

LEARNER GUIDE

Food Safety

Level 3

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Title:		Monitor and Supervise a Food Safety and Quality Management System in the Agricultural Supply Chain					
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Table of Contents

Directions	5
Introduction	6
1. Purpose.....	6
2. Learning Assumed to Be in Place.....	6
Revision of Level 2	7
1. Food Safety and Quality Risk Factors.....	7
2. Basic Food Safety Practices.....	7
3. Non-Conformance and Deviations	8
4. Health and Social Issues.....	8
5. Recordkeeping.....	8
Chapter 1.....	11
1. Introduction.....	11
2. Food Safety and Public Health.....	11
3. Food Safety and Global Trends	11
4. Food Safety Regulations and Legislation	12
4.1. The National Department of Health	12
4.2. The Department of Agriculture, Forestry and Fisheries	12
4.3. The PPECB.....	12
4.4. Commercial Standards Organisations.....	12
5. Food Safety in the Citrus Industry	13
5.1. Citrus Improvement Programme	13
5.2. Crop and Fruit Quality Management Research.....	13
5.3. Disease Management Research	13
5.4. Integrated Pest Management Research	14
6. Food Safety and Communicable Diseases	14
6.1. Mumps, Measles, German Measles and Chicken Pox.....	14
6.2. Tuberculosis, Colds and Flu	14
6.3. Headache	14
6.4. Migraine	15
6.5. Diarrhoea	15
6.6. Other Diseases and Illnesses	15
6.7. HIV and AIDS	15
7. Agriculture and the Environment.....	15
8. Dissemination of Information to Workers.....	16
9. Recordkeeping and Regulations	20
Chapter 2.....	22
1. Introduction.....	22
2. Formal Reporting	22
3. Informal Reporting.....	23
4. Responses to Non-Conformance.....	23
Chapter 3.....	25
1. The Meaning of Traceability	25
2. The Purpose of Traceability	25
3. Minimum Requirements for Traceability	26
4. Non-Compliance and Traceability	27
Chapter 4.....	28
1. Introduction.....	28

2. Good Agricultural Practices for Recordkeeping	28
3. Quality Management Systems	30
3.1. ISO	30
3.2. GlobalGAP	30
3.3. HACCP.....	31
Chapter 5.....	32
1. Introduction.....	32
2. Approach to Internal Audits	32
3. Conducting Internal Audits	33
4. Internal Audit Records.....	34
Chapter 6.....	35
1. Pre-Harvest Food Safety Principles	35
1.1. Sanitation Standard Operating Procedures.....	35
1.2. Maximum Residue Levels.....	35
2. Implementing Food Safety Principles	37
3. Recordkeeping.....	38
Bibliography	41



Directions

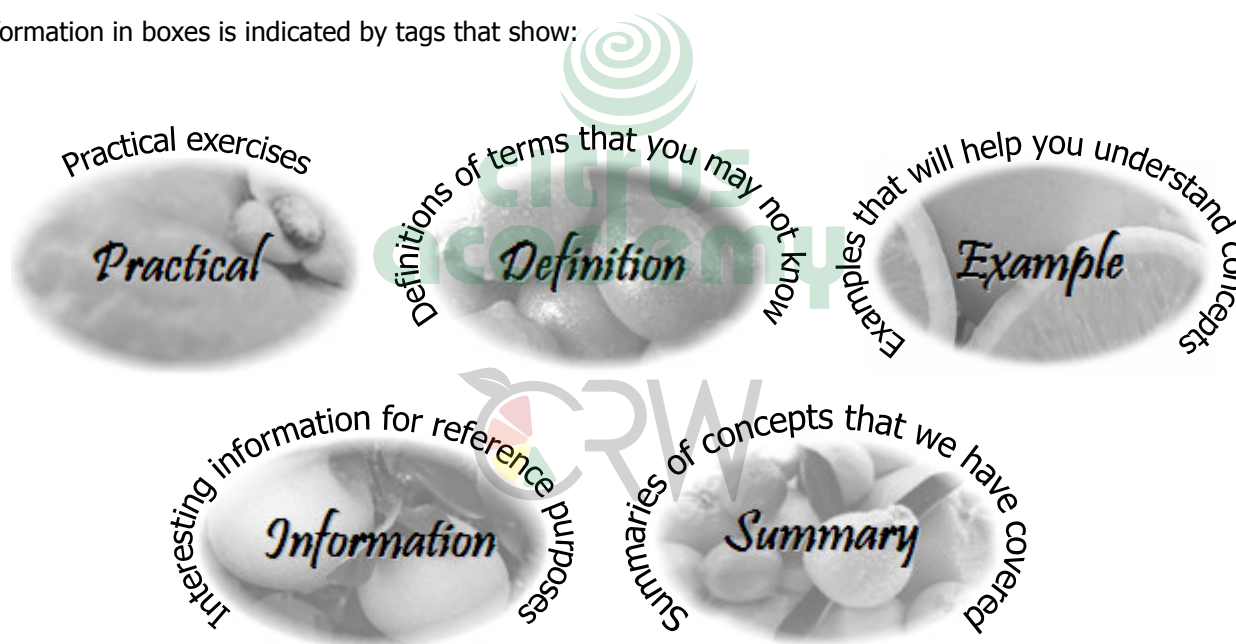
This learning material has been developed to assist the learner wishing to complete this unit standard. The guide contains all necessary learning to ensure that the learner will attain the competencies required by the unit standard.

The learner guide is accompanied by a Learner Assessment Guide. Please ensure that you have access to this guide as well.

The learner guide was designed to be used by a learner during the presentation of a skills program based on the unit standard, and to be kept afterwards by the learner for reference purposes. The learner assessment guide was designed to be completed during and after the presentation of the skills program, and forms part of the assessment process.

Although this learner guide contains all the information required for attaining competency in this unit standard, references to additional resources, both printed and electronic, are provided for further study by the learner.

Information in boxes is indicated by tags that show:



Introduction

1. Purpose

A learner achieving this unit standard will be able to monitor and supervise the implementation of food safety and quality, production, environmental and social practices, and awareness within the agricultural supply chain.

Learners will gain an understanding of sustainable agricultural practices as applied in the animal, plant and mixed farming sub-fields. This unit standard focuses on the application of food safety practices in primary agriculture.

They will be able to participate in, undertake and plan farming practices with knowledge of their environment. This unit standard instils a culture of maintenance and care for both the environment as well as towards farming infrastructure and operations.

2. Learning Assumed to Be in Place

It is assumed that the learner has successfully completed the unit standards listed below:

<i>NQF Level</i>	<i>Unit Standard Number</i>	<i>Unit Standard Description</i>
NQF2	Literacy and Numeracy	
2	116125	Apply crop protection effectively and responsibly
2	116070	Operate and support a food safety and quality management system in the agricultural supply chain

Revision of Level 2

1. Food Safety and Quality Risk Factors

- Food safety means protecting food from contamination that may occur during any stage of food production, harvesting, processing, transportation, preparation, distribution and storage.
- Food safety standards in South Africa are prescribed by the Department of Agriculture, Forestry and Fisheries (DAFF) through the Agricultural Product Standards Act (APS), which in turn underpins a number of Regulations, and ultimately Standards and Requirements applicable to all stages of the supply chain.
- The PPECB are assigned by DAFF to perform quality inspections and food safety audits. They inspect against the Standards and Requirements checklists.
- Growers are compelled to maintain food safety standards by this legislation.
- Consumers demand food that is safe to eat and that does not pose a health risk.
- GlobalGAP is the most widely used food safety accreditation system.
- The three types of food safety hazards are chemical hazards, physical hazards and biological hazards, of which chemical hazards pose the biggest risk for citrus.
- Chemical hazards refer to plant protection products (agrochemical) residues that may be on fresh produce when sold to the consumer.
- Plant protection products must be registered for use by DAFF.
- Maximum residue levels (MRLs) is the amount of a plant protection products that is still on the fruit when they are exported. MRLs are prescribed for each registered PPP by DAFF, and must be strictly adhered to.
- Physical hazards refer to items that may damage and injure fruit.
- Biological hazards are mostly invisible and include viruses, parasites, fungi and bacteria.
- Pathogens are bacteria or viruses that can cause illness in humans.
- HACCP (Hazard Analysis and Critical Control Point) is a system that assists with monitoring risk areas related to food safety.
- The seven principles of HACCP are hazards analysis, identification of critical control points, establishing critical limits, monitoring critical control points, establishing procedures for corrective action, recordkeeping and verification.

2. Basic Food Safety Practices

- Food handling practices must prevent harmful bacteria from contaminating and growing in food by controlling the conditions that bacteria grow in.
- FAT TOM stands for the environmental conditions in which bacteria grow. It stands for food, acidity, time, temperature, oxygen and moisture.

- Personal hygiene plays an important role in preventing the contamination and cross contamination of fresh food.
- Personal hygiene includes regular hand washing, wearing protective clothing, keeping nails and hair short, clean and neat, and maintaining a general good standard of hygiene.
- Farming activities produce a certain amount of waste, which must be disposed of in such a way as to not pollute the environment.
- Warning signs are used to provide information of possible food safety hazards related to a specific activity in an area or a specific substance.

3. Non-Conformance and Deviations

- Protocols are agreed upon standards and norms that will be applied by business involved in handling and shipping a fresh product.
- Deviations are the result of non-conformance or non-compliance with protocols and procedures.
- Everyone involved in handling and shipping fresh produce must be aware of the protocols and procedures that apply, and are legally responsible for the safety of the product.
- Deviations may compromise food safety and may lead to fruit quality damage.
- The response to deviations depends on the nature of the deviation or non-conformance, but should include immediate corrective action, isolating the area in which the problem occurred, determining the cause of the problem, and preventing a recurrence of the problem.
- Traceability refers to the ability to identify the origin of any given product.
- Traceability requires effective recordkeeping and every person must be aware of his responsibilities in this regard.

4. Health and Social Issues

- Every person is ultimately responsible for their own health and safety, and keeping healthy requires exercising good healthcare practices.
- Since food safety is the responsibility of every person in the supply chain, each person must be aware of the consequences of poor healthcare practices.
- HIV/AIDS and communicable diseases pose a risk to people in a food safety environment.
- The Occupational Health and Safety Act (OHSA) aims to ensure the safety and health of employees in the workplace and places a responsibility on both the employer and the employee to uphold these principles.

5. Recordkeeping

- Recordkeeping is essential for effective general management and for traceability.
- Recordkeeping systems can be computerised or manual. It is often easier to process information in and extract information from computerised systems.
- Records that are essential include employee health records, incident and accident reports, annual agrochemical application programs, agrochemical application details, agrochemical stock control and use records, skills development records, sales records, and environmental control records.



Food Safety

Food safety means protecting food from contamination that may occur during any stage of food production, harvesting, processing, transportation, preparation, distribution and storage.

Contamination

Contamination is when food comes into contact with harmful substances or micro-organisms. Cross-contamination refers to when harmful substances or micro-organisms are transferred from contaminated fruit to uncontaminated fruit through human contact or other means.

Pathogen

A pathogen is something that can cause a disease, such as a bacterium or a virus.

Incubation Period

The incubation period is the period between the time somebody is infected with a disease and the appearance of its first symptoms. It is important to know the incubation period of a disease if one wants to determine the source of the pathogen that caused it.

HACCP

HACCP stands for **Hazard Analysis and Critical Control Point**. HACCP offers a continuous and systematic approach to assure food safety, and is an internationally recognised and recommended approach, which aims to anticipate and prevent food safety hazards.

Waste

Waste refers to the "leftovers" or unwanted products from industries and other human activities.

Pollution

Pollution is the unwelcome concentration of substances that are beyond the environment's capacity to handle. These substances are detrimental to people and other living things.

Deviations

Deviations describe the difference between the actual, observed value and the expected value.

Non-Conformance

Non-conformance, or non-compliance, means a deviation from the prescribed norm, protocol, procedures or standard. Non-conformance includes failures, deficiencies, defects and malfunctions in a product or behaviour that brings about deviations.

Protocol

A protocol, in terms of food safety, means agreed upon standards that will be maintained by everyone involved in handling and shipping a fresh product.

Traceability

Traceability is the ability to trace any product back to its original source. In terms of fruit production and exports, traceability is the ability to trace back a specific carton of fruit through the entire process to the orchard in which the fruit was grown.

Communicable Disease

A communicable disease, also called an infectious disease, is any disease that spreads easily through direct or indirect contact between humans or animals. Infectious diseases can spread from person to person or from animals to humans.



Chapter 1

After completing this chapter, the learner will be able to:

Understanding basic health, social and environmental issues which relate to the agricultural environment.

1. Introduction

Food safety plays a major role in public health. People fall ill and many die as a result of eating unsafe food every year. A resolution was adopted by World Health Organisation and its member states to recognise food safety as an essential public health function, and to develop a global strategy for reducing the danger of food-borne diseases.

With South Africa being a member state of the World Health Organisation, the South African citrus industry is committed to meeting all the standards and adhere to all laws, rules and regulations that govern aspects of basic health and social and environmental issues related to agriculture in South Africa.

Every citrus grower in Southern Africa is expected to be committed to food safety as well, not only because the consumer expects that, but also for the sake of public health.

2. Food Safety and Public Health

The availability of safe food improves the health of people and is a basic human right. Safe food contributes to health and productivity, and provides an effective platform for development and poverty alleviation.

The public is becoming increasingly concerned about the health risks posed by microbial pathogens and potentially hazardous chemicals in food. Up to one third of the populations of developed countries are affected by food-borne illnesses each year, with the problem being even more widespread in developing countries. Food and waterborne diarrhoeal diseases are for example the leading causes of illness and death in less developed countries, killing an estimated 2.2 million people annually, most of whom are children.

Diarrhoea is the most common illness caused by food-borne pathogens, but other serious side effects include kidney and liver failure, and brain and neural disorders. The debilitating long-term effects of food-borne disease include reactive arthritis and paralysis. Food-borne diseases affect children, pregnant women, the elderly, and people already affected by other diseases most seriously.

Serious outbreaks of food-borne disease have been documented on every continent in the past decade, illustrating both the public health and social significance of these diseases. Outbreaks are however likely to be only the most visible aspect of a much broader, more persistent health problem.

Food-borne diseases not only significantly affect people's health and well-being, but also have economic consequences for individuals, families, communities, businesses and countries. These diseases impose a substantial burden on healthcare systems and markedly reduce economic productivity. Poor people tend to live from day to day, and loss of income due to food-borne illness perpetuates the cycle of poverty.

3. Food Safety and Global Trends

Trends towards global food production, processing, distribution, and preparation present new challenges to food safety. Food grown in one country can now be transported and consumed halfway across the

world. People demand a wider variety of foods than in the past. Consumers want foods that are not in season in their own country, and often eat away from home.

For children in schools and childcare facilities, and for elderly persons in hospitals and nursing homes, food is prepared in large quantities, and can therefore be the source of major food-borne disease outbreaks. Greater life expectancy and increasing numbers of immune-compromised people mean a larger vulnerable population for whom unsafe food is often an even more serious threat.

4. Food Safety Regulations and Legislation

4.1. The National Department of Health

In 1963 the World Health Organisation (WHO) in conjunction with the Food and Agriculture Organisation (FAO) established the Codex Alimentarius Commission. Codex Alimentarius is a Latin phrase that literally means Food Code, and the commission is often simply referred to as Codex.

Codex is an inter-governmental body with 171 member countries (March 2005). The mandate of Codex is to establish international food standards in order to protect the health of consumers, and to ensure fair practices in the food trade. Codex member countries use the Codex Alimentarius as the basis for developing their own food safety regulations and legislation.

4.2. The Department of Agriculture, Forestry and Fisheries

In South Africa, the Food Safety and Quality Assurance directorate (FSQA) of the national Department of Agriculture, Forestry and Fisheries (DAFF) is mainly responsible for legislation and regulation regarding food safety standards for exported crops.

Food safety standards are prescribed by the Agricultural Products Standards Act (APS), which in turn empowers a number of regulations that apply to specific commodities, on which Standards and Requirements are based. Food Safety is one aspect of the Standards and Requirements and applies to each commodity type in the form of checklists. The Agricultural Pests Act (Act 36 of 1983) regulates the use of plant protection products in crop production.

The directorate of FSQA of the Department of Agriculture, Forestry and Fisheries carries out its own inspections but may on occasion appoint assignees to undertake inspections at the point of sale, manufacture, packing or export to ensure that the set standards and requirements are maintained and that the benefits of classification, grading and marking reach the consumer.

4.3. The PPECB

The Perishable Products Export Control Board (PPECB) was established in 1926, and is a statutory organisation that conducts its business in terms of the Perishable Products Export Control Act 9 of 1983. The PPECB is an assignee of the DAFF, meaning that it has been mandated to conduct business on behalf of the DAFF.

The PPECB conducts, amongst others, quality assurance inspections and food safety audits. Where assignees are appointed, the Directorate carries out audit inspections to verify that the set standards are applied correctly.

Samples taken during inspection may also be sent for analysis to government laboratories. Routine analysis of various agricultural products helps to determine the composition, microbiological contamination and pesticide residue levels in food products. Chemical residue analyses and the detection of harmful organisms are of particular importance for products marketed internationally.

4.4. Commercial Standards Organisations

There are various other organisations that set standards for food safety, but they function on a commercial basis. The most important amongst these are GlobalGAP, a set of food safety and quality standards for most of the products exported to the European Union. Growers that wish to

export to these markets will most probably required by their buyer to apply for accreditation and be committed to the standards set by GlobalGAP.



Sources for Legislation and Regulations

Legislation, application forms, compliance checklists, and Standards and Requirement checklists can be downloaded from the following websites:

- Department of Agriculture www.daff.gov.za
- PPECB www.ppecb.com

5. Food Safety in the Citrus Industry

The citrus industry is concerned with ensuring that citrus growers produce a safe crop of good quality in such a way that economic returns are optimised with simultaneous regard for sustainability and minimisation of environmental impact.

Accordingly, the Citrus Growers Association (CGA) and Citrus Research International (CRI) administer the following significant methods of addressing food safety in the pre-harvest and postharvest citrus production environment, which can be linked to controlled research, management and monitoring.

5.1. Citrus Improvement Programme

The Citrus Improvement program (CIP) ensures that the plant material bought by growers is not prone to disease. Starting with the best possible quality of plant material reduces the dependence on PPPs. In evaluating cultivars the CIP addresses:

- Assessments of market needs;
- Breeding of new cultivars to meet assessed needs
- Development of better rootstocks; and
- Evaluation of cultivars and rootstocks

In addition, quarantine issues are addressed, in particular with regard to shoot tip grafting.

5.2. Crop and Fruit Quality Management Research

The Crop and Fruit Quality Management Research program enables the South African producer to meet the demanding standards set by the major export markets. This program addresses:

- Yield manipulation;
- Fruit size;
- External appearance and rind condition; and
- Internal quality

5.3. Disease Management Research

Disease management research includes various projects that address:

- Graft-transmissible diseases;
- Soil-borne diseases;
- Fruit and foliar diseases;
- Biological control;
- Packhouse procedures; and
- The cold chain

5.4. Integrated Pest Management Research

Past and current projects include Thrip, red scale, sporadic and disruptive pests, non-target effects, False Coddling Moth and fruit fly. These projects change constantly as new threats develop.

6. Food Safety and Communicable Diseases

As already discussed on previous levels of learning and in the revision exercise, the most well-known communicable diseases are:

- Mumps
- Measles
- Chicken pox
- German measles
- Influenza
- Tuberculosis (TB)
- Rabies
- Diarrhoea
- Foot and mouth disease

The diseases listed above spread in various manners. They can be transmitted between humans, between animals or from animals to humans.

The only communicable diseases that have an influence on the food safety of fresh produce are **avian (bird) flu** and **mad cow disease**. These can be passed on indirectly through fertilisers that use animal waste products, and the impact is as yet unknown.

Both communicable diseases and non-communicable diseases are important to the degree that they impact on worker health and safety. If a worker contracts either type of disease, the supervisor or employer must be informed without delay so that the worker can receive prompt treatment, and so that the spread of the disease to other workers can be prevented.

In this section examples are given of how these types of diseases should be dealt with in a pre-harvest environment to ensure optimum worker health and safety and optimum product food safety.

6.1. Mumps, Measles, German Measles and Chicken Pox

Mumps, measles, German measles and chicken pox are infectious illnesses, meaning that they can spread to other workers. Workers who have these diseases should not be allowed to work, even if they feel well enough. They should also not be allowed to interact with others until they have recovered completely.

6.2. Tuberculosis, Colds and Flu

Diseases such as tuberculosis, colds and influenza are very infectious diseases that are passed on to other people by the germs released into the air when workers cough or sneeze. These types of illnesses fall into a high risk area in terms of food product safety.

If a worker contracts any of these illnesses, the supervisor must be informed immediately. The worker must consult a doctor who will determine the severity of the illness and whether there is a risk to the safety of the food product.

6.3. Headache

Headaches are not an illness in itself, but rather a symptom of a possible illness. Headaches can be a symptom of a wide variety of illnesses, but can also be due to other factors such as stress. It is therefore important that the cause of the headache must be determined accurately.

Depending on the severity of the condition, workers may be able to interact with others if the cause of the headache is not a contagious disease. Should workers require medication to treat the condition, the medication should not cause drowsiness as a side effect, as this might be detrimental to the safety of the worker and his co-workers, and to the safety of the food product.

6.4. **Migraine**

Migraine is not classified as an illness or disease, but rather as a condition that is not contagious, but that causes severe headaches, and sometimes nausea and vomiting. For this reason, it is dangerous for food safety. Workers suffering from this condition should therefore not be allowed to work.

6.5. **Diarrhoea**

Diarrhoea is not a disease or illness in itself, but is normally a symptom of another illness that may be detrimental to food safety. The cause of the condition must therefore be determined by a doctor, who will assess the seriousness of the disease, whether it is contagious, and the risk posed to the safety of the food product.

6.6. **Other Diseases and Illnesses**

Examples of other illnesses that will not allow staff to interact with others are hepatitis and certain skin conditions.

6.7. **HIV and AIDS**

HIV, although infectious, is only infectious through contact with bodily fluids, such as blood, or through sexual transmission. It does pose a possible risk to food safety.

Extra precaution should be taken in the form of providing disposable protective gloves as part of the uniform. All staff must also be well-informed about HIV/AIDS and aware of the precautions that must be taken should the need for first aid and assisting an employee who has been injured.

7. **Agriculture and the Environment**

The most significant contribution that individual growers can make to sustainability and minimising environmental impact is to apply Integrated Crop Production (ICP) principles in conjunction with an Integrated Pest Management (IPM) system.

Plant protection products have the most significant impact on the natural environment and could potentially result in the most significant environmental degradation. Integrated pest management principles entail the complementary integration of various pest control measures into a system that strives to maximise returns, long-term sustainability, and minimisation of environmental impact.



Sources

For more on IPM principles and guidelines, the **Integrated Production Guidelines for Export Citrus Volume III – Integrated Pest and Disease Management** can be obtained from Citrus Research International (<http://www.cri.co.za>). The South African government takes a stern stance on environmental conservation and has published the legislation to govern the impact of agricultural on the environment, being Environmental Management Act 107 1998 and the Genetically Modified Organisms Act 15. These Acts can be downloaded from the website of the national Department of Agriculture, Forestry and Fisheries at www.daff.gov.za.

8. Dissemination of Information to Workers

The most important methods in which to create awareness of food safety issues amongst workers are:

- Skills development
- Periodic workshops and road shows by commodity organisations
- Awareness campaigns, incentives and disciplinary enforcement by employers
- Warning signs
- Inspections by the relevant authority

Below is an extract from the Department of Agriculture, Forestry and Fisheries checklist for compliance to food safety standards. It is a handy guideline for the types of information that should be disseminated and communicated to workers in order to meet the required standards for food safety. Please note that checklists are continuously updated and changed. Always ensure that you have the latest checklist available on the website at hand.

Section 1 – Establishment: Design and Facilities				
1.1	Location of Establishment			
1.1.1	Is the packhouse not located in an area that poses a threat to the environment and to food safety?	MINOR		
1.2	Location of Equipment			
1.2.1	Is all equipment adequately maintained and cleaned?	MINOR		
1.2.2	Is all equipment used for its intended use?	MINOR		
1.2.3	Does all equipment facilitate good hygienic practices including monitoring of control points?	MINOR		
1.3	Premises and Equipment			
1.3.1	Design and Layout			
1.3.1.1	Does the internal design and layout of the packhouse permit good food hygiene practices and protection against cross contamination of the product?	MINOR		
1.3.2	Internal Structures and Fittings			
1.3.2.1	Do surfaces of walls, partitions and floors have a smooth and impervious surface to allow for appropriate cleaning and drainage?	MINOR		
1.3.2.2	Is equipment and containers made of materials that do not impart any toxic effect on produce?	MINOR		
1.4	Containers for Waste and Inedible Substances			
1.4.1	Are all containers used as refuse bins specifically identified and suitably constructed?	MINOR		
1.5	Facilities			
1.5.1	Water Supply			
1.5.1.1	Is the water used for sanitation and process (postharvest washing, hydro-cooling, ice-cooling) purposes of drinking water quality (potable)?	MAJOR		
1.5.1.2	Where recycled water is used for process purposes, is it treated and maintained in a condition that will not constitute a risk to fresh produce?	MAJOR		

1.5.2	Drainage and Waste Disposal			
1.5.2.1	Is a drainage system provided for efficient disposal of wastewater to prevent the contamination of fresh produce or the potable water source?	MINOR		
1.5.3	Personnel Hygiene Facilities and Toilets			
1.5.3.1	Are adequate, suitable and conveniently located toilet facilities available?	MINOR		
1.5.3.2	Is a cleaning/sanitation schedule for the change rooms and toilet facilities available (facilities are cleaned/sanitised at least once per working day)?	MINOR		
1.5.3.3	Is toilet paper provided?	MINOR		
1.5.3.4	Is running cold/hot water available for washing hands after toilet use?	MINOR		
1.5.3.5	Is liquid dispensable soap provided?	MINOR		
1.5.3.6	Are disposable towels or hot air dryers provided for drying hands (normal washable towels are unacceptable)?	MINOR		
1.5.3.7	Are visible signboards directing workers to wash hands after toilet use present in strategic positions in the toilet facilities?	MINOR		
1.5.3.8	Are refuse containers/bins provided for disposal of towels (if hot air dryers are not provided)?	MINOR		
1.5.4	Air Quality and Ventilation			
1.5.4.1	Is adequate natural or mechanical ventilation provided in the packhouse?	MINOR		
1.5.5	Storage (Cleaning Chemicals; Pre-Harvest Chemicals)			
1.5.5.1	Is the storage facility for the storage of cleaning/postharvest chemicals suitable for the purpose and secure?	MINOR		
1.5.5.2	Are all chemicals properly labelled?	MINOR		
1.5.6	Food Control and Monitoring Equipment			
1.5.6.1	Where applicable, is equipment used to heat treat, cool (cold stores), store or freeze produce designed to achieve required produce temperatures as rapidly as necessary in the interests of food safety and product suitability?	MINOR		
1.5.6.2	Where applicable, are temperatures regarding this equipment (e.g., cold stores) controlled and monitored?	MINOR		
1.5.6.3	Where applicable, is all temperature measuring equipment and other monitoring equipment calibrated (records, calibration certificates/stamps)?	MINOR		
1.5.6.4	Where applicable, are cold stores maintained in a clean and sanitary state?	MAJOR		
1.5.6.5	Where applicable, does condensate and defrost water from the cooling system not drip onto fresh produce?	MINOR		
1.5.6.6	Where applicable, for various produce groups, is the humidity and air-flow in the cold stores regulated and monitored to ensure conformance to food safety and	MINOR		

	product suitability?			
Section 2 – Control of Operation				
2.1	Postharvest Chemical Treatments (Where Applicable)			
2.1.1	General			
2.1.1.1	Are only pre-harvest chemicals that are registered in South Africa used for pre-harvest chemical applications?	MAJOR		
2.1.1.2	Are certificates of competence for the technical adviser/or farmer available on the farm to demonstrate his/her competence to give advice on the selection of postharvest chemical products?	MINOR		
2.1.1.3	Are all manufacturers' label instructions followed correctly for postharvest chemical applications?	MAJOR		
Section 3 – Establishment: Maintenance and Sanitation				
3.1	Maintenance and Cleaning			
3.1.1	Is all pack line equipment/machinery surfaces (sizers, conveyors, drop boards, grading tables and wash tanks) coming into contact with produce well maintained (no injury points or broken belts) and free from flaking plaster and metal shards?	MAJOR		
3.1.2	Are cleaning chemicals used according to the manufacturer's instructions?	MAJOR		
3.1.3	Is there a cleaning schedule in place that defines the different areas and equipment to be cleaned, the frequency, responsibility and verification procedures?	MINOR		
3.1.4	Are there facilities provided for the cleaning of utensils and equipment with a supply of hot or cold water?	MINOR		
3.2	Pest Control Systems			
3.2.1	Are rodent traps present in strategic positions on the packhouse premises?	MINOR		
3.2.2	Are establishments and surrounding areas regularly examined for evidence of infestation, and any treatments recorded?	MINOR		
3.2.3	Are openings to doorways, vents, drains, in packhouse walls and windows covered with wire mesh?	MINOR		
3.2.4	Are the grounds in the immediate vicinity of the packhouse free of litter, waste and improperly stored garbage, and is grass on the packhouse premises kept short?	MINOR		
3.2.5	Are all surfaces and walls within the packhouse free of birds or other wildlife and their defecation?	MINOR		
Section 4 – Establishment: Personal Hygiene				
4.1	Health Status			
4.1.1	Are all personnel and other people suffering from infectious diseases (jaundice, diarrhoea, vomiting, fever, sore throat with fever, discharges from ears, nose and eyes) that can be transmitted through produce not allowed to enter the packhouse or handle fresh produce?	MAJOR		

4.1.2	Do workers handling produce who have sores, skin irritations or boils wear moisture proof plasters/bandages covering these skin defects?	MAJOR		
4.1.3	Do workers have access to first-aid facilities?	MINOR		
4.1.4	Is there a trained person responsible for the first-aid facility and for administering first-aid?	MINOR		
4.2	Personal Cleanliness and Behaviour			
4.2.1	Do all workers and visitors wear suitable clean protective clothing, head covering and footwear?	MINOR		
4.2.2	Do workers not wear jewellery (only flat wedding band allowed)?	MINOR		
4.2.3	Are hand washbasins or hand sanitizers present at packhouse entrances?	MAJOR		
4.2.4	Do workers and visitors sanitize their hands when entering the packhouse?	MAJOR		
4.2.5	Where hand washbasins are used, are liquid soap dispensers available?	MAJOR		
4.2.6	Where hand washbasins are used, are disposable paper towels or hot air dryers available?	MINOR		
4.2.7	Is a waste bin present for the disposal of used paper towels?	MINOR		
4.2.8	Are signboards present in strategic positions in the packhouse indicating the prohibition of eating, chewing, drinking and smoking?	MINOR		
4.3	Visitors			
4.3.1	Do visitors adhere to personal hygiene provisions in section 4.2?	MINOR		
Section 5 – Lot and Product Information / Traceability				
5.1	General			
5.1.1	Does packaging contain all the required information as specified under the Agricultural Products Standards Act of 1990?	MAJOR		
5.1.2	Is produce accompanied with information to enable the next party in the food chain to handle, display, store and prepare the product safely and correctly?	MAJOR		
Section 6 – Training				
6.1	General			
6.1.1	Are workers trained in personal hygiene?	MINOR		
6.1.2	Is personnel hygiene training records available?	MINOR		
6.1.3	Is refresher training courses given on a periodic basis (training records)?	MINOR		
6.1.4	Are workers who handle and apply plant protection products trained?	MINOR		

Table 1.1: Extract from Compliance Checklist

9. Recordkeeping and Regulations

Recordkeeping is essential for issues related to food safety such as traceability, which is one of the main requirements of food safety legislation. Traceability promotes transparency and encourages consumer confidence that fresh produce is safe for human consumption.

Traceability should make it possible to trace a fruit from where the consumer is standing with it in his hand in an overseas marketplace right back to the orchard where it was produced, and to identify the details of the processes that the fruit was subjected to from when it was a fruitlet on the tree to where it is in the hand of the consumer.

Various types of records are kept in a citrus production environment. The format of the records depends on the production environment, on the skills levels of the people responsible for recording the information, and the available resources. Recordkeeping systems can be computerised or manual. Advanced software is available that allows the grower to record all the necessary information regarding the production practices on the farm. Growers can however choose to have a manual system, where records are kept in hard copy. It is however easier and quicker to produce useful, comparative information from a computerised system.



Chapter 1

- Food safety is an essential public health obligation according to a resolution that was adopted by the World Health Organisation.
- Food-borne diseases are a major threat to public health and affect the social and economical well-being of societies.
- Global trends in food consumption mean that food is consumed far from where it is produced, and that food from a single source is consumed by a great number of people.
- The Codex Alimentarius Commission establishes international food standards to protect the health of consumers, and to ensure fair practices in the food trade, on which member countries base their national food safety legislation and regulations.
- In South Africa the Agricultural Products Act (APS Act) prescribes food safety standards, and the Agricultural Pests Act (Act 36 of 1983) regulates the use of plant protection products.
- Regulations for specific commodities are based on and empowered by the APS Act, and standards and requirement checklists are in turn based on the regulations.
- PPECB is an assignee of DAFF, and conducts, amongst others, quality assurance audits in terms of food safety regulations, and food safety audits.
- GlobalGAP prescribes a set of food safety requirements for certain agricultural products that are exported to regions where their buyers require GlobalGAP certification.
- Communicable diseases are of importance in plant production because it impacts on worker health and productivity.
- Workers that contract infectious diseases must be removed from the workplace until they no longer pose a danger to the health of other workers.
- The environmental impact and sustainability of citrus production is addressed on an industry level through the Citrus Improvement Program, Crop and Fruit Quality Management Research, Disease Management Research, and Integrated Pest Management Research.
- The most significant contribution that individual growers can make to sustainability and minimising environmental impact is by applying Integrated Crop Production (ICP) principles.
- Awareness amongst workers with regard to food safety issues are created through skills development, workshops and road shows by commodity organisations, awareness campaigns, incentives and disciplinary enforcement by employers, warning signs, and inspections.
- Checklists are handy guidelines for the information that should be disseminated to workers.
- Recordkeeping enables traceability, which should allow one to trace a fruit from where the consumer buys the fruit back to the orchard, with details of all the processes that it was subjected to in between.



Complete activities 1, 2 and 3 in the **Learner Workbook**.



Chapter 2

After completing this chapter, the learner will be able to:

Report non-conformances with respect to food safety, production, environmental, and social practices in the agricultural environment.

1. Introduction

Throughout the production process, all the role-players and stakeholders have an equal responsibility to contribute to food safety. International standards bodies and national governments can draft regulations and legislation, the industry can promote and enhance the process, and the grower can draft policies and procedures based on Good Agricultural Practice, but if the farm worker is not aware of these requirements or does not apply the principles of food safety, all of this effort is of very little value.

In general, the responsibility of the worker with regard to food safety includes:

- Keeping themselves and their workplaces clean
- Protecting food from anything that could cause harm
- Following good hygiene practices, such as washing their hands before and after handling food
- Staying alert to and aware of food safety hazards
- Following the rules for food safety in the workplace
- Following the sanitation program

Unfortunately there are always incidences where people do not conform, whether it is workers or growers. At a previous level we looked at the meanings of the terms deviation and non-conformance, also referred to as non-compliance, and at the difference between the two concepts.

It is important that action is taken quickly and appropriately once non-conformance is identified in order to ensure that food safety is not compromised and that the correct protocols are restored as soon as possible. This can be done throughout the production cycle with the help of an effective reporting system.

The reporting system should have both formal and informal aspects. All workers and employees from the lowest rank to the highest should be encouraged to report and communicate any non-conformance immediately, and to keep escalating the reporting until appropriate action is taken.

2. Formal Reporting

To develop an effective reporting system, it helps to formalise Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP) and Good Handling Practices (GHP) by applying the step-by-step procedures of HACCP to each hygiene practice.

The HACCP system has seven principles, which may be specific to HACCP, but still comprise a good general approach to food safety monitoring. The principles are:

- Hazard analysis
- Identification of critical control points
- Establishment of critical limits
- Monitoring critical control points
- Establishment of procedures for corrective action
- Recordkeeping
- Verification

Formal reports and documentation can be developed for each critical control point which would assist with highlighting non-conformance and non-compliance. This documentation would take the form of checklists and periodic pro-forma reports.

Formal reporting also results from internal and external audits related to HACCP, GlobalGAP and other GAP systems.

3. Informal Reporting

Informal reporting relies on the cooperation and integrity of every person who is involved with the production and growing of the food product. The system relies on two principles, being:

- A thorough knowledge and understanding of the procedures and protocols that applies to you workplace; and
- A tiered verbal reporting system that usually follows the chain of command in the production environment

Informal reporting entails that every person, from the farm worker to the supervisor to the manager and farm owner, are trained and educated in all the aspects of food safety, including the identification of potential hazards to food safety and the necessary procedures and protocols that surrounds food safety in their immediate place of work.

Everyone has the responsibility of constantly paying attention to deviations and non-conformance. It is important for farm owners and managers to encourage a non-punitive system of verbal reporting and respond to any reports with positive and ethical action that immediately mitigate and eliminate any risk to food safety.

4. Responses to Non-Conformance

Responses to deviations or non-conformance depend on the type, severity and circumstances of the deviation or non-conformance. The following steps should however form the basis of the response:

- Correct the problem as soon as possible.
- Isolate the area or products that were affected by the deviation or non-conformance, and take the necessary corrective action if possible.
- Determine the possible impact of the deviation or non-conformance, including the impact on the environment and on worker health and safety, and take the necessary steps to rectify or limit the damage.
- Determine the cause of the deviation or non-conformance. Possible causes may include a lack of skills or knowledge, the necessary resources not being available, technical failure, or a lack of responsibility.
- Take the necessary steps to prevent the occurrence in future.

Contingency plans for serious cases of deviation or non-conformance must be in place in the form of written procedures. Everyone must be aware of the contingency plans, and of his or her role in responding to the situation. Emergency drills, in which serious cases of deviation or non-conformance are simulated, form an essential part of preparing the workforce for such an occurrence.



Chapter 2

- Everyone involved in the production process has a responsibility towards food safety and must be aware of what is required to ensure that food is safe for human consumption.
- Non-conformance must be reported immediately and the reporting must be escalated until appropriate action is taken.
- The seven principles of HACCP are a good general approach to food safety management.
- Periodic reports and checklists must be developed for each critical control point that is identified with the specific aim to detect non-compliance and non-conformance as soon as it occurs.
- Informal reporting relies on every person having a thorough understanding of the requirements and principles of food safety and on a tiered reporting system that normally follows the chain of command.
- The response in case of non-conformance must include steps to immediately correct the problem, to isolate the area in which the problem occurred, to determine the impact of the problem and take steps to rectify the situation, to determine the cause of the problem, and to ensure that the problem does not recur.



Complete activity 4 in the **Learner Workbook**.

**citrus
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Chapter 3

After completing this chapter, the learner will be able to:

Demonstrate an understanding of the concept of traceability in the agricultural supply chain.

1. The Meaning of Traceability

Traceability is the ability to trace and follow a food product or any substance intended to be, or expected to be incorporated into, a food product through all stages of production, packing, processing, handling and distribution. Traceability refers to the completeness of the information about every step in a process chain.

Everyone that is involved in the production, harvesting, packing and shipping of fruit must be aware of the requirements of traceability and the importance of the recordkeeping that makes traceability possible.

Traceability is not only newsworthy, but investment worthy too. In order to produce export citrus, growers must comply with the requirements of the Agricultural Products Standards Act and international quality systems such as GlobalGAP, ISO and HACCP.

The **International Standardisation Organisation (ISO)** develops voluntary international standards for products and services. ISO defines traceability as the *ability to trace the history, application, or location of that which is under consideration*. This definition is quite broad and it does not specify a standard measurement for "that which is under consideration", such as a single orange or a shipment of packed citrus, a standard location size, such as an orchard, farm, or country, a list of processes that must be identified, such as pesticide applications or animal welfare, or a standard identification technology, such as pen and paper or computer.

It does not require that a drop of orange juice must be traceable to the original tree where the orange grew on, or that the wheat in a loaf of bread must be traceable to the field. It concerns itself with controlling the quality and of citrus used in a particular juice extraction plant and with guaranteeing the general consumer safety in batches of packed or processed citrus products from different farmers for different grades of citrus.

The definition of traceability is necessarily broad because food is a complex product and traceability is a tool for achieving a number of different objectives. As a result, no traceability system is complete without each grower adapting and integrating relevant GAP systems for his own operation.

2. The Purpose of Traceability

The purpose of traceability is to allow one to determine the point at which deviations or non-conformance occurred if it is found that the safety of the product has been compromised.

The basis of a good food safety program is the implementation of pre-requisite programs such as traceability-recall procedures and efficient management of chemical, physical and biological hazards.

For traceability to serve this purpose an effective recordkeeping system is required. Production practices in the orchard, harvesting practices, packing practices, procedures and protocols, and shipping practices, procedures and protocols, must all be recorded and documented in such a way that the product cannot only be traced back through the process, but also so that the point at which deviations or non-conformance occurred can be identified.

Checklists and compliance criteria have been developed as an aid and self-assessment tool for Food Business Operators (FBO's) in implementing the food safety system, which also assists with assessing the effectiveness of the recordkeeping systems. The same checklists are used by PPECB auditors to verify that the system is in place.



Sources

The PPECB issues various checklists and compliance criteria that are used on the farm, in the packhouse, during transport, by cold stores and by processing facilities. These checklists are updated regularly, and can be downloaded from the website of the PPECB (www.ppecb.com).

3. Minimum Requirements for Traceability

Standards and Requirements that are based on the APS Act require that food products are handled under hygienic conditions through all stages of the supply chain, from primary production to the point of export and that all off-farm FBOs apply to principles of HACCP along the entire food supply chain.

These standards and regulations also require recordkeeping that enables traceability, in that FBO's are able to recall or withdraw products from anywhere in the trade chain, should it pose a health risk.

Traceability is therefore a legislative requirement. Other organisations that set standards for food safety and quality, such as GlobalGAP, also have traceability as a requirement and prescribed the minimum standards for recordkeeping systems, but even if a farmer is not accredited with GlobalGAP, the legislative requirement of maintaining the necessary systems to enable traceability remains.

In terms of Good Agricultural Practice for recordkeeping, producers, packhouse managers and exporters must:

- Enable the traceability of citrus fruit at all stages of production, packing, handling and distribution.
- Be able to identify any person or supplier from whom they have been supplied with citrus fruit, or any substance intended to, or expected to be used in the production or processing of citrus fruit.
- Have in place systems and procedures to identify businesses to which their citrus fruit have been supplied.
- Ensure that adequate procedures are in place to withdraw citrus fruit from the market where such citrus fruit present a serious risk to the health of consumers.
- Immediately withdraw citrus fruit identified as presenting a serious risk to the health of consumers.
- Immediately inform the Executive Officer of the Food Safety and Quality Assurance directorate of such withdrawal.
- Immediately make available, on request, any information or documentation mentioned in terms of all points listed above.
- Have a detailed recordkeeping system that keep records of the information mentioned, as well as any other relevant information for at least five years.

4. Non-Compliance and Traceability

All the food safety and quality legislation and systems that exist are mainly concerned with maximising quality and consumer protection and there are clear cut penalties for non-compliance. The most basic penalty is simply that no produce will be accepted, shipped or sold if it does not comply with the minimum standards for traceability.

As discussed previously, traceability is a legislative requirement in terms of the Agricultural Products Standards Act. Apart from the dangers of not complying with this legislation, non-compliance also holds dire financial implications for any grower, especially in terms of export markets.

Non-compliance may lead to withdrawal from international markets and subsequent decline in consumer confidence, and even to de-certification in terms of GlobalGAP, ISO and HACCP. This means that the produce will have to be sold at inferior price to markets that are less strict.

In case of produce that does not comply with South Africa legislation in terms of such criteria as minimum residue levels, the entire crop may even be quarantined and destroyed and the grower prosecuted according to the legislation that was contravened.



Summary

Chapter 3

- Traceability depends on the completeness of the recordkeeping systems throughout the supply chain.
- ISO develops voluntary international standards for products and services and defines traceability as the ability to trace the history, application, or location of that which is under consideration.
- The purpose of traceability is to allow one to determine the point at which deviations or non-conformance occurred if it is found that the safety of the product has been compromised.
- Traceability is a legislative requirement.
- The immediate penalty for non-compliance is that produce will not be accepted, shipped or sold if it does not comply with the minimum standards for traceability.



Practical

Complete activity 5 in the **Learner Workbook**.

Chapter 4

After completing this chapter, the learner will be able to:

Perform basic recordkeeping activities on the farm.

1. Introduction

The purpose of recordkeeping is primarily to enable the farm management team to take decisions on production practices and to enable them to evaluate the effectiveness of the practices that are implemented. Recordkeeping is also essential for complying with a major food safety requirement, being traceability.

2. Good Agricultural Practices for Recordkeeping

Grower's records may come in various formats, but the minimum information that must be recorded remains the same. In the previous chapter we looked at the minimum requirements for traceability, and this summarises the types of information that a recordkeeping system must be able to keep track of.

Below is an extract from a checklist that can be used to ensure that the correct records are kept:

Record	Required / Encouraged	Grower	Exporter
Records of each field or nursery and / or cuttings house to provide a permanent record of crops and agronomic activities undertaken at those locations.	R	✓	
Risk assessment results for all new sites, taking into account the prior use of the land and all potential impacts on adjacent crops and other areas, and a management plan setting out strategies to minimise all identified risks, such as spray-drift, water contamination, etc. This can be used as justification of the suitability of the site for agricultural production.	E	✓	
Soil maps	E	✓	
Justification for soil fumigation	R	✓	
Records of the use of chemicals for the sterilisation of substrates, including location, date, type of chemicals, method of sterilisation, and operator details.	R	✓	
Records indicating the source of substrates.	E	✓	
Records to demonstrate the competence and knowledge of growers or their advisors regarding fertiliser use.	E	✓	
Records of fertiliser application, including location, date of application, type of fertiliser used, quantity of fertiliser applied, method of application, and operator details.	R	✓	
Calibration records for fertiliser application machinery.	E	✓	
Stock records for fertilisers stored on the farm.	E	✓	
A current list of all products used and approved for the crops being grown on the farm.	E	✓	

Record	Required / Encouraged	Grower	Exporter
Records to demonstrate the competence and knowledge of growers or their advisors regarding plant protection products.	E	✓	
Records of plant protection product applications, including crop name, location, date of application, trade name of plant protection product used, operator details, reason for application, authorisation, quantity of plant protection product used, application machinery and re-entry time.	R	✓	
Calibration records for machinery used to apply plant protection products.	R	✓	
Records of calculations to determine the correct quantity of plant protection product for the crop to be treated, and the proposed treatment type.	E	✓	
An inventory of plant protection products kept in the crop protection store, including expiry dates.	E	✓	
Justification for the type of postharvest treatment utilised.	R	✓	
A current list of all postharvest treatment products stored on the farm.	R	✓	
Records to demonstrate the competence and knowledge of growers or their advisors regarding postharvest treatment products.	E	✓	
A list of all possible waste products in all areas of the farm business.	E	✓	
A list of all potential sources of pollution.	R	✓	
A waste and pollution management plan to avoid or reduce wastage and pollution.	E	✓	✓
A risk assessment and action plan regarding worker health and safety.	R	✓	✓
Training records for all training undertaken on- or off-site for all staff.	R	✓	✓
Records of the use of First Aid devices, including device or product used, patient treated, date of treatment and reason for treatment.	E	✓	✓
Records of protective clothing and equipment issued to workers.	E	✓	✓
A conservation management plan aiming at enhancing biodiversity on the farm.	E	✓	
Results of a baseline audit to help understand existing animal and plant diversity on the farm.	E	✓	
An energy management plan to improve the efficiency of energy use.	E	✓	
Records of permissions to plough virgin soil.	R	✓	
Records of genetic contamination incidents.	R	✓	
Records of insect and disease incidents.	E	✓	

Record	Required / Encouraged	Grower	Exporter
Results of water analysis, at least on an annual basis, including all water used for irrigation and fertigation purposes.	E	✓	
Results of internal audits regarding compliance to this code of practice.	R	✓	
Plantation inputs	R	✓	
Plantation yield	R	✓	
Water used for irrigation, fertigation and crop protection purposes.	R	✓	
Marketing statistics	R	✓	
Nature conservation permits	R	✓	✓
Supplier records (PUK codes, Nature Conservation Permits, Signatory to this code of practice, other certifications held).	R		✓
BEE: sourcing of material from BEE companies.	E	✓	✓
Assistance to BEE independent harvesters.	E	✓	
Annual SAPPEX Questionnaire	R	✓	✓
Planting Records	R	✓	
Monthly Export Statistics	R	✓	✓

Table 4.1: Extract from Recordkeeping Checklist

3. Quality Management Systems

We have already referred to some of the better known quality management systems available. These systems generally comply with the legislative requirements, and furthermore do not only enhance the quality and standard of the produce, but ensure the best possible level of food safety.

3.1. ISO

ISO (International Standardisation Organisation) is a global network that identifies the International Standards that are required by business, government and society, develops them in partnership with the sectors that will put them to use, adopts them by transparent procedures based on national input, and delivers them to be implemented worldwide.

ISO standards reflect an international consensus from the broadest possible base of stakeholder groups. Expert input comes from those closest to the needs for the standards and also to the results of implementing them. In this way, although voluntary, ISO standards are widely respected and accepted by public and private sectors internationally.

ISO is the world's leading developer of international standards. ISO standards specify the requirements for state-of-the-art products, services, processes, materials and systems, and for good conformity assessment, managerial and organisational practice. ISO standards are designed to be implemented worldwide.

3.2. GlobalGAP

GlobalGAP started as EurepGAP in 1997 as an initiative of retailers belonging to the Euro-Retailer Produce Working Group (EUREP). It has subsequently evolved into an equal partnership of agricultural producers and their retail customers. Their mission is to develop widely accepted standards and procedures for the global certification of Good Agricultural Practices (GAP).

It is possible for producer organisations to seek an independent and transparent recognition of equivalence with the GlobalGAP standards and procedures through a benchmarking system thereby facilitating global trade and aiding the harmonisation of technical criteria.

GlobalGAP provides the tools to objectively verify best practice in a systematic and consistent way throughout the world. This can be achieved through the protocol and compliance criteria. GlobalGAP's scope is concerned with practices on the farm, once the product leaves the farm they come under the control of other codes of conduct and certification schemes relevant to food packing and processing. In this way, the entire chain is assured, right through to the final consumer.

3.3. HACCP

HACCP is a commonsense approach designed to identify and control food safety hazards, and monitor the controls established. It depends on self-regulation by individual growers through preventative management with the oversight of regulatory agencies.

We have already discussed this system in learning material on previous levels and will look at the step-by-step implementation of such a plan in Chapter 6.

Chapter 4

- Recordkeeping is essential to traceability.
- Checklists are available to ensure the correct records are kept.
- Quality management systems that are commonly used are ISO, GlobalGAP and HACCP.
- ISO reflects international consensus on the standards that are required by governments, business and society.
- GlobalGAP aims to develop widely accepted standards and procedures for the global certification of Good Agricultural Practices (GAP).
- HACCP is a commonsense approach designed to identify and control food safety hazards, and monitor the controls established.



Summary



Practical

Complete activities 6 and 7 in the **Learner Workbook**.

Chapter 5

After completing this chapter, the learner will be able to:

Demonstrate a basic understanding of internal audits in the agricultural environment.

1. Introduction

Internal audits form an integral part of any quality and food safety management system. The purpose of an internal audit is to ensure that the processes and systems that make up the quality and food safety management system function as there were intended to, and that the protocols and standards that have been developed and set out for each process and system are actually being applied and maintained. The implementation of policies and procedures to regulate the quality management system are verified during an internal audit.

Typically, conducting internal audits is an accreditation requirement for on-farm quality management systems. For example, for GlobalGAP accreditation internal audits must be conducted in accordance with GlobalGAP prescriptions. Internal audits are also a management tool, however, that enables management to monitor the efficiency of production systems and to be alerted to areas where adjustments and improvements are required.

2. Approach to Internal Audits

An organisation's approach to internal audits consists of the policies and procedures that govern its internal audit functions, including auditing schedules. The audit schedules of smaller institutions are generally not as formal and complex as those of larger institutions.

There are no hard and fast rules that prescribe exactly how internal audit systems for food safety should be designed and executed, although commercial quality management systems, such as GlobalGAP and ISO, prescribe the manner in which internal audits ought to be conducted. Thus the approach to conducting an internal audit is often closely related to the quality management system that is implemented in the production process. If HACCP is used as the basis for the quality management system, the internal audit is designed to address the critical control points that are identified in the system.

An internal audit can therefore take many forms, depending on the nature of the process or system that is being audited and on how critical the process or system is. However, there are certain common elements that occur in all internal audit systems, being:

- An audit charter;
- A risk assessment process to describe and analyse the risks inherent in a given line of business;
- An audit plan detailing internal audits budgeting and planning processes;
- An audit cycle that identifies the frequency of audits;
- Audit work programs that set out for each audit area the required scope and resources;
- Written audit reports;
- Requirements for audit work paper documentation;
- Follow-up processes; and
- Professional development programs

The audit work schedule prescribes how regularly audits are conducted, which will again depend on the type of system or process being audited, the risk of food safety being compromised and the outcomes of previous audits on that system or process.

Internal audit plans and schedules must be dynamic, and management must be able to make changes to the program depending on circumstances. It must however be observed that there is a minimum requirement for internal audits in terms of regularity – just because a specific system seems to be functioning well and has never presented a risk, it does not mean that it can now be audited only once a year or at the whim of management.

All systems and processes that may pose a risk to food safety and quality must be included in the internal audit and must be audited on a regular basis.

3. Conducting Internal Audits

Once the elements of the internal audit system have been developed the persons responsible for conducting internal audits are identified and the necessary resources are made available.

Assuming that the above is in place, conducting an internal audit mostly includes the following steps:

- Measuring and monitoring
- Evaluation
- Reporting

Taking corrective action if the findings of the internal audit indicate that a system or process is outside critical limits or approaching critical limits is generally not part of the internal audit, but a necessary and critical management action that follows on the internal audit.

In deciding upon the appropriate corrective action, management should take into account additional information that was not generated by the audit. When this process or system is next audited, one of the elements of the follow-up audit should be to verify that the corrective action has been implemented.

Conducting an internal audit is best described by way of an example. In the example below, a HACCP based quality management system is used.



Conducting an Internal Audit

The farm ABC Citrus produces 700 tonnes of Navels per annum. In January of 2004, the management drafted a policy and procedure manual for integrated production practices. One of the procedures pertains to protocols and application methods of plant protection products according to a set spray program, with the aims of controlling pests and diseases effectively and of avoiding plant protection product residues above the MRL.

The internal audit schedule prescribes that spot checks must be done on 25% of all spray actions per annum. The internal audit is performed by the farm manager and records of his findings are kept and reported accordingly.

Year	Internal Audit Findings	Additional Information	Management Action
2004	• Ten audits performed • Nine out of ten times the application method was appropriate for the type of pesticide applied • Application protocols were followed correctly eight out of ten times	• Yield: 710 tonnes • Export pack-out: 82% (60% 1st grade) • No rejections for exceeding MRLs	• Reduce internal audits to 10% of all spray actions per annum • No additional staff training required

2005	• Four audits performed • Two out of four times the application method was appropriate for the type of pesticide applied • Application protocols were followed correctly one out of four times	• Yield: 695 tonnes • Export pack-out: 73% (40% 1st grade) • One rejection for exceeding MRLs	• Increase internal audits to 30% of all spray actions per annum • Undertake a refresher training course for all spray pump operators
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4. Internal Audit Records

Recordkeeping is an essential element of an internal audit system. The policies and procedures around recordkeeping are developed as part of the policies and procedures of the system.

Production records are kept as a matter of course for all the systems and processes that is implemented on a farm, whether those records are related to food safety quality management systems or not. Internal audit records are kept in addition to production records, and focuses on the specific actions and measurements that were taken during an internal audit.

Checklists are often used to conduct internal audits, which allow the auditor to evaluate every aspects of the process or system. Checklists for each audit are kept on record, and the information is processed and reproduced in an audit report that contains the findings of the audit, similar to that in the example above.

An example of such a checklist is the *Standard Operating Procedure (SOP) for Sampling and Analysis of Agricultural Products of Plant Origin to Determine Agrochemical Residue Levels as part of Export Inspection*. This checklist can be downloaded from the website of the PPECB at www.ppecb.co.za.

academy



Chapter 5

- Internal audits aim to monitor and probe the integrity of any quality management system continuously.
- There are no specific rules for internal audits, but it is closely related to the type of quality management system that is in place.
- Regardless of the size of the entity or the approach to internal audits, there are key elements that must be included in all internal audit systems.
- Conducting an internal audit mostly includes measuring and monitoring, evaluation, and reporting.



Complete activity 8 in the **Learner Workbook**.

Chapter 6

After completing this chapter, the learner will be able to:

Operate food safety and quality principles as related to the agricultural supply chain.

1. Pre-Harvest Food Safety Principles

Food safety practices are aimed at preventing direct and indirect contamination of food that is meant for human consumption, and at enabling traceability. Specific attention is given to monitoring plant protection products to ensure that no unsafe residues are found in or on the food product.

1.1. Sanitation Standard Operating Procedures

An implementation plan is developed to monitor Sanitation Standard Operating Procedures (SSOP), which has been designed to eliminate the risk of food contamination. Sanitation Standard Operating Procedures that must be monitored include:

- Safety of water (including ice) that comes into contact with food or food contact surfaces.
- Condition and cleanliness of food contact surfaces, including utensils, gloves, and outer garments.
- Prevention of cross-contamination from unsanitary objects to food, food-packaging material, and other food-contact surfaces, including utensils, gloves and outer garments, and from raw product to cooked product.
- Maintenance of hand washing, hand sanitising, and toilet facilities.
- Protection of food, food processing-packaging materials, and food contact surfaces from adulterants, such as lubricants, fuel, pesticides, other unsafe compounds, and chemical, physical and biological contaminants.
- Proper labelling, storage, and use of toxic compounds.
- Control of employee health conditions that could contaminate food, food-packaging materials, and food-contact surfaces.
- Exclusion of pests from the food plant.

1.2. Maximum Residue Levels

One of the most important documents related to food safety in the pre-harvest environment is related to current maximum allowable residues (MRLs) for the fruit product produced. All farming activities and management planning should take this document into account.

Maximum residue levels are closely related to pre-harvest intervals (PHIs), also called withholding periods. The pre-harvest interval for any plant protection product is the time period between application and harvest that should ensure that the residue level at harvest will not exceed the MRL.

A document detailing the maximum allowable residues and pre-harvest intervals for all plant protection products that are used in citrus production, called the Recommended Usage Restrictions document, is published periodically by the Citrus Growers Association.

The purpose of these restrictions is to ensure compliance with residue tolerances in the countries to which Southern African citrus is exported. The recommendations on container labels are based on the current registrations of plant protection products, which must be adhered to at all times in terms of the SA Act 36 of 1947. However, the requirements of importing countries have made it necessary to introduce further restrictions.

Due to the multiple fruit set pattern of lemons, plant protection products may only be used as specified during the first spring blossoming and fruit set period. Special caution should be exercised to ensure that pesticides applied to protect later sets do not result in unacceptable residues on more mature fruit remaining on the trees from earlier sets.

The following general requirements are applicable to the use of plant protection products on all cultivars:

- Growers should keep MRL and PHI documents handy and consult it before any application of plant protection products.
- Application done in accordance with label indications will in many instances not ensure that export requirements are met. The restrictions specified in Recommended Usage Restrictions documentation are applicable in addition to the label requirements.
- The withholding periods specified on product labels provide an indication of the ability of treatments to conform to South African residue levels. Since overseas requirements are generally more strict these withholding periods are not adequate unless specifically mentioned in this document.
- These restrictions apply to the period during which fruit is present on trees, between blossom and harvest, and not to the period between harvest and the onset of blossom, during which time standard label requirements apply.
- All usages apply to normal blossom situations. Under conditions where blossoming occurs over an extended period, a more conservative approach must be adopted. Under these conditions, treatments should be timed according to the early portion of the blossom.
- Particular attention must be given to ensuring that spray machinery is calibrated to apply the correct spray volumes in relation to tree size and that spray operators are trained in the handling and application of plant protection products.
- All treatments must be applied at the registered concentrations.
- Alternation of products, where applicable with reference to the restrictions, will reduce the risk of excessive residues of any one chemical and will also reduce selection pressure for resistance.
- Additional restrictions in documentation do not necessarily provide an indication of the compatibility of the products with integrated pest management and good agricultural practice.
- The addition of oil to a treatment, if not registered as such, should be avoided as this may increase the residue level.
- All exporting growers should keep accurate spray records so that in the event of exceeding MRLs the reasons can be determined. These records should be retained in safe-keeping for at least three years.

- Growers are strongly urged to abide by these restrictions to minimise the risk of residue tolerances being exceeded. However, it must be noted that no absolute guarantee can be given that even by following these guidelines export residue tolerances will in all instances not be exceeded.



Sources

Current copies of the Maximum Allowable Residue Levels document can be downloaded from the CGA website at www.cga.co.za.

Suggested HACCP Plans have been developed to act as a guide for drawing up HACCP flow charts and identifying hazards, and can be downloaded from the PPECB website at www.ppecb.co.za.

2. Implementing Food Safety Principles

Various methods are used in practice to implement food safety principles, which must form an integral part of the production management of any farm. The principles of HACCP provides a sound implementation strategy and we will use it here as an illustration.

At previous levels, we looked at the principles of HACCP. In the table below, the principles are listed with a description with each, together with an example of how it will be applied in the implementation of food safety principles. The example we will use is in the implementation of observing maximum residue level restrictions.

<i>Principle</i>	<i>Description</i>	<i>Example</i>
Hazard analysis	All chemical, physical and biological hazards that may occur at every point during a process are identified.	High chemical residues on fresh fruit when it is consumed.
Identification of critical control points	Points at which control can be applied and food safety hazards can be prevented, eliminated or reduced to acceptable levels are identified.	• Crop protection program development • Spray material measurement and mixing • Spray material application
Establishing critical limits	Measurable preventive measures are identified and critical limits, being the operational boundaries for the CCPs, are set.	• Critical limits as per PHI and MRL documentation • Critical limits as per spray program • Calibration and tractor speed as prescribed
Monitoring critical control points	A planned sequence of measurements or observations to ensure the product or process is in control and critical limits are being met is established.	• Verification of crop protection program before implementation • Recording of mixing and measurement, proper training of operator • Proper training of operator, monitoring by supervisor, recording of calibration and application

<i>Principle</i>	<i>Description</i>	<i>Example</i>
Establishing procedures for corrective action	Should loss of control occur, definite steps are put in place to correct the process.	• Redevelop crop protection program • Safely discard incorrectly mixed or measured spray material • Discontinue spray application immediately, record details of trees or orchard sprayed incorrectly, monitor residue levels, disqualify fruit for export if necessary
Recordkeeping	Preparation and maintenance of a written HACCP plan, together with other documentation, such as all records generated during the monitoring of each CCP and notations of corrective actions taken.	• Written crop protection program • Mixing and measuring records • Application records
Verification	Verification includes documenting scientific or technical validity of the hazard analysis, adequacy of the CCP's and effectiveness of the HACCP plan, and periodic revalidation using independent audits or other verification procedures.	• Verification of crop protection program by consultant • Monitor residue levels • Monitor residue levels

Table 6.1: Application of HACCP Principles

3. Recordkeeping

Recordkeeping has been discussed as it relates to traceability and other aspects of food safety and, as has been said before, it forms an integral part of production management.

Recordkeeping is essential not only because it is required by legislation and standards systems, such as GlobalGAP, but mainly because it provides the farm management with an essential management tool. If you cannot measure, you cannot manage, and if you do not keep records, you cannot measure.

Recordkeeping systems come in many shapes and forms. They can be computerised or paper-based. They can be self-designed and -developed or sophisticated software can be used that is developed specifically for keeping track of all farming activities.

But no matter what shape or form the recordkeeping system takes, the information that it must be able to store, process, and reproduce remains the same.

As an example, the following records have to be kept for agrochemical usage:

- Records of each field or nursery and/or cuttings house to provide a permanent record of crops and agronomic activities undertaken at those locations.
- Risk assessment results for all new sites, taking into account the prior use of the land and all potential impacts on adjacent crops and other areas, and a management plan setting out strategies to minimise all identified risks, such as spray-drift and water contamination. This can be used as justification of the suitability of the site for agricultural production.
- Soil maps.

- Justification for soil fumigation.
- Records of the use of chemicals for the sterilisation of substrates, including location, date, type of chemicals, method of sterilisation, and operator details.
- Records indicating the source of substrates.
- Records to demonstrate the competence and knowledge of growers or their advisors regarding fertiliser use.
- Records of fertiliser application, including location, date of application, type of fertiliser used, quantity, of fertiliser applied, method of application, and operator details.
- Calibration records for fertiliser application machinery.
- Stock records for fertilisers stored on the farm.
- A current list of all plant protection products used and approved for the crops being grown on the farm.
- Records to demonstrate the competence and knowledge of growers or their advisors regarding plant protection products.
- Records of plant protection product applications, including crop name, location, date of application, trade name of plant protection product used, operator details, reason for application, authorization, quantity of plant protection product used, application machinery and re-entry time.
- Calibration records for machinery used to apply plant protection products.
- Records of calculations to determine the correct quantity of plant protection product for the crop to be treated, and the proposed treatment type.
- An inventory of plant protection products kept in the crop protection store, including expiry dates.
- Justification for the type of postharvest treatment utilised.
- A current list of all postharvest treatment products stored on the farm.
- Records to demonstrate the competence and knowledge of growers or their advisors regarding postharvest treatment products.
- A list of all possible waste products in all areas of the farm business.
- A list of all potential sources of pollution.
- A waste and pollution management plan to avoid or reduce wastage and pollution.



Chapter 6

- Observing sanitation standard operating procedures reduces the risk of food contamination.
- Maximum residue levels are prescribed by legislation, but also by importing country's standards.
- A document indicating maximum residue levels and pre-harvest intervals is developed by the Citrus Growers Association of Southern Africa and Citrus Research International.

- HACCP provides a handy tool for implementing food safety principles.
- Hazard analysis involves identifying all possible hazards to food safety at every point.
- Critical control points are identified as points at which control can be applied.
- Critical operational limits are established for each critical control point.
- Critical control points are monitored and operations are measured against operational limits.
- Procedures for corrective action are developed in case of a loss of control.
- Records are kept of all operations at critical control points.
- The soundness, effectiveness, and implementation of the system are verified.
- Recordkeeping is essential for traceability and effective management.
- The basic types of records that must be kept are prescribed by legislation and standards authorities.



Practical

Complete activity 9 in the **Learner Workbook**.



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