
Segregating GMO Crops—Cultural and Functional Challenges

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In my world we segregate things very tightly. There are 20,000 pure line varieties of soybean germplasm. Would it be any surprise to you that some of those are better for our purposes than others? Which one do you choose? Recently we have had choices that are very different from what we had in the past. I'm a merchant. I leave the life preserver of science behind. Science gets used and abused by lots of different interests in the debates on GMO and IP. But the food shopper is my holy grail. I don't tell her what she wants. I ask her what she wants and do my best to deliver that product. The purpose of IP is to give somebody an advantage, a benefit. And increasingly you will see that benefit in market access.

We supply corn and soybeans to companies around the world. We contract with farmers to get the varieties, the hybrids, raised the way we want them, delivered the way we want. The Open Market won't deliver those to us, so we have to contract up front. The smallest unit we ship is a bag, and the largest, a vessel of roughly 60,000 tons. We secure our growers by paying a premium. I may come back to this, but I want to point out here that the market speaks with dollars. Today you are paying roughly \$3.50 per bushel for conventional corn. If that were non-GMO corn, you would be paying \$3.90. That could be the difference between profit and loss in farming today, easily. If that corn happened to be certified organic and IP, you would be paying \$13. It is an enormous difference. That organic farmer is often netting 500 to 1,000% more than his conventional neighbor. Now, IP products mainly come in bags or containers, or through facilities that have lots of different pockets. If we have time at the end of this talk, I'll walk you through a slightly different interaction.

There is a competitive advantage for buyers. Our buyers range from a tiny tortilla or tofu manufacturer to some of the largest food companies in the world. Up until around

1994, distinctions could be visually noted. It was fairly easy to tell the difference between a waxy corn and a nonwaxy corn. But with the advent of the social distinction of GE, it became impossible to see any difference, so now we get into testing protocols. For a food supply company, contamination due to adventitious presence is now the single biggest problem in meeting buyer standards. My bias is coexistence. I don't see any alternative for American agriculture other than to meet many different demands. And I am mostly concerned about products that are raised in a way that denies neighboring growers the right to hit their preferred market. I am for continued improvement in crop production. I am not anti-GMO.

What I am really doing is managing for purity. Different standards of purity are coming into the system. So the first thing to consider about GMO is how you define the term. As Kathleen said this morning, this is sort of a bastard term. Nobody owns it. We had one well-established private definition, but now we have another definition with the USDA certification. That could be the start of a hundred definitions. I could probably argue that the reason we went with less than 50% GE as a company standard is anti-GE interests. We need some regulation to define this term. That is a national conversation. It will be a troubling conversation. I do not know what the end result will be. Zero is impossible, but we get questions from people calling from around the world, who want to be non-GE. If they insist on a standard of zero contamination, I tell them that we can't do business because that just doesn't exist.

The corn growers association agreed to accept 5%. But my problem is that I don't have a single client in the world who would accept 5%, so problems form. In Japan, for example, the official standard is 5%. If you are dealing with a Japanese food company, they are going to tell you 3%. If you are dealing with a whole food company such as a tofu manufacturer, it is 0.9%. And at the 3% level none of the food companies want to suggest they are as forgiving as their government, which shakes hands with the United States. They want to establish that they are independent, so they cut it back. The EU labeling standard is 0.9%. As for the US and Canada, we don't really have a standard. But the standard I effectively have to work with in the marketplace around the world for food companies is 0.9%.

If you go back to the development of the organic rule in the late '90s, we had about 15 competitive missionaries, all organic certifiers, all telling us their definition of organic was better than anyone else's. It was very confusing. Finally we as a community took control of that word and defined it. Since then the market has grown exponentially. The consumer has some reasonable confidence that organic is what it says it is going to be. As for tolerance levels for IP traits and cultural distinctions, we have much the same situation as for GMO. How do you get a private grain or food company to invest in a tolerance level when they don't know what it will be a year down the road? It is extraordinarily difficult.

Functional traits now become important. That raises a situation that hasn't yet become a disaster but is poised to become a disaster. I think it involves a policy mistake on the parts of USDA, the US government, and Syngenta. This is the development of Enogen corn. Enogen corn is absolutely wonderful for the ethanol industry because it comes

equipped with a lot of enzymes that take that corn starch and turn it right into sugars. If you are a starch company, what in the world would you most like to avoid? Something chewing up your product. Something chewing up your starch. So now I've got Kellogg's worried about what you are going to find in the bottoms of bowls of Corn Flakes. But what is the problem for companies like mine? According to Syngenta's own research, 1 part in 10,000 of Enogen corn ruins any other corn, GMO or non-GMO, for use as grits. One part in 2,500 ruins any other corn for use in alkaline milling, tortillas, and tortilla chips. Those are both really huge markets for the American corn farmer, for American agriculture. I can't test at the farm or the grain elevator level at either of those tolerance levels. I have to have PCR for that. So how many of you farmers want to hear, "Excuse me, can I hold your truck for a few days?" If we could get an ELISA test that allowed us to test for that level, we could test for these lower tolerances on a regular basis. But even that is expensive. One ELISA per truck would cost \$30, whether it is carrying 1 bushel or 1,000 bushels. With PCR, depending on the traits you are testing, the cost can run from \$250 to \$750. It becomes a huge issue.

So who defines what the traits are? Private companies or a community in broad discussion? States or federal? My preference is federal, so you have the same rule everywhere. What we are seeing here is similar to what happened in a lot of other industries. When I was a kid there were two tennis shoes, the black high-tops and white low-tops. Now there must be 2,000 choices. Why wouldn't we expect the same thing to go on in agriculture? Since we added new technologies there are more and more distinctions being made. How do we go about trying to meet people's needs? We establish contract standards that we think will meet our clients' needs. We lay out segregation protocols. And by the way, when dealing with corn, if you give us a 70- to 100-foot segregation, we are pretty comfortable. With soybeans, you can give us a 12-foot segregation level and we are comfortable that we can meet the 0.9 standard. It is becoming more difficult for us to meet these standards today largely because of some seed issues.

We established verification programs, almost always using third parties and testing standards. We incentivize the producer and reward for quality and purity. Earlier I explained to you the corn incentives: from conventional corn at \$3.50 a bushel to organic corn at \$13. On the soybean side, conventional soybeans are around \$9.50 a bushel; if it is non-GMO, around \$11; and if it is organic, around \$30. Again, huge differences. Now when people get an incentive to deliver you something with no more than 0.9%, they make a serious effort. The difference in price is significant. We get overwhelming, though not complete, compliance. We verify everything with documentation. We verify with testing. A lot of people think it is easy for us to get representative samples of a product like corn. But it is not easy to get a representative sample out of a truck going across the scale. It is difficult especially when we are measuring for 1 part per 1,000. Verified accurate testing to buyers' standards at the point of shipment would be a wonderful role for government. We would love to know if a shipment is going to be accepted in Japan, Korea, Taiwan, and Belgium before we invest in the cost of shipping. In grade standards that pretty much is the case. Grade standards are the basis for trading. They tell a processor almost nothing

he needs to know about the corn. Nothing about the protein levels. Nothing about amino acids, nor biochemistry. They just tell you that it is sort of yellow. So I would like to see government step in. But I know that Mr. David Shipman, who used to run the USDA's GPS committee, doesn't want to have anything to do with certifying GMO levels. I understand why. But it would be very helpful if somebody were to do that.

On to the issue of seed. We have contamination factors coming from seed. When I ask a seed company that sold farmer X non-GMO seed what its tolerance for GMO in non-GMO seed is, this might be the dialog: "Don't ask." "No, no, no I have to ask." "We don't really know." "How can you not know? I need to know." "Well we think our average is 0.8%, but our range is from nondetectable to 3.5%." Who got the 3.5%? Who got the nondetectable? It is becoming increasingly difficult for us. Almost no one I know puts a label on their bag about the GMO level inside. So there is lots of "buying blind" going on. We can test a seed lot before planting. But how do we get a representative sample? We are asking for levels of purity that the seed industry has never responded to. The standard for hybrid purity is 95%. Now we are asking for seed standards of 99.5%–99.9%. This is a tremendous improvement. The closer you can get to perfection, the more expensive, the more difficult it becomes. One of the things we could do is buy seed from Monsanto and Pioneer in Europe, where they quit raising GMO seeds because the Europeans said they didn't want it. I understand that DuPont Pioneer has decided to give us better segregation by growing a significant chunk of their seed now in the US Pacific Northwest, where the main air flow comes from the west, so the closest corn upwind is Hawaii.

So we have these two possibilities, EU purchase or more extreme domestic isolation. We have farmers who have protocols for cleaning their equipment, third-party inspections, testing during production, and buffers for purity. Post-harvest you have a lot of cleaning, testing of inventory before delivery, testing each load on shipment and subsequent to shipment at the final destination—there are many choices. With ELISA we can go down to maybe 1 part in 400. The benefit of ELISA is that it is quick and relatively inexpensive. PCR takes more time than you have if you are to keep the flow of commerce going, and it is tremendously more expensive. The cultural standards can all be addressed by the 0.9% rule. As for the functional standards, I'm guessing the buffer area needed to avoid 1 part in 10,000 would be a mile. One acre of high-amylase Enogen corn will commercially exclude the surrounding 2,000 acres from producing corn for grits. That lends itself to private zoning in the Midwest. That is not the way I want to organize agriculture. This could be avoided. You could put a marker in that amylase corn to allow those of us who care to separate it out. How long does it take to put a colored stripe in corn? About two generations. How many generations can you plant and raise in a year in Hawaii? Three. Is that too much to ask of the system? To put a marker in something that could be this disruptive? I don't think so.

This morning a lady asked about organics and process definition. There is a wrinkle here. Organic standards are process defined. I think that was done well, skillfully, and diplomatically. This is pretty much what the rule says about GMOs: Crops raised according to the organic rules are organic. They are to be raised without using any GMO inputs. There is

no testing required to prove or disprove that the crop is organic. There is no defined level of adventitious presence of GMO that negates the organic identity. But there are today certified organic crops that are no longer marketable because almost every food processor sensitive to the market wishes to avoid GMOs. These buyers require crops to be both organic and non-GMO. They define non-GMO as having less than a defined level of GMOs. So the real market situation for an organic farmer is that he starts towards a really good market. With too much GMO content, we have to divert him to another market, and those diversion markets are becoming fewer and farther between. The first market was close to his farm. The next market might be 1,000 miles away. Logistics become a significant problem. So the potential loss to an organic farmer from a substandard market could be \$9 a bushel on corn; \$9 a bushel on 150 bushels an acre, that is \$2,025 per acre. Are there some who lose? Yes. My company is one of the very few that is willing to share our data on rejections, with all the personal information stripped out. The percentages that we reject allow some calculation of national losses. These estimates are not perfect. But I think they are reasonable.

What is the vision for US agriculture? My goal is that US agriculture must support farmer choice and protect farmers from being market-dominated by their neighbors. You can do that if you use buffer strips to segregate GMO cultural traits from non-GMO fields. Unless there is some responsibility for two farmers to talk, they probably aren't going to do it. But if there is a responsibility, then they will talk and may coordinate crop rotations so that they need no buffer at all. But how at the same time do we support the farmer who wants to plant GMO crops and serve GMO-accepting markets? How do we support the technical development of crops without disrupting markets and ruining markets for neighbors?

How can we balance and respect these conflicting values? I think we have to acknowledge when a significant market distinction such as GMO merits labeling as a coexistence solution. There is obvious popular interest in getting GMO/non-GMO labeling. So I would like to see non-GMO labeling. It means you have to just define what the label means, what level of GMO presence is acceptable in a product labeled non-GMO. Such labeling would not be mandatory. I think that voluntary labeling addresses the consumer's right to know. Mandatory is unnecessarily punitive to other people in the ag community with whom we need to coexist, cooperate. I think we have to define "non-GMO" as meaning "less than X content." What is the value of X? I don't really know. And we have to enforce truthful labeling through FDA or USDA. I think there is tremendous credibility value in USDA services. It is absolutely wonderful on an international basis. I think it should be the same at home. I agree that farmers don't have the right to damage their neighbors' market choices. You can drive this to an extreme. And most arguments driven to extreme collapse. But if the segregation requirement is reasonable, and we get a reasonable tolerance level, then I think farmers on both sides of the GMO fence have a responsibility to cooperate. That can be enforced through access to insurance, payments for conservation, lots of ways. On seed approval, market disruption as well as safety needs to be considered for new traits and new commercial seed groups. The time to define weed status is also

during the approval process. For less disruptive traits, appropriate buffers are okay, but when a new trait comes into commercial availability, we should take a look at it as a community and determine the disruption factor. I think we should require appropriate segregation buffers to be included in contracts between a seed provider and a farmer so that all parties understand that they are participating in this industry. The potential benefits minimize the expense and conflict over labeling. I think the arguments over labeling will continue and voluntary labels will ease the controversy over introducing new traits. If I felt more secure when a new trait was implemented, there would be a lot less resistance from members of the community that I now have to engage. We can minimize resolution via tort law and class action—a terrible way of making policy. But it will hammer out a policy. I think we'd satisfy many who want a reliable label by voluntarily using labels, and it would support US farmers of all stripes as disciplined suppliers to the world. The world looks at the United States right now and says, you people can't control your seed supply. You are being rejected by China. Look at you, you let Starlink get through, you let something else out. This didn't do anything good for our credibility in the world.

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