

Executive Summary

Consumer Reports Food Safety and Sustainability Center wanted to determine the extent of GE corn and soy in processed foods and whether labels that suggest or claim to be non-GMO were meaningful. Safety of individual products was not the primary purpose for testing. Rather, given the questions about safety, environmental contamination, and other factors (described below) that concern consumers, we wanted to provide a market snapshot and recommend labels that consumers could rely on for those who want to avoid GMOs.

The overwhelming majority of corn and soy planted in the United States is genetically engineered (GE). Corn and soy are important building blocks in a wide variety of processed foods in the United States.

Consumers are concerned about GE ingredients in their food and believe that foods should be labeled. In fact, a recent national telephone survey conducted by Consumer Reports found that 72 percent of consumers say it is important to avoid GMOs when they shop, 40 percent of consumers are looking for non-GMO claims on food, and 92 percent of consumers think GE foods should be labeled. In addition, more than 60 percent of consumers think “natural” means GMOs were not used.

Despite this consumer demand, there are no requirements for labeling genetically engineered ingredients in processed foods and there is extremely limited safety testing required. Without labeling, there is a lack of transparency in the marketplace and Consumers' Union, the policy and advocacy arm of Consumer Reports, is actively engaged in a campaign to have foods with GE ingredients (also known as Genetically Modified Organisms or GMOs) labeled. In the meantime, consumers are unable to make informed purchasing decisions.

Consumer Reports tested over 80 different processed foods with corn or soy ingredients for GE DNA. We tested popular breakfast cereals, bars, corn chips, corn tortillas, baking mixes and flours, meat substitutes, soy “dairy” products, and tofu/tempeh products.

We purchased and tested conventional products (those with no label claims), organic products (which are not permitted to contain GE ingredients) as well as products with a Non-GMO Project Verified Label (which should contain no more than 0.9% GMO ingredients and have verification testing) and products with a natural label (which are not required to be Non-GMO despite the fact that many consumers think and believe they should).

It is important to note our test was a small market basket and we cannot draw conclusions about the entire market or every product for a given brand, but based on our test results we found that:

- Almost all of the samples of conventional products we tested contained GE corn and/or soy and the majority of the corn and or soy DNA in most of these samples was GE. This included popular brands in all categories, except soy dairy and tofu where we did not encounter any conventional products.
- We found negligible levels of GE corn or soy (0.9% or less) in samples of products that had either an “organic” label or a “Non-GMO Project Verified” seal. Since these labels have third party verification, they are the most reliable and *consumers looking to avoid GMO ingredients should look for products with these labels.*

- The majority of samples of products that came from a manufacturer that made a “no-GMO” claim that was not certified by an independent third party also contained minimal amounts of GE corn or soy (0.9% or less).
- Virtually all samples of products with a natural label (in the absence of an organic or non-GMO claim) had comparable levels of GE corn or soy as their conventional (or unlabeled) counterparts. According to a recent national poll conducted by Consumer Reports *the majority of Americans expect products with a natural label to not contain GMO ingredients. Consumers who want to avoid GE ingredients should not rely on products labeled “natural” to avoid GMOs. This label is highly confusing and generally misleading for consumers and Consumer Reports is asking the government to ban its use on food.*
- Samples of soy based infant formulas, like other products we tested, contained mostly GMO soy unless they carried the organic and Non-GMO label, in which case GMO content was minimal. *Consumers looking for soy formula without GMO ingredients should look for USDA Organic or Non-GMO Project Verified seals.*

What labels tell us about GE ingredients in food and how consumers can make meaningful choices.

In order of trust from least to most and how meaningful with regard to GMOs

NATURAL – not meaningful

While many consumers believe that the Natural label on a product means that it contains no GE ingredients, this label actually has no meaningful definition for processed foods and is not verified. The FDA does not have any formal definition for the use of the word “natural” on processed food products but states “The agency has not objected to the use of the term [natural] if the food does not contain added color, artificial flavors, or synthetic substances” (43). However, the Consumer Reports Food Safety and Sustainability Center does not believe that even this is adequately enforced. According to a recent nationally representative phone survey conducted by the Consumer Reports National Research Center 64% of American adults believe that a natural label indicates a processed food product contains No-GMOs (47). There have also been several lawsuits filed and settlements made for the use of GMOs in foods labeled as “natural” (48).

GENERAL NO-GMO CLAIMS – somewhat meaningful

Consumers may encounter products that make an uncertified Non-GMO claim. These general claims are made by the manufacturer and there are no required standards or required independent third-party verification. There is no threshold the manufacturer must meet for GE content and there is no required testing.

ORGANIC – meaningful

The USDA Organic seal is permitted on products that follow USDA guidelines and are verified by third-party certifiers. The organic program does not permit the use of GE crops and documents lack of use through process inspection, but regular verification testing of GE content is not required (40,41).

NON-GMO PROJECT VERIFIED – highly meaningful

The Non-GMO Project is an independent third party that certifies products contain no more than 0.9% GMOs as Non-GMO Project Verified. In order to use this seal, the certification must be validated by tracing ingredient sourcing and genetic testing when applicable (42).

Introduction

CR Food Safety and Sustainability Center tested over 80 products with either corn or soy ingredients to determine the extent of Genetically Engineered (GE) corn and soy in processed foods and whether labels that suggest or claim to be non-GMO were meaningful.

According to a telephone survey of 1,004 adults conducted in May 2014 by the Consumer Reports National Research Center, GE ingredients in food are a major concern of consumers when they shop for food. In fact, 72% of consumers say it is important to avoid GMOs when they shop, 40% of consumers say they look for non-GMO claims on food, and 92% of consumers think GE foods should be labeled (47).

While some consumers may be concerned about GE ingredients for safety reasons, the safety of individual products was not the primary purpose of our study. Rather, given the questions about safety, environmental contamination, and other factors (described below) that concern consumers, we wanted to provide a market snapshot and recommend labels that consumers could rely on if they choose to avoid GMOs.

In the Common Question and Answer Section below we discuss all of the background issues relevant to GE safety, technology, and use.

Common Questions and Answers

What's the difference between GMOs (Genetically Modified Organisms) and GM (Genetically Modified) and GE (Genetically Engineered) crops?

Nothing really, these terms are used relatively interchangeably in the vernacular.

What are GMOs?

According to the World Health Organization, GMO's are plants or animals (in this report we will only talk about plants) whose genetic material has been altered in a way that does not occur naturally (1). This alteration occurs in a laboratory and usually involves inserting genes from other organisms into the plant (i.e. a gene from a bacteria into corn). This is done in order to introduce the characteristics of one organism into another. For example, modified genes from the bacterium *Bacillus thuringiensis* (BT), which produce a natural insecticide, are spliced into corn so that the corn plant also produces this insecticide and thus resists insect pests (2).

What is Genetic Engineering (GE) and how does it work in plants?

GE involves altering a plant (or animal's) genetic material (DNA and RNA). All plants and animals contain DNA. DNA is basically a long series of codes, a small number of which contain information about how to make proteins (structural genes) while other codes can be thought of as regulatory codes. A genetic construct, (genetic material

intended to be transferred via genetic engineering), is a unit of codes that contains the regulatory information (including “on/volume” and “off” switches), the sequence necessary to manufacture the protein, and marker sequences (necessary to detect which cells have been successfully genetically engineered). The main component of the “on/volume” switch is called the promoter sequence and the “off switch”, the terminator sequence. These sequences are important for the manufacture of the protein (this process is called translation). In some cases genes may be engineered not to produce proteins, but to produce RNA sequences that can effect genetic expression and other cellular functions.

When plants are genetically engineered, genetic elements from other organisms (or sometimes the same organism) are modified and then inserted into the plant DNA. These genetic elements will include “on/volume” switch codes (promoter), sequences that code for proteins (like the BT insecticide), the “off” switch sequences (terminator) and a sequence for a marker protein. Scientists first assemble the genetic elements they want to insert. The genes are then randomly inserted into the plant’s DNA via one of two mechanisms: biolistics (use of gene gun) or use of a bacterial shuttle (e.g. *Agrobacterium tumefaciens* Ti plasmid). With either of these two methods, scientists do not have much control over where the inserted genes land, so they often end up in the wrong place, which can lead to a range of unintended effects, a phenomenon known as “insertional mutagenesis” (3). The process can take many trials before scientists can find a plant that actually has the desired characteristics/agronomic traits they were trying to introduce. Since scientists cannot easily distinguish between cells that have taken up the new genetic constructs and express the desired protein from those cells that have not, they usually add marker sequences in the new gene. These marker sequences help scientists to determine if the gene has been incorporated into the DNA and is being expressed (e.g. producing the desired protein product, like the Bt insecticide for example). Often the marker sequences used are antibiotic resistance genes or herbicide tolerant genes, this allows scientists to determine which cells were transformed, because they will be the ones that survive in the presence of an antibiotic or an herbicide. A GE plant may have a number of copies of promoter sequences as well as multiple different genetic sequences that express traits (stacked traits-discussed later). The coding sequences that make up these genes can be used to detect the presence of GE material in plants and food.

In Genetic Engineering what does “event” mean?

Each successful insertion of a genetic construct in a single plant or animal cell is called an event. Thus, the same genetic construct being inserted in the same genetic background can lead to multiple events depending on where, and how many copies of, the genetic construct is inserted (4).

What types of genes are engineered in GE crops?

The vast majority of commercialized GE crops have been engineered to be either herbicide tolerant (to glufosinate and/or glyphosate herbicides, i.e. RoundUp), or to manufacture their own pesticide (e.g. Bt toxin) (5). Indeed, the herbicide-tolerant (HT)

trait is in over 80% of all the engineered crop acreage in the US (5c) and the overwhelming majority of that acreage is in glyphosate tolerant crops (6). Two crops, corn and soybean, make up the bulk of the acres planted to GE crops for food (around 159 million acres) (8). In 2013, 93% of soybeans were GE, most of them glyphosate tolerant (6) and 90% of corn was GE with 85% containing HT trait (7). In addition, the majority of cotton is also GE (8). In 2013, 90% of cotton was GE, with 82% containing HT trait (7). Other common GE crops include sugar beets and canola (rapeseed) of which 95% and 93% of which are GE respectively (8), and all are herbicide tolerant (5c). GE varieties of virus resistant squash and papaya are also grown (8). Some drought resistant crops have also been developed (5c).

GE has been used to create these types of commodity crops as well as to develop much more exotic organism in the laboratory that could be commercialized in the future. For example, [fish genes have been put in tomatoes to make them more cold tolerant](#), [One company has developed a type of apple that does not turn brown when you cut it open](#) and [another company has developed a type of salmon that grow to maturity twice as fast as wild salmon, though not necessarily faster than farmed salmon](#). [While not something you would eat, spider genes have been spliced into goats, so that the goats produce spider silk protein in their milk \(spider silk is extremely strong for its size and thus potentially valuable\)](#). Plants have also been engineered to produce drugs [including safflower engineered with insulin genes](#) and [corn engineered to produce an animal vaccine](#) as well as industrial compounds (e.g. [corn engineered to produce adhesives](#)).

How are GE Crops Regulated?

Unlike other developed countries the US does not require that GE crops undergo comprehensive evaluation for safety for humans and the environment before they go on the market. Three federal agencies have some partial authority over GE crops: USDA, the Environmental Protection Agency (EPA), and the U.S. Food and Drug Administration (FDA) (5b). USDA's Animal and Plant Health Inspection Service (APHIS) is supposed to insure that new GE plant varieties pose no pest risk to other plants. EPA, which regulates pesticides, is supposed to insure that any pesticide produced by a plant is still safe for human and animal consumption and does not pose unreasonable risks of harm to the environment (9). EPA therefore only does selective evaluation on those plants that produce pesticides like Bt or in certain very limited circumstances that are virus tolerant, but does not assess safety of the crops that are herbicide tolerant (9b). FDA, which regulates food safety, does not require any safety assessment of the GE crops, but invites companies to provide data for a voluntary safety review (10). This is in contrast to other major economies such as European Union, Australia, Japan, and China, which all require that a premarket mandatory safety assessment of GE crops is conducted (11, 12, 13, 14).

Also in the U.S., FDA doesn't require labeling of the food products made of GE ingredients (10); despite some over 60 countries in the world do require the labeling (15). There are many varieties of GM corn and soy that have gone through voluntary safety assessments in the US, as well as varieties of canola, sugar beets, rice, potatoes, cotton,

plums, squash and other vegetables, but not all of them are currently commercialized (16).

Are GE ingredients in the foods we eat?

Since the majority of corn, soy, and sugar beets produced in the US are GE varieties it is reasonable to assume that the majority of processed foods we eat containing these ingredients contain GMOs. Labeling however is not required so consumers cannot be sure.

Is GE necessary to feed the world?

Biotech companies often claim that genetic engineering increases yield and is needed to feed the world's hungry. However this doesn't seem to be the case. In fact, the yield increases in GE crops in the US range from very small to none (34). Adoption of GE crops has led to simplified weed control for farmers but has not had a significant effect on yields. (28, 34).

In terms of needing GE foods to fight hunger, it is interesting to note that the world already produces more than enough food to feed all its inhabitants. Hunger, whether in the US and or other parts of the world, is not caused by an insufficient quantity of food being grown (35). Rather it is caused by disparities in wealth, waste, wars, and market inefficiencies (35). Consequently, engineering crops does nothing to address the root causes of hunger in the world today.

Looking at the long term outlook, GE foods may actually threaten food availability and increase food costs. Biotech corporations are able to patent and own genetically engineered seed and animals. Three global companies control over half (53%) of the global commercial seed market (37) and in the United States, in 2012, the top three companies (DuPont, Monsanto, and Sygenta) controlled 76% of the corn seed market and 85% of the soy market (38). Since companies are able to patent the seeds they develop using GE, if a farmer saves and grows patented seeds, the company can sue that farmer for patent infringement (39). Patenting of life raises ethical issues as well as the spectre of monopoly control of food supply, which could limit food availability or increase costs.

Are GMOs Safe for the Environment?

GE crops can have a significant negative impact on the environment. Although the industry often claims that GE crops reduce pesticide use (25, 6b), in fact the opposite is true. While use of insecticides has declined, the use of herbicides has increased vastly. An analysis of USDA data found that herbicide resistant crops led to an increase of 527 million pound of herbicides used between 1996 and 2011, while insecticide use declined by 123 million pounds, such that, overall, pesticide use increased by an estimated 404 million pounds (6b). The vast increase in herbicide use, especially glyphosate (trade name RoundUp), has caused weeds to become resistant to them, and this chemical is losing its effectiveness. Indeed, there are now at least 13 species of weeds in the US that

are resistant to glyphosate, and are considered superweeds (26). A survey of farmers in 2012, conducted by Stratus Agri-Marketing Inc, found that almost half (49%) of US farmers had glyphosate resistant weeds on their farms, up from 34% in 2011 (27). In addition, studies suggest that glyphosate-tolerant crops and the use of glyphosate are likely more responsible for the large decline in monarch butterfly populations than are declines in the overwintering habitat in Mexico, since this herbicide use is wiping out most of the milkweed, which the Monarch butterfly depends on for food (29, 30). The biotech industry's answer to the epidemic of glyphosate-tolerant weeds is to create crops (corn and soy) that are resistant to herbicides such as 2,4-D and dicamba, herbicides that are considered to be more toxic than glyphosate (28).

An additional environmental concern is that some types of GMO crops can also spread their pollen and contaminate non-GMO varieties (31, 32). A recent poll conducted by Food and Water Watch and the Organic Farmer's Agency for Relationship Marketing of organic grain producers in 17 states found that the majority of them are concerned about GMO contamination of their crops. In addition one-third of the respondents have already had to deal with contamination of their crops and over half have had their grain rejected by buyers because of GMO content (33).

Are GE Foods Safe for People?

There is global scientific agreement that genetic engineering has the potential to introduce allergens and toxins in food crops, to change the nutritional value, and to create other unintended changes that may affect human health (19 p1,6). More than a decade ago, it became clear that these are not just theoretical risks when DuPont engineered Brazil nut genes into soybeans to produce soybeans with a more complete protein profile. As DuPont readied the soybean for commercialization, they had it tested for allergenicity, since many people have nut allergies. Tests showed that the new soybean would likely have triggered serious reactions in people with Brazil nut allergies (17). After critics raised concerns, DuPont decided to voluntarily shelve the product and FDA took no action.

Due to the potential for risk, the UN food standards agency, called the Codex Alimentarius Commission, has created a protocol for assessing health risks, (18, 19, 20, 21) and these protocols are utilized by other developed countries as a basis for regulation. As noted above FDA does not require safety assessment of the GE crops, but provides consultation and review of developer's safety assessment at the developer's request. FDA has no required safety tests and no required long-term safety testing of GE crops.

There is no current evidence that human health is harmed by consumption of GMO's currently on the market, but there is also no evidence that GMO's are safe for long-term consumption, as sufficient studies have not been done. There are studies, however, which have shown potential harm in animals and which require follow up. For example, a study comparing genetically engineered and the non-engineered version of that same corn variety, found that a known corn allergen gene could be turned on in the genetically engineered plants (22). An animal-feeding study found that Bt corn might effect gut and

peripheral immune cell responses (23). A meta-analysis of animal feeding studies involving GE crops suggests the crops have effects on the liver and kidneys and that longer-term studies are needed (24).

Consumer Reports Test

Why we did it

Consumer Reports wanted to determine the prevalence of GE corn and soy ingredients in processed foods and whether labels that suggest or claim to be non-GMO were meaningful. Safety of individual products was not the primary purpose for testing. Rather, given the questions about safety, environmental contamination, and other factors that concern consumers, we wanted to provide a market snapshot and recommend labels that consumers could rely on to avoid GMOs.

What we did

Consumer Reports tested a wide variety of processed foods with corn or soy ingredients on the label as a snapshot of the current US market. We only selected products with corn or soy on their ingredients list. While other GE ingredients such as canola oil, cottonseed oil, and sugar derived from GE sugar beets are likely common in foods, these ingredients are so highly processed that most of the DNA is destroyed and therefore quantitative GMO analysis of the DNA would not be possible. This is also true for many highly processed common corn and soy ingredients such as corn syrup, soybean oil, and soy lecithin. Consequently, we only tested products that contained less processed soy and corn ingredients such as corn flour and soy protein.

To assess the presence and quantity of GE ingredients in commonly available processed foods, we purchased and tested products that were conventional, claimed to be “Natural”, “Organic”, or “Non-GMO”, which included products with a Non-GMO Project Verified label.

Product Procurement

Secret shoppers were sent out to stores selling the types of processed foods we pre-selected from a list of processed food, including many market leading brands, from the categories in table 1. Shopping occurred in the New York Metropolitan Area and the Greater Seattle area from April to June of 2014. Two distinct lots of the same product (same UPC code) were purchased and tested. If additional testing was required (see below) additional lots were purchased from May and July of 2014.

Breakfast Cereals
Corn Chips
Corn Tortillas
Corn Muffins/Breads/Polenta/Grits/Cornmeal
Granola & Breakfast Bars
Soy-based Infant Formula
Tofu/Tempeh
Meat Substitutes
Soy Milk & Dairy Products

Testing Methodology

For each product lot, a sample was sent to an outside independent lab with expertise in GMO testing, and the sample underwent quantitative GMO analysis of the corn/soy species DNA. Upon arrival in the lab each single sample was ground and homogenized and real-time PCR analysis was then conducted on the DNA extractions. If the corn/soy species DNA was sufficiently intact, quantitative GMO results were obtained.

Testing covered the 13 individual GM corn events commercialized for food production in North America as of the 2013 harvest.

Testing covered three individual GM soy events commercialized for food production in North America as of the 2013 harvest.

For product samples that contained corn, but no soy ingredients, the following quantitative tests were performed to capture the 13 individual GM corn events commercialized in North America for food production as of the 2013 crop:

Test	GM corn events covered by the test
35S Promoter	All 13 commercialized GM corn events except: GA21, MIR604, and MIR162
Corn GA21	GA21 (Syngenta Agrisure GT)
Corn MIR604	MIR604 (Syngenta Agrisure RW)
Corn MIR162	MIR162 (Syngenta Agrisure Viptera)

For product samples that contained soy ingredients, the following quantitative tests were performed to capture all three relevant GM soy events commercialized in North America as of the 2013 crop.

Test	GM soy events covered by the test
Soy Mon 40-3-2	Mon 40-3-2 (Roundup Ready)
Soy A2704-12	Bayer CropScience A2704-12 (LibertyLink)
Soy Mon89788	Mon89788 (Roundup Ready 2 Yield)

For products that contained both corn and soy ingredients we conducted the soy testing and also tested for corn DNA using the corn DNA reference gene Alcohol Dehydrogenase I. If corn species DNA was determined to be sufficiently intact for quantitative GMO analysis, the sample was then subjected to additional testing as follows:

Test	GM corn events covered by the test
Corn Bt11	Corn Bt11 Syngenta (Agrisure CB/LL)
Corn DAS-59122-7	Corn DAS-59122-7 (Dow Herculex RW)
Corn GA21	GA21 (Syngenta Agrisure GT)
Corn MIR162	MIR162 (Syngenta Agrisure Viptera)
Corn MIR604	MIR604 (Syngenta Agrisure RW)
Corn Mon810	Corn Mon810 (Monsanto YieldGard/MaizeGard)
Corn Mon863	Corn Mon863 (Monsanto YieldGard Rootworm RW, MaxGard)
Corn Mon87460	Corn Mon87460 (Monsanto Genuity DroughtGard)
Corn Mon88017	Corn Mon88017 (Monsanto YieldGard VT Rootworm RR2)
Corn Mon89034	Corn Mon89034 (Monsanto YieldGard VT Pro)
Corn NK603	Corn NK603 (Monsanto Roundup Ready 2 Maize)
Corn T25	Corn T25 (Bayer Liberty Link Maize)
Corn TC1507	Corn TC1507 (Dow Herculex I, Herculex CB)

In addition to the above tests all samples were also tested for a corn or soy reference gene. This reference gene test looks for a sequence of DNA common in all corn (GMO and Non-GMO) and is used as the denominator to calculate the percentage of GMO ingredient in the product.

The product was considered to be “Non-GMO” if test results show that the corn/soy DNA is not more than 0.9% GMO. The product was considered to be “GMO” if the corn/soy DNA is greater than 0.9% GMO. The 0.9% threshold is the cutoff currently used by the Non-GMO Project for food ingredients. A 0.9% threshold is also used by the European Union for “genetically modified” labeling purposes.

For products with a “Natural” label, “Organic” label, or a “Non-GMO” claim, if one or both of the initial lots of the product had a test result greater than 0.9% GMO, then both lots of that product were re-tested (DNA was re-extracted from the original homogenized samples and PCR analysis was performed again as described above). If re-testing still demonstrated that the sample(s) contained corn/soy ingredient(s) that are more than 0.9% GMO, then two additional lots of the product were purchased and tested.

CR Test

What we found

We tested only products that had a corn or soy derived ingredient listed on the ingredient panel. Our test was a small market basket and we cannot draw conclusions about the entire market or every product for a given brand, but based on our test results we found:

Conventional foods

- Overall, in almost all foods we tested, if the product didn’t have a claim (indicating that it was made with non-GMO corn/soy ingredients such as “Organic”, or “Non-GMO Project Verified”, or “Non-GMO”), our test results showed that the corn/soy ingredients were GMO (i.e., greater than 0.9% GMO).
 - In samples of products without an Organic or Non-GMO label claim, the GMO level of the corn/soy ingredient was always significantly more than 1% GMO. In fact, for products without such a label claim, there were no samples in which the corn/soy ingredient was less than 17.8% GMO. Some samples of products contained corn or soy that was 100% GMO, and the average test result for samples of products without an Organic or Non-GMO label claim showed that the corn/soy ingredient was more than 70% GMO.
 - Breakfast cereals are a staple for many families. Our testing showed that samples of these cereals contained substantial levels of GMO corn or GMO soy:
 - General Mills Cocoa Puffs and Corn Chex
 - Kellogg’s Froot Loops
 - Kashi Go Lean and GoLean Hearty Honey & Cinnamon (Hot Cereal)

- General Mills Kix and Trix
- Quaker Life Original.
- Chips and snacks. Our testing showed that samples of these products contained substantial levels of GMO corn:
 - Doritos Oven Baked Nacho Cheese
 - Tostitos Multigrain Tortilla Chips
- Vegetarian meat substitutes – Our testing showed that samples of these products contained substantial levels of GMO soy:
 - MorningStar Farms Grillers California Turk'y burger and MorningStar Farms Chik'n Nuggets
 - Boca Original Vegan Veggie Burgers

There were samples from one product that did not fit in with the overall trend described above. Takis Nitro Corn Snacks contained no label claims, but the GMO level of the corn in the samples we tested were low enough to be considered Non-GMO. We called this company and they said that this product line *was* made with GMO corn, but we didn't find it in the lots we tested.

Organic and Non-GMO Labeled Foods

- Samples of products that had an Organic or “Non-GMO” claim, the corn or soy ingredients were almost always Non-GMO (i.e., not more than 0.9% GMO). This included both products with Non-GMO Project Verified labels as well as non-GMO claims not certified by independent third parties.

Natural Foods

- Samples of products with a “Natural” label or a brand name that implied the product was natural, but that did not contain an Organic or “Non-GMO” label claim, almost all contained corn and/or soy ingredients with a similar GMO level as completely unlabeled products. Products labeled “Natural” only (with no other claim) that had samples which contained substantial levels of GMO corn or GMO soy in our tests included:
 - Kashi GoLean Hearty Honey Cinnamon Hot Cereal
 - UTZ Multigrain Tortillas
 - We tested six different packages of this product each with a different expiration date (different lot). The first set of two lots contained GMO corn, the second set of two lots contained Non-GMO corn, and the third set of two lots contained GMO corn. This helps illustrate that the “Natural” label is meaningless in terms of control of GMO content.
 - Pirate’s Booty Aged White Cheddar Snacks
 - While the packages of Pirate’s Booty we tested did not qualify as Non-GMO, after our testing was completed Pirate’s Booty Aged White Cheddar Snacks became Non-GMO Project Verified and removed the Natural claim.
 - Snyder’s of Hanover Yellow Corn Tortilla Chips

- Krusteaz Natural Honey Cornbread (note, after our testing was completed it appears that Krusteaz Honey Cornbread has removed the natural claim from its packaging).
- One additional product that was labeled “Natural” and also explicitly claimed that it was Non-GMO turned out to actually contain substantial levels of GMO corn in the samples we tested:
 - In addition to the natural label, Xochitl Corn Chips have a “No-GMO” claim on the package, but these chips contained a significant amount of GMO corn. We tested a total of six packages of these chips each with different expiration dates (lots), and the GMO level of each sample was much higher than 0.9% GMO.
- We also tested products from the Nature Valley Brand. These products don’t contain any claims of corn or soy ingredients being “Natural”, but the brand name itself may imply to some that the product is natural. There were samples of two types of bars we tested from this brand that both contained substantial levels of GMO ingredients:
 - Nature Valley Crunchy Granola Bars Oats ‘N Honey
 - Nature Valley Protein Chewy Bar Peanut Butter Dark Chocolate

No package claims, but Non-GMO claim on Company website

- Some additional products did not make a Non-GMO claim on their package, but made such claims on their company websites. This included Bob’s Red Mill and Toffuti. Samples of products from both of these brands were Non-GMO in our tests.
- Also important to note, some other companies that made products with no organic claims or Non-GMO claims on their packages were in the process of getting a Non-GMO Project Verified seal during our testing. Getting verified can take time and for example, during the course of our project we noted Kashi Go Lean Crunch Cereals both with and without a Non-GMO Project label on the package that all tested as Non-GMO. After we completed our testing a number of products we tested were listed on the Non-GMO Project Verified website as certified, indicating that they were in process during our tests. These products are market with a footnote 4 in the results table below.
- Three products we tested and found to be Non-GMO had still not been Non-GMO Project Verified as of publication of this report (October 2014), but samples tested as Non-GMO. This included Beachnut/Goya Corn Cereal, Food Should Taste Good Yellow Corn Dipping Chips, and Hodgson Mill Mexican Style Jalapeno Cornbread Mix. We called these companies and they confirmed that they were still in the verification process.

Infant Formula

- We tested a variety of soy-based infant formulas. Like other products we tested, samples of those without a label claim contained mostly GMO soy, while those with an Organic or Non-GMO label claim contained only Non-GMO soy.

No Quantitative GMO Results

There were some products that we tried to test, but we were unable to obtain quantitative GMO test results. These products contained corn or soy ingredients, but the DNA was of insufficient quality to conduct quantitative GMO analysis. We are unable to say if these products contained GMO ingredients or not. Those products included:

- Kellogg's Corn Flakes
- Kellogg's Frosted Flakes
- Kashi Indigo Morning
- Food Merchants Organic Polenta
- Trader Joe's Organic Polenta
- Baby's Only Organic Toddler formula
- Tofurky Kielbasa
- Tofurky Deli Slices oven roasted

GMO Corn and Soy Test Results – Label Status Current as of Press Time, 6am October 7, 2014

Consumer Reports tested a wide variety of processed foods with corn or soy ingredients on the label as a snapshot of the current US market. We only selected products with corn or soy on their ingredients list.

We purchased and tested products that were conventional, claimed to be “Natural”, “Organic”, or made some type of verified or unverified “Non-GMO” claim. We tested at least two samples of each product, each sample from a different lot. All products were purchased between April and July of 2014. It is important to note that between testing and publishing, there were manufacturers who were obtaining or obtained Non-GMO Project Verified certification. This demonstrates an actively changing market that seems to be responding to consumer demand.

The product was considered to be “Non-GMO” if test results showed that the corn/soy DNA was not more than 0.9% GMO. The product was considered to be “GMO” if the corn/soy DNA was greater than 0.9% GMO. The 0.9% threshold is the cutoff currently used by the Non-GMO Project for food ingredients. All of the products that we tested that contained greater than 0.9% GMO corn or soy had substantially more than 0.9% (these products had between 18% and 100% GMO corn or soy and on average more than 70%).

Full Results Table

Product Name (Purchased from April to July 2014)	Organic Claim	Non-GMO Project Verified	Non-GMO Claim ^s	“Natural” Claim	Corn and/or Soy Test Results*
Bars					
Kellogg’s Special K Protein Chocolatey Peanut Butter Granola Snack Bar					GMO
Nature Valley Crunchy Oats 'N Honey Granola Bars				#	GMO
Nature Valley Protein Peanut Butter Dark Chocolate Chewy Bar				#	GMO
Nice! Oats & Honey Crunchy Granola Bar (Walgreens)					GMO
PowerBar Performance Energy Chocolate Peanut Butter					GMO
Clif Builder’s Chocolate Peanut Butter Bar			✓		NON-GMO
Kind Plus Peanut Butter Dark Chocolate + Protein		¹¹	✓	✓	NON-GMO
Breakfast Cereal					
General Mills Cocoa Puffs					GMO
General Mills Corn Chex					GMO
General Mills Kix					GMO
General Mills Trix					GMO
Kashi GoLean		¹¹			GMO
Kashi GoLean Hearty Honey & Cinnamon (Hot Cereal)				✓	GMO
Kellogg’s Froot Loops					GMO
Quaker Life Original					GMO
Barbara’s Puffins Peanut Butter		✓			NON-GMO
Beechnut/Goya Corn Cereal		²		✓	NON-GMO
Kashi GoLean Crunch!		✓			NON-GMO
Nature’s Path Organic Sunrise Crunchy Maple	✓	✓		#	NON-GMO
Post Grape Nuts Original		✓			NON-GMO
Corn Chips/Snacks					
Doritos Oven Baked Nacho Cheese					GMO
Pirate’s Booty Aged White Cheddar		¹⁰		✓ ⁹	GMO ¹⁰
Snyder’s of Hanover Yellow Corn Tortilla Chips				✓	GMO

Product Name (Purchased from April to July 2014)	Organic Claim	Non-GMO Project Verified	Non-GMO Claim ⁵	"Natural" Claim	Corn and/or Soy Test Results*
Tostitos Multigrain Tortilla Chips					GMO
Utz All Natural Multigrain Tortillas				✓	GMO ⁶
Xochitl Totopos de Maiz			✓	✓	GMO
365 Everyday Value Organic Tortilla Chips White Corn (Whole Foods)	✓	✓			NON-GMO
Barcel Takis Nitro					NON-GMO ⁷
Food Should Taste Good Yellow Corn Dipping Chips		2		✓	NON-GMO
Guiltless Gourmet All Natural Baked Not Fried Yellow Corn Tortilla Chips	✓	✓		✓	NON-GMO
Mission Organics Blue Corn Tortilla Chips	✓		✓		NON-GMO
Que Pasa Organic Tortilla Chips	✓	12	✓ ¹		NON-GMO
Simply Tostitos Yellow Corn Tortilla Chips	✓				NON-GMO
Trader Joe's Organic Yellow Corn Tortilla Chip Rounds	✓				NON-GMO
Xochitl Totopos de Maiz White Corn Chips Organic	✓		✓	✓	NON-GMO
Baking Mixes/Flours					
Betty Crocker Authentic Cornbread & Muffin Mix					GMO
Jiffy Corn Muffin Mix					GMO
Krusteaz Natural Honey Cornbread & Muffin Mix				✓ ⁹	GMO
Quaker Yellow Corn Meal					GMO
Arrowhead Mills Organic Gluten Free Yellow Corn Grits	✓	✓ ⁴		✓	NON-GMO
Bob's Red Mill Organic Whole Grain Corn Flour	✓		✓ ¹	✓	NON-GMO
Hodgson Mill Mexican Style Jalapeno Cornbread Mix		2		✓	NON-GMO
Corn Tortillas/Tortilla Flour					
La Banderita Corn Tortillas					GMO
Maseca Instant Corn Masa Flour					GMO
Mission White Corn Tortillas					GMO
Mission Yellow Corn Tortillas					GMO
Old El Paso Crunchy Taco Shells					GMO
Ortega Yellow Corn Taco Shells					GMO
365 Everyday Value Organic Corn Tortillas (Whole Foods)	✓	✓			NON-GMO
Bob's Red Mill Golden Corn Flour			✓ ¹	✓	NON-GMO
Food For Life Organic Sprouted Corn Tortillas	✓		✓ ¹		NON-GMO
La Tortilla Factory Sonoma All Natural Yellow Corn Tortillas	✓ ³		✓	✓	NON-GMO
Infant Formula					
Enfamil ProSobee Soy Infant Formula					GMO
Gerber Good Start Soy					GMO
Similac Go & Grow Soy Infant Formula					GMO
Similac Soy Isomil					GMO
365 Organic Soy-Based Infant Formula (Whole Foods)	✓		✓		NON-GMO
Earth's Best Organic Soy Infant Formula	✓		✓		NON-GMO

Product Name (Purchased from April to July 2014)	Organic Claim	Non-GMO Project Verified	Non-GMO Claim ⁵	"Natural" Claim	Corn and/or Soy Test Results*
Meat Substitutes					
Boca Original Vegan Veggie Burgers					GMO
MorningStar Farms Grillers California Turk'y Burger					GMO
MorningStar Farms Chik'n Nuggets					GMO
Amy's All American Veggie Burger	✓ ³		✓		NON-GMO
Bob's Red Mill TVP			✓ ¹	✓	NON-GMO
Boca All American Classic Veggie Burgers			✓		NON-GMO
Primal Strips Soy Meatless Vegan Jerky Texas BBQ			✓		NON-GMO
Wildwood SproutTofu Meatless Meatballs Original		✓		✓	NON-GMO
Soy "Dairy"					
Pacific All Natural Ultra Soy Original Non-Dairy Beverage	✓ ⁸		✓ ¹	✓	NON-GMO
Silk Original Soymilk		✓			NON-GMO
Soy Dream Butter Pecan Non-Dairy Frozen Dessert	✓ ³	✓ ⁴		✓	NON-GMO
Soy Dream Enriched Soymilk Original	✓				NON-GMO
Soy Dream Vanilla Frozen Dessert	✓ ³	✓ ⁴		✓	NON-GMO
Soy Slender Soymilk Vanilla	✓ ⁸	✓ ⁴			NON-GMO
Tofutti Better Than Cream Cheese Plain			✓ ¹		NON-GMO
Tofutti Cuties Vanilla Frozen Dessert			✓ ⁵		NON-GMO
Trader Joe's Soy Slices Cheese Alternative Cheddar Flavor	✓				NON-GMO
Tofu/Tempeh					
Lightlife Organic Tempeh Original	✓	✓			NON-GMO
Nasoya Organic Extra Firm Tofu	✓	✓			NON-GMO
Nasoya Light Silken Tofu	✓ ³	¹²	✓		NON-GMO
Soga All Natural Extra Firm Tofu		✓ ⁴		✓	NON-GMO
Soyboy Organic Smoked Tofu	✓	✓			NON-GMO
Wildwood Organic SprouTofu	✓	✓ ⁴		✓	NON-GMO

* The product was considered to be "Non-GMO" if test results show that the corn/soy DNA is not more than 0.9% GMO. The product was considered to be "GMO" if the corn/soy DNA is greater than 0.9% GMO.

⁵Non-GMO Claims made by company other than Non-GMO Project Verified claim

¹ Claim not present on package tested, but claimed on company website

² Claim not present on the package tested, but manufacturer confirmed that product was in the process of getting Non-GMO Project verified

³ Product has claim that it is made with organic ingredients (≥70% organic)

⁴ Claim not present on package tested, but listed on Non-GMO Project Verified website at time of testing

⁵ Claim on ingredient list of some packages and on company website.

⁶ Six packages with different expiration dates were tested (lots) were tested. 4 Lots contained GMO corn and 2 lots contained Non-GMO corn.

⁷ Company stated that they do not try to source Non-GMO Corn

⁸ Product contained organic corn or soy beans in the ingredient list

⁹ While the product we tested had a natural claim on the package, as of publication of this report (October 2014) the claim had been removed

¹⁰ While in our tests, the packages of Pirate's Bounty we tested were *not* Non-GMO, after our testing was completed, we learned

Product Name (Purchased from April to July 2014)	Organic Claim	Non-GMO Project Verified	Non-GMO Claim [§]	"Natural" Claim	Corn and/or Soy Test Results*
<p>that there is now a line of Pirate's Booty that is Non-GMO Project Verified as well as a line that isn't.</p> <p>¹¹ At the time of publication product was in the process of getting Non-GMO Project Verified</p> <p>¹² At the time of publication product had become Non-GMO Project Verified</p> <p># Product did not make a natural claim, but product name implies natural</p>					

Conclusions

Almost all of the processed foods that we tested (that contained corn or soy on the ingredients list) and that were not specifically labeled as Organic or Non-GMO contained substantial proportions of GE corn or soy. On average the majority of the corn or soy ingredients were GMO in these products. These GMO containing products included widely eaten breakfast cereals, snack foods like chips and bars, and meat substitute products. It is important to note that between testing and publishing of this report, that there were manufacturers who were obtained or obtained Non-GMO Project Verified certification. This demonstrates an actively changing market that seems to be responding to consumer demand.

Four soy-based infant formulas we tested, Enfamil Prosobee, Gerber Good Start, Similac Go and Grow, and Similac Soy Isomil all contained significant GMO content.

We found that products with an organic or Non-GMO Project Verified claim, all had a very low (or undetectable) level of GE DNA. All contained no more than 0.9% GMO corn or soy. In addition virtually all but one (Xochitl Corn Chips) of the products tested that made a Non-GMO claim, but did not have a Non-GMO Project verified seal, also met the criteria to be considered Non-GMO.

All the foods that had a natural label, but were not specifically labeled Organic or Non-GMO were essentially the same as completely unlabeled foods in term of GMO content. This claim is misleading to consumers who, based on a recent consumer reports survey, expect natural products to not contain GMO ingredients. Consumers should avoid foods with this meaningless claim and Consumer Reports is asking the FDA to ban the use of this term on processed foods.

Additional Advice for Consumers

- There are a variety of reasons why consumers may care whether their food contains GMO ingredients. Consumer Reports believes all GE products should be put through mandatory safety assessments similar to that required for food additives before being put on the market, as in done in other developed countries. Since that isn't required here, even though there is no definitive evidence that products currently on the market are harmful to human health and there is evidence to suggest that further safety studies are needed-- consumers have a right to know about these products in order to make informed purchasing decisions. Consumers may also be concerned about the environmental and social implications of these crops. We are thus providing information on the meaning of the labels consumers see in the grocery stores (see table above).
- Consumers looking to avoid GMO's should look for products with an Organic label or Non-GMO Project Verified seal. Our tests found that almost all products that were labeled Organic or that made a Non-GMO claim contained little or no GMO corn or GMO soy (0.9% or less). However there was one exception.

Xochitl Corn Chips made a general, uncertified claim that they were No-GMO on the package, but in fact in the samples we tested we found substantial levels of GMO corn. A Non-GMO Project Verified label is the most reliable “Non-GMO” claim, because compliance is evaluated by an independent third party and verified by testing.

- Consumers looking to avoid GMO ingredients should not buy products that contain a Natural label but lack an Organic label or Non-GMO Project seal. Almost all the “natural” products that we tested contained a significant percentage of GMOs. These products were in fact not much different in terms of GMO content from products that made no label claims.

What the FDA Should Do

- The FDA should prohibit the natural label on processed food products that contain genetically engineered ingredients, because this label does not meet consumer expectations and is misleading. According to a recent nationally representative phone survey conducted by the Consumer Reports National Research Center, 64% of American adults believe that a natural label indicates a processed food product contains No-GMOs. In our study all the products with this label alone were likely to contain GMO corn or soy.
- FDA should require labeling that indicates that a product contains GMO ingredients.
- FDA should require GMO ingredients to go through a mandatory safety review process similar to the approval process for food additives, before they can go on the market.

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