The Difference Between Heirlooms and Hybrids, GMOs and Gene Editing

Avoiding GMO foods is becoming more of a challenge as they remain mainly unlabeled. Many consumers also are left in the dark about what these foods are, and there is a persistent misconception that 'all foods have been modified anyway.' That is not true, and there are stark differences between foods that have changed through creating heirlooms and hybridization versus altering the DNA of GMOs and other new gene editing technologies like CRISPR. These differences affect not only the plant but the health of the consumers. With the rise of serious, life-changing and life-threatening diseases such as cancers and autism, understanding which foods have been modified and how in order to avoid them is more important than ever.

Image credit: *Heirloom Veggies: 5 advantages over hybrids*

Heirloom Seeds Are The Chosen Ones

> *"An heirloom variety is a plant variety that has a history of being passed down within a family or community." – Seed Savers.*

Heirloom seeds are often prized by farmers as the best seeds available. They are the best of every crop that came before it. The process of creating heirloom varieties in absolutely natural and can be done by anyone who grows their own food. The featured image above contains heirloom vegetables.

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All it takes is harvesting the strongest, best-looking seeds from the best plants. For example, a farmer grew a whole row of tomato plants, but a couple stood out as bigger than the rest with larger yields. The farmer may then choose to live the best of the tomatoes from these plants (often chosen by size or color) and leave them for seed collecting. The next year, using these seeds, the farmer follows the same process until years later they are left with quality heirloom seeds.

Heirloom foods are often tastier and may have better pests resistance that was developed over the decades.

These heirloom seeds are often passed down generation to generation, and they keep improving with time. They were the most popular seeds throughout history until large-scale farming became common. On large farms, the field technologies do not have the capacity to collect the best seeds. Heirloom foods are grown by primarily small farmers and gardeners.

Today, some farmers still like to specialize in heirloom varieties, and some seed companies sell nothing but heirlooms. The best way to support these foods is to buy heirloom produce from small farms.

Great heirloom vegetables and fruits to try are lemon cucumbers and 'Mexican Sour Gherkin' cucumber, 'Pink Accordion' tomato, 'Lebanese Bunching' eggplant, 'Green Nutmeg' melon, 'Romanesco' broccoli, and 'Chioggia' beet.

Hybrids: Natural, Yet Limited

> *"Hybridization is a controlled method of pollination in which the pollen of two different species or varieties is crossed by human intervention." – Seed Savers.*

Hybrid foods are also created without the use of laboratories and genetic editing. It is done by controlling pollination to cross two different varieties or species of plants. It is done on small farms, but also on a larger scale. Mass commercial hybridization began in the 1950s.

Commercial hybrid seeds are labeled as F1, but there is a huge flaw in growing them. They produce the intended harvest once, but the follow-up seeds are unpredictable and often unusable. Farmers who use hybrids have to buy new seeds every year.

Hybrid seeds can be stabilized to grow the same variety every time, but the process takes years and patience. Some hybrids have been in our food system for many decades. Hybrid corn goes all the way to Mayan times, and the non-GMO hybrid corn available today was created in the 1930s.

Other common hybrid produce includes carrots, cucumbers, melons, tomatoes, broccoli, cabbage, and squash. Many fruit varieties are also hybrids.

Hybrids are the biggest reason why some people argue that many foods have been genetically modified. That’s incorrect. They have gone through hybridization, but that is natural and not done in the lab like in the case with actual GMOs.

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GMOs: The First Lab-Altered Foods

> *“Genetically modified organisms (GMOs) are living organisms whose genetic material has been artificially manipulated in a laboratory through genetic engineering. This creates combinations of plant, animal, bacteria, and virus genes that do not occur in nature or through traditional crossbreeding methods.” – The NON-GMO Project*

GMOs are most known to be created by one of Big Biotech corporations Monsanto. Yet, it is not the only company producing GMO foods and patents. Syngenta, Dow AgroSciences, Bayer, BASF, and a few smaller companies are also producing GMOs.

The very first GMO was created in 1982, and it was a diabetes medicine. This approval has led to the Food and Drug Administration (FDA) giving green light to many GMOs to come, including foods. The first tomato was altered in 1994, RoundUp soybeans in 1996, and today there are GMO rice, corn, squash, canola, yeast, alfalfa, cotton, sugar beets, papaya, and salmon.

GMOs are defined as an organism that was genetically altered in the lab. Often times, these organisms have genetic material from other species inserted into them.

The most bizarre genetic manipulations included inserting a gene from a flounder fish into a tomato. The product from this experiment never made it to the market, but now there are actual GMO animals. GMO salmon is the first and entered food supply in 2017 after being approved two years earlier. This salmon is modified with a growth hormone to make it grow faster.

Like other GMO foods, activists and many health experts are raising alarm to the fact that there is still not enough information regarding GMOs effect on human health. There are, however, many studies linking GMOs to increased risks of cancers and other diseases.

Due to these risks, GMO foods have been banned in dozens of countries around the world, yet in the U.S., biotech companies are not slowing down.

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American consumers today are left to figure out which foods contain GMOs themselves and make educated choices. There are many hidden GMOs in processed foods. Most commonly found are the ones made from corn, soy, and canola. These are corn flour, corn masa, corn meal, corn oil, corn sugar, corn syrup, and cornstarch; and soy flour, soy isolates, soy lecithin, soy milk, soy oil, soy protein, soy protein isolate, and soy sauce.

Other ingredients can be less obvious. The common potential GMOs are also in baking powder, citric acid, condensed milk, glucose, glycerin, lecithin, maltodextrin, protein isolate, starch, sugar, vegetable fat, and vitamins B12 and E.

The one way to know for sure you are buying a non-GMO food or product is to buy certified organic and look for the non-GMO label.

Gene Editing

> *"CRISPR/Cas9 is a system found in bacteria and involved in immune defense. Bacteria use CRISPR/Cas9 to cut up the DNA of invading bacterial viruses that might otherwise kill them. Today we've adapted this molecular machinery for an entirely different purpose – to change any chosen letter(s) in an organism's DNA code." – The Conversation*

Gene editing technology is the newest on the market today. The one technology that is gaining attention is "CRISPR" or Clustered Regularly Interspaced Short Palindromic Repeats, which is the basis for CRISPR-Cas9 genome editing.

In the future, this technology can be used to slice human DNA like a pair of scissors and choose to alter the genome in absolutely any way. The potential there, some scientists say, is to find answers to treating incurable diseases.

The danger in this technology is that any minor error in the

genetic code can have unpredictable results. The second concern is that this technology can be accessed by anyone.

Finally, CRISPR has been approved by the USDA earlier this year to be used on food. First foods that received the green light include white-button mushrooms and an oilseed crop.

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The USDA also said that as long as the gene is manipulated in the way nature can, the CRISPR food will not be regulated. This is a stark difference from animals edited with CRISPR that are classified as "animal drugs."

CRISPR cannot introduce DNA from one species into another, but it is still questionable what hidden effects it has on food and animals that it genetically edits.

This newest technology is hotly debated among the health groups, but companies out to make money will be too fast to patent and sell it to the consumers. Both Monsanto and DuPont Pioneer already have their hands on it. Another food company which is exploring CRISPS is Mars.

When it comes to CRISPR food, the consumers will once again be left in the dark, as it will not be labeled.

Conclusion

To say that most foods are not what they used to be is correct. Most plants have changed over the decades whether by their own evolution or the hand of man. Yet to say that all have gone through genetic engineering is false.

By definition from the Merriam-Webster dictionary, genetic engineering means:

> *"The group of applied techniques of genetics and* ***biotechnology used to cut up and join together genetic***

> ***material and especially DNA from one or more species of organism*** *and to introduce the result into an organism in order to change one or more of its characteristics.”*

Foods that were enhanced by creating heirlooms or hybridization are not cut up and manipulated in the lab. They do not contain are foreign DNA from very different species. Neither do they have any health concerns.

GMOs created by Monsanto and other biotech companies, on the other hand, could not be done without using a laboratory. The true results of these DNA manipulations are still hard to fully grasp. Yet, too many studies already exist linking them to adverse health effects. Natural foods will always be safer and in the case of the heirlooms tastier, which is why it is highly recommended to always choose organic foods and produce.

Be sure to check out *How to Avoid GMOs in 2018 – And Everything Else You Should Know About Genetic Engineering.*

Sources

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