Session 6:
Gaining, Retaining and
Optimising Market Access

CGA CITRUS SUMMIT

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Biosecurity: The Threat of Huanglongbing (HLB, Asian Greening)

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What Is Biosecurity?

A set of management practices to reduce the risk of entry and spread of pests (includes diseases) not already present in the country

Biosecurity breaches may have serious implications:

- Reduce agricultural yield, quality and value
- Increase cost of production (cost of control measures)
- Undesirable environmental impact
- Impair trade through constrained market access
- In the case of very serious pests it can result in the end of affected commercial agricultural industries with extensive socio-economic implications

What Is the Risk Trend?

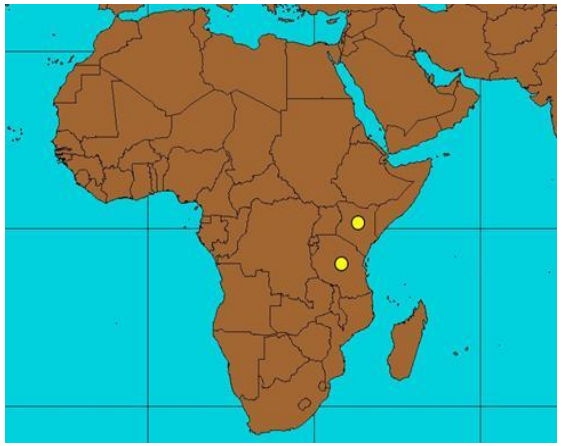
Internationally there is a significant increase in global trade and people movement → Creating a rapid biosecurity risk highway

What Is the Southern African Citrus Industry Exposure?

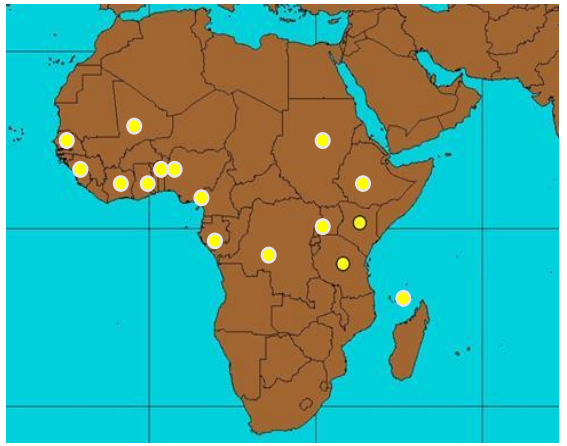
- Currently SA is free from many devastating citrus pests
- Southern Africa is not an island and shares risk exposure with the whole of sub-Saharan Africa
- Intra-African movement is subject to little effective control
- Once a pest enters Africa, spread throughout is likely
- Incursions directly into southern Africa are also an ever-present threat (illegal movement of plant material happens all the time, mostly through ignorance of risks)

Recent Examples: *Bactrocera Dorsalis (Invadens)*

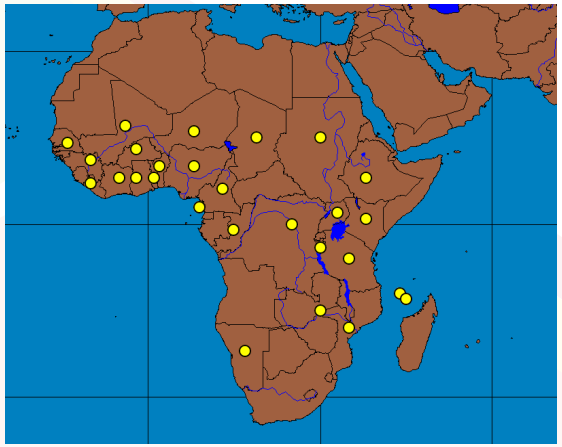
2004



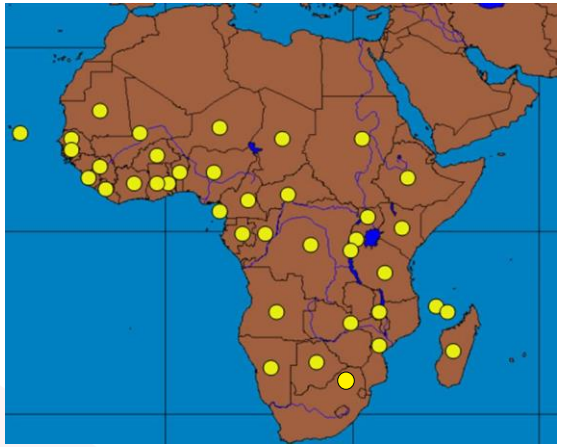
2006



2009



2014



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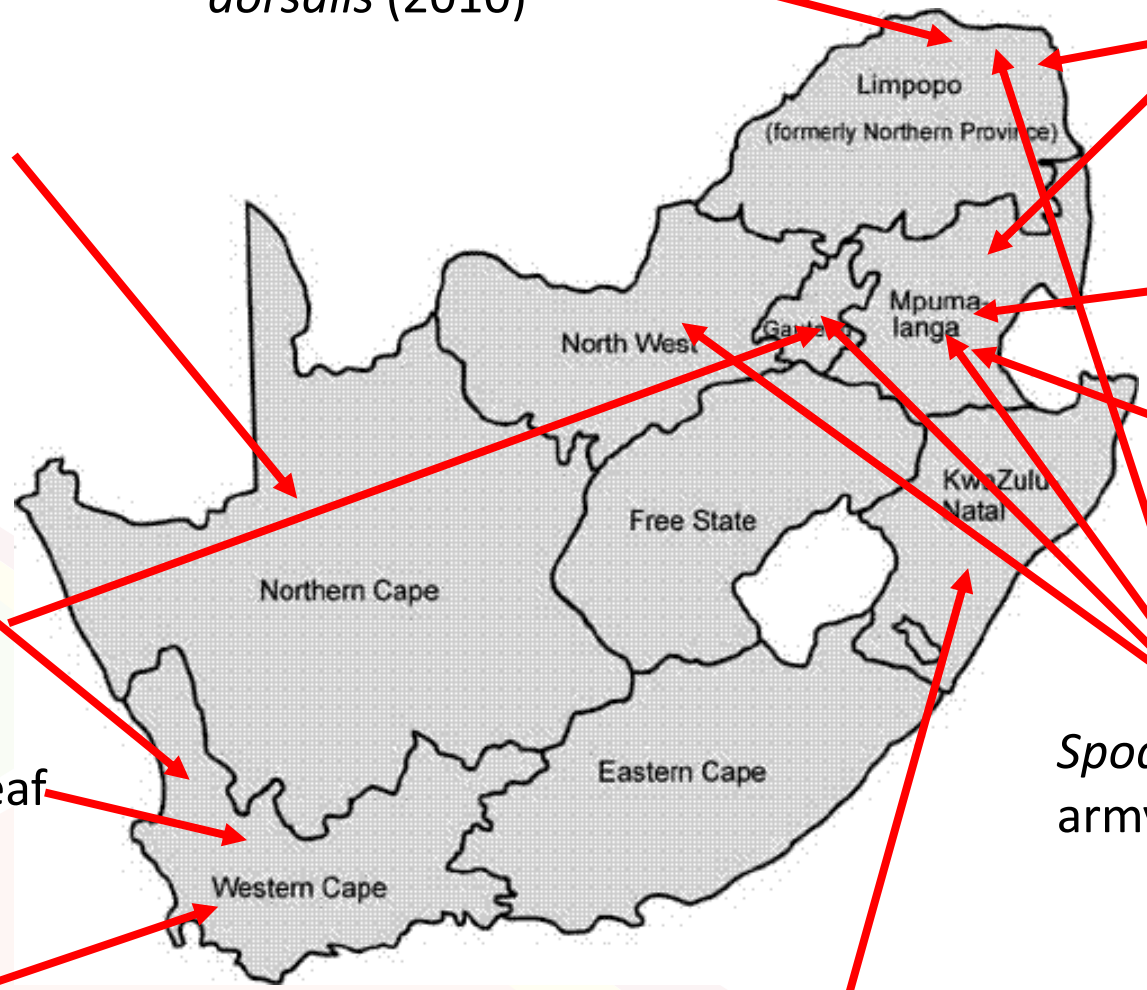
Recent South African Biosecurity Incursions



Bactrocera invadens / dorsalis (2010)

Pepper mild mottle virus (2007)

Raoiella indica (Red palm mite) (2016)

Acalitus vaccinii (Blueberry bud mite) (2016)

Aleurothrixus floccosus (wooly whitefly) (2010)

Tuta absoluta (Tomato leaf miner) (2016)

Spodoptera frugiperda (Fall armyworm) (2017)

Holocasista capensis (leaf miner) (2016)

Aster yellows phytoplasma (2008)

Banana Bunchy Top Virus (2017)

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Biosecurity Threats (Fruit Fly) – Watch List

Anastrepha bistrigata
Anastrepha distincta
Anastrepha fraterculus
Anastrepha ludens
Anastrepha obliqua
Anastrepha pseudoparallela
Anastrepha serpentina
Anastrepha sororcula
Anastrepha striata
Anastrepha suspensa
Anastrepha turpiniae

Bactrocera aquilonis
Bactocera carambolae
Bactrocera correcta
Bactrocera curvipennis
Bactrocera kirki
Bactrocera latifrons
Bactrocera melanota
Bactrocera minax
Bactrocera neohumeralis
Bactrocera passiflorae
Bactrocera psidii
Bactrocera trivialis
Bactrocera tryoni
Bactrocera tsuneonis
Bactrocera xanthodes

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Biosecurity Threats (Insects) – Watch List

Biprorulus bibax [Pentatomidae]
Ceratitis malgassa [Tephritidae]
Ceroplastes ceriferus [Coccidae]
Ceroplastes cirripediformis [Coccidae]
Ceroplastes floridensis [Coccidae]
Ceroplastes grandis [Coccidae]
Ceroplastes japonicus [Coccidae]
Ceroplastes sinensis [Coccidae]
Citripestis sagittiferella [Pyralidae]
Clepsis peritana [Tortricidae]
Coccus pseudomagnoliarum [Coccidae]
Conogethes punctiferalis [Crambidae]
Ctenopseustis obliquana [Tortricidae]
Deudorix isocrates [Lycaenidae]
Dialeurodes citri [Aleyrodidae]
Dirioxa pornia [Tephritidae]
Deudorix isocrates [Lycaenidae]
Dialeurodes citri [Aleyrodidae]
Dirioxa pornia [Tephritidae]
Drosophila immigrans [Drosophilidae]
Drosophila paulistorum [Drosophilidae]
Drosophila pseudoobscura [Drosophilidae]
Drosophila repleta [Drosophilidae]
Drosophila willistoni [Drosophilidae]
Dysmicoccus neobrevipes [Pseudococcidae]
Dysmicoccus nesophilus [Pseudococcidae]
Ecdytolopha aurantianum [Tortricidae]
Egira curialis [Noctuidae]
Epiphyas postvittana [Tortricidae]
Eudocima fullonia [Noctuidae]
Eudocima salaminia [Noctuidae]
Euzopherodes vapidella [Pyralidae]
Frankliniella bispinosa [Thripidae]
Frankliniella kelliae [Thripidae]
Pseudaonidia duplex [Diaspididae]
Pseudococcus calceolariae [Pseudococcidae]
Pseudococcus cryptus [Pseudococcidae]
Pseudococcus elisae [Pseudococcidae]
Pseudococcus jackbeardsleyi [Pseudococcidae]
Rastrococcus iceryoides [Pseudococcidae]
Rastrococcus invadens [Pseudococcidae]
Rastrococcus rubellus [Pseudococcidae]
Rastrococcus spinosus [Pseudococcidae]
Scirtothrips citri [Thripidae]
Scirtothrips dorsalis [Thripidae]
Scirtothrips inermis [Thripidae]
Selenaspidus articulatus [Diaspididae]
Thrips hawaiiensis [Thripidae]
Thrips palmi [Thripidae]
Trioza erytreae [Triozidae]
Unaspis citri [Diaspididae]
Unaspis yanonensis [Diaspididae]
Vinsonia stellifera [Coccidae]

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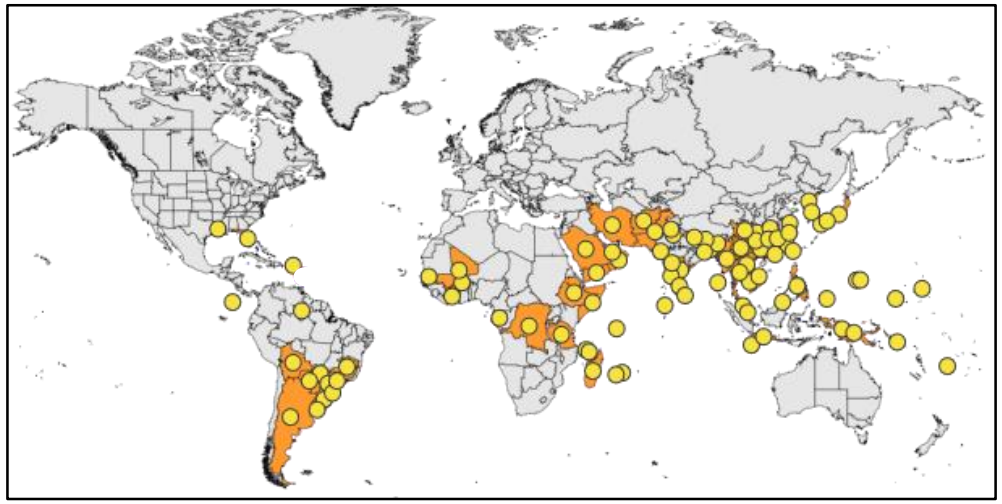
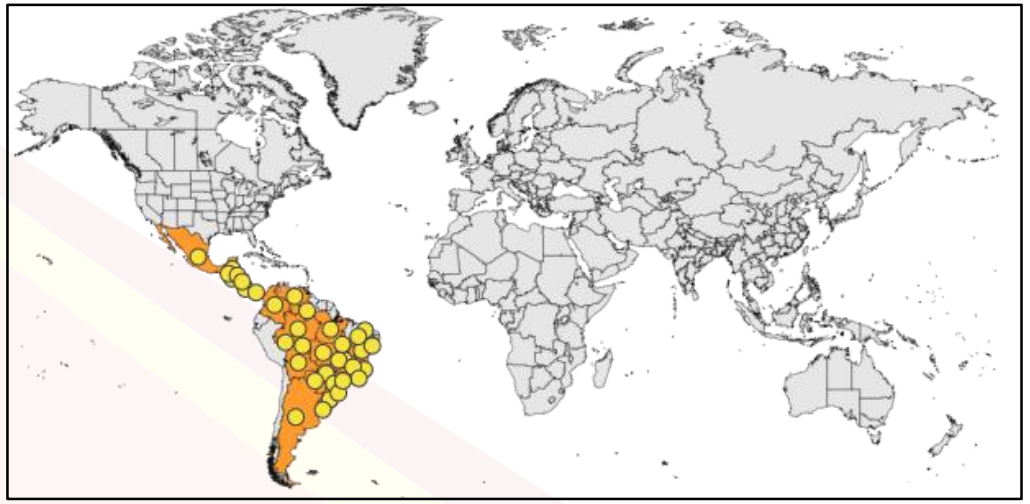
Biosecurity Threats (Pathogens) – Watch List

CITRUS CANKER Causal organism: *Xanthomonas axonopodis* pv. *citri*



LEPROSIS Causal organism: Leprosis virus - Vector: *Brevipalpus* spp. mites



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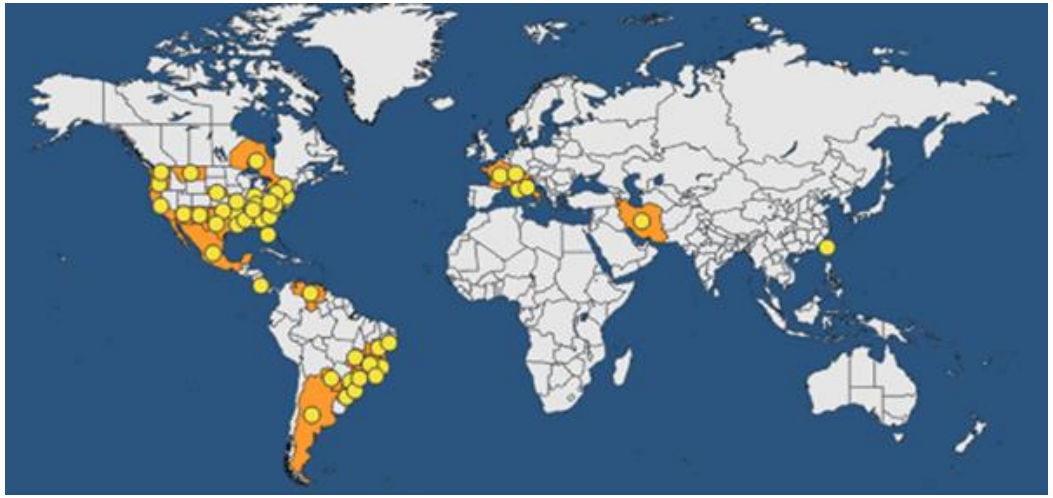
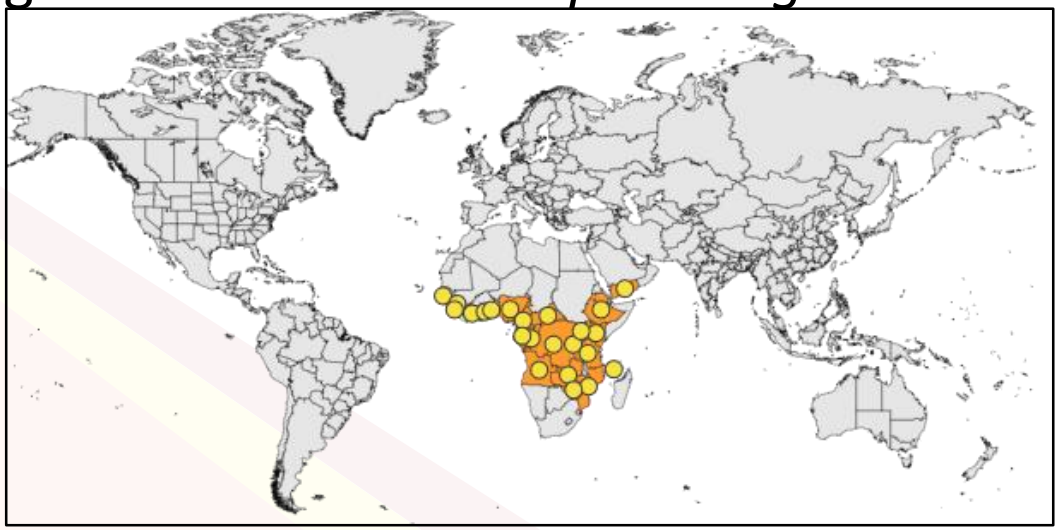
Biosecurity Threats (Pathogens) – Watch List

CITRUS VARIEGATED CHLOROSIS Causal organism: *Xylella fastidiosa*



PSEUDOCERCOSPORA Causal organism: *Pseudocercospora angolensis*



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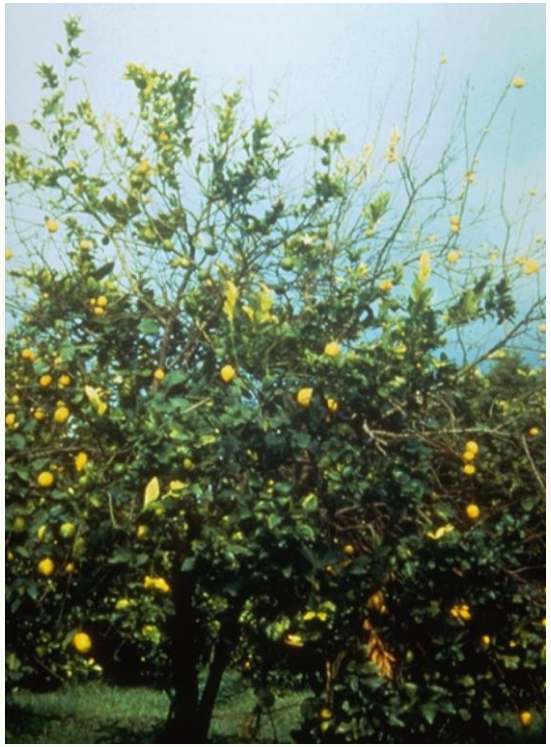
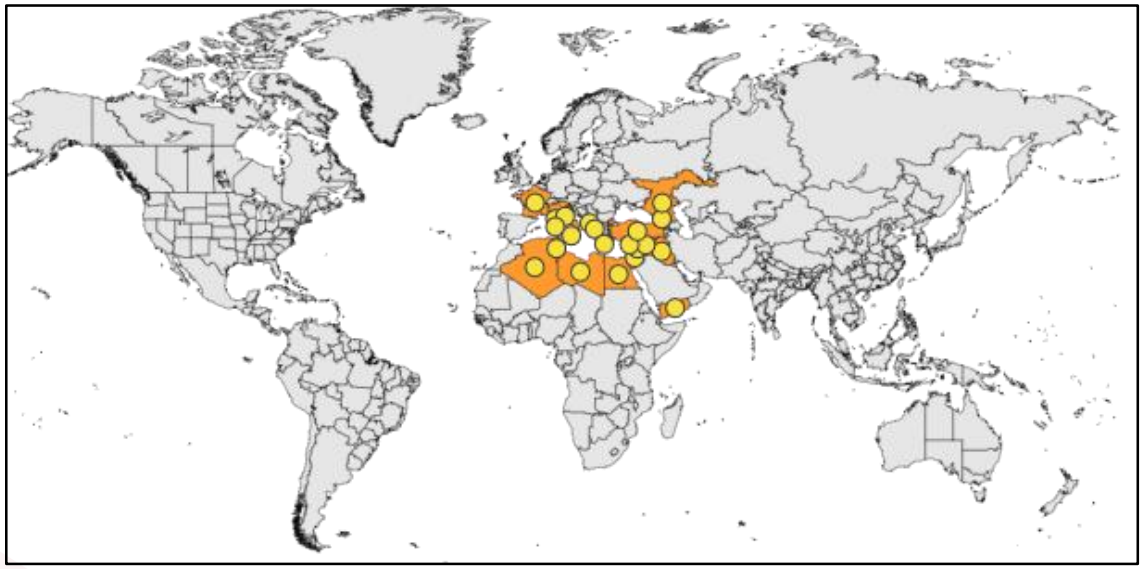
Biosecurity Threats (Pathogens) – Watch List

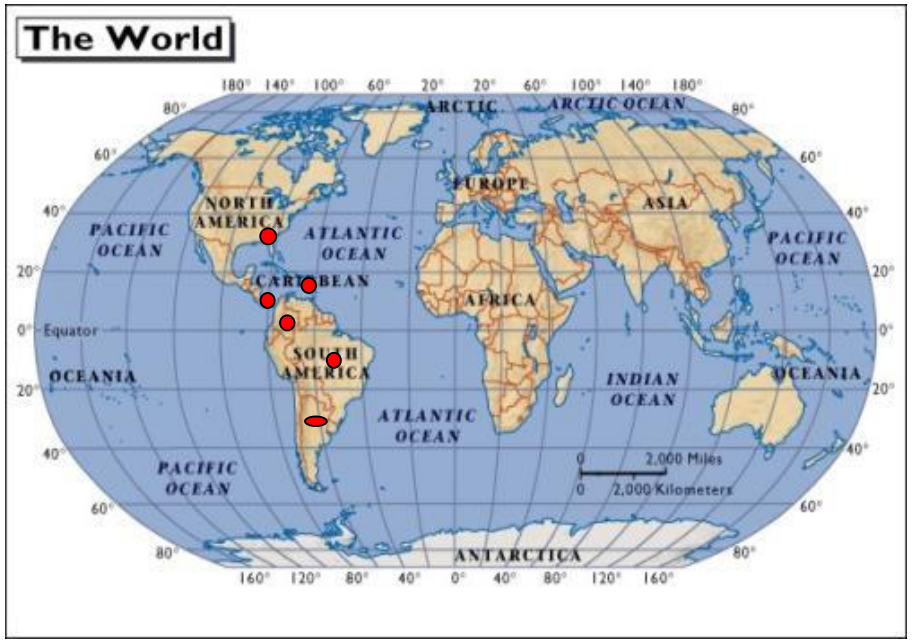
MAL SECCO Causal organism: *Phoma tracheiphila*





Biosecurity Threats (Pathogens) – Watch List

POSTBLOOM FRUIT DROP Causal organism: *Colletotrichum acutatum*



Greatest Biosecurity Threat

HUANGLONGBING (HLB; ASIATIC GREENING)

Causal organism: *Candidatus* Liberibacter asiaticus & vector *Diaphorina citri*

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HLB

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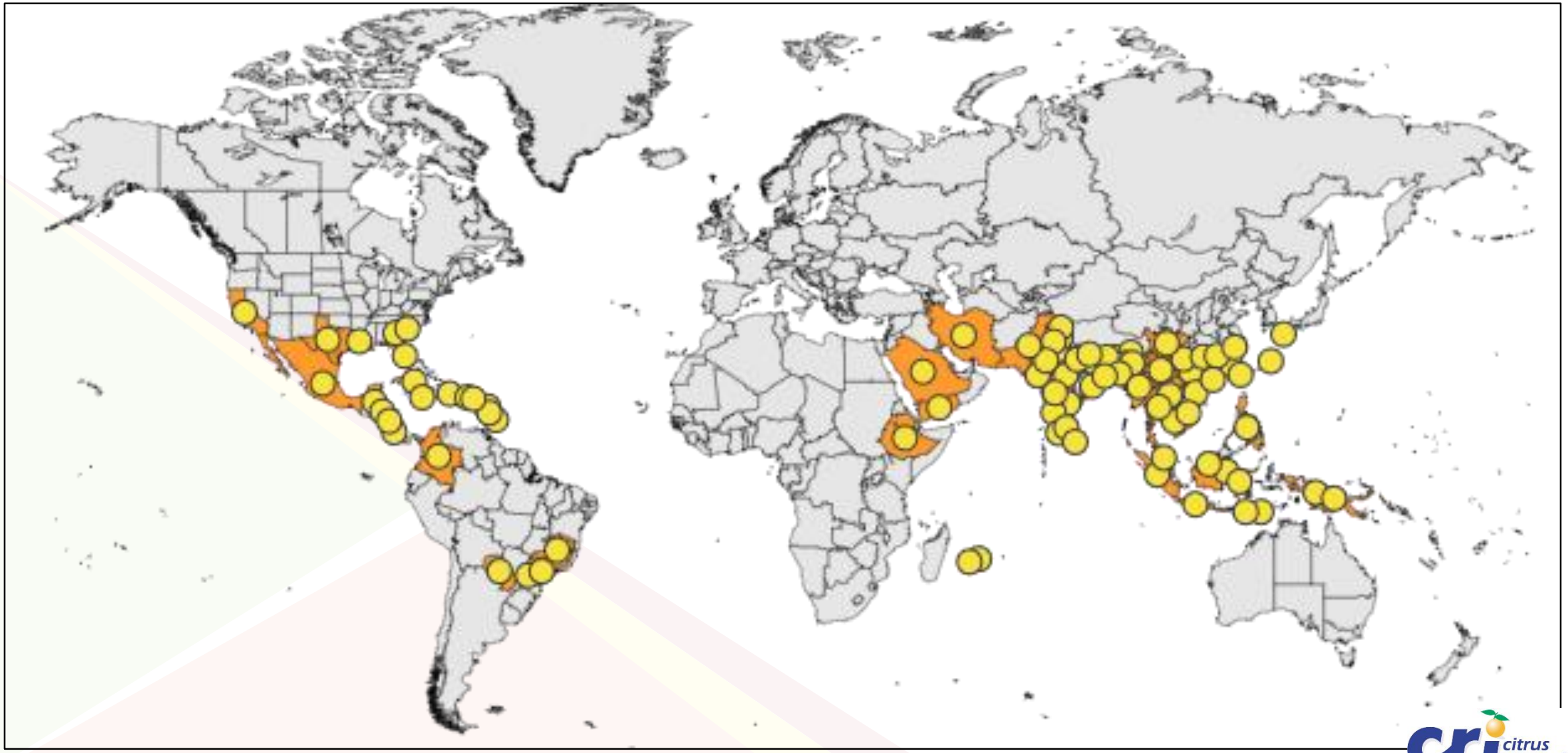
HLB – Global Distribution



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HLB – This Is Not African Greening!

- Most destructive citrus disease globally; caused by a phloem-limited bacterium - *Candidatus* Liberibacter asiaticus that is heat tolerant
- Disease is vectored by the Asian citrus psyllid *Diaphorina citri* that is heat tolerant (and potentially the African citrus psyllid, *Trioza erytreae*)
- Spread by movement of infected plant material (trees and budwood)
- Alternative hosts - *Murraya* spp (Orange jasmine) and *Severinia buxifolia* (Box orange)
- Very difficult to contain spread - trees can be infected for longer than 2 years without visible symptoms and early diagnostic tests not reliable
- After infection trees decline, become economically useless due to poor fruit quality + fruit drop and die

Florida – The Low Road

- The vector, Diaphorina citri, first reported in 1998
- The disease first detected in 2005
- An industry based on Grapefruit and Oranges (highly susceptible)
- HLB impact was compounded by Canker
- Will / ability to act decisively was insufficient: “we cannot stop it”
- Single biggest failure: “we did not stop the movement of risky plant material”
- Major contributor to failure: unwillingness to enforce hard measures and misleading claims that infected trees can be “managed” through nutrition
- Did not remove infected / symptomatic trees and apply strict area-wide coordinated controls
- Disease went into exponential growth phase, became an irreversible epidemic

Florida – The Low Road

- More than 15 000 job losses
- Estimated >90% of Florida's citrus trees and acreage is infected
- USDA production forecast (2015/16 orange crop): down by 66% since 2004; Grapefruit: down by 75% since 2004
- Florida's orange forecast for 2016/17: down by a further 14% from last season
- Since 2009 more than $400m (R5.2bn) has been spent for ACP-HLB research
- In 2017 USDA allocated another $13.1m (R170m) to HLB research

Brazil – The High Road of Hope

- The vector, D. citri, first reported in 1942
- The disease first detected in 2004

Year	Intervention	% Area HLB + in Sao Paulo State	% trees symptomatic
2004	Surveys	3	-
2007	Surveys	13	-
2008	Surveys	19 (100 in centre)	-
2005 - 2012	**Removed 18 m trees & Area-wide vector control**		
2012	Surveys	-	7
2015	Surveys	-	18
2016	Surveys	-	17

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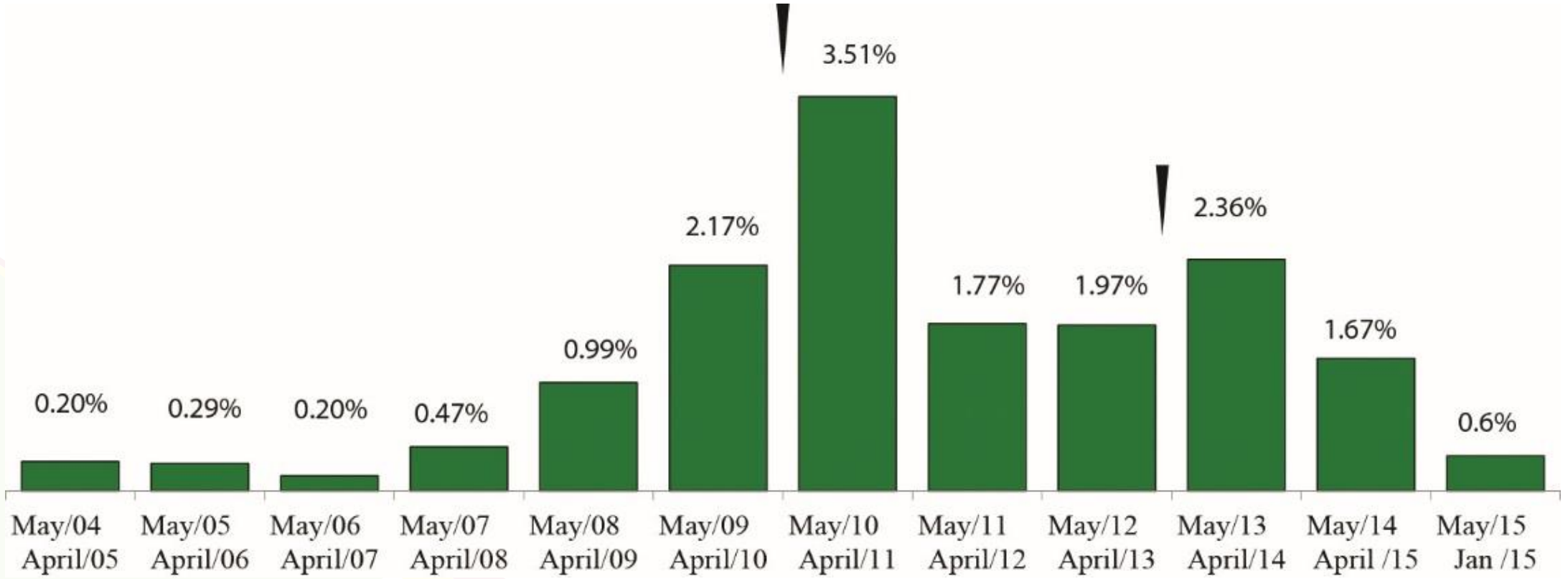
Brazil – The High Road of Hope



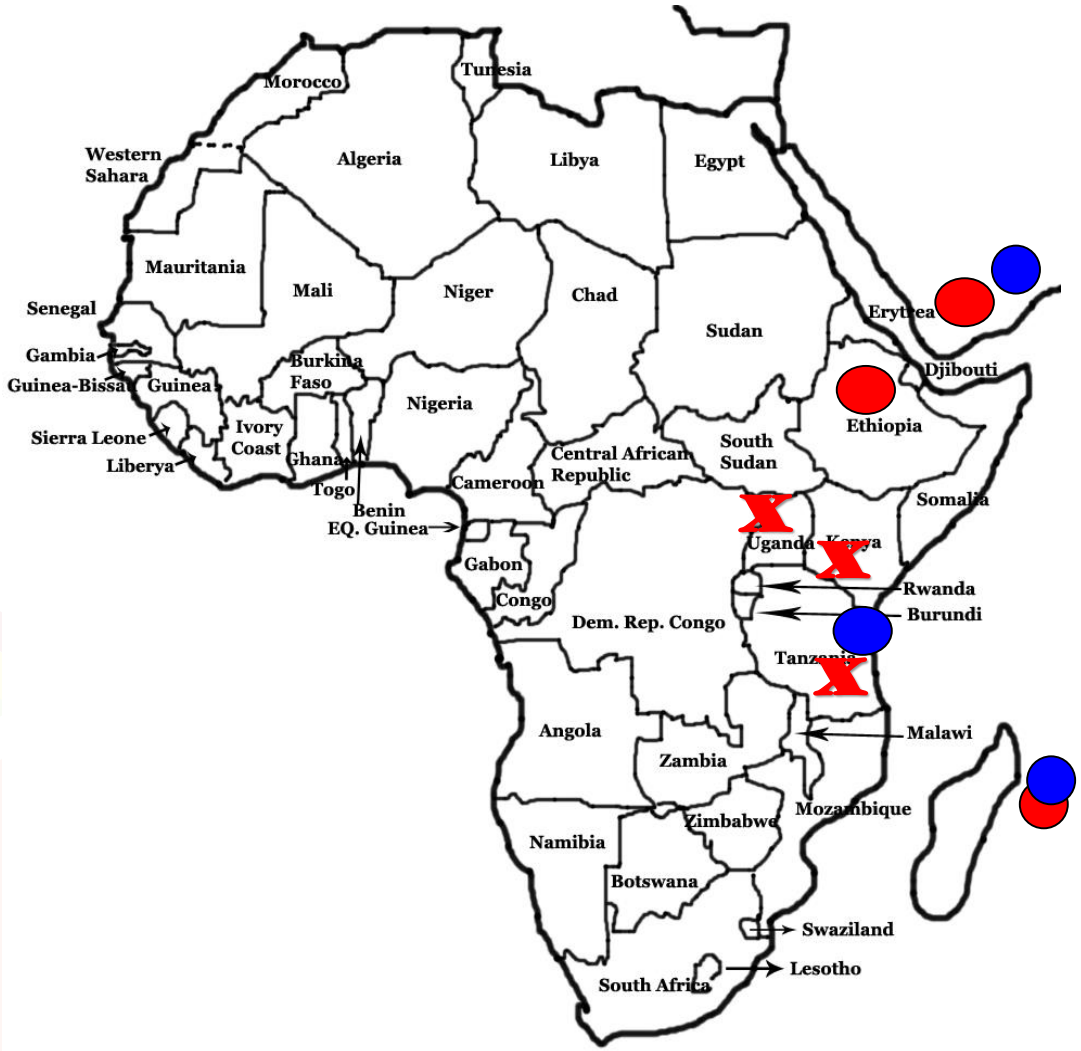
Annual incidence of new infections (trees removed) in a citrus area under control. First arrow - aggressive vector management; second arrow - neighbouring orchard removed without first treating with insecticides

Brazil's 10 Point Plan

POSITIVE ATTITUDE - WE CAN "DO" WHAT IS NECESSARY TO SURVIVE HLB

1. Plan planting and replacements
2. Plant healthy nursery trees (compulsory citrus improvement scheme and all trees produced in insect-secure structures)
3. Speed up plant growth and production
4. Inspect frequently for HLB-infected trees
5. Eliminate diseased plants
6. Monitor for psyllid presence
7. Control the vector
8. Intensive management at the edges
9. Take part in regional management
10. Partner with neighbours

Status of HLB and Vector in Africa



HLB

Vector

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CRI Preparedness Actions

Action Plan

- 2012 original HLB emergency response Action Plan compiled between CRI and DAFF
- Periodically updated in line with other countries' action plans and experiences
- External advice taken from other countries to identify key points
- To be workshopped with CISAC members and updated

Surveillance

- Greening surveys have been periodically conducted in SA for many years to delimit African Greening and more recently HLB included
- Africa: Identified risk areas have been surveyed to establish HLB status eg. Angola, East Africa & Ethiopia
- Collaboration established in East Africa - continuing with surveillance, movement control & awareness
- Collaborations being developed in other African countries, including Namibia, Mozambique, Zambia, Botswana

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CRI Preparedness Actions

Planning & Resources

- A Biosecurity focus established in CRI (Biosecurity Manager post), with budget allocation from CGA
- A Biosecurity Advisory Committee is to be established

Regulation

- CRI has worked with DAFF in amending relevant legislation for control of exotic pests
- CRI has strongly advocated a compulsory statutory CIS, but has to date been blocked by other parties – very NB risk mitigation factor that must be put in place before pest arrives
- Advised DAFF on high risk traveler pathways for intensified quarantine screening

CRI Preparedness Actions

Citrus Improvement Scheme (CIS)

- 2016 review and action plan focussed on biosecurity and preparedness actions:
  - CIS and nursery specific HLB disaster management plan to be drafted
  - Improved biosecurity measures at all CIS facilities
  - Change-over to tree production in insect-secure citrus nurseries
  - Capital investment might require a tree price increase

Research

- International research networking links established and supported to stay abreast of HLB research progress – promising prospects beginning to emerge
- Collaborative research projects established with USA laboratory where promising prospects of future solutions are evident (RNAi)
- Collaborative research being conducted on vector control in Mauritius
- Early detection using dogs – project started, dogs being trained

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CRI PREPAREDNESS ACTIONS

Awareness

- CRI has engaged with DAFF to ensure awareness of the HLB risk and identify required preparedness actions
- CRI represents the citrus industry on various fora for Industry-Government cooperation on plant health, including the Phytosanitary Risk Committee which has formed an HLB Focus Group
- CRI Research Symposia (2016, 2014 & 2012) included strong international participation to advocate HLB awareness
- CRI preparing grower information packages and encourage participation in regional surveillance network
- Do not allow budwood to be brought in illegally; report biosecurity concerns to CRI (prevention is possible; cure is not)

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Thank you

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