

Invisible Threats, Real Losses: Strengthening Biosecurity



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SYMPOSIUM**

28 - 29 MAY | KRONENBURG, PAARL

- When we think about threats to our industries, we often think about drought, storms, logistical disruptions or costs.



- But some of the most devastating threats are invisible, microscopic pests or an unnoticed insect.

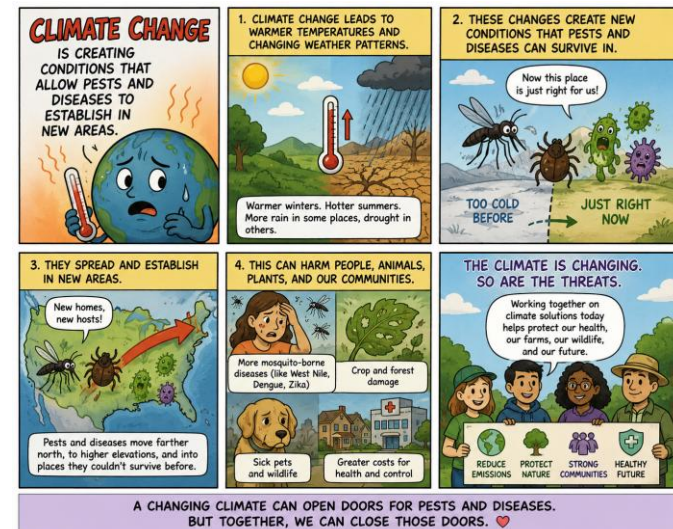


- In the global trade environment, an invisible pest can escalate rapidly into a national disaster.



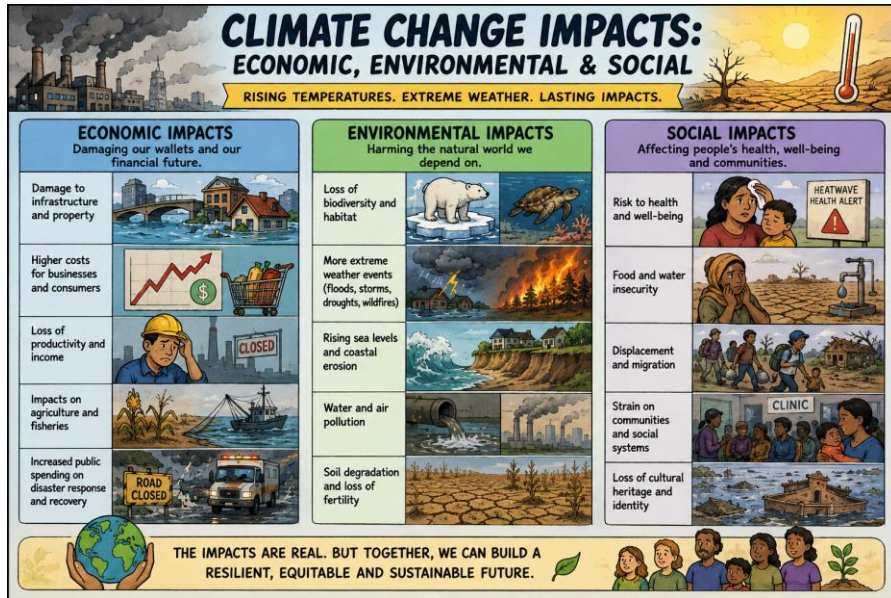
Reality of Invisible Threats

- Plant pests and diseases move faster than ever.
- Global movement of people and e-trade increases exposure - moves plant products and plant material across continents within hours.
- Climate change is creating conditions that allow pests and diseases to establish in new areas.



A CHANGING CLIMATE CAN OPEN DOORS FOR PESTS AND DISEASES. BUT TOGETHER, WE CAN CLOSE THOSE DOORS. ❤️

Real Losses



Environmental Impacts

- Increased pesticide use
- Biodiversity disruption
- Ecosystem damage

Social Impacts

- Job losses
- Reduced rural income
- Pressure on farming communities
- Food security is threatened - especially vulnerable subsistence farmers

Economic Impacts

- Export suspensions / additional requirements
- Increased production costs
- Loss of market confidence
- Reduced competitiveness

Biosecurity is not just a technical requirement – it is a strategic necessity

- Industries that are prepared, minimise impact, recover faster, maintain market access more effectively, and protect long-term competitiveness.
- Industries with strong biosecurity systems inspire confidence among trading partners.

What is Biosecurity?

IPPC | International Plant Protection Convention

An infographic with a green background. At the top left, there is a branch with green leaves. In the top center, a drone is flying. On the right side, there is a microscope. At the bottom right, there is a small plant with green leaves. The text is centered on the left side.

Plant Biosecurity

[plɑ:nt ,baɪ.əʊ.sɪ'kjʊr.ə.ti] - *noun phrase*

Measures used to prevent, detect, manage, and respond to threats to plants from pests and diseases.



Food and Agriculture
Organization of the
United Nations

What is Biosecurity?

- The strategic framework of practices and measures designed to protect a country from the introduction, spread, and impact of harmful pests and diseases
- It requires a coordinated effort across multiple sectors and government to be effective.



Citrus Industry preparedness

- Citrus industries around the globe face the threat of exotic pests and diseases that make sustainability a challenging and costly venture.
- CRI compiled a list of the Top 10 threats.
- This process was intended to create preparedness, and preparedness begins with understanding risk.



Top 10 Biosecurity Threats

- Huanglongbing (HLB) + Asian Citrus Psyllid (ACP): '*Candidatus Liberibacter asiaticus*' vectored by *Diaphorina citri*
- Citrus Variegated Chlorosis: *Xylella fastidiosa* subsp. *pauca*
- Citrus Canker: *Xanthomonas axonopodis* pvs. *citri*, *aurantifolii*, *citrumelo*
- Sudden Death: *Citrus sudden death associated virus*
- Citrus Leprosis: *Citrus leprosis virus-C*, *Citrus leprosis virus-C2* and *Citrus leprosis virus-N*
- Postbloom fruit drop: *Colletotrichum abscissum*
- Leaf and fruit spot: *Pseudocercospora angolensis*
- Peach Fruit Fly: *Bactrocera zonata*
- Mal Secco: *Plenodomus tracheiphilus*
- Yellow vein: *Citrus yellow vein clearing virus*

CITRUS BIOSECURITY THREAT: Yellow Vein Clearing Disease

Symptoms

Symptoms are most prominent on lemons, with foliar symptoms of vein clearing and leaf crinkling, with irregular, elongated chlorotic spots, predominantly visible on young growth. Veins on the underside of the leaf become water-soaked and turn brown. Foliar symptoms are accompanied by leaf drop.

On other citrus types, irregular ringspots may be seen on leaves, and mosaic-like patterns on fruit.

In severe infections, trees die back and fruit are malformed, causing reduced fruit quality.

Symptoms are more visible in the cooler periods of spring and autumn and less noticeable in hot environments. Yellow vein clearing disease can be asymptomatic on some citrus cultivars.



Vein clearing and flecking on 'Ettrog' citron and atypical chlorotic ringspots on 'Pineapple' sweet orange, 'Malta' sweet orange and 'Kinnow' mandarin, similar to symptoms associated with ICRSV



The disease

- Yellow vein clearing disease is caused by citrus yellow vein clearing virus (CYVCV).
- The disease is associated with poor tree vigour, reduced yields and decreased marketability of fruit.
- There is no treatment once trees become infected. Infected trees need to be eradicated



Vein clearing and flecking on 'Eureka' lemon



Possible confusion with

Atypical chlorotic ringspot, similar to those induced by Indian chlorotic ringspot virus (ICRSV), were recorded on 'Kinnow' mandarin and 'Malta' sweet orange.

Defoliation of CYVCV infected tree >



Host range

- All *Citrus* spp.
- Severe symptoms are observed on 'Eureka' lemon and sour orange
- Grapevines and a range of herbaceous plants and weed species

Current distribution

- Turkey
- China
- India
- Iran
- Pakistan
- California, U.S.A.

Method of spread

- **Infected plant propagation material**
Citrus propagation material (trees, cuttings, grafts, budwood, rootstock seedlings) and propagation material on other hosts
- **Viruliferous insect vectors**
Aphids: *Aphis craccivora* on non-citrus hosts, *Aphis spiraecola* on citrus and non-citrus hosts
Whitefly: *Dialeurodes citri*
- **NOT fruit or seed transmitted**



Aphis craccivora



Aphis spiraecola



Dialeurodes citri

Preventative actions

- Quarantine procedures for importation of citrus propagation material and other hosts
- Plant certified disease-free citrus trees
- Awareness and surveillance to ensure early detection and rapid implementation of control measures
- Do not bring illegal plant material into South Africa and onto your farm

For more information on this disease, or if you find anything unusual, contact Wayne Kirkman from CRI's Biosecurity Division: waynek@cri.co.za, 084 458 0349

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IZIGROGRISO KWIMPILO YESITRASI:

**IHuanglong (iHLB) okanye
uHlazaniso lwase-Asia:
iPhetshana leeNyaniso**



Iimpawu

Uphawu lokuqala lweHLB emthini ngokwesiqhelo iba lisebe okanye ukhuni olunamagqabi amthubi. Olona phawu luqwalaseleka lula egqabini kukuphatsha okungahambelaniyo nesikhumba. Imithambo iye igqame ze ibe mthubi. Kuqhelekile ke nokuwa kakhulu kwamagqabi.

Imithi eyosuleleke kakhulu ibonakala isiba namagqabi agqaggeneyo namthubi, ukubuna kakhulu kweziqhuni, ukungakhuli kakuhle, imithambo egqamileyo, ukundzonda kweengcambu nevumba elibi.

Iziqhamo ziba namabala angemahle (ekubeni luhlaza) ze zibonakalise iinguqu kwibala xa zikhulayo. Isiphelo sesiqhamo esisikhondo (esikwisikhuni) sijika sibe orenji ngelixa sisala siseluhlaza sona isikhondo.

Ezinye iziqhamo ezisemithini eyosulelekileyo ziyancipha ngokobukhulu, zikekele (zigoobile ngaphakathi kwikholumela), uyehla umyinge wezo zinyibilikayo, wenyuke umyinge wezihlahlwazi yaye zingavakala zimuncu, zikakra okanye zibutyiwarha.

Kungahle kubonakale ukufika kweentyatyambo nanini na okanye ukufika kwazo ngobuninzi kumasebe osulelekileyo yaye nokubuna kwazo nangasiphi na isigaba.



Isiqhamo esincinci esikekeleyo



Amagqabi amancinci, imithambo emthubi nokuphatshaokungangamelaniyo

Umthi wona ungalahlala ungenazimpawu isithuba seenyanga okanye iminyaka emva kokuqala ukosuleleka. Kuyacotha ukuvela kweempawu yaye imithi eyosulelekileyo incipha kancinci ekubeni luqilima nangokweziqhamo, ze ihlale ingahlumi okanye ke ide ife. Isifo esi sikhula ngokungafaniyo ukuze imithi ngemithi ibe nokubonakalisa umxube wembonakalo eqhelekileyo neyosulelekileyo.

Esi sifo

- IHLB, eyayanyaniswa negciwane ikhandideytas Libheribakta asiaticus (iClas), sesona sigulo seziqhamo zesitrasi sitshabalalisa kakhulu ehlabathini.
- Ukukhula kwemithi, impilo nokuveliswa kweziqhamo zichaphazeleka kakubi.
- Imithi echaphazelekayo iyafa, yaye iziqhamo ezineempawu azikufanelanga iimakethe zeziqhamo ezintle kunye neziselo zazo.
- Akubikho kunyangeka xa sele yosulelekile imithi. Imithi eyosulelekileyo idinga ukududulwa.



Ukugqagqana okumthubi kwakunye nokungakhuli kakuhle



Eli phetshana leenyano likhutshwe liCandelo loKhuseleko lweZityalo leCRI, kweyoMqungu ka2024

Ukubhidaniseka okusenokwenzeka ne-:

Amagqabi angabonakalisa iimpawu eziyelelene ekusweleni izinki, ikopa okanye imanganizi. Noko ke, oku kumbatsha kwesikhumba kungangamelaniyo kona, okufana nqwa neHLB, kuyaphikisana neempawu zokungondleki, nazo ezingalungelelanayo. Iimpawu zokuswela izakhamzimba zona, ezifana nokuba mthubi, zisasazeka ngokufanayo kwikhenopi iyonke, kodwa iimpawu zeHLB zona zingasasazeka nangakumbi. IHLB isenokubhidaniswa nezinye izifo, ezifana nesifo sokuqina kweziqhamo zesitrasi, ukosuleleka iyifaytoplasma, ukubuna, intsholongwane yeziqhamo zesitrasi itristera, isifo sokubuna kweengcambu kwakunye nokubola kweziqhamo zesitrasi.

Uthotho lwezityalo

Zizityalo ezikusaphi lweRutaceae ikakhulu, kuquka:

- Yonke imveliso yesitrasi
- I-orenji jasmine (iMurraya paniculata)
- Igqabi lekhari

Uzasazo lwangoku

- Ise-Asia
- EPapua New Guinea
- EMelika (kuMandla, kuMbindi nakuMazantsi)
- ETopiya
- EKenya
- EMorishiyasi
- NaseReunion

Uhlobo lokusasazeka

- Izasasazi zezifo ezizizambuzane

Ipsyllid yase-Asia yesitrasi nqwa (i-ACP) (iDiaphorina citri) kunye netrizoid yesitrasi yase-Afrika (i-ACT) (iTriozia erytreae). Zizondla ngencinci yeflora yeziqhamo ezosulelekileyo. Xa sele ingenile, igciwane lingaxhathisa lihlahle kwivektha leyo isithuba seenyanga ezintathu, ze lidlulise igciwane leHLB xa lizondla.



Ii-ACP esezikhulile ziyamelana nelanga yaye aziphili kuphela kwiingingqi ezineemo ezithile zezulu.

Aziko eMzantsi Afrika



Ii-ACT esezikhulile azimelani nelanga yaye zidinga ukuphila kwiingingqi eziphileyo.

Ziko eMzantsi Afrika

- Izixhobo zeziqhamo ezosulelekileyo

Izixhobo zokutyala kwesitrasi (imithi, izijongqe, izikhondo, izikhuni) ndawonye nezixhobo zokutyala ezinye izityalo

- Azosulelwa ziziqhamo okanye zizithelo

Iintshukumo zokusithintela

- Iinkqubo zokubekela bucala ngenjongo yokuziswa kwezixhobo zokukhulisa iziqhamo zesitrasi kunye nezinye izityalo
- Imithi yesitrasi eqinisekiswa ngokwezityalo ukuba ayinasigulo
- Ulwazi kwakunye nokujongajonga ngenjongo yokunisekisa ukufunyaniswa kwangethuba kwanokufakwa ngokukhawuleza kwamalinge olawulo
- Ukuthintela uhlaselo kunye nokusasazeka kwe-ACP, kuquka ulawulo olusebenzayo lwe-ACT
- Musa ukuzisa izixhobo zezityalo ezingekho mthethweni eMzantsi Afrika kwanakwifama yakho!

For Ngeenkukacha ezithe ngesi sifo, okanye ukuba uthi ufumane nantoni na engaqhelekanga, qhakamshelana noWayne Kirkman weCandelo lezoKhuseleko lweZityalo leCRI: waynek@cri.co.za, 084 458 0349

Isinikezelo: Ingxam yolu papasho lunjongo ikukwazisa ngokuphangalelo kuphela, yaye akukho mntu uya kwenza intshukumo, okanye asilele ekwenzeni intshukumo ngokususelela kwinkukacha eziqulathwe ngaphandle kokufumana iinkukacha zeengcali. ICitrus Research International (iCRI) ndawonye nabo bonke abantu abasebenzela iCRI bazikhwebula ngokuphandle kubutyala malunga nayiphi na into ethi zenywe ngokubeka ithemba kolu papasho.

Eli phetshana leenyano likhutshwe liCandelo loKhuseleko lweZityalo leCRI, kweyoMqungu ka2024

Threat #1:

Huanglongbing (Asian Citrus Greening)

“Where HLB moves in, Citrus moves out”

- HLB is described as the most destructive citrus disease globally.
- It is caused by a bacterium and is spread by the Asian Citrus Psyllid and infected plant material.



Despite billions of rands invested in research, there is currently no treatment for the disease once the tree becomes infected.



Is SA citrus industry prepared for HLB?

- Official HLB Steering Committee.
- HLB/ACP Action Plan adopted.
- CRI has a dedicated HLB research portfolio.
- CRI established a Biosecurity division, including a Biosecurity Advisory Committee, with a clear strategic framework.
- Regional cooperation with neighboring countries is critical as pests do not recognise borders. Currently we have surveillance networks in Mozambique, Zimbabwe, Botswana, Zambia and Tanzania.



Take Home Message



- Biosecurity is not the responsibility of a few specialists.
- Biosecurity cannot be left to government alone – industries have to play their part in securing their futures.
- Biosecurity is a shared responsibility.
- Awareness and training are key - know your enemies.

Closing

- The success of our industries depends not only on production, but also on our ability to protect what we produce.
- The invisible threats are real.
- And while we may not always see them, their impacts can be enormous.
- The question is therefore not whether biosecurity matters.
- The question is whether we are prepared enough.

