

Joseph Heckman, Narrator

Anneliese Abbott, Interviewer

August 30, 2021

Location: Remote over Zoom

JH=Joseph Heckman

AA=Anneliese Abbott

AA: All right. This is August 30, 2021, and this is Anneliese Abbott interviewing—

JH: Joseph Heckman.

AA: So Joseph, thank you so much for taking the time to interview today. Do you want to start with telling us a little about your background in organic/sustainable agriculture and how you've been connected to that over the years?

JH: Okay. Well, I grew up on a farm in Ohio. It was a mixed operation, with dairy, beef cattle, pigs, rabbits, chickens, vegetables. So it was a really diversified operation. And the farm was originally started by my grandfather, Ben Heckman, and then his son Norbert Heckman went off to World War II, was in the army. It was my father who really started adopting the organic system of farming. And so he started that shortly after he got back from the war. Married my mother, I think it was 1946 when they got married.

So there's a set of letters between my grandfather to my father while he was in the Army. And I interviewed my dad about this, too. And he told me that when he was in the Army, he met a soldier buddy I believe from Texas that was reading a book called *Plowman's Folly* by Edward Faulkner. So then he let my dad read the book. And he was really taken in by it and was inspired by it, and then he wrote home to his dad, my grandfather, and said, "Go ahead and get this book; it's a really good book." When my dad eventually got back to the farm after the war, he never plowed. He would disc and use other means of tillage, chisel plowing and so on. And that book *Plowman's Folly* has a lot of emphasis on managing soil organic matter for soil quality.

It seems like one thing led to another after that. He subscribed to the Rodale publications. I think he started around 1949. He called himself an organic farmer, back in a day, in the '50s and '60s, so on, you were really on the fringe to be an organic farmer. You were quite a minority. So organic is kind of going mainstream.

Anyway, growing up on an organic farm, I think kind of gives me a unique perspective on what things were like in those times. I was born in 1956. And there was, I'm not sure if it was the *Organic Farmer* or the *Organic Gardening and Farming* magazine. Because the two were kind of split off into two magazines for a period of time in the '50s. But anyway, there's this one issue of that Rodale publication, it's a monthly publication, which I think is now no longer published. But it was published for about 70 years. Anyway, in 1956, that's the year I was born. My dad apparently had filled out a survey from Rodale, and it was about how to take a road trip across the United States. Had a picture of a road map and a car across the United States. And there was 150 different organic farms that you could stop and visit. My dad was included in that.

And it mentioned what he was doing on his farm and what he was raising. At that time he had Shorthorn cattle, that was quite a story, and the crops he raised, and so on, doing that organically.

So my dad was pretty active in the organic farming movement, at least in terms of having a network of people that were seeking out organic or other farmers that were seeking out organic fertilizers. My father started selling rock phosphate and New Jersey greensand. And people that would visit the farm pretty frequently, either to get these products or to buy beef from us, organic beef. This was before there was any kind of certification. In a way, it wasn't really necessary back then, because you were kind of considered a kook if you were organic, so why would you really ever need certification then? And it was, there was just this network, people knew each other through different means. My father was a subscriber to, I'm trying to think of the magazine, *The Natural Farmer*. Natural food and farming, Natural Foods Association. So besides Rodale, there was this magazine. I think they had local meetings and so on, we would attend those. So there's that. And he was, I don't know when the Ohio Ecological Food and Farm Association was established, but he was active in that too, or at least attended meetings. So he had a whole network of farmers and customers that were interested in organic farming. And so I would often overhear the conversations and so on. As a child, I was always interested in what the big guys were talking about, and so on. So I was sort of a witness to a lot of those things.

And then I went off to college at The Ohio State University and majored in agronomy. At that time, still, you could just feel it that you didn't really want to talk openly about your interest in organic farming. Just kind of kept it quietly to yourself. And then at the University of Maryland, I went on there later and got a master's degree also in agronomy. And there things were beginning to change a little bit. That was like 1982 to '85, I was there. And I got a master's degree studying soil microbiology and land application of sewage sludge and heavy metals. And there was this one seminar class that actually brought in organic farmers. This was the work of Dr. Ray Weil, from the University of Maryland, that actually gave a voice for the first time that I recall in an academic setting where organic farmers had a chance to speak in an academic institution, at the University of Maryland. So that happened.

There was also a time when some of us grad students got together, and we drove out to the Rodale Institute for their field day in the middle of the summer. That was fun, too. But still, it wasn't something that you would feel completely comfortable talking about or expressing much interest in. There was still a certain amount of, it was still somewhat on the fringe. You didn't show too much enthusiasm for it if you wanted to advance in academia. And then I went on for my PhD at North Carolina State University. I was working with Dr. Gene Campit. He was a pretty famous soil scientist.

And it's kind of a funny story I'll mention. We went to a gathering of graduate students, and then what do graduate students do? They talk about, oh, who's going to be your major professor, who are you working with, what are you going to work on, etc. I mentioned Gene Campit, and they said, "Whoa, Dr. Campit, the famous soil scientist, you're going to work with that famous soil scientist?" And then they went on and said something to the effect, "Oh, he's responsible for the American farm crisis." And I said, "Well, how do you make that connection?" You kind of had to sort it out, piece it together and so on, but the story was that he did a lot of research on the soil fertility problem in Brazil on oxisols. And those soils are so phosphorus deficient, they're acidic and so on. And they weren't really able to produce corn and soybean like they are today until Dr. Campit figured out that, well, if we had enough phosphate fertilizer, we can look at that kind of as a capital investment, and then it would make these soils

productive. The land was cheap because it wasn't productive, but instead of buying land, you're investing in that land to make it productive.

And so then in the '70s and '80s, what was going on was that initially—well, I'll come back to the '70s—folks would say things like, “Soil for oil” because of the oil crisis. And that we had soil, we could be productive, and the Middle East had the oil and so on. But then farm prices sometimes were good in the '70s, and then in the '80s there was a crash in the market. And part of this is because Brazil was coming on and becoming a major producer of soybean. And that was beginning to flood the world markets. And then some American farmers had apparently just gone out on a limb and extended their debt too far buying land and so on while prices were good. And then the farm prices crashed because of the Brazilian soybean production. So there's a soil fertility story there, too.

Also remember that in the 1980s when I was applying for jobs, there was a time when to look for jobs in what was so-called “production agriculture,” there were so many professors that were interviewing for an academic job. Production was said to be a cuss word because there was such an overabundance of commodities during the period of the 1980s. So one of the things that I worked on at North Carolina State University was potassium and chloride nutrition of corn and soybean, and looking at what was called “intensive agricultural production,” with irrigation and high fertility inputs and so on. So it was very much a conventional kind of thesis. I was happy just to have a thesis project. Made several publications out of it, and so on.

But I think it was also interesting what graduate school did to me. Although I was interested in alternative agriculture and organic farming systems, that stayed with me. But at the same time, I think it's interesting what an academic environment can do and influence your thinking. It kind of made me go off in another little direction for a while, for a period of time. Eventually I got a job—well, I'll just briefly mention that I worked at the USDA as a postdoc for a period of time, until Rutgers University finally, very slowly, came around and made an offer to me. I don't know, whatever their slow policy was on hiring. Took like six months from interview to hiring, or getting an offer. Anyway, then in 1990 I took a position at Rutgers University. And my predecessor, Dr. Roy Flannery, was working on what he called “maximum yield corn and soybean research.” And so I was working on intensive corn and soybean at North Carolina, so it kind of steered me into what was going on at Rutgers. And Roy Flannery was pretty famous for achieving high yields at that time, over 300 bushels to the acre corn was considered exceptional. And so I inherited that project and continued on and published a couple papers on maximum yield. And I looked at chloride nutrition as a nutrient.

In my early days at Rutgers, you just knew that, if you're in the tenure stream, it wasn't going to do you any good—and this is the early '90s, and this is after the Organic Food Production Act was passed—there was a lot of talk about sustainability. We'd have meetings on “What is the meaning of sustainability?” We'd go on and on and talk about that, it seemed *ad nauseum*. Wouldn't talk much about organic. And it was just, you almost had kind of a fear of ever talking about the O-word in academia before you were tenured. At some point in about the mid-'90s I started talking about, “Well, I'm interested in this organic thing,” and that I grew up on an organic farm, had kind of a unique perspective. But then I did work on that maximum yield corn, which was anything but an organic farming system. It was just really high-input conventional agriculture. But then having worked in that, I think it also gives me somewhat of a unique perspective.

As I matured and moved on in my career, I got more and more involved in organic farming. Eventually I served on the board of the Northeast Organic Farming Association for

about nine years. And at one point I got appointed to a committee in the Soil Science Society of America. It was called the Council on the History and Philosophy of Soil Science. And when I was on that committee, I was encouraged to give a seminar and report on something related to history. And so I had stumbled upon some writings of Sir Albert Howard, one of the key founders of the organic system of farming. And he wrote a book, apparently it was the last book that he wrote, called *War in the Soil*. I thought, "What a title for a book! I've got to get ahold of that book and see what it's about." And it was hard to get a copy. I eventually got one through Rare Books, and I paid over \$80 for a copy of that book. It's only about a hundred pages. But gosh, does Howard ever lay it out in that book. And that kind of inspired me to look at organic. I read some more of Howard's work and so on. I thought, "The more I read about this, there's some elements of truth here that need to be looked at, particularly some of the ecological principles." So I got more and more interested in that.

And then I started writing about the history of the organic farming movement, based on having grown up on an organic farm and having also now a doctorate in soil science from North Carolina State University, and agronomy degrees before that. So it kind of gave me a perspective, having grown up on an organic farm, and also being trained in soil science at a professional level. Just with a lot of curiosity, looking with fresh eyes. Things I saw as a child, but then, what's more, you can look at it with fresh eyes as an older person, an adult, and with all the training I had as a scientist, and make more sense of what you once witnessed as a child growing up on an organic farm. And so I think that's kind of the perspective that I offer. And I've since published in about three articles or a book chapter, maybe more, on the history of organic farming. One of them is very much tied up with the raw milk movement, which I've become very active with.

So I began to see how there's just a certain amount of good common sense and ecological common sense for some of the principles of organic farming. It doesn't necessarily mean that they're right or correct about everything. But let's give them a voice and see what it's about. And also, you begin to see some of the deficiencies, or some of the problems associated with some industrial model of conventional agriculture, the high input model. Just a really good common sense aspect of the organic system is what Howard called the Law of Return, or the Rule of Return. I just think it makes a lot of sense that we recycle our waste materials that came from the land back to the land, and recycle those nutrients. But you won't see much about that in your typical soil fertility textbook.

And I'm developing a concept now, and I'll just announce it here, what I'm calling "Community Supported Soil Fertility." We have community supported agriculture, but I like the idea of people that have an appreciation for the fact that there are cycles in nature. And people who buy food from a farm should be able to take back and return to the land some of the things they take from the land. If they eat meat, and they have bones, those bones could be not just thrown in the trash and go to a landfill, but instead, they could be ground up, collected and returned to the land to restore calcium and phosphorus levels in the soil. And so I just think that anything in the way of food waste that ends up in a landfill, or yard waste, is a wasted opportunity to rebuild soil fertility. And so I think the more a community becomes aware of the need to recycle these nutrients, the more we can sustain soil fertility.

And those principles actually go way back to the *Farmers of Forty Centuries*, where F. H. King wrote about how it was like a cultural instinct in Asia, China in particular, where they just would value various waste materials that were there in the social cycle of humanity and made an effort to recycle whatever those natural waste materials were back to the land. And I

think that's probably one of the things that inspired Howard to write about what he called the Law of Return or Rule of Return. It's just a very good principle. And if we did this, these nutrients could be recycled forever and ever and ever. Sometimes you read about how there's talk about phosphorus for example, rock phosphate and so on. It's a limited resource. But on the other hand, it's an element, and it continues to be an element, and if you recycle it over and over, it's like a currency that just flows through the ecosystem of the farm, away from the farm, back to the farm. And this can happen perpetually over and over forever. And so it's not like oil or something that can be consumed and used up. Some of it can be lost by runoff out to the ocean, but other than that, it can be returned back to the farm, to the soil, and sustain soil fertility.

And that's one principle that I take away from the organic movement. I think it's just a very, very valuable lesson. Of course, my specialty is soil fertility, and so I look at a lot of life processes through the lens of soil fertility. I think that's just a very, very important one. We don't always need to go out and mine and create strip mines for rock phosphate and so on. There's a lot that we can do just simply recycling nutrients locally in place. Or sometimes we need things like rock phosphate. But there's just a lot of poor management that's going on in soil fertility. And I teach these principles in the classroom and so on.

All right, that's some background about me, and an introduction and so on. (27:27)

AA: Yeah, thank you. That's really interesting. And thanks for sharing about your father, too. There's not many people I've interviewed that their family had gone so far back in the organic farming, so your perspective is really unique.

JH: Yeah. I interviewed my father in his later years. He died in 2009, he lived to be 90. And I asked him a lot of questions. He liked to talk about it. So I did learn a lot as to what were some of the motivating things for him. The other thing was that he knew that I was interested in these sort of things, and so he turned over to me, because when he read magazines, he would save them. There was a whole storehouse. And I have these still yet, a big collection of *Organic Farming and Gardening* and *Organic Farmer* magazine, *Prevention* magazine, *Natural Food and Farming*, *Layman Speaks*. And it's interesting to look at these old magazines and see what they were talking about back then. I mean, one of the things that Rodale wrote about, I think it was in 1953, was, "What is the meaning of organic?" And you can look at what he wrote back then, what his thinking was, and what it was today.

And one of the things I teach, I teach a class at Rutgers, "Principles of Organic Crop Production." And I always have the students read that, because I want them to see that the meaning of organic and the perspective of organic has changed over the years and so on. It's a little different than it was back then. But still, some of the early principles that Rodale talked about back then are still there, even in the modern organic definition. (29:23)

AA: So going off of that, is there anything you want to talk about related to farming methods? I know you talked about how your father was influenced by *Plowman's Folly*, and then I don't know how much farming you actually did before you went off to college and all that, but if there's anything you want to share about farming methods and how you developed them, or you already mentioned some of the publications that influenced them.

JH: Well, actually I'm a farmer today, and I have some of my land certified organic. But my main job is professor of soil science at Rutgers University. I teach three or four courses. I teach

Soil Fertility, Principles of Organic Crop Production, I teach a graduate seminar, and then I teach a freshman seminar course. They call it at a Rutgers Byrne Seminar. And that's a real fun class to teach, and I introduce students to organic food and farming systems. And I'm doing it in kind of a unique way. The course is titled, "Function of Love, Work, and Knowledge in Organic Food and Farming." And we look at it through the lens of the work of Dr. Wilhelm Reich. And I discovered his writings through a health food store, natural food store that we would frequent. There was some literature there that talked about the work of Wilhelm Reich.

I'm planning to write a paper about that, because there is an interesting exchange between a friend in England who is writing to Wilhelm Reich, who was at that time living in the United States. It was A. S. Neil. A. S. Neil and Wilhelm Reich were friends. And so they had this exchange of letters, a book called *Record of a Friendship*, which you can get. A. S. Neil was running a school in England, and it was really kind of a unique school, because he said it would be a free school in the sense that students weren't mandated or dictated to go by authority to class. Instead, students chose to go to class when they were interested. So it had some different free-range kinds of concepts. I thought that was interesting, too.

But anyway, getting back to this letter. So A. S. Neil is writing a letter to Wilhelm Reich. And he writes about the work of Albert Howard and how it inspired him to get involved in composting and how composting was improving the health of animals and even conferring some resistance to hoof and mouth disease. Then this letter was received by Reich. Then he writes back, says, "Gee, that was really interesting"—I'm paraphrasing—"what you were writing about the work of Howard. I'm going to go right ahead and take a look at that." And I don't know that Reich ever did, but that's something that I want to find out about. Because there's an archives about the work of Wilhelm Reich, it's at the Harvard Countway Library of Medicine. So the archives are there, I might go visit there sometime.

And so this happened in the 1940s, but it also illustrates how, before the internet, when people wrote letters, and how still these ideas circulated from Europe to the United States, or even around the world. And it seemed to strike a chord with Reich, and I can see how it would when I learn more about the work of Wilhelm Reich. And so that's some of the things that I talk about in my class. And so I teach the classes at Rutgers. Where else were we going with this?
(34:06)

AA: Anything you wanted to say about farming methods.

JH: Oh, farming methods, okay. Well, I use some of those concepts that I learned from Reich. They seemed applicable to organic. He talked about bions, he talked about subtle energies and life energy and so on. And also, just the principle or the knowledge I think is kind of applicable in a way, because one of the things that the organic movement has struggled with is certification and the meaning of organic, and can it be done in such a way, you write the regulations so strictly, that then it doesn't leave the wiggle room for hydroponics and putting organic cows in CAFOs and all of that.

Kind of like, okay, the Real Organic Project and what they're doing. What are they doing with this Real Organic Project? They're trying to correct the problems that weren't really solved by the National Organic Food Production Act. They're trying to solve through a political process that—I'm not saying that the certification isn't a good thing, but I don't think it solves all the problems. I like some of the things that the Real Organic Project is doing, paying attention to the fact that they're putting organic cows in concentrated feeding operations [this is a violation of

the organic standards], they're not putting them on pasture, and so on. I think those are really big problems. And there are concerns about the hydroponics also. But I'm suggesting that we shouldn't look strictly to politics to solve some of these certification issues.

That's where I like the work of Wilhelm Reich, because he talked about what we call "work democracy." And it's kind of summed up in just a few words. As he was known to say, "Love, work, and knowledge are the wellsprings of life, and they should also govern it." All right. So how can you govern an organic system if you use love, work, and knowledge? Well, if you actually read the works of various organic pioneers, particularly that of Lord Northbourne, how does he end his book? I hate to spoil the book if you haven't read it, but he ends it in a wonderful way. He says, after talking about all the problems of industrial agriculture—this was written in 1940, and Lord Northbourne, you may know. He was presumably the first person to start calling it "organic." But he talks about all the terrible things that are going on with destruction of ecosystems, and soil erosion, and so on. And he goes on to say at the end, "We haven't yet tried the way of love." So the idea of love fitting into the organic movement makes a lot of sense to me. So I take that from Reich and various organic writers, and so on.

And even in the Real Organic Project, there's this one farmer that's interviewed. It's a raw milk dairy farm in Maine, I really like this particular couple. They talk about how there's a loving relationship between the customers who want their milk, and how they treat their cows, and how they farm, and so on. And they bemoan the fact that the USDA organic standards failed in that regard. The CAFOs and so on. So if you really love your cows, you're going to treat your cows well. If you love your customers and the customers love the farmer, they know each other, there is an organic relationship, and it's often a loving relationship.

So I built that into the course. So that's the love part of it. Now how about work? Well, I have some folks, some of them actually have PhDs. They come out to my farm, working hard, baling hay on a hot day, we're sweating and so on. And interesting thing they will tell me that things like, "This work is really satisfying." It's like, yeah, this is a struggle, but when it's all said and done, you feel like you really, really did something. I think that's one of the things that's really neat about farming. You're producing something of great value. You can take pleasure and satisfaction in knowing that you're feeding people. You're feeding people. And you can see the children, they're growing up healthy. They're not being exposed to pesticides. They're getting really good, wholesome food. So that is all very, very satisfying. And it comes from work, hard work.

And then knowledge, of course, because if you're a good observer of nature, and you know science, and science is about observing and learning from nature, and you apply that knowledge to being a better farmer. And so you can build a whole way of using that knowledge and apply it to farming. And I do that on my farm. One of the things that I've gotten really interested in as a farmer is raising livestock out on the land or pasture. And if you look at the early organic farming movement, there wasn't so much talk about that. It is in the standards, but it's not often followed. The Real Organic Project is trying to go back to pasture. And I think that's all a really, really good thing. And some of the things that we've come to know about pasture is that it really does make organic food uniquely better and more nutritious. I think there's some pretty good science to that. The conjugated linoleic acid, the fat-soluble vitamins, the omega-3/omega-6 ratios, the quality of the fats. And there's probably a whole lot more. Plus, many farmers that switch to the organic farming system and put their cows on pasture will tell you that their vet bills have decreased and the animals are more healthy. The production may not

be the same as it once was in a CAFO cow, but the cows live many more years and more lactations.

And so I think there's really a lot of benefits to putting animals out on pasture. And we often, when the question comes up about, is there any special nutritional value of organic food versus conventional food? Usually, folks focus on plant foods, vegetables. I don't know why, but that's the first place they'll go. Fine if you want to start there, but let's look at animal foods, too. There the differences are more outspoken, more obviously marked. You can do a laboratory analysis and make it clear that, yeah, the foods are uniquely different. If they truly are following organic practices and putting those animals out there on pasture.

And going back to this principle of love. I mean, if you really love your animals, you want to treat them well. And you're not going to treat them like factory units. Instead, you want them to have a good life. If you ever watch, you can go to YouTube or whatever and find videos of cows going out to pasture, particularly in the spring for the first time. Those cows are kicking up their hooves, and they're just, they are so excited to be let out on the fresh green grass pasture. And they're just going to go out there and consume it and enjoy it. You want to do things for your cows to keep the cows happy. I think that putting a certain amount of love into your farming practices is a really, really good thing. And it's good that some people are willing to pay a premium for that, to keep that farm in business and appreciate that organic food.

So at my farm, a big part of it is pasture. I even call my farm Neshanic Pastures LLC. Because I wanted to emphasize pasture. And we're on the Neshanic River, and so that's where the word Neshanic comes from. And then I am growing some vegetables, too. But I think that fits in nicely into the rotation. One of the things that was actually identified well over a hundred years ago, and I've written about this, I came across the soil fertility textbook from 1917. And you open up the book, right there on the inside cover there's this picture of cows out on pasture. And it goes off and says something under the picture, the photo, that there's nothing that is better for building soil fertility than dairy farming and putting cows on pasture. And I think there's really a lot of truth to that. It's been known for a long time.

And it's another reason why pasture's so important, because pasture's a cover crop, it's a no-till system. Lots of people fail to acknowledge that and think about it that way, but I do. A lot of the forage is trampled that's cover cropped. Plus, it still produces food, unlike a cover crop that's simply produced as a green manure and you mow it or plow it under or whatever. That then takes land out of productivity, it's just a green manure, it's just a cover crop. Which is good, but then pasture does both. If you graze it, you produce some food, and you've still got a cover crop, and it's no-till. And then, occasionally, you do tillage. That's one of the things I've done research on here at my farm. I took some land that had been in sod for twenty years, tilled that sod out, I'm going to grow sweet potatoes. And it's amazing the burst of fertility that is released to grow the next crop of vegetables that first year. And then the second year not as good, and so on. But that means then you need to rotate back into pasture. It's one of the reasons that animal agriculture is such an important part of the organic system.

I think one trend that has happened sometimes, some people in the organic movement have promoted vegetarianism or veganism. And it really hasn't worked out well. Even the Rodale Institute, I think they went off the rails a bit with their "Power of the Plate" publication. And I was actually on the panel that talked about that particular development of a soil-health connection. And Jeff Moyer was driving, and he invited people to promote those ideas. Plant-based food systems and minimizing or even eliminating animal foods. And I think that was a mistake. I spoke up at the meeting. I think my words were not well received. But I think animal

agriculture and animal foods are very important to the human diet and they're very, very important for soil fertility. It's a win for soil fertility having animal agriculture, particularly with pasture, and it's very good for human nutrition and human health. So it's a win for human nutrition, it's a win for soil fertility nutrition.

That's one of the principles I talk about. It really hasn't seemed to catch on in a big way. But I think Howard understood this. And one of my favorite quotes from Howard is about how Mother Nature never farms without livestock. I think he was right on target about that, that livestock need to be integrated into the farming system. And that's what I do at my farm. Of course I grow vegetables; I eat vegetables and fruits. But it's integrated in with the animal agriculture. So you asked about what I do in terms of farming practice, that's one of the things I do. I like to promote animal agriculture and integrate it with the organic system. And I just see a lot of benefits from it.

And it also ties in with the raw milk movement, something I've been very active with. Promoting access, I think people have the right to get access to good-quality, carefully-produced, fresh, unprocessed milk. And when they've gone to pasteurization, it meant that you can scale up dairies, and you didn't have to be so careful about cleaning that cow. There's a lot of good production practices, keeping the milk clean and pathogen-free, that get neglected by ramping up production, knowing that there's a kill step of pasteurization that will follow and that you can then make these megadairies. And by doing so, it then concentrates the livestock into small geographical areas rather than having many small dairies across the land and integrated with vegetable production and crop production in general, where dairy farming is one of the best ways to sustain soil fertility. So if you concentrate them into smaller areas, then you have an overabundance of manure there and you're not doing pasture, or it's hard to have a very big farm with dairy and have the cows on pasture. Pasture somewhat limits the size of the farm that you can manage.

So by going to pasteurization, it enabled the scaling up of dairy into a big commodity, where milks from many farms could be blended together and there's no farm identity anymore. Regardless of how carefully produced. Tragically, I think it was kind of unfair to my father. He was a dairy farmer, too, and was producing really good, high-quality milk organically. But there was no market in the '60s, '70s, and '80s for organic milk. And so it was blended with everybody else's, went into the bulk truck. So you weren't getting any kind of organic premium for it. That's changed some now with the work of Organic Valley and some of the other organic processors.

But I think it's even better when you can direct market your milk from a farm, organic farm, pasture-raised milk. Like one of the farms that I'll mention, because I like this farm, there's others out there too that I could mention, this doesn't mean the others aren't good, but I'm connected with this one. It's called The Family Cow. And they're out of Pennsylvania, big supplier of raw milk and beef and chicken on pasture, eggs. I mean, I do raise some of my own. They've got vegetables, partner sometimes with other farms that have these foods. It's almost like you don't need to go to a grocery store. You purchase these foods directly from a farmer. They deliver throughout the region. If you go to their website, they just do a wonderful job of integrating their livestock into the landscape with pasture and so on.

But I think these food processing things, like pasteurization, have led to commodification and concentration of animals. And have really broken a lot of the linkages between organic farming and human health. There's this belief, it's sometimes more explicitly, sometimes implied, that there's a connection between soil fertility under organic management and human

health. And I wouldn't say that there is such a connection. And maybe there is, and maybe there's some evidence for it. That is broken if you do something to that food that was authentic when it was from the farm, the organic farm. And you put it through a food manufacturing plant, or ultrapasteurize, or pasteurize, or other things, extruded in some way, whatever the food is. Homogenized. You go through these various manufacturing processes so you can put it on a shelf for a long shelf life. You're destroying some of the natural, original organic properties of that food. And there is actually quite a body of research, at least with milk and raw milk, showing that it helps to protect people from allergies, asthma, and respiratory infections. So there are health benefits. And this is well-established through the scientific literature, most of the literature coming out of Europe, some from the United States. And anecdotally there's been many people experienced health benefits by drinking raw milk.

So it can be done well. If it's done poorly, it can be a risky food. But the risk to any food that's not carefully produced. At the top of the list of risky food is leafy greens. It's a fresh food. It's not raw milk, it's leafy greens that's at the top of the list, most risky food. So there are health benefits to it. And I think that's very, very important. Because when we talk about organic farming, if you look at the work of Eve Balfour and her book *The Living Soil*, she talks about the wholeness of the system. Makes quite a point about that. So if you start to pick it apart, and if you do things to kill part of the living system of the food, you're not going to have the health benefits that would be there if it was the original, authentic, organic food. I think there's some important takeaways there in that regard.

So Anneliese, I've gone on for a bit here. Tell me what more you would like me to comment on and talk about. (56:32)

AA: Well, my next question was about philosophies. I think you've actually covered a lot of that in what you've said already. Is there anything else you want to add about that before we move on to other things?

JH: I do think that organic farmers have a different way of looking at nature. I think sometimes they might get a little mystical. And then the conventional farmers might get a little mechanical in their mindset. I prefer the word "functional." Look at how nature functions, and use that as a model. I would highly recommend that people read the book *Look to the Land* by Lord Northbourne. I think it's a great book. I think there's a lot of good ideas in there about philosophy. I also think it's really useful to read some of the older works about organic farming and not simply read some of the modern texts. They had an interesting perspective. It was based on observations of nature. They may not have had all the scientific knowledge to understand the reasons for certain things, but there was a certain wisdom to it.

So while I'm thinking about it, let me just mention some of the books, some of the older books that I think are really worth taking a look at. I think that people should look at the work of Weston A. Price and his book *Nutrition and Physical Degeneration*. That is about his observations of peoples eating in a traditional way, sometimes as farmers or as hunter-gatherers, and how when they encountered or their traditional food systems were displaced by modern food systems, and how their health deteriorated, particularly their dental health. But not just their dental, but their overall health declined with modern food systems. There's a lot of valuable lessons there.

I've already mentioned *Look to the Land*. That's a good book. *The Living Soil* by Eve Balfour. The works by Rodale, I don't see as much there, because I think what he basically did

was he took other ideas and kind of repackaged them. They weren't necessarily his own observations. But even Eve Balfour, I think her book *Living Soil* is kind of a digest of different things that were going on in the organic movement at the time. Which she did do an experiment comparing a farm managed organic versus conventional in England. The Haughley Experiment. That's written about in her book.

The works of Robert McCarrison. You can find some of that in Eve Balfour's book, where she summarizes some of that. And of course the work of Albert Howard should be taken a look at, too. And then there's a lot of good modern books out there about organic. Eliot Coleman has some great books about organic vegetable production. He's got a very good historical perspective on organic farming. I hope you'll interview him, too.

I think that's it on that question for now. (1:01:12)

AA: Yeah, thank you for all those book recommendations. So one thing I'm really curious about hearing your perspective on, and you covered some of it already at the beginning, but is the relationship between organic, and then also sustainable agriculture, realizing that those are not necessarily synonymous terms, and academic institutions, but especially the land grant universities, and in your case especially the ones that you were affiliated at, since you were in the universities. When sustainable agriculture, there was more conversation about it, from what I gather, from the late '80s, and then through the '90s. And then organic, I had another person I interviewed say he went to college in the '60s, I think, and then his professor read a letter ridiculing organic farmers in front of the class. So I was wondering if you ran into any of that in your undergraduate or even graduate work, or if it wasn't quite so blatantly anti-organic by the time you got your degrees.

JH: Could you go back and reiterate some of your earlier part of your question, and we'll start there?

AA: Yeah. Starting with just the relationship between organic and then sustainable and the land grant universities, your perspective on that.

JH: I think with the sustainable, I think Rodale had something to do with that actually getting enacted in the law, the SARE program, which is what it's called now. At one time I think it was called LISA, low-input sustainable agriculture. And that really annoyed a lot of folks in academia, LISA. Then they had to switch over to SARE, sustainable agriculture research and extension. I think the SARE program's been very good, a lot of good research has been done. I had some of my research funded by the SARE program. I don't like how they do the grant funding today, with the so-called outcome funding. It doesn't make any sense. You don't know the outcome of research before you do it. The way they did it originally in the grant applications made a whole lot more sense, you could write a real good research proposal and get it funded. And they did, they funded some of my research on a pre-sidedress soil nitrogen test, which can be worked into the organic farming system very nicely.

In terms of sustainability, though, there are some problems with the word. I just as well like the word "permanent agriculture" as sustainable. Cecil Hopkins wrote a book about soil fertility and used the words "permanent agriculture." It was published in the early 1900s. And then J. Russell Smith wrote about tree crops, and he subtitled something to the effect of "permanent agriculture." And F. H. King, in his book *Farmers of Forty Centuries*. The book is

all about sustainability, but you can read the whole book, and nowhere in that book do they talk about sustainability or sustainable agriculture. I once came across the word “sustain,” but not sustainability. Yet he puts in the title “permanent agriculture.” Well, permanent agriculture was all about sustainability. So I don’t know why or how exactly, there’s a book on the history of sustainability that I was telling you about, published by Rutledge. But it’s become quite the word.

Now we’re getting new words, too. We’re hearing about renewable agriculture or regenerative agriculture. And I just don’t really quite know where those things are coming from. I don’t completely understand it. I like organic, and it seemed to me pretty much all-encompassing. I don’t know. It seems to me now the standards are making people feel like there’s something about organic that is inadequate and that they need to add on to it, but other words, I just haven’t yet come to a real good connection with these alternative terms. Sustainability, regenerative, renewable, it goes on and on. So I still like the word organic. I think if organic is done well, there’s different qualities of organic farming. Some farmers do it very well. And some not so well. Maybe that inspires the need for doing something different or better.

I have stumbled upon at one time some article about Eve Balfour trying to get people interested in what she had to say by, she started talking about sustainability. And maybe that’s where some of the sustainability and organic came into play, and I think that may have happened in the 1970s. And it just planted a seed. But I haven’t really sorted all that out, haven’t really found all the details of the history there. But I’ll just mention that. I guess sustainability inspires some people. One of the things I take away from the book *Look to the Land* by Lord Northbourne is the idea of the farm is like a living entity, and that you manage a farm with as many different living parts. The farmer is kind of like the conductor of an orchestra. And there’s a lot of different parts going on, particularly if you have livestock integrated with plant and vegetable agriculture. That’s a lot of things to keep in the air and keep working well, integrated together. But I think it has a lot of things that are, in many ways, very sustainable when carefully managed and done well.

I think it’s also important not to get too big and try to do more than what is humanly capable. Because you have to be able to get out there, walk on the land and see the land, see what’s going on, and so on. I think some of the things, trends that are going on today, are kind of troubling. There was an article in the *New York Times*, and I don’t have it here handy, but it was about how we could farm with no soils, no seasons, no farmers. And it would be done hydroponically in buildings that would not allow in sunlight, not even going to use sunlight. Very artificial environment. And then the crops and the environment, harvest and everything, managed by robots. It sounds like a very mechanical kind of system. And it’s really the antithesis of I think what Lord Northbourne was talking about in his book, the organic farm. And seeing it as kind of a living entity, and the farmer being actually part of the farming system, and integrated into that farming system. Whereas these modern industrial systems, hydroponics and so on, even are seeking to eliminate the farmer himself. And I guess it goes back to what Wendell Berry said, “What are people for?” People need work, too.

And I would go even further and say that—this is part of, I’m working on a book chapter, I’ve almost finished it out, it is a book called *Soils and Human Health*. And the second edition is coming out. They’ve asked me to revise them a chapter, and then I talk about this hydroponic thing that I’ve just mentioned. And it strikes me that there’s another important thing that farms do, farms provide. There’s many studies showing that there’s an important relationship they call “plant-people relationships.” When people don’t have an opportunity to view green, living

environments and they only see manmade images and lifeless images or degraded landscapes, people begin to get depressed. And it's actually therapeutic, there's a whole discipline called horticultural therapy. The problem with the horticultural therapies, and that's why I wrote this chapter, they don't talk about the soil. So I talk about horticultural therapy in a way to bring it back to the soil. And I would argue that the way you farm, and by making these creative, beautiful landscapes, these aesthetically pleasing landscapes with cows grazing the land and beautiful fields of crops and so on, not monocultures, but a diversity of agriculture, it actually creates beauty and psychological wellbeing.

I live in the state of New Jersey, one of the most urbanized states in the nation. And people here really, really value the farms that we have left, and they've been very supportive of farmland preservation programs. Because they want to be able to view these beautiful green landscapes, and so on. And they're agricultural landscapes. And what I'm saying is these agricultural landscapes have value beyond food production. It's not just about food production. And I think it's also one of the neat things about an organic farm, when you've got customers coming out to your farm, direct marketing and so on, they're taking away from that farm more than just food. They're taking away an experience, a good experience. And they're seeing the healthy landscapes.

And it's like, when we would go shopping at a farm, an organic farm, my daughter was just beginning to speak. And we would drive out to a farm and purchase foods. And she'd say, "Daddy, look, cows! Baa-baa," or she would maybe, she's just learning about the animals, the sheep, and the various animals you would see on the land. But she would just get so excited to see the animals out on the landscape and so on. And so what I'm saying is, there's value to viewing healthy, beautiful landscapes. And if we're going to grow our food in buildings, without sunlight, without soil, and with robots, we're depriving people of human contact with nature.

Farming systems—Albert Howard died in '47. He didn't have an opportunity to write about these tragic situations. But I can imagine what he might say. He talked about artificial fertilizers, artificial food, and making people artificial. And that has consequences in a way. How you farm ultimately has an impact on human health and wellbeing. The food quality's important, too. But also the beauty of the landscapes. And so you can check out my chapter, you can I think tie that into it. It's about the function of viewing beautiful landscapes and how that relates to human health and wellbeing. I just updated the chapter, so it's what I was thinking about, and particularly that article that was in the *New York Times* and about how we could produce the food without even soil, sunlight, seasons, or farmers. (1:15:49)

AA: So I'm curious. Going back to what you were saying about how when you first became a professor or when you were in graduate school, about how you couldn't use the O-word because that would be, you might not be able to get tenure or get your research funded. I'm curious if there's anything you want to elaborate on that.

JH: Well, I can't think of anything that was explicitly said. But there's a certain amount of communication that you pick up on that's subtle. I've always been outraged about censorship. One of the things that attracted me to the works of Wilhelm Reich, too, was you couldn't have his books, they were banned and burned by court order and the help of the Food and Drug Administration. I always thought that was an outrage, it made me want to seek them out, save them, and read them. But now we have all kinds of censorship going on in many different ways, through social media communication systems of today. It's not just print media anymore.

There's just a certain amount of messaging that you pick up on that you just don't go there. You don't talk about certain things. And if you do, you're going to be vilified. And I know from at least one experience—but this is later, this was after I was full professor. And I write about this in my article on the raw milk movement. So around 2007 I started talking about raw milk in a university academic environment. And it didn't really go off that well. It stirred up a lot of controversy. And one of the ways I dealt with the controversy was I said, "Well, let's just put everything that we collect about the history, the science, the politics, the legal aspects of this special category of food. We'll put it on a website for sharing at Rutgers University, at least internally." So people can send me anything, put it on the Web, whether it's pro or con, and just let people make up their own mind about it. In other words, there would be no censorship at all. And it was successful. I published an article about this, how I managed to do that. And how I managed to organize a seminar series on a very controversial topic.

And the organic farming movement and raw milk movement have been intertwined. They're almost parallel movements. And going back to J. I. Rodale, I particularly like this quote. He says, "It's not organic to produce milk organically and then to pasteurize it." I think he's really, really spot-on there. I don't know how you can say that better than that. But today we have lots of milk produced organically, and then it gets pasteurized, and even worse, ultrapasteurized. But if the farmers aren't going to be trained and take the responsibility to produce a really clean, carefully produced milk, then it may as well be pasteurized. But there are other ways to do it. The Raw Milk Institute, I'm on the board of that organization.

So anyway, that's kind of where I go with it. I never really ran into any—well, I did give a seminar at the American Society of Agronomy meetings about Albert Howard. And my first seminar for the American Society of Agronomy, I think it was in Indianapolis, and it was 2003, probably. And I remember getting pushback from some people in the audience, really didn't want to hear my message about the history of organic farming. But within my own institution, I didn't get a lot of pushback. But I just sensed that it wasn't, I didn't want to go there, particularly as a non-tenured faculty member.

But one thing that I think I was at least partly responsible for was that we had a newsletter for vegetable producers. And I said, "How about if we have an organic edition of this newsletter? I'll write articles for that." So we had the organic edition. Now it's all together, we don't have the organic edition. You write for both.

And it is truly remarkable how the organic movement has matured and evolved over the decades if you trace it out. And this is something actually I'm working on, Anneliese. I'm working on a timeline of the organic movement. I read a lot of these articles and so on, and I just put down a date and what was going on on such and such a date. And not necessarily commenting on what impact it had on the organic movement, but you at least know that there was a timeline of events. And then you can begin to imagine, there could have been a context to it, or at least a cause-and-effect kind of relationship to some extent. You can't easily quantify those things. But at least you know what was going on at the time. So that's a work that I have in progress. That's in the article that I'm currently working on.

It truly is amazing to me, that's one of the things that I find fascinating about the organic farming movement, is that having grown up where you were on the fringe, you were really a kook, you weren't cool at all to be an organic farmer. But today it is. That's what young people are attracted to. They're attracted to it. The organic system grows and continues to expand beyond our wildest dreams. And it really has gone mainstream in many, many ways. And it's been, I think one sociologist ten or more years ago commented on, I wish I could find his paper,

somebody in Europe, said that of all the different social movements out there, the organic farming movement is one of the most successful. (1:24:17)

AA: Yeah, thank you. That's really interesting. Yeah, I'm trying to trace these connections between organic. And on that line, is there anything you want to share about your perspective on the connections between organic and the broader historical or cultural context, like other movements? I don't know how much you've looked into that.

JH: Well, I do see some other movements. I follow some health freedom movements and so on, some of those are kind of intertwined with the organic movement. Nutrition and supplements and alternative medicine. Still, I think that at one time there was established, I don't know if it's still there, an office of alternative or complimentary medicine at NIH. And it never really caught on or seemed to achieve the same level of acceptance as organic farming. I mean, it has for some people, but I don't think it's gone as mainstream as organic. So there's still some opposition to organic, and particularly with the big pesticide-producing companies. They will do whatever they can to put light on, negative light on organic. You see that sometimes at meetings. Not as much as was once the case.

I remember talking to a colleague at Rutgers, Dr. Steve Reiners. He was a vegetable extension specialist at Rutgers. He's now at Cornell. But he was there, and a colleague with me, in the early '90s. And he told me that in 1988—I'm just pulling this out from memory—that he organized a session at our vegetable growers' meeting about organic vegetable production. And he was given a really, really hard time. He went on to tell me, it was really tough at the time he did that the first time. And so he went ahead and did it and survived and so on. So that was the '80s. But now I organized the session for organic vegetable production at our meetings in New Jersey, and nobody gives me a hard time, not the least. It's just accepted. It doesn't raise any ruckus in the least way. It's gotten so routine and accepted. But if you go back a few decades, then you did have some rough times.

I'm hoping that someday this is where the raw milk movement will go. And I think it is, to some extent. It's interesting what's happening there, because I would say ten or more years ago, there was a lot more negative press about raw milk. And much less so today, but mostly there's fewer outbreaks, because we're teaching farmers, we're training farmers how to be better producers. And the number of outbreaks has dramatically decreased. So farmers are getting better at it, we're getting more science showing that there really are health benefits to drinking raw milk. The whole system is just getting better, and we don't see as much pushback as once was the case in the early 2000s. David Gumpert, in his book, he wrote a book called *The Raw Milk Revolution*, followed up with a book *Life, Liberty, and the Pursuit of Raw Milk*, I think it was. David Gumpert documented a lot of these events in raw milk, and I wrote about it, too, in my paper about raw milk.

I mean, these social trends are interesting. And there's a lot of good questions in the history of science, why it is, what it is, and why it plays out, and why there's so much opposition to new ideas. Of course there's the work of Kuhn, where he talks about *The Structure of Scientific Revolutions*, and then the history of science is full of that sort of thing. But it seems like one of the things we learn from the history of science is that not that much is learned from the history of science, tragically. It gets to be repeated anyways. So the same mistakes are made over and over again. But I like to point it out at least, that sometimes it's helpful. Some of the things going on today look like it's kind of an emotional plague chain reaction against the living.

I won't say anything more about that, but some of those ideas I get from the work of Wilhelm Reich, what he wrote about the emotional plague, I wrote about that in the raw milk movement. It helps explain some of the opposition. If you look up Wilhelm Reich's work, particularly he writes about it in his book *Character Analysis*. Where do these actual psychological forces come about? And how they come about to oppose things that are natural and living, that are wholesome. Where does the urge come to dehumanize and to make things mechanical and to kill the life in it? Another of his books that might be worth taking a look at is *Listen, Little Man*, where he writes about some of these challenges. But anyway, I do take some of my inspiration from the readings that I've done of the works of Wilhelm Reich. (1:31:59)

AA: Thank you for sharing that. I'll definitely have to look more into that. And I appreciate what you said about the history of science. That's certainly a topic I'm going to look into more. So we've got about maybe 30 minutes left, up to 30 minutes, anyways. You don't have to go that long. But is there anything you want to say about your involvement in organic organizations? I know you said you were involved in NOFA. Is there anything you want to share about that?

JH: Yeah, I was on the board of the Northeast Organic Farming Association for about nine years. It's a good organization. I like NOFA. They've put on some really good meetings. I've met some really wonderful people in the organization. And then sometimes there were some bad players, too, that didn't seem to have the best interests of NOFA in mind. There were some occasional bad players that seemed to work to destroy the organization. It was really annoying that someone would do that. But that's a long story that I won't go into. But these things happen, I guess, in any kind of organization they can potentially happen. There can be some bad players.

I'm also, I'm on the board, about ready to go off the board I think, of the Farm to Consumer Foundation. And that's an organization that is about making direct connections between farmers and customers. And it's a lot about raw milk, but not entirely. Then I'm on the board of the Raw Milk Institute, which I already mentioned.

So I would often bring ideas to NOFA about speakers. Sometimes they would go with my ideas, and sometimes not. Sometimes I'd be a speaker. I like to go out and speak on the subject of the history of organic agriculture. It's a fascinating subject. But sometimes I got NOFA to bring in speakers like Carey Gillam, she wrote this book about *Whitewash*, glyphosate and Monsanto. I think she's got a very, very important message to talk about. But sometimes, folks at NOFA just didn't want, I guess the message was somewhat of a downer, because who wants all this bad news? But I think it's important not to ignore it and learn from it and see what you can do about it. I like her book. She's done some really good work on exposing some of the problems with glyphosate and the really sloppy science that's been done to defend and promote glyphosate. So I respect her.

Then there's been some other speakers. One of the best speakers we ever had that really everybody loved was Eliot Coleman. I did get a chance to meet him there. His daughter wrote a wonderful book about growing up on his farm. And I sent you my review of it. It goes by the title *This Life Is in Your Hands*. And Eliot Coleman, I hope that you will interview him if you haven't already, because I think he's got a wealth of knowledge. And he just has a way about him that he can deliver a message that is so upbeat and so positive. He's actually from New Jersey, Redbank area of New Jersey. One time Rutgers was looking for nominations for an honorary doctorate for graduate. And I nominated Eliot Coleman. Sad to say that Rutgers didn't take the opportunity. They missed a wonderful opportunity to give him an honorary doctorate. Because the guy's

really quite a scholar. One article that he wrote that I really like and that I like to get my students to read, you can find it easily online. I'll think of the title and I'll have to email it to you. I think it was something like this: "Organic Farming: Deeply Rooted in the Science of Ecology." I think that's what it is. Deeply rooted in the science of ecology. And I think he's so right on target about that. And if you'll listen to him and read his stuff, that's what it is. It's really, organic farming is a lot about ecology. But it's something more, too, he gets into philosophy. There's some fringe ideas in the organic farming movement, too. His stuff is really, really good.

There's some work of Steven Druker, his book about genetic engineering. It's called *Altered Genes and Twisted Truth*. Steven Druker's book I think is important, also. I brought him in to Rutgers, and that really created a storm. You get a sense of these things. There's only so much, if I could give some advice to young people at work on controversial subjects. I would say this: Be careful. Go about it slow. Feel your way. Stick to the science. Be able to document things. And don't take on more than you possibly can manage. I've gone into the raw milk movement, it's gone okay, after I was tenured. But you'll make a lot of enemies. Be prepared. And there's one book that I think can be really helpful. Brian Martin wrote a book *Confronting the Experts*. It's really a book that he edited. But it's a good book to show that if you're going to work and move into some controversial area of science or agriculture or whatever that you've got to be prepared and stick with the facts. Don't go off on a tangent where you can't defend some statement. If you can't easily defend it, just stick with the facts and stick with the science.

To give you an example, when I was talking about raw milk, I would have people say things like, "What about people getting sick?" And they make the assumption because they don't know that people get sick from pasteurized milk. And so I would have the statistics easily at hand, so I'd just fire back and say, "What about the 168,000 people that got sickened by salmonellosis in pasteurized milk?" You can find these, it's published in the *Journal of the American Medical Association*. And then in 2007, what about the three people who died from listeria? That was pasteurized milk from a plant that was apparently, according to the records, operating adequately. According to the article, once again published in the *Journal of the American Medical Association*. And when you throw those facts out there and you know those facts, do your stuff well, it can stop people in their tracks. They have to stop and think that maybe they don't really know the whole story. Maybe there's more to the story than they're aware of. And it makes them stop and think. And it's been a very useful tool for me.

Some people manage to do it. I know some colleagues who have, going all the way from grad school with some alternative idea and managed to get through and tenure and so on. But at least in my case, I tried to keep kind of a lid on it until I got tenure and a professor and became more outspoken about some of these other issues. But it's been easier because organic has come a long ways since back in the day. (1:42:44)

AA: I appreciate all that advice, thank you very much. Do you want to end with that, or is there something else you want to make sure you say to conclude this interview?

JH: I think we can probably end there. Nothing else really comes to mind. I appreciate the opportunity to meet with you. It's been a good opportunity to put things out there and see where this goes. I'll be interested in what you make of all this. I think you're doing some good work. I think that, like I said before, the organic movement can be looked at as a model because it's been one of the most successful social movements out there. People try to do all kinds of things to change the world in a better way. And I can't think of anything that has been more successful

than the organic farming movement. It's got its discontents, and that's what the Real Organic movement is trying to rectify. And I think they're doing some good work, and I support them. But by and large, compared to other social movements, it seems like one of the most successful ones out there. I can't think of anything else that's been so successful as the organic farming movement.

And it continues to grow. Even when you have depressed economies, the demand for organic food continues to grow. And I think the more people learn about the value of organic, like it's one of the best ways to minimize your exposure to pesticides. And at our house, unless we know the farmer or we grow it ourselves, if we can possibly find an organic version of the food, we buy organic. Particularly because just avoiding pesticide residues, like glyphosate. And right now reading Stephanie Seneff's book called *Toxic Legacy*, and she's a professor at MIT. You might want to interview her, actually. Because she's a very strong promoter of eating organic. She's a pretty famous professor at MIT. And she's written extensively about glyphosate and the problems with it. She's very detailed, and she goes deeply into the biochemistry. I've been pretty well alerted, convinced that gee, this is a pesticide residue I want to avoid. And so we make an effort to buy organic to minimize exposure to the glyphosate. I think it's really important. I think the organic farming movement has done a lot of good.

Here's another thing. Maybe this is a good place to wrap things up. I think one of the great things about organic farming. I mean, go back to when Earl Butz, the Secretary of Agriculture, says, "What part of"—I don't know how he said it exactly, trying to paraphrase—"What part of America do you want to see starve?" Or something to that effect. And he's thinking that when you think of organic farming, you think of starvation. We know that's not true. And because organic farms can be productive enough and we can do it, and those that are defensive of pesticides, they're essential, we can't farm without them. I mean, there's no question that nitrogen, phosphorus, potassium, sulfur, the whole list of micronutrients, they are essential to life. We can't live without them. But pesticides are not. If you're smart and you apply knowledge, you can find lots of alternatives to using pesticides. And that's what organic farming has done in a very good way.

And it really shines a light on conventional agriculture and says, "Well, organic farmers can produce this crop without glyphosate. Why can't you?" It poses that question. And I think this is a real benefit to agriculture, because organic is creating a challenge to conventional agriculture. Look, it can be done, why can't you do it that way? Or, maybe the products that they've developed, the OMRI list of products and so on, we're seeing more and more of that kind of thing, that it's stimulating creativity and research, and saying, "Gee, I'm going to get into the organic marketplace. That's pretty exciting. They pay a premium for it."

So that's a really, really good thing. And so we've got people that were, scientists, professors, that were very much mainstream conventional agriculture minded. But now they see where organic is going, and they want to at least get a piece of it. And they think about their research projects, here in New Jersey, cranberries can be kind of a challenge to grow organically. But we've got researchers interested in seeing, what can we do to make this possible to grow this crop and have an organic cranberry? Or some of the fruit crops that are pretty challenging to grow organically. Some of the crops are a lot easier to grow organically. Dairy, pasture, forage, and so on. But they try to grow peaches, and they've got a whole bunch of different diseases. And grapes, again, lots of disease, lots of pest problems. I think it can be done, but it's just, when you have a whole list of products or materials that are on the prohibited list of the organic

program, it stimulates, what can we do to work around this so we don't need this particular pesticide? I think it can be very, very stimulating.

So organic has been a lot more successful than one could have imagined just a few decades ago. It's not perfect. Just like Real Organic, I'd like to see the cows on pasture, animals on pasture. Not just ruminants. Let's put poultry on pasture and get a better egg, a better chicken, better food. Let's put pigs on pasture. If somebody wants to grow something hydroponically, label it hydroponic, don't try to get the organic label. Because the Real Organic Project is correct about this. They say that it's about the soil. And when Albert Howard was writing, organic—I'm a soil scientist, so I particularly appreciate this aspect of organic also—it is very soil-centered. Very, very focused on the soil. And that's a good thing. I like that, as a soil scientist.

And so, yeah, if you want to grow hydroponically, then just label it hydroponic. And there's one other thing about hydroponics that I really would like to see investigated. We learned so much about the microbiome. I think there may be a microbiome that's associated with food grown in fertile soil as opposed to food grown in water and a nutrient solution that can have a different microbiome. And how does that, the question is, not like the vitamin or mineral content, which might not even be different, but what about the microbiome that's associated with that lettuce or whatever you're growing hydroponically? Does that then have some influence on the human microbiome? And I just throw that out as a question. That's something I'd like to see investigated in terms of that question.

Any last questions or thoughts?

AA: Not unless there's one last thing you want to wrap up with, but we can stop there.

JH: I think we should.

AA: All right. Well, thank you very much for doing the interview. (1:53:06)

Additional conversation with Joseph Heckman following the recording, transcribed from shorthand:

Albrecht's base saturation. I have seen people just storm out of the room talking about that. We had one speaker that was teaching in the turfgrass short course, Joel Simmons, and I think he got fired for teaching base cation saturation research concepts. It just doesn't make sense. When I look at a soil test, I look at those base saturation numbers. I think there is some value to it, it's not completely wrong to look at them. If you are familiar with the base saturation number percentages and you say that's a target, I can say very quickly magnesium is really way off target and calcium is off target, I am going to choose a particular liming material to at least move it in that direction. There is some validity, but it's been overstated.

The other thing I would say about it is it doesn't do much harm to use that concept. Liming materials are pretty cheap. And there's also a little truth to the fact that magnesium has a big hydration radius and it pushes soil particles apart. In the alternative agricultural community there has been ongoing interest in this base saturation concept. Calcium and magnesium function quite differently. Calcium flocculates clay particles and magnesium pushes them apart. There seems to be some sense of it. And then there's this Neil Kinsey guy who has a successful consulting firm about it. He writes a lot for *Acres U.S.A.* and so on. I guess he uses it very successfully.

I just look at the numbers of about 68 percent calcium saturation and somewhere around 10-20 percent magnesium and 3-5 percent potassium and then I can very quickly look at a soil test for base saturation and say if I get limestone then I know which one I am going to choose. If calcium is really low I am going to use high-calcium. Or if magnesium is low relative to calcium saturation then I am going to recommend dolomitic limestone. It's as simple as that. They cost about the same. I know there are some consultants that will try to tweak the saturation to such an extent, I don't go that far, I just say, when it's convenient to do so just move it in this direction. You are going to apply limestone anyway whether you are buying dolomitic or calcitic, it's about the same.

Everyone's entitled to be partly wrong about something and partly right. Some of these historical figures, it's important not to take them too literally and realize that some of the things they said might have been wrong and that with new information and knowledge and science we can now know better. But not always. Albert Howard was already talking about that. He thought that plants could utilize organic molecules as a source of nutrition and take up amino acids, and now we know that's true. Liebig thought otherwise and said emphatically no. Turns out he was wrong. But he influenced generations of soil scientists. We have a researcher at Rutgers working on something he calls rhizophagy. He looks at root systems and sees microbes being taken up in the root hair, being digested and utilized as a source of nutrition. So this idea of feeding the soil to feed the crop, it kind of makes sense, and that researcher, it's such a radical development in plant nutrition. The work on this is by Jim White, a colleague at Rutgers. And he has done some fascinating work on that. Organic farmers get it and they are just on the edge of their seat listening to what he has to say about it. I think it's something. There was somebody that worked with the Rodale Institute, she did work at Penn State on this question, and she worked at Rodale for a time, too. She lives here in NJ now. She went to work by Blue Apron, one of these food distribution coops. She confirmed that, too, that plants can utilize organic substances for nutrition. It's a radical idea but it turns out to be true....

In the American Society of Agronomy at one point, I can't remember exactly the years, I wrote an abstract about the history. We had an organization called COSA, the Committee on Organic and Sustainable Agriculture. Actually, this is important, we should have said this. First the American Society of Agronomy, and it was really the society's soils and crops, near the headquarters in Madison. We got them to finally do something about sustainable. They had to put organic and sustainable in there. It really was the forerunner to the eventual establishment of the Organic Management Systems committee in the American Society of Agronomy. I was the chair for two years on COSA. It never got well tolerated, but I was the one who said, "We need an organic division within the American Society of Agronomy," which evolved into what is now the community structure. I am sure I was the one that first proposed that.

I bring this up because Kathleen Delate was instrumental in making it happen. I remember when it was proposed, I think in 2009. It was sent out on Veterans Day, and normally you don't get much email traffic on a holiday, but there was a huge flood and some of it was opposition that there would be an organic division in the American Society of Agronomy. It really struck a chord of opposition. Kathleen can help you flesh it out in more detail. That's important. Pat Carr was one of the early chairs of the organic community. I was chair for a while too. I was very n on the organic community in the American Society of Agronomy. You could feel the opposition. That has changed remarkably.

As a matter of fact, Pat Carr is a pretty good educator and writer. The editor of the American Society of Agronomy came to him a couple years out and says, "Look, we need a

good review article about organic farming, organic agriculture, for the American Society of Agronomy. Can you put something together?" He contacted people he knew across the US and Canada and I helped to co-author one of the review articles. Some of the content that I wanted to include didn't get in there. The other thing we did as part of COSA, this is another thing I had pursued. When you got these professional societies they have awards for all kinds of different things. One of the things that I had pursued, because they had all these different awards, I said, "Why don't we have an award for somebody that's doing great work in agronomy in connection with organic agriculture?" So I proposed we have an academic achievement award for the researchers who were doing good work in organic agriculture. That eventually did come about. Kathleen Delate was someone who won that award, you could ask her about it. That was something I just thought that those people who are doing good work should get some recognition. This might help to overcome some of the opposition. Academically you can put it on your CV, you got such an award.

There must be an animal science society; I don't know to what extent they have got an organic division. The American Society of Horticulture, they have been very active in organic agriculture for some time. Some of the early articles were in HortTechnology. Journal of Alternative Agriculture. Renewable Agriculture and Food Systems.

John Doran. President of the Soil Science Society of America. Soil scientist out of Nebraska, had a lot to do with Renewable Agriculture and Food Systems. When I presented a paper for that committee or the first time I gave a talk on the history of organic farming, John Doran, I ran into him in the hallway. He says, "I am really interested in this Howard guy. Would you write a paper about that for Renewable Agriculture and Food systems?" It took me about three years to write it by the time I published it. He was somebody that was very supportive of organic farming. He could give you some of that early history. He worked on soil quality I think.