



## Basic biosecurity measures on macadamia farms

### 1. Plant health

- Start with a strong foundation. Buy good quality trees from Seedlings Growers' Association of South Africa (SGASA) accredited nurseries. Inspect trees before they leave the nursery for root health and insect presence.
- Quarantine seedlings for 4-6 weeks before introducing them into orchards to monitor for MFC throughout its egg-adult developmental stages over four (summer) – six (winter) weeks.
- Support general plant health and the tree's innate immunity through good nutrient and water management.
- If possible, establish buffer zones planted with non-host plants to limit the spread of pests and diseases from other crops or neighbouring farms.



Photo credit: Amorentia Estate and Nursery.



## 2. Monitoring and Integrated Pest Management

- Regular monitoring and surveillance activities are your first line of defence against pests and diseases. Kindly refer to the SAMAC Monitoring Standard Operation Procedure for guidelines on monitoring specific insect pests and use the FABl Disease Diagnostic Clinic for the identification of pests and diseases.
- Practice integrated pest management by implementing its principles of prevention, monitoring, and intervention.



### Standard Operating Procedures for monitoring of major insect pests causing losses in South African macadamia orchards

The integrated pest management (IPM) approach in crop protection involves prevention, monitoring, and intervention. Monitoring is a very important activity to detect, prevent and manage problems in the orchard. Pest monitoring, commonly known as "scouting" in macadamia orchards, involves the inspection of random data trees and in many cases, inspection of different observation points on the trees in a systematic way.

It is suggested to keep accurate records, and where possible use an electronic device that can refer to the geographic point location of each observation to identify insect pest hot spots or sensitive areas, and entry (or migration) patterns. A scouting routine is suggested, where a scout would walk through the macadamia orchard, or a group of macadamia plantings grouped together in operational clusters of similar planting age groups, cultivar sensitivity, soil type or other similarities.

Each developmental stage of the macadamia (Figure 1, phenology) can be associated with different problem-causing targets (Table 1). Observations are done repeatedly on each data tree according to a set procedure (Table 2).

Observation points should be located randomly in the trees, to get a representative observation covering the warmer and cooler sides of the trees, as well as the insides of the trees. The observation points are 1m in size, where there is good visibility with as many branches included as possible.

An understanding and background knowledge of the damage-causing targets are important, so that different stages and symptoms of the targets can be identified.

Scouting should also be implemented to give a measure of effectiveness of pest control actions. A well-trained scout with good eyesight must be selected for this purpose. Equipment required include a clipboard with data capturing sheets or a working electronic device, 10x magnifying glass, field guide with pictures and names of the major and minor pests, pest symptoms and specific beneficials to be scouted, knife and board to cut into open, sampling containers or bags to keep specimens, traps, lures, sticky cards, calibrated equipment for knock-down sprays, effective knock-down chemical and instructions, and a sheet to place on the orchard floor. Ensure that the sheets do not blow away with the wind of the spray equipment when these are used.



## 3. General Orchard Hygiene

- Clean equipment, tools, and machinery regularly to prevent the spread of pests and diseases.
- High pressure air or water can be used to clean vehicles and other machinery. Pruning equipment can be cleaned with a 10% bleach solution, followed by an oil, e.g. macadamia oil, application to prevent rust.
- Cleaning of equipment and vehicles is important when moving between infected and other orchards and/or farms. If an infestation of a specific pest or disease is known, movement of machinery should always be from

uninvested orchards to known infested orchards. This is especially important for the management of the macadamia felted coccid, and the spread of pathogens such as *Botryosphaeria* and *Fusarium euwallaceae* (dieback).

- Dispose of plant material appropriately. For example, trees or branches removed because of severe macadamia felted coccid or bark borer infestations, branch dieback, etc. should be chipped and solarized or burned to limit the spread of these pests and diseases.



## 4. Access Control

- Place signage at various entry points to your farm and maintain a visitor register.
- Make sure that all footwear, clothing, and vehicles are free from any plant material or soil before entering the premises. Casual workers and contractors may be a specific risk as they move regularly between farms.
- Provide scrubbing brushes, water, vehicle-, and foot baths with relevant sanitizers at applicable entry points.
- Persons returning from overseas visits should preferably not be allowed to immediately enter orchards unless they change their shoes and clothing.
- Visitors or service delivery personnel that may have visited other farms beforehand should park their vehicles in designated parking areas and should use farm transport if orchards need to be inspected.



## 5. Training and response

- Ensure scouts are properly trained and have all the necessary equipment needed to act as your first line of defence.
- Remain updated on new pest and disease threats as circulated by SAMAC.
- Develop a response plan for existing and potential threats.
- Inform SAMAC (elrea@samac.org.za) of any suspected biosecurity threats.