GMOs REVEALED

Episode 7
Transcript

Patrick Gentemp: Welcome to episode seven of GMOs Revealed. I'm your host Dr. Patrick Gentempo. We've got something very unique as the first interview for episode seven. Toni Bark interviews a farm consultant named Robert Saik. Now, here's what's unique and interesting about this, he is very pro-GMO and he's also, I would think, a little cocky or arrogant. Throughout the interview he's saying, "Oh you'll never say this, you'll never leave this in, you're going to edit this out." We decided to air the entire thing and let it be shown. We have nothing that we're afraid of to show you and I want you to see what the other side looks like for the people who are pro-GMO.

Now, I'm going to tell you because we did the entire thing unedited it starts out a little bit slow but boy does it heat up. I'm going to let you be the judge. You look at Toni interviewing this person, you see the information that comes out, and you draw your own conclusion. I think this is a unique twist. I think you're going to enjoy and I can tell you it gets pretty fiery so give that one a good look.

Then, after that I'm interviewing Greg Horn. I've known Greg Horn for many years. He's the former CEO of GNC Stores. He's spent his life in health and nutrition and Greg has special expertise and unique context when it comes to GMOs so take a look at that interview. I think you're going to find it to be fascinating. Enjoy this episode.

Toni Bark: I'd like to start out with you telling me your name, and what you do, what your business is, the name of your business. If you could just give me a brief introduction.

Robert Saik: My name is Robert and I'm the founder and the CEO of the AGRI-TREND Group of Companies. I'm a farm boy, grew up on a farm in Northeastern Alberta, currently live in Red Deer, Alberta. Our organization helps coach farmers so we have six different disciplines that we have that we work with farmers in the areas of growing the crop, selling the crop, and managing the money. We have coaches that work as agronomists, we have coaches that work at geo-spatial integration, technology integration. I have coaches that work on grain marketing strategies and I have coaches that work on farm business management strategies such as balance sheet and succession issues. We manage all that on an

integrated strategy, a data system that moves the data from growing the crop, selling the crop, managing the money, in a completely integrated fashion. It's a pretty unique business.

We have 28 PhDs and Masters in our organization. We don't sell fertilizer, chemical, seed. We don't sell any crop protection products. We don't buy grain, we don't sell equipment so we get paid by integrating ideas and technology and providing leadership to farmers through technology integration, and science integration, and data management services. We help farmers make better decisions and give them confidence. Our work really is helping farmers allocate scarce resources to produce a safe, reliable, and profitable food supply in an environmentally sustainable manner.

I also have the opportunity and the privilege in agriculture to travel extensively and I've been able to travel a good chunk of the world in agriculture observing what's going on in our industry.

Toni Bark: It sounds like your business is a very holistic or integrated business in terms of being a consultant, financial and maybe business planning for farmers, for commercial farmers. Is that really-

Robert Saik: Our legacy company, the biggest part of our business really is the agronomy. I've got a bachelor of science degree in agriculture so I'm not a PhD, or a Masters, or anything but my trade would be plant physiology, crop nutrition, and soil chemistry so that's my strength. Through the course of time, through the 17 plus years we've been building -agriculture and I've migrated my roll more into business management I spend actually a lot of time these days on technology integration. Satellite integration, sensory integration, and data management is where I'm spending a lot of my time these days but we have a very powerful organization on the ground that works with farmers literally from all across Canada and as far north as you can farm in Canada all the way down through the Pacific Northwest. Through North Dakota, South Dakota, we have business going on in Iowa, Indiana, Kentucky, Tennessee, Mississippi. We're looking at opportunities right now in Connecticut, and Delaware, and

Washington State. We deal with all kinds of crops and we deal with all kinds of farmers so that's our business.

Toni Bark: You're not consulting internationally. It's really North America for the most part?

Robert Saik: We've done some work in Kazakhstan, Ukraine, Russia. I've traveled extensively in Europe. I've spent some time in Kenya, on the ground and I've done work in Brazil, Argentina. I've traveled Peru, and we're incorporated in Australia right now as well. We haven't got active operations in Australia but we're incorporated in Australia.

Toni Bark: You're really international.

Robert Saik: Yeah.

Toni Bark: It's not just consulting for farmers in Canada and in parts of the US. It's for farmers all over the world.

Robert Saik: Exactly. Yeah. I've been able to observe agriculture globally and it's fun. It's a great business.

Toni Bark: How many years have you been doing this for?

Robert Saik: My whole life. I started out as a farm kid renting farmland when I was 14 years old and then I migrated into my degree through the University of Alberta. Then got into the whole business of farming. I bought some land when I was 21. I missed the peak of the interest rates by about a week so I had about 18% interest rate so I understand that side of farming.

Toni Bark: How many years has AGRI-TREND been in business?

Robert Saik: We incorporated our company and founded it in 1997 so it's been 17, going on 18 years now that we've been in operation.

Toni Bark: That brings an interesting question up because in 1997, at least in the United States I'm not sure about in Canada, I think is really when we started seeing GM crops being planted in a large way. That was really around the time that things switched over, that we really started seeing the increase in planting of GM seeds.

Robert Saik: No question. Genetically engineered crops started making their way significantly into Canada with the introduction of genetically modified canola and that's been one of the strongest examples, in Canada anyways, of a GE crop that we started. I think your timing is about right, that circa '95 is when it started to really start to become a very important part of the work that farmers were doing.

Toni Bark: Tell me about that. You feel it's a very important part, I'd like to hear about that. You started your business as GM was already just booming so it would've been interesting to hear if AGRI-TREND was in business, let's say, '89 what the difference was in '97 when we started seeing canola, and soy, and corn really to a large-scale being planted in terms of not just conventional but the genetically modified.

Robert Saik: That's really interesting because growing up as a farm kid and growing back then, what was called, rapeseed and then migrating to open pollinated canola, which was a predecessor to the genetically engineered canola ... as I worked on the farm and I worked in the industry so I had an opportunity to work for [Oil-enco 00:07:36] the Eli Lilly company. I worked for them for about 6 years and then I founded, in my 20s, I founded two retail fertilizer companies. One in Alberta and one, later on, in Saskatchewan.

The Alberta company worked on ... the Alberta retail business that I was involved in focused in on the traditional crops in Canada: wheat, barley, canola, oats, that sort of thing. Then in the Saskatchewan business I was also involved with potatoes, and chick peas, and lentils, and pulse crops like peas so it gave me a real good understanding of how all those crops ... It was really interesting for me to be able to witness and to experience firsthand the evolution of the farming practices that we had in the 80s and maybe even in the 70s. In the 80s and through the 90s into the 2000s to today.

I have very, very good perspective on watching how farmers adopted this technology and the differences it's made in agriculture particularly in Western Canada but all throughout Canada corn, soybeans, and then now down in the United States with the crops that they're growing here but also

internationally I've been able to see that progression happen. It's been very, very interesting to observe.

Toni Bark: In terms of how farmers plant conventional versus GMO ... and I'm bringing up the GMO because, as you know, in this film we're looking at conversations regarding-

Robert Saik: Absolutely.

Toni Bark: In terms of the benefits or the advantage that you see for farmers to plant GMO versus conventional seeds. I'd love to hear what that is.

Robert Saik: I'll start off by talking about canola because it's a large crop in Canada and virtually 90% of the canola crop is genetically modified. Canola crop was bred specifically to improve the health aspects of that oil so low glucosinolates and low urea acid made that oil much healthier from canola versus rapeseed. When I started my career we saw that migration from rapeseed into canola, which is now spread throughout the world, that oil profile. Incidentally, just as an aside, it was the health food of the year. Forget about the year it was but it was the United States health food of the year. I'd call it 5 to 7 years ago.

Toni Bark: Who determined that? There was industry behind that.

Robert Saik: I'm sure there was but it was, it was declared.

Toni Bark: Let me ask you, was there a benefit in terms of the yield? Was there a benefit in terms of being cheaper to plant?

Robert Saik: The practice?

Toni Bark: Right because I know your field is really helping the farmer so I'm assuming keeping the cost down, better yields per cost, that would be-

Robert Saik: I think some of the things that happened as a result of the technology and some of the advantages for farmers were that ... In the early part of my career we used a lot of pesticides to grow canola and a lot of them were soil incorporated pesticides so we had a lot of tillage going on. I know that in the 70s and the 80s we often tilled canola ground. Once in the fall, maybe twice and then maybe two

times in the spring before planting all in an effort to adequately distribute pesticides in the soil that we would've sprayed on. Or we would've planted that crop and then used multiple applications through the growing season. As a result of having genetically modified or genetically engineered seed the farmers have been able to significantly reduce the amount of tillage that they use to grow the crop. So much so that many of the farmers today actually don't till at all so they'll be able to seed that canola crop into standing stubble from the prior year and rely on the weed control benefits that come to them as a result of the GE technology.

I think that's one of the most profound things that I've seen in terms of change in cultural practices. That lends itself to a whole bunch of benefits. I see a lot less soil erosion. I see a lot less degradation of organic matter. I see better water infiltration, better water percolation, less soil particulates or dust in the air so there's an improvement there. I see better water use efficiency from the crop and those are all the environmental things. Then, of course, the ability of a farmer to be able to plant in a one pass operation, or maybe two at the most, significantly increases his efficiency. We're driving down the amount of diesel fuel we're burning and, quite frankly, the technology works really, really well. The crops are clean and we're not using as much pesticide to grow the crops, not by a long shot. It's way down.

Toni Bark: That might be certainly with canola. I'm not as familiar with the genetic modification of canola. It's not like Roundup ready, it's not glyphosate ready, and it's not BT like corn.

Robert Saik: No, it is, absolutely.

Toni Bark: It is BT.

Robert Saik: You've got several things too. You've got Roundup Ready canola.

Toni Bark: Oh, you do? Okay.

Robert Saik: You've got Liberty Link canola, which is glyphosinate and so we've got rotation that happens with those two different herbicide groups. You've also got related technologies such as Clearfield canola, which is not a GM but it is engineered to

be resistant to a different herbicide group. Herbicide groups and herbicide rotations are very important, it doesn't matter whether you're an organic farmer, or you're a conventional farmer, or you're a GE farmer that management of herbicide rotation is really critical. The same would be said of soybeans and corn is that it has allowed the farmers to dramatically reduce tillage in their operations.

Toni Bark: You had mentioned reducing the pesticide use and I don't know if you're being very specific that pesticide is a pesticide or if you're looking at also herbicide. I know from 2008/2009 studies, we're looking at over 8000 from universities, from agricultural departments in the United States the actual amount of Roundup having to be used on Roundup ready soy increased by over 382 million pounds just for using genetically modified crops. They require so much more because they become so resistant. It's interesting that the canola, according to what you're saying and I haven't looked at that data, but with canola that hasn't been the case. With soy the actual increase use of chemicals has increased because it's not pesticide but the herbicide use has gone way up.

Robert Saik: I don't have any problem with what you said Toni, but you said that the increase of glyphos- went up. Makes sense, as they move towards more Roundup ready crops the use of glyphos- should go up because that's occupying a larger percentage. If you look at the total amount of pesticide that's used, the total amount of pesticide used in corn production in the United States there are also studies out there that total pesticides have gone down.

Toni Bark: By 64 million.

Robert Saik: Glyphos- has gone up but total pesticides have gone down. The other side of that equation that I think is the untold side of the equation is that the toxicity of the products that we're no longer using, like atrazine for example this is a tough product. There are a lot of insecticides ... and you're exactly right. I use the word pesticides but we could go a little deeper in the discussion of herbicides, insecticides, and fungicides and we could delve into that. I agree with you that the use of Roundup has gone up and probably still continues. I don't know what the current stats are but during

that era when the introduction of GE crops came in without a doubt Roundup sales and Liberty sales went up because that was what farmers were moving towards but they weren't using other products. I use those products, I use those other products and I don't want to go back to using those other products again.

What we're using today, handling wise and safety wise for the workers and the people that are doing the work, is way better than what we were using in the 70s and the 80s. I don't want to go back to those products.

Toni Bark: While what you're saying is true, and it is true that pesticide use went down and it went down in the first 13 years of introducing genetically modified soy by 64 million pounds so that's huge but-

Robert Saik: Can I ask ...

Toni Bark: That's for the corn.

Robert Saik: You referred to a study, which study did you refer to? As you know, there are many studies out there some that will show you that pesticide's use has gone up, others that will show you pesticide use has dramatically decreased and a lot of them are computer extrapolated studies.

Toni Bark: This is based on the NASS and USDA's data so just based on their data alone I've looked at a few meta-analyses and there's one specifically by Benbrook, I'm sure you're familiar with Charles Benbrook's name, but if you actually do look at the data-

Robert Saik: Benbrook's study is widely debated.

Toni Bark: I'm sure but there are other people who've looked at the data, the data is the data and it's not just here it's also in Argentina and in some other countries. Argentina has put together their equivalent of the NASS-

Robert Saik: Let's talk about Argentina, let's get to there-

Toni Bark: I was about to get their safety.

Robert Saik: We'll get to Argentina in a bit.

Toni Bark: Yes, the pesticides are very toxic and they've been reduced, 64 million pounds in 13 years is a lot, but 322 million pounds of increased glyphosate is also a lot and the safety has been challenged. You're talking about it's much safer for the workers but I know in the [She-ko 00:17:55] region in Argentina the government, the local government did a study on what was coinciding with the increased glyphosate because of Roundup ready crops and what they found is that pediatric cancers went up threefold and birth defects went up fourfold and it was directly related to the increased use ... and it was for the workers by the way. This is in the region where they're growing everything. Atrazine was bad but it certainly looking like workers, for people working around the glyphosate a triple increase in pediatric tumors and cancers and a quadruple increase in birth defects is also not probably a good health outcome.

Robert Saik: I can't comment on that study specifically but I do know the study and I don't know the intricacies of the study. I also know that there are a lot of folks in the industry wondering and a lot of people, scientists, et cetera that are looking at studies like that and saying, "How was it done?" I'm no PhD and I'm not going to even speculate. Would the workers have been exposed to more toxic pesticides without GE? I think, absolutely.

Toni Bark: Remember, they were already planting so they switched. We're talking about they were being exposed prior and then when they switched they started seeing this increase. This was a governmental study looking at data, that's all it was.

Robert Saik: You want me to agree with-

Toni Bark: No, you don't have to agree with me.

Robert Saik: I can't because I can't comment on the study, I don't know it.

Toni Bark: I'm just bringing up the notion that while you looked back and he said, "Oh wow atrazine was bad now looking back at it," it could be possible for you 10 years from now to look back and say, "Wow, I didn't realize-"

Robert Saik: Geez Toni, I don't know. If you look at atrazine or you look at some of the compounds that we used to use to grow our

crops, and I'll say this again I don't want to go back to those compounds, and the reality is that Mother Nature is a ferocious opponent to growing food. She throws everything at us whether it's a disease or insects coming in, weed pressure Mother Nature is a formidable opponent and farmers out there need tools to be able to grow the crops that we have. Again, to go back to the technologies, and it seems like a lot of people want us to retract to the 60s, 70s technology, as a farmer and as a person who works with farmers I don't want to see that happen. That, to me, is regression.

We have a lot of real positive things going on. I don't want to go back to the technologies that we're using in the 60s, 70s, and 80s. To me, it's environmentally risky, environmentally harmful, and I don't think that it's particularly sustainable. I think that the technologies we have today are better and I think that we'll learn more and more as we go along too. The amount of information that we're digesting in society today and the amount of data that we're processing in all aspects of genetics, there's petabytes of data almost on a weekly basis so it's phenomenal the amount of information we're getting and I think we're putting that to pretty good use.

Toni Bark: You mentioned sustainability and I know, from talking to and reading, plant pathologists and plant physiologists talk about the glyphosate how it interferes specifically with magnesium and manganese uptake, and all other minerals. Not just those minerals, not just the manganese but all minerals are reduced and there's increased plant pathology with these new genetic modifications. In fact, some of the crop deficiencies seen in the genetic modified soy has been attributed, half at least has been attributed to something called splitting, soy splitting and what has been thought is that it's part of the genetic modification process, the transformational process in the lab with the genes.

Robert Saik: A couple things going on in what you just said there. One is the manganese issue, I think, is something that all farmers need to pay closer attention to. Manganese is part of a suite of micronutrients in soils. Micronutrient deficiency globally is a very, very serious problem. Zinc deficiency, iodine, iron deficiency. Zinc deficiency is such an issue that when a

pregnant woman has a zinc deficiency the child is born with less mental capacity, you can't correct it. These micronutrients and soils ... and this is interesting because I actually spent about six years working in the area of micronutrients. These micronutrients in soils are declining over time and the mechanism you're referring to is the shikimate pathway inside the plants. Does glyphos- effect the shikimate pathway? It may have an impact on manganese. It may. There are people that says that it does, there are people that says it may not have as a big an impact as others purport.

However, regardless of that, whether you have conventional or whether you have GE soybeans, my observation Toni in the field, conventional soybeans, or Roundup ready, or any of the GE soybeans is that we are seeing more manganese deficiencies in soybeans. We're seeing more manganese deficiencies because we're seeing more manganese deficient soils. If you track oats, for example, and oats is a high manganese using crop, it will exhibit very cleanly, it exhibits manganese deficiencies in its physiology. We can see that in soybeans as well. Is there an issue with manganese in soybeans? I think there is. Is it correlated to glyphos- use? Maybe, I'm not a scientist but it may be. What could we do about it? I think that what we should be doing about it is what we've been doing with our farm customers, is addressing those deficiencies in the soil.

I can tell you that in Canada, for example, parent material is low in copper so a lot of the wheat that we grow has been declining in copper levels in the wheat. You could say, is that the wheat's problem? No. The soil over time needs to be replenished. We're seeing the same thing in zinc, and we're seeing the same thing in manganese, and calcareous soils, we can see the same thing in iron. Is there something there? Yup, I think there might be something there. Is it related specifically to Roundup, and the shikimate pathway, and interference? Maybe, maybe not. Are we seeing more manganese deficiencies in soybeans? Yes. We're seeing that though in conventional and Roundup ready soybeans and I started-

Toni Bark: We're not seeing it on organic. All these soil-

Robert Saik: Where would your organic soybeans get the manganese from?

Toni Bark: Let me explain. All organic where they're grown not monocrop. What we see is soil deficiencies are increased in monocrop culture. That doesn't relate to the genetic modification issue. It relates to how large farms grow.

Robert Saik: That spills over into another area of discussion and a valid one. We're sitting today in Iowa and this is corn and soybean country, that's what this is. It's blessed. Iowa, Indiana, and Illinois produce more corn than almost the entire southern hemisphere of the world. The three I's are big. The reason they do this is because they can. They grow corn and soybeans. Your people call it monoculture but they do it because most parts of the world can't and they do it here because it's economically viable and it's what the farmers can do here.

In Canada, we have a little bit more diversity but we can't grow as much corn and soybeans because we can't. We grow canola, and wheat, and barley, and rotate with some other crops. You would argue or you would say that our cropping patterns are better because we have more rotational crops. I wouldn't argue against that. At the same time these guys know how to grow corn and soybeans and they feed the world with corn and soybeans.

Toni Bark: That's interesting that you said they feed the world because most of this is feed corn and a lot of feed soy and Third World countries really can't afford meat and they don't use meat for their protein. I'm wondering how. You say they feed the world, if you could explain to me because that's very confusing for me.

Robert Saik: The reality is that the North American population needs ... needs, likes. It likes its protein as meat, right? This area, the corn and soybeans that are grown going to feed. They also go, by the way, from Brazil and Argentina into the European economic community for the same purpose. By doing that we're not pulling feed and food from other areas of the world backwards so we're feeding this area ... Do you follow?

Toni Bark: Kind of. This area is not starving.

Robert Saik: No, of course, not. It's not starving because 2% of the population feeds 98% of the population because of the ability to grow the corn and soybeans to feed the livestock that we enjoy. We are, when I say feeding the world, North America's part of that world and so it's significant.

Toni Bark: Fair enough but what I would say is that ... and maybe it's not you. I've looked at your site and I've read some of your blog. I thought that I saw that your take on GM crops is that it helps feed the world, feeds poor people and starving people.

Robert Saik: I think it could.

Toni Bark: Could because it doesn't. You do admit that it's not right now? There's no nutrition that's getting to-

Robert Saik: One of the reasons I wanted to be here was to talk about that. There's a couple of points and I know that this will be cut but there's a couple points that I do want to cover with you. I want to cover Argentina and Brazil because I want to talk about that. Then I'm going to get right now into Kenya, for example. Toni, there's a couple of points I want to make about that and this is really the reason I'm here today. The reason I'm here today is because I believe that as opposed to many of the previous breeding methods that we've employed in our culture RNAi technology or transgenic technology both those, RNA has gene switching and transgenic we'll talk about that a little bit later but, those technologies are so much more exact than what we've been living with and they offer us the opportunity to genetically modify crops to be more salt resistant, to be more water use sufficient, to have higher nutrient density. When I talk about feeding the world with genetically modified crops or using that technology to help feed the world I'm very serious about that.

I just got back from Kenya. I went to Kenya and I was working on a project with 14 schools, orphanages, and clinics and every one of them has gardens and we're trying to help them grow these gardens. While I was in Kenya I talked to some doctors there about serious nutritional deficiencies in Kenya and it was caloric intake. They simply didn't have enough calories. The second thing was vitamin A deficiency.

It was very rampant and a serious problem. Then came iodine and zinc was a big issue in Kenya.

I've had the opportunity, the good fortune to be able to travel through a lot of bio tech laboratories and see a lot of work that's being done. The Danforth Center in St. Louis has developed a cassava crop that is resistant to a virus. The cassava is tapioca for us in North America but it is a root crop and grown in the soil and it can stay in the soil for up to 18 months so you could harvest it when you're hungry and eat it. This virus decimates that crop, absolutely decimates that crop. The Danforth Center has done a lot of work on this and this research work's supported by the Bill and Melinda Gates Foundation and it's very, very effective. It sits on the shelf in Kenya because the Kenya government, right now, is paralyzed over the GM debate so it sits there. There's a technology that could help feed the poorest people on the planet and it sits there.

Another one, whether I bring it up or you bring it up, will be golden rice. I think there's people on both sides of the fence of that but the reality is that technology has sat on the table since 2002 and a genetically modified rice fortified in beta carotene, allowing people who eat it to have higher levels of vitamin A, I think that helps some of the poorest people on the planet. My concern about the railing against genetic engineering in North America is that we, and I'm saying the fat 'we' of the world, are potentially hurting some of the poorest people on the planet. I could go on with other advances in genetic engineering that have nothing to do with Monsanto that have made a difference in food quality historically. We could talk about papaya, for example.

Toni Bark: Let me ask you about the rice. It's a great example because in order to get your daily requirement, which is not a lot, you have to eat 14 bowls of that rice. 14 bowls of rice is a lot of empty carbohydrate, which is actually not good for anyone so that's why it really hasn't panned out.

Robert Saik: It hasn't panned out because it hasn't made it to market. Studies that I have seen said that golden rice eaten in regular daily quantities will make a difference to vitamin A levels inside human beings. That's what I read in studies I've looked at.

Toni Bark: To get your normal daily requirement for an average adult 14 bowls are a lot that's not-

Robert Saik: One or two bowls, one bowl would give them something as opposed to nothing.

Toni Bark: At what price?

Robert Saik: What is the price?

Toni Bark: I don't know.

Robert Saik: The price is free. They've already said that the golden rice will be given free.

Toni Bark: The first year.

Robert Saik: No, free to the poorest farmers on the planet, free.

Toni Bark: Indefinitely, every year? They get free seed every year?

Robert Saik: Those are the agreements that I have seen. That's what I've read.

Toni Bark: Do we know what the health outcome is? My question is this-

Robert Saik: I know what the health outcome of vitamin A deficiency is.

Toni Bark: I do too, I'm a physician but I also know what the health outcome is of having endocrine disruptors in your system, of having the shikimate pathway of the bacteria that's in your biome-

Robert Saik: Now, you're tying glyphos- in with the vitamin A.

Toni Bark: What I'm saying is we don't really know what the long-term use on mammals is. Without knowing-

Robert Saik: Long-term use of what? Glyphos- or golden rice?

Toni Bark: Golden rice. There's genetic modification so with every genetic modification we've seen, like with Roundup ready, there's more glyphosate used and we also have-

Robert Saik: How do we then advance the science of plant breeding? What are the alternatives? If you don't like genetic

engineering and transgenics, you don't like RNAi then what is the alternative for us to use?

Toni Bark: You're implying that we have to do plant genetic science. What I'm saying is sustainable farming and helping subsistence farmers this is probably more of a political issue really than a scientific issue. If you look at subsistence farmers in countries like India and in Brazil where there's been genetic modification crops brought in it hasn't decreased poverty, it's actually increased poverty, increased suicide of these farmers. It's been a political issue. I'm not saying there's not some valid genetic modification, there certainly could be but so far it hasn't panned out the way the industry says it would. We don't see poor Third World nations being fed nutritionally because of genetic modified plants being grown anywhere. It's mostly soy and corn. In terms of numbers its cotton, canola, soy, corn, those are the bigger numbers.

Robert Saik: Those are the only ones that have made it to the market in substantial quantities. I agree with you ... you're pointing out the obvious but to get a crop that is genetically engineered to market today will take 13 years and over $136 million. There are what? 165 genetically engineered events, that's what they call them, 165 genetically engineered crops approved in the United States today, that's how many there are. The cost of getting one of these things through the regulatory process here is so onerous that only companies that have got significant resources can get there. Consequently, they're concentrating on the biggest crops in the world, which are corn, cotton. Some of the crops that we really need help in, some of the crops that would feed the poorest people in the world, and some of the crops that would benefit the most from genetic engineering aren't being given a chance.

There are four main streams of crop propagation today. We have conventional breeding so you grow your crops in the field and you cross pollinate and this is conventional breeding. You're trying to cause nature to smash together genes from one variety and another variety, and you're trying to smash these genes together and you do that through conventional breeding methods, through pollination, and so

on, and so forth. You may disrupt or you may introduce 30,000 to 100,000 different gene disruptions as you seek to seek out the mutation, which is what it is. You seek out a mutation in that crop ultimately that you want to take as a new variety forward. That's conventional crop breeding. By in large, most crops are still propagated that way and it's going on all the time. There's not a crop that we eat today that hasn't been manipulated by man, that's just the fact.

The other one that people don't understand is mutagenesis. Today, there are close to 3000 organic crops that owe they're genesis to mutagenesis. Mutagenesis is the bombardment of seeds with nuclear radiation or the submersion of seeds in carcinogenic chemicals. I'm really serious about this, this is what the industry has been doing and it's on the rise again. This type of breeding is on the rise again.

You contrast that to RNAi technology, which is the flipping of three or four genes, usually one to three genes that exist inside of the plant and you flip them around such as polyphenolic oxidase enzymes in the arctic apple. Or transgenic where you take three or four genes that have a trait, and a good example of this one ... and this would actually dovetail in both the questions you've asked, wild potato has been found that it's resistant to potato blight. They can isolate the genes inside the wild potato and splice it into conventional potato and have conventional potato varieties that have all the attributes that we're comfortable with but are also resistant to the blight. Because it's genetically engineered that has not made it to market. Instead what we're doing to fight the blight at field level, and this is again why am here today, is we're spraying between 6 and 16 applications of fungicide on potatoes.

Now, I don't know about you but I do know about me. I would rather take the genes out of wild potato and splice them into conventional potatoes that would be resistant to the potato blight. The irony is it was done by Irish scientists.

Toni Bark: I agree with you on that one. That's not taking a gene from an insect or something from a foreign kingdom of the plant. You're taking a gene from the potato itself a Solanaceae plant to another Solanaceae

Robert Saik: Exactly.

Toni Bark: I don't think many people-

Robert Saik: If you go to the memes that are on Pinterest or Google and you look at it they talk about the splicing of fish in the tomatoes and there's all these different things. That hasn't happened. The reality is most transgenic work has between the same species.

Toni Bark: The BT corn, you're saying-

Robert Saik: BT corn is a great example of a technology that was ... the thuringiensis, right?

Toni Bark: That's a bacterium.

Robert Saik: Right, it's a bacteria that's been put inside. Organic farmers use BT extensively, they use it all the time. It's a pesticide that's used in organic farming and they use it all the time, and that's what they're using. That BT is now inside of the corn and inside of the soybean now in Brazil. Intacta, it's the first year that they're growing Intacta commercially in Brazil. Having that BT inside of the plant reduces the amount of insecticide applications that the farmers have to use dramatically.

I was just on a farm in Brazil in March of this year and they said the Intacta will knock down their insecticide applications 4 to 6%. I'd like to do toxicology studies on those workers and find out what the benefits are.

Toni Bark: I would too. One of my questions to you would be this, in terms of approval for safety, the safety studies the FDA has decided that there's really no difference between genetic modification and non-genetically modified seeds in plants and so therefore the safety, the long-term safety is really ... they just got approval because it's assumed that there's no difference.

Robert Saik: No, that's not accurate.

Toni Bark: That's not accurate?

Robert Saik: No, it isn't accurate. Right now, if you look at the approval of conventional crops or mutagenesis generated crops neither one of those has to go through an FDA approval process. You don't know how many genes were switched, you don't know what the long-term ... If you're talking long-term there's no such thing as being 100% sure of anything. That's the nature of science. You're never 100% sure. If you're questioning the long-term effects of a breeding program and you say, "Well, we're not sure of the long-term effects," I would be much more afraid of the long-term effects of mutagenesis breeding than I would be of RNAi or transgenic breeding. I've looked at this quite a bit and those two breeding methods, conventional and transgenic, do not have to go through FDA approval.

Now, people will say, "Well, the FDA approval process is voluntary." Technically it's voluntary but no seed that is genetically engineered has made it to the market, will make it to the marketplace without FDA approval. Then it got a go through the USDA. Just for me to finish the statement, it's conventional crops, mutagenesis crops are not treated the same way as RNAi or transgenic crops. Those ones have to go through regulatory process, those ones have to go through approval processes. They have to have studies that are generated to have them approved so the FDA is very careful in terms of the approval process and the same thing with CFIA in Canada. These other crops that are bred and they come on the market ... if anybody picks up a gardening journal and just whips it open you have all of these crops that are coming on all the time. These new varieties of tomatoes, and new varieties of lettuce, these new varieties of potatoes. Where do they come from? They come from-

Toni Bark: Hybridization, right?

Robert Saik: Conventional breeding, that'd fall into there, yeah. They come from a process that doesn't require regulation and yet we have a regulatory process under which the GE crops must fall and people say, "Well, we want more," well then let's put all the crops underneath the same study.

Toni Bark: The difference is-

Robert Saik: You'll never approve anything as safe then, you couldn't.

Toni Bark: The difference is a hybridization, let's say, nectarine, hybridization of fruit happens, or vegetables, or any plant happen outside of a laboratory. They can happen haphazardly.

Robert Saik: They can happen.

Toni Bark: They can come right they can and they do. The difference is when you take something into a laboratory and now you're taking genes from a bacterium, or a virus, or another species of some sort you're inserting, you're translocating the genes, you're splitting genes, you might be affecting the shikimate pathway, you might be affecting other pathways that actually effect mammals and the person eating them. It's different that just a hybridization where it was a crosspollination. That's been going on for millennia.

Robert Saik: You say it's different, I say it's not because the mashing together of what's going on in the field by researchers plowing together ... I just read something about plums and ...

Toni Bark: A pluot.

Robert Saik: Yeah, that's not natural. That is not a natural fruit but are plums a natural fruit? Where did they come from? You got this, what is it called?

Toni Bark: Pluot.

Robert Saik: You got this pluot. Okay so you got this pluot, what are the long-term implications of that? How is that different and how is that somehow better than taking a tomato and increasing the antioxidants in a tomato through bioengineering where you're dealing with one to four genes and here you're dealing with an unknown number of potentially hundreds of thousands of genes that have been mashed together? You don't know the long-term effect of that. I would argue you probably know more about the long-term effect of transgenics than you do about some of these mutagenesis.

Toni Bark: How would you?

Robert Saik: At least you have a handle on the trait that was affected.

Toni Bark: How would you know the long-term effect especially if they're just put out in the market?

Robert Saik: You wouldn't have any more or less confidence in the long-term effect of a mutagenesis generated seed than you would have from a genetically engineered seed. You wouldn't have any more or less confidence in long-term benefits or long-term risk, you couldn't because you can't measure the long-term.

Toni Bark: I thought you had said you would have more knowledge of long-term effects of the genetic modification.

Robert Saik: I would be more confident in the long-term effects. I'd be more confident maybe not in the long-term effects, I'd be more confident in the process that we have generated today. Again, I think that's the reason that I'm here is that I feel so strongly that technology and science is moving forward that I worry that the railing against Monsanto, whether people believe there's a conspiracy theory ... you talked about the suicides in India. I'm carrying documentation with me right now that shows that the BT cotton has resulted in farmers using vastly less pesticide to grow Indian cotton. The amount of money they're making is 50% higher, the amount of pesticide they're spraying on ... keep in mind it's tropical so there's a lot of bugs there. They're spraying all of the time so the toxicology load is less. This whole thing about Indian farmers and suicide when you look at long-term Indian farmers the levels haven't changed and farm level suicides in India are lower than urban level suicides and there is no correlation between that and genetically engineered foods.

Toni Bark: That's a good point. A lot of those farmers migrated to the urban environment when the genetic modification plant, the GE plants-

Robert Saik: Because they could.

Toni Bark: Because they couldn't afford to grow-

Robert Saik: No, because they could. They're making more money off the crop they're growing, their kids could move to cities. There's another side to this story and that's what I'm here talking about. There's another side. When a farmer's all of a sudden

making more money and the technology works he doesn't have to rely so much on physical labor. His kids can actually do something different, which is what we are blessed with in North America.

Toni Bark: I was just going to say the poverty rates went up with these migrated farmers. [crosstalk 00:48:30] it's hard to know.

Robert Saik: The middle class in India-

Toni Bark: The middle class has grown phenomenally but I wouldn't say that's because of genetic modification.

Robert Saik: I think that's a reach for all of us, yeah. Cotton is a good example of a crop to discuss because it's grown in the United States. I reached out to one of our PhD's and I said to Will I said, "Will, tell me about the evolution of cotton in the Mississippi Delta. Tell me about the pesticide use in cotton and talk to me about before GE cotton and after." He said that conventionally grown cotton even today, if you were growing conventionally grown cotton to fight the boll weevil, to fight the caterpillars, to fight the bugs, and the weeds, and the disease you're going to be using between 24 and 26 pounds of active ingredient. Active ingredient being pesticide, active ingredient. The amount that they're using now to produce cotton using genetic engineered cotton seeds is less than four pounds of active ingredient.

There's a really interesting discussion point for a trade off. Do you want to go back? Some people are saying that they have to have non-GE cotton. Do they understand what the pesticide load is on the environment and the cotton plant with non-GE versus GE? What are the long-term risks? There's BT and Roundup ready inside of the cotton so you can plant the crop and it's resistance against the bugs, and you can clean up the weeds. I'll get into herbicide resistance later.

Toni Bark: I was going to say, it sounds like there's a whole lot of glyphosate being sprayed on that cotton.

Robert Saik: There is and that comes with its own set of challenges too so we'll get to that. I'd much rather have a cotton plant that fights the insects with BT technology and can be sprayed with Roundup, which has a far lower toxicity index than the

previous herbicides they were using, then go back to the way that it was.

Now, I know you're going to ask about herbicide resistance and weeds. It is a very serious problem and farmers know it the problem is the technology has worked so good that we've been able to plant our corn, [spray-tice 00:51:04], and go to the lake, and it's worked really, really well. The problem with that is that in any regime, and I mentioned before that organic farmers that use pesticides, because there are many pesticides sanctioned for use in organic farming and some of them like the organic pyrethroids are very, very dangerous to humans and to bees. If you don't believe me just look at, what's called, PyGanic, which is an organically derived pyrethroid. It's used to kill insects in organic production, if you overuse that in an organic growing regime or you are a conventional grower using conventional herbicides, whatever that means, or you're a genetically engineered grower using Roundup ready or Liberty seed and you overuse whatever compounds you're going to use you build up resistance and weeds start to become resistant.

You and I, we would have no this agreement there. That is a serious issue. It's so serious right now that farmers all over North America are really being challenged to do herbicide rotations right now so we have to be able to rotate. That may mean some farmers have to pull back from Roundup ready and plant conventionals which means that they're going to go to alternate herbicide regimes.

Toni Bark: Which just seems to be what's happening.

Robert Saik: To get the weeds.

Toni Bark: The sale of conventional seeds have gone up-

Robert Saik: Oh yeah.

Toni Bark: The last few years so it does seem to be that's what's happening.

Robert Saik: That's a not entirely surprising. I think that the sale of conventional seeds is going up for two reasons. One of them is that farmers are catching on that they do need to do

rotations of chemical groups on their farms. It's something we track. It's very important. The second thing is that, I think, some people are tapping into what's rising as the non-GMO market so I think some farmers are consciously going back to older varieties or conventional varieties to tap into a movement that this film is helping to create.

Toni Bark: What I've been reading is that farmers who have been growing GMO Roundup ready soy have started reducing their Roundup ready soy and increasing their conventional, the planting of conventional. This has been a big trend over the last year or two.

Robert Saik: I don't disagree with you on that statement. I don't know if the word 'big trend' is the right word but it is starting to happen. The reality is, I think, we are up to 93% genetically engineered soybean planted in the United States of America.

Toni Bark: That's right.

Robert Saik: I could be wrong but 90 for sure. When you get that much going on and it's all moved towards one herbicide, which is primarily glyphos-. Again, this is really interesting because the only company seem to understand when they mention genetic engineering is Monsanto. Monsanto, a $13.4 billion company but the organic movement, Whole Foods, and these companies are $20 billion too. They're the only ones that get talked about but the reality is that all of the large companies are working on technologies that is genetically engineered technology and we're starting to see some differences happening in genetic engineered crops that hopefully will hit the marketplace and allow farmers to plant soybeans with different genetically engineered herbicides in the rotation.

Different herbicide regimes because of the different genetic engineering breeding. In the short-term, right now, what you're saying is true if we have to get a handle on a resistant weed, be it ragweed or something like that, that's got away on us on our farm then we've got to move into a different variety and treated with different chemicals. There's only one way out and that is you have to kill the weeds because if the weeds take over the crop you don't have a crop.

When people in the city look at these fields I don't know that they have an understanding of the risk level that these guys are taking. A potato grower will dump 2500 to 4000 bucks an acre into the ground to grow a potato. A canola grower will fork out 5, 600 bucks an acre and corn growers 12, $1500 more an acre. A lot of money, a lot of money going into the ground to have it at risk from disease, weeds, or insects. I just saw a stat the other day that if we wiped out all pesticides that farmers use on the planet we would decrease food production 73% on the planet, that's how hard it would hit us. Do we have issues? Yes.

Toni Bark: Because of the way we're growing. In monoculture, of course, you have to use pesticides with monoculture.

Robert Saik: Yes.

Toni Bark: You agree with that, that if we were growing-

Robert Saik: What would you tell a farmer outside of Cedar Rapids? What would you tell him to do? What would be the answer? They grow corn and soybeans, they grew it very successfully, and they grow it economically, and I would argue they grow sustainably. No farmer wakes up in the morning and is going to degrade his soil for future generations. It doesn't make sense. People who say that should spend some time with some farmers. The reality is what would these farmers grow? What would the farmer around Cedar Rapids grow if he wasn't growing corn or soybeans? What is the economically viable crop? What would we have them do?

Toni Bark: That begs to talk about the politics again because if corn, soy, certain foods weren't subsidized heavily there would be ... and if other foods that were much more nutritious were subsidized then they would be growing other things. They would be growing cruciferous vegetables to a larger degree. They'd be growing other things that had more nutrition than just carbohydrates.

Robert Saik: I think there's merit in that, that where the reality is California is so litigious, and the regulations in California are so strong with respect to pesticide applications, and how the farmers grow, and then now they have water issues as well that a lot of that production shifted over into Mexico where

they spray on whatever you want and bring it back in, and consume it in California.

In Canada 70% of our organic produce some from somewhere else. What are their standards? We don't know. Do I believe ... this is another thing that's happened in this whole discussion is the polarization that has never ever existed in agriculture has now happened. There is a polarization between the local grower that's growing for the farmers markets and the local ... say, that guy's an organic grower he's never been vehemently opposed to commercial growers and commercial growers have never been vehemently opposed to the local grower that's serving a local marketplace.

There is a significant polarization happening in agriculture today and it's sad, and it's socially ripping the fabric out of small towns. You got commercial growers that are getting bigger all the time, that's economies of scale, that's not going to decline and then you got these local people. The local people say they're selling into a farmers market and say, "Well, I'm organic I don't use any pesticides not like that guy out of town." The guy out of town says, "Well yeah but I'm not selling my tomatoes for such and such a margin that can support ... and quite frankly if I did grow tomatoes on that scale I would put you out of business and the price of tomatoes would not sustain the organic market place."

The thing that bothers me most Toni about this whole discussion is when did the organic movement become the anti-GMO movement? When did that happen and why did it happen? The organic movement started ... and by the way, it's a label. It's a marketing label, it's not verified by the FDA or anything. There are forms and stuff that the growers are supposed to fill out and keep track of but by in large-

Toni Bark: It's a little more than that.

Robert Saik: Yes there is. I'm not against organic growers. I respect what they do. In fact, we learn a lot from them because the organic movement started with growers and consumers saying, "We want less synthetic pesticide and less synthetic fertilizer used on our food," that's where it started. Now, it's become the anti-GMO movement. To me, and I'm going to

write on this actually, I want to write this, I think the future of feeding the world is GMO, genetically modified organic food production.

If you took what I said earlier about us learning more and more about science all the time ... and I know this documentary has been severely railing on glyphos- and Monsanto but if you take genetic engineering and apply genetic engineering to crop protection so that the crops fight fungal diseases and viruses better, and if you apply genetic engineering so that the crops will fight insects better. You apply genetic engineering so the crops can extract more nutrients out of the soil whether it's extraction of phosphate or micronutrients such as zinc, or iron, or manganese then you would have a crop that would be healthier because you've got more nutrition packed into it and it would achieve the goal of using less synthetic pesticides and less synthetic fertilizers.

I don't know the answer to this but I don't know why the organic movement has become the anti-GMO movement and this is, at the heart of it, what's causing the fabric of many agricultural growers to be torn apart. They used to live in harmony and today they're not living so much in harmony.

Toni Bark: I have a few ideas. There's a list. One is the labeling issue. A lot of people prefer to buy non-GMO, a lot of people don't want GMO. They don't want to be part of an experiment and so the only way to be assured you're not buying GMO, for the most part, is buying organic. There is a movement against labeling on the part of the industry because, of course rightly so, they want to sell more product so they created that battle right there, that's one thing. The other thing is that you had organic farmers living side-by-side with non-organic farmers but then you had cases, and I think the first one was in Canada, where an organic farmer's crop was pollinated, naturally pollinated but with genetic material from his neighbor's farm, which was genetically modified crops, and suddenly he's got a legal battle with whoever the seed producer is.

Then there's one more, I'm not done-

Robert Saik: Two points, I'm trying to keep track of the points.

Toni Bark: The other one is the larger political question, which is like in humans and in animals if you live a certain way you're going to be more prone to disease. If you talk to plant physiologists and plant pathologists and if you look at blights, then you look at fungal infections, and plants that are grown on sustainably oriented farms, meaning there's crop rotation and it's not monoculture, there's more resistance to disease. We see less resistance as we start growing mono-culturally, as we start using more chemicals. They do one thing but then they bring up another.

It's like people who take a lot of antibiotics for their sore throats, it ruins their bio flora, and their immunity actually down the road is being weakened because they're more prone to infection. We know that from studies. In the moment it helps, in the moment but really what they should be doing is altering the way they're living to reduce the infection instead of taking antibiotics. I know you have strong feelings on how people eat and yeah, I get that. There are reasons why there has been now this separation and really that they're at odds now, the organic growers with the GMO growers, and the reasons are real.

Again, I'm going to recap. It's that there's been organic farmers who've been burned because their organic farms were infiltrated by genetic modified seeds and so that's one issue.

Robert Saik: I'm going to be able to talk to that specifically because have intimate knowledge of that case.

Toni Bark: The other one, like I said, is the labeling. People prefer to buy organic, people prefer to buy non-genetically modified crops. The reason they're buying organic is because that's the one label they know.

Robert Saik: Let's talk through that. Let's deal with the first thing that you brought up, that is absolutely false. That farmer, who I could name but I won't, we know that farmer.

Toni Bark: There's been more than one case now. There's been multiple cases.

Robert Saik: That's the one that you referred to first of all.

Toni Bark: Right, the Canadian one.

Robert Saik: That was 800 acres sown in straight rows and when they saw him spraying the crop with Roundup they asked, "Where did you get the seed? Because you didn't buy the seed and you didn't pay a technology use agreement." He said, "It blew in." If you're an organic farmer ... this is the first thing that is always brought up with this case that they say that guy was an organic farmer. Absolutely not true, was not an organic farmer. There wasn't a small little plot of canola. It was 800 acres planted in straight rows that blew in from the road. Lastly, if you're an organic farmer what are you doing spraying Roundup on the crop in the first place? That is way off label.

That case gained him notoriety around the world and people have grabbed that case and ran with that case all around the world. It is patently false. Those facts are true, I said and the fact that he was an organic farmer pursued by Monsanto ... he was pursued by Monsanto and rightly so. His neighbors are paying for the technology use agreement and he wasn't. He was found guilty but in the meantime this guy went all around the world speaking on the evils of a corporation. Plant breeder rights are important whether you're a Monsanto or whether you're a breeder that's working on conventional methods and it's taking you 50 years to perfect something, those breeder rights are important. Just wanted to clear the air with that because that is a sensational story that gets circulated just like the suicides in India gets circulated and it's not based in fact. That's that one.

Labeling, let's talk about labeling. Labeling is interesting because under the FDA ... again I'm Canadian so I've done a lot of reading on this. Americans would have more knowledge. CFIA in Canada, Canadian Food Inspection Agency has a similar requirement. In the United States the labeling of food is designed from a health standpoint, a health and safety standpoint so if there's a difference in the composition of the food, say, that you took and brought peanuts' genes and put it into a tomato you could have an allergen there. Now, nobody's done that but that would have to be labeled because potentially there's a health risk there. If I give you

the complex of sugar from an organic sugar beet, a conventionally grown sugar beet, and from a GMO sugar beet and I gave you sugar you can't tell the difference. There is no difference. The labeling issue is and needs to stay with the health issue.

There's a label on cigarette packages because cigarettes, now we discovered, kill you.

Toni Bark: I think we always knew that. I think that was industry-

Robert Saik: The label is there because it's a health issue. There is no substantiated, none, 3 trillion meals served there's not been one documented case of anybody dying from GMO food.

Toni Bark: How would you trace that exactly? There's in vitro work. In vitro and looking at also statistical analysis we know that glyphosate is an endocrine disruptor.

Robert Saik: Are you talking in vitro or enviro?

Toni Bark: I'm talking about even in vitro. If you look at cells we know that cells die given a certain amount of glyphosates directly to the cells, we know that from laboratory studies.

Robert Saik: They'll die with salt too.

Toni Bark: Yes they will.

Robert Saik: And they'll die quicker with salt.

Toni Bark: It depends on the salinity.

Robert Saik: And they'll quicker with nicotine and they'll die quicker with aspirin.

Toni Bark: It depends on the salinity. We know the amphibian studies with glyphosate causes a lot of birth defects.

Robert Saik: I just went over the toxicology reports on glyphos- because I knew this was going to be brought up. I went over the LD50s and I also went over the NOLA tests on toxicology there is a difference between enviro and in vitro. In vitro you have a Petri dish and you expose the cells to the carcinogenic chemical or whatever the chemical would be and that is one

way of doing research work. A lot of people report that as being an accurate way of doing research when in fact that may not represent what's actually happening in nature.

Toni Bark: I agree.

Robert Saik: The current issue with neonics and bee studies right now ... Canada is a good example because we have canola and the canola is vast, millions of acres and that supports the bees and neonics are used inside canola production. The levels inside of bees in the wild, 5 nanograms I think it is that they're finding 3 to 5 nanograms, if that. You go to an in vitro study and the levels are 6, 8 times higher than they're finding in nature. Is that representative?

Toni Bark: No, but the study's on the bees themselves not the in vitro and their mitochondria. The studies on what the neonics do to the mitochondria are real. There are centers that are ... Purdue is one of the centers, Harvard is one of the centers they're actually looking at the direct effect of neonics on the bees mitochondria.

Robert Saik: No question about that. We're really off topic here but tied-

Toni Bark: It's related because neonics are used on GMO.

Robert Saik: They're used in all crops.

Toni Bark: Right but they're used-

Robert Saik: They'd be used in all crops so the idea there is, is an in vitro study representative of what's going on in nature?

Toni Bark: No.

Robert Saik: I just read an excellent case study on this that looked at the amount of neonic exposure that a bee would have in a canola field, for example, versus an in vitro study and you can't extrapolate that in vitro study into nature.

Toni Bark: I'm agreeing with that, that I'm agreeing with.

Robert Saik: It catches a lot of press.

Toni Bark: For sure but I'm talking about the actual studies on the bees themselves.

Robert Saik: Back to glyphos- and you brought in vitro into it. In vitro studies, is there a correlation between in vitro-

Toni Bark: Let's get off in vitro then. Let's talk about the actual effect that glyphosate is an endocrine disruptor and that the use of glyphosate is associated with all kinds of issues. I don't know what you're going to say about Séralini's study and Séralini is just one of the people who studied tumor growth-

Robert Saik: You're not going to throw Séralini into this film.

Toni Bark: Let's leave Séralini alone.

Robert Saik: Even his pictures that he documented so much is questionable about that. I'm not even talking about the methodology, the fact that his picture left out the control, and the fact that his book, and his movie came out the same time, and the fact that he got reporters to sign a non-disclosure so they couldn't talk about the methodology before he released the study. All of that brings into question ... and then the scientific community basically looked at his methodology in terms of testing and the number of rats ... first of all, the type of rat is prone to tumors and then what do you have?

Toni Bark: Wasn't it the same type of rat?

Robert Saik: All of them were.

Toni Bark: Let's move on. He's not going to cover it. [inaudible 01:12:17]. Really to recap, what we're discussing is that people want to know what they're eating and I think people have the right to know if something has been genetically modified. I think people have a right to know that. There's no accountability or traceability if there is a problem if things aren't labeled. Since, we don't have long-term studies outside of ... we actually don't even have long-term studies. The studies that we do have, that the FDA's seen has been from the industry itself-

Robert Saik: That's not true. There are many, many-

Toni Bark: There's no long-term health studies. It's impossible to do it.

Robert Saik: As long-term as we've had genetically engineered crops in the marketplace there have been people looking at their effects. I don't know what long-term constitutes but you know there's 5 and 10 year studies that have been done independently of industry.

Toni Bark: Are you telling me that there's been studies looking at the health effects of a population that each genetically modified food compared to a population that doesn't eat genetically modified food?

Robert Saik: No, I'm not going to say that at all because this is an area where I'm starting to cross into an area where I really don't have the expertise so I'm not going to comment on that.

Toni Bark: That study hasn't been done, I can tell you.

Robert Saik: I'm sitting on data right now that's got hundreds and hundreds of metadata studies so we choose to disagree on that point. I'm not going to agree with you on that because I don't agree with you on that. It's just that I can't substantiate my side of the argument because I don't have the knowledge.

Toni Bark: You're saying there's been studies looking at populations that are eating non-genetically modified food and comparing their disease rates to populations eating genetically modified food?

Robert Saik: No, I don't know that.

Toni Bark: Those studies have not been done, I can assure you.

Robert Saik: Back to the label discussion then. The FDA will put health risks on labels. By the way, I think one of the most important things that we should be labeling in food is nutritional density. By the way, credit to Whole Foods they got that ANDI index, which is the Average Nutrient Index.

Toni Bark: Yeah, that's good.

Robert Saik: I think that's good.

Toni Bark: It is good.

Robert Saik: I was looking at the ANDI Index in their store and soda pop's got a zero and 100 is kale, it's got 100 ANDI Index. I don't like kale but anyways, it's good to know that that exists. I think that's where food labeling should go. To argue that you need to label a GE crop there is no scientific evidence that says that GE crops are a health risk. Their constitution inside of food is identical as I outlined with sugar and-

Toni Bark: Sugar's a poor example. What about the chemical residue, do you think that should be listed?

Robert Saik: The chemical residue, now if you're talking about that we should list the chemical residue for all crops grown.

Toni Bark: Absolutely.

Robert Saik: Organic crops that use chemicals should have chemicals and, by the way, they should include the organic or naturally occurring chemicals so this could never end. Aflatoxin, mycotoxin, E. coli, salmonella, all should be tested, will you know what that would do.

Toni Bark: No, I'm not saying that at all, that's not what I'm saying.

Robert Saik: Those are important. Mycotoxin and aflatoxin if you're talking about labeling and you say you want crops labeled because there might be a chemical residue-

Toni Bark: Added chemicals.

Robert Saik: Again, toxicity is all about the quantity. Water can be toxic to you drink too much so toxicity is all about the amount that you ingest. The amount that we ingest over time and conventional crops before GE we were ingesting chemicals. Do we know what that was? Do we want to go back to those days? I'm summarizing that I don't. I would rather eat a GE crop than one that I was growing in the 70s and 80s because I know that I'm using a lot less chemical on it. To me, it's much safer than a crop that I was growing in the 70s and the 80s. If you say that you have to label genetically modified crops you're implying that they're dangerous.

Toni Bark: We don't know that they're not. Do you have any evidence that they're not?

Robert Saik: You don't know that an organic crop that you're eating isn't dangerous. They can be very dangerous. Aflatoxin levels in organic-

Toni Bark: What are you seeing aflatoxins in?

Robert Saik: Aflatoxin, a naturally occurring carcinogen.

Toni Bark: I know what an aflatoxin is but what are you concerned about?

Robert Saik: I'm concerned about the long-term ...

Toni Bark: What plants, what produce are you concerned about?

Robert Saik: Organic peanut butter.

Toni Bark: It's only peanuts. The aflatoxin is a peanut issue it's not a broccoli issue.

Robert Saik: You have higher aflatoxin levels in organically grown corn for example because you can't clean off the diseases off organically grown corn. It's going to have higher aflatoxin levels, absolutely. If that's the case then ... the case for labeling GM crops is fear-based, it's not science-based.

Toni Bark: We don't have evidence that genetically modified foods are safe and that they're not contributing to a lot of diseases we've seen rapidly growing, on the rise since the mid 90s when they've been introduced. People unwittingly, we're ingesting. They went from soy milk or soy beans and corn and suddenly mid to late 90s were seeing the introduction of genetically modified soy and corn. By the way, if you look at graphs that actually they have done it MIT, the artificial intelligence department has been looking at graphs of disease rates that have skyrocketed since the introduction of genetically modified foods specifically Roundup ready and BT corn.

Robert Saik: Autism rates absolutely correlate with the increased consumption of organic food in North America. Absolutely, 100% parallel the lines.

Toni Bark: All food was organic before 1935 so if you're saying autism rates-

Robert Saik: As organic consumption of organic produce has increased so has autism. Is that causation or correlation?

Toni Bark: Organic consumption increased as a backlash because people didn't want to buy genetically modified, you know that.

Robert Saik: If people want to have choice they do, today they do. I question that choice because earlier I said that I think the future of agriculture, genetically modified organic food production. I think that there should not be a separation between the organic and the genetic engineering world. I think that should be a coming together.

Toni Bark: You're not leaving nature alone. There's a group of people that don't want that. I don't want that. I don't want to eat something that's been genetically modified.

Robert Saik: They haven't left nature loan because of the very reason of the earlier ways that foods are bred.

Toni Bark: That is nature. That's how it always has been done.

Robert Saik: Really? Like nuclear bombardment and mutagenesis with chemicals?

Toni Bark: That is not found in organic food.

Robert Saik: Toni, over 2400 to 3000 varieties ... I know it's 2400 but it's approaching 3000 varieties that are sanctioned to be grown organically owe their origin to mutagenesis.

Toni Bark: Oh their origin? First of all, nuclear radiation is our background. There's background nuclear radiation in the Earth.

Robert Saik: You can't take a seed and subject it to nuclear radiation or to chemical bombardment and change the genetic structure to mutate it and say that that is a safer process than what we're doing with RNAi or DNA ... RNAi or transgenics.

Toni Bark: You know that all seeds even before 1935 have been subjected to background nuclear radiation because that is the nature of Earth.

Robert Saik: That is not purposeful. What I'm talking is the purposeful mutation of seeds that now find their way into the organic food supply. I think those should be labeled.

Toni Bark: Okay then, that's a good point. There are plenty of people who look and most of the organic farmers that I buy from are using heirloom seeds.

Robert Saik: Heirloom seed from where? If you go backwards, what does heirloom seed mean and how far back do we go ...

Toni Bark: 16, 17, 1800s, 1900s.

Robert Saik: It's totally been non-altered? I wonder what the long-term studies are on that. I don't know.

Toni Bark: They've been eating them for hundreds of years. The thing is this, you brought up autism and I don't know but you're implying that organic food increases the rate of autism.

Robert Saik: I'm just saying that people say that ... To me, some of those correlations are preposterous. They lay two graphs together and they say there's a reason. You don't know-

Toni Bark: We really don't know is what you were going to say, we really don't know.

Robert Saik: We don't know the reason that autism is going up. Is it correlated to organic consumption of food?

Toni Bark: All food was organic before 1935 so we would've had the same rates of autism if it was due to eating organic food.

Robert Saik: Maybe but I'm just saying that there's an example of a ridiculous graph is what I'm trying to point out.

Toni Bark: That's a ridiculous argument.

Robert Saik: It is.

Toni Bark: Again, one could argue the backlash that organic's become so popular is a backlash against being forced to buy genetically modified food.

Robert Saik: Back to the label issue on today, if they want to buy non-GMO they can. There are some projects out there that are verifying or trying to verify, I don't even know how they do it.

Toni Bark: There are, yeah.

Robert Saik: There are so from a standpoint of the FDA, the FDA's responsibility is are foods safe? Yes. Foods are safe accord-

Toni Bark: Based on what?

Robert Saik: According to all the testing that has been done to bring those seeds to marketplace, which is onerous and-

Toni Bark: Do you know what those studies are in terms of health, in terms of feeding? What is that study? Are they feeding it to mammals? Are they feeding it to people?

Robert Saik: Toni, I can't correlate all ... I can't bring up those studies in my head, I don't have them there. The fact of the matter is, mutagenesis and conventionally grown crops don't have to go through those studies and all GE crops do. They're under far more scrutiny than conventional breeding or mutagenesis generation of seeds, far more scrutiny. If people want to have a non-GMO crop they can have it. They can buy a non-GMO crop with one of the non-GMO projects.

To me, this is almost getting out of hand. One of my favorite cereals is Cheerios. I love Cheerios especially Honey Nut Cheerios, love them. Now, they've gone and they're non-GMO Cheerios. Think about that. Cheerios are made of oats, there is no genetically modified oats on the marketplace so what are they really-

Toni Bark: That's like saying no cholesterol in olive oil. There's never been cholesterol in olive oil.

Robert Saik: Exactly. Now, they have non-GMO Cheerios so what is it that's non-GMO about Cheerios today?

Toni Bark: The sugar.

Robert Saik: Sugar. They took out sugar and they took out maybe some of the anti-caking agent that may come from corn and stuff like that. They took out some other ingredients because in the

process the Cheerios have shrunk by about four ounces, cost has gone up, and the nutritional density inside the Cheerios has gone down.

Toni Bark: The cost of Cheerios and the other non-GMO cereals in Europe have not gone up. In fact, they're cheaper in most of the European markets than they are here. I think that they had to reconfigure their formulation here and so the public is bearing the price right now, bearing the brunt of that cost-

Robert Saik: That cost is not going to end and if we talk about labeling, again, get back to this, this is a good point. If we label, why do we label? There's fear of genetically modified crops so we should label.

Toni Bark: We wouldn't have traceability for problems unless we label. If we want to do a long-term study even a survey of people who eat conventional, which now conventional really means GMO even though in farming terms it doesn't, but people who eat conventionally versus people who eat avoiding GMOs. If we want to really do that long-term study then we need to label because there's no traceability without labeling and it's one big experiment. If we want to end this argument once and for all like 10 years from now, 15, 20 years from now, which we could do if you really think it's important to feed the world, then you should be for labeling because then there's traceability and then those studies can be done and we'd have the answer.

Robert Saik: I'd be for labeling if anybody can demonstrate to me that there's a danger in the genetically engineered corn, or soybeans, or canola that I'm consuming today. I can tell you that my confidence level ... I haven't exhaustively read but I can tell you that I'm probably better read than the average Joe in the street and I can tell you that my confidence level in eating the crops that we grow today is very, very high. I have a high confidence level. Now, if people want to buy non-GMO they have that choice. There's the projects out there that are labeling non-GMO food and they can do that. Alternatively, if they want to go organic and non-GMO, and again, they could do that.

Now, organic food is a label right now, it's not a safety thing. It's a label, it's a marketing label. That's what it is. I have no

problem with it. People want to eat that way, that's just fine. I won't spend the extra money myself personally. I won't spend the extra 65 to 200% to buy organic. I do buy organic some time but it's for packaging preferences. The choice already exists today. There's a recent study that just came out in April 2014 by CAST, I don't know what the acronym stands for but it's a group out of Iowa that did a deep dive into the cost of labeling. They figured out that the cost of labeling would be at least $500 per family per year or higher and that a lot of the costs aren't quantifiable yet.

Toni Bark: I'd like to know who CAST is supported by and funded by because there's been very similar-

Robert Saik: Fair enough.

Toni Bark: Studies done by groups that say just the opposite.

Robert Saik: That it wouldn't cost anything to label?

Toni Bark: Right.

Robert Saik: The cost would be there. Somebody's going to pay.

Toni Bark: If they're selling to the European market they have to have the chain of ... it's all verified anyway. They have to keep it verified if they're selling it to a lot of the European and foreign markets that don't want any GMO. These big farms and these big companies actually know-

Robert Saik: Again, the whole premise here that you're coming at me on is that the premise is that it is has to be labeled because it's dangerous.

Toni Bark: No, what I'm saying is you're telling me you have confidence that GMO is not dangerous and I'm telling you from a science standpoint the only way you can say ... there's something called attributable rate. You're saying the attributable rate or the cause that GMOs have on disease is zero or close to zero. What I'm saying is from a science standpoint if you do statistics, it doesn't matter what your science is, there's something called attributable rate. You're telling me that attributable rate looks like it's zero. In order to know that for sure you must look at a population exposed to what you're talking about and look at their disease rates and you

must compare that to an unexposed population and look at their disease rates and there's no way around that. That's the only way to say-

Robert Saik: If you compared to the population of Kenya and their death rate to the population of America, you can't do that?

Toni Bark: No, you can't do that. In America ... what I'm telling you is that you can't make the statement, it's impossible. To make a statement that GMOs are safe long-term on human health-

Robert Saik: You can't make a statement saying that they're unsafe.

Toni Bark: That's right but that's a ridiculous argument, isn't it? You can't say they're safe and therefore we shouldn't assume they're safe. What we should do is-

Robert Saik: The whole campaign around labeling is around fear mongering.

Toni Bark: No, it's around the traceability. It's about the liability and the traceability, and we want to know what the long-term studies are. If we really want to know and you're so confident that there's not a problem then let's do that study. Let's get everything labeled, and let's have a long-term study, and in 20 years look back at the disease rates on the people who eat it versus the people who don't. That's a really simple study that wouldn't cost anything, it's just labeling. The people, the consumers who want labeling, and the scientist, and the physicians who want to labeling want it for the very reason that they want traceability. We want to look at this long-term in a progressive study, a long-term study where we follow groups of people. People who have no problem, like you, eating genetically modified food and then there's many people who are not going to be eating genetically modified food. They're going to be buying organic food because they want to know for sure that it's not genetically modified.

Robert Saik: Then you have to talk about your Food and Drug Administration policy in the United States. You're getting back to policy issues here because the Food and Drug Administration, as I understand its role, is to protect the public by making sure that the food they eat is safe.

Toni Bark: They haven't made sure genetically modified food is safe because-

Robert Saik: They have, absolutely.

Toni Bark: They haven't. The only way to do that is to do the study I just told you about.

Robert Saik: Again, those crops coming to market have gone under far more scrutiny than any other crop coming to market.

Toni Bark: They're not fed to people and looked at long-term health effects. They're not. That is not what goes through so the only way to say it's safe-

Robert Saik: The only way to prove this is to put it through a human study? That the only way to prove it?

Toni Bark: That is the only way to prove ...

Robert Saik: How do we get all our drugs registered and how do we get everything else registered? Are there not toxicology studies and protocols that are defined? Are there not?

Toni Bark: The studies have to go through phase I and phase II trials and phase II trials are always with exception, and that's something we're talking about in the film but, theoretically and what they've always been, and that's changed, is that comparing that drug in question. The phase I is usually comparing it with another drug in people who have the same disease. The phase II is comparing it against the placebo, which theoretically is sugar, and so we do compare drugs theoretically to a placebo that doesn't have any of the drug and look at the long-term effects at least for 2 to 5 years and what diseases people develop based on taking that drug. Your point is that that's how it does work for drugs. Now, it doesn't work that way for genetically modified food.

Robert Saik: Why are you treating that one special? Why are you treating that food special? Why is that one being singled out? When I could give you and I have given you several examples of foods that I think that are at higher risk than the GM foods.

Toni Bark: We don't know that they're at higher risk but I agree that those other food ... anything that's done through intentional

mutation with the radiation or chemicals I agree with you, I agree that they should be labeled as such.

Robert Saik: If you just said that, if you just agreed with that then we have got to put a whole bunch of our crops through long-term testing because-

Toni Bark: No, label them.

Robert Saik: No, but then they should be tested to prove that they're safe.

Toni Bark: That's never going to happen financially from many.

Robert Saik: You don't know that the long-term effects of a mutagenesis generated seed is sauce or not unless you put it through long-term trial. Same argument.

Toni Bark: No, the argument I'm making is not put it through a long-term trial. It's label it. Label it as such so we can follow-

Robert Saik: So you can put it through a long-term trial?

Toni Bark: Yes, so we can follow.

Robert Saik: That's the same thing you should be saying on mutagenesis crops.

Toni Bark: I'm saying that I don't have a problem with that, having those labeled so we can trace them.

Robert Saik: I disagree with you and respectfully disagree with you because from a farming level, and this is why I'm here today ... I'm not a doctor, or PhD, I'm not a medical expert but from a farming standpoint and agricultural standpoint I know what I'm putting on the crop today and how I'm going that crop is vastly different than it was in the 80s, and I don't want to go backwards to that, and our technology is far better today. I'm safer. I'm more confident in the food that we're eating today.

Again, I'm not a doctor but the issue here is questioning the policies and the safety record or the system of the FDA. I can't comment on that other than that body in the United States and that body and Canada has been in charge of and

responsible for the safety of our food supply, that's what its job is. If there's a question mark around their track record or question around their methodology then I'm saying that that should be applied to all technologies, all crops. Organic, conventional, GMO, long-term studies, mutagenesis, let's get it all on the table. I worry that we're throwing out one of the most promising technologies to feed the 9 billion people coming on the planet because of fear.

The technology is not understood well by people but as you look into it my confidence level didn't diminish, my confidence level went up. I've learned more about it and as I learn more about it I'm going, "Heck, I don't want to go back to this other system. I like where we're at and where we're going." Is it perfect? Do we know everything? Absolutely not, never do. There's always the next thing that comes but my confidence level in what we're doing is very high.

Patrick Gentemp: Greg, tell us about your background. How did you end up where you are today?

Greg Horn: My name's Gray Horn. I started off in the health food industry when I was 15 1/2 years old I read a book called 'Sugar Blues' that my mom had up on a bookshelf and told about how sugar was damaging your health. I was a typical teenager so I stopped drinking soda, and stop eating candy, and cut out a lot of sugar, and I felt so much better. So visceral a connection between nutrition and health that I decided with a certainty, that only a 15-year-old can have, that I wanted to go in this business and make that my career.

That led me to a fantastic career in the health and nutrition area. First, at GNC, General Nutritional Center, which is the largest retailer in the world of nutrition supplements. I was there for 11 years. I left as a CEO. When I left there I started a company called Specialty Nutrition, I scratched out one word and kept going and I've had fantastic clients including companies that I've been the interim CEO of during transition periods, like Garden of Life, which is the number one organic non-GMO certified brand in the health food channel to this day. I specialize in science-based nutrition that can have a serious impact on people's health and you can measure it.

Patrick Gentemp: Just as an overview, what's your view of GMOs?

Greg Horn: GMOs, genetically modified organisms, if you talk to scientist in these biotech labs in these biotech companies, which I've done, they'll tell you that these genetically modified crops in particular help feed the world and improve the economics for farmers. Both of those things are probably true and so you have a lot of enthusiasm and passion around feeding more people with less land in these labs. That really the original green revolution in the 70s, we're going to feed the world and the Malthusian prediction did not come true. Now, time has gone by and now you have over 90% of many of our food crops are genetically modified food stuffs. My concern lies primarily in the area of the application of very toxic herbicides, like glyphosate, which is Roundup, and very heavy pesticides to kill insects that end up on these crops and ultimately in the food supply at the base of the food supply.

Patrick Gentemp: In your mind is it well-established that the toxicity of these herbicides or pesticides are shown to have adverse health effects in the population?

Greg Horn: First of all, anything with the word -icide at the end means you're trying to kill something. That's what -icide means so an herbicide is trying to kill a certain type of plant, and a pesticide is trying to kill a pest, an insecticide an insect, et cetera, a fungicide a fungus. These are chemicals designed to kill things, let's get that straight from the very beginning. The fundamental question I have is, do you want more or less of that on your food? Chemicals specifically designed and engineered to kill things? What these GM crops do in many cases, is increase the resistance so that the particular plant, like the corn, or the soybean, or the canola, in the case of Roundup and glyphosate, is actually resistant to that so they can spray at will. It kills the other weeds but you also have to imagine that a lot of it ends up back on your food.

Patrick Gentemp: Everything's got its roots that start somewhere. You've been around this industry in nutrition, health, and green living for a lot of years so how did this whole thing get started? What's the genesis of it?

Greg Horn: You have to go back to the roots of chemical warfare basically.

Patrick Gentemp: Chemical warfare?

Greg Horn: Chemical warfare, yes. We know it was used in World War I and in World War II there was big advances in chemical warfare. Monsanto was already making PCBs and they were already making nuclear weapons, during World War II they made nuclear weapons, they made polystyrene. They have this expertise at killing things with chemicals, that's an expertise that they had. There's a pretty long list, DDT, so they're making these pesticides and-

Patrick Gentemp: Did they make agent orange?

Greg Horn: Agent orange, yeah, that was a Monsanto product at one point during the Vietnam War period. You have this expertise at killing things. That expertise after World War II got directed towards increasing farm productive through having these chemicals that were originally designed to kill, can kill insects and can kill other things. That's kind of the genesis of Monsanto certainly involved but certainly other chemical companies getting involved in this area that's nicely named 'crop science' but it's really the application of very toxic compounds to crops. The benefits are that they do kill bugs and they do kill weeds so that's a net benefit to the farmer.

When you then extrapolate that so that it's every crop that's when the unintended consequences can start. I remember this, I went to a meeting in the mid-90s, a strategy session, a presentation on the strategy that Monsanto had. It wasn't confidential or anything, it was just a public seminar. It was in Chicago and they talked about how they were going to get rid of their petroleum-based chemical fertilizer and industrial chemicals business and focus instead specifically on genetically modified seeds that were resistant to their pesticides. I came up, it was a fairly small group, small enough you could come up to the speaker afterwards, and I said, "Hey, you know? There'll be riots in the streets if you do this. You should keep the chemical business. Why would you risk your entire business on the premise that the American public is going to take lying down genetically modified foods specifically designed to matchup to your pesticides? That's not going to happen." I was completely wrong.

Obviously, if you fast forward now, it's in 90 plus percent of the soybean, canola, cotton, corn crop in this country are now GM, genetically modified seeds. Most of them are designed to be resistant to glyphosate, which is Roundup, and there were no riots in the streets. There were in other countries. There were in France, New Zealand never let them in, other countries never let them in but in the US that actually never happened. It turns out it was a brilliant strategy. It was an intentional strategy. It wasn't a closed door conspiracy, they told people what they were doing, and then they did it.

Patrick Gentemp: Should there be riots in the streets?

Greg Horn: It's interesting because now my own personal perspective is shaped more from the health-food business, I'm a health-food person and so from that standpoint the health-food conscious people, health-food store shoppers, for example, are recently in the last eight or 10 years waking up to the idea that this is almost all the food supply. It's a little late. Now there's a niche market, there's niche brands and niche companies that they're chasing after, that people are flocking to. Non-GMO and certified independently is a big deal now to consumers but I remember in, this would've been in the late 90s, I think Monsanto split off their chemicals business in like '97 or something like that, about '97, after that the crops were starting to come out.

I was in charge of GNC at the time and we had customers calling in saying, "I don't want genetically modified soybeans in my soy protein or growth hormone in my whey protein. I contacted our contact at Archer Daniels Midland, remember I'm running GNC, and I said, "Hey, we only want our soy protein to come from non-genetically modified. We don't want to experiment with this with our customers. Our customers don't want it," and they said, "Hey Greg, that's great but you can't. We can't ship you that." I said, "Well, why not? We're the bigger seller of this protein in the world for supplements." They said, "No, we can't because it's deemed safe we don't separate the soybeans that are GMO and the soybeans that are not in the silos when they store it." When they go to process it they don't know the difference.

This is the late 90s, it was already intermingled in the food supply and the idea of segregation you had to wait a year so they could literally put it in a different grain silo. That's when I had a feeling that this was probably unstoppable and at that time the GM crops were only maybe, I don't know, 15, 20% of the crops not 90.

Patrick Gentemp: When you had that conversation did it lead you to any particular action or any particular agenda that was different than before that conversation? When you had this realization, holy crap this stuff is intermingled, you can't un-ring the bell, what's going to happen?

Greg Horn: There's a selfish answer to that. For GNC's business we ordered stuff a year out that was separated so that we'd have a non-GMO protein powder from the stuff we wanted. That was a proactive business step. From a personal standpoint I started seeking out products that didn't have that. I didn't want to experiment with myself. That certainly didn't stop it from taking over the broad marketplace. I was really surprised that there wasn't the same kind of passion that people are bringing to it now that it's a small fraction of foodstuffs they have to do a special process and be independently validated through a service to show that it's non-GMO, that used to just be called food. Non-GMO food used to just be called food not that long ago, 20 years ago. Now, people are looking for more real food but you can't un-ring the bell, as you mentioned, so all you can do as a person if you care about this stuff is actually just avoid it yourself, and look for those independent seals, and look for less processed food.

Patrick Gentemp: It's interesting because you're saying that used to be called food. Now, we have to characterize food based on technology and it's interesting too because it seems very cultural. As you said, there are many areas of the world where they said, "We don't allow GMO products to come in here." Yet, where we are in North America it's ubiquitous and it's almost inescapable. If you were to put on your crystal ball hat and gaze into it and say, "Where's this all going," because there is this certain counterculture that saying, "We're very disturbed by this. There seems to be some malfeasance and conspiracy surrounding the whole thing

relative to Monsanto and other manufacturers, and what their agendas are, et cetera." Where do you think this is going?

Greg Horn: I think the genetically modified crops are here to stay. It's not just because of Monsanto making a $1.9 billion profit off pesticides and a $6.2 billion profit off the seed, the genetics of the seeds. A lot of crops don't go into food so 40% of the US corn crop, for example, goes into the creation of fuel, ethanol that you burn in your tank. Another 36 or so percent of that last year went into feed so feeding animals the grain.

Patrick Gentemp: What are some of the implications there?

Greg Horn: We'll get back to that in the second. For human consumption you're left with another, whatever that is, 24%, I guess, of the corn goes into some kind of food crop. 94%, I think, is GMO. I think, probably, the best we can do now in terms of practical application for the food supply is to have genetically preserved foods be our human consumption foods. I don't think it matters quite that much whether the corn that we're growing is GM if you're going to bring it up anyway. I'd just like to see that segregated and in my own personal life that's what we try to do is segregate the food quality stuff versus the stuff that's going into fuel. The farmers can get a higher yield on fuel but I'd really rather have something that's much more close to natural than genetically modified for the food side of it.

Patrick Gentemp: This becomes a slippery slope though because you have this crossover effect where oh, we have a field over here for fuel and we're going to spray it like crazy and it's going to be GMO but over here is the field that's for consumption. How do you try to create the separation when pretty much you can't because winds blow and cross-contamination of crops, and suddenly you've got a challenge or an issue? Is there any proposed solution to that particular dilemma?

Greg Horn: First of all, this idea of [cross-pollini-zation 01:46:32] that's an unintended-

Patrick Gentemp: Consequence.

Greg Horn: Consequence and there's been crosspollination since the dawn of plants on the Earth, they've always been cross-pollinating. The difference now is that you have a man-made insertion variant that's now cross-pollinating and so that's got unknown consequences.

The idea of segregation of genetically modified and non-GMO foods is a really powerful one and going back to the late 90s when we did that for GNC at the silo level with ADM and they did it for us all the way through to what we're doing in our own family where we're demanding to have non-GM and more organic foods that we consume that's very powerful. I think the awareness of non-GMO went through a little bit of a dip so it was under the radar, and then people heard about it but didn't care, and now they're caring a lot. That consumer demand and voting with your dollars on what you purchase is incredibly powerful at shaping markets and demand because if farmers have more demand for non-GM crops that's what they're going to plant and that's what they're going to grow. You got to tap into the economic systems. I don't think you're going to put the genie back in the bottle in terms of genetic engineering.

Patrick Gentemp: I want to circle back to something that you said earlier that really got my attention. The genesis of something, the values out of which something is created, the intention infuses the spirit in it and sends it off into its future. You said that the companies, especially Monsanto I think you cited, that their original business was waging chemical warfare and that they were literally waging chemical warfare on humans. It was, basically, the United States government's involvement in World War II, Vietnam, large scale wars and these people were charged with the intention and the duty, if you will, to create chemicals that can kill human beings. War goes away, human on human war and they say, "Well, let's now adjust our sights on something other than humans. Let's put it on plants, on pests, and wage chemical warfare there." If you look at just the fundamental construct of the idea of waging a war, make it chemical warfare, and pointing at different types of species not just humans on the planet doesn't the overall construct just seem like something that could be radical and have long-term very adverse, toxic, dangerous effects in the world?

Greg Horn: The chemical warfare metaphor is perfect. There was these plants that were designed to make chemicals, and then the war's over, and we need a new enemy. The new enemy is insects, the new enemy is weeds. That's a legitimate enemy. They repurposed those, both the chemistry knowledge as well as the productive capacity, towards killing a new enemy. The enemy was the things that ate our crops. It worked, they are winning the war. These chemicals are very effective at killing the bad stuff and in the short-term that's what you care about. The question is how do you win the peace?

A war is a short-term phenomenon, hopefully, so what happens afterwards? Afterwards we just kept using more and more of this and we actually upped the ante to change the biological nature of the seed, this is life sciences, so that it would actually be more resistance to the chemical warfare. Which brings up the question, now that we're in peace time, what do those biological changes within the seed mean once you consume them, and to your biology, and the food supply? What residual of that pesticide or herbicide that remains in the plant, what residual effect does that have on your own biology? That's an unanswered question.

Patrick Gentemp: Wouldn't it make sense to answer that question before you unleash this into the world in an irretrievable way?

Greg Horn: Carrying through your warfare analogy, you're just trying to get the war won and there's going to be causalities. Once you win you vanquish the enemy and then you can figure that out later. After the war there's time to rebuild and there's to ... but you got to win. That mentality applied to crops and pests, and weeds is a never-ending battle because it's a co-evolution. As the pesticides get better and as the herbicides get better the plants and the insects get better and so there's an arms race of a different kind happening where eventually there's resistance that starts happening to these things and you need more, and more, and more of them. Where the life actually originates is not just in the seed it's also in the soil that the seed is grown in and that gets decimated as well. You could say that our current food supply as a result, almost a casualty of this chronic, chronic chemical warfare that's the base of our food chain.

Patrick Gentemp: That's really some of the questions about unintended consequences in that it seems that it's irretrievable that you can't get back to a neutral set point to do a do over. Now, you're saying there's this evolutionary battle or process but let's talk about that. What are the implications to the soil? If you start wiping out in a massively effective way insects, what does that mean as far as the ripple effects? To the bird population? To other such things? There's a balance in nature that if we go and just destroy it in this massive way aren't we in a compromised situation that we might not be able to recover from?

Greg Horn: We're already living in a very engineered environment and we're already as a human species dependent on our own engineering for everything from infrastructure for power plants, and dams, and rerouting rivers to the agricultural system. We have that problem already. My question is, how can you protect your own health and the health of people in light of the fact that we've already engineered our environment? I don't think you want to go all the way back because winning the war has increased yields and it has done some good things for feeding the world. There's much higher yields with these products that go into things other than food.

When it comes back to food though the biology interaction between what you're eating that's been genetically modified or the pesticide residue on that and how your own biology interacts is unknown. That experiment is still unfolding and so there's another co-evolution there. That co-evolution might mean that we're just getting sicker. If you look at some of these correlations, and correlations don't prove anything definitively but, they're eye-popping on how some health conditions and diseases have skyrocketed as we've been applying these pesticides and eating these GM seeds as the base of our food supply.

Patrick Gentemp: Do you think that we have enough of a context for this or are we still in this experimental realm wondering what the implications are?

Greg Horn: We're in the largest uncontrolled experiment in human history. There's been over 70,000 new chemicals introduced into our environment in just the last 100 years. We've started

eating foods that we genetically modified ourselves only in the last 20 or 30 years and nobody really knows what these cocktails that we absorb through our diet, through our air, through our water are really going to do. That is so uncontrolled. All the variables are all moving at the same time so it's a big unknown maybe the biggest unknown in our entire human history.

Patrick Gentemp: It's extraordinarily chilling, huh?

Greg Horn: There's going to be a co-evolution that happens while we adjust but I don't know that the human metabolism can adjust at the same rate as the human ingenuity to introduce new toxic chemicals against legitimate enemies at the base of the food supply. That interaction is so mind-boggling that the reaction, that I have and other people who are interested in promoting non-GMO and organic foods, is to go back to before that happened to selfishly protect your own food supply. If you apply that to a bigger system, the food supply should it be subject to a giant uncontrolled experiment? Do you really want to do that experiment with your own health?

Patrick Gentemp: Let's now talk about that because if you're somebody like me my answer to the question is I don't want to subject myself or my family to what I think is a massive experiment that has deleterious effects on humanity at large and on individual human beings. Now, I want to take action to try to safeguard my health and my family's health. This is where, obviously, you're an extraordinary expert. You understand the macro view but you've spent your life's energy really working on individual strategies that people can incorporate to live, I think what you referred to as, a green lifestyle and especially on the nutritional side. Imagine that there's a mother out there who's taken responsibility for the health of her family, she's watching this, and she's saying, "Oh my God, what do I need to do now to now make a shift in our behaviors so that we can try to safeguard ourselves against the threat that is here?" What's a low hanging fruit for not somebody who's sophisticated and has understood the stuff for 10 or 20 years but is starting out on that path, what would you suggest to them?

Greg Horn: The first thing you can do to protect yourself is don't trust anyone, don't. You don't need to anymore. In the age of the Internet, and transparency, and independent certification you don't need to trust anyone. Don't trust me, don't trust Pat Gentempo, don't trust anybody. Look for independent certifications that are validated through a firm that, other than paying a certification fee, doesn't have any economic interest in the success or failure of the product. When I first started in the organic food industry there were 31 different certifiers and we needed one. That's a case of we actually went to the government and said to the USDA, "Come put the standards that can independently verified not by the company, because we don't want to trust anybody."

That organic round seal with the farm on it that says 'organic' is now one of the best-known brands in the world because it's independently certified. The Non-GMO Project is another case where it's independent. They, and they look at every component of a packaged food or even a simple food and if you see that seal you know that it doesn't have any genetically modified organisms in there. Not trusting anybody is a big idea.

The second is to eat as simple and as low on the food chain as you're comfortable with. If you can read the ingredient panel and you understand what those are ... a whole apple's better than applesauce even if the only ingredient's apple because it's been processed. The lower you can be on the food chain when you're eating the more you're not letting chemicals concentrate on their way up the food chain into higher and higher forms that can be more toxic.

The third thing is just to prioritize. With the Internet, there's lots of the lists. The Environmental Working Group puts out the list, The Monterey Bay Aquarium puts out a list of safe seafood and 'The Dirty Dozen' is the Environmental Working Group's list that show you how to prioritize. For pesticide and herbicide avoidance things like berries should be a big priority, anything where they would spray the fruit directly with a chemical to kill a bug and then you eat the fruit that's the one to spend the extra money for to buy organic. There are simple ways you can protect yourself and make that

choice to not do the wide scale uncontrolled experiment on yourself, your health, and your family.

Patrick Gentemp: You have a personal story that I think gives you great empathy and a sense of purpose around this particular subject. Can you share that?

Greg Horn: I was at GNC, I was the head of GNC and we had a lot of success there, and we moved into this brand-new office building with new furniture made out of pressed board, and new wallpaper, and new carpets, and new foam everywhere in the furniture, and flame retardants on the nice wood paneling in my office. I had the corner office and I got sick. I didn't really know what it was that first but my energy was low, and I couldn't function, and I had brain fog. It was achy, there was a whole bunch of symptoms and I realized that I have, was later diagnosed with, chemical sensitivities, which is a loss of tolerance for synthetic chemicals in the environment.

Fortunately, I had access to the world's leading experts on health and nutrition so I used that to my advantage and created essentially a self-study program, which I literally wrote a book called 'Living Green' which is the one you were talking about, on how to live a less toxic life in a fairly toxic world. This is a personal passion of mine. I can't function without living this way because of my health so it's a deeply personal issue for me.

I do a combination of diet, lots of different kinds of exercise, but also I take certain nutrients and fibers that help detoxification of toxins that you can't avoid, they're already in your system. Detoxification in a chemistry sense happens in your liver so you want to make sure that you have enough of the substrates that your liver's functioning properly to change one molecule to another. You also want to reduce your load of some of these ... some of these chemicals are actually obesogens. An obesogen is something that within your body triggers a hormonal response that makes you fat. The xenoestrogens so estrogens that originate outside your body is one of these classic chemicals and they're in lining of cans that are BPA, they're in receipts, they can store them through your skin. It's not just in water bottles and that type of thing.

Once they're in your body you want to detoxify those and that happens in your liver. There's fruit and vegetable extracts, broccoli extracts, and other substrates that help your liver actually do that better so you're actually detoxifying. Then fibers, having a fiber rich diet helps carry that away so I would recommend that to people who are worried about toxicity issues. Eating low on the food chain and making sure your diet includes these substrates that help you detoxify the things that you can't avoid absorbing.

Patrick Gentemp: Is there good news in a sense of saying, "Well, there's something that I can do that can help to undo the damage that has been done," where there's regenerative ability of the body if you do, as you said, reduce the load, detox that you can get your body back on a track where it can start to express better health that might've been compromised as a consequence of this whole environment that we're talking about here?

Greg Horn: The human body is an amazing thing. I've gone from waking up every night literally drenched in sweat and barely being able to function to functioning at a very high level and really not feeling any health problems as long as I stick to first, avoidance. You try to avoid as much as you can out there and eating clean food, that's an organic, and non-GMO is actually a big part of that but there's other things you can do. These nutrients that I'm talking about especially this broccoli extract make a big difference in my own health, making sure that your mitochondria and your cells have the right kind of energetic substrates is really important and there's nutrition solutions for that. Having enough fiber so that you're keeping things moving through your system. The average American eats 15 g of fiber and the recommendation is 30 g so on average we're getting about half as much as we need and that can make a huge difference in your ability to detox and eliminate.

Patrick Gentemp: Greg, I want to say thanks very much for taking the time to sit down with us out of your busy schedule. Any final thoughts before we conclude?

Greg Horn: What I found is that these issues start at a very personal and passionate level, at the level of the individual and that's very powerful because if you're choosing to protect your own

health through organic foods and through non-GMO foods, and what you put in your body, and how you treat your body that has power. A ripple effect back to what types of crops are grown to service that demand so I would say it sounds selfish but start with yourself and the quality of the food that you're able to eat for now and in future generations.

Patrick Gentemp: Thank you very much.

I hope you got a lot out of episode seven of our nine episode series here with 'GMOs Revealed.' Tomorrow we have in our episode Gerry Caratola and Stephanie Seneff. Now, Gerry is a dentist. You might say, "Well, what does a dentist have to say about this?" A lot. Actually, I was really pleasantly surprised. First of all, Gerry's quite a character, he really comes alive on camera and in the interview. When you start to understand that you have a microbiome not only in your gut but there's one in your mouth and the relationship of that to your entire health. I think you're going to say, "Oh, I never understood that but it certainly makes a lot of sense." It's a really great interview, it's stimulating.

Next, we have Stephanie Seneff who is a senior scientist at MIT and I got to tell you she's a person that just knows the facts, states the facts, looks at the data, and sees the trajectory of where we're going. What she has to say about this GMO issue is truly chilling and you can't get any more credible than a senior scientist at MIT so you want to be sure to see that particular presentation also.

Tomorrow starts episode eight of our nine episode docu-series with GMOs Revealed and on a personal note I want to say it's been a privilege to take this journey with you. Our vision for GMOs Revealed is unbridled. We know that this information needs to get into the world and I'd love for you to join us in this mission to get this information out and support us by owning 'GMOs Revealed.' We have two packages, silver and gold, there's multiple options there with bonuses and other such things. This information is vital, it's valuable, and it's important so I invite you to please share our vision, join our mission, own GMOs Revealed and let's move forward into the world in a more empowered way.