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TOPIC: GENETIC MODIFICATION IN FOOD
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Genetic modification in food

- Genetically modified food (or GM food) is food produced from plants or animals whose DNA has been altered through genetic engineering. These genetically modified organisms are often called GMOs for short.

- Genetic engineering is the process of manipulating an organism’s genes directly—by, for example, transplanting DNA from other organisms. It’s different from the conventional method of selectively breeding plants and animals to get desired traits. Genetically modified foods have been on the US market since 1994, ever since the introduction of "Flavr Savr" tomatoes that had been engineered to ripen more slowly.

- There’s no one type of genetically modified organism—genetic engineering is a tool that can be used for a variety of purposes. Most of the corn and soy grown in the United States has been genetically modified to be resistant to herbicides, so that it’s easier to spray fields with weed killer.
Advantages

- Food supplies become predictable.
- Nutritional content can be improved.
- Genetically modified foods can have a longer shelf life.
- We receive medical benefits from GMO crops.
- It creates foods that are more appealing to eat.
- Genetically modified foods are easier to transport.
- Herbicides and pesticides are used less often.

Disadvantages

- GMO crops may cause antibiotic resistance.
- Farmers growing genetically modified foods have a greater legal liability.
- Genes go into different plant species.
- Independent research is not allowed.
- Some genetically modified foods may present a carcinogen exposure risk.
List of genetically modified foods:

- Rapseed
- Honey
- Cotton
- Rice
- Soybean
- Sugar Cane
- Tomatoes
- Vitamins
- Corn
- Sweet Corn
- Potatoes
- Flax
- Papaya
- Red hearted chicory
- Cotton seed oil
- Tobacco
- Meat
- Peas
- Vegetable Oil
- Sugarbeets
- Dairy Products
**Rapeseed** - Resistance to certain pesticides and improved rapeseed cultivars to be free of erucic acid and glucosinolates. Gluconsinolates, which were found in rapeseed meal leftover from pressing, are toxic and had prevented the use of the meal in animal feed. In Canada, where "double-zero" rapeseed was developed, the crop was renamed "canola" (Canadian oil) to differentiate it from non-edible rapeseed.

**Cotton** - Resistant to certain pesticides - considered a food because the oil can be consumed. The introduction of genetically engineered cotton plants has had an unexpectedly effect on Chinese agriculture. The so-called Bt cotton plants that produce a chemical that kills the cotton bollworm have not only reduced the incidence of the pest in cotton fields, but also in neighboring fields of corn, soybeans, and other crops.

**Rice** - Genetically modified to contain high amounts of Vitamin A. Rice containing human genes is to be grown in the US. Rather than end up on dinner plates, the rice will make human proteins useful for treating infant diarrhea in the developing world.
• **Potatoes** - (Atlantic, Russett Burbank, Russet Norkatah, and Shepody) - May include snack foods, processed potato products and other processed foods containing potatoes.

• **Flax** - More and more food products contain flax oil and seed because of their excellent nutritional properties. No genetically modified flax is currently grown. An herbicide-resistant GM flax was introduced in 2001, but was soon taken off the market because European importers refused to buy it.

• **Papaya** - The first virus resistant papayas were commercially grown in Hawaii in 1999. Transgenic papayas now cover about one thousand hectares, or three quarters of the total Hawaiian papaya crop. Monsanto, donated technology to Tamil Nadu Agricultural University, Coimbatore, for developing a papaya resistant to the ring-spot virus in India.
• **Squash** - (yellow crookneck) - Some zucchini and yellow crookneck squash are also GM but they are not popular with farmers.

• **Cotton seed oil** - Cottonseed oil and linters. Products may include blended vegetable oils, fried foods, baked foods, snack foods, edible oil products, and small-goods casings.

• **Tobacco** - The company Vector has a GMO tobacco being sold under the brand of Quest cigarettes in the U.S. It is engineered to produce low or no nicotine.
• **Meat** - Meat and dairy products usually come from animals that have eaten GM feed.

• **Peas** - Genetically modified (GM) peas created immune responses in mice, suggesting that they may also create serious allergic reactions in people. The peas had been inserted with a gene from kidney beans, which creates a protein that acts as a pesticide.

• **Vegetable Oil** - Most generic vegetable oils and margarines used in restaurants and in processed foods in North America are made from soy, corn, canola, or cottonseed. Unless these oils specifically say "Non-GMO" or "Organic," it is probably genetically modified.

• **Sugarbeets** - May include any processed foods containing sugar.
• **Dairy Products** - About 22 percent of cows in the U.S. are injected with recombinant (genetically modified) bovine growth hormone (rbGH).

• **Vitamins** - Vitamin C (ascorbic acid) is often made from corn, vitamin E is usually made from soy. Vitamins A, B2, B6, and B12 may be derived from GMOs as well as vitamin D and vitamin K may have "carriers" derived from GM corn sources, such as starch, glucose, and maltodextrin.
Major Genetically Modified Crops:

GM Rice

- Golden rice is a type of GM rice. It contains a large amount of Vitamin-A due to beta-carotene which is found in carrots. This beta-carotene is changed by the body into Vitamin-A, which is absorbed by the body and can help the eyes.
- Beta-carotene is what gives carrots their orange color and the reason why GM Rice is a shade of orange (golden). Three genes are implanted into the GM rice, two from daffodils and one from a bacterium. These genes allow the rice to produce beta-carotene on their own.
Thank You.