

# Free the Seed!

## Transcript for S3E3: 'Festivity' Sweet Corn

**Rachel Hultengren:** Welcome to Episode 3 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.

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**Rachel Hultengren:** Our guest today is Jonathan Spero, of Lupine Knoll Farm in southwestern Oregon. His plant breeding work focuses on open-pollinated sweet corn, which he has been working on since 2001. On his farm of about 5 acres, Jonathan also breeds kale, broccoli, sugar beets and a few other vegetables. He was a member of the Board of Directors of the Open Source Seed Initiative from 2014-2018.

Jonathan and I will be talking about 'Festivity', a multi-colored sweet corn.

Hi Jonathan – thanks for joining us!

**Jonathan Spero:** Hello, Rachel. Glad to be here.

**Rachel Hultengren:** I'm excited to get to talk about this new sweet corn that you've developed. And maybe we can start by having you just describe 'Festivity' for us. What does it look like?

**Jonathan Spero:** 'Festivity' is multi-colored, in that it has not only white and yellow but blue and red kernels. It has just a blush of color at the milk stage, that is, eating stage. But as the plants mature, they become more darkly colored like what we call an ornamental corn, sometimes. But it's a sweet corn.

**Rachel Hultengren:** Mmhmm. So take us back to the beginning. How did you get started on this, and what was your goal with it?

**Jonathan Spero:** Well, the original goal was a multi-colored sweet corn. The colors are generally phytonutrients, or this is my premise, and therefore corn with color is more healthy than corn that's just white. And so this was my initial purpose. I had tasted some multi-colored sweet corn that others have attempted, and thought we could create something that is sweet, open-pollinated, sugary-enhanced and has multiple colors.

**Rachel Hultengren:** Has that been studied before, whether sweet corn that is more colorful has more vitamins that are important to human health?

**Jonathan Spero:** Well, I'm working on a premise. I mean, there are... I read about a program trying to convince people in a certain part of Africa that yellow corn was good to eat. That they believed that

white corn only was good for humans. The yellow corn, of course, has nutrients that protect the eyes. I don't know what some of these are. I'm going to work on the assumption that these are phytonutrients, that in general you're going to get more out of a corn that has more color to it.

**Rachel Hultengren:** Mmmhmm. That's interesting. How did you approach this project with that goal?

**Jonathan Spero:** How did I approach the project? Well, the first year was 2001. And I needed, I wanted a yellow or a yellow and white F1 hybrid sweet corn to use as a parent, and so the first year we didn't do anything with color. I grew a hundred foot row of each of fifteen different F1 hybrids of the time. Came from various sources, mostly from seed companies, and evaluated them for vigor, for productivity without fertilizing – I didn't fertilize at all that year, just to see how they would do – and other characteristics I liked. The taste, of course. And one variety kind of stood out, and that variety is called 'Tuxedo', which is a variety that is being removed from the market as an F1 hybrid. And so we selected that as the initial parent. And so the next year, 2002, that's when I introduced color. I picked up 15 or 16 lines of colored corn of various types – blue corns and Indian corns, corns from the GRIN - that's the government repository - corns from [Seed Savers Exchange](#) had the requirement that they had color. Color, that is, other than whites and yellows. And I grew those 16 rows in a field twice that size, and every other row I grew that 'Tuxedo'. So the 'Tuxedo' was half the field, but was fully dispersed across the field. We detassled all of those colored corns. We took every tassel of every row of everything that wasn't 'Tuxedo', and removed it.

**Rachel Hultengren:** Can you tell our listeners a little bit about the process of detassling and why that's important in corn breeding?

**Jonathan Spero:** Well, detassling is critical and relatively easy and something I like to do. In a lot of plants, separating out the male parts from the female parts is a very exacting, magnifying glass and careful gloves removing anthers from flowers, etc. Corn, the male part is this tassel that's sticking up overhead. The female part is the silks that become the ear. They're physically separated – they're easy. All you need to do is when a corn ear is starting to show its tassel, is you reach in and kind of jerk it vertically up and that pulls the tassel out. And that plant is only female from then on. It will produce ears of corn, as long as there's pollen to pollinate it. But that lets you use the one pollinator, in this case 'Tuxedo', to pollinate fifteen different multi-colored corn.

**Rachel Hultengren:** So through the process of detassling all those multi-colored corn varieties, you were making sure that none of the pollen of those varieties was present in the field, so that any ear of corn that you harvested, from any of those plants, could only have had 'Tuxedo' as the male parent.

**Jonathan Spero:** Yes, that's correct.

**Rachel Hultengren:** So then what did you do?

**Jonathan Spero:** So, okay, the next year... I now have 15 kinds of crossed corn. A multi-colored corn providing the ear, and 'Tuxedo' having provided the pollen. So we grew all this corn out, samples of it. And we picked the one that seemed the most interesting, or, well, in many ways was the best. Once again, we got lucky and had one outstanding choice jump out of these selections. And that was an 'Anasazi' corn; it came out of the [Sandhill Preservation Center](#), and by itself, the 'Anasazi' corn is incredibly varied. It's got big ears and small ears. It's got ears that'll tolerate drought and ears that'll tolerate flooding and big kernels and small kernels. I believe it was created with the intent of people

who wanted there to be some corn to make it regardless of the weather of that year. All that variation, in a way it's made it more difficult but it's created incredible opportunities. There're all kinds of interesting, valuable, exciting corn varieties hiding in those genetics. It's variation creates the possibility of all kinds of different traits to emerge, different corn varieties to be developed from that one cross.

**Rachel Hultengren:** What's the story of the 'Anasazi' corn? Do you know where that came from?

**Jonathan Spero:** Well, I can tell a story of it. It's allegedly very very old corn from 'Anasazi' caves, but I have no way to prove that. But like I said, it came to me from [Sandhill Preservation Center](#), who at least as of 2010 the catalogue in front of me, once again had the variety available, as do I.

**Rachel Hultengren:** So that second year, when you grew out the crosses, the hybrids of 'Tuxedo' and all of these multi-colored corns, what did the field look like? Did you grow all of those plants with all of the seed sort of mixed up, or did you grow plots of them individually?

**Jonathan Spero:** No, those were rows. In that year, since I'm not saving any seeds that year, I did not isolate the individual corn varieties. I merely grew them out. I keep the rows four feet apart, which is enough that I probably get at least 80 percent pollination within the row.

**Rachel Hultengren:** I'm glad you pointed that out, that you weren't planning to save seed from these rows necessarily, you were just growing them out to test them, to look at them and see if they were the combination you wanted to go forward with. Because corn is wind pollinated, it requires more management to prevent unwanted crossing, which can be done either with isolation distance of quite a large distance, or hand pollination. So if you're growing corn in a field for seed, you need to know that no corn is being grown within about a mile of your patch if you want to save seed from it. Is that right?

**Jonathan Spero:** A mile is high. Corn pollen's fairly heavy, and there's also wind direction. So I actually have three fields of corn, they are related corn so the consequence of a tiny amount of crossing is small. But they're only six to eight hundred feet apart with some terrain breaks. And that seems adequate to minimize outcrossing. Now if I had an absolutely prohibited corn 800 feet away, especially if it was upwind, I would worry about it. But it doesn't really need a mile; it's not beet pollen.

**Rachel Hultengren:** So beet pollen is lighter and so it carries further?

**Jonathan Spero:** Beet pollen is lighter. Beet pollen can go three miles easily. Corn, you know, the one growers association rules I read said 660 feet. Once again, terrain matters. 660 feet would be perhaps inadequate if we were out in an open field. But if it's over the hill and through the woods, then that probably is enough.

**Rachel Hultengren:** Mmhmm. Once you had identified the 'Anasazi' by 'Tuxedo' cross as the one that you wanted to continue taking forward, what did you do from that point?

**Jonathan Spero:** Well, that next year I grew only 'Tuxedo', actually that was going to be the 'Tuxedo' F2 that year, because all the 'Tuxedo' in that field was only (pollinated by) 'Tuxedo' because it was the only pollen in the field. So I grew the 'Tuxedo' F2, that is the second generation from the hybrid, and I grew 'Anasazi' corn. And once again I detassled the 'Anasazi' corn, and therefore the seed that was out there was all 'Tuxedo' crossed by 'Anasazi'. It was all, excuse me, 'Anasazi' crossed by 'Tuxedo'.

**Rachel Hultengren:** Yeah, and the way you say that makes a difference. When you're talking about a cross, the female plant is the first one that you say in that cross. So if it's 'Anasazi' by 'Tuxedo', that means that you saved seeds from 'Anasazi' and it was pollinated by 'Tuxedo' as the male parent.

**Jonathan Spero:** That's right. So then I just started growing those seeds out, generation on generation. And I started finding a great deal of variation for sweetness. I also was finding variation in color and type, and I started sorting out different varieties. The original line was this 'Festivity', was to try to keep multi-color. In that case, by rejecting... no, I looked for ears in specific that had the variety of colors within the individual ear. I also developed 'Tuxana', which is an all-white line; since the white is recessive it was the easiest one to stabilize, even though the parents were yellow and multi-colored.

But back to 'Festivity'. 'Festivity' was selected to keep all of the colors of the original 'Anasazi' and get to a larger, consistent and sweeter ear, and a lot of the selection has been about sweetness.

**Rachel Hultengren:** Can you describe the taste-testing process for me?

**Jonathan Spero:** The method we've used mostly on this variety is... You've got rows of corn, usually I grow these in a quarter to a half acre block. And it can be a popular neighborhood event, especially since people who attend can sometimes come home with two or three bushels of corn if they want it. The population is variable, meaning that going down this row of corn, some of the ears are going to be sweeter than others. And we're looking for sweetness. But also, most of these plants have two ears. A plant that is sweet in the secondary ear is probably sweet in the primary ear. So using that, once people have tasted a dozen ears of corn or so, and kind of got a sense of, "Yeah, this is sweeter than that," we'd go down the row, break off the secondary ear, peel it back, take a bite, decide if it's a sweeter one or a less sweet one, and of the sweeter one we'd flag the primary ear and leave that ear to mature.

**Rachel Hultengren:** The fact that corn can have two ears makes the taste-testing process a lot easier, because if corn only had one ear per plant, it would be difficult to both taste that ear to assess whether it's a sweet plant, and also save that seed.

**Jonathan Spero:** It's much more difficult. What people do is clip off the tip and then retie the end back together and hope it doesn't get disease. With one ear, that's about all you can do is go through with the garden loppers, and cut that top inch or so of corn off, have something to taste, and then reclose the ear. It's a lot more work.

**Rachel Hultengren:** Yeah, it sounds like it would be. So you have all these neighbors and friends helping you to taste and then to flag the best plants. How many plants do you take out of that larger field? How many of them will go forward in each of the years you continued working on this project?

**Jonathan Spero:** I was typically looking for something close to 50%. In other words, if we're tasting 2,000 ears, we'd want to end up with at least 600 flagged and as many as 1,000 flagged.

**Rachel Hultengren:** When you were doing the taste-testing, were you also assessing for color at that point?

**Jonathan Spero:** No. Well, somewhat. I mean, if you peel back an ear, and it was... it had no color, it was yellow, say, that was a rejection automatically in the 'Festivity' line because I wanted multi-color. So yes, in that we're rejecting all yellow ears, and ears that were really pretty might get counted in even if they weren't quite sweet enough, so there was a little room to play there.

**Rachel Hultengren:** So you said you were aiming to have at least 600 plants every year that were coming out of the field as selections, and corn plants, because they are a cross-pollinating plant, you need a certain number of corn plants, both to assure adequate pollination and to have adequate population size for variety maintenance.

**Jonathan Spero:** A population of 300 is considered adequate. A population of 250 is probably adequate to maintain that genetic diversity. It is interesting to note that with an open-pollinated variety, you're trying to narrow traits somewhat but not narrow the genetics to where you're getting inbreeding depression. SO you do need to keep up that population of probably 250 or 300 plants.

**Rachel Hultengren:** What does inbreeding depression look like in corn?

**Jonathan Spero:** Oh, corn will drop pretty fast. I mean, if you're selfing you'll see it, or if you just keep a very small population, the next year the plants will not be quite as big, they will not be quite as vigorous. In the first year, you don't notice it too much, but the productivity declines, the height of the corn declines, the size of the ear declines. Corn needs the vigor of outcrossing, and it needs a sufficient population that are not all clones.

**Rachel Hultengren:** You've described the taste-testing process for us, and the process of looking for color on the ears. What were some other traits you were looking for while you developed 'Festivity', and how did you evaluate those?

**Jonathan Spero:** Well, I worked on different traits in different years. For example, this year, 2019, one of the traits I've been breeding for is cold soil tolerance, or the ability to emerge when planted in cold soil or early. And so to do that, I've planted about 5 days earlier each generation. I originally was planting about May 20<sup>th</sup>. This year I got back to about April 20<sup>th</sup>. Only about 25% of the stand came up, so that selection was actually useful. I also plant really thick, which allowed me to still have some type of a stand even though I only got about 25% germination in the cold.

That's another selection method. Seedling vigor is critical, especially for organic, especially for trying to grow without fungicides and all that stuff. So I plant thick. I plant, on average, one seed per inch, sometimes even closer. By putting in a dozen kernels per foot, and then doing about four selective thinnings, gradually taking out the weakest plants, I'm able to select for plant vigor. As far as color and appearance, most of that is actually done on the mature dry ear. You can't see as well at milk stage, and besides if you peel back an ear that you're going to be saving for seed, at milk stage you're damaging it. So color I pick out, you know, of the dried ears after they're shucked and dried.

**Rachel Hultengren:** So having really vibrant color at the mature stage, which is beyond the point at which the sweet corn would be picked for eating, but having that vibrant color later - that's highly correlated with having color at the eating stage?

**Jonathan Spero:** That is, once again, the assumption. And there is a little bit of a conflict here, because the color appears as the kernels mature. Sweetness declines as the kernels mature. And people want their corn sweet. It's difficult to find ears that turn color before they start to lose their sweetness.

**Rachel Hultengren:** So it's a fine line of exactly when 'Festivity' would be best to pick and eat if you want it to be both interestingly colored and sweet.

**Jonathan Spero:** Right. You've pretty much got to harvest corn when it's at that milk stage, when it's at its peak sugar eating stage. I mean, certainly you can eat overripe corn, but it's not going to sell at the market. But I've found that these ears that have considerable color at maturity tend to have blushes of color at the eating stage, and that's what 'Festivity' is.

**Rachel Hultengren:** Does that color hold up well to cooking, or are there cooking methods that retain that color more than others?

**Jonathan Spero:** Most of these colors do. It has more to do with the colors and their basis... well, the cooking methods certainly has an effect. If you roast your corn, you're not going to lose any color. But the blue and the yellow color are mostly down in the kernel, they're in the aleurone, they're underneath the pericarp, the skin. And therefore they will hold up in cooking. Some of the reds are in the pericarp, they're in the outside. If you take a red corn and put it in boiling water, frequently when you take it out you'll have kind of a grayish corn and very red water, because you lose your color into the water. But most of the yellow color in sweet corn, blue color in sweet corn, and some of the red purple color in sweet corn is down in the kernel, therefore boiling it doesn't hurt – doesn't lose you anything.

**Rachel Hultengren:** I see. So the different color compounds hold up differently, and that's at least in part due to where they're located in the kernel. And you recently released 'Festivity', this year or last year?

**Jonathan Spero:** I grew 'Festivity' in 2019, this year. And I grew about half an acre of the field. This was remnant select seed – we'd done ear-to-row selection, which is a somewhat faster way than merely picking the sweetest ears.

**Rachel Hultengren:** Can you describe ear-to-row selection for our listeners?

**Jonathan Spero:** Yes. I have what I grew this year selected out. So in this case, I picked 300 of the nicest looking ears, from the previous generation. And instead of just shelling them into one big basket, I shell them into 300 individual bags. So I now have 300 choices, and they're separate from each other. So now I take my bags and I lay out the field – and I use a grid of four by ten. So grow a ten foot section of row of each of those 300 ears. I give them a number, I give the row the bag a number and I give the row the same number. So I have number 47 here, I have not just one plant, but ten feet of plants. We grow up those stands, we evaluate those individual mini-rows, those ten foot blocks from one parent as a unit. And we taste-test and look at productivity and size and vigor, and in these cases we look quite a bit more because we have a dozen plants to evaluate as a cluster. Of those 300, I pick usually the 100 best, and then we go back to the remnant seed. Remember, we have... each of these 300 plants is in one bag. So now we've picked the 100 we like best – we know the numbers 47 and 62, etc. are the ones we liked. We go back and take only those bags out, mix those seeds. That's called remnant select seed – that's the leftover seeds from the ones we chose. And we plant that for the next generation.

The advantage of doing ear-to-row selection over just taking the best ones and saving the seed, is that your very nice plant may have been pollinated by something that wasn't so good, and therefore you haven't gained very much. Whereas if you can choose only the best plants and then go back and only grow the best plants, then you've eliminated your weakest pollen. You're going to make a little fast progress towards sweeter, more vigorous, etcetera.

**Rachel Hultengren:** Right. So when you went out in the field and picked those 100 plots that were the best of the 300 plots, if you had pulled ears off of the best plots, when you went out there, it could have been the case that they had been pollinated by some of the ones you didn't pick, and so you would have some of that genetic material in your population still, in the next generation. So you were able to eliminate that possibility by going back to the seed that was left over from your planting that spring.

**Jonathan Spero:** Yes.

**Rachel Hultengren:** Yeah, that can be a really powerful way to make more progress more quickly in a breeding project.

**Jonathan Spero:** (The) process is slow. I mean, we've worked with sweetness year after year after year, and you gain but you gain slowly. And I think we gain faster with the ear-to-row selection. And in 'Festivity', we've done two such cycles, and I just prepared... we've just picked out 300 ears from what we harvested in 2019, and have individually bagged them for a future ear-to-row grow out.

**Rachel Hultengren:** So even though this is a variety that you're offering through your seed company, it's a project that is ongoing - you're continuing to select it.

**Jonathan Spero:** That's correct, especially with 'Festivity'. 'Festivity', trying to keep all that variability from the 'Anasazi' in color and etc, it's pretty diverse and it's going to be an ongoing process to continue to improve and refine. So yes, I am selling seed, but I am also trying to select and improve the seed each year.

**Rachel Hultengren:** And now that you've released it, you've pledged 'Festivity' as an open-source variety. What does that mean to you?

**Jonathan Spero:** What does that mean? Well, I didn't invent corn. Food really should be available. The concept of patents on a seed, to me restricts the possibility of people producing food. Once again, I have to emphasize – I've crossed some corn and I've selected some corn. I didn't create corn; that's based on a thousand generations before me. I've made some small tweaks; I don't see that making it intellectual property is reasonable, or that intellectual property rights should exist on this ear of corn. The food source really should not be restricted in that way.

**Rachel Hultengren:** How long have you been thinking about intellectual property rights as they apply to plants, and what was the evolution, if there was an evolution, to your thinking about intellectual property rights?

**Jonathan Spero:** I don't think I've ever really believed that genetics is something to which there's a right of ownership. And so I've worked with public domain varieties. Public domain varieties are varieties that have not had intellectual property restrictions placed on them. I was drawn to the open-source concept because a) it brings that out. It says to the world, "This isn't owned property, this is common heritage of mankind." And it also includes this virality concept, meaning that if you take my corn, and you want to select it, improve it, cross it, make it more useful to whatever you're trying to do, you're absolutely free to do that. But that you can't do that and then turn around, take my work, make a tweak in it and patent it and lock other people out of that corn. So the open-source, to me, is very valuable to keeping food in the public domain.

I, you know, believe that some rights to compensation are valuable, some rights that do not restrict others from growing the seed, using the seed, using the seed to take the next step. Once again, my corn crosses are, in my opinion, an improvement, but they're one step in thousands of years of corn breeding. And so, intellectual property rights should be limited in such that I can't lock that past work up.

**Rachel Hultengren:** In a previous episode, Dr. Goldman made the point that just because a variety is pledged as open-source does not mean that the breeder can't receive remuneration for it. It's freed seed, not free seed. And I wondered, have you received any financial compensation for developing 'Festivity'?

**Jonathan Spero:** Well, I received this just last week, this has to do with 'Tuxana', a related variety, and this is the Snake River Seed Cooperative in Idaho. And they sent me a very nice letter, saying they'd been growing the 'Tuxana' corn for several years and they like it for several reasons, and they sent me a check for 5% of the value of the corn that they have sold, though they grew the corn. I've never even heard of these folks. This is a voluntary royalty sent out by somebody using the corn, seeing that it's open-source, and seeing that there was some value in breeding it and being kind enough to want to repay that.

**Rachel Hultengren:** So one way of receiving remuneration for developing a variety would be these royalties that you've just described. Another would be if you were to sell seeds of that variety yourself from your seed company, you could use some of the funds that you got from those seed sales to fund your projects on your farm. Are there other ways that independent breeders can receive compensation for developing varieties?

**Jonathan Spero:** Well, there are grants available, at least sometimes. The Organic Farming Research Foundation helped fund the process of developing 'Festivity', between 2011 and 2014. They reimbursed me for some of those costs of that ear-to-row grow, and some of the taste selections. So grant funding is a possibility. The federal government now has more grant funding tied to organic than they did in the past. So I would say that grants are probably a major source.

Voluntary royalties are potentially a valuable source, if your variety gets enough popularity to sell enough quantity that a few percent, in this case a 5% royalty starts to add up to a significant amount. Once again, that takes selling more corn, more people... more success as the plant breeder in developing something that people want to buy.

**Rachel Hultengren:** What would it take for independent plant breeders to make more money on the varieties they develop?

**Jonathan Spero:** Well, one almost has to figure out how to fund that development. The problem is that, you know, the 'Festivity' I've been working on for most of two decades every other year. So there's 8 or 10 years of work in there, and there's no real return in that time. So that either depends on something like grant funding, or on essentially making it a hobby. And to be honest at this point I'm cutting back some. I have developed the last 4 or 5 generations at my own expense, and I do not sell enough to cover the expense of what I'm creating, so I have to consider, on some level, it's a hobby. I know that that's not a great answer for someone trying to make a living.



The next ear-to-row on the 'Festivity' is going to wait until somebody wants to finance it, to be honest. I have grown that remnant select seed, I have selected 300, I have bagged them separately, and put it away. And ear-to-row grow is a fair-sized project, it's done on about four tenths of an acre, it takes a bit of time. And it will be waiting for somebody who wants to create additional funding. Or improvement will. Meanwhile, I have seed to sell of what I have, which I think is pretty good.

**Rachel Hultengren:** If it's a hobby that you're doing because you love it, not because you're making a lot of money on it, what do you love about it?

**Jonathan Spero:** Well, I like working in the ground. I like the selection of making better food. I find that one way that somebody working in a small farm situation can make a difference is in improving or developing varieties, so that there is better corn out there. So that the corn doesn't need fungicide to keep it from rotting. Or whatever traits. So I enjoy working in selecting and picking. I am attempting to make a living at this, I just can't say I've done really well at it. So what do I love about it? I love that this 'Festivity' corn is better corn than anything that I had a decade ago. So I think these are valuable contributions to the food security and food supply.

**Rachel Hultengren:** Thanks for doing that work.

**Jonathan Spero:** I enjoy it.

**Rachel Hultengren:** Do you have any advice for someone wanting to breed sweet corn?

**Jonathan Spero:** Breeding sweet corn is fairly easy. I have found that the possibilities are there. You can take a hybrid and stabilize it, that is grow it out enough generations that it becomes reasonably uniform. You can make crosses, like the 'Anasazi' 'Tuxedo' cross is a fairly wide cross, it's produced a lot of corn. It doesn't... I mean, it takes a little bit of space, but doesn't take huge amounts. When you've got a wide cross you don't need the big populations. And it's easy to do, you don't have to worry about emasculating flowers, etc. You can control the pollen by detassling, so I find corn an easy crop to deal with. It's also nice that the seed is the crop, so you save a year. If I grow a broccoli, or whatever, I've got to grow it out the next year to find out how I did I do? What's the quality of the offspring? Whereas with corn, the offspring is the ear of corn that year. So you see the colors, for example, immediately.

I just think, once again, corn is not a difficult crop to work with. It might be a difficult crop to stabilize, we've selected for sweetness several years now, and we're gaining, but it's not a difficult crop to work with. And you can eat your mistakes.

**Rachel Hultengren:** That is really nice. Are there any books or videos or other materials that you would recommend for anyone wanting to start a vegetable breeding project?

**Jonathan Spero:** Um, sure. I'd make some recommendations. Two books that I have relied on a great deal – the first is Dr. Carol Deppe, who you have introduced, and her 'Breed Your Own Vegetable Varieties'. That's the book I would credit with teaching me the how of basic breeding. The other reference I use a great deal, especially for quick questions, you know, "Will garlic cross with onions?", etc, is a book called "Seed to Seed", by Suzanne Ashworth. It's got a tremendous amount of that type of information, concise and easy to find. That's two books I would recommend.

The [Seed Savers Exchange](#) yearbook I like to use a great deal, because I look through it and find out some of the more unique material that's out there. And so by looking through the 80 kinds of corn,

looking for corn that might have such-and-such a trait, it also, of course, allows me to buy and get some of those seeds to trial.

**Rachel Hultengren:** Is that primarily where you find new varieties to include in breeding projects or trialing?

**Jonathan Spero:** Once you start breeding with something, you're not looking for new material too often, for too long. When I was selecting all these corn varieties to trial, and before choosing the 'Anasazi' 'Tuxedo' cross, yes I used the [\(Seed Savers\) Exchange](#) yearbook a great deal. I looked through seed catalogues. I also used the GRIN – the government repository for seeds, which has a lot of unique older seed types.

**Rachel Hultengren:** Is there anything I haven't asked you about 'Festivity', or breeding sweet corn, or intellectual property rights that you'd like to share with our listeners?

**Jonathan Spero:** Corn's got its challenges each year. One year's dry and one year's wet and one's year's cold. But multiple years of continued selection, I think, it gives you a robust variety. It gives you... corn that's gone through some different challenges is going to hopefully have different strengths.

**Rachel Hultengren:** What would you say was the greatest challenge in developing 'Festivity'?

**Jonathan Spero:** The greatest challenge has been trying to get consistent sweetness. Sweet corn has gotten sweeter over the last 50 years, such that what was considered sweet in our younger days – or my younger days – is not sweet enough now. And since this cross included this much variation, selecting for sweetness has been the biggest challenge, and something we've worked on year after year.

**Rachel Hultengren:** When you're doing those taste tests, with different people in the field, what do you use as the standards that everybody tastes before they go out to do the evaluations? Do you use extremely sweet sweet corn?

**Jonathan Spero:** Well, here's how – no, I don't use a different corn. It's relative sweetness. So what I'll typically do, is I'll have three people on two rows. And the first ten or twelve plants, you break off the secondary ears and all three people taste them until they're getting some agreement on what's sweeter and what's less sweet. Then, because there's thousands of ears to do, you can't have three people tasting every ear, one person goes down each row, making those choices. And once you've tasted ten or twenty, you can pretty quick say, "Yeah that's sweet, or that's not sweet." But with the third person, if it's indeterminate, or sometimes your taste buds start to get tired, the third person would be the kind of decider in between for both rows. So a person can just march down the rows, breaking off an ear of corn, taking a bite, and most the time either flagging it or not flagging it and go on.

**Rachel Hultengren:** Mmmhmm. How many ears of corn can someone taste before their taste buds get tired?

**Jonathan Spero:** (Laughs) That's a good question. Um, if you can convince them at the beginning not to take big bites, and not to "Oh, sweet corn!" chomp it down, typically about 250. We're doing about two and a half hours of corn tasting, and in that time, a person can taste about 250 ears. Now, that's a lot, but to get the populations up, you need to keep tasting. You've got to convince people right from the beginning, you just take a little bite, and probably even spit it out. Because a couple of hundred ears

later, you've had enough corn, it's true. Only some people are hard core enough to want to come back, day after day. Other people are saying, "No, I've had my corn for the year."

**Rachel Hultengren:** That is a lot of corn.

Thanks again, Jonathan, for talking with me about 'Festivity'. It sounds like a really interesting project, and I'm really glad that we were able to talk about sweet corn today.

**Jonathan Spero:** I've enjoyed it – my pleasure.

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**Rachel Hultengren:** I've been speaking today with Jonathan Spero of Lupine Knoll Farm about 'Festivity' sweet corn. You can purchase seed of 'Festivity' from [Siskiyou Seeds](#) (that's S-I-S-K-I-Y-O-U) or [Restoration Seeds](#), or you can email Jonathan through his website at <http://www.lupineknollfarm.com/>.

A full transcript for this episode is available on our show-notes, along with photos of 'Festivity', and those show-notes are on the Open Source Seed Initiative's website at [www.osseeds.org](http://www.osseeds.org). We'll also have links to the books that Jonathan recommended.

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!