

Transcript: Plant Breeding Stories Podcast
S3 E1.1 African Seed Systems - Dr Richard Jones



[Theme music plays]

Hannah Senior: Welcome to season three of the plant breeding stories podcast, where I talk to leading lights about 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 that are 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, our 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: To kick off this season, we have a special edition, a three-part episode about seed systems in East Africa. Why this topic? Well, because for a new variety to be released and go into cultivation, it needs to be multiplied up and distributed. And so the seed industry has an important role in ensuring that plant breeders' work translates into real world impact. So I'll be speaking to a seed producer, a seed saver, and a seed systems expert, all of whom have been working on the changing and sometimes challenging frontline of the seed industry in East Africa, for many years. Their insights are thought-provoking and relevant to plant breeders across all parts of the world. You can listen to them in any order and all three represent a different and valuable perspective on how improved varieties influence or fail to influence what farmers grow and how they do it. We touch on collaborations with international research organizations to get varieties out into the market, the role of maize and how this affects the growing of smaller crops, critical for nutritional and agronomic diversity and how gender dynamics affect how seeds are bought and what species are cultivated. We'll also touch on the unintended consequences and impacts of aid and development efforts and how a seemingly somewhat dry topic like intellectual property rights translates into very real impact on people's lives.

Hannah Senior: In the first part of this triple bill kickoff to season three, I'm speaking to Dr. Richard Jones, who spent his career understanding farming practices in many countries across Africa with a particular expertise in how seeds were distributed. He has advised many NGOs and governments on seed systems and how to make more effective interventions in agriculture. We talk about the evolution of the seed industry across the continent and where aid interventions to provide seed to farmers have sometimes not worked as hoped. We also discuss the important role of private industry in ensuring that farmers have the varieties they want to grow and need to maximize their success, despite all the regulation that this brings. Transcripts of this episode, and all our podcasts are available at pbsinternational.com/podcast. I hope you enjoy it.

[Theme music fades]

Hannah Senior: To get us started, Richard, would you like to just tell me a little bit about yourself, maybe just introduce yourself to the listeners.

Dr Richard Jones: Thank you, Hannah. Well, I was born and brought up in Devon in the United Kingdom and I was very fortunate in my youth to do an exchange with a French friend. His parents were brought up on a farm. So my first experience with agriculture was actually working on that farm during the Easter holidays, learning to speak French, and then he would come over to England in the summer holidays and spend time with us to learn English. We're still really good friends. That was my first experience with agriculture.

Dr Richard Jones: But I took a year out between school and university and actually traveled to Africa. First to South Africa and then we traveled over land to Kenya, with a friend. And so I think that was when the African bug bit me. [He laughs.] Then I went to university and did agricultural botany as I mentioned. And then my first posting was actually to Botswana in Southern Africa and I was working with the farming systems research project. Farming systems research was really first about trying to understand what farmers do or did, and then with that understanding, help improve the system, but

in a sort of more participatory way than had been done potentially in the past. And I ended up spending six years in Botswana. The last five years I was working in farming systems on the edge of the Okavango Delta, two very contrasting systems. And I did research on those systems, which actually formed the basis of my PhD.

Hannah Senior: And then from Botswana, you went on to Malawi and I understand that was when you started to see how so-called improved varieties sometimes didn't get adopted as anticipated. Can you tell me more about that?

Dr Richard Jones: So I went to Malawi as a post-doctoral research fellow funded by the Rockefeller foundation and I was attached to the Malawi Maize Commodity Team. Now Malawi had had a strong history of maize research going back before independence. And there had been a good understanding that farmers had not readily adopted many of the new maize varieties that had been developed by research. And we discovered that farmers really liked local maize seed - seeds that they saved from harvest to harvest, selected, kept on the farm and stored that seed and planted it the following year. And they called that maize, 'local maize'. It was their maize and that maize had certain characteristics. It had a very hard endosperm. We call it a flint endosperm and it pounded well. So Malawians pound their maize into a flour and eat a product called 'nsima'.

Dr Richard Jones: Now the local maize met those characteristics very well, but the improved maizes, which were predominantly hybrid varieties, which were coming in through the research system had very flowery endosperm and very soft endosperm. And they didn't pound as well. And what we found is that farmers kept the local maize for their own consumption and they used the hybrid maize as a cash crop. And why did they do that? Well, the hybrid maize didn't store well on a farm at all. So by growing it as a cash crop, selling it to the parastatal marketing agency, they basically got rid of the storage problem onto somebody else's hands.

Hannah Senior: You're retired now, but throughout your career, you worked in many countries in Africa, within agriculture and seed systems and distribution. Could you describe for me the arc of your career after those early projects?

Dr Richard Jones: So after I finished my time in Malawi with the Rockefeller Foundation, I moved to Kenya and was employed by ICRISAT, one of the international agricultural research centres. ICRISAT works on crops that are very important in arid and semi-arid areas. And the breeders were very happy with their developments, very satisfied with their developments, but the investor who was funding this research, the African Development Bank at the time said, "Well, it's all very well telling us that you've released five new varieties, but so what?" So ICRISAT then decided to invest in getting these into the hands of smallholder farmers. And I was employed as a technology exchange specialist to work alongside the breeders to really help improve the distribution of these varieties.

Dr Richard Jones: So we worked with many different channels. We worked with non-governmental organisations, which were working with smallholder farmers. They have played a role in getting these new varieties into the hands of smallholder farmers. We started working with the millers who were buying the grain, because if they could have smallholder farmers growing a more uniform product, their processing industry would be better able to meet the demands of the international markets. So we were looking at many different channels that could be used to improve seed distribution. At the end of the day, I mean, you can give seeds away for free, but it's not a sustainable solution. You really need to get farmers paying for these products. And then you get a whole business cycle developing around them.

Hannah Senior: And were you involved in seed distribution after natural disasters or civil upheavals? You know, the kind of events that can disrupt or even destroy existing infrastructure in countries.

Dr Richard Jones: I mean, it's been a very common intervention after both a natural and a civil disaster to come in with what they call seeds and tools programs. I was involved in a project in Southern Sudan. This was before independence. And we were going around in very, very remote areas, talking to farmers about these programs and saying, "These programs have been going on in this part of the world for many years. Have you benefited from them?" And what we found is that the farmers were growing their traditional local varieties. And many of the varieties that have been distributed through the seeds and tools programs were not being grown. The administrators behind these programs, they're only in places for a short term. They don't really understand the farming systems. And I think it's very easy to fund the seeds and tools program by a big international agency that has good accounting practices and can say that we've distributed so many tons of seeds, so many tools to farmers. It sounds good on paper, but the reality was quite frankly, these were having very minimal impact. It really led to a shift in approach to what they call the seed throw approach, which was pioneered really by Catholic relief services, where farmers rather than being given seeds and tools were given cash that they could exchange for seed. And I call "seed" in inverted commas.

Dr Richard Jones: So a meeting was called, people were told to bring their own traditional seeds, and then that exchange could take place locally. And I think we developed a sort of hybrid model of that in Mozambique, after the big flood in 2001, where we invited commercial seed companies to come in and also offer their seed for sale. So you have local farmers selling their own saved seed, and you had commercial seed companies also selling their seed. And you're allowing farmers to make their own choices. You weren't making choices for them.

Hannah Senior: And I suppose that also avoids undercutting the local seed businesses. You know, if you have businesses that are distributing seed and then an organization comes in and gives that seed away or gives other seed away, it must do damage to the local seed distribution infrastructure.

Dr Richard Jones: You know, seed production is an expensive business. It carries a lot of business risks because you know, it takes three or four years to go through the cycle of seed production, to have enough seed to sell to a farmer. Now, if you come in the third year and you start buying seed from outside and giving it away, you're basically undercutting the market of that company. So it's really important in any intervention that you don't undercut the business side of it.

Hannah Senior: And then after ICRISAT you moved into a different role for the last few years of your career before retirement. So tell me about that.

Dr Richard Jones: Yes, the last five years of my career, I was working with AGRA, the Alliance for Green Revolution in Africa with a project funded by USAID. And we were basically a grant-making project supporting the scaling of seeds and other technologies. We were working in six countries across Africa, and the idea was to really identify through a sort of competitive process, companies that were interested to help scale new seeds. And we were pretty much focusing on crops that had not really been addressed in the past. So we were looking at things like beans and cassava, sweet potato, pigeon peas, groundnuts, and offering small competitive grants to these companies to get involved in promoting these crops.

Dr Richard Jones: Now, these crops had not been very attractive and really had been the intention of these companies up until then, but what happened, we sort of catalysed the process. These companies would start producing seed, start selling seed along their existing lines of seed. And they realized that farmers were very interested in buying them.

Hannah Senior: And that leads me to the topic of maize, which is not a native crop, but it's something that comes up over and over when talking about plant breeding and seed production in Africa. Why is that?

Dr Richard Jones: I think it's a very interesting question because maize comes from Mexico, Central America, and it was brought over to Africa by the Portuguese in the 16th century. The traditional crops of Africa, sorghum and millet. Sorghum is an incredibly resilient crop. It's very drought-resistant. You see sorghums growing from very dry environments with less than 300 millimeters of rainfall to very wet environments. So people tend to say "sorghum is a drought-resistant crop". Yes it is, but it's ironic that you will also find sorghums growing in areas with 2000 millimeters of rain.

Dr Richard Jones: So you have enormous diversity in sorghum, but it does have a number of Achilles heels. It is very susceptible to insect damage in the head of the inflorescence, which is where the seeds come from. And also it is very susceptible to bird damage. Birds love to eat sorghum. Maize on the other hand is enclosed in the sheath. So birds can't get at it. Other animals can, monkeys can eat maize cobs, porcupines can so it's not completely immune to pests, but I think that's probably one of the biggest reasons for the switch from sorghum to maize. And it's also easier to prepare for a food.

Hannah Senior: Great. Thank you. So turning the question to seed distribution over the last few decades, the traditional pattern of farmers saving seed for the following year has in many ways been replaced by commercial seed companies. Can you talk a little bit about that change? How and why it's happened and what the effects are, in particular for smallholder, small-scale farming?

Dr Richard Jones: Well, the ability of farmers to harvest and save seed from season to season is intrinsic to agriculture. If we hadn't been able to do that, agriculture would have never developed and we as a species, probably wouldn't have prospered as we have on the planet. What you saw, in some countries in Africa, not universally, is that traditional system continued and continues to this day. But you also saw the emergence of what we would call commercial seed companies, especially in Southern and Eastern Africa. Those countries had commercial farming that developed pretty much during the

colonial period. And you've got the emergence of large scale commercial farmers who are wanting to draw upon modern technologies. And you saw that a lot with hybrid maize.

Dr Richard Jones: Hybrid maize was developed in a parallel in Southern Africa and in the United States, in the fifties and sixties. And that technology really conferred huge benefits in terms of yield. And what happened is the government started investing in seed companies to get the products of that research into the hands of farmers. Now, initially that was pretty much confined to the large scale commercial farmers that were operating, but as independence came along, many of the countries wanted to see those benefits going to smallholder farmers.

Dr Richard Jones: So those seed companies were basically tasked with expanding seed production and getting it into the hands of the smallholder farmers who made up the majority of the population. Those companies were largely what we call government parastatals. They were government-run companies and for a while that worked quite well, but then they were monopolies. There was only really one seed company in each of the countries that they were operating in. There was very little trade in seed between countries. And I think there was a realization that these things had become a huge burden on the Exchequer by the eighties, which led to the liberalisation of the seed sector. And that liberalisation really opened up the market. And you saw sort of burgeoning competition in the seed market in many of these countries, which basically has led to increased choice to small holder farmers.

Hannah Senior: And what kind of issues are present in seed distribution? I mean, I realize Africa as a continent has this vast diversity of countries, systems, landscapes, you know, et cetera. So it probably isn't one size fits all, but what are the common threads in the challenges that exist in seed distribution in Africa?

Dr Richard Jones: I think one of the big problems was faced by any input supply distribution company, not just seeds, but fertilizer, pesticides, et cetera, was hard to

actually get those into the hands of the broad network of farmers. And what we found is that in many villages in Africa, you have small shops. And so there's been a lot of effort to identify entrepreneurs operating these types of shops and get them involved in selling, distributing seeds. So you then start to develop a whole logistical system, which ends up with these small agro-dealers, where a local farmer can go and buy his or her seed off the shelf. Farmers go into the shop and say, "Which is a good seed variety?"

Dr Richard Jones: So then you start then to see knowledge about these varieties and about these inputs passing down the chain into the hands of farmers. Traditionally, that advice used to come through government extension workers, but with cutbacks, there are fewer government extension workers now than there were in the past. Populations have also increased. And you've got one guy and extension workers serving two to 3000 farmers. So it's very difficult to access that information. So you've got these parallel channels, developing.

Hannah Senior: It's quite a regulated process, isn't it selling seed? So again, for the benefit of any listeners who aren't hugely familiar with, or haven't thought too deeply about seed distribution, why is regulation needed in this area?

Dr Richard Jones: Somebody told me that seed is more regulated than the nuclear industry. [They both laugh]

Hannah Senior: I did not know that! But it's curious, isn't it given that, as you said, farmers can and do store seed, why does it need regulating so heavily? More heavily than the nuclear industry!

Dr Richard Jones: Well, yes. If I was to put two samples of grain in front of you, let's say maize grain or peanuts or something else, and ask you to tell me which one is seed and which one is not, you could look at them, but physically they don't look any different. Now once you plant those out and they start to grow, then differences will start to appear depending upon the crop. And unless you can trace the seed production

process back to its origins, you cannot tell whether one of those products is going to be seed or it's not going to be seed. So the whole quality control process really depends upon growing that seed crop under control conditions, making sure that it is isolated so it doesn't cross pollinate with off-types, if it's a cross pollinated crop. If you have seed-borne diseases and you start distributing that you're basically spreading a disease.

Dr Richard Jones: So it's very important that you have standards that are then regulated to ensure that farmers can get hold of seed, that's free of diseases, free of pests, potentially in the bag, that they're going to be true to type when you plant them out so that they actually produce what is described on the label. And without that regulation, then the thing becomes a free for all. And what you do see is a lot of what is called fake seed, so that people see that seed costs more than grain and they go and buy up grain and they color it with a coloring to make it look like what seed has been treated with, [he chuckles] and sell that at inflated prices. And then you get a lot of disappointed farmers.

Dr Richard Jones: I think what is happening in many countries, you've seen a great expansion in the seed sector, but the regulatory systems haven't been able to keep pace with what is required. So that has created opportunities for fake seed to come into the marketplace. And there's a lot of work and investment going on now to see how you can upgrade the regulatory system to address that.

Dr Richard Jones: I'll give you an example. We have airlines flying all over the world and we have airliners and air travel is by and large, pretty safe. But it's not a government regulator that goes and checks on the maintenance of every aircraft. The government regulator basically puts in place standards that have to be met by the airline, in maintaining their aircraft. And if those standards aren't met, the airline can be shut down or punished in some sort of way. And those systems are audited independently and maybe at random. Now we're trying to move towards a system like that for seed regulation, rather than having a government seed inspector go in and

inspect every field, you will have a seed inspector who is licensed to do that work, and maybe will charge a fee to do that so that the system can expand to keep pace with the development of the seed industry.

Hannah Senior: As a sort of wrap-up to our conversation today, can you tell me why you feel so strongly that there's a need for more private-sector seed distribution in Africa?

Dr Richard Jones: When the seed sector was liberalized, of course, there was a lot of concern that the price of seed would go up, farmers wouldn't get the varieties that were well-adapted. What you saw is a huge explosion in range and the number of varieties available to farmers, and that increased competition really led to better quality seed lowering prices. And it was a very favorable development, which farmers really responded to and the sales of those seeds have increased dramatically over time.

Dr Richard Jones: But farmers don't just grow one crop. They grow many different crops and that's important for mitigating risk from drought for good nutrition. Also, the market is wanting many different types of products. You can certainly sell maize, but you can sell groundnuts. You can sell pigeon peas, you can sell beans. You can also consume those crops. So there's a real need now to diversify the range of crops and varieties available to farmers. And that's really the area that I've been involved in most recently, trying to help expand the range of crops, moving away from the sort of most profitable hybrid crop to lower-value crops.

Hannah Senior: Well, thank you very much indeed, for joining me today, Dr. Richard Jones, it's been an absolute pleasure.

Dr Richard Jones: Thank you.

[Theme music plays]

Hannah Senior: You've been listening to Plant Breeding Stories by PBS International. And I'm your host Hannah Senior. This was part one of a three-part special edition episode. And next week's episode will be back to the usual format.

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 help others in the plant science community to find it. I'd love to hear from you if you want to suggest people you'd like me to interview and you can contact me on Twitter @PBSint or on Instagram @PBS_int. Until next time, stay well.

[Theme music fades out]