



Citrus Orchard Foreman Occupational Learning

Study Guide

KM-10: Overseeing Farming Resource Utilisation

Qualification:	110667 – Occupational Certificate: Orchard and Vineyard Foreman		
Module No.:	611202001-KM-10		
Module Title:	Overseeing Farming Resource Utilisation		
NQF Level:	4	Credits:	8

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Qualification Information

The content of this study 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

Knowledge Module

The content of this learner guide is aligned to the following module 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

Knowledge Topics, Topic Elements, and IACs

The content of this study guide is aligned to the following knowledge topics, topic elements, and internal assessment criteria of the module above.

Knowledge Topics, Topic Elements, and IACs	
Code	Title
KM-10-KT01	Finances (14%, 1.12 credits)
KT0101	Financial cost control concepts and practices
KT0102	Production cost and profit
IAC0101	Budgeting concepts are defined and the principles thereof are discussed
IAC0102	An understanding of concepts of profitability, sustainability and competitiveness is demonstrated
IAC0103	Principles of using operational budgets to prepare production plans are outlined
IAC0104	Methods of monitoring expenditure against an operational budget are described
IAC0105	The concept of the cost value of labour is defined
IAC0106	Impact of internal and external variables on cost are explained
IAC0107	The concepts of equipment availability and reliability are discussed
KM-10-KT02	Management of Agricultural Assets (14%, 1.12 credits)
KT0201	Infrastructure, machines and equipment as assets (including types)
KT0202	Principles of optimum efficiency of machines and equipment
IAC0201	The definition of physical assets is given
IAC0202	The types of physical assets such as machines, equipment, buildings, roads and orchards/vineyards are listed and their impact on management is described
IAC0203	The life cycle of physical assets (from cradle to grave) is given along with the replacement considerations (financial, technological and other)
IAC0204	Aspects which will prolong the life span of a physical asset are identified
IAC0205	Factors which will shorten the life span of a physical asset are identified
IAC0206	The effect of wear and tear on the durability of the infrastructure, machines and equipment is described
IAC0207	The principles of scheduled maintenance is outlined
IAC0208	The principles of fault finding and troubleshooting are discussed
IAC0209	The principles of regular inspections and checks are delineated
IAC0210	The calibration of equipment and need for the accuracy is discussed
IAC0211	The breakdown of machinery and equipment is discussed in terms of corrective actions that should be taken
KM-10-KT03	Stock control (14%, 1.12 credits)
KT0301	Ordering and receiving stock
KT0302	Stock take
KT0303	Storage of stock
KT0304	Handling and storage of Agri-chemicals
IAC0301	The principles and concept of stock control are defined and outlined
IAC0302	Delivery procedures are described in terms of the impact on stock
IAC0303	Stock leaving the orchard / vineyard is discussed in respect to the necessary procedures involved
IAC0304	The Weighing/counting of stock is described

IAC0305	The cost of stock is explained
IAC0306	The reason for forecasting of stock needs and required order quantities is explained
IAC0307	Stock taking principles are outlined and explained
IAC0308	Stock taking methods and procedures are discussed
IAC0309	The principles of safe storage are explained
IAC0310	The safe storage of stock on hand is described
IAC0311	Reordering levels are defined per stock
IAC0312	Stock flow concepts are explained
IAC0313	The legislation regarding the handling and storage of Agri-chemicals are outlined
IAC0314	The safe use and storage of Agri-chemicals are described in terms of particular chemicals
IAC0315	The safe disposal of Agri-chemicals is described in terms of specific chemicals
IAC0316	Good housekeeping in the chemical store is outlined
KM-10-KT04	Food Safety (14%, 1.12 credits)
KT0401	Food safety regulations
KT0402	Elements of food safety management system
KT0403	Procedures for implementing food safety management systems
IAC0401	The factors impacting of food safety are listed and explained
IAC0402	The control mechanisms for ensuring food safety are outlined and described
IAC0403	The regulations and impact factors around food safety management is discussed
IAC0404	The elements of food safety such as traceability, MRLs, decay management and contamination control (personal health and hygiene, etc) are explained
IAC0405	The concept and principles of food safety are defined and outlined
IAC0406	Food safety hazards are identified along with the appropriate counter action
IAC0407	Food safety systems are listed and their applications described
IAC0408	Hygienic work principles and practices are described in the context where they are to be applied
IAC0409	Food safety standards and accreditation are discussed and explained
IAC0410	Regulatory requirements are listed
IAC0411	Customer requirements are discussed in terms of regulatory requirements and food safety management
IAC0412	A basic understanding of dispute procedures are demonstrated
KM-10-KT05	Quality management (14%, 1.12 credits)
KT0501	Principles of product quality
KT0502	Quality control concept, principles and practices
KT0503	Quality testing
KT0504	Sampling principles and methods
IAC0501	Principles of product quality are discussed
IAC0502	The concept of quality control is discussed
IAC0503	The role and importance of quality testing is argued
IAC0504	Sampling principles and methods are described
IAC0505	The importance of the application of laboratory results is explained
IAC0506	Factors influencing the quality of fruit are defined
IAC0507	The importance of accurate analysis of test results is emphasized

KM-10-KT06	Logistics (15%, 1.2 credits)
KT0601	Operational Logistics
KT0602	Movement of resources
KT0603	Material and resource planning
IAC0601	Logistics are defined
IAC0602	The role of logistics in food production is outlined
IAC0603	The process of determining the logistics required is described and applied to specific situations
IAC0604	The continuous assessment of logistical effectiveness is discussed
IAC0605	The importance of responsiveness and accessibility is explained
IAC0606	The movement of labour is described in terms of its impact on logistics
IAC0607	The movement of product is described in terms of its impact on logistics
IAC0608	The movement of machinery is described in terms of its impact on logistics
IAC0609	The movement of consumables is described in terms of its impact on logistics
IAC0610	The movement of transport is described in terms of its impact on logistics
IAC0611	The impact of the availability of resources is explained
IAC0612	The impact of resources allocation to maximise production is described
IAC0613	The importance of the identification of required machines and estimation of consumable on logistical planning is discussed
IAC0614	The effect of bottlenecks and other constraints are described and possible corrective actions are named
IAC0615	The importance of correct stock levels and availability on production processes are explained
KM-10-KT07	Administration, record keeping, reporting (15%, 1.2 credits)
KT0701	Principles and concepts
IAC0701	The need for administration, record-keeping and reporting is motivated and the underlying principles explained
IAC0702	Effective administration and record-keeping is described and implemented

KM-10-KT01:

Finances

(14%, 1.12 credits)

Topic Elements

The content of this chapter covers the following topic elements:

- KT0101: Financial cost control concepts and practices
- KT0102: Production cost and profit

1. KT0101: Financial Cost Control Concepts and Practices

IAC0101: Budgeting concepts are defined and the principles thereof are discussed

- A budget is a financial plan that lists expected income and expenses for a specific period, usually one season or one year.
- Budgeting is used to plan the use of resources and track how well the business is doing.
- Budgeting requires accurate estimates of requirements for inputs, labour, and equipment to manage citrus orchards throughout the season.
- A good budget is based on realistic production targets, historical farm records, and current prices.
- Budgeting helps management control costs by setting clear spending limits.
- Budgets must be prepared before the start of the production cycle so that resources are available when required.
- Regular review (and updating if necessary) of the budget helps ensure that orchard operations remain financially sustainable.

IAC0102: An understanding of concepts of profitability, sustainability and competitiveness is demonstrated

- Profitability refers to the ability of the citrus farming operation to generate income that exceeds the total cost of production.
- Profit is calculated by subtracting all production costs from the income received from the sale of citrus fruit.
- A citrus orchard is considered profitable when the revenue from fruit sales is higher than the costs required to produce and market the crop.
- Sustainability is the practice of avoiding the depletion of natural resources to maintain ecological balance.
- In farming, sustainability refers to producing fruit in a way that does not damage the environment to the point where farming is no longer possible there.

- Farms 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.
 - Excessive or poorly managed chemical use.
- In the farming business, competition and competitiveness both refer to a farm's ability to get more sales than other farms.
- Farming is only successful if farmers can sell their product in a large, global market, filled with thousands of other competitors.
- Competing on this market involves:
 - Offering the best product possible.
 - Charging the best price possible (for both growers and customers).
- Offering the best product possible involves maximising fruit quality and yield.
- Charging the best price possible involves managing production to minimise costs and maximise profits.

IAC0103: Principles of using operational budgets to prepare production plans are outlined

- Operational budgets are used to prepare production plans.
- Operational budgets provide detailed estimates of the costs associated with each production practice.
- From these estimates, foremen can calculate when production plans should occur, what equipment should be used, what inputs are needed, and how many workers are required.

IAC0104: Methods of monitoring expenditure against an operational budget are described

- Monitoring expenditure involves comparing the actual costs incurred during orchard operations with the costs that were originally planned in the operational budget.
- Production records are used to track spending by recording practices performed, inputs used, labour used, and other costs.
- Regular financial reviews, such as monthly or seasonal budget comparisons, help ensure that orchard management remains within planned limits.

self-assessment

KT0101: Financial Cost Control Concepts and Practices

Can I?	Y/N
Can I describe the purpose and content of a budget?	

Can I adhere to a budget?	
Can I interpret a budget to plan production practices?	
Can I explain the concepts of profitability, sustainability, and competitiveness?	
Can I monitor expenditure and maintain production records?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0101	Budgeting concepts are defined and the principles thereof are discussed	A1, A2, A4, A7, A8
IAC0102	An understanding of concepts of profitability, sustainability and competitiveness is demonstrated	A1, A2, A4, A7, A8
IAC0103	Principles of using operational budgets to prepare production plans are outlined	A1, A2, A3, A4, A6
IAC0104	Methods of monitoring expenditure against an operational budget are described	A1, A2, A3, A4, A6

2. KT0102: Production Cost and Profit

IAC0105: The concept of the cost value of labour is defined

- The cost value of labour refers to the total cost incurred by the farm for employing workers to carry out production practices.
- Labour costs include wages, benefits, equipment, training, and any other expenses related to employing workers.
- The cost value of labour must be considered when planning production activities to ensure that labour is used efficiently and within the operational budget.

IAC0106: Impact of internal and external variables on cost are explained

- Production costs can be influenced by variables both within the farm (internal) and outside the control of the farm (external).
- Internal variables include:
 - Labour efficiency.
 - Equipment condition.
 - Input usage.
 - Efficiency of production practices.
 - Management decisions.
- Poor planning, wastage of inputs, or inefficient production practices can increase production costs within the farm.
- External variables include:
 - Market prices for inputs and equipment.
 - Weather conditions.
 - Pest and disease outbreaks.
 - Changes in regulations.
- Understanding these variables helps the farm foreman anticipate potential cost changes and manage resources more effectively.

IAC0107: The concepts of equipment availability and reliability are discussed

- Equipment availability refers to the extent to which machinery and tools are ready for use when required for production.
- Reliable equipment ensures that production practices can be carried out on schedule.
- Equipment reliability refers to machinery and tools being able to perform their intended functions consistently without breakdowns.
- Regular maintenance and servicing help improve reliability and reduce downtime.
- Equipment that is frequently unavailable or unreliable can delay important production practices and increase labour costs.
- The foreman must ensure that equipment is inspected regularly and that faults are reported and repaired promptly.

self-assessment

KT0102: Production Cost and Profit

Can I?	Y/N
Can I define the cost value of labour?	
Can I describe production costs?	
Can I list internal variables that affect costs?	
Can I list external variables that affect costs?	
Can I ensure that equipment is available and reliable?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0105	The concept of the cost value of labour is defined	A1, A2, A3, A4, K2
IAC0106	Impact of internal and external variables on cost are explained	A1, A2, A3, A4, K2
IAC0107	The concepts of equipment availability and reliability are discussed	I1, I3, I4, I5

KM-10-KT02:

Management of Agricultural Assets

(14%, 1.12 credits)

Topic Elements

The content of this chapter covers the following topic elements:

- KT0201: Infrastructure, machines and equipment as assets (including types)
- KT0202: Principles of optimum efficiency of machines and equipment

1. KT0201: Infrastructure, Machines and Equipment as Assets (including Types)

IAC0201: The definition of physical assets is given

IAC0202: The types of physical assets such as machines, equipment, buildings, roads and orchards/vineyards are listed and their impact on management is described

- Assets are defined as any item owned by the farm business that have value, including the items that the farm uses to produce the products they sell.
- Assets include tools, pieces of equipment, pieces of infrastructure, and property.
- Assets can be broadly divided into moveable and fixed assets.
- Fixed assets are long-term assets (usually property or infrastructure) that a farm owns and uses in production.
- Fixed assets are not expected to be consumed or converted into cash any sooner than at least one year's time and cannot be realistically moved.
- Moveable assets are short-term assets (usually equipment or infrastructure) that can be moved without causing material damage to the farm or its permanent structures.
- Moveable assets tend to have a much shorter life cycle than fixed assets.
- Assets are further classified by their:
 - Use or purpose.
 - Standard amount of the asset required.
 - When and how often the asset will be used.
 - The life cycle of the asset.
 - The cost of the asset, either as price per unit or total capital expenditure.
- Common moveable assets include:
 - Vehicles (trucks, tractors, quadbikes, etc.).
 - Manipulation tools and equipment (sprayers, applicators, shears, etc.).

- Harvesting tools and equipment (clippers, bins, trailers, picking bags, etc.).
- Construction equipment (bulldozers, backhoes, graders, etc.).
- Workshop equipment (spanners, wrenches, drills, etc.).
- Office equipment (computers, printers, desks, etc.)
- Common fixed assets include:
 - Irrigation systems (pumps, filters, pipelines, etc.).
 - Water sources (reservoirs, tanks, boreholes, etc.).
 - Storage facilities (chemical storage, equipment storage, locker rooms, etc.).
 - Maintenance facilities (garages, workshops, etc.).
 - Logistics infrastructure (internal roads, parking, loading areas, etc.).
 - Security infrastructure (fencing, gates, security cameras, etc.).
 - Housing (worker accommodation, manager housing, etc.).
 - Worker health facilities (clinics, bathrooms, etc.).

self-assessment

KT0201: Infrastructure, Machines and Equipment as Assets (including Types)

Can I?	Y/N
Can I define and classify physical assets?	
Can I list common moveable assets?	
Can I list common fixed assets?	
Can I differentiate between moveable assets and fixed assets?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0201	The definition of physical assets is given	I1, I2, I3, I6, I7
IAC0202	The types of physical assets such as machines, equipment, buildings, roads and orchards/vineyards are listed and their impact on management is described	I1, I2, I3, I6, I7

2. KT0202: Principles of Optimum Efficiency of Machines and Equipment

IAC0203: The life cycle of physical assets (from cradle to grave) is given along with the replacement considerations (financial, technological and other)

IAC0204: Aspects which will prolong the life span of a physical asset are identified

IAC0205: Factors which will shorten the life span of a physical asset are identified

- The life cycle of an asset refers to the series of stages involved in the management of an asset.
- The life cycle starts with the initial identification of the need for the asset and ends with its eventual disposal or renewal.
 1. Every asset has five stages in its life cycle:
 2. Creation/Acquisition.
 3. Utilization.
 4. Maintenance.
 5. Renewal/Disposal.
- The first stage (planning) involves identifying the need for an asset, often performed when planning a new orchard or other operation.
- This planning is based on previous experience and industry recommendations.
- Planning also occurs when a current asset is reaching the end of its life cycle and must be replaced.
- Once the needed asset has been identified and all involved parties have agreed on the need for the asset, the next stage begins.
- The second stage (creation/acquisition) involves either making, purchasing, or otherwise getting the asset onto the farm.
- Depending on the asset, it can either be bought entirely (such as tools) or created on farm out of prebought material (such as constructing a fence).
- Many errors can be made during the second stage, including:
 - Acquiring or creating the wrong type of asset.
 - Acquiring or creating a low quality asset.
 - Acquiring or creating the asset too early or too late.
 - Improperly acquiring or creating the asset.
 - Acquiring or creating too much or too little of the asset.
- If an error occurs at this stage, it can affect all the other stages of the asset life cycle, sometimes only years later.
- The third stage (utilization) is when the asset is actually used.

- Often, the third stage (utilization) and fourth stage (maintenance) are combined in the asset's life cycle as they often occur at the same time, as assets are used and repaired continuously.
- These two stages are however separated as they involve different practices and often occur in smaller, repeating cycles.
- If all goes according to plan, utilization will be the longest phase of the assets' life cycle.
- The fourth stage (maintenance) involves all the work that will be done on the asset throughout its life cycle, including, but not limited to emergency repairs and scheduled maintenance.
- Maintenance must be performed regularly, by properly qualified individuals, using the right equipment, or the life cycle of the asset will be cut short.
- The final stage (renewal/disposal) involves replacing or renewing the asset when it is no longer fit for purpose.
- All assets will eventually have to be partially or fully renewed or replaced, but the length of time that this will occur in varies wildly between assets.
- Renewal and disposal ties into the first stage (planning) as the length of time the asset can be used for must be considered when selecting the asset.
- Asset renewal and disposal should be planned for, and farmers should not wait until the end of its life cycle to start looking for replacements and how to dispose of the asset.
- If an asset is vital for the proper functioning of the farm, management must ensure that replacement is planned and a proper method of disposal ready long before the asset reaches the end of its life cycle.
- Managing an assets life cycle involves using knowledge of the stages and the asset itself to extend the asset's usability as possible without losing any functionality.
- The most commonly neglected stages are proper management and initial setup or acquisition.
- Errors during the management of an asset can be caused by:
 - A lack of data.
 - Outdated policies.
 - A lack of care.
 - Human error.

IAC0206: The effect of wear and tear on the durability of the infrastructure, machines and equipment is described

- Wear and tear refers to the gradual deterioration of infrastructure, machinery, and equipment as a result of regular use over time.
- If wear and tear is not managed properly, it can lead to equipment failure, increased repair costs, and production delays.
- Monitoring the condition of equipment allows management to identify early signs of wear before severe damage occurs.
- Proper operation of machinery and use of equipment by trained workers reduces unnecessary stress on equipment and slows the rate of wear and tear.

IAC0207: The principles of scheduled maintenance is outlined

- Scheduled maintenance refers to planned servicing and maintenance activities carried out at predetermined intervals to keep machinery and equipment in good working condition.
- Maintenance schedules are usually based on the number of operating hours, seasonal use, or manufacturer recommendations.
- In citrus farming, scheduled maintenance includes tasks such as changing oil and filters, lubricating moving parts, and inspecting components.
- Scheduled maintenance helps prevent unexpected equipment failures.
- All workers should follow the maintenance schedule carefully.
- Records should be kept of all maintenance performed.
- Workers responsible for operating equipment should report any unusual noises, leaks, or performance issues immediately.

IAC0208: The principles of fault finding and troubleshooting are discussed

- Fault-finding refers to the process of identifying and diagnosing problems in machinery and equipment.
- Fault-finding requires a clear understanding of the equipment's design, components, and method of operation.
- Fault-finding should incorporate a process of elimination, isolating individual components to determine what the specific issue is.
- The fault-finding should not stop when the first fault is found, as there may be more than one fault in the equipment.
- Regular inspections of equipment and machinery is essential as part of general maintenance and equipment management.
- Many faults develop gradually and worsen over time, due to wear, corrosion, or blockage, and these faults can reduce the effectiveness of pest and disease control actions using this equipment.
- Equipment should be checked regularly and systematically according to manufacturer instructions.
- If any workers notice any issues while using the equipment, such as weak coverage, work must be immediately stopped, and the issue reported to a supervisor.
- The supervisor should issue the worker another piece of the same equipment so that work can continue, if possible.
- After issuing replacements, the equipment should be returned to the storeroom, workshop or equipment manager for further checks and repairs if needed.
- These further checks can include testing operational parameters, such as pressure, flow rate, and spray pattern, to allow for clearer identification of the specific fault.
- Visual inspections should also be performed (for physical damage, wear, blockage, etc.) of each component of the equipment in turn.
- Qualified electricians should systematically check electrical and control systems on larger equipment.
- When performing any fault finding, safety considerations must be a main concern.

- All equipment and machinery undergoing fault-finding must be turned off, depressurised, and isolated in a safe area to prevent accidents during inspection and repair.
- All of these checks, the original issue, the effects on work, possible negative results of the fault, maintenance actions, replacement issuing, costs, and workers involved, should be recorded.
- These records of maintenance and prior faults are used to predict and identify recurring issues, as repeated malfunctions often indicate underlying problems in the maintenance system or with suppliers.

IAC0209: The principles of regular inspections and checks are delineated

- Regular inspection of citrus crop protection equipment ensures that all components, including pumps, hoses, nozzles, and control systems, are functioning properly and ready for use.
- Frequent checks help to identify wear, corrosion, or damage early, preventing minor issues from escalating into major breakdowns that could disrupt spraying schedules.
- Inspections allow operators to verify that calibration settings are correct, ensuring accurate and uniform application of pesticides, fertilisers, and protective sprays.
- Regular inspections reduce the risk of chemical leaks or spills, which protects both workers and the environment from unnecessary exposure to hazardous substances.
- Checking equipment on a routine basis minimizes downtime during critical periods of pest or disease outbreaks, ensuring timely and effective crop protection.
- Inspections contribute to the longevity of machinery by highlighting maintenance needs, such as lubrication, filter replacement, or tightening of connections, before severe damage occurs.
- Regular assessment of electrical and control systems helps prevent failures that could compromise the effectiveness of automated spraying or monitoring operations.
- Routine inspections provide operators with confidence in the reliability of the equipment, allowing them to focus on efficient and precise crop protection activities.
- Identifying and addressing faults early reduces operational costs by preventing costly repairs, wasted chemicals, or lost labour due to equipment failure.
- Inspections support compliance with safety regulations and industry standards, ensuring that all equipment meets required performance and environmental guidelines.
- Regular checks enable record-keeping of equipment condition, maintenance, and repairs, which helps in planning preventive maintenance schedules and budgeting for future replacements.
- By maintaining equipment in optimal condition through regular inspections, farmers can maximize yield, protect fruit quality, and safeguard the overall profitability of citrus production.

IAC0210: The calibration of equipment and need for the accuracy is discussed

- Most agrochemicals are applied by some form of machinery or equipment which needs to be calibrated prior to application.
- This calibration ensures that the correct amount of chemical is applied to the crop, avoiding underapplication or overapplication.

- Underapplication will render the application ineffective, requiring repeated applications and wasting labour.
- Overapplication will render the application harmful to the environment or the trees, while wasting money in chemical costs.
- Overapplication may also harm workers or other people, as well as beneficial organisms in and around the orchard.
- For trunk applications and soil drenches, equipment calibration is not required, with the exception of some specialised trunk applicators.
- These applicators may require calibration and volume setting and should be done according to manufacturer's instructions.
- For all other trunk applications and soil drenches, the focus should be on accurately measuring the agrochemicals to be applied.
- Foliar applications that use spray equipment will always require calibration to ensure that the correct volume of spray material is delivered.
- The control action will only be successful if the spray material is uniformly applied in sufficient quantity to adequately cover the tree.
- Spray equipment must be calibrated correctly before it is used to apply spray material, as the calibration of the equipment will determine the amount of spray material applied.
- Spray machines vary in design and complexity but generally they consist of:
 - A pump that pumps liquid from the spray tank through nozzles.
 - Nozzles that consist of whirlers and discs.
- Whirlers determines droplet size, the angle of the spray, and a hollow or full cone.
- Discs have different sized holes which determine the amount of spray material delivered per unit of time.
- The amount of spray material delivered also depends on the pressure of the pump, expressed in kPa (kilo Pascal).
- The following information is required to complete the calibration:
 - Litres required per tree.
 - Tree spacing in row.
 - Tractor speed (for larger spray machines).
 - Number of nozzles.
 - Pump pressure.
- Calibration is based around calculating how many litres per minute each nozzle on the spray equipment must deliver to the trees.
- To calculate this, the following procedure is followed:
 1. For vehicles, calculate how many trees are passed per minute at driving speed.
 2. Look up the delivery in litres per minute per nozzle of the various combinations for whirlers and discs at various pump pressures from reference tables.
 3. Select and attach the appropriate combination of whirlers and discs.
 4. If using a tractor, the PTO speed needs to be set to the correct value.
 5. Test the coverage before application begins and recalibrate if needed.

- Knapsacks and herbicide sprayers may also have to be calibrated, depending on the type of application that required.
- The calibration of this equipment varies and must be done according to manufacturer instructions.

IAC0211: The breakdown of machinery and equipment is discussed in terms of corrective actions that should be taken

- A breakdown occurs when machinery or equipment stops functioning properly.
- Equipment breakdowns can disrupt production practices.
- When a breakdown occurs, the foreman or supervisor should immediately stop the production practice the equipment or machinery is being used for to prevent further damage or worker injury.
- The problem should be reported to management and the breakdown should be recorded.
- If appropriate, basic corrective actions such as replacing damaged parts, tightening loose components, or clearing blockages may be performed.
- If the problem cannot be fixed on the farm, the equipment should be sent to a qualified mechanic or service provider for repair.
- Temporary alternative arrangements must be made to ensure that orchard operations continue without major delays.
- After repairs are completed, the equipment should be tested to ensure that it is functioning correctly before being returned to normal use.

self-assessment

KT0202: Principles of Optimum Efficiency of Machines and Equipment

Can I?	Y/N
Can I describe the stages of an asset life cycle?	
Can I create or acquire new assets?	
Can I manage asset utilization and maintenance?	
Can I renew or dispose of assets?	
Can I define and manage wear and tear?	
Can I describe the purpose of and implement scheduled maintenance?	
Can I define and implement fault-finding and troubleshooting?	
Can I inspect equipment?	
Can I calibrate equipment?	
Can I react appropriately to equipment breakdowns?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0203	The life cycle of physical assets (from cradle to grave) is given along with the replacement considerations (financial, technological and other)	I1, I2, I4, I7, I8
IAC0204	Aspects which will prolong the life span of a physical asset are identified	I1, I2, I4, I7, I8
IAC0205	Factors which will shorten the life span of a physical asset are identified	I1, I2, I4, I7, I8
IAC0206	The effect of wear and tear on the durability of the infrastructure, machines and equipment is described	I2, I3, I4, I5, I7
IAC0207	The principles of scheduled maintenance is outlined	I2, I3, I4, I5, I7
IAC0208	The principles of fault finding and troubleshooting are discussed	I2, I3, I4, I5, I7
IAC0209	The principles of regular inspections and checks are delineated	I2, I3, I4, I5, I7
IAC0210	The calibration of equipment and need for the accuracy is discussed	I2, I3, I4, I5, I7
IAC0211	The breakdown of machinery and equipment is discussed in terms of corrective actions that should be taken	I2, I3, I4, I5, I7

KM-10-KT03:

Stock Control

(14%, 1.12 credits)

Topic Elements

The content of this chapter covers the following topic elements:

- KT0301: Ordering and receiving stock
- KT0302: Stock take
- KT0303: Storage of stock
- KT0304: Handling and storage of Agri-chemicals

1. KT0301: Ordering and Receiving Stock

IAC0301: The principles and concept of stock control are defined and outlined

- Stock control refers to the system used to manage, monitor, and record all inputs and products stored and used on the farm.
- Items which fall under stock control systems include:
 - Fertilisers.
 - Pesticides.
 - Fuel.
 - Packaging materials.
 - Spare parts.
- The purpose of stock control is to ensure that the correct quantity of stock is available when needed for production practices.
- Effective stock control helps prevent shortages that may delay production.
- Stock control also helps avoid overstocking, which can lead to unnecessary expenditure.
- Accurate stock records must be maintained to track stock levels and reviewed and updated regularly.

IAC0302: Delivery procedures are described in terms of the impact on stock

- Delivery procedures refer to the process followed when new stock items are received on the farm from suppliers.
- All delivered items must be checked against the delivery note or purchase order to confirm that the correct products and quantities have been received.
- The condition of the delivered stock should be inspected to ensure that items are not damaged, expired, or incorrect.

- Once verified, the stock should be recorded in the farm's stock control system to update the inventory levels.
- Proper documentation of deliveries helps maintain accurate stock records and financial accountability.
- Stock should be stored in the appropriate storage areas immediately after delivery to prevent loss or damage.
- Incorrect or damaged deliveries must be reported to management and the supplier for correction.

IAC0303: Stock leaving the orchard / vineyard is discussed in respect to the necessary procedures involved

IAC0304: The Weighing/counting of stock is described

- Weighing or counting stock is performed to determine the stock levels on the farm.
- Some items such as packaging materials, spare parts, or tools may be counted, while others such as agrochemicals may be weighed.
- Accurate weighing requires the use of properly maintained and calibrated scales or measuring equipment.
- Counting or weighing should be done carefully to ensure that stock records reflect the true quantities available or used.
- The foreman should supervise the process to ensure that workers follow correct procedures and avoid errors.
- The results of weighing or counting must be recorded in the farm's stock records.

IAC0305: The cost of stock is explained

- The cost of stock refers to the financial value, usually the purchase price, of stock used on the farm.
- Additional costs such as transportation, storage, and handling may also contribute to the total cost of stock.
- Damaged, expired, or lost stock can increase production costs and reduce farm profitability.

IAC0306: The reason for forecasting of stock needs and required order quantities is explained

- Forecasting stock needs involves estimating the quantity of stock required for future production.
- Forecasting includes predicting the need for agrochemicals, spare parts, fuel, packaging materials, and other stock.
- Forecasting helps ensure that sufficient stock is available for planned production practices throughout the season.
- Accurate forecasts help prevent delays in production and shortages.
- Forecasting should be based on production plans and historical usage records.

self-assessment

KT0301: Ordering and Receiving Stock

Can I?	Y/N
Can I control stock?	
Can I list common stock items?	
Can I manage stock delivery?	
Can I weigh or count stock?	
Can I calculate the cost of stock?	
Can I forecast stock needs?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0301	The principles and concept of stock control are defined and outlined	A2, A4, I6, J1, J2
IAC0302	Delivery procedures are described in terms of the impact on stock	A2, A4, I6, J1, J2
IAC0303	Stock leaving the orchard / vineyard is discussed in respect to the necessary procedures involved	A2, A4, I6, J1, J2
IAC0304	The Weighing/counting of stock is described	A2, A4, I6, J1, J2
IAC0305	The cost of stock is explained	A2, A4, I6, J1, J2
IAC0306	The reason for forecasting of stock needs and required order quantities is explained	A2, A4, I6, J1, J2

2. KT0302: Stock Take

IAC0307: Stock taking principles are outlined and explained

- Stock taking refers to the process of physically verifying the stock quantities on the farm.
- The main purpose of stock taking is to ensure that the actual physical stock matches the quantities recorded in the farm's inventory and records.
- Stock taking helps identify discrepancies such as shortages, damaged goods, or expired materials.
- Regular stock taking promotes accountability and helps prevent losses due to theft, wastage, or poor recordkeeping.
- Stock taking should be carried out at regular intervals, such as monthly, quarterly, or annually, depending on the farm's management procedures.
- During stock taking, all items must be counted or measured accurately and compared with existing inventory records.
- Any differences between physical stock and recorded stock should be reported to management and the inventory should be updated.

IAC0308: Stock taking methods and procedures are discussed

- Stock taking methods include full stock takes and cycle counting.
- Full stock takes involve counting and recording all stock in storage at once.
- Cycle counting involves performing stock takes of selected stock items regularly throughout the year rather than counting all items at once.
- Accurate measuring equipment, such as scales or measuring containers, should be used when stock must be weighed or measured.
- Stock sheets or inventory forms should be used to record the quantities counted during the stock taking process.
- Workers involved in stock taking should follow clear procedures to avoid double counting or missing items.

self-assessment

KT0302: Stock Take

Can I?	Y/N
Can I describe the purpose and methods of a stock take?	
Can I perform a stock take?	
Can I create a stock inventory?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0307	Stock taking principles are outlined and explained	A2, A4, I6, J1, J2
IAC0308	Stock taking methods and procedures are discussed	A2, A4, I6, J1, J2

3. KT0303: Storage of Stock

IAC0309: The principles of safe storage are explained

IAC0310: The safe storage of stock on hand is described

- Tools and equipment can be expensive pieces of equipment and storing them according to proper procedure is vital for ensuring they work effectively for many years.
- Proper storage is just as important as proper maintenance, as maintaining tools to a high standard then storing them in an improper way will render the maintenance pointless.
- Proper storage increases the lifespan of tools and equipment, prevents the spread of diseases, saves maintenance and tool costs, and keeps the tools in a ready-to-use condition.
- Tools and equipment must always be in good, clean condition before they are stored, as storing an unsterilised or broken piece of equipment is pointless.
- All tools and equipment must be cleaned before storage, and any soil or plant material (such as sap or bits of leaves) must be removed.
- After cleaning, tools and equipment must be sterilised and then rinsed with water and dried thoroughly.
- Drying is a major step and should not be skipped, as storing tools when wet can lead to rust, which can cause tools to become ineffective and useless over time.
- Certain tools may have special storage requirements, such as cutting tools having special covers to protect their edges, and these requirements should always be followed accordingly.
- The storeroom should be clean, cool, secure, dry, and well-organised, and designed using organisation systems such as pegboards or shelves to organise tools and equipment.
- Tools and equipment should never be stored in a way that they can damage each other by knocking against or falling onto each other.
- Even while in storage, tools and equipment must still be regularly maintained.
- Tools and equipment in storage must be regularly checked for signs of rust, wear, or damage.
- It may be necessary to grease or sharpen the tools if they have been in storage for an extended period.
- Large, dangerous tools or equipment (such as chainsaws) must be stored in a secure place, where they cannot be used or tampered with by unauthorised individuals.
- Storerooms should have secure locks on their doors, and keys should only be available to specific personnel, such as storeroom managers and foremen.
- Recordkeeping is an important part of managing tools and equipment.
- Records must be kept of the tools and equipment issued, what they were used for, the worker who used them, and in which orchard and block they were used.
- These records help if a tool or piece of equipment goes missing, as it makes it easy to identify where the tool was last used and who last used it, and thus where it is most likely to be.
- A system must be in place from which it can be identified what tools and equipment are in the storeroom, and how much of them there are available.

- An "incident" refers to an accident or a near accident at the workplace where workers were or could have been injured or killed, safety was compromised, or property was damaged.
- All incidents, especially those caused by a faulty tool or tool misuse, should be recorded.

IAC0311: Reordering levels are defined per stock

- Reordering levels refer to the minimum quantity of a stock item that must be available before a new order is placed to replenish the supply.
- The reordering level should be determined based on the rate at which the stock item is used and the time required for new supplies to be delivered.
- When stock reaches the predetermined reordering level, a new purchase order should be initiated to avoid shortages.

IAC0312: Stock flow concepts are explained

- Stock flow refers to the movement of stocks into, within, and out of the farm's storage and production systems.
- Effective stock flow management ensures that materials move through the system in an organized and efficient manner.
- Proper labelling and organisation of storage areas help maintain a clear flow of stock and reduce confusion.
- All stock movements must be recorded accurately in the stock control system.
- Good management of stock flow contributes to better resource utilization and improved operational efficiency on the farm.

self-assessment

KT0303: Storage of Stock

Can I?	Y/N
Can I describe proper storage practices for tools and equipment?	
Can I thoroughly clean, sterilise, dry, and store tools and equipment?	
Can I ensure the storeroom is secure and properly organised?	
Can I keep proper records of storage and tool use?	
Can I reorder stock when needed?	
Can I define stock flow?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0309	The principles of safe storage are explained	I1, I2, I3, I4, I8
IAC0310	The safe storage of stock on hand is described	I1, I2, I3, I4, I8
IAC0311	Reordering levels are defined per stock	A2, I6, I8, J1, J2
IAC0312	Stock flow concepts are explained	A2, I6, I8, J1, J2

4. **KT0304: Handling and Storage of Agri-Chemicals**

IAC0313: The legislation regarding the handling and storage of Agri-chemicals are outlined

- Agrochemicals are a broad categorisation encompassing a variety of chemicals used in farming, include fertilisers, pesticides, herbicides, fungicides, and growth regulators.
- There are numerous laws and regulations that govern the use of agrochemicals, and it is every grower's responsibility to be aware of and comply with these laws and regulations.
- Non-compliance with these laws and regulations can lead to serious legal and financial consequences for the farm.
- There are four main pieces of legislation that relate to agrochemicals, namely:
 - Health Act of 1977.
 - Registrar of Fertilisers Act No. 36 of 1947.
 - Farm Feeds, Agricultural Remedies and Stock Remedies Act of 1947.
 - Occupational Health and Safety Act No. 85 of 1993 and the Amendment Act No. 181 of 1993.
- All agrochemicals must be approved and registered with the Department of Agriculture (DoA) in terms of Act 36 of 1947.
- The following sections of the Occupational Health and Safety Act, 1993, are relevant to handling agrochemicals on a farm:
 - Section 10 – General Duties of Manufacturers and Others Regarding Articles and Substances for Use at Work
 - Section 17 – Health and Safety Representatives
 - Section 21 – General Prohibitions

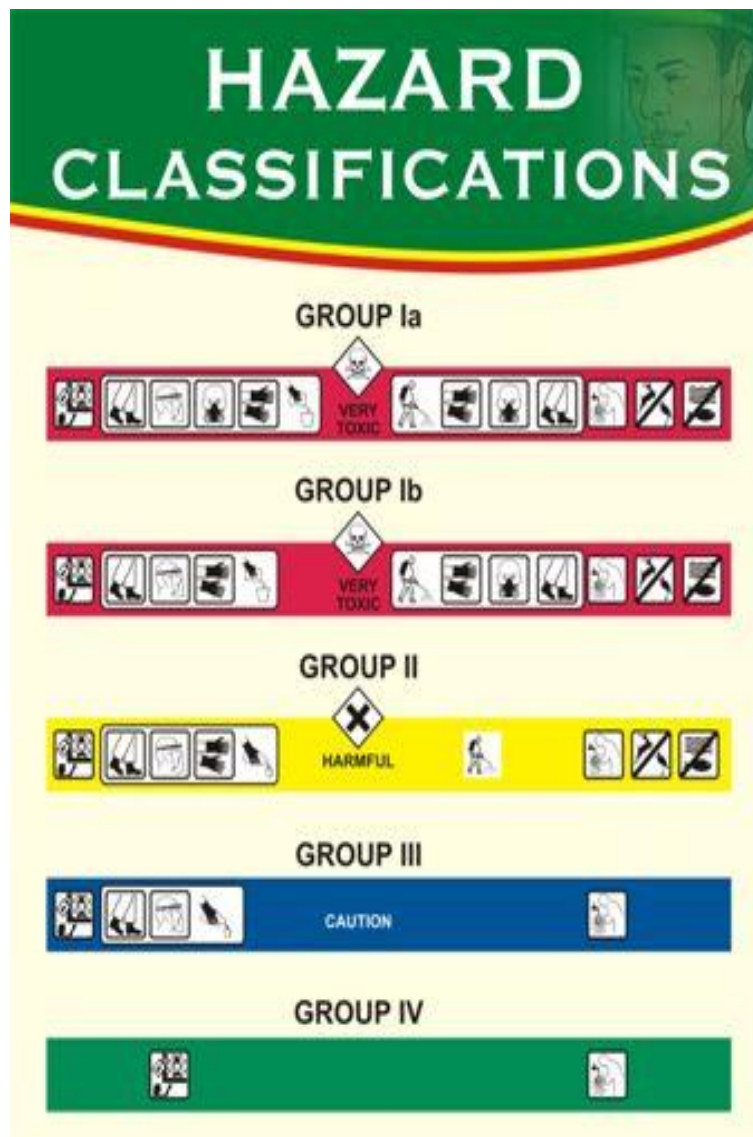
IAC0314: The safe use and storage of Agri-chemicals are described in terms of particular chemicals

IAC0315: The safe disposal of Agri-chemicals is described in terms of specific chemicals

IAC0316: Good housekeeping in the chemical store is outlined

- All agrochemicals must be considered as dangerous, and can harm workers, animals, and the environment, meaning that they must be stored carefully.
- Agrochemicals have special storage requirements, which are prescribed in detail in occupational health and safety legislation and GlobalGAP regulations.
- Storage requirements for particular agrochemical products are prescribed on the product labels.
- All agrochemicals must be stored, handled, and applied as indicated on their registration certificates and labels.
- Workers handling the products must be trained in the correct and safe handling procedures.

- Agrochemicals must be stored in a secure, well-ventilated, cool, dry building that cannot be accessed by children, animals, or unauthorised persons.
- The storeroom must have a smooth, level cement floor.
- Warning signs must be placed on the outside of the storeroom, and they must clearly show that this is an agrochemical storeroom.
- There must be easy access to washing facilities with running water, soap, and towels in the storeroom.
- An eye-flushing bottle must be available in the event that eyes are contaminated.
- The storeroom must have at least two 9kg dry-powder fire extinguishers on hand.
- No food products, animal feed or seeds may be taken into the storeroom. No eating, drinking, or smoking is allowed inside the storeroom.
- Classifying agrochemicals is a big part of storing and managing them effectively, and agrochemicals can be classified as:
 - Fertilisers (granular and liquid).
 - Plant protection products (granular, powdered and liquid).
 - Growth regulators (liquid).
 - Herbicides (liquid).
- Granular products, like fertilisers and some plant protection products, must always be stored in a separate area from liquid agrochemicals.
- Signs should be used to mark liquid products and keep them from contaminating granular products in case of breakage and spillage.
- Plant protection products are classified according to their toxicity, by way of colour bands on the product labels, demonstrated below.



- In the storeroom, plant protection products must be stored according to this classification. Red band products (groups 1a and 1b) must be stored in a separate space, which must be kept locked at all times.
- Internationally recognized symbols are used to indicate the toxicity of chemicals in groups one and two:

Group	Hazard Statement	Symbol Description	Symbol
Ia – Extremely Hazardous	Highly toxic	Skull and Crossbones	
Ib – Highly Hazardous	Toxic		
II – Moderately Hazardous	Harmful	St. Andrew's Cross	
Table 1: Symbols for Toxicity Classification			

- There must also be a separate, secure area in the storeroom where used and empty containers are kept before they are disposed of.
- These containers must not be left lying around where they can be taken and put to some other use.
- Any discarded agrochemicals must also be kept secure and disposed of safely.
- Tools and agrochemicals should not be stored in the same place, as tools may puncture the containers and some agrochemicals are corrosive and can cause the tools to rust.
- Before agrochemicals can be put in the storeroom, the storeroom has to be prepared by clearly marking different areas and cleaning the storeroom.
- Agrochemicals that are in bottles and boxes should be stored on sturdy shelves.
- Granular agrochemicals that are in bags, such as fertilisers, must be stored on pallets on the floor.
- They should not be stored directly on the floor, because they can then more easily get wet or contaminated.
- The storeroom is likely to get dirty and contaminated and needs to be cleaned regularly, and especially before receiving new stock.
- Cleaners in the storeroom should wear protective clothing while cleaning, including overalls, rubber boots and rubber gloves.
- A respirator is required when cleaning up agrochemical spills.
- All cleaning products should be used according to manufacturer's instructions.
- Pest infestations in the storeroom should be carefully monitored, and any infestation, such as by ants, cockroaches, or rats, must be immediately reported, and a pest control company contacted immediately.

self-assessment

KT0304: Handling and Storage of Agri-Chemicals

Can I?	Y/N
Can I define agrochemicals?	
Can I list the relevant legislation regarding agrochemical storage and use?	
Can I ensure housekeeping is properly performed on the chemical store?	
Can I classify agrochemicals?	
Can I store and dispose of agrochemicals appropriately?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0313	The legislation regarding the handling and storage of Agri-chemicals are outlined	A6, F2, J1, J2, L1
IAC0314	The safe use and storage of Agri-chemicals are described in terms of particular chemicals	A6, F2, J1, J2, L1
IAC0315	The safe disposal of Agri-chemicals is described in terms of specific chemicals	A6, F2, J1, J2, L1
IAC0316	Good housekeeping in the chemical store is outlined	A6, F2, J1, J2, L1

KM-10-KT04:

Food Safety

(14%, 1.12 credits)

Topic Elements

The content of this chapter covers the following topic elements:

- KT0401: Food safety regulations
- KT0402: Elements of food safety management system
- KT0403: Procedures for implementing food safety management systems

1. KT0401: Food Safety Regulations

IAC0401: The factors impacting of food safety are listed and explained

- Food safety refers to the practices used to ensure that the fruit produced on the farm is safe for human consumption and free from harmful contamination.
- Food safety is most often compromised by biological, chemical, and physical contamination.
- Biological contamination can occur through bacteria, viruses, or other microorganisms that may be present in soil, water, in or on workers' bodies, or elsewhere on the farm.
- Chemical contamination can occur if agrochemicals are used incorrectly and residues remain on the fruit.
- Physical contamination can occur when foreign objects such as stones, glass, metal fragments, or plastic enter the harvested fruit during handling or packing.
- Poor worker hygiene practices can affect food safety if workers do not follow proper hand washing and sanitation procedures.
- The quality of irrigation water used in the orchard can influence food safety if the water source is contaminated.
- Improper handling, harvesting, or transport of citrus fruit can introduce contamination or damage the fruit.
- Environmental factors such as animals entering the orchard or improper waste disposal can also increase the risk of food safety hazards.

IAC0402: The control mechanisms for ensuring food safety are outlined and described

- Control mechanisms are the procedures and practices used to prevent, reduce, or eliminate food safety risks.
- Control mechanisms include:

- Proper training of workers to ensure that they implement good hygiene practices and safe handling procedures.
- Hand washing facilities and sanitation stations to maintain good personal hygiene.
- Agrochemicals being used according to label instructions to ensure that chemical residues remain within safe limits.
- Regularly cleaning and maintain production equipment.
- Monitoring and testing irrigation water sources to ensure that they are safe and uncontaminated.
- Following clear procedures when harvesting and transporting fruit to avoid contamination or damage.
- Ensuring that records are well kept and regular inspections are performed.

IAC0403: The regulations and impact factors around food safety management is discussed

- Food safety management is guided by regulations and standards that ensure agricultural products are safe for consumers.
- Growers must follow national and international food safety regulations that control the use of agrochemicals, worker hygiene, and produce handling.
- Compliance with food safety standards is important for maintaining access to local and international markets.
- Food safety regulations may require farms to maintain detailed records of chemical applications, worker training, and production practices.
- Regulatory authorities or certification bodies may conduct audits and inspections to verify that farms follow proper food safety procedures.
- Failure to comply with food safety regulations can result in rejection of fruit shipments, financial losses, or legal penalties.
- Environmental management practices such as safe waste disposal and protection of water sources also contribute to food safety compliance.
- Effective food safety management helps protect consumer health and supports the reputation and sustainability of the citrus farming enterprise.

self-assessment

KT0401: Food Safety Regulations

Can I?	Y/N
Can I define food safety?	
Can I list the practices and factors which influence food safety?	
Can I implement control mechanisms to manage food safety?	
Can I list the regulations and impact factors that affect food safety?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0401	The factors impacting of food safety are listed and explained	A1, A3, A4, A5, A6
IAC0402	The control mechanisms for ensuring food safety are outlined and described	A1, A3, A4, A5, A6
IAC0403	The regulations and impact factors around food safety management is discussed	A1, A3, A4, A5, A6

2. KT0402: Elements of Food Safety Management System

IAC0404: The elements of food safety such as traceability, MRLs, decay management and contamination control (personal health and hygiene, etc) are explained

- Traceability refers to the ability to track citrus fruit from the orchard where it was produced right through to the final market.
- Traceability systems require accurate recordkeeping of all production and logistic practices.
- Maximum Residue Limits (MRLs) refer to the maximum amount of pesticide residue that is legally allowed to remain on fruit intended for human consumption.
- Compliance with MRLs requires that agricultural chemicals be used according to label instructions, including correct dosage and pre-harvest intervals.
- Decay management involves practices that reduce the development of fungal or bacterial decay on harvested citrus fruit, such as washing and waxing.
- Contamination control focuses on preventing physical, chemical, or biological contamination of fruit during production and handling.
- Personal health and hygiene practices, such as regular hand washing, use of protective clothing, and avoiding work when ill, help prevent contamination of citrus fruit.

IAC0405: The concept and principles of food safety are defined and outlined

- Food safety refers to the set of practices and procedures used to ensure that food products are safe for human consumption.
- The main principle of food safety is the prevention of contamination.
- Food safety in citrus farming begins in the orchard and continues throughout production and transport.
- Preventative measures are more effective than corrective actions, and growers should always try to prevent contamination rather than cure it once it has happened.
- Proper agrochemical management ensures that pesticide residues remain within safe and legal limits.
- Maintaining good agricultural practices helps ensure that citrus fruit meets required food safety standards.

IAC0406: Food safety hazards are identified along with the appropriate counter action

- Food safety hazards can be biological, chemical, or physical.
- Biological hazards include bacteria, viruses, and fungi that may contaminate fruit through soil, water, animals, or poor worker hygiene.
- A key counter action to biological hazards is maintaining proper sanitation, hygiene practices, and clean water sources.
- Chemical hazards include agrochemicals, cleaning agents and other chemicals which are used incorrectly or leave excessive residues on fruit.

- Chemical hazards can be controlled by following label instructions, observing pre-harvest intervals, and maintaining accurate chemical application records.
- Physical hazards include foreign objects such as stones, metal fragments, glass, or plastic that may contaminate the fruit.
- Physical hazards can be controlled by maintaining clean working areas and regularly inspecting harvesting equipment and containers.

IAC0407: Food safety systems are listed and their applications described

- Food safety systems are systems that are used to identify, control, and monitor food safety risks in production.
- One commonly used system is Hazard Analysis and Critical Control Points (HACCP), which focuses on identifying potential hazards and establishing control measures at critical stages.
- Good Agricultural Practices (GAP) provide guidelines for safe and sustainable farming practices that support food safety in primary production.
- Good Hygiene Practices (GHP) focus on maintaining cleanliness, sanitation, and personal hygiene in areas where food is handled.
- Food safety systems require proper documentation and record keeping demonstrating compliance with safety standards.
- Regular training of workers is necessary to ensure that food safety procedures are understood and followed.
- Internal inspections and audits help ensure that the farm continues to comply with food safety requirements.

self-assessment

KT0402: Elements of Food Safety Management System

Can I?	Y/N
Can I list and define the elements of food safety?	
Can I define and manage traceability?	
Can I define and manage MRLs?	
Can I manage decay?	
Can I ensure workers maintain their hygiene?	
Can I identify food safety and appropriate counter actions?	
Can I list and define food safety systems?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0404	The elements of food safety such as traceability, MRLs, decay management and contamination control (personal health and hygiene, etc) are explained	A1, A3, A4, A5, A6
IAC0405	The concept and principles of food safety are defined and outlined	A1, A3, A4, A5, A6
IAC0406	Food safety hazards are identified along with the appropriate counter action	A1, A3, A4, A5, A6
IAC0407	Food safety systems are listed and their applications described	A1, A3, A4, A5, A6

3. **KT0403: Procedures for Implementing Food Safety Management Systems**

IAC0408: Hygienic work principles and practices are described in the context where they are to be applied

Refer to IAC0401: The factors impacting of food safety are listed and explained.

IAC0409: Food safety standards and accreditation are discussed and explained

Refer to IAC0401: The factors impacting of food safety are listed and explained.

IAC0410: Regulatory requirements are listed

Refer to IAC0403: The regulations and impact factors around food safety management is discussed.

IAC0411: Customer requirements are discussed in terms of regulatory requirements and food safety management

Refer to IAC0403: The regulations and impact factors around food safety management is discussed.

IAC0412: A basic understanding of dispute procedures are demonstrated

Refer to IAC0403: The regulations and impact factors around food safety management is discussed.

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0408	Hygienic work principles and practices are described in the context where they are to be applied	A1, A3, A4, A5, A6
IAC0409	Food safety standards and accreditation are discussed and explained	A1, A3, A4, A5, A6
IAC0410	Regulatory requirements are listed	A1, A3, A4, A5, A6
IAC0411	Customer requirements are discussed in terms of regulatory requirements and food safety management	A1, A3, A4, A5, A6
IAC0412	A basic understanding of dispute procedures are demonstrated	A1, A3, A4, A5, A6

KM-10-KT05:

Quality Management

(14%, 1.12 credits)

Topic Elements

The content of this chapter covers the following topic elements:

- KT0501: Principles of product quality
- KT0502: Quality control concept, principles and practices
- KT0503: Quality testing
- KT0504: Sampling principles and methods

1. KT0501: Principles of Product Quality

IAC0501: Principles of product quality are discussed

- Product quality refers to the set of characteristics that determine the value and market readiness of citrus fruit.
- Important quality factors include appearance, size, colour, firmness, flavour, and juice content.
- Growers should try to be consistent, ensuring that fruit from the same orchard or block meets the same quality standards.
- Compliance with quality standards helps maintain the farm's reputation and customer satisfaction.
- Product quality is strongly influenced by production practices and handling.

self-assessment

KT0501: Principles of Product Quality

Can I?	Y/N
Can I define the principles of product quality?	
Can I manage product quality?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0501	Principles of product quality are discussed	A3, A4, A5, A6, A7

2. KT0502: Quality Control Concept, Principles and Practices

IAC0502: The concept of quality control is discussed

- Quality control refers to the systematic processes that aim to ensure that fruit meets defined standards of quality before reaching the market.
- The purpose of quality control is to prevent unsafe or low quality fruit from leaving the farm and reaching customers, ensuring consumer satisfaction and compliance with regulations.
- Quality control involves inspecting and monitoring quality characteristics and adjusting production accordingly.
- Sampling methods are used to check fruit for consistency and adherence to quality standards.
- Corrective actions such as regrading or discarding non-compliant fruit are part of quality control procedures.
- Quality control applies throughout the production process.
- Maintaining records of inspections and quality assessments helps track performance and supports continuous improvement.

self-assessment

KT0502: Quality Control Concept, Principles and Practices

Can I?	Y/N
Can I define and implement quality control?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0502	The concept of quality control is discussed	A3, A4, A5, A6, A7

3. KT0503: Quality Testing

IAC0503: The role and importance of quality testing is argued

- Quality testing is the process of evaluating fruit to determine whether it meets the required quality standards and is fit for sale.
- The primary role of quality testing is to identify substandard or defective fruit before it reaches the market.
- Quality testing ensures compliance with local and international market requirements, including safety and grading standards.
- Quality testing provides objective data that can guide production decisions.
- Quality testing allows producers to maintain consistency.
- Quality testing helps reduce post-harvest losses and prevents financial loss associated with unsellable fruit.
- Quality testing supports traceability and accountability, linking the results back to specific orchard blocks or production practices.

self-assessment

KT0503: Quality Testing

Can I?	Y/N
Can I define the purpose of quality testing?	
Can I perform quality testing?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

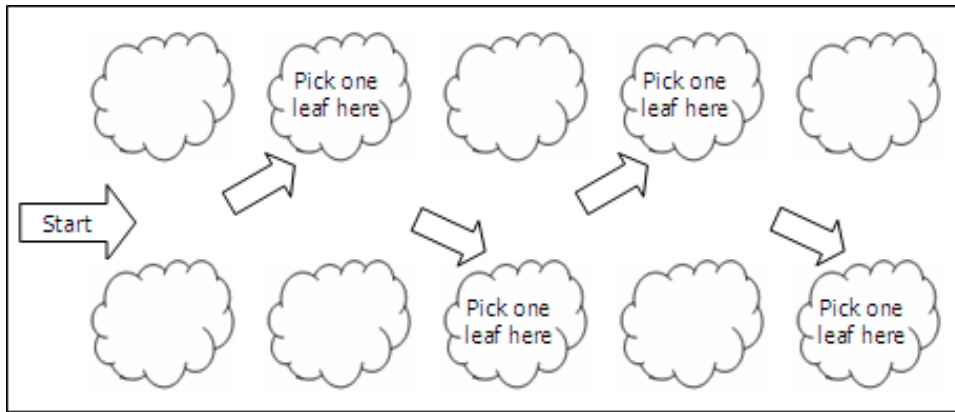
IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0503	The role and importance of quality testing is argued	A3, A4, A5, A6, A7

4. KT0504: Sampling Principles and Methods

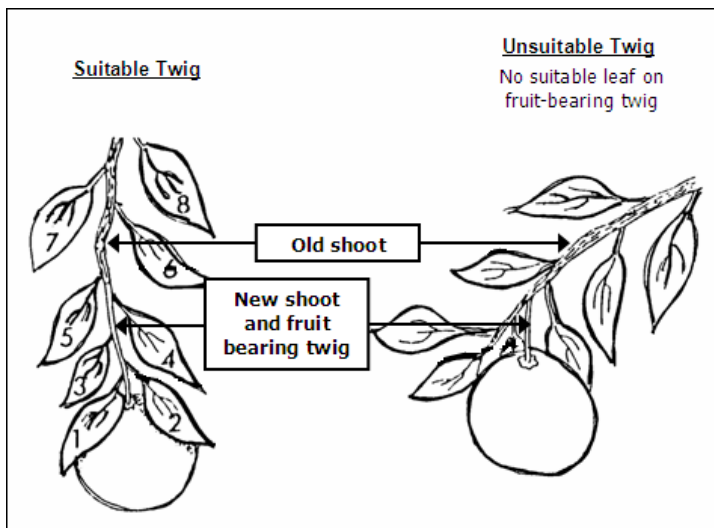
IAC0504: Sampling principles and methods are described

IAC0505: The importance of the application of laboratory results is explained

- Leaf and soil analyses are the primary tools for measuring nutritional status in citrus production.
- Soil sampling involves collecting soil and analysing it to determine soil nutrient levels and certain chemical and physical soil properties.
- Soil sampling helps guide soil preparation and corrective activities before planting.
- Soil samples are also collected after orchard establishment to monitor nutrient availability and optimise nutrient supply through fertilisation.
- Leaf sampling involves collecting leaves and analysing them to determine the nutrient status of the plant itself.
- The results of leaf and soil sampling are used to create and modify the fertilisation program.
- Fruit sampling is not used to assess nutrient status in citrus production and is only used for maturity indexing or post-harvest inspections.
- Despite fruit sampling not being used for nutrient analysis, fruit should still be visually monitored for signs of nutrient deficiencies.
- Sampling is only effective when samples represent the whole orchard rather than representing only a piece or section of it.
- A sample is defined as a smaller, manageable volume that reflects the characteristics of the bulk material being analysed.
- In citrus production, a sample is a small, representative portion of fruit, leaves, soil, or other material collected for the purpose of analysis.
- To ensure that samples are representative and provide reliable information, soil and leaf samples should be taken from the same set of trees or orchard area throughout the year.
- Two to four rows of trees should be selected to represent the orchard for sampling, and these are referred to as the index rows.
- Index rows should be marked, and all future samples for that orchard should be taken consistently from these trees.
- Leaf sampling in South Africa is typically performed between February and May, and it should be done at the same time each year for consistency.
- Sampling must be done before harvesting, particularly for early varieties like Satsuma.
- For leaf sampling, the following procedure is followed:
 1. Enter the path between two of the rows in the index block.
 2. Using clean hands or gloves, pick leaves from every second tree on the left and right, as shown below:



3. Pick 50 to 100 leaves per sample.
4. Pick only healthy, undamaged leaves.
5. Pick leaves that are between 1 and 2 metre from the orchard floor, between about the waist and head of a person of average height.
6. Pick leaves from fruit bearing twigs, as shown below:



7. Put the leaves in a new, clean plastic bag.
 8. Squeeze the air out of the bag and close it tightly.
 9. Label the sample as prescribed below.
 10. Keep the samples until they are dispatched to the laboratory in the shade or in a cool place, but do not freeze the samples.
- For soil sampling, the following procedure is followed:
1. Enter the same index block where leaf samples are taken.
 2. Identify areas under every second to fourth tree for collecting small samples, or sub-samples, which will be used to make up the eventual sample.
 3. Remove any visible plant debris from the surface of the soil but take care not to remove the topsoil.
 4. Take the sub-sample from the surface down to a depth of 30cm depth using a sterilised spade or soil auger.
 5. Take a total of between 15 and 20 sub-samples per index row.

6. Collect the sub-samples in a plastic bucket.
 7. Mix the soil in the bucket and place about 500g in a plastic bag to form the sample that will be sent for analysis.
 8. Seal the bag tightly.
 9. Label the sample as prescribed below.
 10. Keep the samples until they are dispatched to the laboratory in the shade or in a cool place, but do not freeze the samples.
- When labelling samples, the following procedure is followed:
6. Attach a label to the container, by either sticking it on or tying it on securely with string.
 7. Do not write the information directly onto the container, because even permanent marker ink rubs off during transport.
 8. Never place a label inside the bag with the sample.
 9. If the laboratory handles samples from multiple producers, the labels should contain all the details of the sender, including:
 - Name of producer
 - Address
 - Telephone number
 - Details of analysis required in case of special instructions
 - Order number, if used
 - Sample reference (such as the orchard number)
 - Type of sample
 - Date of sampling
 10. If the laboratory is on farm or only handles the grower's samples, the labels only need to include:
 - Details of analysis required
 - Sample reference (such as orchard number or location on farm)
 - Type of sample
 - Date of sampling
- The sample references, whether they are the orchard name, number, or on-farm location, must be standardised for recordkeeping practices.
- The laboratory report will contain this reference, and the sender must be able to connect the results with the relevant orchard or location.
- References should not be overly detailed and should be as simple as possible while still being standardised and informative.
- Workers, especially those involved in sampling, must be aware of the reference system used on the farm and instructed to follow it.
- Samples must be kept separate from potential sources of contamination, as contamination could alter the analysis results.

- Before packing samples for transport to the laboratory, ensure that all samples are correctly labelled and that the labels are legible.
- Check each sample against the Samples Dispatched list as they are packed.
- When packing, place the samples in a sturdy box and use packing materials such as bubble wrap or newspaper to secure and protect them during transport.
- All equipment used during sampling, including cups, spatulas, buckets, and mixing tools, must be thoroughly cleaned and sterilised before use to prevent contamination.
- Sampling equipment should be washed after use, then safely stored, inventoried, and maintained like any other farm equipment.

IAC0506: Factors influencing the quality of fruit are defined

Refer to IAC0501: Principles of product quality are discussed.

IAC0507: The importance of accurate analysis of test results is emphasized

Refer to IAC0505: The importance of the application of laboratory results is explained.

self-assessment

KT0504: Sampling Principles and Methods

Can I?	Y/N
Can I calculate when sampling for maturity indexing should begin relative to the estimated harvest date?	
Can I sample fruit effectively and accurately?	
Can I sample leaves effectively and accurately?	
Can I clean, sanitise, store, and manage sampling equipment?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0504	Sampling principles and methods are described	A3, D1, D2, D3, D4
IAC0505	The importance of the application of laboratory results is explained	A3, D1, D2, D3, D4
IAC0506	Factors influencing the quality of fruit are defined	A3, D1, D2, D3, D4
IAC0507	The importance of accurate analysis of test results is emphasized	A3, D1, D2, D3, D4

KM-10-KT06:

Logistics

(15%, 1.2 credits)

Topic Elements

The content of this chapter covers the following topic elements:

- KT0601: Operational Logistics
- KT0602: Movement of resources
- KT0603: Material and resource planning

1. KT0601: Operational Logistics

IAC0601: Logistics are defined

- Logistics refers to the planning, coordination, and management of the movement and storage of materials, products, and resources.
- In citrus production, logistics includes the transportation of stock, equipment, machinery, and the fruit itself, onto, on, around, and off the farm.
- Logistics management also involves managing the timing, handling, and organisation of these resources to ensure efficiency and minimise waste.
- Effective logistics ensures that the right products and materials are available in the right quantities at the right time and place, and that the fruit arrives at its destination safely and on time.
- Logistics integrates aspects of supply chain management, inventory control, transportation, and communication.

IAC0602: The role of logistics in food production is outlined

- Logistics plays a critical role in food production by ensuring that stock is safely delivered to the farm on time, and fruit is safely delivered to the target market on time.
- Proper logistics management ensures that the fruit makes it to its final destination (sometimes thousands of kilometres away) in a good condition, and on time.
- Logistics management supports cost control, reduces waste, and increases the overall efficiency of the food production process.

IAC0603: The process of determining the logistics required is described and applied to specific situations

- Determining logistics requirements begins with assessing the types and quantities of materials, inputs, and products that need to be moved.
- In citrus this usually involves assessing the amount of fruit that must be transported, where it is going, how it is being transported, and how soon it needs to get there.

- Logistics require the collaboration of many organisations, including growers, packers, transport companies, export agents, and buyers.
- Farm management must develop a detailed plan for each logistical operation, ensuring that resources are available and efficiently utilised.
- Contingency plans should also be developed to address unexpected delays or equipment breakdowns.

IAC0604: The continuous assessment of logistical effectiveness is discussed

- Continuous assessment of logistics involves regularly monitoring and evaluating the efficiency of the transport, storage, and handling of inputs and fruit.
- Key performance indicators such as delivery times, stock availability, equipment utilisation, and the condition of harvested fruit upon arrival at storage or market should be continuously monitored and recorded.
- Farm management should identify areas where delays, bottlenecks, or losses occur and implement corrective actions to improve performance.
- Regular feedback from workers, transport operators, and outside organisations involved in logistics helps to identify practical issues in the logistics system.
- Continuous improvement in logistics supports better resource allocation, higher productivity, and consistent fruit quality.

IAC0605: The importance of responsiveness and accessibility is explained

- Responsiveness in logistics refers to the ability of the farm to adapt quickly to changes in demand, weather, or unexpected operational challenges.
- Accessibility in logistics refers to inputs, equipment, and harvested fruit being readily available at the locations where they are needed.
- A responsive logistics system allows for timely adjustments in production or logistical practices.
- Both responsiveness and accessibility are essential to minimise losses, reduce costs, and maintain high standards of productivity and product quality.

self-assessment

KT0601: Operational Logistics

Can I?	Y/N
Can I define logistics?	
Can I implement effective logistics practices?	
Can I determine logistics requirements?	
Can I continuously assess logistics performance?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0601	Logistics are defined	A3, A4, A5, A7, A8
IAC0602	The role of logistics in food production is outlined	A3, A4, A5, A7, A8
IAC0603	The process of determining the logistics required is described and applied to specific situations	A3, A4, A5, A7, A8
IAC0604	The continuous assessment of logistical effectiveness is discussed	A3, A4, A5, A7, A8
IAC0605	The importance of responsiveness and accessibility is explained	A3, A4, A5, A7, A8

2. KT0602: Movement of Resources

IAC0606: The movement of labour is described in terms of its impact on logistics

- The movement of labour involves organising workers to carry out production practices.
- Efficiently moving labour reduces delays and ensures that critical tasks are completed on time.
- Poorly managed labour movement can create bottlenecks, such as too many workers in one area and too few in another, delaying production.
- Labour movement is tied to logistics, as transport is often required to move labour around.
- Labour movement must be coordinated with transport availability to ensure workers can reach necessary work areas promptly.
- Farm management should plan shift schedules, breaks, and transport arrangements to optimise productivity.
- Effective management of labour movement supports overall logistical efficiency, ensuring resources and activities are synchronized.

IAC0607: The movement of product is described in terms of its impact on logistics

- The movement of product refers to transporting harvested citrus fruit from the orchard to packing facilities, storage, and markets.
- Timely movement of fruit is critical to maintain fruit quality and meet market delivery deadlines.
- Delays in product movement can create storage backlogs, reduce shelf life, and increase waste.
- Farm management must monitor handling and loading practices to prevent damage to the fruit during transit.

IAC0608: The movement of machinery is described in terms of its impact on logistics

- The movement of machinery involves transporting machinery such as tractors, sprayers, irrigation pumps, and other equipment to the areas of the farm where they are needed.
- Delays in moving machinery can disrupt scheduled orchard operations, such as spraying or harvesting, and create inefficiencies.
- Managing the movement of machinery requires the careful planning of routes, timing, and availability to prevent conflicts between different tasks.
- Machinery must be maintained and inspected before movement to avoid breakdowns that could halt production.
- Proper scheduling and tracking of machinery movement improves resource utilisation and overall farm logistics.
- Inefficient machinery movement increases fuel costs, labour time, and the risk of operational delays.

IAC0609: The movement of consumables is described in terms of its impact on logistics

- The movement of consumables involves moving inputs and stock such as agrochemicals and fuel used in production practices.
- Well-managed movement of consumables ensures that workers and machinery have the materials needed to carry out tasks without delay.
- Late delivery or misplacement of consumables can halt production, costing the farm a lot of money.

IAC0610: The movement of transport is described in terms of its impact on logistics

- The movement of transport refers to the management of vehicles used to move products, machinery, labour, and consumables around the farm or to markets.
- Inefficient transport movement can cause delays, reduce productivity, and increase fuel and maintenance costs.
- Transport schedules must be coordinated with production practices to ensure a smooth logistical process.
- Tracking transport usage and routes helps optimise vehicle allocation and reduce unnecessary travel or idle time.
- Effective transport management ensures that the flow of resources and products across the farm and to external markets is smooth, reliable, and cost-effective.

self-assessment

KT0602: Movement of Resources

Can I?	Y/N
Can I describe and manage the movement of labour?	
Can I describe and manage the movement of product?	
Can I describe and manage the movement of machinery?	
Can I describe and manage the movement of consumables?	
Can I describe and manage the movement of transport?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0606	The movement of labour is described in terms of its impact on logistics	A2, A4, A8, K2, K4

IAC0607	The movement of product is described in terms of its impact on logistics	A2, A8, I8, J1, J2
IAC0608	The movement of machinery is described in terms of its impact on logistics	A8, I1, I2, J1, J2
IAC0609	The movement of consumables is described in terms of its impact on logistics	A8, I1, I2, J1, J2
IAC0610	The movement of transport is described in terms of its impact on logistics	A8, I1, I2, J1, J2

3. **KT0603: Material and Resource planning**

IAC0611: The impact of the availability of resources is explained

- Resource availability refers to having the necessary inputs, equipment, labour, and other stock accessible when required for production practices.
- Limited availability of resources can delay critical production practices, seriously impacting productivity and fruit quality.
- If resources are adequately available, this ensures that all scheduled production practices can be completed on time and to the proper standard.
- Farm management must monitor resource availability to anticipate shortages and adjust production practices if needed.

IAC0612: The impact of resources allocation to maximise production is described

- Resource allocation involves assigning available resources (such as labour, equipment, and inputs) to specific production practices.
- Efficient resource allocation ensures that high-priority practices are completed first, reducing losses and ensuring efficient production.
- Poor resource allocation can lead to idle labour, underused machinery, or insufficient application of inputs, reducing overall productivity.

IAC0613: The importance of the identification of required machines and estimation of consumable on logistical planning is discussed

- Identifying the required machinery for each task ensures that the right equipment is available at the right time, preventing delays in production practices.
- Estimating consumable needs allows farm management to ensure that all consumables are available when needed.
- Accurate planning prevents shortages that could halt operations and reduces excess stock expenditure.

IAC0614: The effect of bottlenecks and other constraints are described and possible corrective actions are named

- Bottlenecks occur when a particular resource, process, or piece of equipment slows down production.
- Common constraints which cause bottlenecks include insufficient labour, unavailable machinery, limited storage space, or delayed deliveries.
- Bottlenecks can lead to significant delays and serious financial losses to the farm.
- Corrective actions to deal with bottlenecks include redistributing tasks, increasing resource allocation, scheduling maintenance during non-peak periods, or acquiring additional equipment or labour.
- Planning alternative routes for transport and adjusting schedules can also reduce the impact of bottlenecks.
- Proactively identifying and managing constraints ensures continuous workflow and maintains productivity levels.

IAC0615: The importance of correct stock levels and availability on production processes are explained

Refer to IAC0301: The principles and concept of stock control are defined and outlined

self-assessment

KT0603: Material and Resource planning

Can I?	Y/N
Can I define resource availability and describe how it affects production practices?	
Can I effectively allocate resources including labour, equipment, and inputs?	
Can I calculate machinery and consumable requirements?	
Can I identify and manage bottlenecks?	

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0611	The impact of the availability of resources is explained	I1, I6, I8, J1, J2
IAC0612	The impact of resources allocation to maximise production is described	I1, I6, I8, J1, J2
IAC0613	The importance of the identification of required machines and estimation of consumable on logistical planning is discussed	I1, I6, I8, J1, J2
IAC0614	The effect of bottlenecks and other constraints are described and possible corrective actions are named	A8, I6, I8, J1, J2
IAC0615	The importance of correct stock levels and availability on production processes are explained	A2, A4, I6, J1, J2

KM-10-KT07:

Administration, Record Keeping, Reporting

(15%, 1.2 credits)

Topic Elements

The content of this chapter covers the following topic elements:

- KT0701: Principles and concepts

1. KT0701: Principles and Concepts

IAC0701: The need for administration, record-keeping and reporting is motivated and the underlying principles explained

IAC0702: Effective administration and record-keeping is described and implemented

- Administration, recordkeeping, and reporting are essential for the organised management of a citrus farm, enabling informed decision-making and productive efficiency.
- Accurate records provide a historical account of all production practices and support planning, budgeting, and compliance with regulations.
- Proper recordkeeping ensures accountability and compliance with regulatory requirements.
- Reporting allows management to monitor performance, identify trends, and detect problems during production.
- Reports generated from records facilitate communication between workers, foremen, and management, improving coordination and decision-making.
- Maintaining organised records supports food safety compliance, traceability, and audit readiness for market or regulatory inspections.
- Good administration involves carefully managing production and keeping up to date with all production practices.

self-assessment

KT0701: Principles and Concepts

Can I?	Y/N
Can I define the aspects of effective administration and recordkeeping?	
Can I keep accurate records of production practices?	

Can I effectively administrate production practices?

work scenario reference

To learn about how the above information is applied in practice, please look at the following workplace scenarios:

IAC Code	IAC Title	Relevant Work Scenario(s)
IAC0701	The need for administration, record-keeping and reporting is motivated and the underlying principles explained	A3, A4, A5, A6, I1
IAC0702	Effective administration and record-keeping is described and implemented	A3, A4, A5, A6, I1