

Mark Schapiro, Berkeley Book Chats, October 23, 2019

Timothy Hampton: Welcome to Berkeley Book Chats. I'm Timothy Hampton, director of the Townsend Center for the Humanities.

Berkeley Book Chats showcase a Berkeley faculty member engaged in a public conversation about a recently completed work. This popular series highlights the richness of Berkeley's academic community.

Today's conversation features Mark Schapiro of the Graduate School of Journalism discussing his book, *Seeds of Resistance: The Fight to Save Our Food Supply*.

He is joined by Deirdre English also of the Graduate School of Journalism.

Deirdre English: Thank you very much, and I'm delighted to be here. I love this book, and I think it's a really important and skillfully written book. I'm very mindful that we're here at the Townsend Center for the Humanities. This is not really a book in the humanities, this is a book in science journalism, which is Mark's field. Mark teaches environmental journalism at the Graduate School of Journalism where I also teach. We've known each other for a long time.

Mark Schapiro: Ah, yeah.

Deirdre English: We may touch on that because it's even bound up in the story of the book, right?

Mark Schapiro: Yeah.

Deirdre English: Anyways, just thinking about how to interview Mark today, I thought I would maybe try to give it a little humanities spin, which is very easy to do given this book. This book really is a coming together of science and the art of writing science and literature. I say that because it's very beautifully written in places and you'll see that, and also because it's so rich in storytelling. We have a lot to say about that too. So there's the science and then there's the storytelling and the use of language that are all really relevant today.

Deirdre English: So, with that theme in mind, let me just start by asking Mark about the title of his book, *Seeds of Resistance*. I'm going to get to the seeds, but I'm going to start with the resistance. That is a double entendre. I want to ask Mark what you had in mind when you spoke about resistance?

Mark Schapiro: Well thank you for that question because this is one of the rare books that I've written that I actually knew what the title was from the minute I started writing it. I was thinking of two things. One is the ecological resistance that we need to deal with climatic shifts. Climate change, which I've written quite a bit about, is profoundly changing conditions on the planet and completely conditions for growing food. It's clear — farmers, scientists, everybody's telling us what we need are seeds that are capable of resisting these changes. When we say resistance, it's actually showing resilience to these changes, the ability to adapt to the accelerating drought, the diminishment of water, the changing water

patterns, et cetera — the dramatic shifts under way. So, on the one hand we need resistance from the seeds on the planet.

Mark Schapiro: At the same time, I am trained in investigative journalism. Usually my common approach, as Deirdre knows, was to do a big blast of investigation and then let other people figure out what to do with the consequences. After a couple decades of doing this work and actually coming to understand the environmental stresses better, I thought it was very important in this book to not only investigate to where we are with the state of seeds on this planet, but also to show the resistance that's been emerging to the efforts of big companies to take control of these seeds and why that matters now at this time of high environmental stress. So, I put those two together. It's the seeds themselves that are resisting, and it's also the community of people all around the world, the farmers, scientists, citizens that are resisting efforts to assert corporate dominion over these fundamental ingredients.

Deirdre English: So the botanical resistance of the seed, resistance to drought conditions for example, needs to be defended by a political or activist resistance to the corporate takeover of the seed.

Mark Schapiro: Yes.

Deirdre English: The poor little seed. Okay, so that's clear. With my next question, I want to really bring out some of the power of Mark's writing, and also to put the seed, *Seeds of Resistance* in the title, really in the center of our discussion as Mark does with this book. He really valorizes the seed, he really reminds us of the seed as a fount of life, and that the seed is in danger and we need to defend it. I want you to hear some of Mark's more poetic writings. There's a lot of science in this book. There's a lot of investigative reporting in this book. But there's also some really mellifluous writing. I'm going to ask him to read a few paragraphs from the end of the book, which he's written in an interesting and circular structure where the end of the book could equally serve as the beginning of it. You'll see what I mean when he reads this. It's a fairly long section, would you please read that Mark?

Mark Schapiro: Sure. I'll start with George Bernard Shaw. I'm going to reference George Bernard Shaw. This does come at the end.

Deirdre English: That's good.

Mark Schapiro: We're all familiar with George Bernard Shaw. So, this comes at the very end.

Mark Schapiro: "My favorite description of seeds come from the great Irish playwright, George Bernard Shaw, who characterized them with just three words. Seeds contain he said, 'a fierce energy.' Shaw was talking specifically about acorns and the marvel of how they grow from tiny kernels in to might trees dispensing tasty nuggets, but the same words can apply to any seeds on earth.

Mark Schapiro: "Seeds drop from trees, blow from flowers, tumble from the feet of bees, arise from the waste of squirrels. A kernel can spend centuries lying dormant, apparently lifeless. Then add some water, a dapple of sunshine, a couple of minerals, and voila a stream of energy commences. Seeds actually sense the presence of those life giving elements, and that it is time to start photosynthesizing, time to send sugars through its veins, time to emerge. The shell cracks, a sprig emerges, a stem pokes above the surface of the earth, and delivers to us a flower or a fruit or more seeds to provide food for humans or other animals. It takes a certain ferocity to accomplish this transformation from

dormancy to life as it does to adapt to the changes that are occurring in the ground in which seeds grow. The metabolism of seeds growing in the midst of drought will slow down to preserve their energy until conditions change. Leaves contract or unfurl depending on the flow of water and intensity of the sun are just two examples among many. Seeds can control those basic adaptive functions, but the question now is who controls the seeds? There is where the story ahead begins.”

Deirdre English: Yeah so you can say, and that's where his book ends. So, with that I want to move on to storytelling. This is a book that is absolutely filled with amazing stories. Just revelatory stories about scientists, individuals. Scientists without whom we wouldn't have the biodiversity that we have today and frankly villainous corporations who are really guilty of depriving us of the biodiversity that we need to withstand climate change. I think that's really the basic skeleton of the book. It's filled with so many really rich stories. I have to say I was reading this book and two weeks ago I was in Arizona, and I visited the Hualapai Reservation, and I observed a lot of the problems of that community. I went in to the local — the only — grocery store on that section of the reservation, and there I saw a lot of Frito Lays corn chips, potato chips, and Pepsi. At the same time, I was reading Mark's book, and you'll see why I mentioned this in that context. So, would you start off by telling us that anecdote about parched corn?

Mark Schapiro: Yeah. First of all, the challenge in a book on seeds is that they appear to be inanimate, but of course they're not. I mean, they're deeply alive. The challenge from a journalistic, from a storytelling point of view, how do you bring these things to life because they don't move around. You can't really follow them around. They're not gesturing like characters in life, and that was a real challenge.

Deirdre English: Interview them.

Mark Schapiro: You can't interview them, yet, but you can kind of interview them because then I realized that seeds actually tell stories. It sounds weird, but I started thinking about these trees that I've seen. When you go to a tree, you see a tree. If it's cut down, you will see these incredible rings in a tree. Actually those rings, I think you learn as a kid or in your first biology classes, that each one of these rings represents a cycle of time that tree has survived. If you think about it, those rings tell you a huge amount about the life of that tree. They tell you about the conditions in which that tree arose, the stresses that it endured because those you can register if you really know how to read tree rings, and the length and age of that tree will be clear from tree rings.

Mark Schapiro: I thought, well, the same thing is going on in seeds. If you were able to cut open a seed that had been around for a long time here on the earth, you would actually be able to interpret the conditions in which that seed grew, where it emanated from, the kind of stresses that it endured. Of course it's much smaller than a tree, and you have to have a super high level of specified knowledge to be able to read that. Poetically speaking, if you think of a seed as a storytelling, as something as an organism can tell you stories, it was like an insight that actually really helped me to write this book because I realized that the stories were about not only what the conditions in which the seeds grow, it's also about the humans that interact with those seeds and the other organisms that interact with those seeds. Suddenly, I had a living story.

Mark Schapiro: One of the stories is about, there's this incredible seed bank that I visited in Arizona. It's right next to us in Tucson, Arizona. This incredible seed bank called Native Seed Surge, and it's a repository of seeds that are native to the Southwest,

which actually means Native American seeds. Ninety percent of which are Native American seeds that have been grown by Native American communities for thousands of years, the longest period of domesticated agriculture in North America, the American Southwest, New Mexico, Arizona. Those people have been growing foodstuffs for thousands of years in hot and dry conditions.

Mark Schapiro: So, they are saving those seeds in this place, very important, and those seeds are now being looked to by farmers all across the Southwest and other parts of the United States as sources as new genetic information. Very important place. They also happen to have a gift shop in the place where you can buy seeds. You can go down there and buy them right outside of Tucson. It's really cool. They sell seeds, they sell fertilizer and it's organic, and et cetera. They also sell these little bags of parched corn, which are basically parched corn which are heated up kernels of corn that are salted, totally delicious, and come out of the Hopi community which has been parching corn for thousands of years. They figured out how to do it, they put them in little bags, and you can buy them for a couple bucks. They're delicious. On their packaging, they happen to say these parched corn nuts taste kind of like corn nuts and delicious, salty, and everything.

Mark Schapiro: In to their mailbox — it's this small, little adobe settlement outside of Tucson where this seed bank is — comes a letter from Frito Lay. In to this place comes Frito Lay, it tells them cease and desist immediately from the use of the term, from calling these corn nuts because we have trademarked the term corn nuts. Of course this came like a complete bolt from the heavens, like out of a foreign universe in to this small little place.

Mark Schapiro: If you go there, you'll be charmed by it, but it's a small little institution, and it was suddenly facing blow back from one of the biggest food companies in the world, which is in turn owned by Pepsi Cola by the way. Number one, that's incredibly revealing about the efforts of a multinational food company to claim ownership of an idea that had actually been around for thousands of years. A group of Hopi native people in neighboring New Mexico, which is where this place gets all this parched corn, and I talked to some native people in New Mexico.

Mark Schapiro: This woman tells me, "Oh yeah we used to grow up at all of my grandmother used to do this parched corn, and they were delicious. We popped them up the thing, they were salty." So, I thought that was a very revealing story for two reasons. One is it tells you a lot about the potency of seeds and the long term resilience of those corn seeds that came out of native communities in the Southwest, and the efforts of big, multi-national food companies and other multinational chemical companies to assert dominion over the seeds that arise from the earth.

Deirdre English: So, what happened? How did they respond to the letter?

Mark Schapiro: Well, the point was essentially it's a small organization, they're funded partly by donations and partly by this gift shop, they had no capacity to fight Frito Lay in court. It would've cost God knows how many millions, and so they capitulated. Now you can buy these little things, but they say something like delicious, parched corn. Same damn thing, but they no longer use the word corn nuts.

Deirdre English: You know you have a beautiful paragraph where you say they capitulated to these lawyers as if they had no choice, but you say something like that they might have written back asking Frito Lay or Pepsi Co. to thank them for the

centuries of indigenous labor that went in to producing the corn seeds in the first place that Frito Lay now has a patent on. So, they didn't do that.

Mark Schapiro: They didn't.

Deirdre English: Best not to provoke the lawyers I guess. Anyway, so let's talk about that though. Where does corn actually come from? Is it the most native vegetable that we have in this country would you say? Is it the most indigenous?

Mark Schapiro: Well, it's no, I would say beans and squash are Native American. They've been growing those for thousands of years.

Deirdre English: But it's very much on this continent, right?

Mark Schapiro: No and yes, from the continent if you include Mexico on this continent.

Deirdre English: We're very corn-based.

Mark Schapiro: We are corn-based of course. What's interesting is you get to the part of where do you, where do seeds come from? It turns out, if you were to look at a map of the world, and you were to have a dinner. Let's say the Townsend Center is going to say we're going to have a big dinner, and we're going to invite everybody to a dinner with native, North American foods. I don't mean native people North American, but native to North America. You would invite us to dinner, which would be extremely nice of you, and there we would have in a bowl in the middle of the dinner, some artichokes, a couple cranberries, and some pecans. Basically, that is the foods that emanate from North America. I'm sure I'm missing one or two, but they're all very minor in our diet.

Mark Schapiro: All the other foods come from the centers of origin around the world, which is a band of land around the equator. Corn comes from southern Mexico, and mountains around Oaxaca is where actually corn originally emanates from. What's cool is it emanates from this little, as Deirdre beautifully put it, unpalatable cob that's basically this little scrawny cob of corn that's a wild relative of corn. It's called teosinte. Teosinte is completely inedible so I don't recommend it, and nobody even in Mexico has figured out how to make it edible, but it contains this incredible panoply of important genetic material so that's able to pass along to more palatable, edible forms of corn to offer resistance. I tell this story when I went to a farm. This is what got me going on this story really was this experience I had back about 30 years ago.

Deirdre English: I remember this.

Mark Schapiro: Deirdre English herself was the editor of a great magazine, Mother Jones, and she sent me crazily enough off to Iowa to do a story about what it meant when you had genetic uniformity in a crop. I ended up talking with some farmers in the middle of Iowa who had experienced this complete wipe out of the American corn crop when it was revealed that a bug had attacked in North Carolina and within six months had wiped out the corn in Iowa and everything in between. So, it's a completely devastating impact, and it was because there were only two types of corn planted in the United States.

Mark Schapiro: When, in a complete panic, those farmers and scientists tried to resolve how to breed resistance in to the American corn crop, they went down to Mexico. They were able to get materials from teosinte and from other wild growing corn in

Mexico, and they brought it back to the United States, bred it in, and within a season or two they were able to respond. Those plants were naturally resistant to this pest. Over and over and over again you see why it's so critical to have naturally evolved forms of seeds that can actually bring in these kind of characteristics of resistance, and I talk about different examples in the book.

Deirdre English: So, let's see if we get this clear. The story of corn is starts with this unpalatable cob, right?

Mark Schapiro: Yes.

Deirdre English: Okay, then over centuries indigenous people experiment with natural selection, right, with encouraging breeds, is that right word?

Mark Schapiro: Yeah, they breed through natural selection.

Deirdre English: They breed the corn until they get a whole variety of more or less palatable corn, right? Some of it's purple, right?

Mark Schapiro: Yeah. Purple...

Deirdre English: Yellow...

Mark Schapiro: Blue...

Deirdre English: White... all different.

Mark Schapiro: Here it's yellow. In Mexico, it's blue and purple.

Deirdre English: Some tastes good to you, and some tastes good to you. Some could be used for a tortilla and some is better in a different way, and there's all this experimentation and improvement of the corn that happens over centuries. That's where the thank you letter from Frito Lay would have been most appropriate, right? Then, how does that turn in to a situation where American farmers in the Midwest are only planting two strains of corn?

Mark Schapiro: Not just corn.

Deirdre English: What happens when they do that? Just stick to corn for now. It's not just corn, we could talk about many other things but weed and potatoes in the same story right, but I think it's good. How does that happen?

Mark Schapiro: Well, that has happened because of a sequence of events going back to the 90s. That's where you get in to the 80s and 90s, is where you get in to the back story to how we got to this place, which is the investigative part of this book. It's basically we have a situation now where you have four companies that are basically chemical companies that dominate more than 60% of the world's seeds. They even dominate more of the corn seeds more like 85% of the corn, 60% of the overall commercial.

Mark Schapiro: So, how do we get to that point? We had this process to rapidly truncate, you had a combination of number one, a series of Supreme Court decisions that enabled companies to patent living organisms, which had never been possible before the 1980s. Why is this so radical? Number one, it's a radical idea that you

can actually patent an organism that will change over time. That enabled seed companies or companies that began to own seed companies to patent their seeds and to put huge amounts of publicity and inducements to buying those seeds. The second thing was genetic engineering, which actually transformed the corn business substantially.

Deirdre English: Let's come back to genetic engineering. Do you feel that was fundamental wrong turn when the Supreme Court made that decision or the decisions that flowed from it to allow the patenting of a living organism?

Mark Schapiro: I do actually. Yeah, the reason is that where seeds obtain their ability to respond to ecological conditions is through season after season. Survival of the fittest. It's Darwin in a field basically, and it's brutal but it's simple and very effective. That's how we got here. It's all how we got here. It works in the field just like it works with us, and it's basically that kind of dynamic. Why that's important now more than any other time, it's always been important, but now it's particularly important because what you have is climate change that's altering conditions very rapidly. They're changing so rapidly that even the big companies can't even keep up with those changes. They're happening so quickly and dramatically.

Mark Schapiro: I spent a lot of time in the Central Valley recently, and I saw this happening right here. In the Midwest, where I've spent some time doing reporting on this book, you could see it. So, the question is, how do we adapt to those circumstances? Well, there's a big difference between seeds that evolved within their ecological home within an environment in which they're capable of responding over multiple generations, and seeds that come out of laboratories that are genetically engineered to perform certain functions with certain traits. They're in no relationship with the environment.

Mark Schapiro: I actually talked to this woman at Monsanto, she was a high up official at Monsanto, and it was so interesting. I said, "How is the company responding to climate change?" First of all, her first thing was "Oh yeah, this is huge. We just sent a bunch of people to the March for Science. Monsanto was there at the March for Science. Half of you might have been there too, but so was Monsanto back a year ago or something." She was very proud of that because Monsanto knows that the earth is changing very rapidly. I thought, well that's interesting, and she said, "Yes, but what we are doing is we are identifying those conditions and trying to breed seeds that are separate from the environmental conditions around it." Essentially what they're trying to do is create a set of conditions for every seed by the intense application of chemical fertilizers, chemical pesticides, you create an artificial environment that the seed is perfectly adapted to or the seed is completely dependent on Monsanto's products to survive.

Deirdre English: Completely dependent.

Mark Schapiro: It's a crack baby seed.

Deirdre English: Yeah.

Mark Schapiro: It's basically born addicted to the chemicals that Monsanto provides, which I thought that her statement that she told me frankly, was very revealing of this distinction that we're talking about. You have all these seeds coming out of these chemical companies that are essentially crack baby seeds, and they have to be replaced every year with a new tweak, but they're engaged in no dynamic with the ecological surroundings. Time after time and I talk about this in the book, and I found it fascinating, I talked to seed breeders, farmers, and everybody is

that the seeds, which is actually a farm, which is a cultivation of a food crop is far more resilient to changes when it's got a diverse variety of population in the field that can actually respond and interact and have much more organic material in the soil, which also absorbs water and has an interaction with the minerals and other elements in the soil. So, this in particular now, I think it's always been an important question, but in particular right now and moving forward at a time of incredible volatility, it's why we need a bio diverse source of seeds.

Deirdre English: Great. Well, I want to go to questions, but I want to say one thing we haven't really said much about climate change. We're now really experiencing desertification in this country, and could you just very briefly say what we can expect in California with climate change, and how it's going to affect agriculture? After you answer that, we'll go to questions.

Mark Schapiro: Yes, well I just spent the spring actually going in and out of the Central Valley when I wasn't teaching at the J School, and a piece came out in the summer. It was a little package for Bay Nature and KQED, and what's interesting is that climate change is already transforming the Central Valley. There's a slow panic setting in. The water supply is diminishing rapidly. The temperature is completely changing cultivation patterns, so basically you have new crops coming in. Almonds are being replaced by pistachios basically because pistachios come from a hot, dry climate in Iran and Turkey. Almonds are not doing all that well when it comes to depleted water.

Mark Schapiro: So, you have two things happening in the Central Valley in California agriculture, one is a shift of crops. Two is increasing fallowing of land that used to be agriculturally productive because it can't get access to the water. Three importantly, which is the other part of the resistance equation, is that you have dramatic growth within the context of the Central Valley, still relatively small in the Central Valley, but dramatic growth over the past ten years in more ecologically harmonious forms of agriculture. So, they're showing farms that have a diverse variety of seeds that are planted and are utilizing organic farming techniques, which include deeper and much more minerals in the soil, interactions with the plants, and cover crops that return minerals to the soil are far more resilient to these shifts. That's happening over and over again. You can see that, and I think that's been one interesting things to look at in the Central Valley.

Deirdre English: At least that's a note of hope.

Mark Schapiro: Yeah, no there is hope here. There are all sorts of examples all over the world of people utilizing these techniques. A huge amount of, right here on this campus a lot of research being done, but all over this country I saw people doing incredible work with diversity of seeds, of pursuing more agroecological techniques of working with their environment rather than trying to channel and defy the environmental conditions. You know, there are incredible stories out there of people doing this. No, I didn't end up totally despondent. I ended up having a lot more respect for those people who are defying these trends and offering us a way through this.

Deirdre English: And the resistance is fascinating because the resistance comes from farmers, scientists, botanists, and consumers. Vote with your fork.

Mark Schapiro: Yeah.



Deirdre English: So, on that note let's go to questions. Oh, here's someone. You're from the J School, so you get the first question.

speaker 5: I'm curious about if there are only six or so companies, how do they and you say that you know-

Mark Schapiro: Four.

speaker 5: Oh four, even less. How do they compete with each other then?

Deirdre English: I thought that too, yeah.

Mark Schapiro: Well fascinating, this is totally fascinating.

Deirdre English: I don't know why I didn't ask that.

Mark Schapiro: Yes, they compete with each other. They're each multinational companies. There's DuPont, a huge American chemical company. Monsanto, now owned by Bayer, huge German pharmaceutical chemical company. Syngenta, which is a Swiss company owned by ChemChina, which is a huge chemical company in China. The fourth is BASF, which is a huge German chemical company. Those are the four that dominate 60% of this trade. So, what's interesting is they compete in the way that big, multinationals compete. They have advertising. They do science. There's rising indicators that some of the science has been manipulated.

Mark Schapiro: What's interesting is the argument over and over again is that when we consolidate, you have to get approval from some regulator. They'll be more innovation, and we'll come up with new product. This group called the Farmer Business Network, it's a fantastic entity and they're a great story right near here, a bunch of Google engineers left Google. They're like algorithm experts, and they figured some of them came from farm backgrounds, so they thought they would create a data collection company for farmers that was independent of the chemical companies because they knew farmers were not trusting the data that was coming out of the chemical companies. They started producing data showing the relative performance of all these seeds.

Mark Schapiro: What they discovered was amazing. They asked all these thousands of farmers all across America to send in their seed samples from different companies, Dow, DuPont, Monsanto, Bayer, Syngenta, et cetera, and they did a detailed analysis and discovered that the seeds were the same. The seeds were the same, so you had these farmers going out thinking they were farming a diverse array of different seeds. Even a farmer can get two or three different types of seeds from two or three different companies if the big seed company, and then they discovered that they were the same, which infuriated thousands of people. This is something nobody hears about here, it's in my book, but infuriated and continues to infuriate thousands of farmers who are often stuck because of the way that seeds are sold in farming.

Deirdre English: They're trying to decide which seed to buy.

Mark Schapiro: Which seed to buy and turns out they're the same seed.

Deirdre English: Basically it's just a different advertising campaign.

Mark Schapiro: Exactly.

speaker 5: So, that means the chemicals are the same too then?

Mark Schapiro: They're roughly the same. Each one is producing some slightly different chemical, but the chemicals that go with the Dow DuPont seeds will work with the Monsanto seeds, but you think you can only buy the Dow DuPont chemical. This was really striking when you realize it's false advertising. They are, I met the president of this company that comes from a farm background, and he's read the take on the chemical companies. He's pissed off. He knows that they are doing this. He's got the sophisticated analytical tools to study it, so we need to get over this presumption. First of all, there's the presumption that industrial agriculture system, all these big companies are going to enable us to produce enough food because we have a growing population. First of all, you look at the data, and you see that the yields are not performing in the way that they claim they're performing, and they're showing extreme fragility in the face of change, which is key. All we're experiencing coming forward is change. Volatile change. These varieties, and I think that's another reason I wrote this book was because we're reaching this point where you have this convergence of corporate consolidation and climatic change acceleration at the same time and what that means.

Deirdre English: Great, great. That's so important. More questions. I think you had your hand up.

Speaker 6: Hi, I have a question about the power of the consumer in this cycle. I've been gardening since the 70s, and also going to farmers' markets for decades, and I know that I have seen even the shift in what's available to purchase as seeds. I've purchased from a small, family business for decades, and I seek out things that are off market because I don't want to grow stuff that is available in the grocery stores. The question is, even the farmers' markets have changed dramatically over the decades, it used to be you could find a lot of imperfect food. You know naturally when you garden, you have imperfections in what things look like, and I feel like nowadays it's very much a polished industry. It's about perfection. It used to be I could go to vendors to get cheaper stuff to do canning stuff, and you can't find that as often. So, I feel like it also feeds in to this cycle of seeds are modified in part for the consumer on the other side who wants something or who is buying something, and while we may be getting fewer choices, there is also a part of the consumer role that's feeding in to the cycle. Can you address that?

Mark Schapiro: Well, that's an interesting point. I mean, I don't know all the answers. I think what might be, there are a number of ways to think that through. One is that farmers' markets have boomed, and one consequence of booming is that the farms have gotten bigger. It's no longer kind of a backyard garden thing where people come and sell what they've produced in a very small situation. So, organic farmer market material has gotten to be kind of a real income that you can live on if you know what you're doing. One thing might be that they're getting better at farming because they have to do it on a more substantial level. That's possible because of course I understand the value of imperfect food and stuff like that. It may be a sign of the growing sophistication of farmers who are able to breed or work with seeds that are more developed. One thing, there's a lot more research going in to organic agriculture now than there was ten years ago. Even under Obama, there was an increase. Even under Trump, there was a small increase in organic believe it or not, because it's a big growing industry.

Deirdre English: Michelle planted an organic garden on the White House lawn.

Mark Schapiro: Yes, I don't think Melania's going to be doing that for now. It's an excellent questions, and also the other part of that question that gets in to the bigger issue is it's more expensive at a farmers' market. So, there's a deep equity question out in the farmers' markets, and I think one of the things to think about at those farmers' markets I think are critical to actually providing support to those independent farms who deliver to those farmers' markets is that when we understand the price of that food, it's a much more accurate price for the food than the food you get at a supermarket. When you pay extra, you're actually paying an honest price for the food because all the prices in those piles of produce and fruit that end up at Safeway and all these other places. It's cheap, may be cheap, it's relatively cheap. United States cheap food compared to many other countries. All the externalized prices, the pesticide poisoning, decimation of ecological resources, the poisoning of waterways, the decimation of insect populations, and all the other factors in an ecological system are costing billions and billions of dollars amortized in all these different channels so we don't see it in the same way. We have to actually acknowledge that the price that you pay in a farmers' market is actually a much more accurate price for a farm that does not undermine and destroy the ecological surroundings in which it's growing.

Deirdre English: Yeah, wow. I'm sure that raises a lot more questions. Somebody else. I think you had your hand up.

Speaker 7: Yeah, I was wondering about viral resistance, in particular genetically modified viral resistance in crops. I don't know if you touched on any of that in the book, but that's an area where genetic modifying is also implemented to make crops resistant to certain viruses. I was just wondering your thoughts on that.

Mark Schapiro: I haven't looked in to that specifically to be resistant to certain disease that come with a virus, and it would be interesting. I tried to at first when I was writing the book, I was like can I write a book on seeds and not deal with genetic modification because it's an explode, you open it up, and I concluded that I could not. So, I do include a couple chapters on genetic engineering. I think that-

Deirdre English: What was it that decimated the corn crop? Was it a fungus, was it an insect? Was it a virus?

Mark Schapiro: I think it was a fungus, yeah it was fungus that decimated that corn crop. What's interesting now is, I'll tell you a quick story about this incredible. So, it's getting hotter in the Midwest. Really hotter. Like NOAA, that's two degrees hotter than the mean over the last ten years. It's getting hotter and one of the consequence of getting hotter and the rain falling more erratically, is that in Illinois and up in to the Dakotas, what they've been having is wheat crops. They have an intense heat period and then an intense rain because the rain falls more intensely. Then it gets hot again. So, one of the results of that, is these fungi are growing up. If you probably know, so fungi love this. Are you kidding, it's warm and it's moist. Fungus love this. It's been decimating the wheat crop in southern Illinois and elsewhere in the Midwest. What's interesting about it is that the only seed that was capable of resisting this fungus is a seed of a wild wheat grass from Syria. That wild wheat grass is an amazing store in itself, and I go in to how this seed was stored at a seed bank in Iraq and it ended up being evacuated in theory.

Deirdre English: The book is worth reading just for this one story about the adventures of this one seed stock.

Mark Schapiro: Amazing tale.

Deirdre English: It's entangled with the war in Iraq, gets saved by these heroes, and you know almost isn't saved for humanity, but then is saved just in time to arrive to the Midwest.

Deirdre English: It's a great story.

Mark Schapiro: There are amazing heroes who actually who moved these seeds from war ravaged places in to places of safety that are now playing this important role-

Deirdre English: Then there's this great Russian botanist who winds up dying in Stalin's prisons, and you know he's another hero of the book. This is a book that is filled with the adventures of seeds. It has lots of heroes and lots of villains. You can buy it from Mark directly-

Mark Schapiro: Special deal.

Deirdre English: ...and save a few bucks on it right now, and he'll sign it. I was asked to wrap this up at around 1:00, and I didn't see any other hands. So, I think it's probably a good time to do it, and in honor of the fact that this is a humanities center, I will end with a poem. What do you think of that? This is a poem by Wendell Berry, another one of my favorite writers about the environment. It's called The Man Born to Farming, we'll just change The Person Born to Farming, kidding.

Mark Schapiro: Fair enough.

Deirdre English: So, listen.

Deirdre English: The grower of trees, the gardener, the man born to farming, whose hands reach into the ground and sprout, to him the soil is a divine drug. He enters into death yearly, and comes back rejoicing. He has seen the light lie down in the dung heap, and rise again in the corn. His thought passes along the row ends like a mole, that's you. What miraculous seed has he swallowed that the unending sentence of his love flows out of his mouth like a vine clinging in the sunlight, and like water descending in the dark? Wendell Berry.

Deirdre English: Thank you all for being here.

Mark Schapiro: Thank you.

Deirdre English: And thank you Mark.

Mark Schapiro: Thank you.

Timothy Hampton: We hope you enjoyed this Berkeley Book Chat, and we encourage you to join us in person or via podcast for future programs in the series.