Free the Seed!
Transcript for S3E2: 'Dakota Tears' Onion

Rachel Hultengren: Welcome to Episode 2 of Season 3 of Free the Seed!, the Open Source Seed Initiative podcast that tells the stories of new crop varieties and the plant breeders that develop them.

I'm your host, Rachel Hultengren.

This podcast is for anyone interested in the plants we eat – farmers, gardeners and food curious folks – who want to dig deeper into where their food comes from. It's about how new crop varieties make it into your seed catalogues and onto your tables.

In each episode, we hear the story of a variety that has been pledged as open-source from the plant breeder that developed it.

My guest today is David Podoll of Prairie Road Organic Farm. David is a founding member of the Northern Plains Farm Breeding Club, and has worked with his brother and sister-in-law, Dan and Theresa Podoll, on Prairie Road Organic Seed varieties. Prairie Road Organic Seed is located in North Dakota, and focuses on breeding and carrying varieties that thrive in the Northern Plains of the US and under organic conditions. We'll be talking about 'Dakota Tears', an open-pollinated, yellow-skinned, firm-fleshed storage onion, that David has been working on for the past few decades.

Rachel Hultengren: Hi David, welcome to Free the Seed!

David Podoll: Good morning, Rachel.

Rachel Hultengren: So let's get started by having you describe 'Dakota Tears' for us. What makes it a unique onion?

David Podoll: Well, unique in the sense that there are a few open-pollinated varieties out there. It's hard to find a good OP variety in a catalogue today. Other than that, how it's unique is that it's unique in the same way that every variety is unique. It has the fingerprints of whoever was the breeder and selector of it, and…

Rachel Hultengren: And just to clarify, an open-pollinated variety is in contrast to a hybrid, which is a uniform variety because all of the individuals are genetically identical, whereas an open-pollinated variety is a variety where it's a population of individuals that are very similar genetically and looking in the field, but are not identical in their genetics.

David Podoll: Right. I mean, open-pollinated varieties have a wider genetic base, or they should, and that gives them more ability to adapt.

Rachel Hultengren: Mmhmm. Are there aspects of your growing conditions in North Dakota or your management that influence what makes for a good onion on your farm?

David Podoll: Well, I don't know if there's anything in particular that makes for a good onion. When I started out, I was looking for something that would keep real well, because we wanted to eat as much as we could from our farm and garden. And so I wanted something that would store a long time through

the winter in common storage. And um… How I started was I was thinking, "Okay, what in the garden can I save seed from and improve it for our climate here in the northern plains?" Many varieties up to that point had been bred for other climates. We tended to be drier and hot summers, so I wanted stuff that was drought-hardy. And we had short seasons so it had to fit in with the season and still produce good quality. In short, I wanted something that was really tough. I wanted something that would endure. And so I started saving seed on any number of things in the garden, and I was completely ignorant about any requirements for seed saving.

And in the case of 'Dakota Tears', at first I just tried to save Downing Yellow Globe, to save seed from it. I wasn't thinking about any particular further breeding project. So I took a dozen bulbs, or 20 bulbs and planted them in the garden. I figured, "Well that's all I need, they produce a lot of seed." I grew maybe, seven, eight, nine hundred bulbs a year, and I could get a lot more than that from 20 seed heads. Not realizing, of course, that with onions, they are obligate outcrossers, meaning that they have to cross-pollinate. They don't do very well selfing, you know, crossing themselves. So on any given seed head, it's important that each floret on the seed head of an onion plant be pollinated from the seed head of another onion. And so you need a lot more onions than just 20. So there's a mathematical formula, and I can't explain it, but it's been worked out by geneticists, that for obligate outcrossers like onions or like corn, you need a very minimum of 100 bulbs in order to maintain genetic diversity over the long haul.

So I soon found out that planting a dozen bulbs wasn't gonna do it. I started to see inbreeding almost immediately, within a year or two.

Rachel Hultengren: I want to define inbreeding depression here briefly - inbreeding depression is when individuals within a population are too related to one another, and it occurs in cross-pollinated or outcrossing species when too few plants are grown in a population every year. So what did it look like for the onions you were growing to be showing signs of inbreeding depression?

David Podoll: Well, inbreeding signs in this case were just a lack of vigor, and probably poor seed quality and germination. And so then, I don't know, I guess I got some books and started reading. At that time, of course, there was no such thing as the internet. And I learned that, yes I had to have at least a hundred bulbs. So then I set about to do a serious project. And so I took… well what I did first was, I knew I wanted good genetic material. So I was growing a good variety already called Downing Yellow Globe, and I was already growing a hybrid called Copra that was a really good keeper. And then I searched the catalogues, and I trialed some others, and I settled on I think about three varieties of good-quality onions that I would cross.

Rachel Hultengren: What was the third variety, in addition to Downing Yellow Globe and Copra?

David Podoll: Well, um, Downing Yellow Globe, Copra, and Early Yellow Globe were the varieties I ended up crossing.

Rachel Hultengren: You said that Copra had good storage quality. What were the traits for each of the other two parents that you were looking to combine?

David Podoll: Well, of course storage was the thing. Both the Early Yellow Globe and Downing Yellow Globe were good storing. I wanted vigor and size and earliness, and a certain globe shape that was nice, and the color of the skin. Those are the main things.

Rachel Hultengren: So once you had chosen the varieties, what was the next step?

David Podoll: I think I had the varieties… I raised bulbs of the three varieties, and then I took really nice-looking bulbs, the kind that I wanted, you know – nice size shape and color of skin, and things that kept over the winter in common storage and weren't yet growing by April. That was the number one criterion. And so I had a block in the garden. And so then I took probably about 40 bulbs from each of these three varieties, mixed them out there in the three row block. I think I did 1-2-3, 1-2-3 of the varieties right down the row, until I had my block. So each particular plant would have a different variety of onion beside it, both beside itself in the row and across into the next row. And so when bees visited the flowers, then they would get things mixed up really well.

Of course, onions are perennial, or a biennial rather, excuse me. So you store the bulbs over the winter time, and you make another selection there, and you plant those out and then they grow the seed heads. So that was then the genesis of what became 'Dakota Tears'.

Rachel Hultengren: Right, so onions are the first biennial species that we've talked about on the podcast. And they differ from annual species in that biennials require two seasons of growth before they produce flowers and seeds. So for onions, you plant the seed in the spring, you get a bulb in the fall. That bulb then has to survive the winter and then be planted back out in the spring. It will grow again and then produce flowers and seeds that second year. If you're in conditions where the weather is more mild and plants can survive in the field through the winter, you could leave your onions out in the field and they would start growing the next year, but in North Dakota I imagine that's not possible.

David Podoll: Right, we have to harvest the bulbs here. Although, just parenthetically, we do have, after seed harvest, we just leave the stalks as they are, and the old bulbs in the ground. And some of them will actually survive the winter here with a little bit of snow cover, so they are really really hardy plants. But normally, yes. And I would recommend that most people dig the bulbs and store them so then you can do another selection evaluation. If you just leave your bulbs in the ground, how can you evaluate them properly? And I know it's tempting to do so in different areas of the country where it'd warm enough, like on the west coast, but actually digging bulbs, storing them over the winter, evaluate them before you put them in storage and maybe do a selection for the stock seed planting at that time, and then further evaluate and select out of those that you selected in the fall for planting in the spring.

Seeds need to be planted and grown every year, and this is part of the selection process, too. You need to plant them every year so the plant can experience that season and incorporate that experience within its genetic heritage. I think there's an intelligence in plants that we have not yet recognized that exceeds what humans are capable of. But I think we can tune into that if we just think about it, touch them, hold them, care for them, nurture them. They become part of us, literally as we eat them, but also part of our soul as we care for them.

Rachel Hultengren: And when you pull the bulbs out in the fall, before you store them, what are the things that you're looking for when you do that first selection?

David Podoll: Well the first selection, of course, in North Dakota, stuff needs to be early; it needs to fit within the season. And so early dry-down, small necks, plants where the tops tip over early but also have a large bulb. Meaning that they're not diseased or anything and that causes them to dry down earlier. But making sure that they're fully vigorous, and when you pull them out of the ground they've got good roots on them… Every stage of the process really has an inherent selection to it. So we pull them out of

the ground in the fall and we put them on this rack, and there they are cured in the warm fall air for several weeks. And then we, you know, each individual onion we pull the tops off and rub the bulbs to make sure that they're sound, pull the dried roots off and pack them in storage in the basement where the temperature over the winter is 40 and 50 degrees (Fahrenheit).

Rachel Hultengren: And then when you take them out of the basement, from that 40-50 degrees, what's the last series of selection criteria that you put those onions through before you plant them out in the spring?

David Podoll: Okay, in the spring, then… Of course, all through the winter we're watching for quality. If there's any that spoil, then they're taken out, and if any start to grow too much then they're taken out. But in the spring, the first thing we look for is whether they're growing or not. Anything that stays fully dormant for the longest period is what we like to select. And then the second selection process includes the size and shape of the bulb. We want nice big bulbs; you know, shapes can vary a little bit and that's how we know we have some genetic diversity. Some are more globe-shaped, some are round, some are a little flatter-shaped, but as long as they're very sound and very hard… and then we like to look at the color of the skin. We like a nice, rich brownish-orange color on the skin for a yellow onion such as this.

Rachel Hultengren: So there are, as you said, multiple stages where you're doing the selection over the course of those two years before you get seeds again from those onions. So biennials can be a little more complicated than annual crops because you have these various stages.

David Podoll: Right. It takes a little more effort in the process. And also I should point out that what I have just described is a process called 'recurrent mass selection'. And so I didn't start out by taking and actually pollinating anything by hand – taking pollen from one plant and putting it on another. I had this mass of plants, and then I let the bees and the flies do the pollinating, the cross-pollinating, and then I did selection work from then on. So that's recurrent mass selection. And it's recurrent because in order to maintain a good open-pollinated variety, one has to do this selection every single year.

Rachel Hultengren: What would happen if you didn't do it every year?

David Podoll: Well, you would get a greater divergence, less uniformity, maybe some less desirable things would creep in. For instance, it would be real easy just to take the biggest bulbs and plant them out. But you may be unwittingly selecting, then, for a later plant, because there may be some larger bulbs that have thicker necks that take a longer time to dry down. And so if you pick those out, you're gonna be shifting the population to a later maturing variety.

So in a class I took on breeding from John Navazio, he said, "You have to always be aware of not only what you are selecting for, but what you're selecting against, and what you might not even know what you're selecting for or against."

After a while, it becomes a real artful process. And sometimes you'll have an onion in your hand, and "Well, should I keep this one, should I put it in the germpool or not?" And so you leave it in your hand for a few seconds, and you just let it speak to you. I know that sounds kind of weird. But then you make your decision based on how it feels to you internally.

Rachel Hultengren: I like hearing that, because there are a lot of things we can measure in doing plant breeding. You know, you can go out and measure the height of every plant, and the thickness of every

neck of every onion, and you can get a lot of data, about any given plant that you have out there, that will inform the decision that you make about whether it's one of the ones that you want. And that data can be really important, but sometimes there are things that we don't think to measure and that are sort of emergent properties that, if we've been working with a crop for a long time, we can have an unconscious or subconscious understanding of what makes a good onion or a good carrot or a good lettuce. And that emergent quality can be something that is undefinable by the numbers that you have.

David Podoll: Absolutely.

Rachel Hultengren: So not to say that it's… it's not a magical quality, but if you're very familiar with something, your brain might be getting a lot of signals from that onion that you're holding and looking at that you wouldn't be able to parse into discrete traits.

David Podoll: I think that's true. And like you said, we can take all kinds of data, but do we need that? Because I seemed to understand right from the very beginning, when I embarked on this process, I somehow instinctively knew that I wanted to do what my gardening ancestor breeders in the human race have done for the last 10,000 years. Except that in the last 100 years or so, we have put the breeding process off to university scientists, and taken it out of the hands of the farmer and the gardener. And so I wanted to honor that long term, many-millennia-old process. Because after all, all of the material that modern, scientific breeders had to use was the heritage of 10,000 years of breeding and selecting that went before them. So I figured, "I can do the same as they did." And anybody can do it; it's not very difficult at all. All you need to do is take the time to observe closely and become involved intimately with the plant itself.

Rachel Hultengren: Mmmm. One of the ways that you've become really intimately familiar with 'Dakota Tears' is by eating it for many years, and I imagine that one of the selections you do with these onions during or after they're stored is to taste them. I was wondering if you could describe the taste testing process for me, and what you're looking for in the eating qualities of this onion.

David Podoll: Well, actually, we haven't done any specific taste testing. It's very difficult to do that with an onion. You can't take an onion bulb and take a slice off it and plant it. As far as I know, it might then spoil. And so I think it's one of those things, that's intuitive, where it's similar to… well, there's that artful sense I think. It's similar to the process we use in selection of 'Uncle David's Dakota Dessert Squash', where we strive for a certain shape where it seems to be genetically linked to the flavor – the quality of the flavor and the color of the fruit. And that goes back to a genetic heritage, and it's kind of similar to the onion as well. If we have an onion with a nice, beautiful wrapper on it, and it's nice and solid, that means it's going to be very flavorful. The onions that turn out to be, and there are always some that pop up in there that don't keep as well, they're a little softer onion that won't make it through the seven months of storage or whatever time there is, that they aren't going to be as flavorful as the really nice solid onion.

Rachel Hultengren: That's a good point to think about, if you're embarking on a breeding project, how you're going to taste something if you're also going to plant that something in the ground.

David Podoll: Right. It's a difficult process at times. I know that with beets you can take and cut off some of the fruit and put it in the ground and it'll be fine. But I'm not sure you can do that with onions, because you're slicing through – each onion layer corresponds to a leaf that it was growing at one time, and yeah, I don't know how much you could damage the bulb and it would still grow well, if it would

heal or not. But that's something I haven't tried. There're always things to try, I suppose, in the process, but that I haven't.

Rachel Hultengren: Yeah, I haven't done any onion breeding, but I think that you could, if you were doing it right before you planted, or very soon before you planted, cut it just above the root plate, because I think that's actually all you need to put in the ground. And you might have a weaker plant growing that year, but you could do some selection that way, though that would be even more complicated to try to take that on.

David Podoll: Right. It might be something I could experiment with just to see how it works in our area… In our area, too, we have really strong winds. We have violent thunderstorms as well as sometimes 40 mile an hour winds that blow all day. And they have to have strong stalks, so we want well-rooted plants and intact bulbs.

Rachel Hultengren: You've said that it was your goal to grow onions for your family, that that was your primary purpose in this project, so even though you don't taste-test the individual onions as a selection step in the breeding process, you've been tasting those onions that you stored through the winter for many years now. How would you describe the flavor of 'Dakota Tears'?

David Podoll: Well, I would say it's got a strong, robust onion flavor.

Rachel Hultengren: Is it good for cooking, or for eating raw?

David Podoll: Well, I wouldn't eat it raw, it might be a little difficult, because it's strong enough. But we use it in many, many things that we cook with.

Rachel Hultengren: Do you have a favorite dish that highlights the onion?

David Podoll: Well, I don't know. Onions are kind of life garlic in our home – it's one of those things that are necessary for life itself. And so you just about throw onions and garlic in any kind of casserole or stew, or with any roast or anything. They go in there.

The 'Dakota Tears' name was proposed by my nephew, Danny and Theresa's oldest son, who was familiar, of course, with its pungency, and so he just said, "Why not call it 'Dakota Tears'?" And we thought that that was a really good name, so we've stuck with that.

Rachel Hultengren: Is it more pungent than other onions you've come across?

David Podoll: Oh, I don't know that it actually is, but we just thought it was a grand name.

Rachel Hultengren: Ah, okay. I'd like to go back to thinking about the storage conditions that you put the onions in every winter. What are the requirements for onions to be able to flower the next year?

David Podoll: Well, I don't know that there are any specific requirements. I do not believe that the bulbs need to vernalize as such, meaning to go through a cool period. But they do need to go through a dormant period in order for them then to send out a seed stalk. But I do not know that for sure. I am not familiar enough… I mean, I've just been doing this process for 45 years in this particular area of the country, and I know we need to dig them, and they need to go into storage, and that's what I know.

Rachel Hultengren: And it's been working the way that you've been doing it.

David Podoll: Yes.

Rachel Hultengren: Yeah, so if they do need vernalization, then it sounds like they're definitely getting it in the basement in 40-50 degrees F for the 7 months that you have them stored.

David Podoll: Right.

Rachel Hultengren: You're not doing anything additional to make sure they get those winter conditions.

David Podoll: And I do not know if onions are like potatoes, for instance. You dig a potato in the fall and put it into storage. It has a dormant period on its own before it will grow again of about 3 or 4 months. And that might be true for onions, but I really don't know. These are good questions. Of course, there are always things we can learn about it, but you know, I describe myself as a yeomen farmer that is just carrying on the tradition of thousands of years of my ancestors who gardened and saved seed.

Rachel Hultengren: That's a wonderful tradition to be choosing to be a part of.

David Podoll: Yes.

Rachel Hultengren: So, for… maybe for onions, but for other biennial species – just to define this for our listeners – vernalization means providing the plant with conditions that make it think that it's experiencing winter.

David Podoll: Mmhmm.

Rachel Hultengren: So if you were to leave your plants in the field and it got cold and the light changed, it would know that had gone through winter, and then when spring conditions come, it would know to start growing again and then to flower and go to seed. But if you dig those plants up in order to protect them, so that they do survive, for example, a North Dakota winter, then you would need to provide them with cool enough temperatures for long enough that they felt like they had gone through winter. And so it might well be the case that those conditions in the basement are exactly what onions need, and so you don't have to do a whole lot more than that. But for other biennial species, that is information that has been researched at a university, or through the USDA, or by others, so that those are known temperatures and known lengths of time, such that if anybody wanted to start a breeding project with a biennial, they could look up whether there were vernalization requirements, and what those were.

David Podoll: Yes, and I should point out with onions, too, is that they are day-length sensitive, and so we can grow a certain class of long day-onions up here in the Northern Plains that they could not grow further south, for instance. Meaning that our days are longer in the summertime here, so that means we need to plant the onions soon enough, of course, plant the onion seed soon enough so the plants can experience this long 16-hour day we have up here to form a bulb. And going further south, if you went down to Kansas with this variety of onion, it may not form a bulb.

Rachel Hultengren: Mmhmm. So for short-day-length onions, they only need 10-12 hours of daylight to start putting on a bulb. But for long day onions, they need to experience those 16-hour days at a certain developmental stage to trigger bulbing.

David Podoll: Right.

Rachel Hultengren: So 'Dakota Tears' is a long-day onion.

David Podoll: Yep, it's a long-day onion.

Rachel Hultengren: I'd like to make a side-note here about vernalization requirements for onion. After my conversation with David, I consulted *The Seed Garden*, a book about seed saving from the Seed Savers Exchange, and confirmed that in order to flower and set seed in their second year, onion bulbs do need to be stored at 32-40 degrees Fahrenheit for at least 8-10 weeks. So 'Dakota Tears' undergoes vernalization in David's basement, where the conditions are right.

Rachel Hultengren: How long did it take from starting the project to when you released the variety? You said you've been working in breeding for forty-something years – is this onion something that you started at the beginning of your breeding career?

David Podoll: Fairly soon, but I don't call it a breeding career. I call it a seed saving… awakening to seed saving, I guess, is how you can put it. And we didn't "release" a variety as such. I mean, we were working with a couple of seed companies to produce some stuff for them. They'd send us the seeds and we'd produce seed from that and send it off to them. And then in a matter of conversation, in a few years, well, "We've got this nice onion or this nice squash or this nice melon – do you want to trial it?" And so we… I think that's what happened with our onion with, I think the first one to sell it before we got into, you know, internet sales. Company in Maine… uh, Fedco! I think was the first one to sell our onion. And I think that Organic Gardening picked it up for one of their trials, and it was voted "Best New Vegetable Variety" 2010, or something like that.

Rachel Hultengren: Have you heard other feedback from farmers or gardeners that have grown it?

David Podoll: A person could just Google "Prairie Road Organic Seed" or 'Dakota Tears' online. And some of the things that the reviews said were that it was "huge and delicious", "flavor-packed", "stores well", "the name fits", "the best onion"… Obviously people will send their positive reviews in, but we've never had a bad review on it.

Rachel Hultengren: That's got to feel good, that people like it.

David Podoll: Yes, it's terribly gratifying to… or wonderfully gratifying, it's not terrible. It's wonderfully gratifying to know that the work that I've done in the garden over the years, which I consider an artful endeavor, to have some acceptance with gardeners around the country. It's very gratifying, yes.

Rachel Hultengren: So you mentioned Dan and Theresa – your brother, Dan Podoll and his wife, Theresa. They're the ones leading the Prairie Road Organic Seed.

David Podoll: Right. They manage and provide the bulk of the labor, and do the sales for the various seeds that are grown. You know, it kind of all started with a lot of my stuff, and then they got into

internet sales of our own varieties, and then some other, good open-pollinated stuff. And that's been kind of continually expanding. And I continue to do the grain farming and Danny helps me with that, and then I help Dan and Theresa with their seed business when I can as well, and, uh, maybe hoping to do more of that when I retire out of grain farming.

Rachel Hultengren: Farmers don't really retire out of farming –

David Podoll: No.

Rachel Hultengren: - they retire to a different type of farming.

David Podoll: Yes.

Rachel Hultengren: How long was it between when you got those 100 or so bulbs in the garden to start the project in earnest, and when you started having those conversations with the seed companies that you had seed contracts from?

David Podoll: It was probably pretty close to 20 years. So the variety was pretty well established. I mean, when you do a cross like we did, with the three different varieties, you will have some divergence in the material, all kinds of stuff will show up, and then you have to select from there what you want out of that population. And so I imagine it took about 5 or 6 years before we had this fairly stable variety that would be something that would be worth putting out in the market, but it was 10 or 15 years after that before the opportunity arose for that.

Rachel Hultengren: So 'Dakota Tears' has been a long time in the making. And it's one of several varieties that you've pledged as open-source.

David Podoll: Mmhmm.

Rachel Hultengren: Is there a story that encapsulates for you the need for the Open Source Seed Initiative, and having open-source seed?

David Podoll: Well, you know when I started earnestly in the garden, seeds couldn't be patented when I started on this process. The idea of patenting seeds and actually owning life forms was just anathema to most of the people of the world. And I have never stopped viewing seeds as a sacred thing, as a sacred trust. I mean, what else can be more important to the survival of the human race than the seeds that we plant on our gardens and farms? So I want to maintain the idea of the sacredness of that seed, and the freedom of anyone to plant that seed.

And so we have this variety of 'Dakota Tears', and incorporated in that is my soul. And all of these varieties as I explained earlier, that are simply built on what other people, other agriculturalists and gardeners have developed over 10,000 years, and so we considered those seeds a sacred thing that should be free for anybody to use. And that's why we have our varieties listed on OSSI. And so, you know, the thought in my brain, anyway, was that this material then would be free for anybody to use in their own breeding and selection projects.

Well, there's a theologian I read, and he said that unless we have an intimate connection with the land on some level, we're not fully human, and that everyone should have the right to at least a plot of land

on which he can grow part of his food. It's such a human thing, to have your hands in the soil, and it's something that we've lost since the Industrial Age came upon us. And I feel so strongly about people being able to be in the garden. And so when I listen to stories about, you know, vacant lots in the city of Detroit being turned into gardens and producing food for the people around them, it is just the most wonderful feeling to know that there's a revival of this sort of thing. And they need to have seeds that they can just take a plant, and save seeds from those plants and plant them again.

You can count the seeds in a flower, a wise person once said. You can count the number of seeds in a flower, but you can't count the number of flowers that can come from a seed. You know, the infinite number of generations in the future – we can't count those. So we need seeds that will endure for as long as we are here.

Rachel Hultengren: If there are folks listening who have not yet taken the jump into a breeding project, do you have any advice for them?

David Podoll: Yeah! Don't be afraid to save seeds. You can start with the easiest things, the self-pollinated seeds like beans, and then maybe go into something like Cucurbits, and then the obligate outcrossers require a little more effort. But take the long-term view, think about what seed-saving… why you're doing seed saving. There's all sorts of information now on the internet about how to do stuff, but make it an art. Observe closely, that's the main thing. Work on maintaining diversity, and handle the seeds gently. And I don't say this necessary because it should be something that we do when we're nurturing seeds. But in the case of 'Dakota Tears', we have learned that handling the seeds gently and doing the work by hand rather than threshing by machine will mean that the seed will have longer viability. Onions have been known – for how long? – that their seed viability is only a couple of years at best. We have discovered here, by doing the threshing and cleaning by hand, gently, we can extend the viability of onion seeds double or triple that, easily. Because we don't… the seed coat is easily damaged and because we don't damage the seed coat with gentle handling, then the seeds will maintain their viability for longer time. And so, just having vigorous seedlings… and that's one thing that people told us from the beginning, I failed to mention that earlier. The vigor of our seedlings is remarkable, and I think it has to do with not just the highly fertile conditions we raise the seeds in, we grow the seeds from, but also in our handling of the seeds.

Rachel Hultengren: That's interesting, yeah. Anything else you'd like to add?

David Podoll: I think I did mention that if you're going to start on a recurrent mass selection process, that you need to begin with good material. You can't just throw poor material together and expect to get good material out of that. So don't just strive for diversity for diversity's sake, but always search out the good material to incorporate in a population.

So critical is the varieties that you choose, the germplasm that you choose, for the process. And so um, it would be well to go back to as close to breeder's seed as you can get – either somebody that's doing the breeding and selection work on that variety, or someone who has been doing a good job maintaining that variety and making sure that it's not contaminated with something that's of much lesser quality that would make the selection process then much more difficult and lengthy.

And I'm a strong believer in population breeding, recurrent mass selection, that you make Mother Nature do that process. I mean, if your end is to cross this squash with that squash, plant out a whole

bunch of each and let the bees do the work, and start from there. And it really is a marvelously satisfying process to see what results from a recurrent mass selection process and then to do the selection from there. It's like you're a co-creator with God in this. It's a really satisfying process that you can create something new, but at the same time recognizing that there is nothing new. The genetic material has always been there, and you're just allowing it to express itself in this form or that form, and under this climate or that climate and whatever condition, and yes.

Rachel Hultengren: Thanks so much, David, for being on the show today. It's been a real pleasure to get to talk with you.

David Podoll: Thank you - you're very welcome, Rachel.

Rachel Hultengren: I've been speaking today with David Podoll. You can purchase seed of 'Dakota Tears' on the Prairie Road Organic Seed's website at https://www.prairieroadorganic.co/.

We'll have the full transcript of my conversation with David on the Open Source Seed Initiative's website at www.osseeds.org.

You can in touch with me at https://rachelhultengren.com. You can find and like the Open Source Seed Initiative on Facebook, and follow Free the Seed! on Spotify, or subscribe wherever you get your podcasts. Our theme music is by Lee Rosevere.

Thanks for listening! Until next time, I'm your host, Rachel Hultengren and this has been Free the Seed!