Workflow: Production – Basic Farming Practices

Toolkit 3.7
Crop and Plant Protection
(Pest, Disease and Weed Control)

target audience

Farm managers and supervisors.

what it is

As part of integrated fruit production practices, both an integrated disease and integrated pest management approach are needed to ensure that pests and pathogens do not damage or compromise trees or fruit.

Integrated Pest Management (IPM) is an important component of production and entails the complementary integration of various pest control measures into a system which strives to balance maximisation of returns, long term sustainability, and minimisation of environmental impact.

Integrated Disease Management (IDM) and pre-harvest disease management affects the biological control of arthropod pests, the incidence of post-harvest decay, and affecting yield, fruit quality, the environment and consequently the profitability and sustainability of citrus production. Pre-harvest disease management clearly forms a critical component in the development of an integrated production strategy.

Weed control is an integral part of controlling and preventing conditions that weaken the citrus tree and increase the risk of pathogens and pests.

This toolkit aims to summarise the key success factors for effective pest and disease control, and the resources provide the significant amount of technical detail regarding this subject.

why it is important

The most important considerations related to pest and disease control are:

- Tree health resulting in optimal production of high-quality fruit.
- Avoiding long term/permanent damage which will severely compromise your return on investment.
- Complying to the extremely rigorous quality and phytosanitary risk management demands of the citrus industry and market. Without compliance and demonstrable results, your ability to export fruit and get best prices will be compromised.

- Risk to the citrus producing area because poor pest and disease management on one farm can affect the surrounding farms, including the risk that a whole production area is barred from key markets.

In short, failure to implement best practice in this area could carry significant (potentially catastrophic) commercial and reputational risk to you, your neighbours, and the industry as a whole.

success factors

- **Accountable and Well-trained Staff** – Success depends on the appointment of the right people to monitor, scout and record. Ideally, you would want at least 2 people who are fully competent, trained, and accountable. Having only one person capable of this critical practice exposes you to a "single point of failure" should anything prevent that person from fulfilling their duty. Therefore, ensure that you have a back-up and, at the very least, a multiskilled team member. Two scouts will also double check each other and reduce detection failures.
- **Knowledge of Pests, Phytosanitary Risk, and Diseases** – This is a technical subject, demanding knowledge, understanding and experience. This includes knowledge of beneficial insects and natural predators. Some pests and their larvae can be confused. Evidence of risk and infestation can be microscopic and requires careful observation. Ensure that the accountable people have the training, support, resources (reference books/tech) and the tools required.
- **Scouting** – There are two key factors that determine the quality scouting on your farm:
  - Technical – This includes the correct technical use of traps, the correct selection of traps, the standardised operating procedure (technically sound process and practice), and the accuracy and completeness of your records.
  - Attitude – Scouting can be described as a high-frequency, routine, high-vigilance observation task. It is repetitive, routine, detail oriented, and demands careful observation, concentration, and discipline. Doing something routinely and maintaining high levels of concentration is inherently difficult. Scouting can be compared to the airport security official scanning thousands of bags daily to pick that one dangerous item. Therefore, the scout's attitude and motivation are extremely important; consider incentivising the scout and check on the scout regularly.
- **Accurate Decision-making** – Rigorous IPM and IDM practice, in particular accurate scouting, enables you to make good decisions and to target your pest and disease control measures as effectively as possible. This will also reduce costs. Careful monitoring leads to:
  - Well informed and evidence-based decisions that require immediate actions.
  - Assessing and tracking seasonal pest trends and anticipating and reacting accordingly.
  - Complete, comparative historical records, including interventions and outcomes, and how this will determine your overall IPM and IDM approach.
- **Spraying and other Control Measures** – Again, both technical compliance (use and calibration of chemicals, tools, and equipment etc.) and process (schedule, timing, maintaining a full record and narrative as evidence substantiating the decisions made) are critical.
- **Pre-harvest Blemish Analysis** – A blemish factor analysis is an important process at the end of every season which will inform your IPM and IDM for the following season. It provides important feedback. The blemish factor analysis achieves the following:

- Comments on the monitoring during the season.
- Comments on the thresholds applied by the farmer.
- Comments on the success of the spray programme applied during the season.
- Assists in anticipating and planning the spray programme for the following season.

➢ **Standardising Pest and Disease Control** – The IPM and IDM process should be fully embedded as standard work. This means that SOPs are in place; standards, both for outcome/deliverables and process, should be clearly defined in writing. Standardising should extend to establishing leader standard work to ensure that the farm owner is fully engaged in understanding and controlling the process and not just the outcome (findings and records).

➢ **Weed Control** – The most direct and immediate weed challenge facing a citrus grower is how to control instances of the annual and perennial broadleaf weeds and grasses. These weeds and grasses cause a loss of yield as a result of weed competition for moisture, nutrients, and light directly under the tree canopy in the root zone of the tree, especially in young orchards.

➢ **Recordkeeping** – Meticulous record keeping is especially important regarding IPM and IDM. Not only are records vital for your management practices, results, efficacy, trend and historic analysis so that you can refine and improve your IPM and IDM, but they are a non-negotiable requirement to comply with certification and other phytosanitary and market related requirements.

execution steps

The detailed execution steps of the many pest and disease management (IDM and IPM) processes can be found in the technical guidelines and learning material in the Citrus Resource Warehouse, the CRI website, and the Citrus Academy's YouTube channel. Refer to the resource table below. However, scouting is so fundamental to IDM and IPM that it warrants a summary:

1. **Two Trained Scouts** – Even if your farm size does not allow for a dedicated scout and the scouting is done by someone with other key responsibilities, ensure that at least two people are trained so that you can always cover the function well.
2. **Resources** – Ensure that the scout has the resources required, such as pest identification booklets, resources on beneficial insects, etc.
3. **Tools** – The scout needs the proper tools and documentation, e.g., clipboard, the correct forms, knife, magnifying glass etc.
4. **Clear SOPs** – Written operating procedures on the positioning and use of traps, and the methodology of scouting.
5. **Scheduling** – Each disease and pest risk emerges at certain times and under certain conditions. The scouting schedule indicates when to scout for what risk, and how rigorous (times per week) the requirement is.
6. **A Comprehensive Weed Control Programme** – Plan and schedule a comprehensive weed and invasive species control programme.
7. **Accurate Recordkeeping** – 100% reliable and honest recording is critical. These records will direct the decisions regarding spraying and other measures.
8. **Clear Escalation Protocols** – Ensure that you have clear rules and processes for when the scout must escalate a problem or ask for external support (specialists, laboratory testing etc.).

9. **Control** – Managers must build scouting into their "leader standard work" routine to control, give feedback to the scouts, and encourage and motivate them to maintain a high standard of work for an activity that is repetitive but very demanding and vitally important.
10. **Seasonal Longer-term Assessment** – Keep good records of your scouting results, the decision you have made based on those results, and the impact of those decisions (whether they have been successful or not). This is a year on year activity that shows that you have a professional grasp of data and will stand you in good stead regarding your quality and other certifications.

assessment questions

Please Note: There is no minimum / maximum amount of questions you can add

1.	Do you have adequately trained employees regarding pest and disease management?
2.	Do you have trained scouts (whether dedicated or not)?
3.	Do you and your scouts have the necessary knowledge regarding diseases, pests, as well as beneficial insects and natural predators?
4.	Do you and your scouts understand the seasonality of each disease, pest, and phytosanitary risk and what to monitor when?
5.	Do you have the resources (reference booklets etc.) and tools to do thorough scouting?
6.	Do you have clear SOPs and control measures to ensure compliance to good practice?
7.	Do you have access to specialist advice should you require it?
8.	Are you clear on key thresholds the industry and/or market requires you to comply with?
9.	Do you implement the necessary disease and pest control measures correctly and at the right time?
10.	Do you maintain full and detailed records?
11.	Do you have a reliable and fully implemented weeding programme?
12.	Do you deal effectively with invasive plant species?

resources

1.	CRI Production Guidelines Volume III: Integrated Pest and Disease Management
2.	CRI product – Identification Manual for Citrus Pests and their Natural Enemies
3.	CRI product – Citrus Pests in the Republic of South Africa
4.	Citrus Academy AV module – Introduction to IPM
5.	Citrus Academy AV module – Citrus Pest Monitoring
6.	Citrus Academy AV module – Interpreting Monitoring Results
7.	Citrus Academy AV module – Pre-Harvest Blemish Analysis
8.	Citrus Academy AV module – Safe Handling of Agrochemicals: General Safety

9.	Citrus Academy AV module – Safe Handling of Agrochemicals: Agrochemical Storage
10.	CA AV module – Safe Handling of Agrochemicals: Agrochemical Application Principles
11.	Citrus Academy AV module – Citrus – Monitoring and Inspection for Phytosanitary Markets
12.	Citrus Academy skills sheet – Scouting
13.	Citrus Academy information sheet – Scout form example
14.	Citrus Academy information sheet – Pre-harvest Blemish Analysis form example
15.	Citrus Academy production learning material – Pests, Diseases and Weeds
16.	Citrus Academy production learning material – Crop Protection (Application)