The Source

News and Information on Agronomy, Quality and Supply Chain Traceability

Volume 1 • Issue 1 July 2005

Awareness

What Do You Know About Non-GMO?

Two recent studies suggest that knowledge of GM issues is mixed, both among food industry professionals and the general public. Consumers are least informed, but a surprising number of food processors are relatively unaware of many issues surrounding sourcing specialty ingredients.

Food Industry Professionals

A November 2004 survey of 88 individuals in the U.S. food processing industry by Penn and Associates, Inc. revealed a lack of knowledge regarding indentity preservation (IP) and non-GM ingredients. While 60% of those interviewed said their business would be seriously impacted if IP corn were not available in the U.S., 44% could not accurately describe the specialized production techniques or estimate the high costs involved in producing non-GM, IP corn products.

All processors consider IP and non-GM corn to be important to their companies' success and they believe that consumers will begin to demand more non-GM and/or IP products in the coming decade.

American Consumers

A national study of 1,200 Americans, released in January 2005 by the Food Policy

Continuedon page 3

FROM SEED TO STARCH:

Tracing Identity is Key to Ensuring Quality

Recent news about the sale of unapproved strains of Syngenta GM corn to U.S. farmers highlights the increasing importance of traceability and identity preservation. The widespread release of Bt10 corn has led the European Union to require testing of all U.S. exports of corn gluten feed and distillers' grains. Syngenta only discovered their mistake recently after switching to stricter DNA testing procedures to monitor their seed stocks.

That the Syngenta seeds have been on the market to U.S. farmers for four years without anyone, other than Syngenta, testing them indicates how porous the U.S. agricultural supply system is to GM contamination — and how important it is to have a robust traceability and identity preservation system in place. However, seeds are only the beginning of the supply chain — there's a lot more that goes on before an "Identity Preserved" or "non-GMO" label can be placed on a food ingredient.

When it comes to corn — used in a wide variety of food products, including corn starch and high-fructose corn syrup — producing IP, non-GM and organic ingredients requires special care throughout the whole supply chain. From selecting seeds, to planting, handling and processing practices, through manufacturing, each step must be documented and the grain tested to track accidental contamination from GMOs and to assure purity.

Starting from Seed

Starting with reliable seed stock is the first step to assuring the identity preservation and purity of a crop. Unfortunately, much of the traditional (non-GM) seed stock used by U.S. farmers is "pervasively contaminated with low levels of DNA sequences originating in genetically engineered varieties of those crops," reports a February 2004 study by the Union of Concerned Scientists.

Many farmers are understandably concerned and view contaminated seed stock as

Continued on page 2

FROM SEED TO STARCH

Continued from page 1

the greatest risk for GMO contamination of their products, according to a July 2004 report published by the Organic Farming Research Foundation. Farmers of specialty hybrid corn varieties (whether GM or non-GM) also have reason for concern, as do their customers — food ingredient suppliers — because contamination will compromise the functionality and performance of the processed food products in which they are used.

The Syngenta incident underscores the importance of rigorous DNA testing of seed stocks *prior* to shipping to farmers. This is the only way to assure that the seeds meet the standards for non-GM classification.

Segregating Crops

Non-GM, IP and organic corn must be grown in acreage that is segregated from other varieties to prevent cross-pollination of varieties. The onus is on the farmers growing the specialty crops to assure that adventitious (accidental) contamination doesn't take place. They do this by surrounding their specialty varieties by unplanted buffer zones (isolation) and rimming the fields with rows of specialty plants. Corn from the buffer plants is handled separately from the main crop and discarded due to the high potential for contamination or is mixed in with commodity corn. Both techniques effectively reduce the acreage planted and increase the crop price needed to maintain dollar-per-acre economies for the specialty varieties that are similar to traditional and GM varieties.

Handling and Transportation

During cultivation, harvesting and storage, specialty crops require specific handling protocols to avoid commingling with GM varieties. In the past all regular corn was treated equal. Farmers delivered their crop to grain silos where it was mixed with regular corn from other farms. Corn was handled as a bulk commodity product in a highly efficient, relatively low-cost system.

With the introduction of GM varieties, the traditional bulk commodity system has been modified to segregate GM from non-GM varieties. This reduced its efficiency, put additional requirements on the supplier, and therefore made it more expensive. It is also only effective as long as the varieties going into the system are what suppliers expect them to be. As the StarLink (see *GMOs in the News*, page 2) and now Syngenta incidents show, without adequate testing, producers can no longer make assumptions about the varieties they are growing.

Many buyers looking for specific traits or varieties are forced to operate outside of this

GMOs in the News

Syngenta Case Reveals Food Chain Vulnerabilities

The inadvertent sale of Bt10 corn seed by Syngenta (see lead story, page 1) highlights the vulnerability of the international food chain to accidental contamination by GM ingredients. In the past four years, 133 million kilograms of the unauthorized corn leaked into the food chain by way of corn gluten feed and brewers grains. The economic impact of the incident remains to be seen.

This isn't the first such incident. In 2000, traces of StarLink, a GM corn variety only approved for animal consumption, were found in taco shells and corn chips. This resulted in a massive — over 300 products — and costly — $1 billion — recall program.

Although StarLink corn consisted of only 1% of the U.S. corn crop, it was mixed with a much larger volume of corn and therefore widely distributed. Three years after the incident, only 0.3% of samples sent to USDA testing labs tested positive for StarLink. There have been no positive tests since September 2004.

Recently, Greenpeace claimed that GM rice unapproved for human consumption is readily available for sale in China. The pesticide-resistant variety has not been tested for human use or for potential environmental impact, yet Greenpeace estimates that between 950 to 1,200 tons was sold after last year's harvest and may have infiltrated the international market. It expects production of 13,500 tons this year if left unchecked.

These incidents demonstrate how easily GM ingredients can move into the food chain and potentially mix with non-GM grains. They further underscore the importance of robust traceability and testing protocols to assure the purity of ingredients required by customers today. ■

system, contracting directly with farmers to produce the desired variety. Specialty corn travels from farmer's silo to buyer's facility, bypassing traditional lower-cost corn transport and distribution networks.

Documentation

As the complexity of assuring grain quality increases, producers must be able to trace a batch of their product through each step of the supply chain back to the raw material supplier. The only way to accomplish this is by careful documentation. A reliable IP, non-GMO or organic manufacturer will have a comprehensive system of documentation, which includes the practices of the farmers (seed varieties used, field locations, nature of surrounding crops and equipment cleaning procedures) and all those involved in handling, storing and transporting raw materials.

Testing

Testing regimes play a critical and growing role in establishing the purity of IP, non-GM and organic corn. "In order to have any kind of assurance that the corn we're buying is what we want it to be, what we expect it to be and what it needs to be to serve our customer's needs, we have to do a lot of testing," says Joe Emling, Manager, Grain Quality and Traceability, National Starch Food Innovation.

Clarkson Grain Company, a pioneer in the specialty grain business, also routinely checks all grain destined for organic markets and turns away shipments that contain unacceptable levels of GMOs. They also test seed lots before they approve them for use by farmers in some of their IP programs. Testing requirements are going to increase, according to Lynn Clarkson, President of Clarkson Grain. "As new GM products enter the marketplace, we will need a new test for each new product. It's going to become enormously complex and expensive," he said at a Pew Initiatives on Food and Biotechnology Roundtable in 2002.

To meet the low limits for the adventitious presence of GMOs required in Europe, non-GM ingredients manufacturers must test all grain shipments from farmers and run regular PCR tests — similar to taking a DNA fingerprint — of composite grain samples as internal systems checks. "PCR tests act as a sentinel, alerting us to any aspect of our system that isn't working as we intend it to. We can then trace the problem and address it," says Emling.

Auditing and Certification

To further assure product quality, leading companies have robust auditing programs that verify the documentation, testing and traceability of their products. They also have independent third-party certification for their programs.

What Does it All Mean?

Maintaining the identity and assuring the traceability of food ingredients is a complicated, but not insurmountable, process. As the public becomes increasingly sensitized to issues surrounding the potential contamination of non-GM crops with GM materials, issues of food quality may increase in importance. Understanding all the steps in the seed-to-starch continuum is the best way to stay on top of this changing industry. ■

Awareness

Continued from page 1

Institute (FPI) at Rutgers University, determined that 48% of respondents are aware that products containing GM ingredients are available in supermarkets. Only 31% of consumers surveyed realize they regularly consume them. The study concluded that Americans know very little about GM foods and as a result are often willing to believe the worst about them.

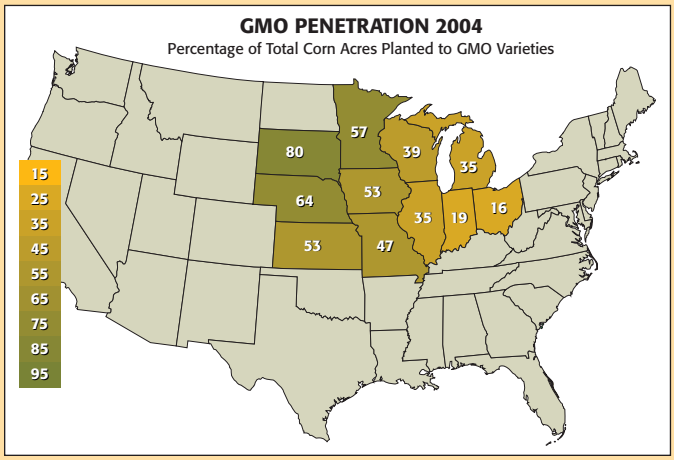
Despite their lack of knowledge, Americans want to know more about the foods they eat. In fact, 89% of respondents favored labeling of foods containing GM ingredients. Topping the list of information that consumers would like to see on food labels was information on the use of pesticides and GM ingredients, the use of organic methods and country of origin.

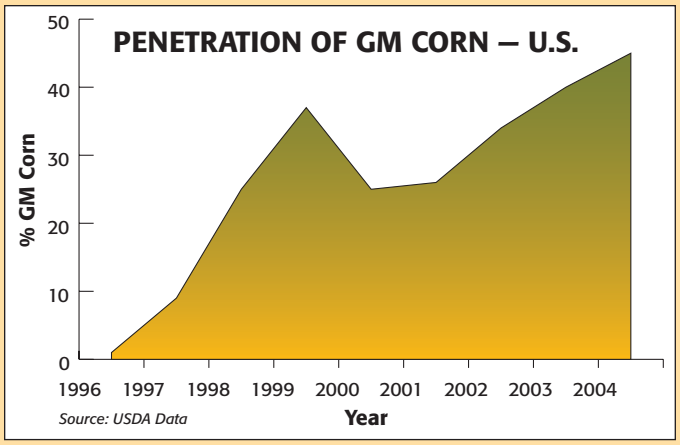
All of this bodes well for an expanding market for IP and non-GM products, which may be perceived by consumers as more wholesome and closer to nature. If consumers do embrace non-GM foods as a healthy and natural alternative, then food processors will need to understand the ins and outs of traceability and purity control in order to evaluate reliable sources for their non-GM ingredients. ■

GM Cropland Increases in U.S. Corn Belt

GM crops are finding increasing favor with farmers everywhere. Worldwide acreage of GM crops has doubled since 2000 and experts predict it will double again by 2010.

The United States leads the world with 59% of cropland under GM cultivation. In fact, American GM croplands grew by 11% last year and, according to the USDA, bio-tech varieties represent 45% of all corn planted in the U.S. in 2004. As the number of acres of GM corn rises, experts anticipate that it will become increasingly costly to meet IP, non-GM and organic purity standards.





"The price of making the distinction is going up," says Lynn Clarkson, President of Clarkson Grain Company. "We're having to increase segregation distances and we're looking at parts of the country where landholding patterns provide inherently better segregation — where they are larger or where they're buffered by geographic features, like mountains, that protect them." ■

DEFINING THE TERMS

The many terms used to describe GM/non-GM, IP, traceabilty and other related issues can be confusing. These definitions provide clarification.

Identity Preservation (IP): the protection, often by segregation, of a crop's unique traits throughout the supply chain — from the seed, through the agricultural and manufacturing processes, to the end product. Important for products, such as corn starch, where specific characteristics related to the variety of seed (for example, Waxy Corn) are crucial to assuring product quality.

IP requires the development and application of strict growing, harvesting, storing and processing protocols to ensure minimal contamination from other varieties.

Traceability: the ability to track the history of a product from its origin to the store shelf. Traceability systems are increasingly implemented in response to rising concerns about issues of quality and food safety.

Biotech or Genetically Modified (GM): plant varieties that have been modified using DNA recombination — genes from plants, animals or bacteria are inserted into the genetic code of the plant with the aim of creating new and beneficial traits. Several varieties of corn have been modified to resist insect pests or to tolerate particular herbicides, such as Roundup®, that would otherwise kill them. Also called genetically-engineered (GE) or genetically-modified organism (GMO).

Non-Genetically Modified (non-GM, non-GMO, non-GE): plant varieties developed through traditional breeding techniques, including hybridization, but which do not include gene splicing.

Organic: the methods involved in growing and processing products without the use of synthetic pesticides, insecticides, herbicides, artificial fertilizers or genetic engineering. Farmers go through a lengthy certification process to adhere to the USDA's national organic standards. While these standards prohibit the use of genetically modified practices or products, organic does not implicitly mean non-GM. ■

Published by National Starch Food Innovation. The information given herein is based on our research, compiled from public news sources, experts in the agriculture, food and food ingredients industries and from personnel at National Starch Food Innovation. While this information is, to the best of our knowledge and belief, accurate, no guarantee of its accuracy is made.

6029-05-0162-15M