Transcript: Plant Breeding Stories Podcast
S2E7 Plant Breeding Stories - Dr Mei-Lei Tan

[Theme music plays]

Hannah Senior: Welcome to this episode of the Plant Breeding Stories Podcast, where I talk to leading lights in plant breeding, asking what they do, what makes them tick and what fascinates them about the world of plants. I'm your host Hannah Senior of PBS International, world leaders in pollination control. We design and produce specialist pollination bags and tents used by plant breeders and seed producers all around the world. And through this, I've been privileged to get a unique perspective on how plant breeding globally affects our diets, farming systems and the environment. I'm excited to share a little of this with you as we meet some of the amazing people who make plant breeding their life's work.

Hannah Senior: Today I'm talking to Dr Mei-Lie Tan, who is the managing director and owner of Germany based Crea Nova Consultancy which specialises in helping smaller and medium sized plant breeding businesses adopt new biotechnologies. She is also the Managing Director of Excellent Labs which provide research and services in plant cell biology. Mei-Lei's story is one of bridging disciplines. As a student in the 1980's she had the visionary idea that cell biology, molecular biology, and phytopathology would become intimately entwined with plant breeding. This connection wasn't widely appreciated at the time but her intuition proved right. This, plus the belief about the value of diversity in all its forms, has led her to an incredibly varied career that has criss-crossed the globe, academic boundaries, technologies and species. All of this hasn't necessarily come easily so Mei-Lei talks honestly about some of the challenges and occasionally outright prejudice in juggling different aspects of life and pushing boundaries to pursue her interests and insights. Before we get going, we did have a minor technical problem early on in the recording so I apologize in advance if you notice a little corruption on the audio.

[Theme music Fades]

Hannah Senior: Just to get things started. Mei-Lie, would you like to introduce yourself?

Mei-Lei Tan: Yes. Thank you, Hannah. My name is Mei-Lie Tan, and as you already mentioned, I'm a consultant of Crea Nova consultancy, I'm owner of that company. And I'm also managing director of a laboratory doing research, plant cell research. It's called Excellent lab and we are situated in Germany. I was born in Indonesia where I grew up and lived until I was nine years old. And then we moved with my family to the Netherlands. So there, I went to school and I also started my university career.

Hannah Senior: What was it that brought you from Indonesia to the Netherlands. Were your family and agriculture, was that the connection? Or was there something else?

Mei-Lie Tan: When we moved to Europe, it was for very, let's say, uh, political reasons. My father passed away in Indonesia and my parents wanted to go to Europe for the education of the children.

Hannah Senior: Mmmhmm [affirmative]

Mei-Lie Tan: So we decided to move to the Netherlands because my father had studied there and we had some relatives in Holland.

Hannah Senior: If we think about this young Mei-Lie moving to the Netherlands, were you already interested in plants or did that come much later?

Mei-Lie Tan: I think when I look back, I remember that as a child, I was always outside in the garden playing with plants, flowers, and yeah, I think that might be the basis of my choice of going to study biology. Also the interest in plants grew, I think from the moment that I got my first botany course where I looked through the microscope and saw the onion cells for the first time. It's just like feeling like falling in love, a fascination that I experienced and I thought, “Hmm, I like to work with plants and I like to work with plant cells.” And that was actually, during my bachelor study that I discovered that. And I think when I moved to my masters, I thought, okay. There was a subject called cell biology and plant tissue culture. And that was in the department of molecular biology.

Mei-Lie Tan: So I've chosen to go into that subject. And cell biology was actually a field where you were working with plant cells and try to find protocols or develop protocols to see if you could get from one plant cell back to a complete plant. Because that's the uniqueness of plant cells, that they have what we call totipotency. That they are able to divide, form cell walls and form shoots and roots again, in contrast to animal cells. And I think I wanted to go more deeper into that field. And that was why I've chosen to study cell biology in combination with molecular biology.

Hannah Senior: And while you were studying for that master's degree, you found yourself intrigued by the world of phytopathology, leading you to study a second masters degree in Vancouver, Canada. So before we go on, can you explain to us what phytopathology is?

Mei-Lie Tan: Phytopathology is actually the studies of plant diseases. As you know, plants can get sick with pathogens, bacteria, fungi, and also that field was very interesting for me because I thought, okay, if a plant is not growing well, they cannot propagate themselves well, they cannot have good yields. I wanted to see what is behind that behind the pathogen and how is the interaction between pathogen and plant. And again, that field was of course, very interesting. If you look at plant breeding where you can breed for disease resistance.

Hannah Senior: Now you could have stayed in plant cell biology or phytopathology but you gravitated towards the whole separate field of plant breeding and did a third master's degree in it - and that's a lot of specialisms! So why and how did you decide to do a third master's degree?

Mei-Lie Tan: I think the reason why I was going into plant breeding was that I was looking for a field of interest where I could apply the knowledge that I could gain from cell biology, molecular biology, and also phytopathology. And I was looking for, let's say, a particular field where I could bring in all together, these three disciplines. Then I found that there is a study called plant breeding. And I thought at that time it was not yet the era of plant biotechnology. That was non-existing yet. But I was sort of dreaming that I could help plant breeding perhaps by bringing in those new technologies. So I decided

to call the professor in the breeding department in Wageningen University in Holland and asked him if I was able to do part of the plant breeding courses during my masters. And then he told me, “Well, no, no way you either do it as a complete study, or there's no way that you can just do part-time plant breeding.” So I was a bit disappointed, but two weeks later I thought, well, this is the only place where I could study that field. So I called him up again. I said, okay, if I have to do it from scratch, I will do it. But I would like to combine it with my master study of molecular and cell biology.

Hannah Senior: So you really connected the dots and could see both the potential synergy of those disciplines and their potential applications in the real world. At the time I gather that that insight wasn’t widely appreciated. Did you get much pushback?

Mei-Lie Tan: In those days it was very weird to have such a combination. But at the end, when I finished my masters, it was the same professor who offered me a PhD in this field and asked me to set up a cell biology lab in his department. So I think…. [Mei-Lie Laughs]

Hannah Senior: [Laughing] So he obviously saw all the benefits once you demonstrated it.

Mei-Lie Tan: Yeah, exactly, exactly. So I was very, very happy with that.

Hannah Senior: And what was the lab that you set up at that time?

Mei-Lie Tan: So I set up the tissue culture lab at the department of plant breeding at the Wageningen University. And I was doing also part of my PhD work at the molecular and cell biology department at the free university. So I was actually three days a week in one lab and two days a week in another lab, having students at both locations. And there, I learned that the languages of the plant breeders and the molecular biologists are completely, completely different.

Hannah Senior: There is a common theme in your career here isn't there? Which we’ll hear more than once, of bridging between disciplines and being connector or translator between different areas of expertise. But then you entered the world of commercial plant breeding shortly afterwards. Why was that?

Mei-Lie Tan: Yeah, after I finished my PhD, the same professor told me, “Well, maybe now it's time for you to move into the industry.” And I'm talking now about the late eighties. And at that time, plant biotechnology was just on the rise. So a lot of seed companies wanted to set up laboratories where we could do cell biology, molecular biology. And I was very happy I could choose from many, many different jobs at that time. And I thought, well, maybe I should start with a company that has already a lot of experience in the seed industry. And so I've chosen to work for, at that time it was called Zaadunie in the north of the Netherlands in Enkhuizen. Later on, it became Sandoz Seeds. So they offered me this job and I had quite a challenge because they asked me to set up a biotech lab from scratch because they had a huge area where they were not using the space. And they said, “Okay, come on, just start and let us see where we can do research.” So that was quite a challenge for me! Getting a blank check to buy the equipment that you like and to set up your team. But I think that was a great opportunity.

Hannah Senior: And when was that happening?

Mei-Lie Tan: We started the lab in ‘87 and I was leading the group of cell biology for almost 12 years, trying to set up and support the breeding with cell biology and plant cell tissue culture, as well as molecular biology.

Hannah Senior: That's quite an exciting experience, isn't it? Because you were able to start with this blank sheet of paper and build something. Did that teach you any lessons that you carried forward into the rest of your career? Was it a very formative experience?

Mei-Lie Tan: Yeah, I think looking back and I'm very grateful that I got that opportunity. Of course it was scary, but the way they trusted me gave me the confidence, “Okay, you can do it even if you're making mistakes.” And I think I've learned from that too, and not being afraid to just jump into it, just learning by doing. I think that would be the case. And not being afraid to start something new and something from scratch. That was, that was the biggest experience I had in the beginning. [She laughs]

Hannah Senior: You stayed with that company, and I know it changed names and merged and so on over the years, but you stayed with the company for 12 years you said. So what happened next?

Mei-Lie Tan: Then I got a job offer to switch from research into business development. There was this startup company called Mogen International in the Netherlands. It was a startup company, a biotech startup company, developing technology for fungal and nematode resistance. And since my background was in phytopathology, I thought, “Well, that might be very interesting” but of course I did not have any commercial background, any commercial experience. But again, here the director told me “Well, I think you have learned enough at the seed company that you're working with, you know what the customer wants and you know the technology. So therefore I think you can do it.” And again, here, I got the opportunity to jump from research into business development. I was very happy to have had that opportunity. And so I was working for Mogen and trying to sell the technology to the seed companies because I knew what the customer wanted. And I tried to help them with these technologies to bring that into their breeding programs.

Hannah Senior: What kind of plants were you working with at this point? Was it broadacre crops or was it vegetables?

Mei-Lie Tan: Mainly vegetable crops, but also we had soybeans, agricultural crops, but also potatoes and bananas. These were also the crops that I was working with.

Hannah Senior: Quite a wide range then!

Mei-Lie Tan: A wide range, yes.

Hannah Senior: So at what point did you set up Crea Nova and what made you decide to do that?

Mei-Lie Tan: I stayed in the industry for almost 16, 17 years and then I thought, well, you know, at one point I was interested to see if I could help the smaller companies, the companies that do not own a big laboratory, but also to see if we could help the breeding of the smaller crops with cell biology and some molecular biology tools. I was

asked by a couple of customers to advise them. And that is what I felt that there was a need in that area. And I wanted to have the freedom to choose the projects I was working with and the crops that I was working with. So in 2006, I decided, okay, now it's time to start my own company. And also because I'm living here in Germany and I had two small children, it was easier for me to work from home and also to be able to choose my own projects. So I started Crea Nova consultancy in 2006. And since then I've had many, many different customers with different crops, different locations. So from South America to Asia to South Africa.

Hannah Senior: Could you give some examples of the kind of crops and the kind of projects that you've worked on, obviously managing any commercial sensitivities.

Mei-Lie Tan: A wide area. I can say cut flowers, fruits, vegetables, also some interesting crops like microalgae...

Hannah Senior: Oooh!

Mei-Lie Tan: So you can do breeding in that too, that's fascinating too. I think that has helped me also to use my experience from one crop to another crop. It's something that you could apply once you get to know the crop very well.

Hannah Senior: And it sort of picks up on that thing we talked about earlier how you have experience and expertise in bridging different disciplines, but now we're talking about different crops and different countries. Is that something you actively sought out or is it something that's just happened along the way?

Mei-Lie Tan: I think both. It's just like, I always see it like a basket flowing on the river. It comes by and then you can pick it up or you can leave it. And it might be also that certain projects were very interesting to me because of the different crops, but also different locations, different, um, well, things that I could learn too. I think it's a combination of both.

[Theme music plays]

Hannah Senior: You're listening to Plant Breeding Stories brought to you by PBS International, world leaders in pollination control. We're exploring the personal stories behind people who've dedicated their careers to plant breeding, helping us to more productive plants, greater food security, and more sustainable agriculture. Now back to the podcast.

[Theme music fades]

Hannah Senior: Your consultancy work with Crea Nova has taken you all over the world. Do you observe differences in the approach to plant breeding and the culture around it when you compare geographies or is it pretty much the same the world over?

Mei-Lie Tan: Of course you see differences, and the differences are dependent also on the local situation and also the economic situation. If you're talking about a plant breeder in South America, for instance, or a plant breeder in Holland in the Netherlands, there's two different worlds and they can use different technologies, different resources, of course. So what I've learned is to look at the local situation, see what we can do with the resources that they have. And of course, you cannot just go about gene sequencing in a country or a location where you hardly can get any chemicals or supplies of laboratory equipment. So you have to think differently, but that makes it very interesting for me to also use all creativity to see how you can solve those problems.

Hannah Senior: That also touches on something that I'm keen to dig into a bit more, which we discussed previously, this thing about using local knowledge. Not assuming that your way of doing things is going to be the only way. So could you just tell us a little bit about that because I know it's something that you feel very strongly about.

Mei-Lie Tan: Yeah, because I think what I do not like is that we impose our thinking of using technology like we are used to doing here in the Western world and to impose that in other countries or other cultures that does not fit into their thinking and their beliefs. So what I see is sometimes if we listen and look at how they solve their problems and try to combine it with things that we could help them with rather than impose things on the local situation that will never work. So I always try to discuss with them and also to look carefully. What is it that is also going well? So you don't change

too much, but you try to make little improvements. And sometimes their solutions can be much more efficient than we could think of. And making use of their experience and know-how I think that is the way we can collaborate.

Hannah Senior: Do you have any examples of that that you could share?

Mei-Lie Tan: Yeah, for instance, if you look at the whole climate change, we see that there is a lot of drought in certain areas. And of course, with plant breeding, you're trying to get more stress tolerant plants. But also at certain locations, you could see that the people who are used to having those dry periods without rain. They have certain practices that they dig holes in the soil and deeper holes in the soil to keep the moisture there. These are small little things that maybe we just don't think of. But if that is their way of also providing more water to their crops… Also, if you look at the way they grow the paddy fields, there are certain things that you should not change completely with stress tolerant plants or crops. So you have to work together with them to find the right solution for the right environment.

Hannah Senior: This question of blurring boundaries between disciplines, you did it early on in your career. Do you think there are still opportunities for that? What do you think the future looks like in terms of cross-disciplinary working?

Mei-Lie Tan: Oh, yes. I still believe that crossing those boundaries will give us innovation. That is what's driving innovation. And currently, and also in the past, I've been looking at a lot of developments in human medicine, looking at equipment that people are using in cancer research and trying to adapt that and trying to use that for plant cell research. And you can think of the way people can identify and sort cancer cells and try to use that and apply that for plant cells. To select and sort plant cells that are very regenerative. So you could improve the efficiency if you want to change the trait of a plant and you could change it in one cell and try to get from that cell back to a complete regenerated plant, and you can do it very efficiently. That would help a lot. And I think by just looking across the border to human medicine and equipment that is being used there, you can try to adapt and change that and use it for plant cells. And that is

actually what I'm looking at now and trying to bring that area also into plant cell research.

Hannah Senior: And does the same apply when it comes to the teams that you work with? Not just academic disciplines, but you know, this theme of diversity and bringing ideas from different perspectives, different countries, different traditions. Does that, or have you also seen that play out?

Mei-Lie Tan: Yes. Again, that could help improving your creativity and innovation. As an example, I know for instance, a very good restaurant in Copenhagen and they have earned a Michelin star. I was asking the owners, I said, “Well, you know, what is your secret?” And then what they told me is that their staff in the kitchen has actually consisted of five to six different nationalities. And everybody brings something into the recipes and I think the same holds true for science. And also when you're setting up your team, I think it's very important to have people with different kinds of background, different kinds of experiences to bring that together. Yeah. I believe in that. [She laughs]

Hannah Senior: What do you think has been the hardest part of your career over the years?

Mei-Lie Tan: In the beginning, it was very difficult to be a woman scientist in those days. I've always been a working mother, full-time working mother. So it was not very easy to… [She laughs]

Hannah Senior: Didn’t somebody tell you that you couldn't be a plant breeder if you wanted to have children?

Mei-Lie Tan: Yep! And that is the second one! Also my professor who told me that, “Why do you want to be a plant breeder? I don't think that will work because you're a woman and you cannot be out of your work for a year or two when you get children!” So I was really, really disappointed to hear that from him. Maybe that was the reason why I said, “Well, I will be a full full-time working mother, then!”

[They both laugh]

Hannah Senior: You're going to prove him wrong!

Mei-Lie Tan: Yes! But anyway, I think in those days it was not very easy to do that. And then again, in the business development, since of course I'm Asian and I'm also a woman. But for me, it was a bottleneck to get acceptance or respect. One of the reasons is also, I wanted to just prove that because of your knowledge and experience, you can do it. And I think that has helped me a lot. Also I'm grateful for all the opportunities that I got and the trust that I could do the job, even though I did not have experience in a certain field.

Hannah Senior: But if you could go back to the start of your career, would you do anything differently?

Mei-Lie Tan: I don't think so. No, I don't think so. I probably would do exactly the same and maybe trying to have a better balance in life. Because of my passion I was working quite a lot and maybe that has also had an impact on my family life. But on the other hand, I think my family would not like me to be so much at home!

[They both laugh heartily]

Mei-Lie Tan: So no, I don't regret anything of it. I would do exactly the same again, yeah.

Hannah Senior: Where do you think the next generation of plant breeders need to be focussing? What things will they need to master?

Mei-Lie Tan: I'm so fascinated by the speed of the developments in technology. I mentioned last week to somebody, I said, "Well, you know, if I was 25 years, 30 years younger, I would still like to do a PhD at this moment because it's so exciting." And seeing that many disciplines are coming together and there is so still much to do in research. And also the developments are getting more and more exciting and faster. But we need to use these tools and this technology to find a better way for sustainable agriculture. And also in the light of the climate change. We also have to look more into areas where we could see that it helps the plant breeders and also plant research. I'm

also thinking about soil biology, where we can have more insight in the microbiology and soil biology, but also the fungi and the ecology in the soil.

Hannah Senior: Mmmhmm. [affirmative] It's a really complex area, isn't it? But there is so much opportunity and it's definitely a growth area at the moment. So it will be so exciting to see where things go!

[They both laugh]

Mei-Lie Tan: That's right, that's right.

Hannah Senior: So having done so many different things over the course of your career, I'm curious about what next, and what's attracting your energies and interests, from here on?

Mei-Lie Tan: Okay. I'm still very interested in transferring my know-how and knowledge. So I will be active also in teaching and also coaching the young scientists. And also I will be able to still be active as a consultant and also in helping people doing research and research projects. But again, I have to sort of wind down a little bit and have more time for my hobbies. And that is something that will be very difficult for me, sort of to find a balance. But yeah, that will be the next steps Hannah.

Hannah Senior: And are you still as fascinated by plants now as you were, when you started your career?

Mei-Lie Tan: Yes. I think that will stay, and every time I look through a microscope, I'm still in love with them.

[They both laugh]

Hannah Senior: Excellent. Well, thank you very much for your time today. Dr. Mai-Lie Tan, it's been a real pleasure talking to you.

Mei-Lie Tan: Thank you, Hannah. It was a pleasure too, for me.

[Theme Music Plays]

Hannah Senior: You've been listening to plant breeding stories by PBS International and I'm your host, Hannah Senior. Plant Breeding is a pretty specialist podcast topic, which can make it difficult for people who share our interest in this kind of thing to find it. So if you've enjoyed the podcast, recommend it to your friends and colleagues, and please help others in the plant science community to find it. By rating this episode and subscribing to the series. I'd love to hear from you if you want to suggest people you'd like me to interview, you can contact me on twitter @PBSInt or on Instagram @PBS_Int. Until next time, stay well.

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