bins are cleaned and maintained by the supplier from which the bins are rented.
- Picking trailers and tractors must be serviced before harvesting.

assessment activities

- ✓ **Activity P1:** Complete this activity to test your knowledge of harvesting tools and equipment.

Chapter 2

New Technologies

learning outcomes

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

- Investigate new tools, equipment, and methods of harvesting.

1. New Technologies

As we mentioned earlier in this material, you must always keep up to date with new developments in harvesting technology. New machines, techniques, or improved equipment might be developed which could streamline harvesting and save you a considerable amount of money.

Until deregulation in 1997, the citrus industry in South Africa was regulated by the Citrus Board. After deregulation, the Citrus Growers' Association was formed by citrus producers in South Africa. The Citrus Growers' Association formed Citrus Research International, who are responsible for research in the citrus industry.

Before the start of each citrus harvesting season, the CGA and various other organisations working in the citrus industry have a series of road shows where new markets requirements and innovations in the citrus industry are discussed.

It is highly recommended that you or a representative from your organisation attend one of these road shows, or another similar conference. They are great places to meet other producers and experts in your area, while getting up to date information about all citrus production.

2. Research Areas

To ensure that a citrus farm or area stays as profitable as possible a research strategy must be developed and implemented. Research should not only focus on new technological developments, but other areas such as new GAP system regulations and government incentive schemes.

2.1. Technology

Your research into new tools and equipment for use during harvesting should also include developments such as computerised software that can streamline the traceability, management and recordkeeping processes. You should also look out for new technologies that can improve maturity indexing or ensure better fruit safety, as well as developments concerning the cooling and treatment of fruit after the harvesting period.

2.2. GAP Systems

GAP and other accreditation systems are updated regularly. Changes to GAP and other accreditation systems are done to ensure that systems are more effective, so you need to keep up to date with changes and implement new recommendations where necessary. The only way a farmer can keep himself informed of these changes is by regular research into these areas.

2.3. Government Incentives

In South Africa the government has various employment and training incentive schemes that can be of great benefit to producers. Training according to government regulated measures ensures a more knowledgeable and productive workforce, and employing the correct training procedures also means that training is more cost effective. Research into government incentive schemes is important to ensure that the citrus producer maximises profitability and complies with social responsibility issues.

3. Evaluating Results

Research should be performed regularly, at a set time every year. The research process must be well structured, and once research is completed, all the information must be collected and assessed. While doing research, you should include all information you find, even if you are not sure it is fully relevant to your farm. It is better to have 'too much' information and then to cut it down than to have too little.

After you have your information, you should check it to ensure that it is applicable to your farm. For example, you might read up about a new technique for transporting fruit from the orchard to the packhouse, but then find out when you read further that it won't work on your farm since your roads are too small.

After you have confirmed that your research is applicable, you then need to ask if it is practical and cost-effective. Even if a new technique or piece of equipment would work well on your farm, it may simply be too expensive to implement. New technology is often quite expensive, so it can often be sensible to wait a few seasons for the price to come down before implementing it.

After you have determined that your research is applicable, practical, and cost-effective, you should then bring it up with senior management. They should then hold a meeting to discuss whether the new technique or piece of equipment can be implemented on the farm, how much it will cost, and finally decide whether or not to go ahead.

The implementation of new GAP system and other accreditation scheme regulations should always be prioritised above new technology that can save you money. This is because, while saving is important, if you lose accreditation due to not complying with a new regulation, you will lose a lot of money and the entire farm may go bankrupt.

When considering new incentives introduced by the government, such as training incentives, you must ensure that you have access to the necessary service providers and training material to enable the implementation of new methods.

summary

Chapter 2 – New Technologies

- Research in the citrus industry is done by independent bodies like the Citrus Growers' Association and Citrus Research International.
- Research must be structured and done on a regular basis.
- Research must be done into new technological developments, new GAP system regulations and government incentive schemes.
- Research results must be assessed to ascertain that development is applicable, cost-effective and practical.

- New regulations that can affect accreditation to GAP and other schemes must always be implemented first.
- New technologies or methods can only be implemented if analysis shows that it can increase profitability and cost effectiveness.

assessment activities

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