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

Aaron Adalja  
Cornell University School of Hotel Administration, aaa362@cornell.edu

Catherine Greene  
United States Department of Agriculture

James Hanson  
University of Maryland

Robert Ebel  
United States Department of Agriculture

Michael Barron  
United States Department of Agriculture

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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

Comments
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Aaron Adalja
Department of Agricultural and Resource Economics, University of Maryland, aadalja@arec.umd.edu

Catherine Greene
Economic Research Service, United States Department of Agriculture, cgreene@ers.usda.gov

James Hanson
Department of Agricultural and Resource Economics, University of Maryland, jhanson@arec.umd.edu

Robert Ebel
Economic Research Service, United States Department of Agriculture, rebel@ers.usda.gov

Michael Barron
Economic Research Service, United States Department of Agriculture, mbarron@ers.usda.gov

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

Aaron A. Adalja1, Catherine R. Greene2, James C. Hanson2, Robert Ebel3, Michael Barron3
Department of Agricultural and Resource Economics, University of Maryland, College Park, Maryland

Abstract

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).

Under USDA regulations, GE methods and inputs are prohibited in organic production, but USDA has not set a tolerance level for accidental presence of GE material. Food manufacturers and retailers have sought additional assurance in recent years that foods labeled organic or natural do not contain GE material. Many buyers now require the use of avoidance protocols, including testing, and have set tolerance levels for accidental GE presence.

Introduction

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).

Under USDA regulations, GE methods and inputs are prohibited in organic production, but USDA has not set a tolerance level for accidental presence of GE material. Food manufacturers and retailers have sought additional assurance in recent years that foods labeled organic or natural do not contain GE material. Many buyers now require the use of avoidance protocols, including testing, and have set tolerance levels for accidental GE presence.

Methodological Approach

We surveyed a random sample of organic farmers to determine the extent of GE presence in their production systems. The sample was drawn from the list of Organic Farmer and Market Directory (OFMD) producers. We surveyed 20% of the Organic Farming Resources Center (OFRC) directory producers and 30% of those surveyed agreed to participate in the study. The survey was a telephone interview conducted by an experienced survey research firm.

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). We 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 Farmers Conference to better assess the challenges of maintaining coexistence for farmers.

USDA Agricultural Resource Management Survey

USDA’s major annual economic survey of producers is the Agricultural Resource Management Survey (ARMS), which collects 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 corn producers was 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-soybean GE production and marketing.

Table 1. Soybean Production

Grain Dealer Interviews

In 2011 and 2012, we interviewed nine 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-GF and seed development for enhanced yield
- More difficulty finding replacement for specialty (non-GF and organic) grains when supply is low due to weather or aflatoxin/yeast 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.

Table 2. Characteristics of Differentially-GE Corn and Soybeans Markets in the U.S.

<table>
<thead>
<tr>
<th>Market</th>
<th>Non-GE</th>
<th>GE</th>
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<tbody>
<tr>
<td>U.S. Production Areaa</td>
<td>95.5% of all planted acres (2011)</td>
<td>4.5% of all planted acres (2011)</td>
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<td>Soybeans</td>
<td>97.3% of all planted acres (2012)</td>
<td>2.7% of all planted acres (2012)</td>
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<tr>
<td>Identity</td>
<td>Most sold through organic markets</td>
<td>Most grown for non-GE markets for seed stock</td>
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| Soybeans | 6% of the non-GE soybean crop sold for markets for non-GE soybeans in 2012 | 0%

Table 3. Characteristics of Differentially-GE Corn and Soybeans Markets in the U.S.

Conclusions

- Organic corn and soybean production has already stagnated in the U.S., and processors find it increasingly difficult to source non-GF 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-GF and organic food products are costly for both farmers and processors. The lack of a uniform tolerances standard also increases uncertainty.

Other findings include:

- Organic corn and soybean production has already stagnated in the U.S., and processors find it increasingly difficult to source non-GF 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-GF and organic food products are costly for both farmers and processors. The lack of a uniform tolerances standard also increases uncertainty.

Reference


2. To find out more about the issues addressed in this paper, visit the USDA, Agricultural Research Service Web page on "Organic Crop Production Efficiency: Extension Summary" at http://www.ars.usda.gov.

Further Information

The publication and the data underlying it are freely available to the public at https://www.ers.usda.gov. Additional data and information are available at the USDA Agricultural Research Service (ARS) website at http://www.ars.usda.gov.

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