GE Contamination Avoidance and Testing

Surveying Organic Seed Growers and Organic Seed Companies

A Summary Report by Organic Seed Growers and Trade Association

2014

Introduction

In 2013, the Organic Seed Growers and Trade Association (OSGATA) designed and implemented two surveys to assess current best practices for contamination avoidance from genetically engineered (GE) crops, as well as testing protocols, utilized within the organic seed community.

One survey targeted organic seed growers, and the other was addressed to organic seed companies.

The purpose of these surveys, as outlined to survey participants, is as follows:

•To assess to what extent and through which processes organic seed growers and organic seed companies are working to avoid potential transgenic contamination in their seed crops.

•To gauge what methods organic seed growers and organic seed companies are employing, if any, in testing for genetic integrity of their seed.

OSGATA's intent in gathering data on GE contamination avoidance and testing protocols from the organic community was, in part, to start defining realistic farmer strategies to maintain seed integrity, while also beginning to identify and record practical limitations in the field and economic burdens of implementing avoidance strategies.

Part 1: Surveying Organic Seed Growers

Survey Questions & Results

1. What do you believe is the risk of exposure to your organic seed from contamination by transgenic (GE) traits?

(21/ 21 Responded)

- 54.4% **High**
- 23.8% **Moderate**
- 28.6% **Low**

2. Do you produce certified organic seed for any crops currently at risk for genetic contamination from genetically engineered crops? Please check all that apply.

(21/ 21 Responded)

- 47.6% ***Zea mays*** **(corn)**
- 28.6% ***Glycine max*** **(soybean)**
- 4.8% ***Gossypium*** **spp. (cotton)**
- 14.3% ***Medicago sativa*** **(alfalfa)**

- 33.3% ***Beta vulgaris*** **(sugarbeet, table beet, Swiss chard)**
- 33.3% ***Cucurbita pepo*** **(summer squash, zucchini, assorted winter squash and gourds)**
- 9.5% **Papaya**
- 33.3% ***Brassica napus*** **(canola, rutabaga, Siberian kale)**
- 33.3% ***Brassica rapa*** **(turnip, broccoli raab, Chinese cabbage, Chinese mustard)**
- 14.3% **Do not produce any of the above-listed seed crops**

3. Are you, or is your stock seed supplier, testing for the presence of GE traits prior to planting?

(21/ 21 Responded)

- 14.3% **Yes, the seed supplier is testing for transgenic presence.**
- 19.0% **Yes, I am testing for transgenic presence.**
- 14.3% **Yes, if my seed supplier is not testing then I will test for transgenic presence.**
- 57.1% **No, the seed stock is not being tested.**
- 19.0% **I don't know.**

4. If you are currently testing for GE content in your seed, which types of genetic tests do you perform?

(9 / 21Responded)

- 0.00% **Enzyme-linked immunosorbent assay (ELISA)**
- 55.6% **Polymerace chain reaction test (PCR)**
- 44.4% **I don't know.**

5. If you are currently testing for GE content in your seed, at what level of detection (LOD) are you testing?

(5 / 21 Responded)

- 80.0% **0.01% (i.e. 1 kernal out of 10,000)**
- 0.0% **0.1%**
- 0.0% **0.5%**
- 20.0% **0.9%**

6. If you are currently testing for GE content in your seed, what is your sample size per crop you are testing?

(10/ 21 Responded)

→Open-ended question; see Analysis & Conclusions.

7. What does your GE testing program cost per individual test?

(8 / 21 Responded)

- 25.0% **Under $50**
- 12.5% **Between $50-100**
- 0.0% **Between $100-150**
- 25.0% **Between $150-200**
- 37.5% **Over $200**

8. On average, what does your GE testing program cost per year?

(8/ 21 Responded)

- 50.0% **Under $250**
- 0.0% **Between $250-500**
- 25.0% **Between $500-750**
- 0.0% **Between $750-1000**
- 25.0% **Over 1,000**

9. Do you currently have a rejection threshold for seed that has GE content?

(10/ 21 Responded)

- 70.0% **Yes**
- 30.0% **No**

10. Have you experienced economic loss, beyond the cost of testing, due to GE contamination of organic seed?

(20/ 21 Responded)

- 25.0% **Yes**
- 65.0% **No**
- 0.0% **No comment**
- 10.0% **No comment due to concerns of legal jeopardy**

11. What measures are you taking to minimize risk of transgenic contamination in your organic seed production systems? Please check all that apply.

(17/ 21 Responded)

- 17.6% **Testing at-risk seed prior to planting**
- 82.4% **Maintaining isolation distances**
- 47.1% **Maintaining physical barriers**
- 35.3% **Planting at different dates from GE-growing neighbors**

- 52.9% **Substituting unrelated crop families from GE-growing neighbors**
- 47.1% **Identifying and eliminating potential contamination points (i.e. shared equipment)**

12. If you are maintaining isolation distances to minimize risk of GE contamination, please list the crop and isolation distance (including unit of measure).

(14/ 21 Responded)

→Open-ended question; see Analysis & Conclusions.

13. What costs, if any, are associated with your GE contamination avoidance strategies?

(13/ 21 Responded)

- 61.5% **Under $250**
- 0.0% **Between $250-500**
- 7.7% **Between $500-1000**
- 7.7% **Between $1000-2000**
- 23.1% **Over $2000**

14. Are there GE contamination avoidance strategies you would like to implement, but cannot? Please explain.

(8/ 21 Responded)

→Open-ended question; see Analysis & Conclusions.

15. Are you currently choosing not to produce certified organic seed of a specific crop, or crops, due to risk of genetic contamination?

(16/ 21 Responded)

- 37.5% **Yes**
- 62.5% **No**

Part 2: Surveying Organic Seed Companies

Survey Questions & Results

1. What do you believe is the risk of contamination to organic seed by transgenic (GE) traits?

(8/ 9 Responded)

- 50.0% **High**
- 50.0% **Moderate**
- 0.0% **Low**

2. Do you sell (or handle) certified organic seed for any crops currently at risk for genetic contamination from transgenic crops? Please check all that apply.

(9/ 9 Responded)

- 88.9% ***Zea mays*** **(corn)**
- 33.3% ***Glycine max*** **(soybean)**
- 0.0% ***Gossypium*** **spp. (cotton)**
- 22.2% ***Medicago sativa*** **(alfalfa)**
- 88.9% ***Beta vulgaris*** **(sugarbeet, table beet, Swiss chard)**
- 100.0% ***Cucurbita pepo*** **(summer squash, zucchini, assorted winter squash and gourds)**
- 0.0% **Papaya**
- 77.8% ***Brassica napus*** **(canola, rutabaga, Siberian kale)**
- 66.7% ***Brassica rapa*** **(turnip, broccoli raab, Chinese cabbage, Chinese mustard)**
- 0.0% **Do not produce any of the above-listed seed crops**

3. Are you testing at-risk organic seed for the presence of genetically engineered traits prior to supplying stock seed to certified organic seed growers under contract or prior to selling certified organic seed to the public?

(9/ 9 Responded)

- 33.3% **Yes, I am testing for transgenic presence prior to releasing as stock seed.**
- 44.4% **Yes, I am testing for transgenic presence prior to public sales.**
- 44.4% **No, the seed is not being tested.**
- 0.0% **I don't know.**

4. If you are currently testing for GE content in your seed, which types of genetic tests do you perform?

(5/ 9 Responded)

- 60.0% **Enzyme-linked immunosorbent assay (ELISA)**
- 60.0% **Polymerace chain reaction test (PCR)**

5. If you are currently testing for GE content in your seed, at what level of detection (LOD) are you testing?

(2/ 9 Responded)

- 100.0% **0.01% (i.e. 1 kernal out of 10,000)**
- 0.0% **0.1%**
- 0.0% **0.5%**
- 0.0% **0.9%**

6. If you are currently testing for GE content in your seed, what is your sample size per crop tested?

(4/ 9 Responded)

→Open-ended question; see Analysis & Conclusions.

7. What does your GE testing program cost per individual test?

(5/ 9 Responded)

- 20.0% **Under $50**
- 20.0% **Between $50-100**
- 20.0% **Between $100-150**
- 20.0% **Between $150-200**
- 40.0% **Over $200**

8. What does your GE testing program cost per year?

(5/ 9 Responded)

- 20.0% **Under $250**
- 0.0% **Between $250-500**
- 0.0% **Between $500-750**
- 20.0% **Between $750-1000**
- 60.0% **Over 1,000**

9. Do you currently have a rejection threshold for seed that has GE content?

(6/ 9 Responded)

- 66.7% **Yes**
- 33.3% **No**

10. Have you experienced economic loss, beyond the cost of testing, due to transgenic

contamination of seed?

(8/ 9 Responded)

- 37.5% **Yes**
- 50.0% **No**
- 0.0% **No comment**
- 12.5% **No comment due to concerns of legal jeopardy**

11. If you have experienced economic loss due to GE contamination, what is the estimated dollar amount of loss?
(5/ 9 Responded)

→Open-ended question; see Analysis & Conclusions.

12. If you work with organic seed growers, what measures, if any, are recommending to minimize risk of transgenic contamination in their organic seed production systems? Please check all that apply. The comment field is also available to expand on your answers.

(7/ 9 Responded)

- 28.6% **Testing at-risk seed prior to planting**
- 100.0% **Maintaining isolation distances**
- 57.1% **Maintaining physical barriers**
- 71.4% **Planting at different dates from GE-growing neighbors**
- 42.9% **Substituting unrelated crop families from GE-growing neighbors**
- 57.1% **Identifying and eliminating potential contamination points (i.e. shared equipment)**

13. If you are recommending maintaining isolation distances to minimize risk of contamination from GE seeds, please list the crop and the recommended distance (including unit of measure).

(6/ 9 Responded)

→Open-ended question; see Analysis & Conclusions.

Analysis & Conclusions

The Organic Seed Grower survey was sent, via an electronic survey collector, to 126 certified organic seed growers. Of this targeted audience, 21 farmers responded. The Organic Seed Company Survey was sent, electronically, to 57 seed companies handling and selling certified organic seed; 9 companies completed the survey. Some respondents skipped questions within the surveys. More

specific questions, i.e. questions pertaining to contamination in individual crops rather than all crops currently at-risk from commercially grown GE crops, might have led to more conclusive results.

The low level of respondents affects the applicability of extrapolation of the data. However, the qualitative responses collected are useful in defining realistic farmer strategies to maintain seed integrity. These responses also are also helpful in establishing baseline information regarding both practical limitations in the field and economic burdens of implementing avoidance strategies.

The respondents' comments, which are all confidential, are discussed below.

Risk of GE Contamination

Regarding the risk of seed crop exposure to GE contamination, higher concern was expressed regarding outcrossing crops, especially corn and *Beta vulgaris* crops. Location was also a determining consideration. One organic seed grower, who responded with a "low" level of perceived risk, said, "I would like to grow corn but am surrounded by GE sweet and field corn. So I choose not to take the risk." Four other seed growers said they stopped growing or would not grow either corn, soybeans, and/or canola as a result of contamination concerns. Growers who checked "moderate" or "low" often commented that their location buffered their exposure in some way, or that they did not grow at-risk seed crops. One seed grower said they focused on vegetable crop seed, in their corn- and soy-heavy area, thereby diminishing their risk. Two other growers said their risk of GE contamination was "low," due to their farms' isolated locations.

Organic seed company respondents reinforced the importance of crop specifics and location as determining factors in assessing risk of GE contamination. One summarized, "Obviously the risk is higher in wind-pollinated out-crossers, such as corn. And some areas of the country pose greater risks. What I have noticed is that corn contamination, in general, has increased since we first started testing."

Testing Protocols

The organic seed grower respondents were most concerned with testing corn seed for GE presence. Barriers to testing included scale and cost. Several growers testing for GE presence defer to the testing protocols recommended by the testing facility they utilize. Other seed growers noted that their testing regimen changes with crop. 30% of respondents utilize a 10,000 seed sample; others submit samples by weight, ranging from 50 grams to 7 lbs, depending on crop. One papaya grower said that tissue testing, rather than seed testing, makes the most economic sense. The majority of the respondents (6 out of 7) expressed zero tolerance for any GE presence detected in their seed lots. One grower stated, "If GE content is detected, it is not sold as organic seed." The only organic grower not expressing zero tolerance stated a threshold of 0.1% in soybean and 1-2% in corn seed.

Similar to organic seed grower respondents, organic seed company survey respondents were largely testing corn seed. Testing plans, as outlined in the given comments, were variable. Some

factors affecting tested included: new growers, new growing locations, and seed amount available for re-sale. Corn sample sizes utilized included 10,000 seeds and 6 lbs. Two seed companies expressed a zero tolerance for GE contamination, one company expressed a 0.01% threshold, and another expressed 0.1%.

Economic Loss

Outside the costs of testing, 25% of organic seed grower respondents said they experienced additional economic loss. One grower lost 50% of their primary organic corn seed customers in 2001. Another organic seed grower had to destroy $4,600 of certified organic Swiss chard seed as a result of GE sugarbeets being grown in proximity to their crop. Likewise, an organic seed company respondent said they were unable to harvest a crop of certified organic Swiss chard seed, valued at $15,000, due to probable contamination by GE sugarbeets.

Another organic seed grower said they anticipate losses with GE contamination being identified by their newly implemented testing regime. One seed grower, summarized indirect losses to the organic community as well, "We have refused to purchase organic seed lots which have tested positive for GE contamination. This did not cause loss to us but would cause loss to the seed seller." A papaya grower stated that their direct economic loss due to GE contamination is minimal, but "time and stress are not small."

GE Avoidance Strategies

Organic seed growers commented that starting with tested seed is important. One suggested talking to neighbors or looking at satellite maps to identify possible sources of contamination in respective areas. Isolation distances implemented by organic seed growers varied by crop. For corn, one grower used 1.5 miles with a forest barrier and time isolation. Three other seed grower respondents and 2 seed companies said they isolate organic corn seed crops by a minimum of 5 miles; one corn grower said 1,320 feet, and one seed company said 2 miles. At-risk *Beta vulgaris* growers recounted distances between 4 and 5 miles. A seed company respondent recommended 3 miles in open air, 1.5 miles for greenhouse seed crops, "which time isolates the seed by several weeks, and provides a physical barrier for GM pollen." *Brassica* isolation distances ranged from 1.5 miles to 3 miles. Two organic growers recommended the following isolation distances for soybean: 200 feet plus natural barriers of vegetation and 1 mile. One respondent said they isolate alfalfa by 8 miles.

A grower in Iowa recounted the difficulties of maintaining isolation distances for genetic purity in a region known to grow GE crops on a commodity scale. This particular organic grower is 1/8 of a mile from the next farm and utilizes 40-60 rows of corn as a physical barrier to help isolate the interior corn seed crop. They also plant their corn 2-4 weeks later. Their corn is a shorter season variety (100 days to maturity) and still may mature at the same time as their neighbors' corn (110-120 days to maturity). This grower spoke to the difficulty of avoiding commingling of crops when

relying on shared use equipment. They rely on a neighbor who combines the organic corn following the combining of their own soybean crop. A stray soybean can be visually identified and removed from the organic corn seed. "Cleaning the combine completely is not an option; asking an Iowa farmer to take 6-8 hours off in October to clean a combine might make his head explode."

Some organic seed growers would like to implement other GE avoidance strategies but cannot. Vegetative barriers surrounding their entire growing areas and a complete ban on the growth of GE crops were expressed.