Steve Peios:

Hello everybody, and a warm welcome to you all to our eighth webinar in the Australian Biosecurity Series. Australia's number one intercepted biosecurity risk, travelling seeds, hosted by the Department of Agriculture, Water and the Environment. Hello again, everybody. My name is Steve Peios and I will be facilitating today's forum for you all. Thank you for taking the time out of your busy schedules to join us this morning. I would like to begin by acknowledging the traditional custodians of the land on which we meet and pay our respects to their elders past and present. I extend that respect to Aboriginal and Torres Strait Islander peoples attending today. We have an extraordinary mix of listeners with us today, from all around Australia, New Zealand and beyond. So a warm welcome to you all. We also have many regional and rural attendees as well, so greetings to those folks tuning in from these areas.

Steve Peios:

We can see attendees already this morning from Tawonga, in Victoria, Dalgety in New South Wales and Columboola in Queensland, just to name a few. Seeds make up 73% of the intercepted risk items in 2020, 2021 with over 36,000 interceptions. A large number of these seeds intercepted have been to carry deadly pests and diseases that we know can destroy our crops, plants, foodstuffs, and our way of life, importantly. Seeds travelling to Australia have been found to carry some of our top plant priority pests and diseases. We have many protective methods to stop potential spread of these types of disease, X-rays, detector dogs, and even recently we've introduced new laws for unidentified seeds, found travelling from overseas to be destroyed. It is through our biosecurity teams and our government standards that we continue to keep risk items out of Australia. And we'll hear more about why this is so important and the run-on effects we must avoid in Australia. In today's webinar, we'll be hearing from four incredible speakers.

Steve Peios:

Dr. Fiona Constable of Agriculture Victoria Research, and Dr. David Dall, Assistant Secretary for Plant Sciences and Risk Assessment at the Department of Agriculture, Water and the Environment, who will take us together through the pests and diseases that have been found on seeds making their way to Australia and the research of tested seeds that have been intercepted.

Steve Peios:

We will then hear from Zarmeen Hassan, from AusVeg, who will speed about the importance of clean seed pathogens and present to us a fascinating case study on the cucumber green mottle mosaic virus, CGMMV. Lastly, Emma Davensen from the Behavioural Analysis Team at the Department of Agriculture, Water and the Environment, will present to us the key findings from a study into people who buy seeds online and how we may be able to limit risks through behavioural change. Our panellists will then be here and available, ready to answer all of your questions with a Q&A session. So thank you very much again to everybody for joining us. It is my pleasure to introduce our first two speakers, Dr. Fiona Constable and David Dall. Now Fiona and David, we know that seeds making their way to Australia through mail and other channels are a huge risk. If you could please take us through what viruses have been found on seeds from overseas and also your findings from this research, we can't wait to hear it. Over to you, please, Fiona and David.

David Dall:

Thank you very much, Steve. I'll lead off and then transfer over to Fiona, thank you. Look, our talk this morning will combine a summary of the results of interceptions and what we call our seeds in the mail project with a brief overview of the continuing and considerable effort that the department puts into securing biosecurity around the seeds for planting pathway. Ours is a short presentation on a very big subject, so I will keep it moving along. But before proceeding, I just invite you and all of our participants, Steve, to notice this picture on the right hand side of unlabeled cucumber seeds, which came to us in the mail. And I think it's pretty obvious that the top right, the grub that actually accompanied them. This came into Australia from overseas, unfortunately. Next slide. Thank you, Fiona. Look, just a bit of background. Australia is highly dependent on imported seeds, to the tune of around 95%, to actually grow its domestic vegetable crops.

David Dall:

And many other kinds of seeds are also imported. The seeds for planting pathway as we call it is relatively high risk because pests such as fungi, viruses and viroids, which are like a little mini virus that actually are already closely associated with those seeds, basically juxtaposed with a potential host, and that is of course the seedling that will emerge from these seeds. And that gives them a relatively high chance of being able to find a foothold in Australia as these things germinate. Obviously, they're planted together with these seeds. As well as those microorganisms, there are other risks such as arthropod pests, such as grubs, beetles, mites, and so on that can come in with seeds. And we've seen a picture of that already, we'll see some more examples shortly, and other biosecurity risk contaminants, such as soil, which has all sorts of microbes in it, plant debris, which can have other kinds of pests in it and so on.

David Dall:

So we do pay a lot of attention to the biosecurity around seeds coming into Australia. As a consequence, we have significant regulatory involvement at a variety of levels ranging from general conditions, all seeds that come into the country, for example, must be labelled with their full botanical name, didn't occur on the example that you saw, and must be free of other seed types. They must be free of live insects, didn't occur as you saw, and of soil and other contaminant materials. So that's a blanket requirement. There are other requirements as well that I won't go into that all seeds coming in must adhere to.

David Dall:

In addition, we have what we call emergency measures. These are where we need to take instant action. These are such as those applied to a variety of seed types to keep out one of our key pest, Khapra beetle, which is a major pest of grain and known to be associated with seeds and newly recognised viruses, emerging viruses, as we say, such as tomato mottle mosaic virus. And finally, we have a range of specific to testing requirements for established pests and diseases that we know are present in other parts of the world, but not in Australia that we wish to keep out of our country. Thank you. Please, the next one.

David Dall:

And in particular, we pay a lot of attention to four major plant groups. You can see the names of them there, Solanaceae, Cucurbitacea, Apiaceae, and Brassicaceae, they're the official names for the groups of plants that actually contain vegetables, such as tomato, cucumber, carrots, cabbages, et cetera. All subject to a range of pests and diseases that we need to keep out. So I am going to now hand over to Fiona to tell us about how we actually go about keeping out these pests and diseases. Thank you, Fiona.

Fiona Constable:

Thanks, David. So we've been testing seed at the border since about 2008. We started testing Solanaceae, in particular tomatoes, for pospiviroids and we've subsequently started testing Cucurbitaceae in more recent years associated to outbreaks of diseases that cause significant yield losses and loss of quality in various crops. We've test up to 9,400 or 20,000 seed depending on the type of test that we apply. Those seed lots will get broken down into sub samples of the smaller sub samples of seed between 100 and 400 seed and we use ELISA or PCR. For those of you who are not so familiar, I think one of the, probably the only good thing about COVID, is it actually makes my life a lot easier to explain what viruses are and how we test. So an ELISA is just a little bit like the rat test that is used currently for detecting COVID, we're using an antibody based test to detect the whole virus.

Fiona Constable:

And the PCR is a test where we're using a molecular method to detect just a little bit of the genome of the virus or other pathogen, in fact. And so we break these down into sub samples and if we get a positive result for any of the regulated pathogens, then they're refused entry and we notify both the client who's getting the seed tested, or we notify DAWE. Testing is done onshore by two laboratories, that's our laboratory here in Victoria or by New South Wales Department of Farm Industries, their plant diagnostic laboratory, but also some testing may be done onshore by accredited facilities. We have had quite a lot of detections of different pathogens and seeds since testing started. And I'm just going to take you through the intersection rate that we've noticed for a couple of the different types of pathogens we've been testing for over the last few years.

Fiona Constable:

So you in the Solanaceae, as I said, we test tomato capsicum seed. We started testing for pospiviroids, they're a little bit like viruses. They're a little bit of nucleic acid and a little bit of RNA that has a devastating effect on plants and reducing marketable yield. We started testing for those in tomato in 2008, and subsequently started testing capsicum in 2013. And we also bought on board tobamovirus testing, and more recently with tomato brown rugose fruit virus spreading around the world. We started testing for tobamoviruses. Tobamovirus virus is a genus, and it includes a bunch of different species of viruses. And when we started testing for tobamoviruses in 2019, we were using a generic test that checked all species within the genus. And what we found was that 44% of the seed that were tested were, in fact, contaminated with a tobamovirus species, some of those viruses that occur on shore, like pepper mild mottle mosaic and tobacco mosaic viruses.

Fiona Constable:

And so they are not regulated at the border. So if a seed lot is found infected, then there's probably no restriction for that coming in with those particular viruses. But if we found tomato brown rugose fruit virus or tomato mild mottle virus, and you can see there that we do detect those with some frequency, then that seed will not be allowed to enter the country. And so it's very important that we do test for these pathogens because of their devastating effect. And on the right, you can see the effect of tomato brown rugose fruit virus on a tomato variety. Those tomatoes probably won't ripen properly. They may not build up the sort of flavour. They might not grow to the size that they should grow to and those plants might not yield what they need to yield. So we do detect viruses with quite a lot of frequency.

Fiona Constable:

The pospivirus, although the data's not here., We have detected quite a few of those as well. And the reason for testing those is that we have had a number of incursions over the years that have been eradicated, which is really fortunate. And so we continue to keep testing those at the border as well. For the next slide, again, we've been testing cucurbits for quite some time. We had an outbreak of cucumber green mottle mosaic virus in 2014 in the Northern Territory and it's subsequently been found in a couple of other regions around the country. Because of its devastating effect and its impact on market access to other regions, we still regulate for this virus in seed, and you can see again on the right, the effect that cucumber green mottle mosaic virus can have in cucumbers. It has a very significant impact on other cucurbit species as well.

Fiona Constable:

We also test for melon necrotic spot virus, that virus was actually found in Australia. An outbreak occurred in 2015, '16. The impact of that particular virus to the grower that was affected was around $2 million in lost produce, which is why that's so important. And you can see the fruit, that's the fruit that came to our laboratory when we detected that virus in Australia. And again, it's still regulated. Fortunately we don't find melon necrotic spot very frequently in imported seed at the border. I think we've only had one or two detections in all the seed that we've tested since we started testing for that virus. But the incidence for CGMMV has been quite high at times. And in 2016, not long after we first started testing for CGMMV, 3.5% of the seed blocks that were imported into Australia were contaminated and then that was reduced. So over the period of three to four years, from 2017 to 2020, with the introduction of that seed testing, we seem to be getting less interceptions at the border and only 1.2% of seed lots tested at the border were infected.

Fiona Constable:

I'm going to go talk a little more about CGMMV or cucumber green mottle mosaic virus, if I can. There we go. So we've had, as I said, our first outbreak of CGMMV occurred in the Northern Territory. It's subsequently been found in a couple of other states. It was found in watermelons, but it's also been found in cucumbers and some weed species. So what we are seeing here on the left hand side... I don't want to go into too much detail, but except it shows the relationship of different strains of CGMMV to one another when we compare their genomes. And what we find with the Australian isolates that you can see in the middle is that they all cluster very closely together and they're all highly related. They're all more than 99.4% similar. So what we believe is that we've really only either had one incursion with subsequent spread, or maybe we've had more than one incursion, but we've got a common source of the virus that's come into the country. But what this really highlights, sorry, is that seed testing reduces risk.

Fiona Constable:

So for the next slide, we have been doing some work on mail order seeds. We received seeds through the mail and did a bit of testing on seed lots to see what would be present in those seeds. We tested 31 different cucurbit seed lots. And we actually found viruses of significance. So CGMMV and melon necrotic spot, which are regulated, were found in some of those seed. And we also found some other viruses like cucumber mosaic virus and potyviruses. And as David pointed out earlier, some of those seeds that came in the mail also had a bunch of other insects, grubs, and beetles and book lice. And fortunately, none of those were significant pests, but it does indicate a definite pathway for things other than viruses and viroids like insects, such as Khapra beetle, which can have a significant impact on our crops and environment. So it's really important to keep your eyes out, not to purchase stuff online and bring it into the country without it being tested. David, I think I'll hand back over to you.

David Dall:

Thank you, Fee, if you can do the next slide and I'll move this along. I suspect we're probably going a little bit over time. So seeds in the mail, the awareness of this was really heightened by the instances of unsolicited seeds rolling up. Our actual testing project was separate to that and it was coincidental that these things rolled up, but that really had a heightening effect, then had a publicity effect for us that we were able to get the message out, which we do anyway, but that really heightened it. Web platform engagement, these are our responses to what we've found and what's going on. I'll simply... I'll leave that to Emma, who's going to talk about that in a moment. We've also introduced enhanced screening technology at various first points of entry. Seeds are hard to find. They're not very big.

David Dall:

They can easily be concealed. And in fact, not only can they easily be concealed, but I'll give you here an example again. You can see here, this was a package of seeds that I ordered under permit. You can see right under my name, the permit number written there to come into the country for our experimental or purposes, but you can also see what is labelled on that package, rubber bands. It wasn't rubber bands at all. It was cucumber and melon seeds. And so this is a deliberate... Excuse me, deliberate attempt to circumvent our importing biosecurity systems here. And indeed, most of the materials that we actually received were mislabeled, deliberately mislabeled, as toys, and lace, and nail decorations and rubber bands. Occasionally, they came as garden supplies and so on, though there is deliberate recognition and deliberate attempts to circumvent our biosecurity systems offshore. And Steve did mention the streamline response and that is now seeds that don't comply with the requirements are simply destroyed when they're detected. Please look at our website if you would like more information. And over to you, Steve, thank you.

Steve Peios:

I do have some questions for you as well, David and Fiona. So please don't go too far because I have one myself, but thank you very, very much for that presentation. I'd now like to welcome to speak on our webinar this morning Zarmeen Hassan. Zarmeen, in your work at AusVeg, you understand the large importance of protected plant life to provide fresh, healthy produce and crops for Australians and beyond. If you could please take us through the importance of clean seeds for the industry, and the example of a pest or disease that you have come across in your line of work. Ladies and gentlemen, Zarmeen Hassan.

Zarmeen Hassan:

Thanks. And those are some scary statistics that David and Fiona took us through. And I will talk about the impact that CGMMV cucumber green mottle mosaic virus that Fiona talked about had on our industry and continues still today to impact us. So just to give you an understanding of the magnitude of the industry, AusVeg is the peak industry body for vegetable growers and vegetable growers who essentially help put food on the table for the Australian consumer. We represent over 3,600 farmers nationally, who in 2020, '21 produced about 3.8 million tonnes of vegetables at a farm gate value of almost five billion, so 4.9 billion to be exact. And when you take that to a retail level, that value doubles so it's almost a $9 billion industry. And so any disease that comes in has a significant impact on a pretty major industry. And that's just vegetables, there's a whole host of other plant industries that are impacted as well.

Zarmeen Hassan:

And so in order to protect the industry from threats that include pest and diseases, not just from seed, but across the entire spectrum, we also run a farm biosecurity program, which works with the industry state governments and federal governments to essentially mitigate the risks to our industry and to help our growers and farmers to protect their farmland and hence to be able to continue to supply food to the consumers. And this $4.9 billion industry, it all pretty much starts with seed, right? That's the starting point of it. So it's absolutely critical that we protect all the entire value chain, but also critically, as David mentioned, seed is imported, being over 90% of the seed that come them to Australia. We're heavily reliant on imports. And so it's important we protect and secure our seeds from pest and diseases as well.

Zarmeen Hassan:

And look, CGMMV that Fiona talked about is an example of what happens when an infected seed or seedling enters the farming operation and how it can devastate an entire industry in a region. So CGMMV was detected in the Northern Territory in 2014. It impacted almost 20 vegetable and melon farms, about 13 melons and the rest vegetable, started with the Northern Territory, but was subsequently moved on to other states as well. Crops were destroyed and farmers were not able to plant for two years on their properties, any cucurbits. And so that would include melons, watermelons, cucumbers, pumpkins, et cetera. They were not allowed to plant for up to two years. Growers had to destroy the crop and pretty much were left with almost red dirt for over two years. Some even went out of business and weren't able to recover.

Zarmeen Hassan:

The industry lost about 40... There was about $40 million worth of losses nationally because primarily what CGMMV does is it impacts the quality of the fruit and hence impacts the marketable yield for growers. So growers pretty much are unable to sell their produce. It also impacts... So that's a physical yield example, but what it also does is created market access issues. So growers from Northern Territory and impacted properties were not able to move their produce to the rest of the country. And what eventually happened was to regain market access for about two years, every plant had to be tested at four leaf states. So imagine that cost implication of that and all of that cost implication was born by the Northern Territory government. So the cost impact was significant from the loss of revenue perspective, as well as continuing to get market access.

Zarmeen Hassan:

What also happened, so that's happened at the time of incursion, but the impact continues. Till today, CGMMV is under official control. In about 2020, about two years ago, CGMMV was detected in a shipment in New Zealand. That was in New Zealand that went from Australia in cucurbits. And that pretty much brought the cucurbits straight to New Zealand from Australia to hold. And it took us over a year to bring that market access back. And that include doing establishing past three places of production. It was a long drawn out process. And for that almost 12 over 12 month period, growers that are exporting traditionally to New Zealand were unable to export to New Zealand. So the impact of that incursion continues. Now in 2022, the impacted industries which is melon vegetables and green life industries, are still spending time on updating an industry management plan to ensure that trade continues.

Zarmeen Hassan:

So the point is that an impact of an incursion is felt immediately and many years hence as well. And at the end of it, that cost is pretty much born by growers and in some cases, the seed industry as well, because the regulatory cost increases. So this was an example of what seed can do, an impacted seed can do, to our industry and that's just one example. If you look at just the vegetable biosecurity plan, there's a whole host of... And I won't go through all of them. There's a whole host of exotic plant pests or pests that are not currently in Australia that can threaten the industry. And so it's absolutely imperative that we work across all stakeholders, from community, to growers, to industry, to try and keep these pests and diseases out because there is also significant regulatory burden.

Zarmeen Hassan:

And the more disease we import from outside Australia, the regulatory burden to businesses and to industry increases. You know, this is just an example of the cost that's associated with seed testing for businesses, both for seed businesses as well as vegetable growers. And the more the threat, the regulatory burden will continue to increase. And so if you've ever dealt in biosecurity, we talk about the biosecurity continuum and that biosecurity, which is keeping external pests and diseases out of the country, is essentially a shared responsibility. And that shared responsibility is not just ours because we run a biosecurity program, but it is from the Australian consumer to growers, to us who work in the industry. We do a lot of citizen science as well, so that responsibility is everyone's to ensure that we minimise the risk that comes into the country.

Zarmeen Hassan:

And so as a farmer, if you're a farmer using seed, some of the key things that you can do is ensure that you use seed from a reputable producer. Know who the producer is and ensure that the seed that you're getting on an ongoing basis is free from disease and particular diseases that impact your particular crop. If transplants are being used in the planting process, then ensure that they're inspected for disease prior to planting. Seed saving is obviously a farmer's right. And a lot of growers do save their farm seeds and also share seed. The one thing that CGMMV did was it reduced the seeds that were shared amongst farmers. But if farmers are sharing seed, they are to test the seed before you share them so that you're not transferring disease from one property to another property.

Zarmeen Hassan:

As a member of the public, and Emma will talk a little bit more about it as well and David has also referred to this, is don't import untested seed through mail. You're not only importing seeds to put into your plant and to put into your garden, but you're also importing a whole raft of risk to the food that we produce, as well as the livelihoods of farmers. A lot of us come from backgrounds where we've seen interesting plants in our parents' gardens and our grandmother's gardens. And we'd love to bring one of our plant or the seed a plant in and to grow it in our own gardens. But please, again in your luggage do not bring untested seed. If you are bringing seed, declare it so that it can go through the proper process.

Zarmeen Hassan:

And also, we love to plant, take seeds from produce that we pick from the market. That also has the potential of transferring disease. So produce that is available on shelves is primarily for consumption. And we asked to limit or not use that produce to plant into your garden so that you're not, again, transferring disease. And a lot of diseases are first detected in household gardens, in community gardens and then spread to the growing areas. And so if we can stop them at the urban community garden level, then we are supporting, protecting the rest of the growing industries. That's it for me. I think I've kept up to time.

Steve Peios:

Thank you very much, Zarmeen. Absolutely great presentation there. And I note there on the slide your contact email there for anybody to get in touch. We've also got some questions that have come through as well, which is fantastic. So looking forward to asking them shortly and a reminder to everybody that we have a poll coming up at the end, which is very important for us to make sure we get some feedback. And if you could fill that out for us, that would be much appreciated. Last but not least, I'd like to welcome Emma Davensen to our panel today, a member of our behavioural research team here in the department and the studies around behavioural insights and it is part of the key areas of her work. Emma joins me in the studio today. Thank you very much. It's great to see you here and looking forward to hearing you present all about some very important stuff regarding how beneficial that information and research is into people's behaviours when it comes to importing plant seeds and the type of buy. So over to you, Emma. Great to see you.

Emma Davensen:

Thank you, Steve. Good morning, everyone. I was so interested to hear the presentations from Fiona, and David, and Zarmeen. As we've heard, heaps of seeds came in last year and they have the potential to wipe out industries, livelihoods, species. So I am keen to get into why behavioural research is good in this space and what we've been up to. But first I'd also like to acknowledge traditional custodians. Here where I am, I acknowledge the Ngunawal people and the Ngambri people and I pay my respects to elders. As Steve said, my name's Emma and I work in a slightly different area of the Department of Agriculture, Water and the Environment called the Behavioural Analysis Team. We work with teams all across our department to give special advice on the role of human behaviour in policy issues, programs and services. And that's where I'd like to start this morning, with behaviour.

Emma Davensen:

Let's go back to before those seeds arrived and think about who ordered them. This is a picture of their house. It's been a long day for this person. They've been in lockdown all week. They're sitting at home, late at night, glass of wine in hand, scrolling the internet on their phone. They're thinking about not waking up the kids. There's a rerun of Gardening Australia on TV in the background. They're shopping for seeds. They're not thinking about biosecurity. They're thinking about what veggies they can grow with the kids next season, and they just want to get something ordered before the next show on TV starts. It's here, in moments like this, that we have an opportunity to offer people a different choice and in doing so reduce actual biosecurity risk by changing online seed buying behaviour. Sometimes people's decisions are affected by seemingly irrelevant things such as how information is presented or what other people around them are doing.

Emma Davensen:

But it's possible to change behaviour in the moment by using insights from what we know from decades of psychology, economics and social sciences, about how people make decisions. This is known as behavioural insights. So today, I would like to share some information about a project we're currently working on to explore how we might reduce biosecurity risk by changing online seed buying behaviour. Our first step was to understand more about the people in Australia who buy seeds online. What motivates them? What are their attitudes towards things and their values? And what kinds of barriers do they come up against? We did this by running some qualitative research, which was interviews with shoppers, online nursery owners, and leaders in online gardening communities. Through our research, we learned a bit about who is involved in buying seeds online. And some of the groups we identified are up on the screen.

Emma Davensen:

So there's the occasional grower, who's an individual, perhaps new to gardening, perhaps with less experience and fairly low knowledge. And this person typically is motivated by curiosity and novelty. Then there's the super collector, an individual grower with lots of experience who's motivated by knowledge, challenge and rarity. And then the culturally connected grower was another one we identified, an individual grower, perhaps with more narrow experience, someone powerfully motivated by cultural connections. So on the left here, are just a few of the insights from our research far. There are many more than the three you can see on the screen. The first example I'm going to talk about quickly is challenge and mastery. Among the many motivations we heard about, one we found tricky to design for was challenge. We learned that many gardeners are driven by the goal of increasing their mastery of in depth, knowledge and skills.

Emma Davensen:

So they'll always try to push themselves to find something rarer to grow from seed rather than seedling, or to create a more artful arrangement in their garden. For example, one participant told us, "I'm motivated by the satisfaction of start to finish gardening." Normally we design interventions to make the right behaviours easier for people to do, but in this case, that would make the behaviour potentially less appealing rather than more. So instead, we designed an idea to lean into this challenging motivation, which I'm going to show you in a moment. Another insight I'm going to talk about is that the range has become restricted. This was a really interesting insight. There is a booming market of new gardeners. Simple and accessible gardening practises using a small range of generic plant types have become incredibly popular and have been promoted on mainstream media. We heard that nurseries and other domestic plant suppliers have responded by prioritising stocking a smaller range and have progressively eliminated many exotic or less popular plant varieties.

Emma Davensen:

People we talked to said that this phenomenon has been exacerbated by increasingly prohibitive import conditions. We heard that gardeners were highly trusting of nurseries onshore and were willing to buy from them. But avid gardeners reported frustration at the lack of products available in nurseries. So this puts up a barrier for gardeners being able to easily buy the plants they're interested in. Such gardeners told us they had to pursue other avenues to get those plants that they desired. We found that people don't shop overseas for the sake of shopping overseas. It's just about getting what they need.

Emma Davensen:

So in behavioural insights, we draw on our research findings to create strategies to change people's behaviour. But what might seem like a good idea can be surprising when you test it. So in this project, we created fast, rough, early prototypes, and tested them out with some gardeners representing our groups, the occasional grower, the super collector, and the culturally connected grower. We turned our insights into seven prototype interventions. We ran them past biosecurity policy experts in our department, and that immediately cut out one of our wilder ideas. But six of the prototypes did move to the testing phase. I'd like to share two of them with you today, and please these are rough and still just ideas at this stage.

Emma Davensen:

So in this first idea, there's a video where you see someone walking across grass saying, "Och, ouch." And then there are the two messages you can see on the screen. 'Did you know Bindi grass is an introduced species?' 'Every sting in the foot is a reminder not to bring unapproved plants and seeds into Australia.' This intervention aims to connect the very common experience of walking on painful Bindi grass to the idea of the harms of introduced species. Many people in Australia will have experienced walking on painful Bindi grass that they can recall. So we want to use that common experience, what is known as salience, and connect it to the idea of harm from invasive species. We theorise that a successful connection in this way could each future time people walk on painful Bindi grass, help them think again of the idea of invasive species and the message to not bring in unapproved plants into Australia, which is known as a salience cue.

Emma Davensen:

The intervention is receiving promising feedback and results, and is one that we're going to keep exploring. This intervention on the screen is a bit more complicated and came out of our findings about challenge and mastery. So this is the seed challenge, and it seeks to harness the super collectors' motivation to put their advanced skills into action. It's a bit like a treasure hunt, and actually it's likely to be scrapped because we didn't get too much good feedback from people we were testing this with for a few reasons. This is really good to get this feedback at this stage of our project before the department spends any money on creating an app and rolling it out. So we hope that our work and our research in this area will help the department understand growers and nursery owners out there in new ways. And hopefully our work can lead to a measurable impact in behaviour change to reduce the number of carrier seeds that are trying to sneak into Australia. Thanks very much for your attention.

Steve Peios:

Emma, thank you so much for that great presentation on behavioural insights and the way that people do the things that they do when it comes to purchasing insights. Now, the questions are starting to come through, which is fantastic. So thank you so much to all of our listeners who have been putting those through. Now, the first question I have here is for David and Fiona. So David and Fiona, the first questions that have started filtering through. In the last slide you provided David, there was a package that was deliberately mislabeled. The question here is regarding seeing the permit number, would that raise a red flag at the point of entry? So perhaps when it comes to the question we're talking here about, does that mean that perhaps assessment staff of the department, what would be things perhaps that would raise a red flag at the point of entry?

David Dall:

Thank you, Steve. So having that permit on there, these were obviously... These were, in this instance, these were seeds being imported for the scientific research that you've heard about today. What that would raise is your attention to actually look at that permit, to make sure that the materials inside that package are as they are meant to be, and that they are going to the place that they are meant to be going to. Because obviously, there is something in there that has required a special administrative action to be taken and a permit to be issued. Now, one of the really big problems though comes around the numbers of items that come in international mail, which is numbered in the hundreds of millions each year, so that it would be really fantastic if the resources were available to look at every one of these things coming in through the mail system. And it's simply not.

David Dall:

So it's not so much the ones that have the permit numbers that raise the red flag, although there are steps associated with them, because the ones that don't have the permit numbers don't have permits, but have seeds inside them. And although we are getting better ways of looking at them, it's still impossible to enforce and inspect every mail item that comes into the country. So as we've said over and over, biosecurity is a shared responsibility.

Steve Peios:

Fantastic, David. Absolutely. I think that backs up the key message that it's not only the responsibility of regulators, but each individual as well. Zarmeen, question for you, please, Zarmeen, it's come through. And it is, "How do reputable producers of organic seeds get tested for pest and disease before being imported into Australia?" So I suspect there might be an element here regarding that sort of regulation, but how do reputable producers of seed get tested?

Zarmeen Hassan:

So every seed lot that comes in, organic or otherwise, is sample tested at the borders. So if I remember correctly, it's 20,000 per seed lot for things like Solanaceae and about, I think, almost 10,000 per seed lot for cucurbit. So before they're actually released, all seed batches are sample tested. So anything... And like David said, all seed that's imported, about 90% plus seed that is imported into the country, and so it goes to a testing process before it's released for sale, for commercial sale.

Steve Peios:

Fantastic. That's great news to hear Zarmeen. There's just a quick follow up here as well to that question. We're talking here about mentioning individuals that should not plant seeds from food and production in terms of your presentation. And the question is explaining why that may be the case with an example here regarding planting the avocado seed, perhaps that being environmentally smart in terms of reduce and reuse.

Zarmeen Hassan:

So food that comes on to our shelves meets certain quality assurance requirements. It's tested for residue limits of chemicals. And it is obviously tested for the quality of that produce. However, it's not tested for diseases that can potentially be coming through seed. A lot of produce is also imported and again, that is not tested for disease that it might be carrying. So if that seed is planted, we actually have no idea what might be in that seed and to ensure that we are not inadvertently putting some form of disease into the soil, that often goes from an urban environment then into a production region, we ask to not plant those seeds. And it is a balance between being environmentally friendly and reducing and reusing and reducing waste. But also at the end of it, we need to protect billions of dollars worth of industry and our food source as well. So it is a fine balance, but that produce that comes onto the market and onto our shelves is not tested for diseases for the seed, which don't impact human health, but certainly impact farm and plant health.

Steve Peios:

Fantastic, Zarmeen. Thank you. We talk about striking that balance, once again, about what's most important. And I think there's the wide range of responsibility there. Emma, question has come in for you, which is exciting. Now the question reads, "Can't we just give people the right information?". I might expand on that in the sense as well of in terms of providing that information, I think we do the best that we can as a department, but in terms of that assistance of the right information with that behavioural activity, can you expand on that for us in terms of giving the right information?

Emma Davensen:

Yeah. We've got heaps of really great information on our websites and it's all out there, but the sad reality of human existence is we're often not going to go to those places where the information is. And even if we get the information very completely given to us, we're often not going to have the capacity in that moment to sit down and read through it and understand it because we're just not robots. We're often doing three or four things at a time. We make thousands and thousands of decisions every day, just about what to eat and what to wear. So the way we present information is to take that into account and the way to reach people might be creative and different. For example, you can tell somebody about safe crossing of the road, but if you just change the curb where it is safe to cross the road, people don't really need to think, but they can choose to cross there where it's safer. So that's an attempt at an example.

Steve Peios:

Absolutely. No, that's fantastic. Emma, thank you so much for that. I've got another question that's come in here for David and Fiona. The question here regards research when it comes to seeds, and basically, do you have any more research that is planned for the future?

David Dall:

Steve, we do. And Fiona has an extensive research program. I'll see whether she would like to answer that one.

Fiona Constable:

Yeah. So we're currently working with DAWE on improving our diagnostic capacity for a range of pathogens, which is really great. And that's with David and his team. There's all the work that we've been doing around investigating the interception rates that we are working with David as well to look at risk and use that to inform risk of seed coming in and sort of volumes for testing and that kind of stuff. We're also trying at the moment to work with Hort Innovation, to develop a further research program in the seed space that doesn't really stop just at seeds, but looks at seed-borne pests and pathogens and the risks that are posed right throughout the production system, from seed production through to vegetable production and the like.

Fiona Constable:

And we've got our fingers crossed that we might be able to get some funding in that space to look at one mitigating risk before things come in. But also if things do come in, what are things that growers can do and nurseries can do to mitigate the risk of seed-borne pathogens if they happen to arrive on seed. So there's some of the things that we are thinking of in the future.

Steve Peios:

That's great, Fiona. Thank you very much for that. I have another question here for you please. "Are seed sampling sizes sufficient to prevent the pests from establishing in Australia, giving it only takes one seed to establish a virus?"

Fiona Constable:

Great question. And David might want to contribute to this as well. The volumes that we test are very high. They're some of the highest volumes of testing done in the world. And we believe that we have mitigated the risk through testing those volumes over time. And we can see that with the reduction in outbreaks that we seem to be seeing and prevention of things coming in. No test system is ever going to be perfect. And there is always a risk. It's not a zero risk. There's always a small risk that something will get through the system. Dave, do you want to talk further to that?

David Dall:

Thank you. Thank you, Fiona. I guess there's two... I'll just say two quick things. One is that we've talked about those tomato viruses that we are intercepting. The empirical evidence, observational evidence, is that so far, fingers crossed, we have not had an outbreak of either of those two viruses in Australia, whereas many, many other countries around the world have. And those are countries that test less seeds. A lot of countries test only 3,000 seeds, consider it sufficient. The emerging evidence is that is not enough seeds to actually test. The numbers that are chosen, and that we've talked and Zarmeen's talked about, are statistically based. They give us a probability of detecting the virus in seed lots at a certain level of prevalence.

David Dall:

So what we've been talking about is incidence, how many times in 500 do you see them? But not all seed lots are contaminated to the same degree. Part of the work that we didn't talk about that Fiona and I and others are doing is what is the spread of ranges of contamination in those seed lots? And how do we get a statistical handle on whether we really are doing it? But cutting that short, I'd say that 20,000 seeds gives better than a 99.99% probability of detecting contamination rate of one in 2000 seeds. So it does set a high bar, but so far it's actually doing its job. So great question. Thank you very much.

Steve Peios:

That's great to hear. Thank you for the answers. 30 seconds remaining on the Q and A, so I'll ask a quick one. What should you do if you receive seeds in the mail that you didn't order?

David Dall:

Maybe quickly report them either to your state government department of agriculture or to the Australian government department. Australian government department has a place on its website, and I expect that the state governments do too. Do not plant those seeds. Thank you.

Steve Peios:

Fantastic. Thank you so much, David. Thank you so much, Fiona. Thank you so much, Zarmeen, and thank you so much, Emma. We've run out of time here. We've had so many fantastic questions come through, so thank you very much to our audience and all of our listeners and participants. I did have one more for you, Emma, but unfortunately we'll have to take that offline and perhaps get you in another time, but great questions from everybody. Thank you so much. Just a reminder that we'll have all of the other channels to our work popping up after this webinar finishes. So please keep an eye for that if you'd like to be added to the invitation list for the webinar series. We'll also be shortly opening nominations for the 2022 Australian Biosecurity Award. So if you know of someone who's making a strong contribution to our biosecurity system, please don't be afraid to nominate them. Visit awe.gov.au/aba, and that's where you can nominate them and also read stories about our 2021 Australian Biosecurity Award winners and their stories.

Steve Peios:

We thank everybody for being a part of this. I'd like to say a big thank you once again, Dr. David Dall, Dr. Fiona Constable, Zarmeen Hassan, and Emma Davensen, joining me in the studio today. A fantastic webinar, we thank everybody for being a huge part of it, and it's been my absolute pleasure to host it. Steve Peios here from the Department and I'll see everybody next time for the Australian Biosecurity Webinar Series. It'll be number nine next time around. See you then.