Understanding Sustainable Agriculture:
A Special Interview with Dr. Arden Andersen

By Dr. Joseph Mercola

AA: Dr. Arden Andersen

DM: Dr. Joseph Mercola

Introduction:

DM: Welcome, everyone. This is Dr. Mercola, and today I’m joined by Dr. Arden Andersen, who is a world leader in the field of sustainable agriculture, one of my new passions. But in addition to being a leading soil scientist and agricultural consultant, he is also a physician. He happens to be a DO just like I am, and he specializes in nutritional management. He also advises farmers in building biology and optimizes the energy environment of buildings, homes, and livestock facilities. So, he’s quite a well-rounded, Ben Franklin-type physician and does lots of great things. We’re really excited to have him on with us today. So, thank you for joining us and welcome to our interview.

AA: Well, thank you very much, Dr. Mercola. It’s a pleasure to be here.

DM: I’m wondering if you could explain to our listeners your interest in sustainable agriculture and soil health, what inspired you to also become a physician, and how that all merged together.

AA: Yes. I was originally raised on a dairy farm in Michigan. My father understood the direct correlation between nutrition and animal health. [He] understood at that time that the conventional approach of just more drugs, more vaccines, and more pesticides was just not really working that well in the field. That was kind of my background initially: nutrition is correlated to animal health. Well, originally I didn’t really want to go to Ag school; I wanted to be a pilot. I went to the Air Force Academy initially but then kind of got back into agriculture. I ended up actually going to Arizona and got a degree in agriculture.

DM: I’m just curious. That was first college choice, too, the Air Force Academy. I was never accepted. But you got in, and I’m wondering why you decided to leave.

AA: Well, the bottom line was one, I had a back injury. The other thing was that I kind of realized that it probably wasn’t exactly what I wanted to do. I wasn’t quite sure. You know how you are when you’re 18 or 19 sometimes. I ended up going to the University of Arizona, got a degree in Ag education, and at that time decided to do a work exchange program abroad. I went to the Netherlands. All the time, I was kind of interacting with myself as far as why I was being taught one thing and yet my observation at home on the farm was completely different, particularly relative to animal health, nutrition, and so on.

I got involved more in the biological approach. I took a class from Dan Skow and Carey Reams – the Reams’ Biological Theory of Ionization (RBTI) and that whole approach to soil health. I started consulting with them and for them. I worked for Dan Skow for a while. I saw that whole connection really, from Reams thankfully, with human health and animal health.

My parents at the time had some health problems and ended up going to Mexico to a clinic.
A couple of friends of mine, one was Phil Callahan, whom I did my PhD with, as well as a chiropractor friend of mine, and a couple of other docs told me, “Look, if you really want to make an imprint here, you really need to go to medical school.” I contemplated naturopathic school. That really was the curriculum I like the best. But my one friend told me, “Look, that’s a nice curriculum, but the bottom line is that it doesn’t give you the license to do everything that you really want to be able to do. If you really want to connect things together, you got to go to medical school.”

I ended up going to medical school. As a result, I can talk to a hundred percent of the population. Everybody’s a consumer. As a physician, as you know, you can talk to all the consumers. As a consultant in agriculture, I can essentially only talk to two percent of the population, which is the farming population. Being a physician, even when I talk to farmers about soil, they also have a personal life. They have personal health issues. They have family issues with their health and so on. I can bring that whole thing together for them.

As a physician, as you know, we have a little bit more clout about talking about nutrition than if I were just an agriculturalist. I stand up in front of a group of people and we talk about nutrition. [They’ll say] “Yeah, I’m going to talk to my doctor.” I was able to bring the whole package together. As a physician, I can talk to both doctors as well as farmers. I can bring that whole gamut together.

**DM:** What made you aware that the education you’re receiving at the University of Arizona was... I mean, that your personal experience didn’t align with what they were teaching? What, I guess, catalyzed your interest in this, that you were aware that there was an alternate path and that there was something deeper and more profoundly foundational that was necessary?

**AA:** Right. I did a minor in soil and water engineering. Being in Arizona, of course, water is a big problem. Conservation of water is a big problem. That kind of gave me a little different perspective as well. I guess there are probably two things that really triggered that:

1. In 1981 or 1982, I took a short course from Michigan State University on potatoes. It was very interesting to me that professors stepped in front of the class and said, “You cannot grow potatoes in alkaline soils.” Having gone to the University of Arizona, they raise a lot of potatoes in Arizona in all alkaline soils. I recognized as well that Idaho, which is the number one potato-producing state in the country, is alkaline soil. That didn’t jive. I was like, “Wait a minute, these guys here at this university tell me you can’t grow potatoes in alkaline soil when the majority of potatoes in the country are grown in alkaline soils.”

2. The next thing was that I took a short dairy course as part of my animal science coursework at Arizona. The professor was talking about all of these foot problems, breeding problems, and various other animal health issues in the dairy farms. They were completely foreign to me because we didn’t experience those things in my dad’s dairy. We just did not have those problems. We used less antibiotics in an entire year than the average dairy farm of the same size was using in a week. We just did not have those problems.

Those two major events really got me thinking. I was like, “Wow, there’s really a problem here.” There’s such a disconnect between what really should be going on in the real world relative to animal health and soil health versus what the universities are trying to perpetuate as the status quo.

Then when I went to Holland and worked in a potato, sugar beet, and dairy farm there, I saw some of the richest soils in the world, drained seabed, being destroyed faster than any other place in the world. It was because of their high nitrate use and their high muriate of potash (MOP) use. They had some of the highest nitrate levels in the ground water than anywhere in the world – over 200 parts per million. Their
soils were so compact. About every seven years, they had to go in with bulldozers with a knifing tool just to open up the soils because of the practices that they were using.

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I was taught as a child: you have to observe. Going and taking Carey Reams’ course, one of the things that he said is see what you look at. His little book called The Farmer Wants to Know was my introduction to why weeds are there, why we have insects, and those kinds of things. I knew in my mind that there’s a disconnect here, but I didn’t really have the answer. Carey Reams gave me that answer.

Insects are there because they are nature’s natural garbage collectors. They’re there to take out that which is not fit for us to eat. Weeds are there because that’s nature’s way of evolving the soil from bare rock to mature forest. It’s an intermediate plant that nature utilizes in order to mobilize nutrients and in order to change the soil for the next evolutionary level of plant to come in. That can happen maybe in over a thousand years, or we can actually manage that to happen in over three to five years.

That was really the light switch (we might say) in my mind reading that little book, The Farmer Wants to Know. Aha! Finally, here’s an answer that I’ve been looking for for so long, which actually explained why we have these things, and gives us the ability to address weeds, diseases, and insects at the fundamental cause as opposed to just perpetuating the status quo of more pesticides killing the disease and every year having a problem they have to deal with.

**DM:** Thanks. Your dad’s farm, was he providing raw dairy? Was he also applying these principles which you now are advocating?

**AA:** Actually, he was applying some of those principles at that time. My grandfather understood that when the cattle were sick, he’d turned them out into the meadow and let them eat wild plants and so on. That would get them back on milk and get them straightened out. My father understood that if we were going to have healthy animals, we had to have appropriate forage. We had to have good feed for these cattle. He applied those principles. We didn’t have the foot problems in the animals. We didn’t have the breeding problems in the animals. We didn’t have the mastitis issues in the animals.

We kind of had a big wakeup call in about 1983. We decided to change a little bit of our program. But he was on the Albrecht program, a Brookside and Albrecht program, originally back in the ‘60s, which was a huge step from the standard Michigan State approach to soil fertility. They’re looking at getting your lime doses up or calcium doses up. That was a huge change from Michigan State University.

My father understood that if you want to raise good alfalfa, you’ve got to have calcium in the system. Michigan State until this day says, “Oh, no, we got to get the potash up.” Of course, it guarantees more disease and more problems that you’re going to have in the alfalfa and through to the animal, which is really what my father recognized. It’s that if we get too much potash in that alfalfa, we’re going to have foot problems. We’re going to have breeding problems.

Yes, he was already doing some of those things. But at the same time, he was always looking for a way on how we improve this even further as well.

We did use herbicides and we were noticing on our own farm that we were getting herbicide resistance back in the early ‘70s, particularly relative to atrazine. I will never forget that in 1984, there was an article in the Farm Journal by the editor out of Michigan that said there is no such thing as herbicide-resistant weeds. We saw them in the early ‘70s beginning to evolve. Ten years later in the 1990s, the same Farm Journal came out with an article on, voila, a brand-new discovery: we have herbicide-resistant weeds. We were recognizing those things long before the conventional system even acknowledge that they existed.
That was my background as well. I was taught to look for those kinds of things to begin with.

**DM:** All right. Well, thanks. You are recognized as one of the leaders in high-performance agriculture. It’s interesting that one of your introductions into this area was Carey Reams.

**AA:** Yes.

**DM:** Who I believe is no longer with us.

**AA:** Correct.

**DM:** I’m wondering if you can maybe explain your journey on how it has evolved from that and if you’re still using any of Carey’s principles.

**AA:** Well, I am definitely using his fundamental principles as far as what the soil does in growing crops, weeds, its compaction issues, and so on and so forth correlated to the nutrition that he talked about. His fundamentals that he taught are absolutely correct today as much as they will be in the future and as much as they were in the past. I think the logistics are different today. The products that we have are different today. For example, we have humic acids and things that we didn’t really acknowledged back in the ‘60s and ‘70s because they weren’t a lot of them available.

At the same time, we also have micronization today. We have some integration of some of the biodynamic principles — vortexing and those kinds of things — today that we didn’t really understand or even know about per se at that time. But those things have allowed us to be more efficient at applying those principles. He was really the first one that I recognized. But as I did the research, he wasn’t the first one to say these things; Steiner actually was one of the first people.

The insects are there for a purpose. Insects have different digestive systems. They digest different things that we can’t. The reason they’re there is they’re there to take out those things that are not fit for us to eat. In order to solve that problem, the fundamental thing that Reams talked about was plant Brix readings or refractometer reading of the plant’s sap. The higher the plant sap’s Brix readings, the higher the nutrient density. That fundamental principle that he taught is as applicable today, as it ever was, and as it ever will be.

How do we get there? He acknowledged that the fundamental thing we have to approach is calcium. That is still just the same today as it ever was. As I said, the logistics are a little bit different from what he talked about. Because of the process at the time, we have to put on high doses of calcium. We put on high doses of superphosphate. He would use chicken manure as an inoculant. He would use steer manure as a carbon source. Today a lot of those things are contaminated, as well as we can’t continue to use those quantities of natural resources and expect to be able to do this forever.

What we’ve been able to figure out technology-wise, like I said, the micronization. Chicken manure today is not safe. Most of it has been tested — it’s got glyphosate in it. It has genetically engineered proteins in it. Because of the poor health of the chickens, it doesn’t have a microbial inoculation in there. We actually have companies producing probiotics, if you will, for the soil. We use those.

Getting the carbon in there. Reams recognized that we had to get carbon into the soil. Instead of using steer manure today, we’re going to use things like humic acid or humates, as well as get the biology going in the soil, and those microorganisms will sequester the carbon in the soil for us. The principles that I teach in the three-day soils class are still fundamentally Reams’ principles, because that’s basic science. However, we then integrate today’s current technologies as far as how we execute those principles.
DM: Well, obviously, this is going to be a short version of your three-day soil class. I’m just wondering now if we could put a plug in for that class, and if someone is interested in this area how they would sign up and participate in your class.

AA: Sure. It’s going to be in Bangor, Maine. The 14th, 15th, and 16th of November is this fall’s class. Paula Day is the organizer of that. They can just go on the Internet and look up “Heart of Maine.” Do a search for the “Heart of Maine” and “Arden Andersen soils course in Bangor.” They’ll be able to find that.

DM: Most likely this interview will air after that time. Just to keep this evergreen, if you could provide a process that they could find out where all the future courses will be.

AA: Right. That’s a good question. Sometimes they’re advertising at Acres USA Magazine. That’s a common place where usually most of my classes will be advertised in. Find those. I do courses sometimes for various different small companies, and usually they’ll advertise in Acres as well. For example, Advancing Eco Agriculture sometimes I’ll do something for them – FHR Farms, [inaudible 19:43]. Those different companies, frequently I’ll do courses for them or I’ll be speaking at a seminar. But usually Acres USA is where the classes will be advertised. They can go to AcresUSA.com, and either subscribe to the magazine, or they’ll be able to find it from there.

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DM: Yeah, I actually subscribe to that magazine. It’s a great resource for this type of information. If anyone has a passion about that, they’d probably already know about it already. But if you don’t, that’s certainly a good resource.

AA: Right.

DM: Let’s talk about GMOs for a moment. As you know, I’m one of the leaders in catalyzing the movement to help label them, so that we can eventually remove them or eliminate them from the United States because of all the problems they have, specifically the glyphosate, which seems to be the most pernicious. But the aspect of high-performance agriculture that intrigued me is that it really is a positive approach.

Many of the claims that GMO proponents are advocating, which if you investigate really carefully, aren’t true. But what they’re promoting and proposing is that it can actually be performed far better, far less toxically, and far less expensively with the principles that are advocated by high-performance agriculture. This is actually far beyond organic. It really is the next level after organic, from my perspective. I’m wondering if you could comment on your perspective and help differentiate between the two.

AA: Certainly. Fundamentally, really, conventional agriculture and conventional medicine are all about the fighting of disease and the perpetuation of that fight of disease, because that’s the profit. As long as you continue to target disease, you will never solve disease, because you’re never looking at the underlying cause why that disease exists. That really is their fundamental business plan.

The difference in the approach that we take is the understanding. Agriculture really is about producing food for people. That food has to provide nutrition in order to sustain us. In order for us to be healthy, we have to have that full nutrition. We really do have a dichotomy as far as the approach: targeting disease versus targeting health.

The whole GMO approach is only a continuation of that “let’s target disease” mindset, because the majority of GMOs are simply for them to be able to use herbicide on the crop itself, like the Roundup Ready corn, soybeans, and whatever the other crops might be. It has nothing to do with improving the
actual nutrient value of the corn, the soybean, the canola, or whatever crop it is that you’re doing. It’s completely geared toward: how do we use more herbicide? Unfortunately, at the same time, that whole process of putting in a foreign gene, we are creating a foreign protein, which is highly inflammatory to any mammalian consumer.

Unfortunately, when people think of high technology, what they first think of is, “Oh, my goodness, cellphones.” They think of air transportation – jets and those kinds of things. They think of the latest computers. They think of smart cars, if you will, you know. Today the cars will even park themselves. They think of GPS systems on the tractors and the combines and so on. When they think of technology, they think really about mechanical and electronic technology.

That play on words is used by the chemical industry to come in and say, “We are high-tech farmers. We’re really perpetuating high-tech farming.” No, they’re not; they’re only perpetuating more attack on disease and more perpetuation of the disease, so that they can sell their wares. I mean, that’s a business plan. That’s fine. That’s a business plan. But understand that it has nothing to do with producing food with sustainability or food with nutrition in it. That really is the big dichotomy, the difference.

What it’s done is it really has made a lot of mediocre farmers look good, because they can just perpetuate the status quo and they don’t really have to think beyond just following the protocol that the chemical company lays out for them. “Here, buy our seed, pay us the royalty, you’re going to apply our herbicide product with that, you go out and harvest, and hope for rain.” Most of them have insurance programs, so that if it doesn’t rain, they still make money anyway.

They’ve completely, entirely, lost the whole concept that food is supposed to be produced for human consumption ultimately with nutrition in it. They’ve completely missed that.

The approach that we look at really is first, fundamentally understanding that food is about human health. It’s about the nutrition necessary for human health. Disease, weed, and insect problems are all about a lack or imbalance of that nutrition in the soil and in the crop. If we’re really going to address those, we have to address those fundamental things – the nutrition and the soil health issues – and then we actually do solve the weed, disease, and insect problems at their fundamental level, so we can continue to build nutrition in the soil. That’s completely missed in this whole concept.

You’re absolutely right about this whole concept of getting that information out there to the consumer, because it’s the consumer who really holds the power. Every day, you and I, as consumers, vote at our grocery stores with our dollars. That’s where the power is. What the industry doesn’t want people to understand is that genetically engineered crops are toxic. We’re not just talking about a belief system difference. We’re not just talking about a greenie’s opinion versus a conservative’s opinion or a business person’s opinion. We’re talking about fundamental toxicology.

GMO products are toxic. They are foreign proteins that are proven to cause inflammation. We know, as physicians, all the research shows that disease processes – whether you’re dealing with diabetes, heart disease, or cancer – are fundamentally inflammatory processes that are perpetuated by our environment, which includes our diet. In order to really solve these disease problems, we have to address the cause of inflammation. GMO crops cause inflammation.

The next thing riding on top of that then is the herbicide or the chemical itself – glyphosate. It’s been touted as being perfectly safe. In fact, even Poison Control still says it’s perfectly safe. But when you ask them where they get their information, oh, 1983 documents from Monsanto themselves. In reality, everything since the early 2000s, we have hundreds of articles showing glyphosate to be highly toxic. It’s a chelator. It pulls trace minerals out of the system.
It’s an antibiotic. There’s a 2010 patent received by Monsanto as an antibiotic. They can contend all they want that it doesn’t kill biology; it does. That’s what it was patented to do. Glyphosate wipes out our gut bacteria. We need gut bacteria in order to digest our foods. It disrupts that. It chelates the trace minerals, which we need vitally for our health. We end up with a leaky gut. Then we put the genetic engineered crop in there, which is highly inflammatory, and we just have a perpetuation of that decline in the system.

Without question, we have to have labeling, because that’s the only way that we’re going to stop this big lie. The big lie about how safe it is and we can’t feed the world without it, it’s quite the opposite. We will destroy the world as long as we continue GMOs. We can only feed the world without GMOs and with good nutritional management of the soils, as we talked about earlier.

DM: Yeah, along those lines, there are a number of people who are really concerned about global warming, largely related to the fact that the carbon dioxide concentrations have been increasing. I believe they’re up over 350 or maybe 400. Ideally, it should be about 250. They seem to be increasing. The concern is that, at some point, it’ll reach a critical threshold where it becomes irreversible, and you can’t really turn it around.

The reason I’m mentioning this is that maybe, perhaps one of the most pernicious effects or contributing factors to this would be – not the burning of fossil fuels, although it certainly doesn’t help – the current traditional agricultural practices. Those are contributing to that.

I’m really excited about the alternatives, especially the application of biochar or essentially turning biomass and burning it at specific temperatures to form a type of charcoal that you can bury in the soil and keep that carbon there for hundreds of years or thousands of years. Not only that, but increase the vitality of the soil like they did in South America for thousands of years ago. I’m wondering if you can comment on the use of industrial agriculture, you know, the current traditional system and how high-performance agriculture can have an impact.

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AA: Certainly. The interesting thing about it – really, this is the exciting side and this is where we can all agree regardless of party line or whatever – is that in order to address the environmental issue, the interesting thing is if we follow appropriate farm management practices: Steiner, Reams, and Albrecht. You might say they laid the foundation for us. If we follow those, by default, we solve the carbon sequestration issues. We solve the environmental issues. Because what happens is that we increase the carbon in the soil, and that’s sequestration of air carbon.

In addition to that, by increasing that carbon level into the soil, we decrease weed pressure. That’s been done by the USDA Soil Tilth Laboratory – as much as 75 percent just by increasing the carbon level in the soil. We increase water-holding capacity. In fact, Organic Horticulture Benefits Alliance (OHBA), which is the organization of business owners in Houston that do organic turf management, what they have proven very, very succinctly is that they can decrease water use in Houston in the lawns by 50 percent just by appropriate biological means. We increase the carbon, so we automatically sequester.

Actually a couple of different studies that I am familiar with showed that just by taking between 15 and 20 percent of the arable land in the world, if we sequester the carbon in those areas, we would more than reduce the amount of carbon dioxide in the air that is causing a problem. It doesn’t even take 100 percent of the arable land. With 20 percent of the arable land, we could sequester the carbon that is causing a problem in the air. It’s appropriate farm management that really is the key to this whole thing. As I said, by default, we solve all the environmental problems if we just do appropriate farming.

The whole issue of the biochar and so on, it’s an excellent additive to the system. But the reality is we don’t have to do that. It is a great technology, that’s fine. But appropriate soil management achieves the
same net outcome as does the biochar by simply sequestering carbon in the soil. We increase humus levels in the soil, which does everything that the biochar does, except we don’t have to burn it. We don’t have to use input, burning, or whatever in order to make that biochar. But I’m not anti-biochar. It’s fine. It’s a great technology. I’m just saying that that’s not the only way, and we don’t have to do the biochar in order to achieve that same outcome.

The point is that’s real high-tech farming. When people want to talk about high-tech farming, what they think about is, “Oh, that’s biotechnology.” No, the real high-tech farming is carbon sequestration in the soil, raising the Brix readings of crops, improving the soil tilth, improving the humus levels in the soil, increasing the water-holding capacity in the soil, and reducing water use.

Everywhere in the world, water is becoming more of an issue than does oil. Actually, the wars of the future will be all about water. And actually, in this country already, the political wars in the West are really all about water. As we increase carbon in the soil, we increase our water-holding capacity. That really is high-tech farming. That’s going to solve the problems that we have around the world.

**DM:** Thanks. As a physician, it became obvious to me that the food that we’re eating has a powerful influence on our disease outcome and disease prevention. I did not have the privilege of being raised by farmers and was, like most people, born in an urban environment. My experience with the agricultural community was very limited. But the more I studied health, the more I realized the connection back to the soil. This is actually my newest passion – high-performance agriculture. I grow most of the food I eat now personally. To me, it’s just this giant mystery puzzle.

**AA:** Yeah.

**DM:** It’s a phenomenal hobby. It’s just fun to do, to actually be able to understand these principles and to utilize them to improve the quality of the food that you’re eating and secondarily, of course, your health.

I’m wondering if you could, because you are one of the most knowledgeable people out there on this topic, explain to our viewers exactly how the application of these principles are able to produce these more nutrient-dense foods, and maybe integrate into that discussion the practical application of the use of one of these Brix meters for those who are growing their own plants.

**AA:** I’d be happy to do that. I think that really, fundamentally, because you did not get raised on a farm, you didn’t come in with a lot of biases of how things are supposed to be done on the farm. What I find, having gone through an extensive amount of basic sciences, is that agriculture is really very deficient in fundamental science – fundamental biology, chemistry, biochemistry, and physics – because that’s really what it’s all about.

I’m not saying that to be a successful gardener, you got to go study physics or you got to be a physicist. But what I’m saying is that why we’ve been able to make so many strides in a lot of this is because we have brought in those basic sciences to explain why these things are working, why they should work, and what we need to do in order to get them to work.

Fundamentally, what we really have to understand is that all life really is about microbiology. You and I both know that really, we, personally, are more microbes than we are our own cells. Without those microbes, we’re dead in the water. We have to have them as part of our external immune system. We have to have them as part of our digestive system.

Fundamentally, if we take care of the microbiology (most people think of that as probiotics, so I’m taking the Lactobacillus, Bifidus, or something like that) in our gut, in our digestive systems, they take care of us. The same principle holds true in the soil. If we take care of that probiotic population in the soil, it will then take care of us. Because fundamentally, if we study microbiology and then subsequently
biochemistry, what we understand is those microbes are the ones that are really sequestering nutrients for us, digesting food for us, and then making those things available for our stimulation, whether it be amino acids, trace minerals, vitamins, or whatever that vital nutrient might be for us.

The exact same thing happens in plants. Yes, we can go to a hydroponic operation. We can just feed them with no biology out there. But the problem is we have low nutrient density and we have high disease problems. It’s very easily proven. You go to a closed greenhouse, and they’re worried to death that you’re going to bring in some invasive species. They’re only looking at just a few nutrients. Fifteen or 16 nutrients is all they look at.

Fundamentally, we have to understand that we set up a soil situation, and we have to make it home for beneficial microorganisms. Part of that is (1) we have to have a right nutrient balance out there for them. That’s where Reams, Albrecht, and those people come in to play. Okay, what are the appropriate nutrient balances for a healthy biological system?

(2) We have to inoculate that system. We come in with probiotics for the soil. Yes, we can use things such as yogurt, basic fermentation products, as well as we can buy things off the market, to actually inoculate the soil. Originally, Albrecht and Reams used cattle manure or chicken manure as the inoculant into the soils. Well, back in the ‘40s and ‘50s, we didn’t have a lot of antibiotics in the animals. They didn’t kill off the beneficial [bacteria]. There was a different perspective there.

(3) Then the next step is that okay, now we’ve got the biology, we’ve got the environment as far as the nutrient levels and so on, and now we’ve got to feed them. That means we have to give them ongoing basic nutrition like us eating greens, eating carbohydrates, or various things like that. We’ve got to feed these microbes. They then are going to feed the plants. The better we do that, the healthier the plants are going to be, and we’re not going to have the disease, insect, and weeds issues.

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Essentially, in a nutshell, how do we start there? The first thing that I tell people is they need to do some reading. They need to read some things. For example, there are a couple of textbooks out that I’ve written – Science in Agriculture: Advanced Methods for Sustainable Farming and Anatomy of Life & Energy in Agriculture – as well as Albrecht books. Basically, they give you that fundamental thing of: what do I need to do?

They need to learn some basic observation skills in the field or in the garden and Michael McNeill’s work as well as Graham Shepherd’s work on the visual soil assessment. In other words, when you go out into the field, it’s exactly the same as what you and I were taught in medical school: the history and physical are 80 percent of the diagnosis. As a farmer and as a gardener, you need to learn that the history and physical are 80 percent of the diagnosis.

What does that mean? You go out into the soil. You dig in the soil. You see what you look at. What does it smell like, what does it feel like, what do you see growing, what don’t you see growing, and what kind of organisms do you see or don’t you see out there? Just kind of a gestalt overview of what is or isn’t there.

Plants tell us what’s going on. If we’ve got broad-leaf weeds, we know that we have a biological deficiency. We know that we have an imbalance between potassium and phosphorous. If we’ve got grass weeds like foxtail and quackgrass, we know that we have a functional calcium deficiency. Those kinds of observation skills tell us what actually is happening.
In the back of my latest book called *Food Plague*, I have in there a chapter called “The Kitchen Gardener.” We can go to the grocery store and find all the fertilizer materials we need to grow a successful garden. It’s not really that much different from the human health side of the equation.

One of the tools that I teach people to use is a refractometer. You’ve mentioned that. A refractometer is a very simple instrument. We use them in medicine for various things – checking urine and other issues. But in agriculture, most people would know of that. In the wine making industry, they use it to test the sugar level of the grapes to have an idea when to harvest them and what kind of sugar levels they’re going to get to make wine.

But actually what Reams proved is that because of the fundamental biology of photosynthesis, plants are designed to make sugar. They can only make sugar if they’ve got adequate nutrition. They can only then take that sugar that is made and convert it into fats, proteins, and carbohydrates if they have the adequate nutrition for that to occur.

When we take the sap or the juice from a plant and put it on the prism of a refractometer – it’s a very simple tool and you can get them for 60 bucks – and read that scale of 0 to 32 Brix, which essentially is calibrated in percent sucrose (it’s 0 to 32 percent sucrose in there, but as you know, there’s going to be cross-reading with dissolved solid and so on), what we find is that the higher the Brix reading, the higher that sugar content in that sap, is an indication that the plant has adequate or inadequate nutrition to produce that sugar. The higher that level, the higher the nutrient density, the higher the health level of that plant.

For example, most of the time, if we go to the grocery store, we buy a potato. That potato is going to have a refractometer reading of somewhere between 3 and 5 for a standard potato. If we take and we cut that potato or we peel that potato, most people will recognize, “My goodness, it starts turning brown quite rapidly.” If we had a potato that was 8, 10, or even 12, that potato could sit out on the counter for a half hour and still not turn [brown]. That’s all about antioxidant level. The reason it’s turning brown is that it’s getting oxidized by the air. It has inadequate antioxidant level in the flesh itself.

In addition, the higher the Brix reading, the heavier that potato’s going to be for the size of it because it has greater nutrient density. When I eat that potato, I don’t need to eat as much to get the same nutrient value out of that. I’m going to feel fuller, and it’s going to be easier to digest because I have a more balanced nutrient level in that.

If, for example, I check an apple, that apple is running 10 to 12. That’s where a lot of them are going to run as far as Brix readings are concerned. I peel that apple. In just a couple of minutes, it’s going to turn brown on me after peeling. That’s because of the lack of antioxidants. Where it should be is 18 to 20. It’s where an apple should be as far as the Brix level. When it is up to that point, it has nutrient density. It’s not going to turn that brown color after peeling quite so fast.

When I eat it, it’s going to taste different. In other words, not only is it just sweet. Most people who drink wine, particularly if they’re wine connoisseurs, they recognize there is a character to the taste of different wines. Not just a sweetness or a dryness to them, there’s a character of taste. That same quality comes through in fruit as it has a higher and higher Brix reading. You get a character of taste because of the nutrient density in that fruit.

It’s one of those things I recommend consumers buying – a refractometer – and having at home. Actually I’ve known consumers who will take it to the grocery store. What they’ll do, they’ll just buy a fruit. They’ll open it up, and check the Brix reading right there, so that they can determine what category of fruits and from what sellers they’re going to purchase. The higher the Brix reading, the higher nutrient value, the better value they’re going to get for their dollar when they purchase that. As they recognize that
and they start demanding higher and higher Brix reading food, the farmer then will be incentified to produce a higher and higher Brix reading food or to learn how to do that.

It’s an excellent tool as well if you’re growing your own garden. Let’s say, you purchase a foliar mix that you’re going to spray on the plant. Did it actually raise the Brix reading of the plant? Because you can find out within about 30 to 45 minutes, checking the Brix reading of your tomato plant, spraying with the foliar spray, waiting 30 to 45 minutes, and rechecking that. If the Brix reading came up, that plant’s saying, “Hey, this is good stuff. I like it. It’s helping me with nutrition.”

**DM:** I never realized there’s such a quick response.

**AA:** Oh, absolutely. There is a rapid response. Now, obviously, the more complex a plant, the more difficult it is. A tree is pretty difficult because it’s so complex to be able to get that quick of a change in the system. But most of your vegetable plants, you’ll get a quick one. In any of your cereal, it’s very, very easily done. You check your Brix reading before, you spray it with a foliar spray, and 30 to 45 minutes later, it will respond negatively, neutrally, or positively to that foliar spray. It’s not necessarily that the foliar spray in and of itself is good or bad; it’s what does that plant need at that specific time.

I know a number of farmers that that’s how they judge what foliar spray they’re going to apply, say, to their wheat or their cereal grain that day. They’ll have several mixes in spray bottles. It’s like a Windex bottle. They will do a test at the end of a field with three or four different sprays, wait for 30 to 45 minutes, and recheck them. That will determine which spray they’ll go on and spray the entire farm or the entire field as far as nutrition is concerned. It’s a great technology. This is real high-tech farming or high-tech gardening.

**DM:** Can you provide us with some simple principles on how someone would find a refractometer, how to use it, and the mechanics of it?

**AA:** Yes, absolutely. You just go to the Internet and do a search for “refractometers.” You’ll find them, Pike Agri-Lab out of Maine. There are a number of different companies where you can get them online anywhere from 60 dollars up to 300 for a digital one. It’s very easy to get. Atago is the name of one. There are several different ones out there today. It’s very easily gotten. They’d just do a Google search for “refractometers.”

Calibrate it in Brix for sugar for the field. Because if you go into a medical site, you’re necessarily going to get Brix one; you’re going to get one that either dissolves solids. You might get one for salts. You might get one for albumin. That’s not the one that you want; you want the one for plant Brix readings.

**DM:** Is there any trick to preparing the sample to be analyzed for Brix?

**AA:** There is. Like any tool that we use, Joe, as you know, there’s a potential for human error in them. In using a refractometer, typically you’re going to first use some distilled water to calibrate it to 0. That’s easily done. You just put a drop of water on the prism, look through, and you adjust the scale to 0. Now it’s calibrated to 0. Some of them don’t need that. They’re already permanently calibrated.

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You’re going to squeeze the juice out of the plant, whether it’s the leaf or the fruit. Sometimes if it’s a juicy fruit like peaches, you can squeeze out with your finger and get enough juice out of that. But some of the others are going to be much more difficult, particularly out of a leaf. What you do is you get yourself a good stainless garlic press as opposed to aluminum ones. Mostly, aluminum are going to break on you when you’re putting enough pressure to get the juice out. You get a good stainless garlic press. You take the leaf or a collection of leaves, say, from your tomato plant. You fold them up. You put
them in the garlic press. You squeeze the juice out of them, and drop a drop onto the prism of the refractometer. Look through the prism.

Now, because of a lot of chlorophyll, you’re going to see that there’s going to be a little bit of a fuzzy line in there. You just have to determine where the big differential there between the green and the blue or white on that prism is.

In my book, Food Plague, I talk about that and in my other books as well. I have the refractometer thing in there. You can go to HighBrixGardens.com. They have a chart there for refractometer readings and also a little further explanation on how to use a refractometer.

DM: All right. Great. That’s really helpful, because that’s such a powerful tool.

AA: It is.

DM: I thought we should spend more time on it. Now, you have mentioned your book as a resource.

AA: Yes.

DM: You have several. But one that you mentioned, which appears to be only available on Kindle, was Food Plague. It’s inexpensive – 10 dollars. Is that the one you’d recommend for most people to start out with?

AA: This is it right here. You can probably see that there. It is out in print now. I just got it out in print about a little over a month ago. It is available on Kindle, and it is now available in print. I think Acres USA does have that. You can get it through my clinic at Crossroads Healing Arts. We have that available. There are a couple of organizations that have it out as well. O’Brien Pharmacy in Kansas City has it. The International American Association of Clinical Nutritionists (IAACN), they have it. It is their textbook for the coming year. It is available in different sources now as far as a book is concerned.

DM: Print. Which book of yours would you recommend or what other resources would you advise for those who are just starting this, who are intrigued by the concept of high-performance agriculture, and who are interested in planting their own garden and maybe even a small farm?

AA: I think Food Plague is very good, because, as I said, I have a chapter in the back of it called “The Kitchen Gardener.” That really kind of gets them started in real simple things that they can use even if they’re just going to have a little pot garden, a potted plants garden in their kitchen. They can start with just one or two tomato plants. It’s an excellent place for them to start.

I just kind of gave the overall principles throughout that book, you know: what do insects mean, what do weeds really mean, how do you read them, and what is nature trying to tell us about them? I’ve included that in the book Food Plague because I wanted not only to give them the truth about GMOs, glyphosate, and those things, but also: what are we going to do about it. From a consumer’s perspective, that’s really where I recommend that they start. It’s really simple. I’ve written it for consumers.

Now, if they are farmers, and they want to get a little more sophisticated, I suggest they come to a three-day course. They can subscribe to Acres USA, like you have. There are a number of resources there. Go to an Acres conference. They’ll be able to meet farmers doing various different things.

Connect with a couple of companies out there – International Ag Labs, Agri Energy Resource, Advancing Eco Agriculture, FHR, and Midwest Biosystems. There are several organizations out there that are consultants. Yes, they have products. Of course, they’ll have products; that’s how they’re going to make a
living. But they have seminars. They have field days that farmers can go to actually see what’s going on in a farm and then participate as well themselves.

The books, as I already mentioned, Science in Agriculture and Anatomy in Life and Energy in Agriculture. Those are primarily farm books as far as this program, where do we start, and how do we do that. There are also videotapes available. Acres USA has my three-day course on DVD, as well as individual lectures that I have given and other people have given through Acres USA. They can go there and look at those things for resources.

**DM:** Terrific. I think Acres is a phenomenal organization and clearly one of the only types of its organization in existence actually. You’re one of the leading speakers there on a regular basis. The challenge with that – just a small caveat and warning – is that these conferences are typically held in relatively remote farming locations. They’re not in very easy-to-get-to locations and usually require multiple connections to get to.

**AA:** Right. Sometimes that is a problem for some people, to get to that. But as you know, the Internet today… A lot of that information is available on the Internet now. They can take courses. They can get YouTube videos. They can read books. They can get DVDs. A lot of those things they can bring right into their home.

**DM:** I just want to take a little tangent for a moment on a related topic – the vortexing – which you alluded to earlier. One of the leaders in that was Viktor Schauburger, who was a German.

**AA:** Yes.

**DM:** He’s a contemporary of Steiner. Both of them are no longer with us. But it’s an interesting concept, which essentially restructures the water. Dr. Gerald Pollack, who’s a biophysicist at the University of Washington and who I previously interviewed, believes that that restructuring actually changes the chemical structure, too. Instead of H2O, we have H3O2. It changes the physical characteristics and the physics of the water, and provides enormous benefits.

The reason I mentioned it now is that you could integrate this into the application of the farming or the gardening. Not only do that but integrate the vortexing with the compost tea, and actually grow these microbes to levels… This is very similar to what we do when we ferment vegetables. In a normal two to three ounce serving of fermented vegetables, you can have essentially the equivalent of one bottle of 100 high-potency capsules. Because their doubling time is relatively rapid – 20 to 30 minutes – you ferment it for a day, it’s going to go up by 2 to the 20th or 24th. It’s just an enormous level. I’m wondering if you can comment on the application of those two principles.

**AA:** Yes, the whole vortexing technology. I mean, now we’re really starting to get into advanced physics. That information is out there for people to read about. You mentioned Schauburger. What a lot of people don’t understand is that also Schauburger had done a little work during the Second World War on free energy devices, as well as Steiner really was the guy who talked a lot about vortexing all of your fertilizers before you apply them.

We know today that vortexing absolutely fundamentally changes the results that we get with a given fertilizer. You take a fertilizer. You split it. Maybe the exact thing the plant wants… Let’s say, we’ve checked the refractometer reading. We spray it out there, and you get a result. You take that same mix now, and you vortex it appropriately. What I mean by “appropriately” is either left-hand or right-hand spin. You now go out and apply it. You get even a greater result with that same product. You may actually use less than you did originally on that.
No question about it: it changes the product itself. It can be a lot of fun. The whole biodynamic approach is about vortexing fertilizers and materials in order to enhance them. This is, like I said, advanced physics. There are some very fundamental things going on. GEET technology, for example, that was put up by Paul Pantone, looking at the vortex approach in nature to being able to actually transmute elements and change fuels, so that we have more efficient utilization of various fuels, even water, for burning in an engine.

So, yeah, that technology has been out there for quite some time really. Now finally, I think, the general public is starting to catch on to it, whether a person is a novice or a professional physicist. It’s being applied not only to agriculture but also to human medicine and to industry. It’s something that in and of itself is a study. Part of our training that we do in our three-day course is we talk to farmers to make sure that before you spray that out, you vortex the fertilizer.

**DM:** Yeah, this is technology that is readily available for purchase today. Actually I have a 15-gallon compost tea brewer that I employ someone to... It takes about four hours a day to spread that over the property. Every day, we’re applying 15 gallons of compost tea to improve the quality.

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**AA:** Right.

**DM:** It’s just part of this puzzling mystery to see how it interacts with the plants and improve the resistance to pests and improve the nutritional quality.

**AA:** That’s right.

**DM:** I actually haven’t integrated the application of the Brix readings. Thank you for those specific details on how to do that. You’ve given us a lot of good details and, more importantly, I think, the information on how we can acquire more specifics if we’re so motivated. I’m wondering if there are any closing comments you’d like to make with respect to summaries or points you’d like to emphasize.

**AA:** Yeah, absolutely. I think the most important thing that the consumer needs to understand is that the mantra that we have to have genetic engineering in order to feed the world is an absolute lie. It is not just a fad statement; it is an absolute lie. It is quite the opposite of that. If we continue to perpetuate genetic engineering, we will destroy the population of the earth and the soil.

That is hard data shown at the universities already relative to yield data. Every statement that has been made about how wonderful genetic engineering is in crop production as far as increased yields, decreased water use, etc. are flat lies.

There was a study done out of Europe this past year comparing the United States genetic engineering trend in crops versus the European non-GMO trends. They are advancing way beyond us relative to yield changes. Their yields are improving better. Ours are going backwards.

The other thing about it is that the whole safety issue and the nutritional issue. We have to understand it is all just hype that genetic engineering of food is necessary to begin with. The reason we have weeds, diseases, and insects is that [there’s] a nutritional problem in the soil – not a genetic problem in the soil or the plants. We do not have a gene problem; we have a nutritional management problem.

Yes, it takes more brainwork. It takes more fieldwork. You got to get out in the field and actually participate in the growing of the crop. That’s one reason why a lot of so-called high-tech farmers don’t like that. They don’t want to have to participate in that problem solving issue. Why are the insects there? Go out in the field and evaluate that.
The consumer is who we have to get to. We have to have labeling. We have to be able to know what’s in our food and be able to make a choice: no, we don’t want it. Non-GMO, high-Brix food is what we need in order to be healthy and is what we need in order to solve the environmental problems. The GMO technology is just perpetuating more environmental problems and perpetuating more human health problems.

We have the technology to solve these things. We have the personality to solve these things. It’s the consumer who really holds the power with their voting dollars every day at the grocery store.

**DM:** Yes, indeed. Thank you for that encouragement. I could just make a slight recommendation here. It’s that many people may not have access to soil to sort of practice. But one of the things that almost everyone can do, even a college student in a dorm room who is sharing it with someone, is to take a little potting tray and grow sunflower seed sprouts. Literally you can raise them to harvest within a week. It’s a very rapid turnaround. To me, that’s a very phenomenal approach to put your toe in the water and get that satisfaction, that feedback, and that enjoyment, which could help stimulate your interest from doing this as a hobby to going into it at a deeper level.

**AA:** Right.

**DM:** Plus, in my understanding, these sprouts are far more nutrient dense than the actual plants that grow up. You’re harvesting them at a higher level, and you’re really able to feed yourself and your family this phenomenally healthy food.

**AA:** Right.

**DM:** So, thank you for everything that you’re doing. We’ll list those resources on the webpage when this interview is up for people who are interested in learning more about what you have to teach. That would be terrific.

**AA:** Great. Thank you very much, Dr. Mercola. You have a wonderful day. Keep up the good work as well.

**DM:** All right. Thanks.

[END]