National Plant Surveillance Workshop –
Opportunities for Forest Sector

Observer Report of Annual Workshop of the Subcommittee
National Plant Health Surveillance (SNPHS), Melbourne 24-
25 May 2016

Francisco Tovar
IPMG Research & Biosecurity

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Biosecurity & Forestry – Planning, Capacity, Preparedness

MEMBERS
- Federal Government (DAWR)
- State Biosecurity (Ag Dept.)
- Plant Health Australia (PHA)

OBSERVERS
- Plant Biosecurity CRC
- Invited experts (CSIRO...)

Sub-committee on Domestic Quarantine and Market Access (SDQMA)

Sub-committee on Plant Health Diagnostics (SPHD)

Subcommittee on National Plant Health Surveillance (SNPHS)

Angus Carnegie

Francisco Tovar

National Biosecurity Committee (NBC)

Plant Health Committee (PHC)

Federal, State/Territory Ministers

Resources Chamber

Forest Health & Biosecurity (FHaB)
Shared responsibilities in biosecurity between government/industry/public could present **ongoing risks to forestry**

1. **Fragmented responsibility** – it remains unclear who is responsible for ensuring that **things actually get done** – federal, state or industry. **Potential gaps in system.**

2. **Agency under resourcing** – New and ever increasing trade pathways and decreasing government resources. If industry not actively engaged then **sector-specific risks could be missed.**

3. **Engagement pathways not clear** – Biosecurity decision making is mostly government-agency centric with Plant Health Australia (PHA) broadly representing industry. Specific industries have to lobby to get a place on the decision making tables.
## Agenda

### DAY 1

**Surveillance for plant industries – where do we want to be by 2020?**
- Australia’s Biosecurity system – Kim Ritman (CPP)
- Victorian Biosecurity - Gabrielle Vivian-Smith

**General Surveillance systems in the grains industry**
- VIC Grains Industry Network
- General surveillance in the grains industry
- Grains Farm Biosecurity Program
- CropSafe

**WORKSHOP**

**Tools for Data Capture**
- MyPestGuide/PestFax - Laura Fagan (DAFWA)
- AusPestCheck - Nick Woods (PHA)
- Field Tools for surveillance - Rohan Kimber (SARDI)

**Surveillance in other plant industries**
- Citrus First Detector Network (Stuart Petty Grew C- citrus Growers)
- Biosecurity in the Vegetable Industry - Nicholas Schmidt (Veg. Growers Ass.)
- Surveillance in plant industries in NZ - Rory McLellan (MPI NZ)

**WORKSHOP**

### DAY 2

**Statistical significance of surveillance programs**
- Statistical Modelling for risk based surveillance
- Bayesian analysis for general surveillance
- Statistical analysis of the CropSafe model
- The conceptual model for general surveillance.

**Pest prioritisation and surveillance**
- Pest prioritisation and surveillance – Susie Collins (DAWR)
- Incorporating measures of economic, environmental and community impact into the ranking of national priority plant pests – a spreadsheet-based tool

**WORKSHOP - Surveillance for plant industries in 2020**

**Tools for Data Capture**
- Should we evolve the grain surveillance network - how?
- How would you prioritise systems (maintaining and evolving current systems, and pursuing opportunities)?
- How might we confidently use general surveillance and/or NMDS?
- What are the key tools, methods and capacity challenges?
- Where should we leverage from cross sectoral opportunities?
- What's needed to fill the knowledge gaps?
- What's needed to fill other resource gaps?
- What's needed to engage third parties?
- What are the recommendations?
Federal Government
Federal Government

Agricultural Competitiveness WP

“... to build a more profitable, more resilient and more sustainable agriculture sector, to help drive a stronger economy and increase returns to farmers through the farm gate”

1. A fairer go for farm businesses
2. Building the infrastructure of the 21st century
3. Strengthening our approach to drought and risk management
4. Farming smarter
5. Accessing premium markets

$200 million to improve biosecurity surveillance and analysis nationally, including in northern Australia

FORESTRY

• Focused on Agriculture but systems being built could be used by forestry
• Focused on Northern Australia
  ✅ Potential Hardwood Pests Mitigation
  ✅ Surveillance, Integrated information systems and diagnostic improvements all areas we could engage with
  ✅ Who? A coordinated approach would be BEST! FHaB?
Victoria

OBJECTIVES
1. Maintain and enhance access to markets
2. Prevent or minimise production losses through early detection
3. Respond to incursions in technically feasible and cost effective ways
4. Minimise social and environmental impacts
5. Align with national surveillance arrangements

SURVEILLANCE
- Recognised systems for general and third party surveillance
- Area freedom systems validated and recognised
- Surveillance planning tools
- Smarter surveillance technology (remote detection, in field diagnostics, data capture and analysis with streaming and feedback loops)
- Traceability systems

FORESTRY
- Objectives align well with forestry
- Still a more market access perspective rather than resource protection
- VIC has a State-Based Forest and Timber Biosecurity Framework
- A National Forest Biosecurity Framework is needed
- Traceability systems could be implemented in plantation Hardwood forestry on farms – could be a way to engage with biosecurity agencies
Pest surveillance in the grains industry - gaps, opportunities and applicability to other industries.

**Proactive rather than Reactive**

- **Surveillance**
  - Biotic threats,
  - National & regional

- **Situation Analysis**

- **Management**
  - New knowledge,

<table>
<thead>
<tr>
<th></th>
<th>Investment 2016/17</th>
<th>% of Crop Protection</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease</td>
<td>$31,124,227</td>
<td>56%</td>
<td>69</td>
</tr>
<tr>
<td>Weeds</td>
<td>$16,984,498</td>
<td>30%</td>
<td>24</td>
</tr>
<tr>
<td>Pests</td>
<td>$7,789,639</td>
<td>14%</td>
<td>23</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$55,898,364</strong></td>
<td><strong>100%</strong></td>
<td><strong>116</strong></td>
</tr>
</tbody>
</table>
Pest surveillance in the grains industry - gaps, opportunities and applicability to other industries.

**Crop Protection Surveillance**

State projects (Qld, NSW, Vic, SA, WA)

- **Resistance surveys (chemical & genetic)**
  - Australian Cereal Rust Control Program (ACRCP)
  - Centre for Crop and Disease Management (CCDM, P9)
  - National Canola Pathology Program
  - Septoria (NSW), RLEM, GPA, DBM
  - Weeds – every sub region, every 5 years
  - Grain storage (PBCRC)

- **Biosecurity preparedness**
  - Karnal bunt
  - Wheat blast
  - Permits

- **Emergency response**
  - EPPRD
  - BWYV

- **R&D**
  - Automation
  - PBCRC
Pest surveillance in the grains industry - gaps, opportunities and applicability to other industries.
Pest surveillance in the grains industry - gaps, opportunities and applicability to other industries.
Key points

2. Grains Biosecurity Officers Program based in Western Australia, South Australia, Victoria, New South Wales and Queensland
3. CropPro - A Grains Industry Network comprising CropSafe (diagnostics), GrowNote Alerts (warnings, information, reporting) eXtensionAus (expert info) systems
4. Promising new tools for data capture or early warning, GrowNote Alerts, MyPestGuide Reporter, Twitter monitoring, Website Monitoring, etc...

**FORESTRY**

- In comparison forest biosecurity RD&E is ad-hoc and poorly coordinated - need to improve
- Rather than re-invent the wheel should leverage and cooperate with GRDC and States to gain access or customise and re-brand for forestry
Tools, methods and capacity required to undertake general surveillance

The reach to date
307,000 employed in agriculture in Australia

2010-11 Data. 134,000 farm businesses (99% family owned), 53,700 broad acre farms

NSW 18,000; VIC 12,500, QLD 9,500, WA 6,500, SA 6500, TAS 1,000 and NT 200

(34%) (23%) (18%) (12%) (12%) (2%)

(30%) (28%) (9%) (9%) (11%) Other 14%
Tools, methods and capacity required to undertake general surveillance

**CropPro**

> 20% Sthn grains users past 12 months

**Websites as early warning:**

**Crop Disease Manual**

Timebound and potentially actionable.

South Australian traffic
Tools, methods and capacity required to undertake general surveillance
Tools, methods and capacity required to undertake general surveillance

A national system for priority alerts

- Urgent, actionable and economically important
- Tailored to crops and areas of your interest
- Delivered the way you want it
- Provides call-to-action & direct link to expert information

How does it work?

- Powered by proven systems used by emergency services
- Co-operation with pest, disease and weed experts
- Aligned to GRDC grower services zones
- Tailored to what users told us they wanted
- Provide reporting tool/data

Surveillance Channel

- Web and App-based reporting
- Location detection (lat/long)
- Crop type and preceding crop
- Image upload
- Auto forward function to subject expert by crop, pest and jurisdiction
Tools, methods and capacity required to undertake general surveillance

VIC

Crop Disease app

WA

SIMILAR APPS & INFO – REPEAT EFFORT … WHICH ONE TO USE NATIONALLY?
Tools, methods and capacity required to undertake general surveillance

Virtual Coordination Centre – AusPestCheck (APC)
Tools, methods and capacity required to undertake general surveillance

Key points
1. Numerous Tools have been or are being developed – all show promise
   - VCC- AusPestCheck (National)
   - CropSafe, CropAlerts, GrowerNOtes, (Victoria)
2. Development still seems to be occurring in jurisdictional silos!! – Repeat effort, No data integration (VCC?)
3. Agreed diagnostic, reporting and privacy protocols still an issue slowly being resolved

FORESTRY
- Numerous Tools have been or are being developed – all show promise
- Rather than re-invent work with developers to customise for forestry use
- We have to avoid working in jurisdictional silos developing separate apps that do the same thing! – coordinated approach
- VCC-AusPestCheck has potential to develop a National Forestry Surveillance Dataset
Surveillance in other industries – Citrus

Key points

1. Citrus surveillance initially driven by two key pests Asian Citrus Psyllids and Huanlongbing virus (Citrus Greening)
2. 2014-2016: Coordinated Surveys of all major growing regions – establish area freedom – with government funding/in-kind support
3. First Detector Network (FDN) Created= Scouts, Grower Liaison Officers, Agronomists, Resellers etc.
   - Works on 2 levels – structured surveys with scouts, everyone else
   - Most likely to spot something unusual
   - Effective communication channel
   - ‘Negative’ records collected daily!

FORESTRY

- National coordinator was used to drive change and implement – Forestry?
- FDN = Foresters, Weed/Pest Contractors, Harvesting, Landholders, etc...
- ‘Get started, then get better’
Statistical significance of Surveillance systems

How does the likelihood of detection change probability of area freedom? A sensitivity analysis

Comparing area surveyed to reach $P(\text{free}) = 0.95$ using staff with 80% method accuracy vs staff with 60% method accuracy
**Key points**

1. General surveillance show great promise now that with repeat visits or cumulative data robust confidence limits can be assigned!....

2. General surveillance still has to be part of a system of “surveillance” across the continuum (Russian Green Aphid) – including targeted surveillance

3. Risk based models miss outliers (e.g. cut flowers)

4. Investment in pathways analysis is key for planning of both targeted surveillance (where & when) and general surveillance (who, when) efforts

5. THE FUTURE - Statistical analysis is moving away from P-value absence/presence estimates of confidence for particular pests to more complex, yet robust and flexible “whole of system” analyses (Bayesian modelling)

**FORESTRY**

- If we train foresters and contractors & provide the right tools as an industry we could rapidly develop area freedom dataset for some pests
- Forestry needs to engage more with DAWR and statistical experts to ensure adequate pathway analysis is being undertaken
- Are we considering pathways outside the supply chain?
A nationally agreed process for prioritisation of plant pests for surveillance

### 42 interim national priority plant pests

<table>
<thead>
<tr>
<th>Priority</th>
<th>Scientific name</th>
<th>Common name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Xylella fastidiosa and associated vectors (including <em>Homalodisca vitripennis</em>)</td>
<td>Various (depending on host) including Pierce's disease, leaf scorch, variegated chlorosis</td>
<td>Bacteria (hemiptera vector)</td>
</tr>
<tr>
<td>#2</td>
<td>Trogoderma granarium</td>
<td>Khapra beetle</td>
<td>Coleoptera</td>
</tr>
<tr>
<td>#3</td>
<td>Various, including <em>Bactrocera spp.</em>, <em>Ceratitis capitata</em>, <em>Drosophila suzukii</em></td>
<td>Exotic, economic fruit fly</td>
<td>Diptera</td>
</tr>
<tr>
<td>#4</td>
<td><em>Tilletia indica</em></td>
<td>Karnal bunt</td>
<td>Fungi</td>
</tr>
<tr>
<td>#5</td>
<td>'Candidatus Liberibacter asiaticus' (and other strains) complex</td>
<td>Huanglongbing (and psyllid vector)</td>
<td>Bacteria (hemiptera vector)</td>
</tr>
<tr>
<td>#6</td>
<td><em>Lymnaea spp.</em></td>
<td>Exotic gypsy moth</td>
<td>Lepidoptera</td>
</tr>
<tr>
<td>#7</td>
<td><em>Solenopsis spp.</em> and similar species</td>
<td>Exotic tramp ants</td>
<td>Hymenoptera</td>
</tr>
<tr>
<td>#8</td>
<td><em>Varroa spp.</em>, <em>Tropilaelaps spp.</em>, and <em>Acarapis woodi</em></td>
<td>Internal and external mites of bees</td>
<td>Acari</td>
</tr>
<tr>
<td>#9</td>
<td><em>Lissachatina fulica</em></td>
<td>Giant African snail</td>
<td>Gastropoda</td>
</tr>
<tr>
<td>#10</td>
<td><em>Hyalomma halys</em></td>
<td>Brown-marmorated stink bug</td>
<td>Hemiptera</td>
</tr>
<tr>
<td>#11</td>
<td>'Candidatus Liberibacter solanacearum' and <em>Bactericera cockerelli</em> (vector)</td>
<td>Zebra chip and tomato-potato psyllid complex</td>
<td>Bacteria (hemiptera vector)</td>
</tr>
<tr>
<td>#12</td>
<td><em>Puccinia graminis f. sp. tritici</em> (exotic strains)</td>
<td>Ug99</td>
<td>Fungi</td>
</tr>
<tr>
<td>#13</td>
<td><em>Diatrophiectes naxia</em></td>
<td>Russian wheat aphid</td>
<td>Hemiptera</td>
</tr>
<tr>
<td>#14</td>
<td><em>Xanthomonas citri</em> subsp. <em>citri</em></td>
<td>Citrus canker</td>
<td>Bacteria</td>
</tr>
<tr>
<td>#15</td>
<td><em>Puccinia psidii sensu lato</em> (exotic strains)</td>
<td>Guava (eucalyptus) rust</td>
<td>Fungi</td>
</tr>
<tr>
<td>#16</td>
<td><em>Phytophthora kernoviae</em> and <em>P. ramorum</em></td>
<td>Phytophthora blight and sudden oak death</td>
<td>Oomycete</td>
</tr>
<tr>
<td>#17</td>
<td><em>Apis spp.</em></td>
<td>Exotic bees</td>
<td>Hymenoptera</td>
</tr>
<tr>
<td>#18</td>
<td><em>Fusarium oxysporum</em> f. sp. <em>cubense</em> Tropical Race 4</td>
<td>Panama disease Tropical Race 4</td>
<td>Fungi</td>
</tr>
<tr>
<td>#19</td>
<td><em>Globodera spp.</em></td>
<td>Potato cyst nematodes</td>
<td>Nematoda</td>
</tr>
<tr>
<td>#20</td>
<td><em>Liriomyza spp.</em></td>
<td>Leaf miners</td>
<td>Diptera</td>
</tr>
<tr>
<td>#21</td>
<td><em>Erwinia amylovora</em></td>
<td>Fire blight</td>
<td>Bacteria</td>
</tr>
</tbody>
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<th>Priority</th>
<th>Scientific name</th>
<th>Common name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>#22</td>
<td><em>Mayetiola destructor</em> and <em>M. halid</em></td>
<td>Hessian fly and barley stem gall midge</td>
<td>Diptera</td>
</tr>
<tr>
<td>#23</td>
<td><em>Phytophthora omnivorum</em></td>
<td>Texas root rot</td>
<td>Fungi</td>
</tr>
<tr>
<td>#24</td>
<td><em>Cephus cinctus</em> and <em>C. pygmeus</em></td>
<td>Wheat stem sawfly</td>
<td>Hymenoptera</td>
</tr>
<tr>
<td>#25</td>
<td><em>Puccinia canaliculata</em></td>
<td>Golden apple snail</td>
<td>Gastrospoda</td>
</tr>
<tr>
<td>#26</td>
<td><em>Puccinia striiformis f. sp. hordei</em></td>
<td>Barley stripe rust</td>
<td>Fungi</td>
</tr>
<tr>
<td>#27</td>
<td><em>Heterodera sp.</em></td>
<td>Cyst nematodes</td>
<td>Nematoda</td>
</tr>
<tr>
<td>#28</td>
<td><em>Plum pox virus</em> (Potyvirus)</td>
<td>Sharka</td>
<td>Virus/viroid</td>
</tr>
<tr>
<td>#29</td>
<td><em>Cryptotermes brevis</em>, <em>C. dudleyi</em>, and <em>Incestermes minor</em></td>
<td>Exotic drywood termites</td>
<td>Isoptera</td>
</tr>
<tr>
<td>#30</td>
<td><em>Cryptotermes formosanus</em> and <em>C. gestroi</em></td>
<td>Exotic subterranean termites</td>
<td>Isoptera</td>
</tr>
<tr>
<td>#31</td>
<td><em>Anoplophora chinensis</em>, <em>A. globipennis</em> and <em>A. malasiaca</em></td>
<td>Longhorned beetles</td>
<td>Coleoptera</td>
</tr>
<tr>
<td>#32</td>
<td><em>Bursaphelenchus cocophilus</em> and <em>B. xylophilus</em></td>
<td>Red ring disease and pine wilt nematode</td>
<td>Nematode</td>
</tr>
<tr>
<td>#33</td>
<td><em>Fusarium oxysporum</em> f. sp. <em>vasinfectum</em> (exotic races)</td>
<td>Fusarium wilt</td>
<td>Fungi</td>
</tr>
<tr>
<td>#34</td>
<td><em>Chilo spp.</em></td>
<td>Sugarcane and grain stem borers</td>
<td>Lepidoptera</td>
</tr>
<tr>
<td>#35</td>
<td><em>Pseudococspora fijiensis</em></td>
<td>Black sigatoka</td>
<td>Fungi</td>
</tr>
<tr>
<td>#36</td>
<td><em>Phytophthora infestans</em> (exotic strains)</td>
<td>Potato late blight</td>
<td>Oomycete</td>
</tr>
<tr>
<td>#37</td>
<td><em>Eurygaster integriceps</em></td>
<td>Sunn pest</td>
<td>Hemiptera</td>
</tr>
<tr>
<td>#38</td>
<td><em>Lygus hesperus</em> and <em>L. lineolaris</em></td>
<td>Western and tarnished plant bugs</td>
<td>Hemiptera</td>
</tr>
<tr>
<td>#39</td>
<td><em>Monachamus spp.</em></td>
<td>Sawyer beetles</td>
<td>Coleoptera</td>
</tr>
<tr>
<td>#40</td>
<td><em>Hylesia nigricans</em></td>
<td>Burning moth</td>
<td>Lepidoptera</td>
</tr>
<tr>
<td>#41</td>
<td><em>Neonectria ditissima</em></td>
<td>European canker</td>
<td>Fungi</td>
</tr>
<tr>
<td>#42</td>
<td><em>Ophiostoma novo-ulmi</em></td>
<td>Dutch elm disease</td>
<td>Fungi</td>
</tr>
</tbody>
</table>
A nationally agreed process for prioritisation of plant pests for surveillance

Key points

1. Prioritisation of the large number of pests across the many plant industries, regions and uses (production, amenity and environment) present in Australia, was recognised by workshop participants as a difficult challenge.

2. An interim list of 42 pests (or pest groupings) have been identified as priority pests that are envisaged to guide national surveillance programs.

3. A spreadsheet-based tool that will assist in the development of prioritisation lists by calculating impact in a transparent, methodical and repeatable way.

FORESTRY

- Positively quite a few forestry/amenity pests
- The prioritisation process involved expert elicitation. Unclear who was involved. Myrtle rust still 15th?!
- Spreadsheet tool will hopefully provide transparency regarding process and enable comparison of assumptions made in different plant industries.
SNPHS Chair - final comments

1. Australia requires comprehensive and nationally coordinated surveillance
2. It's all about market access dummy
3. Risk-based models miss outliers
4. We need to consider endemics
5. SNPHS (surveillance) and SPHD (diagnostics) need to become the go-to groups when there are incursions. **Clandestine phone calls just don't cut it.**
6. Incursion responses we need to go hard initially then reassess
7. Data is not standalone, needs to be data and tools for the data bits to be useful package (databases, apps, stats, models, mapping, SOPs, templates, etc.)
1. Signing the Emergency Plant Pest Response Deed is not enough
   – this only covers what occurs in case of an incursion we need COORDINATION, PREPAREDNESS, CAPACITY

2. WANT TO STOP THE BLEEDING – Improve forestry biosecurity surveillance
   - Get started, then get better

3. THERE IS LOW HANGING FRUIT - There are a growing number of surveillance tools that could be leveraged and adapted to forestry use

4. MONEY IS AVAILABLE. To obtain funds and build capacity we need to
   - Engage or we’ll be left behind!

5. HOW TO GO FORWARD - A coordinated approach is needed
   - Actual investment is needed
THANK YOU!

PRESENTERS:
Daryl Hardie (DAFWA), Susie Collins (DAWR), Gabrielle Vivian-Smith (DEDJTR), Leigh Nelson (GRDC), Kelly-Anne Harris, Rosa Crnov & Chris Pittock (DEDJTR), Rachel Taylor-Hukins (NSW DPI/GFBP), Laura Fagan (DAFWA), Rohan Kimber (SARDI), Nick Woods (PHA), Stuart Pettigrew (PHA), Mark Stanaway (DAWR), Nichole Hammond (DAFWA), Martin Mebalds (DEDJTR), Samantha LowChoy (Griffith University), Susie Hester (UNE/CEBRA)

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