

Trapping for Asian Citrus Psyllid in Southern Africa

Current status and the way forward

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The presence of the Asian Citrus Psyllid (ACP) (Fig. 1), *Diaphorina citri* Kuwayama (Hemiptera: Liviidae), in parts of Africa (Fig. 2) (Ajene et al., 2020a; Oke et al., 2020; Shimwela et al., 2016) is currently putting citriculture in Southern Africa at risk. ACP is an effective vector of the destructive citrus greening disease known as Huanglongbing (HLB), which is associated with the gram negative α -Proteobacteria *Candidatus Liberibacter asiaticus* (Las). More recently, Las was reported in ACP and citrus plants sampled in the coastal regions of Kenya (Ajene et al., 2020b). Surveillance of ACP through the use of yellow sticky traps

(Fig. 3) in citrus production areas and nurseries has been recommended by Citrus Research International (CRI) since 2017. In 2019, workshops on early detection of ACP were organised by CRI targeting citrus growers and inspectors from the Department of Agriculture, Rural Development and Land Reform (DALRRD). Additional follow-up workshops were done in 2020 in the Swellendam area of the Western Cape Province, to train inspectors from DALRRD in the field. This series of

workshops promoted the setup of traps for early detection of ACP across South Africa.

Ad hoc trapping for detection of ACP was also conducted as part of CRI surveillance efforts in Kenya (2016), Madagascar (2017), Tanzania (2018), Angola (2019), Zambia (2019), Zimbabwe (2019) and Mozambique (2017-2020). Regular trapping has been conducted in some citrus production areas in Swaziland since 2019. Traps were also supplied to collaborators in northern Mozambique and Tanzania.

Figures 1, 2 and 3

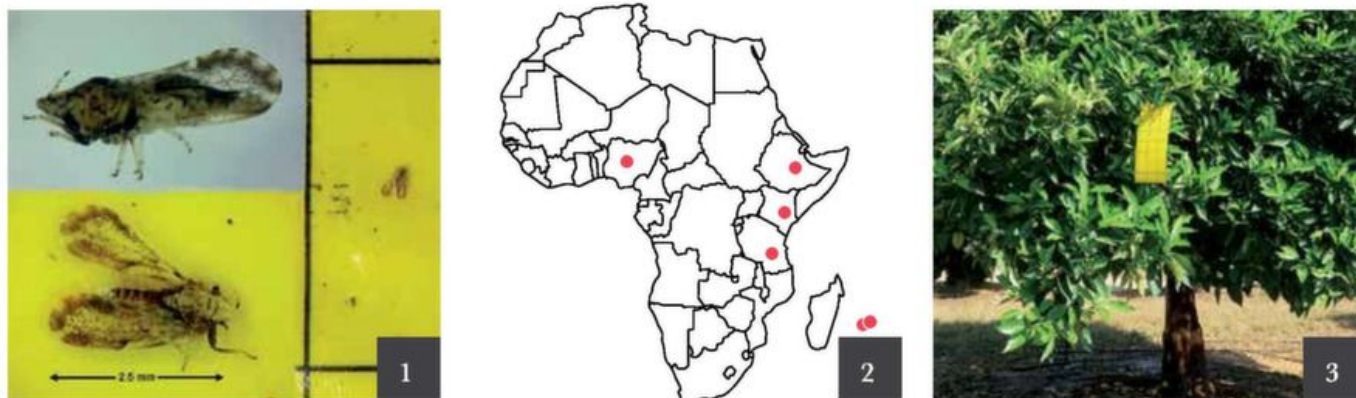


Fig 1: Photograph of ACP showing the characteristic features of broadened wing at the tip (dog's ear shape) and break in the brown marking along the edge of the wing. The close-up images of ACP are shown on the left of the figure and capture of ACP on yellow sticky traps are shown on the right of the figure. Fig 2: Records of ACP in the African region. Distribution records in Africa were sourced from CABI (2020). Fig 3: Double-sided yellow sticky traps suspended on the outer canopy of citrus trees for trapping of ACP.

Current trapping points in SA

In SA, a total of 82 yellow sticky traps were set up by CRI in July 2020 in 14 commercial citrus farms located in Mpumalanga and Limpopo Provinces, and are being checked and replaced on a monthly basis (Fig. 4). These traps were strategically placed for detection of a range expansion of ACP from its currently known records in southern Tanzania. These traps would also be able to detect a potential point incursion. Trapping has also been conducted by DALRRD inspectors in 44 locations (mainly ports of entry and residential areas) in seven provinces across SA (Fig. 4). From these locations, traps have been checked by the CRI trap reading team.

A total of 186 traps set at the Citrus Improvement Scheme facilities (Citrus Foundation Block, nucleus blocks at CRI's Citrus Research Centre and Agricultural Research Council in Nelspruit) are also being checked and replaced regularly (either on a fortnightly basis or every two months, depending on facility).

What are the traps telling us so far?

No ACP was recorded on any of the traps collected in SA from July 2019 to November 2020. In field surveys, there were records of indigenous *Trioza* species in traps collected mainly in the Northern provinces. Some of these *Trioza* sp. were possibly *T. erytrae* Del Gercio, African Citrus Triozid (ACT), which is a vector of African Greening, associated with *Candidatus Liberibacter africanus* (Laf). ACT can also vector Las. The *Trioza* species, suspected to be *T. erytrae*, were further analysed to detect the presence of Laf. None of the *Trioza* specimens collected in citrus orchards and other regions tested positive for Laf. A number of indigenous *Diaphorina* species were recorded on the yellow sticky traps (Fig. 5), a few of them closely resembling wing patterns of ACP. Three indigenous *Diaphorina* species: *D. punctulata* (Petty), *D. virgata* Capener and *D. zebrana* Capener

(Fig. 5) were regularly identified on yellow sticky traps. Citrus is not recorded as a host for these species (Capener, 1970a; b; Petty, 1924). These indigenous *Diaphorina* species possibly utilise the citrus environment for other resources.

ACP was not observed or detected in Zambia, Zimbabwe, Angola, Madagascar, Swaziland and Mozambique (southern and central), but the presence of ACP was confirmed in certain trapping locations in Kenya and southwestern Tanzania. Traps had not been received back from collaborators in northern Mozambique at the time of printing. ACP was reported in southern Tanzania, just north of the border with Mozambique and it is expected that ACP might already have dispersed naturally into this region. Due to the political unrest in this area, surveillance trips are not yet feasible.

Way forward

While the absence of ACP in traps currently being monitored in SA and in some parts of Southern Africa brings some relief, the threat of this pest to citriculture in Southern Africa still remains given its proximity to the region and given the recent detection of Las in ACP in Kenya. Early detection trapping surveys for ACP should expand in SA and preferably also in neighbouring countries.

An action plan on ACP and HLB, which includes rapid response measures following their detection, has been compiled by CRI and the HLB Steering Committee constituted from DALRRD, SA's Citrus Nurserymen's Association (SACNA), SA's Nursery Association (SANA), and the citrus industry represented by CRI and CGA. However, in order to successfully contain and eradicate ACP from an area, early detection of the pest is required. An investment in the early detection of ACP by trapping will go a long way in delaying the establishment and spread of this pest in SA, should it happen to be introduced. Citrus growers in SA were encouraged to conduct

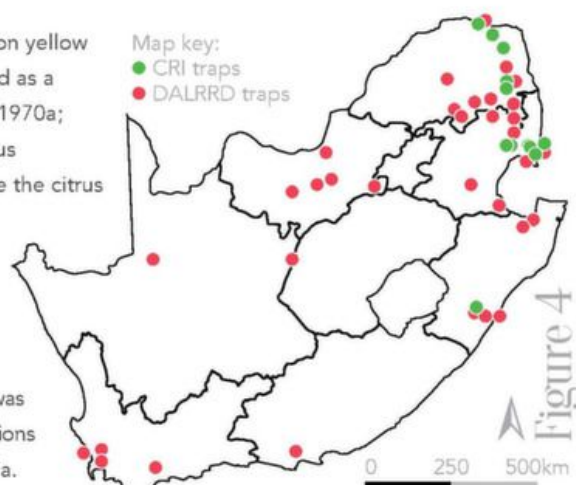
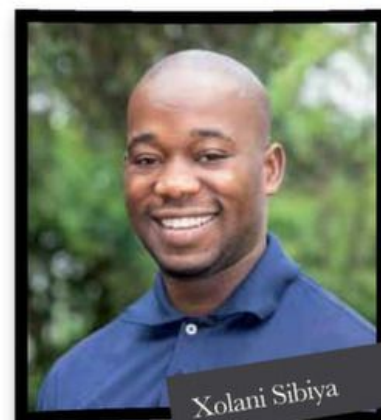


Fig 4: Current ACP trapping points in SA. The circles in red are traps set and maintained by DALRRD. The circles in green are traps set and maintained by CRI.



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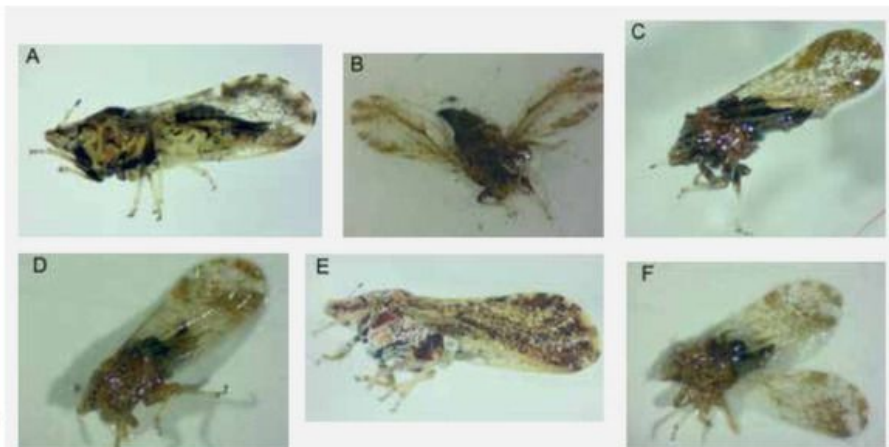


Fig 5: Photos of *Diaphorina citri* (A) currently absent in SA and (B-F) Indigenous *Diaphorina* species recorded on yellow sticky traps in South Africa

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early detection surveys for ACP by setting, collection and replacement of six traps per 100 ha in citrus production areas (Manrakhan et al., 2017 in Cutting Edge No. 240).

Citrus nurseries that are certified by the industry's Citrus Improvement Scheme will also be encouraged to participate in the national ACP survey programme by placing ACP traps in and around their nurseries. ACP trapping by all certified nurseries will expand the national footprint of trapping locations and is a mandatory requirement of nurseries complying with the HLB Safe System for production of citrus trees in nurseries.

CRI's ACP trap reading service has successfully been established at the Citrus Research Centre (CRC) in Nelspruit. With an increasing number of traps submitted, the service was recently expanded. Plans are in place for further expansion in 2021, as more and more traps will be submitted. The relative abundance of endemic *Diaphorina* and *Trioza* species, which closely resemble ACP and ACT, hugely complicates the accurate identification of trapped insects. To this end, CRI is developing morphological keys and molecular identification tools (PCR) for accurate identification. Trapped insects are also PCR-screened for the presence of *Liberibacter* species, the associated

pathogens, in the insect vector, as this is widely regarded as the best early detection measure for HLB. Unfortunately, this is also not a straight-forward assay, as it has been found that certain *Laf* sub-species, which occur in indigenous trees in the Rutaceae family, can cross-react to show false positive results in the Las-PCR assay. CRI's researchers are currently working on systems to improve the diagnostics for ACP and Las, as rapid identification tests will be required to assess the hundreds of traps expected to be read in the near future.

The more traps are placed and serviced in Southern Africa, the better the chance at early detection of ACP and HLB. We encourage citrus growers and nurseries across SA to include ACP trapping in their regular pest monitoring programmes (see CRI Cutting Edge 240). Scouters and technical personnel should be trained to identify *Diaphorina citri* amongst indigenous *Diaphorina* spp. on these traps. All suspect trap catches should be communicated with CRI by sending a close-up photo of the trapped insect and/or by sending the trap to CRI-CRC in Nelspruit for confirmation of identification. For more information, please contact Dr Aruna Manrakhan (aruna@cri.co.za) or Wayne Kirkman (waynek@cri.co.za).

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