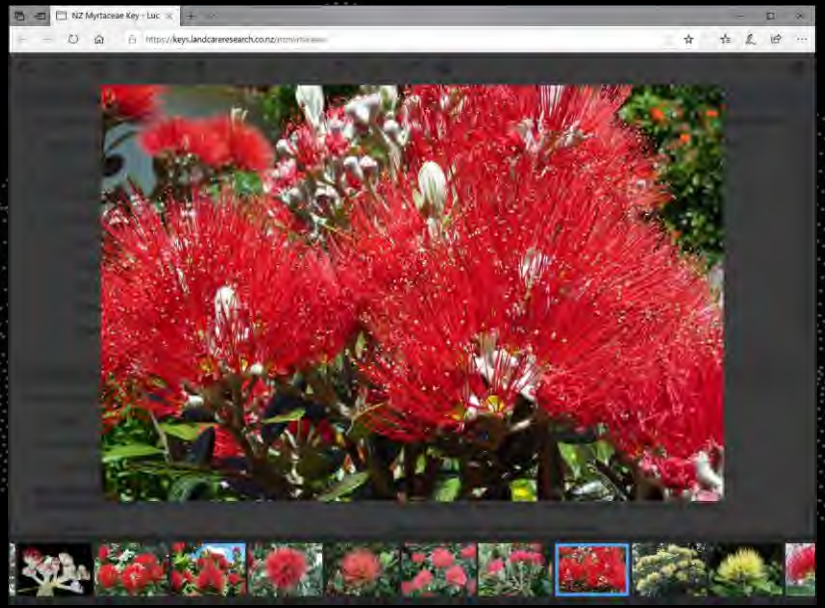
New app to identify plants at risk from myrtle rust



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TE WHARE WĀNANGA O WAIRAKA

Biosecurity New Zealand
Ministry for Primary Industries
Manatū Ahu Matua

Murray Dawson et al.

Background

- Mar-May 2017: Myrtle rust arrived in NZ
- Need for rapid and accurate identification of host spp. to monitor and manage MR
  - Interactive, intuitive, easy-to-use tool
  - Web-based and mobile apps
- Oct 2018: MPI Request For Proposal
  - MWLR, Scion, Unitec collaboration
  - Lucid™ identification key platform
- Work began Feb 2019; completed July 2020
  - Here I'll outline the NZ Myrtaceae key
  - Live demonstration

Images: Robert Beresford
Plant & Food Research

Contributors

- Murray Dawson (MWLR)
- Matt Buys, Elizabeth Miller (Scion)
- Peter de Lange (Unitec)
- Chris Ecroyd
- Colin Ogle
- MPI a major contributor
  - Funded by Operational Research Programme
  - Planning, design, scope and feedback (PHEL)

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- Jeremy Rolfe (DOC)
- Trevor James (AgResearch)
- iNaturalist NZ community

Plant identification: Limitations of printed Floras

- Not user friendly
  - Technical language
  - Complex descriptions
  - Lack of illustrations

METROSIDEROS Banks ex Gaertn., 1788
2. *M. excelsa* Sol. ex Gaertn. Fruct. 1, 1788, 172, t. 34, f. 8.
M. tomentosa A. Rich. Essai Fl. N.Z. 1832, 336, t. 37.
Tree up to 20 m. tall; trunk up to 2 m. diam.; branches spreading; branchlets stout, tomentose. Lvs on short stout petioles; lamina (2.5)-5-10 × 2.5-3-5 cm., elliptic to oblong, acute or obtuse, coriac., thick, clad in white tomentum below (young plants occ. glab. below). Infl. of broad compound cymes with ∞ fls; pedicels stout, tomentose. Receptacle obconic; sepals deltoid; petals crimson, oblong. Stamens ∞, crimson, 3-4 cm. long. Ovary adnate to receptacle. Capsules 7-9 mm. long, tomentose, distinctly exserted, loculicidally 3-valved.
DIST.: Three Kings, N. Coastal forest south to Poverty Bay and Urenui. Inland on shores of lakes of Volcanic Plateau.
Pohutukawa.
FT. 1-2. FL. 12-1.

Description of pōhutukawa
Flora Vol. 1

Plant identification: Limitations of printed Floras

- Traditional printed keys
  - Only one start point
  - Only two choices
  - Often rely on floral characters
  - "Written by those who don't need them for those who can't use them"

1.	Fls white, or flushed with pink	2
	Fls crimson to scarlet, or yellow	5
2.	Lvs 35-90 × 25-50 mm.; filaments ± 3 cm.; receptacle ± 8 mm. long	8. albiflora
	Lvs not > 25 × 20 mm.; filaments ± 1 cm.; receptacle not > 5 mm. long	3
3.	Capsule distinctly exserted beyond receptacle-rim	7. perforata
	Capsule not exceeding receptacle-rim	4
4.	Lvs coriac., subacute, glab. or nearly so; branchlets glab. or nearly so	10. diffusa
	Lvs membr. acuminate, pubescent; branchlets pubescent	11. colensoi
5.	Plant a liane	6
	Plant a shrub or tree	7
6.	Lvs 35-75 mm. long, filaments scarlet, capsules 12-20 mm. long, urceolate	6. scandens
	Lvs 20-35 mm. long, filaments carmine, capsules 8-9 mm. long, subglobose	9. carminea
7.	Lvs clad in dense white tomentum below	8
	Lvs glabrous	9
8.	Lvs ± 2-5 cm. long; filaments 1-2 cm. long	1. kermadecensis
	Lvs ± 5-10 cm. long; filaments 3-4 cm. Long	2. excelsa
9.	Capsule distinctly exceeding receptacle	3. robusta
	Capsule not exceeding receptacle	10
10.	Lvs of lanceolate order, ± 1-2 cm. wide; capsules 8-9 mm. long; receptacle silky-hairy; us. a tall tree	4. umbellata
	Lvs of ovate order, ± 2-3 cm. wide; capsules 6-7 mm. long; receptacle glab.; us. a straggling shrub	5. parkinsonii

Traditional dichotomous key for *Metrosideros* Flora Vol. 1

Interactive identification keys

- Multi-access
- Powerful and efficient
- Easy and fun to use
- More reliable than image recognition
- Allow for character misinterpretation
- Numerous taxa, characters, images

Lophomyrtus bullata. Images: Jeremy Rolfe, Peter Heenan, Chris Morse

283

Myrtaceae leaf diversity

284

Myrtaceae floral diversity



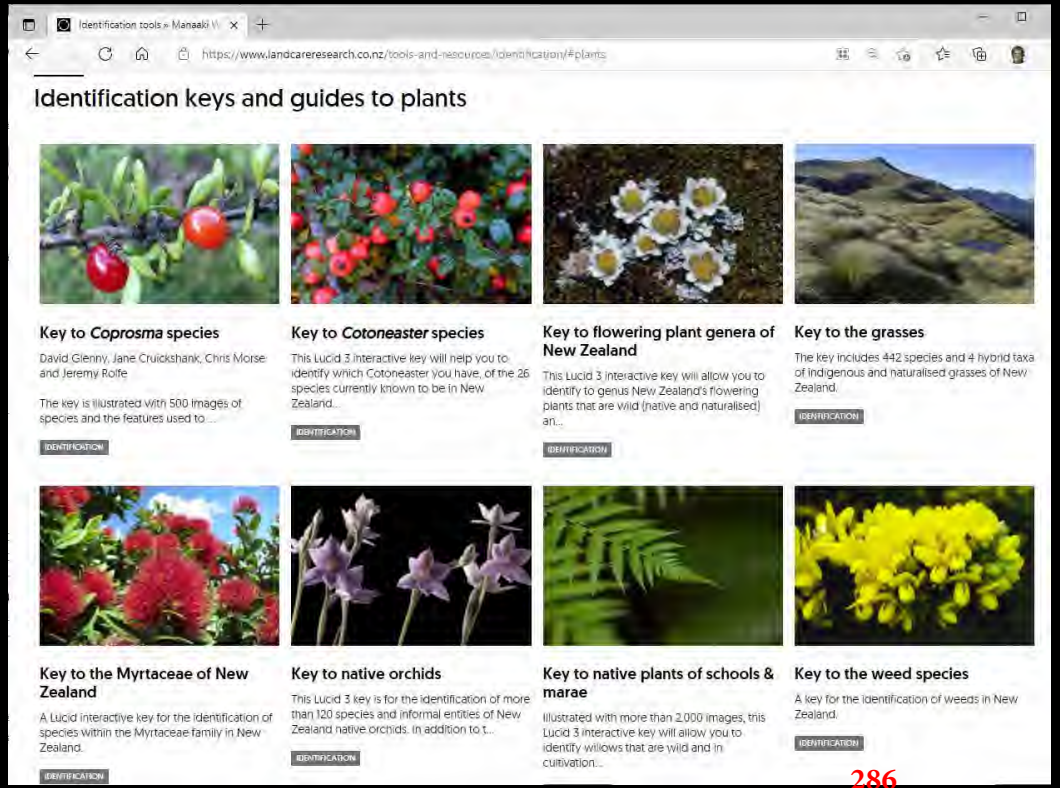




Myrtaceae fruit diversity

Interactive identification keys

- >10 NZ keys hosted by MWLR
  - Flowering plant genera
  - NZ Weeds Key
  - Grasses etc.
- Free and online
- Lucid™ platform



www.landcareresearch.co.nz/tools-and-resources/identification/#plants

Interactive identification keys

- >10 NZ keys hosted by MWLR
  - Flowering plant genera
  - NZ Weeds Key
  - Grasses etc.
- Free and online
- Lucid™ platform
- Smartphone derivatives

Get it on Google play

Download on the App Store

NZ Myrtaceae Key

- 97 taxa (species, subspecies, varieties, cultivars, hybrids)
  - NZ natives
  - Cultivated
  - Naturalised
- Species profiles
  - Written specifically for key
  - Extensive glossary
- 30 characters / 106 character states
- >1600 images
  - Taxa & diagnostic characters
  - Fully captioned

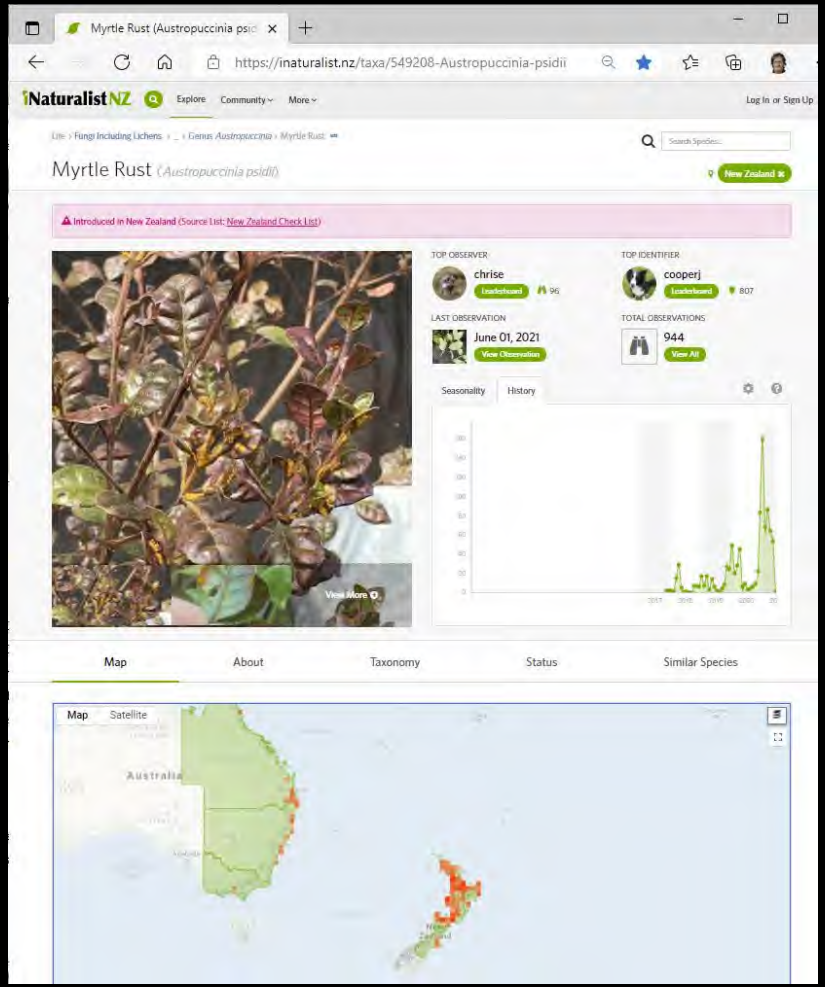
NZ Myrtaceae Key

- New tool works very well
  - Could be reworked for Australian Myrtaceae
- Challenging to produce
- Useful model for other biosecurity and border management issues?
  - Rapid, user friendly ID
  - Integration of resources




NZ Myrtaceae Key

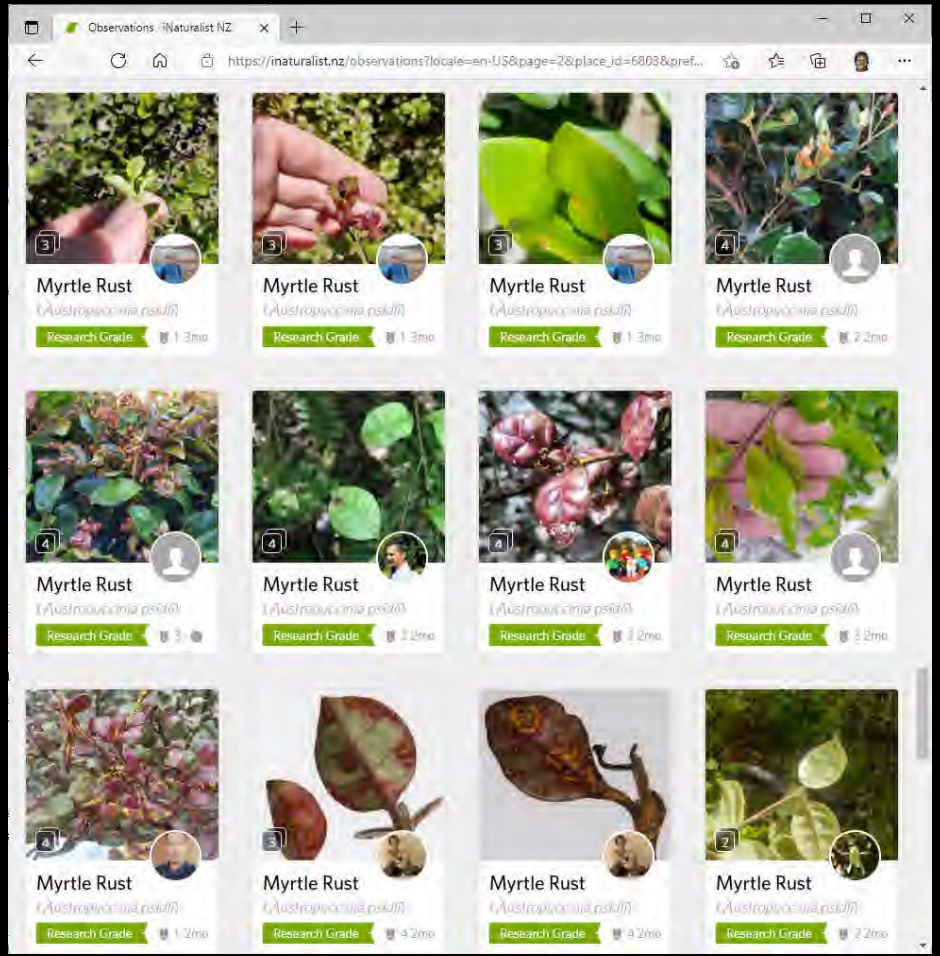
- Identification of host species
- Not for reporting MR locations
  - iNaturalist platform
  - https://inaturalist.nz/



Taxon view

NZ Myrtaceae Key

- Identification of host species
- Not for reporting MR locations
  - iNaturalist platform
  - https://inaturalist.nz/



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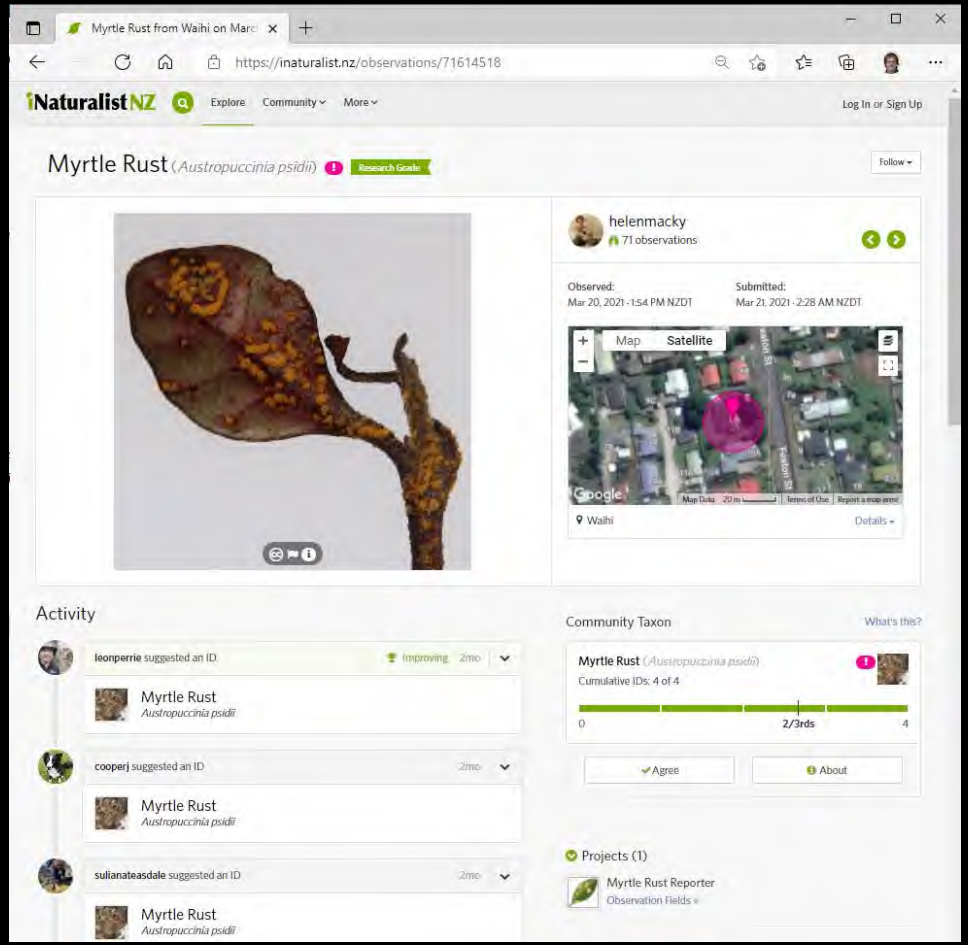
Group observations

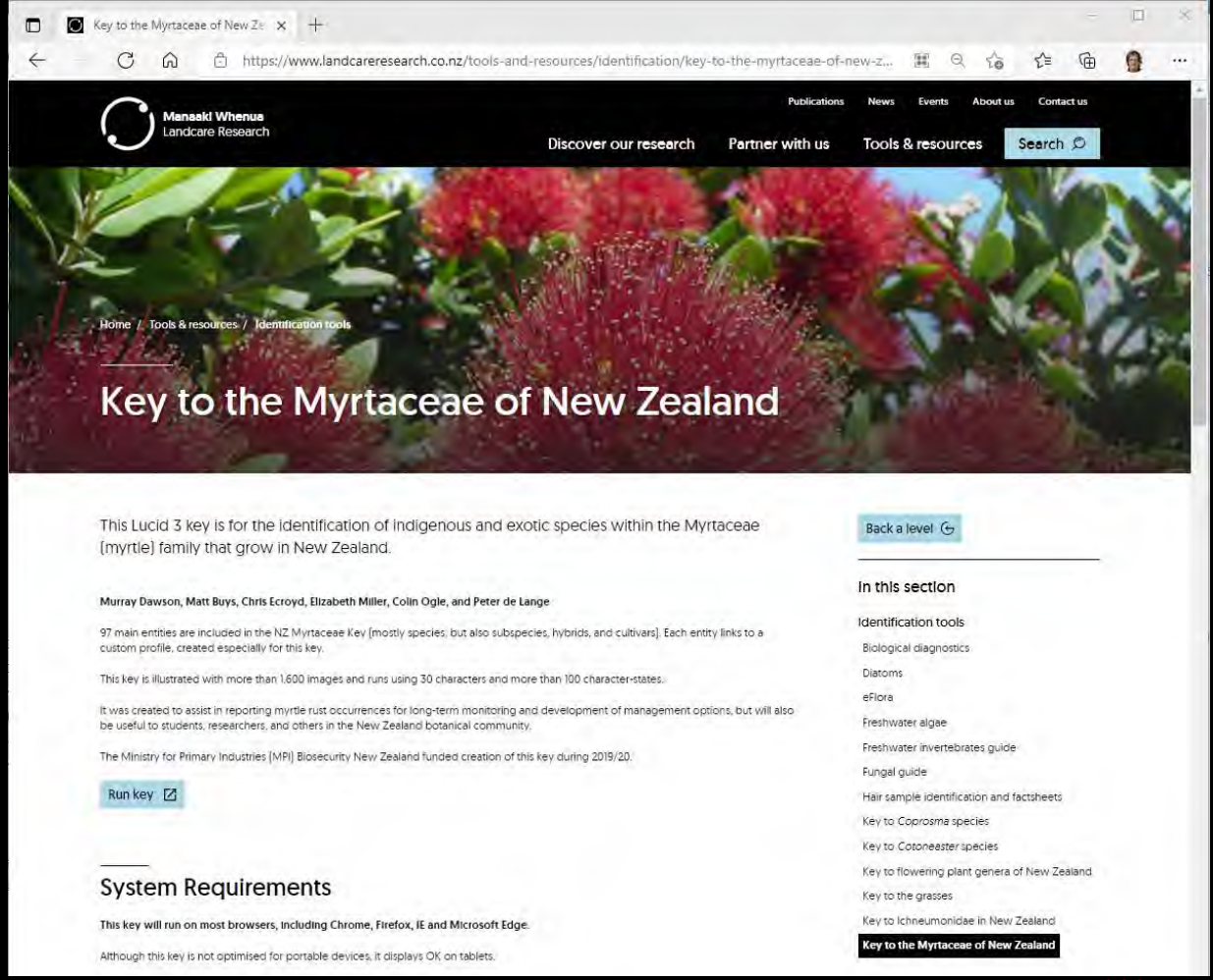
NZ Myrtaceae Key

- Identification of host species
- Not for reporting MR locations
  - iNaturalist platform
  - https://inaturalist.nz/



Individual observation

Live demo



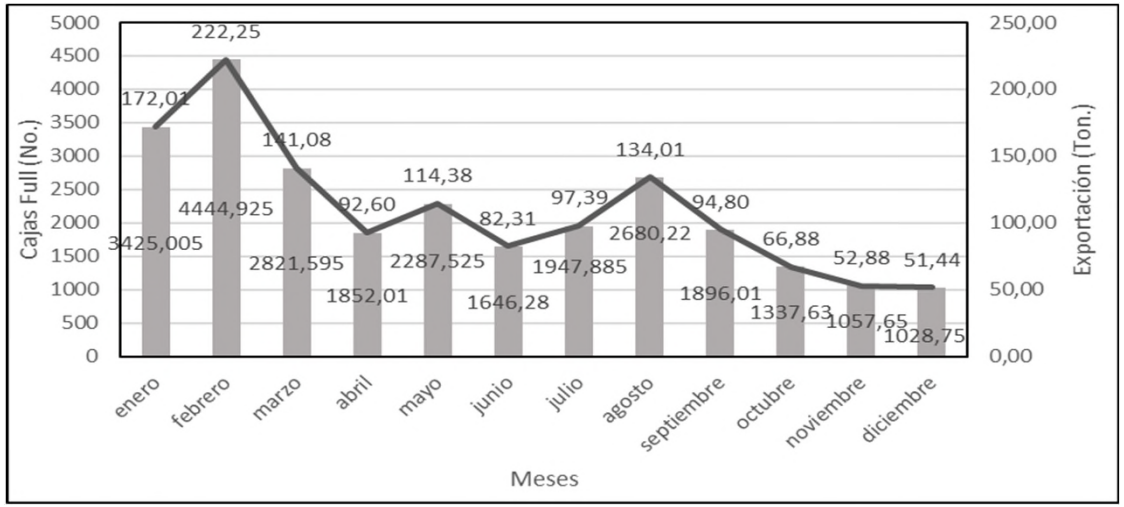
https://www.landcareresearch.co.nz/tools-and-resources/identification/key-to-the-myrtaceae-of-new-zealand/

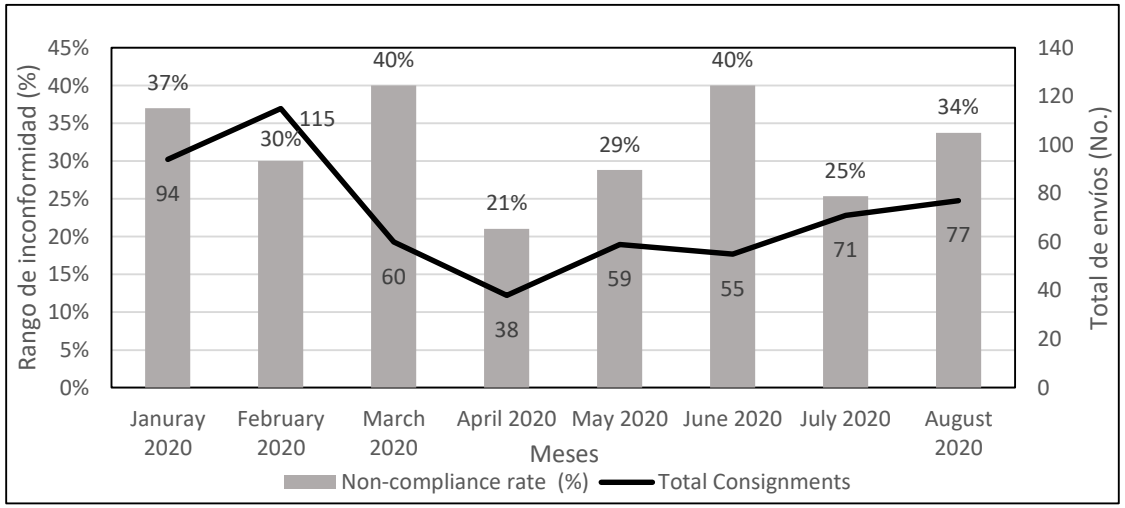
附件16

BALANCE SHEET NOTIFICATIONS 2018 -2020

Exports of flowers and foliage for ornamental use from Ecuador during the period from November 2018 to August 2020 have been notified due to the presence of pests of potential economic importance for Australia, being individuals belonging to the families Thripidae (53%), Tetranichydae (40%) and Aphididae (7%) that present a higher percentage of interception.

Until August 2020 there is a general average of notifications of 33% with maximums of 40% in the seasons of greater export and in the months that the climatic conditions in favor their proliferation.





CONSEQUENCES OF NON-COMPLIANCE

- Implementation of import permits
- Treatment

ACTION PLAN CARRIED OUT BY AGROCALIDAD

- Reassessment of thrips and mite protocols implemented by ornamental export operators in places of production.
- Inspection of 100% of operators in Freight Forwarders.
- Validation of the phosphine fumigation treatment in pre-shipment with the participation of the private company

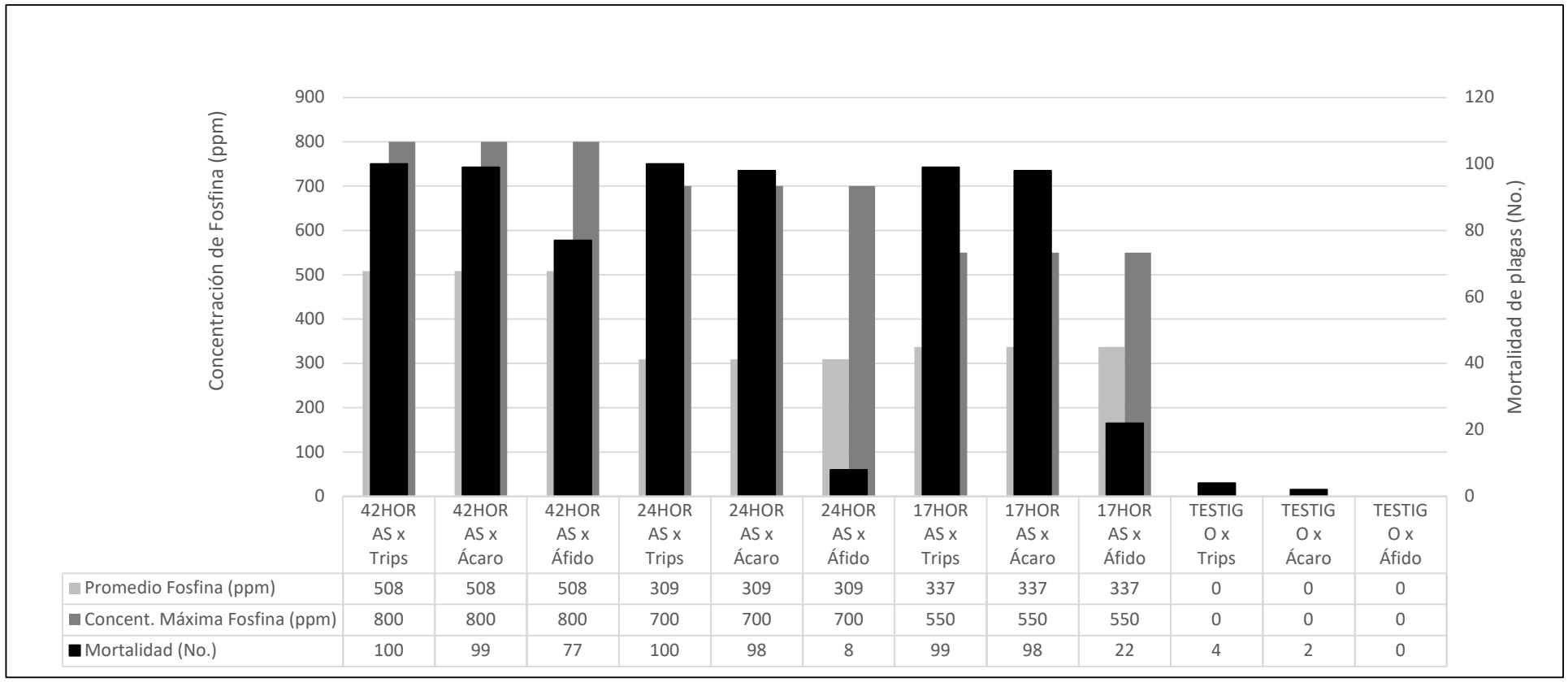
PHOSPHINE FUMIGATION TESTS

Assay for validation of phosphine gas fumigation treatment - Degesh plates (Magnesium phosphide)

- Dosage of 2.31 g / m3 of active ingredient or 4.13 g / m3 of commercial product in sealed containers of 40 feet.
- Pre-shipment of rose stems (Rosa spp.)
- Pest control: Family Thripidae, Tetranychidae and Aphididae,
- Exposure times: 17, 24 and 42 hours in conditions of 3 ° C and 80% RH.

Results:

- 100% mortality thrips, mites and 77% aphids; 42 hours maximum concentration of 800 ppm
- 100% mortality thrips, mites and 15% aphids; 24 hours concentration of 700ppm
- 99% for thrips, mites and 15% for aphids; at 17 hours, 550ppm concentration with a mortality of



	42HOR AS x Trips	42HOR AS x Ácaro	42HOR AS x Áfido	24HOR AS x Trips	24HOR AS x Ácaro	24HOR AS x Áfido	17HOR AS x Trips	17HOR AS x Ácaro	17HOR AS x Áfido	TESTIG O x Trips	TESTIG O x Ácaro	TESTIG O x Áfido
Promedio Fosfina (ppm)	508	508	508	309	309	309	337	337	337	0	0	0
Concent. Máxima Fosfina (ppm)	800	800	800	700	700	700	550	550	550	0	0	0
Mortalidad (No.)	100	99	77	100	98	8	99	98	22	4	2	0

Graph 3.- Relationship of phosphine concentration and mortality of pests of the thripidae, tetranychidae and aphididae families in the validation of the phosphine treatment. Pichincha-Quito, Tumbaco. July 2020.

Since September 2020, the tests of fumigated shipments begin with an exposure time of 17 hours, which is favorable for the logistics process of shipments and with approximately 35% of exporters that have been treated with fumigation

The information provided by the importers has been that the flower has not presented new features in its phytosanitary and commercial quality, for this reason, the pre-shipment treatment implemented has the objective of complementing or reinforcing the systems approach process that is implemented in phytosanitary protocols and that are mandatory for export ornamental operators.

Gracias

Thank you

República del Ecuador

Gobierno del Encuentro | Juntos lo logramos

附件17

QRM Quarantine Regulators Meeting

Advancing biosecurity systems through a success-oriented plan

2021 QRM Questions and Answers

Contents

QRM Quarantine Regulators Meeting
Advancing biosecurity systems through a success-oriented plan

Day One

Presentation: Khapra Beetle response and new measures - *Sam Griffiths, DAWE (Australia)*

Q: When you detect Khapra beetles in a shipment in our border contra point, what are the measures in this contra point? Do you fumigate and release the shipment, or is it refusal to the origin country?

A: Where we detect live Khapra, we make a decision based on the individual circumstances of that detection as to what is the most suitable response. Where the non-compliance is with our measures, or our requirements, we may direct for re-export. Where the issue is with live detection, but the live detection isn't non-compliant with some of our other controls, then we will allow treatment.

Q: What happens when you detect a dead Khapra beetle in a shipment? Is it the same measure, or different?

A: Dead Khapra will usually trigger a full inspection. If that full inspection identifies further issues, for example live pests, then we will treat as a live pest detection. If that full inspection doesn't detect any live pests and we're certain that the consignment has been treated effectively, and that's why the pest was present as dead, then that is compliant and there's no further action.

Q: Deltamethrin can now be used as a chemical spray. Deltamethrin is registered in Sri Lanka for agriculture purposes, but can the same formulation also be used for the container spray?

A: Deltamethrin comes in a variety of different formulations and for a variety of different purposes. The only acceptable formulation for the treatment of Khapra is to use a suspension concentrate of deltamethrin. When that suspension concentrate is used, it must be applied in accordance with the rate that we've specified, and in accordance with the application requirements of our methodology. And importantly, must be done on the container while it is empty. So long as all of those factors can be met, then that deltamethrin product can be used to manage the risk of Khapra beetle.

Q: What is the main reason that the insecticide spray was newly introduced as a measure? Was it requested from industry?

A: The traditional treatment measures to manage Khapra beetle, methyl bromide and heat, are limited in their application. Methyl bromide is not available in every country around the world, and it's an ozone-depleting substance. Heat treatment is difficult to use for Khapra beetle treatments, particularly in colder countries. Industry did not directly request that we explore insecticide treatment, but in the interest of trade facilitation, we wanted to find alternative treatments to provide the greatest flexibility for industry, and deltamethrin was one of them. At this stage it's an interim measure because there is limited efficacy data for deltamethrin. If deltamethrin proves to be ineffective in managing Khapra beetle, then it will be removed as an option.

Q: How is Point of origin determined for a hitch hiker?

A: Point of origin for hitchhikers depends on the pest. Khapra beetle can survive in a container for up to five years, so it can be difficult to detect what the true point of origin is, or the point in which Khapra beetle contaminated that container. This makes it difficult to then profile which containers will be likely to be contaminated by that particular hitchhiker pest.

Q: How about if the high-risk plant products come from Khapra countries into Australia in sea bulk? What requirement or which treatment is appropriate?

A: The break bulk is managed differently to the sea container measures. Australia is working towards measures to manage the risk of commodities, and that will include what happens around bulk commodities and how they will be managed. Australia will provide further information to QRM participants on managing bulk commodities when those measures are confirmed.

Q: Are the heat treatments only applied to empty containers?

A: Yes. Treating sea containers at 60˚C for 3 hours is a new treatment and we are not sure how readily industry will be able to meet this requirement consistently. Conducting a treatment on a full container adds additional complexity and at this stage we don't believe industry or ourselves as regulators, are ready to accept those treatments. If an industry or government could demonstrate a method for treating full containers at 60˚C for 3 hours effectively, we would recognise that and change our requirements.

Q: How many non-compliances from origin countries can Australia accept until you change the requirements?

A: It is difficult to provide a definitive answer to this question. As discussed previously, the nature of khapra beetle makes it difficult to determine the country of origin for every detection. The interim measures have been designed based on the information we have on detections as well as the spread of khapra beetle around the world. We're working on the pest risk analysis currently and that may change some of requirements as we develop a better understanding of the risk. However, we're as confident as we can be in the measures that we have at the moment, so it's not likely that the final measures will be very different from the current ones.

Q: Do you have information that phosphine fumigation is used to control Khapra Beetle?

A: We know that phosphine is widely used to try and manage Khapra beetle, but for Australia, when we've reviewed the literature, Khapra beetle resistance to phosphine is too significant to allow it as an effective biosecurity treatment. We're not confident that phosphine can manage the risk of Khapra beetle to an acceptably low level. But this data is constantly being re-evaluated, so that could change in the future.

Presentation: Hitchhiker management - *Rama Karri, DAWE (Australia)*

Q: Is there any public system to track the previous cargo in containers, in order to state or define what that risk is?

A: We contacted various international bodies to see if there were any centralised systems that capture the container movement history, as well as the goods held within those containers. Unfortunately there is no single central data repository that captures all that information. There are some third-party platforms that provide information on some container movements, but not necessarily about the goods held within those containers. This is a good area where we can collaborate and share that kind of information because that's key to identifying the riskier containers so that we can manage the risks accordingly.

Presentation: Quarantine significant pests in Sri Lanka - *Dr Wickramaarachchi, NPQS (Sri Lanka)*

Q: Is the target curry leaves dry, or live plant?

A: Most popularly leaves will be used fresh, but dried leaves, as well as frozen leaves can be used. There are some products in powder form also.

Day Two

Presentation: The future use of cylinderised phosphine - *André Nothomb and Mathew Murphy, Cytec Solvay Group*

Q: What are the limitations that you find in using or promoting the use of the phosphine gas?

A: Being a dangerous good in a cylinder, and being made in Canada, transportation around the world can be challenging. Sea freight is quite challenging at the moment and made even more difficult with dangerous goods. On a more technical aspect, our phosphine gas is not as fast as methyl bromide, for example, so if you're under time pressure then you can't necessarily fumigate in the same time as MB, although we're working on the protocols for how we might achieve that in the future.

Q: Have you carried out tests with phosphine gas for the control of fruit flies and what was the result?

A: We have two efficacy studies on the control of fruit fly using phosphine gas from ECO2FUME. The study on ECO2FUME efficacy against Queensland fruit fly on Navel oranges using a protocol of 1400 ppm phosphine or 100 g ECO/m3 for 2 days at 23 - 25°C showed 100% mortality of all stages of target insects without quality damage. The study in Sri Lanka against mango fruit fly using a protocol of 1400 ppm or 100 g ECO/m3 for 24 hours at 26 - 33°C showed 100% mortality of all stages of target insects without quality damage to mango. The Sri Lanka ECO2FUME label includes the protocol against mango fruit fly and is commercially used as methyl bromide replacement for pre-shipment treatment of export mango.

Q: Does Solvay do any research on efficacy?

A: Yes. By country we need to have the product registered and labelled, and have a set of pests and diseases on that label. That all comes with trial efficacy work, so we have quite a large database for that. We're continuously working on new pests and diseases in different countries, so it's an area that we spend a lot of time on, and we have a technical team that does that, so it's a big focus.

Q: What is the protocol or dosage for cylinderised phosphine?

A: That depends on pest/commodity combinations. The specifics would be dependent on pest, commodity, and even changes by time and temperature. If you're in a hot climate that will be different, for example. There are a lot of protocols out there.

Q: What do you think could make cylinder phosphine more popular to use to replace methyl bromide?

A: Methyl bromide is a heavier gas, it does tend to take longer to distribute in the commodity versus phosphine, so we do often find we get better distribution quicker with phosphine. Also, it does come straight from the cylinder, it's not vaporised, so you don't need any specialised equipment to vaporise it, and get it in. And also on the venting side, it tends to be vented and cleared quicker.

Q: Are the treatments applied to sawn wood carried out on wood with or without bark?

A: Yes, we have done timber. We generally find that if it's de-barked we don't need to fumigate, but if it still has the bark on, we do. Phosphine has the ability to spread quickly in large ships, so that is a huge advantage for bulk log shipments.

Q: Are aluminium phosphine tables used for flour fumigation?

A: I'm sure in some countries they are, depending on silo application, but it could be problematic.

Q: Is phosphine still being pushed in the IPPC to be approved treatment of wood/timber/wood packaging material?

A: Yes. We're not necessarily approved in all cases, but in some countries we are, like Korea for example. We'd like to be able to do that in more countries.

Q: Is there any training and awareness done for phosphine against methyl bromide from your company for QPS and non QPS?

A: Stewardship is a must. Every customer has to do stewardship before they buy our product, whether that's through our distributor or us. We do talk about some of the differences in stewardship, but that's more focussed on safety. So of course when you do stewardship training, we are happy to answer questions about different products, but I would say that training is more a health and safety focus, not specifically comparing opposite products.

Q: It looks like from the wide application of Phosphine, it does not have a negative effect on the quality of fresh fruit?

A: No, it does not. Obviously, there are many factors that can affect the quality of fruit, but actual phosphine gas itself does not. Even in cold storage, at very low temperatures where with methyl bromide you'd need to come back up above 10 degrees to treat your fruit and vegetables, with phosphine you can stay down as low as zero degrees.

Q: If a methyl bromide treatment fails, can we then we apply the phosphine?

A: This depends on the commodity and the pest. As long as you've cleared the methyl bromide and it hasn't affected the product, you can potentially do another fumigation.

Q: How about the insects resistant to phosphine to be solved as methyl bromide usage under the Montreal Protocol?

A: We do have protocols against resistance, and we see that in some parts of Australia and Thailand. It's normally a higher dose of gas and a longer time period.

Presentation: Priority process of regulated pests in OIRSA region - *Nancy Villegas, OIRSA*

Q: What is OIRSA doing around trying to deal with the risks associated with the movement of containers?

A: At the regular Agricultural Quarantine meeting in March 2021, the Quarantine Directors of the OIRSA member countries requested the support of the Regional Directorate of Ing. Rodas for to prepare the regional study "Risk analysis for border control points, means of transportation and international waste management", in order to have the risk-based reference to achieve the harmonization of the application of sanitary and phytosanitary measures at the regional level. We hope to have this study later this year.

Q: How does OIRSA harmonize each member's measures? By regional standards or any other guidelines?

A: The recommendation of sanitary and phytosanitary measures is based on the respective risk assessments or risk analysis, supported by international regulations.

Q: Has OIRSA started to look into economic modelling to promote the value of the good work that you do in the region over there?

A: As such, economic models, no, but the performance evaluations of the regional operational programs are carried out year after year, always with the idea of detecting opportunities for improvement and continuity with the current operational plan 2015-2025.

Presentation: Dog brigades a successful experience in Guatemala - *Nidia Sandoval, OIRSA*

Q: What is the main difference between "non-intrusive inspection" and "intrusive inspection"?

A: Intrusive inspections are those made by humans opening the luggage. Non-intrusive are made by the dogs as they only sniff the luggage.

Q: How many quarantine dogs are working in your country?

A: Each country has its own project in dog brigades. Right now in other members in OIRSA maybe we have around 100 teams of dog brigades around the other regions. It is important to mention that the dogs in OIRSA brigades come from the streets. We do not buy pure breeds; this reduces costs in implementation.

Q: How do you evaluate the performance of a team (a dog with a handler)? Cindy Weng, BAPHIQ

A: By the seizure that we confiscate. We have statistics and a chart where they can check it if it was positive. Maybe there was luggage that just had a scent, but there was no product inside. We mark it as positive or negative. That's how we evaluate this work.

Q: How do you select the candidates to be handlers? Are they part of the official service team, or privately contracted?

A: During the recruitment selection of staff we make a recruitment by profession, they should be a veterinarian or agronomist, and the person should be young and in good shape. Also, there are some proofs, in this case by Mexico who is an expert in canines, so they come to us, and in cooperation with them we select the person. In the first part, Mexico chooses the dogs from the shelter, and they make a lot of proofs in order to see if the dogs are able to be used. The handlers belong to OIRSA.

Q: Who handles the scanners? Is it quarantine officials or another agency?

A: We have different experiences, for example in Honduras and Costa Rica, the scanners in airports are operated by our officers, not by customs. In Guatemala it is the custom and border protection, and we also sit with them, watching the scanner, but it's really the customs who operate the scanner directly. In other OIRSA countries they operate the scanners, but in Guatemala it is customs.

Q: In the slide number 2 you said: "OIRSA decided to introduce dog detection: FOC R4T..." Considering that Fusarium oxysporum is ubiquitous soil inhabitants that have the ability to exist as saprophytes, how can this dogs-brigade to discriminate Foc-TR4 versus others Fusarium oxysporum "forma specialis"?

A: Specifically, they cannot detect virus or bacteria like that. The dogs detect the soil odour, not a specific soil odour of Fusarium or Panama disease. They only smell the soil.

Q: Biosecurity officers get paid each fortnight, but how about dogs? What do they get for their excellent job?

A: The dogs get rewarded with treats and food

Q: I thought the app was really innovative. Is the real-time data available to the public or only for internal use? And do you use the data for outreach/public education?

A: The data is just for internal use. But we share with the Guatemala government.

Q: Are OIRSA or any member countries exploring the use of dogs for detection of pests in production areas?

A: Yes, Mexico started exploring the use for detection of pests. We are thinking of a new project in order to work in field operations, for example in banana plantation in order to detect the fusarium. But it's only an idea right now.

Presentation: Stewardship program to support the fight against BMSB - *Barb Nead-Nylander, Douglas Products*

Q: Can any country participate in the Stewardship program and training even if it is a non-English speaking country? If so, is remote training conducted?

A: We try to do our training in country, and in language. For example in Japan we have specific training with our distributer which is done in Japanese. That is always our goal. We have had to move to more remote training because of COVID. It is not ideal, because when we first start working in a country, and working with those fumigators, we like to be on the ground with them, to help support them. For example, walk them through the differences with our product, ProFume, as opposed to some other products that they're accustomed to using. So it's something that we really like to work together on. Obviously in these circumstances, we've all had to adjust, but hopefully in the next year or so, we'll be back to more of a normal scenario as it relates to training.

Q: Is there any fumigant residue in the food product fumigated with SF? And how many doses of SF to use for BMSB?

A: SF has a very high vapour pressure, so the parent compound itself is typically not found in a fumigated commodity. Depending on the physical chemical makeup of the commodity, there will be levels of fluoride that can be left. Generally speaking, additional fluoride attributed to fumigation with SF is minor. We've run studies to determine what those residue levels are going to be, and that becomes part of the risk assessment that's made during initial registration. When add a commodity the process repeats with residue levels being submitted to a regulatory review and the risk assessment is redone.

Q: What is the dose, temperature and exposure time that Vikane is used to fumigate logs to China?

A: Based on the China treatment schedule we currently have, the specific dose and dosage requirements are: at temperatures between 5° and 10°C are 104 g/m^3 for at least 24-h exposure and at temperatures above 10°C the dose is 80 g/m^3 for at least 24-h. This is significantly higher than the dose and dosage required for BMSB.

Q: Are Profume and Vikane common or commercial products, or are they more exclusive for the government?

A: No, neither product is exclusive to government. They are products that we provide to licensed trained commercial fumigators in countries where the products are registered. We typically go through a distributor in a country as our normal way.

Q: In the issue of greenhouse effect of this gas, will this affect the usage in the future?

A: SF has not been identified as a greenhouse gas in the Kyoto Protocol. The amount of SF in the atmosphere plays a part in determining how impactful SF will be in altering climate, and only a very small percentage of the atmosphere is SF. We are currently working in the US with the USDA-ARS to identify scrubbing technology that will allow us to significantly cut the amount of gas released during SF fumigations. To date the research has shown SF can be effectively scrubbed on a small-scale. We will advance to larger scale trials in the next year or so. Given these efforts, we are comfortable the level of SF in the atmosphere will remain at levels that make it insignificant to global warming.

Q: Indonesia is planning to register SF as a quarantine treatment in Indonesia and registered the SF providers as well just like MB under the IAQA Scheme. However, we found few differences on the methodology from the ISPM 15 documents and Australian methodology. We would appreciate if Indonesian government can have more information from you.

A: We have not been contacted about this opportunity.

Day Three

Presentation: Phytosanitary measures for the importation of used agricultural and forestry machinery - *Penny McLeod, NZ MPI (New Zealand)*

Q: How do you go about the consultation process with the public? Is it by written submission, or do you have workshops or seminars where you'd hear from industry?

A: A bit of both. We have a standard organisational process whereby we issue a proposed draft standard (either a new standard (IHS) or a IHS with changes), along with a risk management proposal to support and justify those changes. We will often be intalks with relevant industry ahead of the draft release also.

Consultation is 60 days (SPS agreement) where we invite stakeholders to provide us with some feedback in the form of written submissions. After 60 days we usually take about a month to review all those submissions, and then publish a response to submissions document, which gets published at the time we finalise the standard.

Sometimes, the some of the proposed changes won't go ahead because of the submissions received. Reasons for this could that we've been asked to consider something we were not aware of (new facts, data or science) or the risk has changed, even in that 60 days. it's not uncommon for changes to be made to the draft, but if we've proposed some changes, we do try to stick to them because there's good reason to do so.

Workshops with industry are sometimes held during the consultation period to help increase understanding of the proposed changes and improve the quality of submissions received on the standard.

Q: How do you define soil? Do you have any tolerance of soil?

A: Our Vehicles, Machinery and Parts Import Health Standard (IHS) includes the required outcome that the machine must be clean and free of biosecurity contamination when it arrives in NZ. The IHS also includes contamination type thresholds such as soil, seeds, plant material live pests etc that we use to measure the cleanliness outcome against.

For some contamination, like hitchhiker pests, one live hitchhiker is too much, so there's zero tolerance. It's the same for seeds. We allow some plant material, up to five pieces, and when it comes to soil, we have a 20-gram limit. So there can be a small amount of soil, which is usually a road film. Anything that could contain seeds, plant material or other contaminants is too much.

Q: What action do you take if you find soil?

A: Often used machinery doesn't meet our outcome requirement, and that's just a practicality of the pathway. If we find that there is contamination above the thresholds and it's something minor MPI officers may just remove it, and the machine can be given clearance because we're satisfied that the risk has been managed. If it's something a bit more serious or takes a longer time, we direct the machinery to what we call a Transitional Facility (a decontamination facility), where they will remove contamination before our officers recheck again at a later date to make sure it's now compliant and can be released.

Heavily contaminated machines may be directed for reshipment out of NZ, but this is very difficult if they have already been discharged from the vessel. We don't typically know that a machine is heavily contaminated under it is off the vessel and the verification inspection has started.

Q: Do you have experience with military machine inspection?

A: We have sent officers to other countries to help with the cleaning of machinery. NZ MPI has had extensive experience with military vehicles arriving back from peace-keeping activities in other countries (for example, East Timor). Usually, soil contamination with weed seed contaminants have proved to be the most problematic.

Q: New Zealand requests the issuance of a phytosanitary certificate to authorize its entry into the country, for used machinery. Is this the case every time?

A: No, it's not. Being an inanimate risk item, we do not require a phytosanitary certificate. If treatment is required, then a treatment certificate meeting the specifications stated in the IHS is required, but no phytosanitary cert.

Q: Could you tell us more about Tomato Brown Rugose Virus you mentioned? Is there any measures taken to machineries for the virus?

A: Our knowledge is quite limited at the moment because we're still investigating it. We're doing the necessary risk assessment, trying to work out how best to manage the risk Goods like machinery that are used in horticultural settings may well need to be looked at, and perhaps a requirement put in place for that. But we're not in a position where we've decided on the requirements yet or even the best methods to treat/kill the virus.

Q: Have you considered setting up third party arrangements overseas, with accredited treatment providers? That way you could ensure the providers have the knowledge and technical ability to manage the risk, and it could reduce onshore risk.

A: We have thought about this, especially as we have used vehicle systems set up in Japan and other countries, to make sure that the cleaning standard is a good one. Used machinery is harder because it's imported a lot less frequently and the scope and type of machinery is varied.

In Japan we're quite lucky in that the used vehicle systems have proven themselves to be good cleaners of used machinery also. So in Japan if someone is going to be importing used machinery to NZ, they can go to one of those approved systems and get them to clean it to a good standard before importation, and they can have quite a lot of assurance that it will meet our requirements. There are no arrangements in any other country at this time. While overseas arrangements provide good risk management, they also need to be regulated (audited) by MPI due to the lack of NPPO involvement in the inanimate pathways. This is resource intensive.

Q: If a treatment is conducted, and there is runoff, what would you do in terms of that water?

A: The transitional facilities that MPI has approved to deal with cleaning and contamination, will only be approved if they can show to MPI that they have appropriate measures to prevent contamination from getting into the wastewater. They need to have filters that stop that sort of thing from occurring. The MPI requirements for water runoff at cleaning facilities is contained in the following link *https://www.mpi.govt.nz/dmsdocument/28047/direct* Runoff should be to a sewer system.

Q: Should the cleaning or treatments applied to the machinery be carried out by companies authorized by the NPPO of the country of origin, or is it the responsibility of the exporter?

A: At the moment treatment of used machinery is only required if BMSB needs to be managed. Our requirements say that it must be carried out by a provider that's on the offshore BMSB provider list that we share with Australia. In most cases, providers on that list would be NPPO approved due to their involvement with treatment of plant products, but its not a requirement of being approved as a BMSB treatment provider.

Q: Do you have a lot of offshore inspection programs for offshore machinery?

A: No, we don't. We do have some systems set up for used vehicles where we have a presence offshore, but because used machinery is not under a system, it's really just up the importer to make sure that they clean to our standards and then we do the verification on arrival. Because the volume is quite sparse and spread all around the world, I don't think we would ever be able to send MPI officers offshore to make sure that they're clean before the machines arrive in NZ.

Treating used machinery for BMSB may be required, so we do have to have some presence offshore, auditing treatment facilities to make sure they'll be treated properly.

The question regarding waste water was directed to NZ but if you are interested in Australia's policies for similar activities, they can be found under the waste water requirements here 4.3-requirements.pdf (agriculture.gov.au)

Presentation: CSIRO report: Australia's Biosecurity Future - *Dr Andy Sheppard, CSIRO (Australia)*

Dr Andy's report is available here Australia's Biosecurity Future: Unlocking the next decade of resilience - CSIRO

Q: In the preparation of this report, how big was your team?

A: We had support from about three or four of the scientists in CSIRO and around half a dozen from Animal Health Australia and the same from Plant Health Australia, and the Centre for Invasive Species Solutions was another partner. But the Futures team in CSIRO that writes these reports is a very tight team of about four people, and they worked very intensely on each of these reports over the four-month period. They did most of the writing, and we did most of the analysis.

Q: The presentation and report focused on when you were doing your research on the future of biosecurity in Australia, but I'm wondering, given our audience today, how many of the trends, or things you've identified in your report, would you imagine would apply more broadly to all biosecurity regulatory agencies around the world, not just to Australia?

A: Every country could look at the report and imagine scenarios in their own context. Be it in the context of mega shocks or mega trends. The mega trends really are recognised as being global, at least in the developed world, so there's high applicability in that. Apart from our close working relationship with our NZ counterparts we haven't seen any of this thinking coming more broadly from the international institutions in this space. But Australia plays its part in those institutions, and certainly tries to influence that thinking. These reports have broad relevance for any jurisdiction that wants to consider how it needs to improve its national biosecurity system.

Presentation: STDF Pest surveillance and reporting project - *Carol Quashie-Williams, DAWE (Australia)*

Q: How is Australian Government involved in the STDF project? Are the trainers Australian, or international experts or domestic experts?

A: We manage the project, and we provide mentoring, coaching and guidance to the participating countries. They provide us with their progress reports which we then write up and provide a progress report to STDF in Geneva. Any problems from the participating countries will come to us, and we also provide money for the equipment, so we manage the funding, and manage the overall project. Initially our experts were Australian, and we did train-the-trainer sessions in-country, so we now have a number of local participants who have been trained, and they do the training within their countries. The idea is that this is a sustainable project.

Q: Has there been similar work in the form of Pest Early Warning Systems for groups of countries, or perhaps regional?

A: Not under this project. There is a Fall Army Worm project happening regionally. There has been some focus on this in the South East Asian region, including a number of initiatives and activities. PNG is also a participant in the project.

Q: How can countries like Sri Lanka get involved in STDF projects for originally important issues on pest surveillance?

A: The presentation has information on how to get a project started. You need to have a concept, and the STDF provides an opportunity to have a workshop or support some research to define your thinking on the project you want to put forward. You can take advantage of the project preparation grants, and if that results in a worthwhile detailed proposal for a project, then it can be put to the STDF. The presentation also gives information on what kinds of projects they're looking for, such as national and regional projects, projects that have defined benefits in either the biosecurity space, or to assist trade.

Q: Please let us know how can we develop a project like this in the Central America countries?

A: If you would like to apply for STDF support, please write to STDFSecretariat@wto.org and/or roshan.khan@wto.org with the subject line "QRM 2021- follow up". You can also visit www.standardsfacility.org and I welcome you to go through our projects focused on plant health. The STDF has several ongoing projects with OIRSA in all sectors (food safety, animal and plant health). Please contact us to discuss any specific project ideas.

Q: How is the security of monitoring data by P Tracker? And why is Indonesia not include in the project?

A: Indonesia came to the early training activities and were provided with the technologies, but Indonesia felt that they preferred to use their own infrastructure to do their own surveillance, so opted not to participate any further in the project.

Q: If possible, could the project cover plant quarantine too, because this project only covers early detection?

A: The project targets crops and pests identified by each country. Many of the crops are trading internationally and the pests have been intercepted on exported crops. For example, Malaysia survey aquatic plants for white fly. White fly were detected on exported aquatic plants into Europe. In this STDF project there aren't any particular activities or target pests or crops that focus on work at the quarantine border. However, there is no reason that a surveillance project couldn't be done that way. It was preferred by most countries to do surveillance before the border to assist with detections and provide information for market access proposals.

Presentation: Official New Zealand Pest Register (ONZPR) online tool - *Stephen Butcher, NZ MPI (New Zealand)*

Q: How long has the tool been around?

A: It went live early this year, but has been in development for 3 years, and is part of a larger system. There will be other information captured in related databases later down the track.

Q: Has this been an expensive project?

A: Around $1.5million.

Q: It seems huge data base. I am curious how NZ collect that huge data and how does NZ convert the naked data to the data base. Do you utilize specific technology like AI or is it all human effort?

A: The database contains information collected over the last 40-50 years, so it has been an ongoing collection of information. Sitting behind this database is all of the process and documentary systems, particularly our legislative systems, that we go through to make decisions about certain pests, such as whether to regulate a pest, or apply measures on that imported product. There's a lot of information that sits behind it, and what you see is the summary, at the end of the whole process. We have looked into AI, but haven't gone down that track because in this case we require very specific decisions under our legislation, made by a person who has the ultimate role to make a decision on a pest in our system. It's the result of that decision that gets loaded into the database.

Q: Have you looked at site traffic data down to the case level, and potentially be able to track which pests are being looked at more than others?

A: We do have tracking information, but I'm not sure of the level of detail. The database wasn't set up to be transactional, it's informational, but it does link into our transactional databases, and it would be those databases that would be doing the tracking.

Day Four

Presentation: Sea Container Cleanliness - Shane Sela, Wendy Asbil and Wendy Beltz, World Bank Group with Sina Waghorn, NZ MPI (New Zealand), and Rama Karri, DAWE (Australia)

Q: Could we use the learnings from ISPM 15 into how a sea container standard might be progressed as an ISPM?

A: Although it's not clear whether or not an ISPM is required to manage the pest risks associated with sea containers, ISPM 15 does provide a strong parallel because we're really looking at a pathway, not a commodity. Containers like wood packaging are used to carry the cargo and are rarely a cargo themselves. It's mostly about moving the commodities inside, so we need to look at it in that light. With ISPM 15, some of the management around that revolves around reaching out to the chain of custody to manage the risk. Undertaking a shared responsibility in managing risk is one way of achieving a good outcome.

Q: One of the points in your presentation was around measuring effectiveness. You noted the difficulty in capturing data. Is there anything being worked on around data and movement of containers?

A: Every country is different in what they are capable of. To do a survey on a container it could be a cost to industry, so to pull a container in and have it offloaded just to inspect it for contamination costs the importer and ultimately consumers. In the US, we do collect data when a pest is intercepted, whether it's a regulated pest or non-regulated pest. However, in the data we don't notate where the pest was found, i.e. with the cargo or on the container. We also have to collaborate with our border agency, Customs and Border Protection to collect this data. There is a global push to collect data, but no single way in which it can be done.

Q: You were speaking about your engagement with industry. Could you give us some background on that engagement, and how positive and useful you're finding it?

A: A lot of the larger associations are very engaged, some of them are part of the North American Sea Container Initiative, and the Sea Container Task Force. We've had some webinars with their members, and we've talked about the need to reach out to those people who use containers to move their cargo. We had a workshop planned last year which received a lot of interest. The main concerns we hear about is that they are worried that every container will need to have some sort of certification, which would be a huge cost to trade. But they've been very responsive and engaged and are helping us spread the word.

Q: Given there is no separate country-specific container population then any survey would give very similar results wouldn't you think? A sample needs to be related to the total world container population?

A: As long as the survey is being done globally, not just from one region of the world. The problem we have is that some pests show up, then we don't see them again for 2 or 3 years, then they show up again (likely caused by the prevalence of particular pests at the time of loading, storage, transit, etc.). But because it's a global fleet, data from one country would show a lot. NZ MPI regards all sea containers as "risk goods" for legitimate reasons discussed in this presentation and has a specific Import Health Standard to manage them. MPI developed the Sea Container Hygiene System in 2006 with industry cooperation to enforce importation of clean containers from the Pacific Islands in empty containers and loaded containers. As presented this system has a greater than 99% efficacy when conducted compliantly. In addition, all sea containers must be taken to NZ quarantine facilities on arrival at the NZ border to be managed by MPI as an NPPO, or by MPI-trained industry staff as a mandatory requirement.

Q: In general can the countries require that empty containers arrive clean and sealed?

A: Australia has container standards that must be met as containers come in. The U.S. has regulations that state all conveyances, including sea containers, need to be clean upon entry into the U.S. New Zealand has a standard that requires all sea containers (empty or full) to be clean, free of pests and contamination on arrival in New Zealand. Every container that is imported into New Zealand has an interaction (inspected or checked) with MPI or a third party before entry, and any container that does not meet the standard is sent for cleaning.

Presentation: Biosecurity Innovation: projects update - *Jessica May, DAWE (Australia)*

Q: Does the app have the ability to estimate a level of confidence for the species ID?

A: We have been working on that. Because there are so many similar pests, we need to ask ourselves if we're 100% sure that the pest is BMSB, in which case we can deal with it. Or is it just suspected to be BMSB, in which case we need to call in an expert. Currently we need to call in an expert every single time, so the app will save us a lot of time. We're also expanding the app to include the identification of seeds. The app will be very useful to our officers on the ground who are not necessarily trained scientists.

Q: How important has it been for the department to come up with a structured way of dealing with this innovation? A number of years ago, before we had the innovation program with a team facilitating it, it was left up to individual areas to come up with how to innovate. Could you talk us through the benefits of setting up a specialist team and having a structured way of exploring this innovation?

A: It has meant that we can be more targeted. One of the things that we're working on is a proactive approach. We used to go out and ask for ideas, and choose from those ideas, but now we specify which areas we want projects to be about, and this way gives us time and ability to do that, and prevents duplication. Within the department we still see some duplication because we have agriculture, water, environment, and biosecurity, so there's work underway to bring all of that together.

Presentation: Regulations associated with the disinsection of aircraft - *Erin Gillespie, NZ MPI (New Zealand)*

Q: How do passengers respond to the on-flight treatment?

A: We do not generally encourage this as the usual method of disinsection as it is more invasive for passengers and does result in some dissatisfaction from passengers. We have one airline who uses this method as their regular treatment due to an inability to treat residually, I believe all airlines would consider passenger comfort and prefer to use the less invasive method where possible.

Ken Glassey, MPI: Chile was interested about rodents on aircraft. Currently they are trapped using glue boards on the plane, but we're looking at having a Co2 treatment. Both Boeing and Airbus have procedures for treating with Co2 gas. We're looking at converting that into a treatment process.

Q: In the survey of 73 international flights from pacific regions - do you know how many of the insects found were exotic or of biosecurity concern? Ford, Emma

A: 93% were classed as quarantine species.

Day Five

Presentation: New app to identify plants at risk from myrtle rust - *Murray Dawson, Landcare Research (New Zealand)*

Q: Do you track how many users get onto the system, or how many hits each species gets? Are you getting any metrics from it?

A: The web version hosted by Landcare Research has user stats, and the app stores tell you how many installs have occurred for the smartphone versions. The target user base, biosecurity people actively involved in identifying host species for monitoring myrtle rust spread, is relatively low although the key has wider appeal and will be available for the foreseeable future.

Presentation: Recent experiences working with the fumigation of roses with phosphine

- Danierla Cerón, Agrocalidad (Ecuador)

Q: Does "Inspection of 100% of operators" mean batches by batches, or growers by growers? What are the key points for the inspection?

A: The 100% inspection of shipments to Australia refers to the total number of exporters that are part of the shipment. Normally between 1 to 5% of the total shipment is inspected. In terms of procedures, it depends on the species. For example, for thrips, the flower is "tapped" to detect if living individuals fall on a white surface. For aphids and mites, the procedure is to check the foliage of the sampled stems for the presence of individuals.

Q: What statistical model did you use?

A: For the statistical model we have random blocks for the model, the statistical method used for this trial was an analysis of variance with Tukey's tests.

Q: Do you use phosphine to treat any other types of flowers?

A: Ecuador has taken this voluntary procedure for all roses and summer flowers, mainly with Australia.

Q: When the treatment is conducted, how do you determine that the enclosure and also the sleeves of roses are free from gas?

A: To start with, after 17 hours of treatment we have one and a half hours of fresh air, and then 2% of the total number of boxes are taken out. We take samples from these, and we measure for phosphine. We test if the level is lower than 0.003 ppm to open the boxes. So far, treating this way, we have no evidence of live insects in these kinds of exports.