Steve Peios:

Good morning, everybody and a warm welcome as we welcome everybody to the fourth webinar in Australia's biosecurity series, hosted by the Department of Agriculture, Water and the Environment. Hello, everybody. My name is Steve Peios and I will be hosting and facilitating today's forum. Thank you very much to everybody for taking time out of your busy schedules to join us today. And I know that as we come out of COVID lockdown around the country, everybody's feeling quite positive as we move into the Christmas period. So thank you very much for joining us today. And I look forward to everybody joining this wonderful forum.

Steve Peios:

Firstly, I would like to begin today by acknowledging the traditional custodians of the land on which we meet and pay my respects to their elders past and present. I extend that respect to Aboriginal and Torres Strait Islander peoples here today. We have an extraordinary mix of listeners with us today from all around the country, stretching from Darwin and all the way across to Perth. I'm very glad that they're joining us there because I think this virtual way would be the only way that they can join us in the current circumstances. So thank you very much to everybody around the country for joining us. We even have attendees registered from the Ministry for Primary Industries in New Zealand, our wonderful friends there from MPI. There is a good cross of federal and state government attendees today. This is probably the most diverse private sector audience that we've had, with representatives from farmers' groups in chestnut, melon, wildflower and also grape sectors. It seems like plant health is definitely everybody's business. So thank you so much to everybody for joining us today.

Steve Peios:

Now we have a great lineup of speakers who are all involved with helping keeping Australia free of plant pests and diseases. Now, this is some really interesting stuff when it comes to the factual matters, a serious incursion of a major plant pest has been estimated at potentially costing our horticultural and broad acre industries upward of $29 billion to mop up and eradicate. Managing diseases caused by Xylella fastidiosa alone, which is Australia's number one priority plant pest, would be devastating and economically costly. ABARES, which is the Australian Bureau of Agricultural and Resource Economics and Sciences estimated the potential cost of Xylella fastidiosa to Australia's grape and wine sector alone could range from $2.8 billion to $7.9 billion over 50 years. Now I'll just repeat those figures one more time, but that is some serious figures there. $2.8 billion to $7.9 billion over 50 years.

Steve Peios:

The three speakers that we will hear from today will talk about the different challenges associated with keeping Australia free from plant pests, but also highlight some of the successful ways which we are combating the risks. And I know the department is doing lots of hard work every day in order to combat these risks, so we thank everybody in the department for their continued hard work.

Steve Peios:

Now to start today's session, the CEO of Plant Health Australia, Sarah Corcoran will talk to us about the national plant biosecurity status report and where Australia is sitting. We will then hear from Dr. Gabrielle Vivian-Smith. Now Gabrielle is Australia's chief plant protection officer and will speak specifically about the risks of Australia's public enemy number one, Xylella fastidiosa. Then we will follow with Adrian Dinsdale, a scientist who works at the department's Plant Innovation Centre, about the ingenious and innovative way is we are protecting our plant health in Australia. And that will also be another very interesting segment where we look at things in the innovation space, which I know the department has a very serious focus on, as we move forward as well.

Steve Peios:

Now, before we hear from our presenters, we're going to show everybody a great animation that has been released by the department recently to promote why biosecurity is important for Australia. The animation is available on the department's YouTube and we'd encourage everybody to share it on your own channels and networks please, as we look to promote all the great work that we are doing. So before we get into the presenters, let's have a quick look at this great animation.

Steve Peios:

Biosecurity protects Australia from pests and diseases that could impact on our industry's environment, plants, animals and communities. It helps keep pests and diseases out, but it also helps manage their impact if they do arrive here. This is a big job, one that is growing and becoming more challenging every day. Pests and diseases are spreading all around the world. Over the next decade more cargo and mail will arrive in Australia than ever before and this could bring more pests and diseases to our doorstep. We are taking steps to manage these growing pest and disease risks by strengthening our defences at the border, using innovations, new technologies and science, working with importers, farmers and the community, our near neighbours and other countries. Managing pests and diseases before they arrive in Australia. And increasing penalties for those who do the wrong thing when travelling to Australia or importing goods.

Steve Peios:

These steps will help us build a stronger biosecurity system that has many layers of defence. A strong, smart biosecurity system is all that stands between Australia and the significant growing biosecurity risks we face. Learn more about biosecurity and what you can do to help at biosecurity.gov.au.

Steve Peios:

There we have that great animation there. Thank you very much to the people in the department for putting that together. That voice on that animation sounded a little bit familiar there. So it's come up not too bad and really appreciate all the work the department's doing there to put that together. And this is the work that we are doing here as a department to promote all of great work as we move forward in DAWE. All right, everybody, without any further ado, let's kick off today's webinar with Sarah Corcoran. Sarah is the CEO of Plant Health Australia and has years of experience leading national projects to deter biosecurity risks. A very warm welcome to you, Sarah. Take it away, please.

Sarah Corcoran:

Thank you very much and good morning everyone and perhaps good afternoon, New Zealand. It's great pleasure to be here today and to be a part of the Australian Biosecurity Series Webinar, protecting Australia's plant health and presenting on the status of Australia's plant biosecurity. Biosecurity is vital to keeping Australia free from pests and diseases and being an island does help us, but we've seen significant increase in plant biosecurity detections and there's pressures on our biosecurity system. Those pressures as mentioned in the video are things like globalisation, increased trade and new trade routes, climate variability, geopolitics and tourism, which has been on the back burner but well and truly replaced by increased online purchases arriving on our shores. And these factors lead to increasingly complex and unpredictable pathways to guard against threats like Xylella fastidiosa, which Steve has mentioned, Australia's number one national priority plant pest that affects a wide range of commercial and ornamental plants.

Sarah Corcoran:

In the next 10 years Australia's strong plant biosecurity status will be reflected in the economic performance of agriculture. Bumper winter crop harvest combined with strong global prices for grain, sugar and cotton have set our agriculture sector for a record-breaking year this year with gross value production forecast to reach $73 billion. And this is set to grow through the Australian government's initiative, Ag2030, laying the foundations to grow the agriculture sector to $100 billion by 2030. And biosecurity is the key goal to this.

Sarah Corcoran:

The challenge for Australia will be to address the burden that's created by the changing nature of biosecurity threats, plus the cumulative effects of multiple incursions, which is what you can see there before you in that graph. And biosecurity enhances our ability to manage the risks of plant pests and the diseases entering and emerging or establishing in Australia. And it's difficult to put a price on, however, in 2020, the CEBRA, the Centre of Excellence for Biosecurity Risk Analysis successfully valued Australia's world leading biosecurity system at $314 billion, reflecting a 30 to one return on investment. And providing the potential for biosecurity agencies to fine tune investment in risk controls and ensure maximum return on investment.

Sarah Corcoran:

Now I'll describe to you how Plant Health Australia is improving national biosecurity outcomes through partnerships. Established in the year 2000 Plant Health Australia facilitates and drives partnerships to improve policy, practice and performance of Australia's plant biosecurity system. We're funded by our members who are all of the Australian governments and the majority of peak plant industry bodies. In addition to subscription funding, we undertake separately funded projects for individual members, groups of members, or non-members. And the Plant Health Australia (Plant Industries) Funding Act 2002 also provides a levy for plant industry members to invest in activities that prepare and protect their industries and often across multiple industries at once.

Sarah Corcoran:

Another crucial component of our world-class system is the Emergency Plant Pest Response Deed. This is a legally binding agreement and the deed is held between PHA, all Australian governments and 38 national plant industry bodies. The key to the deed is supporting collaborative national decision making and investment in eradication programs where it's considered in the national interest and feasible to eradicate the pest or disease of concern. And the stress the system is under has been an ongoing concern for the deed signatories and as part of the 2020 deed review the parties agreed to further discuss the impact of multiple incidents on the national system and work on this is progressing.

Sarah Corcoran:

And a robust system is built on connectivity and in conjunction with our partners, Plant Health Australia has developed AUSPestCheck, a plant pest surveillance virtual coordination centre. This system collects, analyses and displays plant pest surveillance data and provides a real-time picture of pest numbers and spread. It also has mapping features. And before you, you can see a map out of AUSPestCheck that can distinguish between positive and negative samples and marks a site where a sample may be a waiting diagnosis.

Sarah Corcoran:

To continue to strengthen Plant Health Australia, sorry to strengthen the system, Plant Health Australia also partners in research and innovation, knowledge development, capacity building and collaboration in research to meet industry needs. In a rapidly changing biosecurity environment PHA has a critical role to play in the next five years and we've been working on a new five-year strategic plan to be released this November. Developed in consultation with our members, our board, our staff and key stakeholders there are three pillars to the strategy. Partnerships and collaboration, focusing on connected strategies to improve preparedness and resilience across members, supply chains and the wider community to improve effectiveness of communication and extension. Managing emergencies effectively, focusing on reduced impact of plant pests on Australia's economy, environment and community.

Sarah Corcoran:

And integrated system solutions, focusing on enhanced decision making, underpinned by appropriate technology and evidence-based systems to deliver integrated biosecurity solutions. Our new strategy will be about creating opportunities, propagating a future-focused culture, developing cohesive networks and improving systems capacity and capabilities so that we can continue to build a strong and resilient plant biosecurity system.

Sarah Corcoran:

Improving the system can be achieved through shared responsibility, which should be distinguished from partnerships. And it is as much about sharing responsibility for action, but also sharing the benefits delivered by a robust biosecurity system. Innovation that improves collaboration, efficiency and effectiveness and use of innovative technologies and approaches in plant biosecurity. And mechanisms such as the deed, which I've mentioned, between government and industry and other partnerships, such as memoranda of understandings with industry that PHA managers are also key to improving the system.

Sarah Corcoran:

The national biosecurity system is made up of a diverse set of partners and each with different roles and there's opportunity for new relationships with non-traditional partners. With a multitude of hosts and a plethora of pests to be aware of in the plant world, it is critical to investigate threats and pathways for exotic plant pests and develop implementation plans to mitigate the risk of their entry in establishment.

Sarah Corcoran:

It's also key to have a coordinated surveillance system to increase early detection and provide evidence of absence and support market access. Examples of successes include the ongoing investment in the highly effective Torres Strait Fruit Fly Eradication Program and the successful eradication of citrus canker and Varroa mite early this year. We're also guiding R&D investment in the recently established fall armyworm to ensure industry has the latest knowledge to develop localised management strategies for higher risk crops.

Sarah Corcoran:

And in partnership with a number of the plant RDCs, PHA is also looking to develop insecticide resistance management strategies for a range of crops. And earlier I mentioned, Australia's number one priority plant pest, Xylella. We are the Xylella coordinator for industry and have five R, D and E projects on the go, all collaborations with either government, industry or a combination of the two and also with New Zealand. The aim is improving preparedness by developing tools and knowledge to prevent the potential spread of the disease in Australia and New Zealand by understanding its potential vectors and in this case, sap-sucking insects. And it also includes investigating a rapid accurate and deployable test, field deployable test to detect Xylella. And I'm sure Gabrielle will expand further on this important work in her presentation.

Sarah Corcoran:

A good plan is critical and the National Plant Biosecurity Strategy is a 10-year plan that points the way for governments, plant industries and the community to work closely together to strengthen the system. First released in 2010, Plant Health Australia has commenced development of an updated 10-year strategy, due to be completed at the end of this year. In addition to the updated strategy, its development is informed by three new sub strategies around preparedness, surveillance, diagnostics and these will support the implementation and have been funded by the Australian government through the Agricultural Competitiveness White Paper.

Sarah Corcoran:

And another important resource is the annual National Plant Biosecurity Status Report. Recently released, it's a must have reference for those seeking to understand Australia's plant biosecurity system and its performance. The report details the pre-border, border and post-border activities undertaken over the last 12 months. And it brings together contributions from over 100 government industry and research organisations and is the only published source of biosecurity research, development and extension projects aimed at enhancing capability within the system. And I'm pleased to say it's available now for download on PHA's website.

Sarah Corcoran:

And PHA is proud to be a part of the biosecurity collective with our partners, Animal Health Australia, the Invasive Species Council and the Centre for Invasive Species Solutions and we all share a deep commitment to strong biosecurity for Australia. Following on from the Inaugural Symposium in 2019, the second Australian Biosecurity Symposium will be held from the 3rd to the 5th of May 2022 on the Gold Coast. To help future-proof our biosecurity system, the symposium will focus on prevention, share research and innovation, explore innovative thinking and exchange knowledge and ideas across the biosecurity collective, including agriculture, pest animals, weeds, wildlife, aquatics, humans and the environment. And if you would like to learn more about the work that Plant Health Australia does, please look for and follow us on Facebook, LinkedIn and Twitter. And thank you for very much.

Steve Peios:

Sarah, thank you so much for that wonderful presentation. Really, really exciting stuff. I know personally I've got some questions for you. When we're finished with the panellists I know there's going to be plenty that come through, but there's some really important points there where we talk about strategic relationships and the partnerships that we have as a department. And I know that as we press towards 2030 as well, you can see here all the reporting that the department's doing has a very clear focus on how we want to join together to continue to impress the importance of our biosecurity system and the fact that we are so proud of it and that we lead strongly with that. So thank you so much, Sarah. And I look forward to asking a question when we get to our Q&A.

Steve Peios:

I'd now like to welcome our next presenter and that is none other than Dr Gabrielle Vivian-Smith. She'll be talking about our number one plant biosecurity threat, Xylella fastidiosa. So we've heard that a few times already today and we know that it's very, very important. She's going to talk about what we're doing to manage its risk and expand a little bit of what Sarah talked to us just before. So a very warm welcome to you, Dr Gabrielle Vivian-Smith.

Dr Gabrielle Vivian-Smith:

So good morning, everyone. And thank you for joining us for this really important session on plant health. I'm going to focus today on Xylella fastidiosa, Australia's number one plant biosecurity threat. My talk will focus on why we need to continue to prevent the entry of this pest to Australia and why it is our number one plant pest. In this slide you can see in the top left corner the image there with the kangaroo in the middle of it, that's a thriving olive orchard in Australia. It looks quite similar to the orchard directly below it, which is in Italy. However, the pictures on the right hand side of this screen depict a very different story. The destruction of the trees that you can see in these photographs has happened in parts of Italy and Southern Europe with the arrival and spread of the bacterial disease Xylella fastidiosa.

Dr Gabrielle Vivian-Smith:

But there's more to it than just olive orchards. Xylella doesn't just threaten olive orchards. It's a threat to almonds, citrus, tree nuts, production nurseries, summer fruit and viticulture, as well as many other species. The economic costs of Xylella to Europe have been estimated in the billions of euros and there's no cure for Xylella. Not only does it attack commercial varieties of plants, but it's also a potential threat to Australia's native plants and it can infect more than 500 different plant species all up. And these are the reasons why Xylella is considered to be Australia's number one priority plant pest.

Dr Gabrielle Vivian-Smith:

Xylella fastidiosa is a bacterial disease. It infects the xylem of the plants. This is the water, this is the plant's water conducting system or plumbing system and a scanning electron microscope picture that you can see on the right hand side of this slide shows the effect that Xylella bacteria have when they're blocking these xylem vessels in the plant.

Dr Gabrielle Vivian-Smith:

The physical symptoms that are caused by Xylella are often similar to that of water stress and they're labelled generally as a bacterial leaf scorch and you can see a photograph of that. However, the nature of these symptoms is often fairly nonspecific and it makes it very difficult to diagnose xylella confidently in the field just from symptoms. In fact, most plants that are infected by xylella will be asymptomatic for some period of time after infection. And some species don't show any signs of infection at all, making it very difficult to detect early. Xylella has an interesting, what we call a taxonomy. It has a range of different subspecies and species. There's really only two species of Xylella, there's Xylella fastidiosa and Xylella taiwanensis. Taiwanensis has a very restricted distribution, really just to Taiwan and it's Xylella fastidiosa that most of our focus is on.

Dr Gabrielle Vivian-Smith:

There are a number of different subspecies that are reported in the literature and there's about six different subspecies that have been described. However, there's quite a lot of debate about these and the interest-specific taxonomic boundaries of Xylella fastidiosa are often debated and still debated. And in Australia we recognise the three main ones of these, which are Xylella fastidiosa, subspecies multiplex, Xylella fastidiosa, subspecies pauca and Xylella fastidiosa, subspecies fastidiosa. And these subspecies are important because they often infect different groups or species of plants.

Dr Gabrielle Vivian-Smith:

Some plants can also be infected by more than one subspecies, and the subspecies have the ability to recombine and I guess, change in different ways. And we've seen this when they've encountered new host species and when they've been transported into new geographic areas. It makes it a really complex and quite a tricky plant disease to understand and manage and there's been a huge amount of research trying to get to the bottom of Xylella. As a result of this, the diseases that are caused by Xylella are known by different names in different plants. And you may have heard of Pierce's disease on grapevine and you might have heard of olive quick decline syndrome in olives. They're both caused by Xylella.

Dr Gabrielle Vivian-Smith:

The other reason why Xylella is a really difficult pest to control and to manage effectively is because it's spread by insect vectors. This has contributed to Xylella's devastating impact as it contributes to a really rapid epidemiological spread in some parts of the world. The insect vectors feed on the sap within the xylem of the plants and so they ingest the Xylella into their foreguts and they can spread it quite effectively from one plant to another. Xylella has an interesting relationship with some of its insect vectors and can actually survive within the foregut of the insects. And once infected, the insect can spread the bacteria throughout its life.

Dr Gabrielle Vivian-Smith:

So the map in the next slide shows the current distribution of Xylella and its associated plant diseases. However, this distribution has changed quite quickly over the last decade with its introduction to Europe. The pink dots there are countries in Europe where the pest is considered transient and there are large efforts underway to eradicate and manage that pest through official control measures.

Dr Gabrielle Vivian-Smith:

However, the key message here is that wherever it is spread, Xylella has had a huge impact on agriculture and we'll now look at a few examples. In California the crop losses from Pierce's disease amount to about $104 million a year and growers spend approximately $50 million per year in management strategies. Pierce's disease has been around in California for a while and the effects were first identified in the 1880s by a plant pathologist in California, called Newton Pierce. It was known then back as California wine disease and then later was named after the plant pathologist as Pierce's disease.

Dr Gabrielle Vivian-Smith:

At that time the disease infected more than 35,000 acres and forced viticulture to move northwards. And with the spread of insect vectors or the broader distribution of insect vectors, such as the glassy-winged sharpshooter to wine growing areas, the problem really started to take off. Initially it was thought to be a virus and it wasn't until the 1970s, or after the 1970s that they realised it was a bacterial disease.

Dr Gabrielle Vivian-Smith:

In Italy where it's called olive quick decline the projected cost to the Italian olive industry is 5.2 billion euros over the next 50 years if the trees are not replaced and the management of Xylella is proving particularly problematic. This disease only really arrived or was noticed in 2013 in Italy. And however other, I guess, introductions of Xylella had been present in Europe for some time prior to that. And there's been quite a lot of work trying to unpick how Xylella and when Xylella first arrived in Europe and which of the subspecies arrived where and when.

Dr Gabrielle Vivian-Smith:

The most devastating and striking impacts that were first noticed had been on the olive trees in the Apulia region of Italy. And here we've seen many centuries old olive growth wiped out. The devastation and destruction and the eradication efforts have led to a really vigorous debate as well as social disruption there, given the deep cultural significance of olive trees. And there's been a lot of debate on how best to manage the impact of Xylella, including the disruption of olive growths to stop further spread.

Dr Gabrielle Vivian-Smith:

So citrus variegated chlorosis is what the disease, what Xylella is called in Brazil in citrus fruit. And this is caused by one of the subspecies, the subspecies pauca. And it was first reported in Sao Paulo state in 1987 and affected approximately 200 million sweet orange trees in the region in the first 20 years. Brazil has taken a very aggressive approach to management of the disease and certification programs to reduce the spread of the disease. Their programs centre around intensive testing, growing planting stock free of Xylella in insect proved screen houses and routine monitoring for Xylella, as well as vector management through integrated pest management and systemic insecticide applications in young and susceptible plants. They have quite a complex sophisticated program, which appears to be providing some benefits. So they can manage Xylella, however, it is at a quite a significant cost. It's been estimated back in 2007 that the cost of tree losses, as well as host production and control costs were approximately 120 million dollars U.S. per year.

Dr Gabrielle Vivian-Smith:

In terms of Australia, Xylella does pose a significant threat. There are a range of potential pathways and you can see in the slides that we do have a lot of different commodities and things arriving in the country along various pathways each year, the cargo, sea vessels and aircraft, shipping containers, travellers and mail. We need to be able to watch all of those different pathways. So, Xylella could arrive on imported plant propagated material, or by insect vectors that are brought here through these different pathways. International mail is also of concern when it contains live plant material that has not been permitted entry to the country.

Dr Gabrielle Vivian-Smith:

So whilst there are potentially millions of opportunities for Xylella to enter the country each year, our emergency measures in place that regulate the entry of plant materials and products together with really, I guess, a stringent range of biosecurity inspections at the border and new detection technology go a really long way to protect Australia. Plant material lawfully brought into Australia undergoes inspections and a number of tests to ensure that it does not contain Xylella. And Dr Adrian Dinsdale's talk coming up next will cover some of the great work being done by our Plant Post-entry Quarantine Station.

Dr Gabrielle Vivian-Smith:

However, there are real risks and I just want to highlight one of our examples here. Recently we detected plants in the mail pathway. Careless or thoughtless efforts to order material overseas and import it to Australia, do put many of our plant industries at risk. You can see some of the statistics there in terms of the mail articles intercepted containing live plant materials. So in 2020, over 1,700 mail articles and that's actually increased this year to 1,989 mail articles intercepted containing live plant materials.

Dr Gabrielle Vivian-Smith:

So whilst all of these won't contain Xylella host material, a number of them do and you can see some rose cuttings intercepted there. Rose cuttings from Europe do have the potential to contain Xylella infection and so all of these pathways need to be monitored closely. And we really try to discourage and raise awareness of the risks of such thoughtless purchases. To address the threat of xylella we've developed a National Xylella Action Plan. Xylella is not present in Australia, so our actions are really focused in this plan on prevention, detection, preparedness and response and research.

Dr Gabrielle Vivian-Smith:

Xylella can infect different plant species, leading to new plant diseases and it can also infect new insect vectors. And in Australia we need to do work to understand what native insects in Australia could be potential vectors for Xylella. We're collaborating with international researchers, as well as researchers here in Australia and other stakeholders to learn about the biology and the impact of the disease so that we are well equipped in the event that we have to respond to detections post border here in Australia.

Dr Gabrielle Vivian-Smith:

There's multiple projects across multiple agricultural industries and national coordinator as mentioned by Sarah Corcoran to help oversee and coordinate the activities and the action plan. We're also investing through innovation, ineffective technologies to prevent entry and to prepare for and respond to Xylella. Here I'll highlight one example of some of the new innovative technologies and that is hyperspectral imaging that's currently being used across Europe to quickly monitor and detect new incursions of Xylella through changes in the plant canopy.

Dr Gabrielle Vivian-Smith:

The hyperspectral cameras can take highly accurate measurements of the light spectrum of plants and can cover thousands of vectors at a time. The hyperspectral data is analysed by super computers using algorithms and it can be trained to identify the effects of Xylella before visual symptoms appear. A hyperspectral camera can have between a 100 and a 1,000 sensors, while a typical camera will only have three sensors for the three primary colours. The algorithms can also be developed to specific environments and specific cultivars, plants and researchers at Melbourne Uni led by Professor Pablo Zarco-Tejada are currently developing hyperspectral scanning technologies, which are being adapted to the Australian environment as part of our preparedness for Xylella. His work has recently been published in nature communications, following a DAWE funded project.

Dr Gabrielle Vivian-Smith:

So just highlights, the sorts of ammunition that we're throwing at Xylella. And I will close now, there's plenty more we could about. Today on Xylella it's a vast area of research and a vast area of activity globally, but I'd like to thank you for the opportunity to share with you this case study, highlighting why Australia's plant health needs protecting from pests such as Xylella fastidiosa. Thank you.

Steve Peios:

Thank you so much, Gabrielle. Magnificent presentation again, two from two that have been brilliant so far. Now, without any further ado, I'll move on to our next presenter. And it's a very warm welcome to Dr Adrian Dinsdale. He's going to run us through how innovations are being utilised to help us work smarter to manage plant biosecurity risks. So thank you very much, Adrian, and over to you.

Dr Adrian Dinsdale:

So yes, I am Adrian Dinsdale. I have a very great pleasure of being the acting director of Plant Innovation Centre at Post-Entry Quarantine, otherwise known as PIC@PEQ. And today I'll be talking about how we're using science and innovation support stronger, smarter, plant biosecurity approaches. So I'll just very briefly touch on, I guess, what is biosecurity and why do we do it? And really it comes down to being about protecting three critical things and they are our environment, our food and private industries and of course, jobs and incomes. And those three things are clearly critically important to Australia and to our way of life. And so the role of to protect in helping to protect those three things is to develop an in-house R&D capability for the department to conduct operational trials and implement improvements to how we do our business to more closely engage with the external scientific research community.

Dr Adrian Dinsdale:

So places like state government agencies, CSIRO et cetera and also to develop much closer collaborative links with the education sector, primarily universities, to attract more graduates to biosecurity for the future. Now, just staying at a higher level about the biosecurity system. This is another snapshot. This one's a little bit dated, it's pre-COVID. But what I really just want to illustrate is the sheer volume of goods that come into Australia. It's a staggering amount of goods. Every one of those represents a potential biosecurity risk and so that risk must be managed for each and every one of those items. And what is a bit scary is the figure down in the bottom right that shows the forecast increase in the movement of those goods. And so clearly over time our biosecurity system will come under increasing pressure to help protect those pretty good things I've mentioned.

Dr Adrian Dinsdale:

And now not surprisingly, as the movement of goods into Australia increases, we see a commensurate increase with the interceptions of biosecurity risk at the border. And so if that curve keeps growing, which it is forecast to do, clearly we can't just stand still and keep doing our business the way we're doing it. We need to be smarter, faster, more efficient. So in other words, we must innovate. And that's where our team comes in as an innovation team. So this is the group. We have a pretty diverse skillset, but primarily we're a team of plant scientist and molecular biologists. And we are based here in Mickleham at the National High Risk Post-Entry Quarantine facility where I'm talking to you from today. It's a really fantastic facility. It opened in 2015 with a price tag a little shy of around 400 million. And so to me, I think this really demonstrates the government and the department's commitment to biosecurity and the future of biosecurity.

Dr Adrian Dinsdale:

Now, some of you may be wondering what is PEQ of post-entry quarantine? And I like to describe it as really it's a prison, it's where we lock up potentially nasty biological things that represent a risk to Australia. So most high risk things that come to Australia come to this facility and essentially we lock them up and we manage them and we assess that risk and we don't let them out until we are confident that risk has been managed. So the PEQ facility has purpose-built, high containment facilities built to contain cats, dogs, birds, eggs, bees, ruminants, plants and horses. So as you can imagine, with all of those things on site here, it's a really interesting and dynamic place to work. So that's just a little bit about the team, about what we do, where we do it, who we are and probably most importantly, why we do it. And now I'll just spend the remaining few minutes to go into a little more detail about some of the actual projects we're working on and why we're doing it.

Dr Adrian Dinsdale:

So, first of all, this is probably one of our biggest projects. It's a partnership with several groups there you can see on the top right. And it's about taking what's generally considered to be a pretty mature research tool, something called high throughput sequencing or HTS and implementing that as a routine diagnostic test in a regulatory setting. That project's going very well. We expect that to be implemented late next year and we're pretty confident this will be a world first in a plant ag setting to have this as a routine diagnostic test. And this will give us huge efficiencies to not only how we're able to process plants through quarantine, but we'll do it cheaper, faster, and with better results.

Dr Adrian Dinsdale:

At the other end of the spectrum we have a project where we're looking at alternative herbicide that we can use instead of glyphosate. The glyphosate is used for some biosecurity implications, as most of you probably know its use is being limited in a number of jurisdictions, so we need to find some alternatives. And I put these two projects directly next to each other because they really demonstrate the grid of the kinds of projects that we protect those. At the top there we have really cutting edge molecular DNA diagnostics. And at the bottom we have what could be unkindly described as a bucket chemistry project, but both are really valuable and certainly are worth doing.

Dr Adrian Dinsdale:

Another project we're working on is to improve how we do the current molecular testing at PEQ. So even once that HTS becomes implemented, we always have a need for these tests, because HTS won't work for everything. So all of these kinds of efficiencies we're always trying to identify and improve. This is a really great little tool, something called a minION. It uses a very different type of DNA sequencing technology called nanopore. And what it can do is DNA sequence really, really quickly. So at the moment our sequencing takes days or even a week if we need to sequence an unknown test or pathogen at the border. With this tool we've worked up a whole bunch of new methods that we can implement to do that work in just a matter of hours. We are hoping to roll that out nationally next year.

Dr Adrian Dinsdale:

Other work we're doing goes around to the development of new diagnostic tests. Our tests and pathogens are a biological system, they're constantly evolving and moving and so we need to constantly develop new tests to keep up with them. This is another one of those more cutting edge type projects. So we've taken something called CRISPR-Cas, it's something you might have heard of. It's originally a genome editing tool and we've been able to demonstrate that we can adapt that to a diagnostic tool. And in this case we've worked up a very new cutting edge test to do the test for Xylella. We've shown that that works. We're now working on trying to develop that to make it a more practical and fit for purpose.

Dr Adrian Dinsdale:

This is another very new project for us that we'll start January or February next year. And this is a partnership with the University of the Sunshine Coast and the University of Florida and is part of that education sector engagements where PIC@PEQ will be informally co-supervising its first PhD project in the department to develop new methods to detect tests in imported seeds, mainly viruses.

Dr Adrian Dinsdale:

And this is another partnership project this time in industry who we also work closely with. Steritech recently opened a new facility in Australia, have made a new irradiation treatment called electron beam available commercially for the first time early last year. We are working with Steritech to try and find ways that we can take advantage of this new technology and develop new treatments to develop the risks on seeds.

Dr Adrian Dinsdale:

Similar, pardon me, similar to the project with Steritech, we're also working with a company called Scalzo to try and use new, but perhaps more simpler methods using heat and humidity to also treat seeds to manage potential biosecurity risk associated with those. And again, along the same lines, another partnership project, this one with the Queensland state government, we're investigating a range of really novel potential treatments to see if we can use them to actually disinfect seeds and even do away for the need for diagnosing.

Dr Adrian Dinsdale:

And this is our last industry project we have on the go at the moment is a collaboration with the University of Melbourne and the Victorian Strawberry Industry Certification Authority who investigates some new and novel alternatives to the use of Methyl Bromide. So Methyl Bromide we use quite a lot, it's a very, very effective biosecurity tool, but it's also a very potent greenhouse gas, so that's something we need to relate on. And a number of these projects are funded through the department's biosecurity innovation programs. So our thanks to that group for their support.

Dr Adrian Dinsdale:

I think this is my last slide. Another new project. This one is well underway and it's about developing a range of new tests to detect new pathogens that have recently been identified in imported seeds. This one is yet to commence, we hope to start it quite soon. And it's about seeing if we can use our diagnostic knowhow to detect pest pathogens in tissue culture. But at the moment when high risk plants come to Australia, they're all transferred into soil and that's where all the testing occurs. So if we can do it in tissue culture without having to do that transfer, it's another efficiency bonus.

Dr Adrian Dinsdale:

And the last that I'll mention is another new project we're starting quite soon and that's to develop new tests to detect exotic mites on honey bees. So that's it from me. That's just a little snapshot of some of the work PIC@PEQ does. I hope you found that interesting. Happy to take any questions and thank you very much for your time.

Steve Peios:

Thanks so much for that, Adrian. Really appreciate that presentation, and a good mix there of the differences and changes there between the science focus, the innovative focus outside of that as well as we look to move forward as a department. It's an issue, innovation in general that's been in the news on a number of different facets so far and especially in our space here in the department it's something that we're looking to advance quite significantly. So thank you very much for that, Adrian. There has been some questions that have been answered already. I note that Dr Andy Sheppard from the CSIRO, I'm going to assume that's him that asked a question on Xylella and how we progress biosecurity research on that. Gabrielle has provided a great answer there. And there's also been some questions about what do we learn from the Pseudomonas outbreak on kiwi fruit in New Zealand being a similar bacterial disease.

Steve Peios:

But I might just jump in and ask a question here of Gabrielle and potentially Sarah, if they can respond as well, regarding vectors that have been identified in Australia. And I guess there's also some questions here relating to Xylella and potentially being part of vehicle imports as an example, so if I could throw that over to either of you to jump in there regarding vectors, that would be much appreciated.

Dr Gabrielle Vivian-Smith:

Sure, I'm happy to jump in and perhaps Sarah can embellish. So in terms of vectors, that's an excellent question. And Australia's very fortunate we don't have the two of most notorious vectors. So the Glassy-winged sharpshooter that I mentioned, but also Philaenus spumarius, the meadow spittle bug, which has been responsible for much of the vectoring in Europe. So there are a number of other vectors overseas that have been considered to be highly efficient vectors as well. But those are the two most notorious ones. We don't have those vectors, but the real question for Australia is, we have closely related spittle bugs and cicadelle, so members of, arthropods in the cicada family and we don't know really whether they've got a strong potential to vector Xylella or not, whether they would be a competent vector or a not very competent vector or not a vector at all.

Dr Gabrielle Vivian-Smith:

And some important research is underway. So this question has been identified as a key gap and is mentioned in the national Xylella action plan. And Dr Piotr Trebicki from Agriculture Victoria has commenced a project, which specifically looks at the potential for Australian native cicadelle species to vector Xylella. And it's really just commenced recently, so we don't have a lot of findings yet from that, but at least there is work underway. Shall I go to the other ... I'll pause and see if Sarah wants to handle the vehicle one, but I'm happy to handle that one as well or add to the vectoring.

Sarah Corcoran:

Oh, thanks, Gabrielle. No, I think you answered the question beautifully, and that is the real question for Australia is, do we have the species here that could potentially vector Xylella and really important work and a really important investment to understand that going forward. The next question on the vessel? Yeah, great, there was a question there-

Dr Gabrielle Vivian-Smith:

I'd do it if you like-

Sarah Corcoran:

... which I attempted to answer. So the question was around, how would you detect Xylella on a vessel? Well, I guess potentially there could be vectors harbouring or hitch hiking on that vessel. So, a constant sort of vigilance around potential for contamination of things like live insects or even plant material on board a vessel is really important. So those walk arounds and constant checking to make sure that there's all clear from those things.

Dr Gabrielle Vivian-Smith:

And so it would be mainly the vector that you'd be looking out for in this case as Sarah mentions. And it's not just vessels, but air cargo as well, because those insects are more likely to arrive in a healthy state in air cargo and the glassy-winged sharpshooter arrived in Tahiti in air, through I guess, air cargo and has been a really well known example of that. Xylella itself, we're not so worried about hitchhiking or by itself on a vessel. It's a fastidious bacteria so it can't really grow. It can't really survive outside of a plant, which is one blessing that we have for Xylella, other than inside the guts, the foreguts of those vectors that we talked about.

Steve Peios:

Thanks very much, Gabrielle and Sarah. I might just move on to another question here quickly. I can see a comment here from Rory talking about vectors again, but I might just move on to the next one from our anonymous attendee, purely because it's talking here about strategy and it's asking about focusing on surveillance efforts on Xylella vectors for early detection, rather than on host plants. So noting the common is, wouldn't it be a best strategy? I won't pose the question to you that way, but I'll just ask if there is some relevance there to that point about focusing on surveillance efforts as well?

Dr Gabrielle Vivian-Smith:

Yeah, that's a really good question, and there's been a lot of work done on this very question. In Europe they do surveillance on both the vectors, as well as the host plants. Host plants can be a bit tricky, even sampling them in the field, as Xylella is distributed unevenly in some cases and it often takes a while for the populations to build up to detectable levels. So, in many ways it would be good to be able to do detection using vectors first, but if we don't have the vectors present in Australia, we won't pick up Xylella. So we probably need to have a strategy that's a bit of a mixed strategy there, rather than just putting all of our eggs in the vector detection basket, but it certainly has great promise and is widely used in Europe.

Steve Peios:

Fantastic, Gabrielle, thank you. We're fast running out of time, but I'm going to just go just for a little bit longer here. There's the great question here, which talks about the social impacts of Xylella on olive growing areas in Italy and how that's being managed. Is there work on advancing disease resistant olive varieties?

Dr Gabrielle Vivian-Smith:

Yeah, look, another great question. It's a really fascinating story, the Xylella story. I'm certainly not well versed in all of the impacts, the social impacts in Italy. However, there was quite a lot of ... There had been some really significant legal cases and legal challenges to the work that's been underway. It's been quite devastating to some communities and there was actually a number of social protests. So public protest about the work underway to eradicate Xylella or slow the spread. So street protests, there's also been conspiracy theories about, it's been a little bit like probably gave us a few inklings as to what might happen with COVID really, but so there's quite a lot that you could Google and learn about.

Dr Gabrielle Vivian-Smith:

And I would suggest that rather than me expanding further, what was the second part of that question, just very quickly? The second part? Oh, the resistant cultivars. Yes, they have, they're now allowing replanting in a number of parts of Apulia in Italy. I think they've got two resistant cultivars that they have now located. So that's been a really big win for, or a bit of a turning point for those growers who can now replant olives in their sort of devastated olive groves. Thank you.

Steve Peios:

Fantastic, Gabrielle, thank you very much. There's a question here for Adrian I'd just like to throw to him to give him a chance to answer one. But this anonymous attendee has made a comment about given the projects you listed seed born pathogens are a challenge for PEQ. Are these projects being done to potentially replace growing out samples of seed in PEQ? And how many of our pathogens are amongst the MPPPs are seed born?

Dr Adrian Dinsdale:

Yeah, thanks, Steve, thanks for the question. In regards to the first part, look, as with many of these kinds of trials, the outcomes that we get from them and what things we implement as a result of them, we really base almost entirely on how well those trials work and what kind of results that we get. Most of those trials are underway, but we don't have any final data yet, so I couldn't say whether or not it will make those changes, but those are the kinds of things we were expecting to achieve from this kind of work by managing the risks, but by making access easier.

Dr Adrian Dinsdale:

In regards to the second part of this question, in the most, I couldn't say all off the top of my head, but certainly most of the MPP tests, I don't think are seaborne, can't think of any top of my head that are, Gabrielle or Sarah may know of some. So I don't think any of those would be relevant to this, but I'd be happy to elaborate.

Steve Peios:

Thank you so much for that, really appreciate that, Adrian. It's really fantastic that we've got so many Q&As in there, and I'd also like to say a big, big, thank you to Gabrielle and Sarah for providing some of those answers typed in there as well. And it looks like there's plenty more that we'll look to provide some answers too.

Steve Peios:

On that note, ladies and gentlemen, I'd like to thank everybody for joining us today for our webinar. We really appreciate everybody's attendance. We had hundreds of attendees today from all over the country from internationally as well. And we're very excited that these webinars are picking up the pace in terms of attendance and also interest, so thank you so much. On the screen we've added some other channels for you to connect to our work and also details if you would like to be added to the invitation list for this webinar series, it really is growing at a rapid pace and we're very, very excited by that.

Steve Peios:

I'd like to say a big thank you to Sarah Corcoran, Dr Gabrielle Vivian-Smith, Dr Adrian Dinsdale for their wonderful presentations today and for providing and making themselves available to provide answers to the questions that have been provided. Please look out for there, you can see there on the page at the moment, biosecurity.gov.au is an important central portal, but importantly, awe.gov.au/webinar-series for more information on the Australian Biosecurity Webinars that we are running.

Steve Peios:

We also have a podcast series running as well, Detect and Protect and there's all sorts of wonderful literature and information. Importantly, everybody as well, please note, if you have any further questions you'd like to ask, biosecurity.education@awe.gov.au. That is biosecurity.education@awe.gov.au. Not only to be added to the invitation list, but also if you would like to ask some more questions, noting that we've just finished our webinar today. But a very, very successful session again. I'd also urge you to register for the National Biosecurity Forum, which is being run in November. And as Sarah mentioned as well, we have another great event next year in May coming up as well. So you can find free registration details on the screen at the moment. Thank you very much once again, and we'll see you next time.