Adoption and Coexistence of GE, Conventional non-GE, and Organic Crops

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Abstract
The adoption of genetically engineered (GE) crop varieties by U.S. farmers is widespread for major crops—94 percent of planted acres for soybeans, and 88 percent for corn in 2012 (USDA-NASS 2012).

The potential exists for GE crop production to impose costs on organic and conventional non-GE production via unintended presence of GE material along the supply chain through:

• Contamination of seed stock
• Accidental cross-pollination
• Accidental co-mingling during planting, harvesting, handling, and storing of crops (Bullock and Desquilbet 2002).

Maintaining the integrity of GE-differentiated product markets relies on segregation protocols such as:

• Hybrid selection and seed purity testing
• Physical distancing during crop production
• Equipment cleaning and product segregation during processing
• GE-testing (Greene and Smith 2010).

Keywords
food safety, genetically engineered (GE) crops, compliance cost, regulatory burden, segregation protocols, GE seed

Disciplines
Agricultural and Resource Economics | Agriculture Law | Biosecurity | Food and Drug Law | Food Security

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Adoption and Coexistence of GE, Conventional non-GE, and Organic Crops

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The adoption of genetically engineered (GE) crop varieties by U.S. farmers is widespread for major crops—94 percent of planted acres for soybeans, and 88 percent for corn in 2012 (USDA-NAIAS 2012). The potential exists for GE crop production to impose costs on organic and conventional non-GE production via unintended presence of GE material along the supply chain through:

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The USDA National Agricultural Statistics Service (NASS) conducts periodic surveys to collect detailed information about production practices, costs, and returns in major farm sectors. In 2005, ERS and NASS expanded the ARMS survey to include periodic oversamples of organic producers in order to enable side-by-side comparisons of organic and conventional production. A targeted oversample of certified organic soybean producers in the 2010 ARMS survey and the questionnaires included questions on GE-testing and shipment rejection. The 2012 ARMS survey of conventional soybean producers had questions about non-GE soybean production and marketing.

### Research Objectives

- Synthesize previous ERS findings on the adoption and coexistence of GE, organic, and non-GE conventional crops.
- Examine the related economic issues using new data from several sources including consumers, farmers, and grain dealers.
- Identify the continuing gaps in data and research related to these differentiated markets.

### Data & Methods

- Analysis of new data on the costs of coexistence from a pilot project that is part of the USDA’s Agricultural Resource Management Survey (ARMS) for Organic Corn (2010) and Soybeans (2012).
- Site visits and interviews with ten major Organic and non-GE grain dealers for corn and soybeans in the U.S.
- Focus group at the 2013 Midwest Organic and Sustainable Education Service (MOSES) Organic Farming Conference to better assess the challenges of maintaining coexistence for farmers.

### Grain Dealer Interviews

In 2013 and 2012, researchers from USDA-ERS and the University of Maryland (UMD) interviewed ten corn and soybean trading companies in the Midwestern U.S. The grain dealers expressed a number of concerns about the coexistence of organic and non-GE production with GE production, including:

- Non-GF foundation seed is becoming unavailable
- Lack of non-GE and seed development for enhanced yield
- Increasing administrative, testing and segregation protocols
- More difficulty finding replacement for specialty and organic/generics when supply is low due to weather or aflatoxin contamination
- Difficulty finding new organic and non-GE producers in the United States
- Increasing competition with GE corn and soybean producers
- Increasing foreign competition for organic and non-GE markets.

### Conclusions

- Organic corn and soybean production has already stagnated in the U.S., and processors find it increasingly difficult to source non-GM corn and soybeans. The uneven distribution of the costs and risks to maintain GE-differentiated markets contributes to the challenges suppliers face in meeting the growing demand for organic and non-GE products.
- The strategies to reduce accidental presence of GE material in non-GE and organic food products are costly for both farmers and processors. The lack of a uniform tolerance standard also increases uncertainty.

### Further Information


### Further Reading


### Table 1: Soybean Production

<table>
<thead>
<tr>
<th></th>
<th>Area%</th>
<th>U.S. Production</th>
<th>Organic</th>
<th>Non-GE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybeans</td>
<td>2.7% of planted acres</td>
<td>7% of planted acres (2012)</td>
<td>12% of planted acres (2012)</td>
<td></td>
</tr>
<tr>
<td>Soybeans</td>
<td>2.7% of planted acres (2011)</td>
<td>12% of planted acres (2012)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2: Corn Production

<table>
<thead>
<tr>
<th></th>
<th>Area%</th>
<th>U.S. Production</th>
<th>Organic</th>
<th>Non-GE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>0.2% of planted acres</td>
<td>0.2% of planted acres (2012)</td>
<td>0.2% of planted acres (2012)</td>
<td></td>
</tr>
<tr>
<td>Corn</td>
<td>0.2% of planted acres (2011)</td>
<td>0.2% of planted acres (2012)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 3: Characteristics of Differentiated Corn and Soybean Markets in the U.S.

<table>
<thead>
<tr>
<th>Standards</th>
<th>Federal/organic regulations:</th>
<th>Private standards:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prohibits GE</td>
<td>Requires GE assistance practices</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Table 4: Cost of GE Seed

<table>
<thead>
<tr>
<th></th>
<th>Cost of non-GE seed</th>
<th>Cost of non-GE seed premium per bushel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>34.6%</td>
<td>34.6%</td>
</tr>
</tbody>
</table>

### Table 5: Market Access

- Non-GE as a % of all planted acres
- Organic as a % of all planted acres
- Conventional corn as a % of all planted acres
- Conventional soybean as a % of all planted acres
- Organic soybean as a % of all planted acres
- Non-GE price premium per bushel
- Organic certified seed
- % planting date to avoid cross-pollination
- Deterrence to GE testing

- USDA ARMS Survey States and Locations of Grain Dealers Interviewed

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### References


