
Coexistence

Q&A

MODERATOR: CAROL MALLORY-SMITH
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M. Kahn, Washington State University: We also have a paying program, and what maintained that for many, many years was that farmers could make about ten times as much money growing seed on that land as they could growing the crop itself. If you produced spinach seed it brought in ten times more than producing spinach, so neighbors got together and agreed to yield their choice of crops to work together, because they could make so much more money that way. Lynn's talk emphasized the fact that there are some very significant price incentives to being in some of these labeled categories. There is a price incentive to being organic. There is also a production incentive to doing genetically engineered crops, and in the case of beets it was shocking to me how fast genetically engineered beets took over the market. In less than three years it went from 0 to over 90%, which is simply unheard of in American agriculture. Some of what brought that about was that there were not such precise standards. That occasional squash plant that was straightneck instead of a crookneck wouldn't take you out of the market. As long as most of your seed was what it said it was going to be, it was fine. I wonder if a 0.9% threshold is something that various people can live with. Lynn was giving us a range, but at what point do these neighborly agreements break down in the face of regulation, which is where I think you guys were going.

Clarkson: With respect to soybeans, that is not really a problem. With respect to corn, neighborly agreements about a 0.9% threshold may have a limited life span, because it hasn't been getting easier to get the 0.9% standard, it has been getting more difficult as new traits are added, and as the germplasm selection becomes somewhat more tainted. It is tremendously difficult for seed companies to keep adventitious presence out of their breeding stock. I don't know how long 0.9% is sustainable with respect to corn.

M. Kahn: A quick follow-up question: Is there a danger in setting a standard and then finding that that number can't hold?

Clarkson: Of course.

Loberg: Could I add something here. The answer to this question lies in something I mentioned briefly, namely treating all genetically engineered crops the same, regulation without a lot of layers and rules. So why would you, for example, treat a wind-pollinated sugar beet, a crop that requires an isolation in either direction—from sugar beet to Swiss chard and from Swiss chard to sugar beet—of four miles. Four miles is a long way, but in sugar beet seed production we can achieve that. It does not guarantee 0%, but it gets us close. On the other hand, why would you require four miles for an insect-pollinated cabbage seed? The insect is very, very unlikely to go that far. And corn pollen goes ten feet, or a very short distance. I am exaggerating a bit, but the point is that the fear of government regulation is that it will be blanketed across all genetically engineered crops without differentiation.

Clarkson: It has been a general, a very general broad-based sketch for all GMOs; they are judged the same in spite of different implications, and you are going to see that on a national level.

G. Roth, Penn State: I have talked to some of our local industry people interested in moving toward GMO. They are somewhat worried about liability, about ending up supplying grain that they thought was non-GMO and it turned out to have GMOs in it. I wonder if Lynn or the rest of you could comment on the history in the industry of producers suing each other over who caused the contamination in the product, or can you mitigate that with your careful testing program?

Clarkson: Let's talk about corn, because that is where the problem comes up most often. The farmer liability with respect to his contract ends when he brings it to where we sell it. We assume the liability based on testing at that time. We have never yet known a farmer to sue a neighbor over contamination. We test every load of corn that comes through our gates, and it goes into computerized records so that we can look back for years and see what load was rejected and on what the rejection was based. In the first 10–12 years of the GMO world, we were rejecting maybe two or three truckloads of corn per hundred. Tolerable—painful if it happened to be your truck, but it was tolerable. That has approximately doubled in the last two or three years, and much of that comes from seed sources rather than from cross-pollination. So the issue on corn I was talking about has yet to hit, of course, but we don't have very many rejections here because we can't detect it. We as the supplier have passed the problem on to the processor, and none of us will know which way it goes until that problem actually happens, because it's so small. But if you look at organic crops, because organic fields tend to be smaller than non-GMO fields, the rejection rate on organic is just about twice what it is on conventional corn, but it's still less than 10%.

M. Owen, Ohio State University: Just out of curiosity, do you still get occasional Starlink showing up?

Clarkson: Thank god, no.

T. Harding, Lehigh Valley Growers: I was curious, today the one thing I haven't heard, which I have heard thousands of times in other discussions, is the whole point of the ethics. I was wondering if you had an opinion about the ethics of biotechnology in general. At a conference I attended recently in Europe the question came up, not by left-wing crazy people but by people who are real good scientists, saying what about if we have a total crop failure? What happens if all of our crops fail in spite of the steps we are taking? By the way, I am very impressed with what I have heard today. Have we discussed that? Have we really looked deeply enough into how we as an industry, meaning all of us here in this room, can make sure we don't have further problems with resistance? Maybe we in America should put more of the precautionary principle to work here. From my point of view, labeling is not the direction to go. I have lived with tolerance levels for a long time. They are targets, and we haven't even reached the segments of the vegetable growers, small fruit growers. These are serious issues we are talking about, food and the sustainability of it. Are we talking about the ethics of this? Are we talking about precautionary principle reaching deeper into the approval process, and are we really thinking not only about what the marketplace wants, but about the sustainability of our farms and the liability of our agriculture system?

Loberg: Carol is going to get the last word on this. I think the challenge from my perspective is that ethics change with context. I was telling someone just before we came to the front here that I have a niece who just loves a local food supplier, so much so that she is on Facebook all the time touting the local food supplier. Good for her! Locally grown and fresh, and I'm not against it, but finally I got so tired of listening to her and I said "Well, how is that local food supply thing working out in Africa?" Not too well. So when it comes to ethics, the context becomes important. Starving to death is not a very good thing to push onto people when we have the capability of feeding them. But at the same time the ethics of sustainability must be considered.

Mallory-Smith: I agree with you, but I don't really think that the Roundup-resistant weeds are really affecting sustainability in agriculture. We had resistance before we got Roundup resistance. We would have it even without GMOs. It is a reality of the conventional agriculture system. I think the ethical discussion begins when you start looking at possible actions and then ask if we should take them. And those are traits beyond what we are currently talking about. We are not as comfortable with some of the emerging technologies as with the ones we have been using all along, and we are wondering if they are going to have the same kind of repercussions. There are some ethical questions here. I think it is important to have transparency in our regulatory system, which is not currently the case, and we must be able to evaluate the data, most of which is not available to the general public. Having said that and wanting transparency, I will definitely agree with Greg that using the Noxious Weed Law to look at these crops is not the way to go. We started out with the bad regulatory system of trying to scrunch GE crops under APHIS rules for pest management. Those rules were not written for this technology. And now

we are trying to take them and use them to do the same thing all over again. So unless these new crops actually are weeds and invasive, they should not be called so. They are crops. We should not take this route just because they are genetically engineered, even if the regulatory authority gives you this option. That would just mean making another bad policy decision, and I'm afraid we are heading in that direction.

Clarkson: The range of values and the discussions always get so murky that I am waiting for a life jacket. Roughly 30% of the food produced in the States seems to be wasted. Roughly 30–40% of the food raised in India seems to go bad during storage, before you can even use it. I get lost in all that murkiness. I remember talking to the head of one of the food co-ops that provides food for roughly 6 million families around Tokyo during a Monsanto tour that lasted four hours. I asked, “Dr. X, how many years have you been doing your research?” She told me that she had worked on this for 14 years, that she really admired my absolutely world-class science, and that she encouraged me to continue. She told me, “If this were our IP we wouldn't use it until a generation passed. That's 30 years. Please call me in 16 years. I could be your best client.” So that is my client talking. That is your client talking. And it wasn't a dismissal. It was a deferral. I think that is the major difference. As far as noxious weeds go, that is not a very good vehicle. It is focused on market disruption, and most of us in agriculture are not so much concerned if the issue is whether it is GMO or non-GMO, it is a market disruption issue. Can we manage the technology and have both? I think we can, but I don't see it happening voluntarily.

T. Harding: I want to follow up on the issue of the land grant systems and our responsibility for transparency. It is important, because the land grant system is so important to all of us as growers. With regards to Africa I will tell you that the work I have done in Africa indicates to me that the small producers feel very differently where the sourcing of the seeds is concerned and how they continue to the next generation. These are important issues, so maybe the dialog should be from an ethical stand point. We need to have a fully transparent dialog and we all need to listen to each other. Today has been a very good discussion, but I don't think this is taking place everywhere. Certainly the committee Lynn was on seemed to miss out on that discussion, and I sometimes wondered if they were all in the room at the same time.

R. Hardy, NABC: I want to make a comment on bioethics. Back in the mid-90s NABC established a federal initiative to educate our university members on bioethics. It was a one-week immersion course for 20–30 professors each year. That program ran for several years, until the interest faded, and we felt at that time we had saturated the market. This was around 2004. We have also had noted bioethicists on the programs for NABC meetings, so we have been quite involved in that area.

D. Benfield, Ohio State University: I have heard all afternoon that we feel like we can handle the technology. We feel that the technology is moving forward in positive ways. But as an associate director in the [Ohio] Experiment Station and a college administrator, I wonder what the academic institutions are missing, besides knowledge that might be

beneficial in this whole gamut, in this arena of GMO and genetically engineered crops, in terms of public acceptance or helping to promote that public acceptance.

Mallory-Smith: I don't know exactly how to respond to that because I'm not sure that as a scientist it is my job to drive that acceptance. I think my job is to make sure people have the right information about it and people have the right to make their own choice.

D. Benfield: I will rephrase: Are we as scientists providing the right information?

Mallory-Smith: No. I think we might be providing accurate information, but we are not providing it in the best way, especially when we still have people who say they don't want DNA in their food. So obviously we have failed as educators. And I think we have failed with education about resistance management, too. We have not delivered; or Mike, do you think you have delivered it correctly?

M. Kahn: No, I agree with you entirely.

Mallory-Smith: We claim to be the educators at the university, but we have failed. So how can we deliver the message and make sure that it is understood? I am talking about resistance, for which we haven't had economic drivers on the farm. As far as public perception, we haven't had the web presence or other tools that would actually convince people that we are delivering accurate information. We certainly don't have the tools to compete with the wild stories, and we don't come up with our own wild story about why it is not as posted on Facebook and still sound credible. I think we are credible, but the public doesn't really care what is credible. They would rather read something interesting. So maybe we are just boring?

Loberg: I want to make a quick comment, a short story on the Benton County measure, which is a very broad and damaging measure to the county and to Oregon State University. One thing I found out during the campaign against that measure is that there is a single researcher who is responsible for a \$2,000,000 program in medication of ALS, Gehrig's Disease. I had no idea that Oregon State University was world renowned in ALS research. To test his drugs, he uses genetically engineered mice, predisposed to be susceptible to ALS. When I heard that, I wondered who in Oregon, who in Benton County knows Oregon is known for ALS research? A lot of people don't know that. So I think there is room to just tell the public the big picture stories. One of the problems I have personally is that I know too much and I want to tell everybody too much. It is a problem for scientists in general that we know too much, and that is not what works on social media. There they don't say too much. They just say a little and let you figure it out, and they don't care if it is inaccurate.

Mallory-Smith: I agree that it is more about getting sound bites that resonate with the public. In the case of this particular measure, I felt the university should have taken the lead. The university should have stood up and explained the bad results that would come from it. But the university administration is very nervous, and they didn't even take a stand on this. They did some underground maneuvering, but they didn't state that Oregon State University is against this. But sometimes you have to find ways to have impact, and

we just have to learn how to communicate with the public. There are training programs trying to work with scientists to do that, but apparently they are not working fast enough.

Clarkson: Many in these industries are used to their clients being growers, and that would be all the interaction they would need. Sometime around 2000, consumers pounded the table and said, “I’m not happy with the food system and I want to be heard.” And that is an entirely different perspective. So we might get sound bites out there that are correct, but the consumer doesn’t understand them. Here is a case in point: Sometime over the last six months a study came out that in mother’s milk in the US you find ten times the level of glyphosate as in mother’s milk in Europe. Now, I don’t know whether that is true, and if it is true I don’t know if it is significant. But in the market that I deal with, I absolutely know that that was a significant story, and I have already had to make sure there is no glyphosate in breast milk. It is a difficult issue, but the market pulls some things through and tries to push others through. Right now we have the organic market pulling things through. It is asking for more and more according to our studies. You get companies who are selling into the stream of commerce, but they are not selling it to the consumer. They are selling it someplace else in the supply chain.

S. Fleischer, Penn State: A few years ago I was teaching a class on issues of biotechnology, and the only comment I want to make is that in the resident part of the land grant system you have a great opportunity. After fine-tuning the design of this class three different times, I approached it as an exercise in critical thinking rather than trying to deliver information. It was all about students talking about how they are approaching problems. We developed a protocol for this and went over a lot of content about the different components and found this to be a great opportunity for teaching critical thinking. I thought we could then move on to the science and STS type programs, but then Penn State got rid of the STS program. While this program has not moved forward, it was a great opportunity to teach critical thinking.

M. Irely, United States Shared Corporation of Southern Garden Citrus: We are probably one of the largest farms east of the Mississippi. I think to a certain extent you are too hard on yourselves about failing as educators. I think you are just reaching the wrong group. Everybody here is either an aggie or is from a land grant institution, and there are undoubtedly people who need to be reached in that population, there are many people who are not part of the agricultural system who don’t have a clue where food comes from. All they know is that it comes from the grocery store. We are in a very environmentally sensitive area and found that it is helpful to just bring consumers in and show them our operation. A different kind of education needs to be done, not necessarily what you are used to.

Mallory-Smith: I agree with you. I speak with many general public audiences who do not have a science background and I know I have an impact, but I am still only reaching small segments of people, those who have an interest in learning.

M. Irej: But it's one less group that is going to badmouth it.

D. Mortensen: I appreciated the comments of the previous speaker and want to follow up on them. I am also at Penn State. I couldn't agree more that we are reaching the wrong audience. And the idea that a website or a pamphlet or a magazine article is going to solve the problem is really naïve.

Mallory-Smith: It was a YouTube.

D. Mortenson: Whatever. We have a systemic problem with the education about the food system, and my view is that the local foods movement is actually one of the best places for teaching opportunities in a very engaged nonagricultural community. I would like to hear your reflection on this comment. I think that is at the core of much of what needs to happen instead of surveys about DNA, etc. I also second Ralph Hardy's comment about training in bioethics. It is my view as a scientist that the science community is very arrogant when they claim that "we'll tell you what the science says." This is very naïve. I participated in an ethics panel here in September right before the deregulation of the 240 crops, and people were sitting in the aisles who wanted to hear this, mostly non-ag college folks. We were all asked to read Bernard Rollins's *Ethics in Science* before we participated, and it is very helpful to remind us scientists that we bring a great deal of passion to subjects we choose to study, the way we choose to occupy our time, and the work we do. We need to keep reminding each other that there are biases built into all kinds of things, whether we're teaching as scientists or consumers.