

Building food and agriculture innovation for the future – Q&A

Dr Alison Bentley, Professor Neena Mitter, Dr David McGill

Chair: Dr Gabrielle Vivian-Smith

Chair

Thank you to our three speakers Dr Alison Bentley, Professor Neena Mitter, Dr David McGill, who are now our panellists in this Q&A session. We have about ten minutes for questions.

Q: Ravi Khetarpal, APAARI

Thank you. First of all, those were amazing presentations by all the three speakers. I have a specific comment for Neena about the shelf life of the BioClay RNA spray which is going to be a biopesticide. I am keen to know if you have tried it in the IPM program, Integrated Pest Management, so far. Why am I saying that? Because we have a big project with biopesticide where we have found that if you do the spraying with a biopesticide which does not have a residue, then it reduces the MRL [maximum residue limit] value and you make your product exportable. So that is where I see the future of the BioClay there, where you have a potential for export, if that works out, and we will be happy to partner with you on that. Thank you.

A: Neena Mitter

Thank you, Ravi. In terms of your first comment about shelf stability, yes that's one of the very critical components. Our aim is that this BioClay or a concentrated suspension product should be shelf stable for at least one year. Also, we are looking at other guidelines, which the APVMA provides, which say it should be shelf stable at 40°C for eight weeks, and at 55°C for two weeks as well. These are the guidelines provided for transport of such pesticide products as well. So that is the target that we are working on.

In terms of compatibility with other products, I don't think BioClay will be the only solution. Some of the crops get ten sprays in the growing season, and really if we can reduce that number and translate some of the sprays with BioClay, then that's good. And you have made a very relevant point about the last few sprays or when the fruit is forming or when a product which is sold as fresh produce is forming and we can do the spray, then it gives us an extra value in terms of maximum residue limits. Those compatibility tests of the BioClay with other insecticides and pesticides are being done as well.

Q: Peter Wynn, Charles Sturt University

Alison, you do a lot of the breeding of your wheats at your central lab in Mexico. How much of your work is training geneticists, crop geneticists, in developing countries, and how much of the work is translated to directly happen in those countries, rather than you just sending seed out from your base?

A: Alison Bentley

It's a great question and very relevant to the partnership model for the seed system as a whole, going forward. So, so as you say, the CIMMYT wheat program has for the past 50 years

bred from Mexico, and it uses simulated selection environments in the Sonora Desert in north-western Mexico to simulate different environments around the world. We are now moving to a new model, where we send material much earlier to target environments all around the world, in South Asia and Africa in particular. We have just moved our African breeding pipeline to Kenya for exactly this reason, so that we can develop material that is appropriate in the environment that it is destined to be grown in, but also to provide greater opportunities for capacity development throughout all stages of variety development.

We do a lot of in-service training in Mexico, and we are also looking at how we decentralise that and offer it in the regions and make it appropriate in different parts the world where there are different challenges.

For both aspects – the capacity development as well as the development of germplasm, which is really a core value proposition of the CGIAR – we are looking at how we move these more to the regions, where they are destined to be useful and to be taken up. For both aspects, we are looking at new models, new partnerships and new ways of doing that which are less centralised than they have been in the past.

Q: Nicki Duncan, Charles Sturt University, a conference scholar

Dr McGill, it sounds like your project would have been the envy of many people here having the continuity of time for your project, also the human resources, and that maybe you have been able to build that social capital. You have worked at the different levels: with the farmers, the farm advisers and the institutions. So I wonder, have you been able to make any difference in policy over that time? Have you been able to make a sustainable change there?

A: David McGill

Thanks for that question. We did put in a real concerted effort over the last 12 months to ensure that those lessons about the different layers – particularly the farmer level, in the first project, the farm adviser level, in the second project, and then the organisational level – we made a point of getting those lessons to the policy people whom we had good engagement with, in terms of ag and livestock. We spent a lot of time in the last 12 months in Islamabad having wonderful conversations with the crew up there, and we also had good engagement from two or three of the key livestock experts in Pakistan to make that happen. And Margaret Ayre, from the social research team, and Kaitlyn as well, had strong input in putting together workshops where we (arguably) forced the policy people to sit down with the information and go through the top 10 or the top 20 recommendations that we had at the different layers, and put them into lists for ones to tackle in the short term and others in the long term. And that really forced those conversations to happen.

Maybe the best thing about that was that we asked Dr Muhammad Afzal to talk with us or look at the workshop. He was the CEO of the organisation we worked with at the start. He said, ‘Don’t call it a policy group. Don’t call it a policy group.’ He said, ‘Call it a “science-into-action” group.’ So that’s what we did, and we made a point of that: ‘science-into-action’. We made that happen and made the policy people engage with the information that was put in front of them – and it really did work. That was something that Anna Okello from ACIAR said

to us: 'You've been there for 15 years, nearly. Make sure you have those policy level discussions'.

The continuity in our projects – you don't see that very much. I guess we were super lucky, but also it kind of goes back to that original experience, that lived experience in Pakistan that gave me a true love for just going out there and doing it. Living there gives you a chance to understand the complexities of the situation in a country like that.

If you're running a project or you want to be on a project, go and live in-country for three days, three years, whatever. It's going to make a big difference to your understanding.

Q:

Alison, I was just reflecting on the presentation by Jean Balié, of IRRI, this morning, which was about productivity and the contribution to a changing climate. We heard about emissions reductions, etc. And then I was thinking about your presentation, which was quite strongly focused on productivity growth, and through that addressing some of the crisis and then a very strong equity lens as well. Incredibly important. Can you just describe how the program, the global program, also takes into account some of the drivers around climate?

A: Alison Bentley

Yes, very happy to do that. Obviously, productivity for wheat and for staple crops remains a crucial component of the alleviation of hunger. And as was pointed out, SDG2: Zero hunger, is an ambition that is getting further away rather than closer to being achieved. I think that sets the context, that we need to have that productivity and that's the baseline provision.

In terms of growing resilience, that also needs to be a focus area. There are challenges in doing this, in building resilience while maintaining that productivity, particularly in the face of expanding pest and pathogen burdens around the world. Within the global wheat program, our focus is on baseline productivity plus the package of diseases, acknowledging that most of the farmers that we serve don't have access to agrochemical inputs. That is, having productivity, having your package of disease and then trying to build greater resilience to water and heat into that, which is a very complex thing to do genetically, biologically and agronomically. It is important to be able to provide that rounded package. That's where the science comes in.

There is a lot of science that will say, 'There's a new gene for heat.' And we think, 'That's exciting, but we've got to accumulate that with 100s of other things that we need to keep stable.' That's the constant challenge, along with the need for longer-term investment and the time lag in research into breeding, into a farmer's field.

Packaging those things is a priority and it's a very difficult and ever-moving target as the world moves, I think, as we see wheat and other cereals move, and the climate changing, and as we reach tipping points for certain cereals and we need to transition to other cereals, which is a big part of the conversation. What are the traits that we need to expand? What are the traits that that we need in other crops as they become more and more important?

And then obviously, from the consumer's perspective, as we make crops more nutritious with enhanced grain iron, grain zinc, all these things add to the complexity of providing this full package in our cereal crops.

Q: Tabita Tan, Charles Sturt University, a conference scholar

A question for Neena, in several parts. Thank you for that really exciting talk on your innovation. You mentioned, at the end, the importance of public opinion on this. I just want to find out what the public opinion is on the use of BioClay, and if there's any resistance to that. If so, how can it be overcome? And what impact does the direction of public opinion have on the uptake of this technology by industry?

A: Neena Mitter

Thank you for asking that question. It is important and actually sits at the very core of the adoption of any platform for that matter, and more so of innovations. When we started this journey, even to talk about RNA took a bit of time because the moment you mentioned nucleic acid or gene, the conversation immediately went to GM. So it took us a while to cultivate that conversation about how this system does not involve any change in the genome of the plant; and yes, it is very much a concept that can work. During the course of the 'journey', attitudes changed when the project really started succeeding.

We have been engaged with the growers right from the beginning: any trial that we do, we do a workshop, we bring them in, we show them that it is working – and that changed a bit of the conversation as well. When RNA became a familiar term, that changed the conversation as well. In fact, over recent months, I am now getting queries asking me whether BioClay can be certified as an organic product. This is not my call. That is an organic certification with protocols.

For me, this is an exciting and innovative platform using a biological active to control pests and diseases. Public perceptions are important, but it is looking quite positive at this stage. We are going through the engagement process and going through a survey. The first year's task has been to bring the growers 'on board', and we have also been talking with retailers, and then the consumers, as that chain becomes more visible. So yeah, early steps, but looking very positive at this stage.

Q: Niamh Walsh, Curtin University, a conference scholar

My question is for Dr Bentley and Professor Mitter. Do you believe it's possible in the long term, with adequate investment in research and development, that modern agriculture can move fully or mostly away from chemical use, with products such as your BioClay and with large-scale organic fertiliser being developed? Or has the combination of feeding a growing population and modern agricultural techniques made it impossible to ever move away from mass chemical use in food production?

A: Neena Mitter

We are hearing these words like 'chemical-free agriculture' as some of the targets in some conversations. Any tool, any technique, is a journey that we need to undertake. What we need

to do is a bit of ‘responsible agriculture’ as I call it, by developing those arsenals and tools, as I was saying, by reducing the use of chemical pesticides. But also not only reducing the use. There are new chemicals – green chemistries – that can develop as well. It’s not as if agriculture has to use things that are not ‘chemical’. That should depend upon the use case. It can depend upon that green chemistry, which could be very useful and still sustainable, and can have all the beneficial features. This is what we need to watch, if we start thinking of a chemical-free agriculture.

Overall, I’m not sure how the scenario will play out for various applications, because it’s not just pesticides. There are other amendments; there are fertilisers being used; there are other inputs that go into the agriculture system as well. I think a reasonable target should be to try and reduce it as much as we can, in a responsible way. Let’s balance the profit ratio and the productivity ratio for the grower as well, and set those reasonable targets. But go on very consciously working towards those targets.

A: Alison Bentley

Great question, Niamh. It’s good to see you hitting the hard questions. I think from the perspective of fertilisers, the current Russia–Ukraine situation shows us that the lack of availability of fertiliser components is placing additional pressure on productivity in agriculture. And I think, as Neena points out, it is going to be necessary to work out how we can maintain productivity with reduced inputs, and I think that’s the reality for the short term at least, working out how we can produce at least the same amount with a lot less, before we look at how we can produce more with even less. I think it’s a gradual scale, but we will see that being forced – in this case with fertilisers due to externalities – but also the environmental concerns and other factors over time.

Chair

Thank you. I’ll bring this session to a close. I would like us all to show our thanks to our panellists for sharing their excitement about their work, their expertise and their different journeys. It has been a very interesting afternoon. I would also like to thank the audience for your interesting and diverse questions.