

Restructure of biosecurity division

Biosecurity is at the core of the Citrus Research International mission to maximise the long-term global competitiveness of citrus growers in Southern African. By Paul Fourie, Wayne Kirkman, Elma Carstens and Vaughan Hattingh

In the past, biosecurity-related issues were addressed within the research portfolios of Integrated Pest Management and Disease Management, and the Citrus Improvement Scheme (CIS). With the increasing threat of exotic pest and disease incursions into Southern Africa, most notably Huanglongbing (HLB, or Asian Citrus Greening) and its vector the Asian Citrus Psyllid (ACP), a Biosecurity division was established within CRI, with Dr Hennie le Roux (Fig. 1) ably managing biosecurity from April 2015, until his untimely death in October 2016.

Dr Solomon Gebeyehu (Fig. 2) managed the Biosecurity division from January 2018 until September 2023. Under Gebeyehu's leadership, a strong biosecurity structure and foundation for operations was established. He was supported by Wayne Kirkman as Biosecurity Operations Coordinator and Dr Elma Carstens as Phytosanitary and Biosecurity Specialist (Fig. 3).

Current position

HLB and ACP are the number one threat to the citrus industry of SA, and are receiving requisite attention and focus.

- A citrus biosecurity Master Plan document was compiled to serve as a road map for medium- to long-term biosecurity actions.
- The top 10 priority threats were identified and mini pest risk analyses were compiled for each of the priority pests. From these,

appropriate preparedness actions and rapid response plans can be developed. Fact sheets were compiled to promote awareness.

- The surveillance capacity in CRI was expanded through the appointment of four biosecurity field officers: two stationed at the CRI Citrus Research Centre in Nelspruit, one in Tzaneen, and one in Swellendam. The field officers are responsible for trap deployment, reading

and servicing functions to monitor for ACP, HLB, *Trioza*, and African Greening.

- A contingency fund was established to enable rapid response to future incursions. Contingency provision was also made for the appointment of six additional field officers and a field operations supervisor.
- A biosecurity advisory committee (BAC) was established in CRI with regular meetings to provide technical inputs on biosecurity-related matters, and oversight of on-going biosecurity research projects and activities.
- Importantly, the HLB/ACP Action Plan and HLB Safe System for Production of Citrus Trees in Nurseries were developed and officially adopted in October 2019 by the HLB Steering Committee, under the auspices of the Department of Agriculture, Land Reform and Rural Development (DALRRD), with membership from CGA, CRI, ARC and relevant stakeholders. National plant health regulations were promulgated to enable effective application of the HLB Action Plan in response to an incursion. The Action Plan and Safe System documents were reviewed by an international panel of experts in 2021/22, and recommendations and refinements implemented and approved.
- Modelling of the most likely pathway for spread of ACP and HLB from East Africa into Southern Africa has contributed to focussing early warning surveillance actions on risk corridors. A research project has been initiated to refine the incursion risk heat mapping.
- An ACP surveillance network is operational for early detection; and 700 trapping sites are regularly serviced, and traps read at the Citrus Research Centre (CRC) trap reading laboratory, as well as diagnostic analysis conducted on selected samples of interest.
- Twelve DALRRD inspectors have received repeated psyllid diagnostic training to support the national surveillance programme.
- Notably, the ACP and HLB diagnostics are much more complicated than elsewhere in



Fig. 1 (left). Drs Hennie le Roux (left) and Paul Fourie (far right) with officials from the Angolan Ministry of Agriculture on a biosecurity assignment in Angola (September 2015) Fig. 2. Dr Solomon Gebeyehu (far left) on a biosecurity assignment in Ethiopia with Barry Smales (farm manager) and Drs Birtukan Getahun and Daniel Shimelash of Wolayta Sodo University



the world due to the presence of endemic ACP lookalike species, and the occurrence of subspecies of the African Greening pathogen that cross-react with certain HLB diagnostic procedures. Refinement of the diagnostic procedures is on-going, including two research projects.

- Along with the DALRRD laboratory in Stellenbosch, the CRI and ARC laboratories in Nelspruit have been approved to conduct official HLB diagnostics.
- Good progress was made to establish biosecurity networks in SA, as well as in Southern and East African countries.
- Citrus leprosis, which is one of the top 10 threats, was detected in the Eastern Cape. A rapid response plan was developed and implemented with on-going progress towards achieving eradication.
- The Biosecurity division has supported DALRRD with the on-going surveillance and containment measures for the *Bactrocera dorsalis* (Bd) fruit fly.
- Other cases of exotic pest/disease detections are investigated, often requiring assistance from international experts.
- The Biosecurity division actively participates in the projects of the Phyto Risk working group convened by DALRRD.

Future plans and strategy

Dr Paul Fourie has managed the Biosecurity division from October 2023. Previously, he managed the CIS division for CRI. The CIS was incorporated as a sub-division into the Biosecurity division. In planning the transition, a core biosecurity team strategically reviewed the objectives and strategies as stated in the Bio-security Master Plan. In general, the objectives and strategies were reaffirmed, but specific objectives and tasks were identified to address gaps – most notably, awareness, stakeholder engagement and engagements in Southern and East African countries. Successful biosecurity initiatives started in the previous years were prioritised to be sustained.

A mission statement for CRI-Biosecurity was formulated as "Protecting the Southern African citrus industry through timely identification of biosecurity threats, the

development of preparedness, awareness, early detection, rapid response and impact mitigation plans, and ensuring effective application of the associated actions".

The strategic objectives aimed at ensuring the CRI-Biosecurity mission are summarised under four pillars (Fig. 4):

1. Preparedness

A comprehensive citrus industry Biosecurity Master Plan was developed as a policy and operational guide on which threat-specific activities can be based. This plan will be updated in due course. Likewise, the list of top 10 threats will be reviewed, and the associated pest risk assessments and action plans updated. Official regulations of relevance to biosecurity risk mitigation and execution of action plans should also be in place. Thus, biosecurity requires close collaboration with

relevant government officials in SA, as well as in neighbouring countries.

The practical feasibility of the developed action plans must be evaluated through scenario planning exercises, including specific human resource deployment plans. To this end, mechanisms will be established to access sufficient resources to effectively implement these plans. CRI will continue to grow the biosecurity contingency fund to support emergency response, and will also investigate other national or international funding options.

Figure 3. Dr Elma Carstens and Wayne Kirkman (far right) with CRI colleagues and Fundecitrus collaborators on a biosecurity assignment in São Paulo, Brazil



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2. Operations

Biosecurity operations mostly involve surveillance aimed at early detection of exotic pests/diseases. These operations are coordinated by the CRI Biosecurity Operations Coordinator, and require sustained and effective engagement of stakeholders and support platforms, including the CRI BAC, pest-specific steering committees and relevant government forums. Given the complexity of HLB and ACP diagnosis in the Southern African context, practical training sessions for CRI and DALRRD inspectors, using local and international experts, are required to limit false results, which have significant consequences. Surveillance activities must be guided by appropriate risk pathway assessments, with guidance from BAC and the relevant researchers.

There are currently capacity constraints in the diagnostic laboratories at the CRC,

largely due to the complexity of the HLB and ACP diagnostics. Therefore, on-going development of diagnostic capacity is required at CRI to handle the diagnostic requirements effectively and cost-efficiently. Likewise, diagnostic capacity must be developed at DALRRD, ARC, and in neighbouring countries to broaden the capabilities and to lessen the task load on CRI labs. This should also include conducting pre-emptive development and optimisation of diagnostic protocols of other identified biosecurity threats.

The developed action plans prescribe early detection surveillance, and once a pest is detected, the plans prescribe rapid response and impact mitigation actions. These largely entail delimitation surveillance to determine the extent of the incursion, and based on these findings the appropriate control measures, eradication or containment. These actions require

effective coordination and communication between CRI, DALRRD and the appropriate biosecurity and industry structures.

Non-quarantine citrus pests/diseases that are regulated, such as African Greening, Citrus Black Spot and the Bd fruit fly, require appropriate monitoring (surveys) and controls. These operations are also coordinated in CRI Biosecurity.

3. Awareness, networking, and stakeholder engagement

Awareness is undoubtedly one of the most important aspects of biosecurity. A broad biosecurity awareness strategy will be developed with specific communication plans for the variety of stakeholders in Southern Africa (growers, national and provincial governments, the ag-chem industry, other fruit industries, and public in urban and rural settings). Appropriate awareness materials will support early detection, responsible actions, and response preparedness, but should be tailor-made for each audience. Stakeholders in the grower and public community will be engaged to obtain supportive participation. The biosecurity "war" will not be won by DALRRD and CRI alone, and participation from all sectors is essential.

Awareness, networking, and stakeholder engagement should also extend to Southern and Eastern African countries to enable effective awareness, surveillance, containment and eradication measures, inter alia engagements with Kenya and Tanzania to track the spread of HLB and ACP, and to support containment and eradication measures; and with Angola, Namibia, Mozambique and Zimbabwe to promote the use of certified disease-free citrus propagation material, instead of high-risk material from other countries.

Collaboration with other citrus industries and their scientific and technical support structures, particularly those in the US and Brazil, has proven invaluable in the development of preparedness and response plans in SA. CRI researchers will continue



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to follow, promote and/or collaborate in relevant citrus biosecurity research in Southern Africa and internationally.

4. Citrus Improvement Scheme

The CIS is essentially a citrus health scheme and a logical fit in the CRI Biosecurity Division. Starting with clean propagation material is the first line of defence, and will largely prevent the introduction of exotic pests or diseases. The status and integrity of the CIS must be maintained so that the scheme continues to support the biosecurity interests of the Southern African citrus industry. To this end, sustained production, and supply of certified budwood and seed at the Citrus Foundation Block and the CIS Seed Farm, must be ensured so that there is no incentive to use propagation material with a lower biosecure status. The CIS Nursery Advisory Service will continue to add value through promotion of the CIS and the SA Citrus Nursery Certification Scheme in Southern Africa, including the roll-out

of the HLB Safe System for Production of Citrus Nursery Trees. While a sub-division in CRI Biosecurity, the CIS will effectively be administered and operated as a financially self-sustained unit.

Conclusion

Biosecurity activities are aimed at sustaining and improving the current health status of the citrus industry in Southern Africa. These are long-term objectives; biosecurity is more akin to a marathon, than to a sprint race. CRI, through its Biosecurity Division and active support from the other divisions, notably Research and Technical and Extension, is effectively placed to drive this process. Understanding and support from all stakeholders is essential, be it in government, the citrus industry, other fruit industries, or the public. CRI Biosecurity will work with all stakeholders to develop the awareness, surveillance, and rapid response plans, but the final execution of control measures will be at farm and community level. From our experiences locally and in other countries, each of these biosecurity "wars" will only be won if citrus growers – the stakeholders with the most at stake – are unified in their understanding and execution of the prevention and control measures. 🍊

The four pillars of the CRI Biosecurity Division strategy

