



SEEDHEADS TRANSCRIPT

Episode 3: ANNIE RICHARD English

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Hugo Martorell

Hi and welcome to SeedHeads, the cross-pollinating podcast where our Canadian seed heroes tell their stories, share their how-to tips, and talk about the seeds they love. I'm your host, Hugo Martorell, coming to you from Tiohtá:ke-Montréal, on the traditional unceded territories of the Kanien'keha:ka nations. Today, we are talking with Annie Richard. Annie is a seed producer and co-owner with Kathy Rothermel of Kitchen Table Seed House, a seed company based on Wolfe Island near Kingston in Ontario.

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Hugo Martorell

I chose Annie for this episode because she is an energetic young grower working passionately to preserve seeds. I was delighted to hear her talk about her cucurbit breeding projects and her collaboration with other growers in her regions, as well as with the Plant Breeding Department at Cornell University.

How are you today Annie?

Annie Richard

I'm good and you?

Hugo Martorell

I'm good. Today, we are going to talk about cucurbits, right?

Annie Richard

Yes, that's right.

Hugo Martorell

Okay. Before we start talking about our shared passion for seeds and cucurbits, do you want to tell us a bit more about yourself and Kitchen Table Seed House?

Annie Richard

Sure. Kitchen Table Seed House is a seed company composed of two people, me and Kathy Rothermel. We are based on Wolfe Island near Kingston Ontario and have been running the company for four years. We offer close to 130 varieties of vegetables, flowers and herbs. Our seeds are certified organic. I think right now we are growing about 50 to 70% of our seeds ourselves and we buy the rest from local organic seed companies. The farm has 25 acres, and 3 acres are farmed.

We are using about one and a half acre for seeds and another one and a half acre for green fertilizers. Our focus at Kitchen Table is environmentally adapting varieties that still have genetic diversity. We work so they become better adapted to our regional climate and our short growing seasons. And of course, as the podcast says, we do plant breeding to improve existing varieties as well as to create new varieties of vegetables adapted to our climate but also our organic growing conditions, and that also taste great, which is important.

Hugo Martorell

Your region is the South-East of Ontario, and you're on an island, so what are the conditions like? What is the micro-climate?

Annie Richard

The micro-climate is..., yes, I would say we have one. In the Eastern part of Ontario, we have a milder climate than in the rest of Ontario. We have more wind since we're surrounded by water, and it's generally a little hotter, for a little longer than in the surrounding regions, like maybe a week, something like that, before the first frost.

Hugo Martorell

What is the date of the last frost in the spring and the first frost in the fall?

Annie Richard

Well, of course, it changes every year now, but in general, I would say the long weekend in May, so around May 25th, and usually maybe around October 25th in the Fall.

Hugo Martorell

As a company, Kitchen Table Seed House is also involved in a project called SeedWorks. Am I right?

Annie Richard

Yes. SeedWorks is a plant breeding collective composed of 6 seed producers based in Ontario, in the East and the South. There is no one from the North right now. We're seed producers and growers, and 4 of us own seed companies in Ontario. There is Rebecca Ivanoff, Kim Delaney from Hawthorn Farm Organic Seeds, Greta Kryger from Greta's Organic Seeds, Frank Misek, and Kathy Rothermel and me from Kitchen Table Seed House. We have all been friends a long time and we had a growing interest in plant breeding. So, we got together to work on the Bell Pepper project, which is known as the Southern Ontario Pepper Project. We wanted to create a variety of Bell Pepper with a blockier or more square shape, that would also mature faster than the other varieties on the market.

So, we got together to start this project because we wanted a variety with a lot more genetic diversity that could adapt to various growing conditions, in Ontario and in the North-East in general. I think this project is in its fourth or fifth year, and if all goes well, we hope to introduce our populations on the market this winter.

Hugo Martorell

That's good news.

Annie Richard

Yes, it's exciting.

Hugo Martorell

Today, we are going to talk about your breeding projects. You mentioned the pepper project that was the instigator of this seed producer collective. But

you are also interested in another family that you mentioned earlier, and that is the cucurbit family. Can you give me an idea of the crops or types of cucurbits that you are going to talk about today?

Annie Richard

Yes. I can talk briefly about the cucumber project I am starting this year, as well as a summer squash project and a winter squash project.

Hugo Martorell

Which one do you feel like talking about first?

Annie Richard

Let's start with the cucumbers. I crossed a variety of cucumber that offers some resistance to Downy Mildew with other cucumber varieties of the same species that are not resistant. It's not a new variety per say. It's more an improvement on existing varieties, and if all goes well, I hope to keep the integrity of varieties that are already popular and that many gardeners already grow, but with the added bonus of Downy Mildew resistance so growers can harvest longer.

Hugo Martorell

Are you working with hybrids or open-pollinated lines?

Annie Richard

OPs, yes.

Hugo Martorell

You mentioned one was disease resistant and the other was a popular cultivated variety. Can you tell us why it's popular?

Annie Richard

It produces a lot of cucumbers. [laughs]

Hugo Martorell

A good yield, yes.

Annie Richard

Yes. And it's unique also. It's a white cucumber. A white cucumber that tastes very good.

Hugo Martorell

It's some kind of speciality cucumber, is that it?

Annie Richard

Yes, we could say that.

Hugo Martorell

We could say that.

Annie Richard

Yes. [laughs]

Hugo Martorell

So, you did your crosses and next year you will have your F1.

Annie Richard

That's it, yes, my F1. I have 2 or 3 crosses right now, so that would make 2 or 3 lines, i.e. 2 or 3 projects in the field next year, depending. I will probably choose one to grow myself at Kitchen Table. The other 2 might be offered to the other members of SeedWorks if they wish to work with them.

Hugo Martorell

What can you tell me about the traits that you look for in a cucumber? When we buy cucumbers at the grocery store, it can be disappointing sometimes, because they are not very juicy or crunchy. What do growers or consumers look for in terms of quality?

Annie Richard

The type I work with, like this one, are field cucumbers. It's important for these varieties to taste good, but it should also be important that the seeds in the fruit not be too mature or too big when we want to eat the cucumbers. The skin also tends to be thicker, but it's always better if we can make it thinner.

It's really about eating qualities. And when growing them in the field, ideally, the plants have to be resistant to several diseases and should produce lots of fruits, so lots of female flowers.

Hugo Martorell

Cool. Here is my last question regarding cucumbers: How did you come to find the two open-pollinated varieties you chose? Did some people recommend them? Was it based on your experience in the field? How did you come to identify the potential parents?

Annie Richard

I chose the parents and the cucumber varieties for my project based on experience. They are varieties that I grow in the field. I made my own observations. I also think a lot of growers and gardeners grow these varieties.

Hugo Martorell

Do you found varieties that are almost what you are looking for in today's seeds catalogues?

Annie Richard

No, and that is why I started the project, because the varieties that are popular are not resistant to downy mildew. So, I don't think I could find any like these on the market right now.

Hugo Martorell

Okay. In the seed catalogues, sometimes, the strains and the types of viruses are indicated. We see a coded virus sequence. Downy mildew is a common disease in cucumbers, right?

Annie Richard

Yes, absolutely. It's a disease that is a bit harder to detect than powdery mildew. It's a common disease in our region and it leads to the plant dying too early. I also knew in addition that the popular varieties I wanted to use for my crosses are not resistant to many diseases, because I spoke with their breeder and he gave me some information. I think that's it for cucumbers.

Hugo Martorell

Okay, thanks. So, let's talk about squash. Did you mention two summer squash or are you working on one summer squash and one winter squash?

Annie Richard

A fall squash and a summer squash.

Hugo Martorell

Which one do you want to start with?

Annie Richard

Let's talk about the fall squash. At Kitchen Table, we have a variety of fall squash called *Candystick Dessert Delicata*. We think it's a Delicata that surpasses all the other Delicatas, because the taste is just so great! It's sweeter than the others Delicata. The colour of the fruit is also more orange when it's ripe. So, great taste, but it's very sensitive to powdery mildew, among other diseases. I wanted to make a cross with another variety that would be a bit more disease resistant, specially for powdery mildew.

I made a cross with a variety called Cornell Bush Delicata. The Cornell Bush Delicata is a fall squash of the same species, but it doesn't produce long vines and is a bit bushier. It works better for growers who pull out weeds using machinery. It's also very resistant to powdery mildew, among other diseases. I did a cross of those two varieties this year. It's my second year, as I also did it last year, but the dog on the farm chewed up all the fruits and that, is another story.

Hugo Martorell

How terrible.

Annie Richard

[Laughs] Terrible! I did it again this year and I made other crosses that seem... well, it looks like it's a success and it's going to work. This fall, I will harvest the squash and save the seeds. My plan for next year is to sow about 100-120 plants in the field. I will do a selection taking out the plants that don't seem to be bushy. That can be done early, before the flowers start to open. I can remove the plants that produce long vines. I will leave the other plants there for the rest of the summer. At the end of summer or beginning of fall, I will walk the field and make notes about the percentage of powdery mildew I see on the plants. Some plants will be completely dead, some plants will be half dead and some I think will still have lots of green. I will make notes and observations about the plants, and I will also keep track of the number of fruits produced by each plant. For that first year, I will only keep the 50% that produces more.

The year after that, I will do the same. The third year, I will start tasting the fruits. I think I will then have very productive plants, that will also be bushy.

So, at that point, I will be able to only keep the fruits that taste good. I will continue like this until I see that the population is relatively stable, that most of the plants are bushy, that they are productive, and that the fruits taste good, like sugar cane.

Maybe that will be the time to introduce it on the market. My goal with this project is not to produce a variety that will be consistent genetically. It's more that I want a population that will keep a certain diversity so it can adapt to various regions, to different farms in the area and to the changing conditions from one year to the next. It's a way of improving the population slightly every year instead of doing surfing and really diminishing the genetic diversity.

Hugo Martorell

If I understand this right, you will do some roguing, you will do a negative selection the first few years, well the first three years, and then you will start tasting the squash.

Annie Richard

Yes.

Hugo Martorell

You will then self-pollinate the plants to stabilise them genetically. That's correct?

Annie Richard

I could stabilise and maybe I will, but right now, I have no intention to do so. Maybe I could do both. I also want to make the population available to others on the market. I want to maintain a genetically diverse population, and then, maybe, I could produce a very stable population.

Hugo Martorell

Before we talk about zucchinis, I was wondering what kind of isolation distances is required for Delicata squashes and cucumbers. The vines take up a lot of space in the field. It seems to me it's easy to lose control, for the vines to take over. Can you talk about the challenges in terms of isolation and plot sizes?

Annie Richard

Yes. As it is, we are growing fall squashes for seeds for Kitchen Table. We can't leave a variety of the same specie to get pollinated by bees at the same time in the same field. We don't have that privilege. We are limited on a farm to produce our seeds, grow our plants and do our breeding projects. Fortunately, we have another small plot on another farm on the island where we can grow cucurbits in isolation. That is one way we do it.

Another way is to hand pollinate. We do that often when growing plants for seeds for Kitchen Table if we need to let our breeding population go, or the other way around. It depends on the year and on where the project is at. There is also a growing farm just north of Kingston that grow fall squash, but not of the pepo specie. It's an opportunity to grow our population of seeds, which means that we can do more on our farm.

Hugo Martorell

It would then be a *pepo* in a field of *moschata*, is that right?

Annie Richard

That's right.

Hugo Martorell

[crosstalk] [laughs]. Do you want to talk a bit about the zucchini project? Are you working on a cucurbit *pepo*?

Annie Richard

Yes, I am. The goal of the project is to improve the Costata Romanesco variety – it is a very popular variety. It is one of the varieties that has some flavour [laughs], that tastes good. However, it is very sensitive to several diseases and particularly to powdery mildew. I wanted to cross a Costata Romanesco with a Spineless Perfection, which is a hybrid that is very resistant to several diseases, including powdery mildew. It's also a variety that does not have any thorns on it's stems, which makes harvesting less painful and more fun.

I crossed these two varieties, Costata Romanesco and Spineless Perfection, several years ago. I did the cross one year and the year after that, I made the first selections. I did so by looking at the fruits. I selected the ones that self pollinated the most, the fruits that look more like the Costata Romanesco and the plants that looked more vigorous. At the same time, I was able to send some pieces of the first squash leaves by mail in a specific container to the

lab at Cornell. They have a technology for genetic markers, a machine that can identify markers.

For example, we were looking for the marker that indicated resistance to powdery mildew. The machine can identify if the genes have that marker. We sent our material and got the results by email. It was a bit strange. I had about 100 plants that year and only a few had the marker. They had a partial or mixed resistance. Not one plant had a full resistance. We thought it was a bit weird. Michael Mazourek, the plant breeder at Cornell, thought something had gone wrong somewhere along the way. So, I could not make selections with that material that year.

If it had worked, it would have indicated which plant in the field was resistant to powdery mildew. It would have given me the information before the plant had the disease, but also before the plant had finished producing female flowers. That would have been great, because with that information, I could have marked the plants that were resistant. I would have known exactly which plants to self pollinate a few weeks or a few months later.

That project was around the time we started SeedWorks. I found out at that time that Kim was also working on a summer squash project. She had the same idea in mind, to improve the Costata Romanesco. She made a cross with a different variety than the Spineless Perfection. I think it was called Mutable. It was an open-pollinated variety that was resistant to several diseases, including powdery mildew, and it had less thorn on its stems.

It was essentially the same project. She also had the opportunity to send some plant material at Cornell to identify the markers. She got better results and so she pursued her project because we do collaborative projects. We decided to shelve the Costata and Spineless Perfection cross for now, to avoid duplicating our efforts. [laughs].

Hugo Martorell

You mentioned the need for hand pollination several times. I think Bob did an episode on that subject for our podcast. Could you tell us just a bit about your experience? When did you learn how? How are you better at doing crosses today than before?

Annie Richard

I learned how to do hand pollination when I was working at Cornell. You need to know which plant to pollinate of course and for what purpose. There are two methods for the squash family. There is hand pollination where you take pollen from the male flower to pollinate the female flower on the same plant. And there is when you cross plants, taking pollen from the male flowers of one plant to cross it with the female flowers of another plant. It will vary slightly depending which method we use. If we do hand pollination, it's more direct, so we can choose the plant we want.

Depending on our project, it usually means we choose a plant that has good vigour and traits we're looking for. In the afternoon, towards the end of the day, I will go "close" the male flower, as we say, even though the male flower is not yet open. I know a male flower will open the next day, so I put a small piece of tape on the flower so it doesn't open the next morning before I can get there. This prevents the bees from getting in the flower. I do the same on a female flower of the same plant.

I then come back the next morning to open the male flower and pollinate the female flower. I then used the tags to close the flowers, I put them together and I place them around the neck of the female flower. I cover the female flower I just pollinated with flowers from the same plant or a brown-paper bag. That's it.

Hugo Martorell

Yes. Are the days to maturity an important factor for your various breeding projects?

Annie Richard

Yes, absolutely, because in the North-East, everywhere in Canada I would say, we work with relatively short growing seasons. I always try to have early maturing variety. Even earlier on Wolfe Island, because the weather is changing more and more. We never know if we have an early or late frost. The longer a plant is outside, the more it's exposed to diseases and bad weather. It's always a goal to make selections for plants that produce early maturing fruits.

Hugo Martorell

Do you have any advice or recommendations for people who would be interested in saving seeds from cucurbits or doing some breeding or multiplying work?

Annie Richard

If someone wants to start doing breeding work, I recommend starting with squash. It doesn't matter if it's summer squashes or fall squashes. Cucurbits, especially squash, have big flowers, so it's easier to learn and have some success than with melons or cucumbers. Even though the process is the same, it's a bit more difficult with these two since the flowers are smaller. So, I would recommend starting with some squash.

Hugo Martorell

Very good. Are there any tips you haven't mentioned and would like to share with us?

Annie Richard

Yes. A small tip that makes things easier is the way I close the flowers. I work with small twist ties of different colours. I use a specific colour for the first week I start doing the hand pollination. So, when it's time to harvest the seeds, I look at my calendar and I know I will start harvesting the plants with, for example, the yellow twist ties. I make sure to only harvest the yellow ones, since they are the only ones whose seeds are mature.

It's a way to keep track of what is going on in the field, of what is ready and not ready. It's hard to know if the seeds in the fruit are ready. We can't really tell. We have to give it time. Another tip is that I have lots of small flags in various colours. They are very helpful. It could also be sticks with one end painted a specific colour. I create a legend, matching a specific colour with a specific trait.

For example, if I want to know which plants will produce female flowers first, I will assign a specific colour to that trait, let's say red. I will then place the flag or the coloured stick in the field next to the plants that have that trait. Doing this with different colours of flags or sticks allows me to easily identify which plant has which traits.

If I have projects where I am looking for several traits, I do my selection with all the plants that have flags or sticks next to them. It makes the selection

process easier. With my Delicata project, for the Candystick Delicata, I will let the insects take care of the pollination and I will do my observations at the end of the year. For example, I want to identify the plants that produce the more fruits to save fruits from only 50% of the most productive plants.

One way to proceed is to wait until the end of the year when several plants are dead, or almost dead. I can easily see the fruits. I walk the field and harvest all the fruits from one plant and I then place them near the stem in the middle of the plant. I do that for all the plants. Then, I can come with my computer or my notebook and write the exact number of fruits per plant.

It's easier to not make mistakes this way, because when the stems are everywhere, it's easy to make a mistake. You don't always know to which plant the fruits belong. It's a way to get organized to have more accurate numbers.

Hugo Martorell

If I want to get interested in plant breeding, can you tell me where I could get seeds or diverse genetic material?

Annie Richard

Yes. One way is to do a variety search. Seed companies are offering more and more varieties on the market described as *grec* varieties. That means for example varieties that have been crossed with several parents, so they are genetically diverse. It's a good place to start, because as soon as you plant a *grec* population, you will immediately have lots of diversity. You can start doing your selection or breeding that way.

There is also something you can do with hybrids. You can save the seeds from hybrids and do a selection for open pollination of various traits. You can also ask plant breeding collectives like SeedWorks if they have material they are not using anymore or would like to share. I would also suggest attending workshops on organic farming. There are more and more workshops on plant breeding. It's a good way to meet other people, other breeders. Even breeders that work in different universities in the United States. They will be able to point you in the right direction or even share some material with you.

Hugo Martorell

What is your inspiration for the work you do, or some breeders that you admire or look up to?

Annie Richard

First, there is Michael Mazourek at Cornell University. He has helped me a lot with my breeding and continues to do so, and he shares his time to help me. There is also Carole Deppe who helps me with my squash breeding projects. She also shares a lot of her time and resources with us. It's wonderful. I admire her breeding thread. It really focuses on flavour and resilience. These two people really help me a lot. I admire them very much.

Hugo Martorell

I think the OSSI podcast features an episode with Carole Deppe where she talks about her Costada zucchini project, where she is doing her selections so the zucchinis can be eaten fresh or dried.

Annie Richard

Yes.

Hugo Martorell

Thanks Annie. Have a good night and I have to say, I'm touched and grateful that you took the time to talk with me in French about projects that you care about.

Annie Richard

Thank you Hugo. And thank you for your patience with my French. [laughs]

Hugo Martorell

It was excellent.

Annie Richard

Okay. Talk to you soon.

Hugo Martorell

Good night.

Annie Richard

Bye bye.

Hugo Martorell

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