



HLB now in Kenya: Preparations to mitigate its impact on the southern African citrus industry

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The presence of *Diaphorina citri* (Asian citrus psyllid, or ACP), the primary vector of the dreaded Huanglongbing disease (HLB, or Asian Citrus Greening), was first reported in east Africa in Tanzania (2015) and Kenya (2016). Surveys that CRI conducted in collaboration with local scientists, confirmed the presence of ACP in the eastern regions of Tanzania. Recently HLB, previously known to occur in some parts of Ethiopia, was detected on the east coast of Kenya (Fig. 1). The recent detection of HLB in Kenya brings it considerably closer to citrus production in southern Africa. CRI has engaged in a process with Department of Agriculture, Land Reform and Rural Development (DALRRD) to encourage Kenyan partners to scope the possibility of containing and eradicating the disease in the region.

The detection of Las in east Africa, highlights the importance of the HLB and ACP preparedness actions that CRI has been developing in southern Africa. This report aims to inform the industry about the significance of the recent reports from east Africa, and provides a brief on various preparedness actions being undertaken in southern Africa. Finally we urge growers and nurseries to implement or continue diligently with early detection of ACP – using yellow sticky traps and scouting of trees for HLB symptoms.

The relevance of recently reported detection of Las in Kenya and follow up actions being taken

1. What is the status of the HLB incursion in Kenya? Information on the distribution and abundance of both HLB and citrus host trees in Kenya is being pursued with officials in Kenya (Kenya Plant Health Inspectorate Services, KEPHIS) by DALRRD. There is a longstanding collaboration between scientists in CRI and the International Centre of Insect

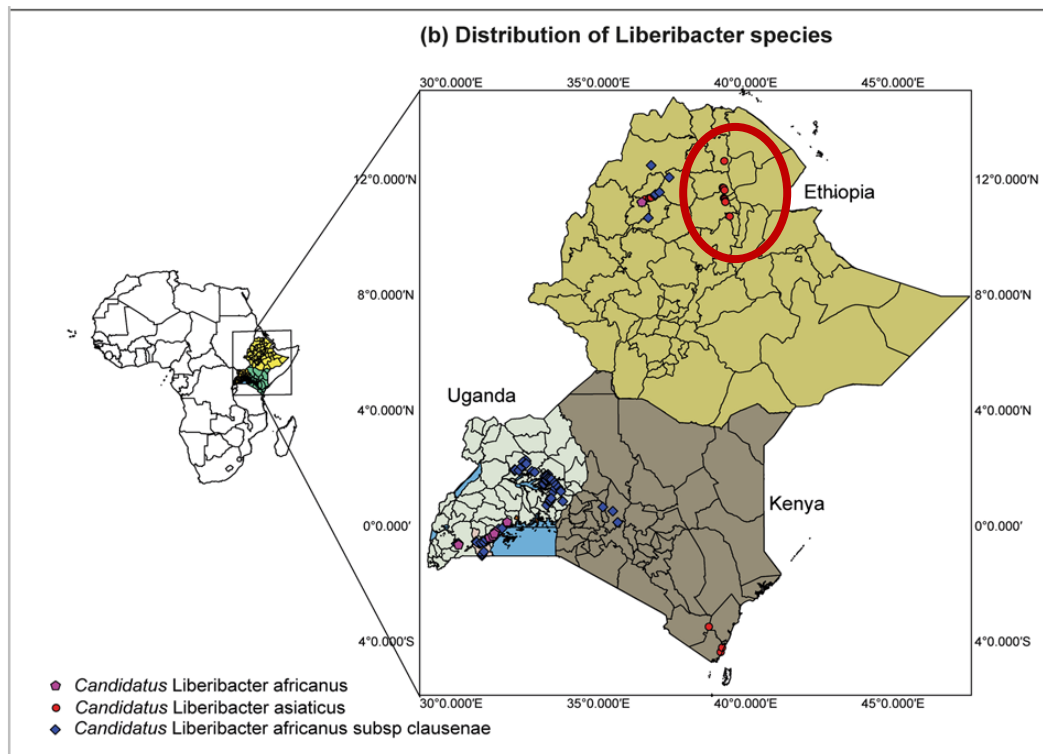


Fig. 1. Detection sites (circled) of HLB in Ethiopia and Kenya (figure from Ajene et al. 2020)



Physiology and Ecology (ICIPE) in Kenya, as well as Tanzanian scientists. These contacts are being used to strengthen collaboration in the region.

2. Is an official eradication/ containment programme in Kenya feasible? Official delimitation surveys to establish the distribution of HLB in the region would be advisable, including north-east Tanzania. Additionally, it is important to gain an understanding of 1) the abundance of HLB-infected host trees within the region, 2) the range and abundance of host plants in the region, and 3) the abundance of ACP and proportion of the ACP population infected with HLB.

According to Ajene et al. (2020), the 3 HLB finds in Kenya are less than 100 km apart: one find in a backyard and the other two in research orchards, one with a citrus nursery. If these finds from a small survey are indicative of the distribution range, it suggests that eradication may still be feasible if quick and decisive official action is taken. It is essential to establish if the nursery referred to in the report may have distributed infected trees more widely, and if so, the extent of traceability of such trees. This information is key to evaluating the prospects of eradication or containment.

If HLB is still sufficiently localized, or at low abundance, even across a broad distribution range, there is potentially a prospect of eradication. This will require rapid official action to be taken in the incursion region. The southern African citrus industry has made progress in developing an HLB and ACP Action Plan that can be shared regionally to assist in response actions. CRI has a technical capacity that can likewise assist.

If HLB and/or infected ACP are already so widespread and abundant that eradication is not feasible, then a programme aimed at containment is required. Containment actions, among other things, may entail restrictions on movement of citrus plants through national legislation. Official controls can be applied at country boundaries and at provincial boundaries where police may have roadblocks. This has happened before with other serious plant pests in the region. Such actions are essential to slow the spread of the disease through

Africa and also mitigate the impact within countries where incursions take place.

3. Delimiting the southern boundaries of the ACP distribution range. As a follow-on from potential containment/eradication in Kenya, ongoing actions should continue to delimit the southern distribution range of HLB and ACP. That includes seeking verification of previously reported finds of ACP in southern Tanzania, as well as extending surveys northwards in Mozambique. Accordingly, CRI will engage collaborators in Tanzania to collect ACP from southern Tanzania and send them to CRI for preliminary identification using morphological features. The suspect *Diaphorina citri* samples can then be forwarded to a taxonomist for identification/confirmation. Samples will also be analysed at CRI using PCR, for detection of Las in the ACP, as this is the quickest method of early detection of an HLB incursion.

Surveillance and sampling for ACP and HLB

Yellow sticky traps and citrus tree inspections are used to survey for early detection of ACP. It is possible to test the trapped ACP specimens for the presence of Las if the insect sample is still in good condition. ACP is currently known to occur in Kenya and Tanzania, but not as of yet in Uganda. In southern African countries, early warning surveillance has been initiated in eSwatini, Zimbabwe, Namibia, Angola, Zambia, and Mozambique, with no Las or ACP detection in these countries so far.

In South Africa, coordinated early detection surveys for ACP using sticky traps have been initiated in commercial orchards in Letsitele and Onderberg regions. CRI has communicated to growers that they should start doing the same. CRI has disseminated detailed guidelines on conducting surveys for early detection of ACP and Las (Cutting Edge no 240: Surveillance of the Asian Citrus Psyllid in citrus production areas in southern Africa). CRI has also developed HLB and ACP Fact Sheets that provide important awareness information about ACP and HLB.



CRI has trained 12 DALRRD inspectors to provide them with the skills to conduct surveys for HLB and vectors. They will contribute to expanding survey and monitoring actions into non-residential areas, border posts and other entry points into South Africa. Similarly, longstanding, and ongoing surveillance of African Greening, with particular focus on buffer zones, has been expanded to include early detection surveys for Las and ACP. Through surveillance efforts by DALRRD inspectors, some psyllid specimens similar to ACP were caught on surveillance traps in South Africa in December 2019 near Golela. However, a collaborating taxonomic specialist in Switzerland confirmed that these specimens are not ACP and are an undescribed possibly indigenous species.

Update of other biosecurity preparedness actions being undertaken in southern Africa

An HLB Steering Committee (HLB SC) was established in May 2019, with representatives from DALRRD and industry stakeholders. An HLB and ACP Action Plan (including HLB Safe Citrus Tree Production System) has been under ongoing development for several years. The Action Plan and HLB Safe System have been adopted by the HLB SC, meaning that they will be deployed as the official national response to detected incursions. The HLB SC is overseeing the ongoing development of preparedness actions, and roll out of the Action Plan, including early warning surveillance, awareness, as well as development of standard diagnostic protocols.

Awareness efforts guided by the HLB SC are aimed at informing all role players about (1) the disease and the devastating impact it will have on our citrus industry, (2) the required preparedness actions, most importantly surveillance in nurseries and on farms to ensure early detection, and (3) the response actions stipulated in South Africa's HLB/ACP Action Plan.

Citrus nurseries are encouraged to proceed with changing over to citrus tree production in insect secure structures, as stipulated in the HLB Safe System for production of citrus trees. Once HLB or ACP is detected in a region, quarantine measures will be imposed, and only nurseries complying with

the HLB Safe System will be permitted to move citrus trees.

Citrus growers have an important role to play in the early warning surveillance component of the Action Plan. Guidelines on how to conduct own on-farm surveillance is available from CRI. This is most important for growers in northern regions, especially bordering neighboring countries. Growers and nurserymen should implement ACP scouting and trapping as part of their routine insect pest scouting programmes (as explained in Cutting Edge 240). CRI has expanded its capacity to assist in ACP identification from yellow sticky traps and will assist growers and nurseries.

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HLB nou in Kenia: Voorbereidings om sy impak op suider-Afrika se sitrus-industrie te versag

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Die teenwoordigheid van *Diaphorina citri* (Asiatiese sitrusbladvlooi, of ACP), die primêre vektor van die gevreesde Huanglongbing siekte (HLB, of Asiatiese Sitrusvergroening), is die eerste keer in Oos-Afrika in Tanzanië (2015) en Kenia (2016) aangeteken. Opnames wat CRI in samewerking met plaaslike wetenskaplikes uitgevoer het, het die teenwoordigheid van ACP in die oostelike streke van Tanzanië bevestig. Vroeëre aantekeninge dat *Candidatus Liberibacter asiaticus* (Las), die bakterie wat HLB veroorsaak, in Oos-Afrika waargeneem is, kon nie bevestig word nie, en daaropvolgende monsterneming het aangedui dat die diagnostiese prosedures wat gebruik is, vals positiewe resultate gegee het. 'n Onlangse publikasie deur Ajene et al. (2020) het egter die opsporing van HLB op die ooskus van Kenia aangeteken (Fig. 1), deur die gebruik van verbeterde diagnostiese prosedures.

Die teenwoordigheid van HLB is sedert 2010 in Etiopië bekend, maar hierdie onlangse opsporing in Kenia, bring die teenwoordigheid van HLB aansienlik nader aan sitrusproduksie in suider-Afrika. CRI het die Departement van Landbou, Grondhervorming en Landelike Ontwikkeling (DALRRD) in 'n proses betrek ten einde Keniaanse vennote aan te moedig om die moontlikheid om die siekte in die streek te bekamp en uit te wis, te ondersoek.

Die opsporing van Las in Oos-Afrika beklemtoon die belang van die HLB en ACP voorbereidingsaksies wat CRI in suider-Afrika ontwikkel. Hierdie verslag het ten doel om die industrie in te lig rakende die betekenis van die onlangse aantekeninge vanaf Oos-Afrika, en verskaf 'n opdatering van die verskeie voorbereidingsaksies wat in suider-Afrika geneem word.

Die relevansie van onlangs-aangetekende opsporing van HLB in Kenia en opvolgaksies wat geneem word

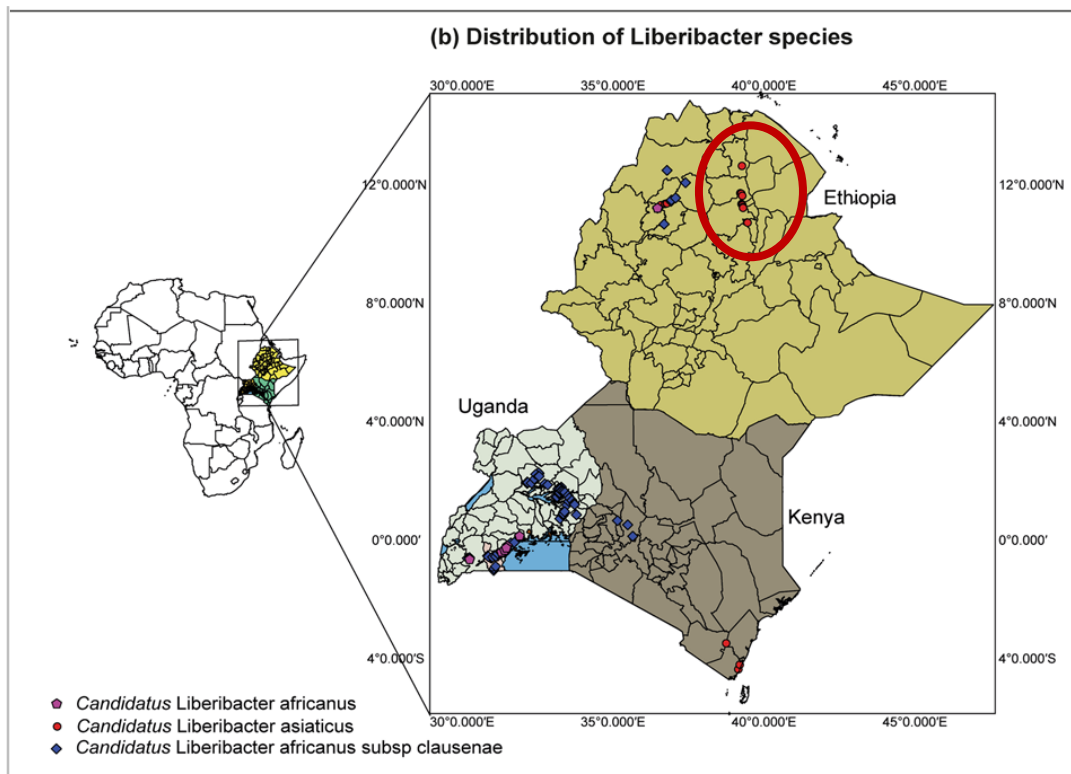


Fig. 1. Opsporingsplekke (omsirkel) van HLB in Etiopië en Kenia (figuur vanuit Ajene et al. 2020)

JOU HEFFING WERK VIR JOU – PRODUSENTE SE HEFFINGS WORD AANGEWEND OM DIE AKTIWITEITE VAN DIE CRI TE BEFONDS



1. Wat is die status van die HLB introduksie in Kenia?

Dit sal belangrik wees om vas te stel of daar enige amptelike regulatoriese aksies in Kenia geneem is in reaksie op die opsporing van HLB, en die tydsberekening en aard van sulke aksies. Inligting oor die verspreiding en voorkoms van beide HLB en sitrusgasheerbome in die streek word deur parallelle prosesse uitgevoer. Dokumente word deur DALRRD voorberei vir amptelike kommunikasie met die NPPO van Kenia (*Kenya Plant Health Inspectorate Services*, KEPHIS) ten einde hierdie doelwit na te streef. Amptelike kommunikasie word op 'n hoë-vlak verbintenis van DALRRD met die Ministerie van Landbou van Kenia gemik, wat die weg sal baan vir 'n tegniese afvaardiging vir gesamentlike uitvoer en implementering van die nodige aksies. Daar is langdurige samewerking tussen wetenskaplikes in CRI en die *International Centre of Insect Physiology and Ecology* (ICIPE) in Kenia, asook wetenskaplikes van Tanzanië. Hierdie kontakte word gebruik om samewerking in die streek te versterk.

2. Is 'n amptelike uitwissings- of bekampings-program in Kenia uitvoerbaar? Amptelike afbakening-opnames ten einde die verspreiding van HLB in die streek vas te stel, word voorgestel, insluitende noord-oos Tanzanië. Verder is dit belangrik om die volgende te verstaan: 1) die voorkoms van HLB-geïnfekteerde gasheerbome binne die streek, 2) die reeks en voorkoms van gasheerplante in die streek, en 3) die volopheid van ACP en gedeelte van die ACP populasie wat met Las geïnfekteer is.

Volgens Ajene et al. (2020), is die drie HLB wat in Kenia gevind is, minder as 100 km van mekaar: een is in 'n agterplaas gevind, en die ander twee in navorsingsboorde, een met 'n sitruskwekery. Indien hierdie bevindinge van 'n klein opname 'n aanduiding is van die verspreidingsveld, dui dit daarop dat uitwissing steeds uitvoerbaar mag wees indien vinnige en beslissende amptelike aksies onderneem word. Dit is noodsaaklik om vas te stel of die kwekery waarna in die verslag verwys word, geïnfekteerde bome wyer versprei het, en indien wel, die mate van opspoorbaarheid van sulke bome. Hierdie inligting is die sleutel tot die evaluasie van die moontlikheid van uitwissing of bekamping.

Indien HLB steeds voldoende gelokaliseer is, of in lae voorkoms, selfs oor 'n breë verspreidingsveld, is daar 'n moontlikheid van uitwissing. Dit sal vinnige amptelike aksie vereis wat in die introduksie-streek moet geskied.

Die suider-Afrika se sitrus-industrie het vordering gemaak in die ontwikkeling van 'n HLB en ACP Aksieplan wat met die streek gedeel kan word ten einde by te staan met hul reaksie-planne. CRI het 'n tegniese kapasiteit wat soortgelyk kan bystaan. Indien HLB en/of geïnfekteerde ACP alreeds so wydverspreid en volop voorkom dat uitwissing nie uitvoerbaar is nie, sal 'n program gemik op bekamping benodig word. Bekamping-aksies, mag onder andere beperkings op beweging van sitrusplante deur nasionale wetgewing behels. Amptelike beheer kan by landsgrense en by provinsiale grense toegepas word waar polisie padblokkades mag hê. Dit het al vantevore met ander ernstige plantplae in die streek gebeur. Sulke aksies is noodsaaklik om die verspreiding van die siekte deur Afrika te vertraag, en ook die impak binne lande waar introduksie plaasgevind het, te versag.

3. Afbakening van die suidelike grense van die ACP verspreidingsveld. Buiten die moontlike bekamping/uitwissing in Kenia, moet aksies voortgaan om die suidelike verspreidingsveld van HLB en ACP af te baken. Dit sluit in die bevestiging van vroeër-aangetekende vonds van ACP in suidelike Tanzanië, asook die uitbrei van opnames noordwaarts in Mosambiek. Dienooreenkomstig, sal CRI met samewerkers in Tanzanië skakel om ACP van suidelike Tanzanië te versamel en na CRI te stuur vir voorlopige identifikasie deur gebruik te maak van morfologiese kenmerke. Die verdagte *Diaphorina citri* monsters kan dan na 'n spesialis taksonoom gestuur word vir identifikasie/bevestiging. Monsters sal ook in CRI analiseer word deur gebruik te maak van PKR, vir waarneem van die Las bakterie in die ACP insek, aangesien dit die vinnigste metode is vir vroeë waarneming van 'n HLB introduksie.

Waarnemingsmonitering en monsterneming vir ACP en HLB

Geel kleeflokvalle en sitrusboom inspeksies word gebruik om in opnames vir vroeë opsporing van ACP. Dit is moontlik om die ACP monsters wat



gevang word, vir die teenwoordigheid van Las te toets indien die insekmonster nog in 'n goeie toestand is.

Dit is tans bekend dat ACP in Kenia en Tanzanië voorkom, maar nog nie in Uganda nie. In suider-Afrika lande, is vroeë-waarskuwing moniterings in eSwatini, Zimbabwe, Angola, Zambië en Mosambiek van stapel gestuur, met geen Las of ACP opsporing in hierdie lande sover nie. In Suid-Afrika is gekoördineerde vroeë opsporings-opnames vir ACP, deur gebruik te maak van kleeflokvalle, in kommersiële boorde in Letsitele en Onderberg-streke begin. CRI het met produsente gekommunikeer dat hulle moet begin om dieselfde te doen. CRI het uiteengesette riglyne oor die uitvoer van opnames vir vroeë opsporing van ACP en Las versprei (Snykant no 240: Monitering van die Asiatiese Sitrus Bladvlooi in sitrus produksie-areas in Suidelike Afrika). CRI het ook HLB en ACP Feiteblaai ontwikkel vir belangrike bewusmaking oor ACP en HLB. CRI het twaalf DALRRD inspekteurs opgelei ten einde aan hulle die vaardighede te verskaf om opnames van HLB en vektore uit te voer. Hulle sal bydra tot die uitbrei van opname- en moniteringsaksies tot in nie-residensiële areas, grensposte en ander toegangspunte na Suid-Afrika. Soortgelyk, is langdurige en voortgaande waarnemingsmoniterings van Afrika Vergroening, met spesifieke fokus op buffersones, uitgebrei om vroeë opsporingsopnames vir Las en ACP in te sluit.

Deur waarnemingsmonitering pogings deur DALRRD inspekteurs, is bladvlooi-agtige monsters soortgelyk aan ACP, in waarnemingslokvalle in Suid-Afrika in Desember 2019 naby Golela gevang. 'n Samewerkende spesialis taksonoom in Switserland het egter bevestig dat hierdie monsters nie ACP was nie, en 'n onbeskryfde moontlik inheemse spesie is.

Opdatering van ander biosekuriteit voorbereidingsaksies wat in suider-Afrika geneem word

'n HLB *Steering Committee* (HLB SC) is in Mei 2019 gestig, met verteenwoordigers vanaf DALRRD en industrie-vennote. 'n HLB en ACP Aksieplan (insluitend HLB *Safe Citrus Tree Production System*) is al vir verskeie jare onder voortgaande ontwikkeling. Die Aksieplan en HLB *Safe System*

is amptelik deur die HLB SC aanvaar, wat beteken dat hulle aangewend sal word as die amptelike nasionale reaksie op opgespoorde introduksies. Die HLB SC oorsien die voortgaande ontwikkeling van voorbereidingsaksies, en uitrol van die Aksieplan, insluitende vroeë-waarskuwing moniterings, bewusmaking, asook ontwikkeling van standaard diagnostiese protokols.

Bewusmakingspogings wat deur die HLB SC gelei word, het ten doel om alle rolspelers oor die volgende in te lig: (1) die siekte en die verwoestende impak wat dit op ons sitrus-industrie sal hê, 2) die vereiste voorbereidingsaksies, belangrikste waarneming in kwekerie en op plase ten einde vroeë opsporing te verseker, en 3) die reaksie-aksies soos uiteengesit in Suid-Afrika se HLB/ACP Aksieplan.

Sitruskwekerie word aangemoedig om voort te gaan met die oorsakel na sitrusboomproduksie in insekbestande strukture, soos uiteengesit in die HLB *Safe System* vir produksie van sitrusbome. Sodra HLB of ACP in 'n streek opgespoor word, sal kwarantynmaatreëls opgelê word, en slegs kwekerie wat aan die HLB *Safe System* voldoen, mag toegelaat word om sitrusbome te verskuif.

Sitrusprodusente het 'n belangrike rol om te speel in die vroeë-waarskuwing komponent van die Aksieplan. Riglyne oor hoe om moniterings op plase uit te voer, is vanaf CRI beskikbaar. Dit is die belangrikste vir produsente in noordelike streke, veral dié wat grens aan naburige lande. Produsente en kwekers moet ACP verkenning en die stel van lokvalle, as deel van hul roetine insek plaagverkenningprogramme, implimenteer (soos verduidelik in Snykant 240). CRI het hul kapasiteit uitgebrei ten einde bystand te verleen in ACP identifikasie vanaf geel kleeflokvalle, en sal produsente en kwekerie bystaan.

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Verwysings

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