

# **Jewish Sources Related to the Ethics of Genetic Engineering of Foods.**

Compiled by Noam Dolgin, noam@noamdolgin.com

## ***Scientific Background & Introduction to Issues***

In natural reproduction, offspring carry a combination of genes derived from their parent stock.

Genetic engineering (GE) or modification (GM) is defined as “the altering of the genetic material in an organism in a way that does not occur naturally by mating or natural recombination or both.” (European Food Safety Commission) DNA can be combined or directly introduced into an organism, or cells can be spliced or fused.

Unlike traditional breeding, genetically engineering enables scientists to cross the species boundary and insert genes from one organism into another. Plants and animals could never interbreed, but with genetic modification, genes from animals have been inserted into plants to achieve new traits. This new technology raises a lot of Jewish ethical and legal issues, which we will address below.

### **Potential Benefits of Genetic Engineering**

Proponents suggest that these technologies will bring desirable characteristics such as longer shelf life, more nutritious foods, and reduced need for toxic pesticides and fertilizers. Through these advancements, proponents argue GE foods will contribute to food security in developing countries, thereby feeding the world’s poor. Monsanto, the world’s largest producer of chemical pesticides and 90% of GE seeds claims: “By improving plant genetics, we are able to safely grow and harvest more food using fewer natural resources and chemicals.”

In general, critics argue that the technology is not being used for the noble causes mentioned above, but instead used to increase size and growth speed of crops, to promote additional resistance to pesticide application (allowing companies to sell more chemicals), and to stop the natural reproductive cycles (forcing farmers to buy seed annually.)

### **Social Concerns**

Many critics argue that the corporations advancing GM technology are solely concerned with market dominance, and selling their seeds in these same poor countries. Farmers are no longer able to keep seed from year to year and therefore must buy seeds from large multinational corporations annually, leaving them in a vulnerable and exploitative position. Additionally, fears of increased exposure to pesticides and other chemicals threaten the lives and welfare of the farmers.

### **Terminator technology**

An actual death of birth, biotechnology companies now produce seeds without the ability to reproduce naturally, forcing farmers to buy need seed annually. Some seeds with this “terminator technology” are engineered to reproduce only if applied a certain chemical. Therefore even farmers who saving seed must purchase chemicals from these firms.

### **Increased Chemical Use:**

The majority of GM agricultural products are developed specifically for toxin-resistance - namely for *higher doses* of herbicides/ pesticides sold by the largest producer companies. A large quantity of research for future products involves transgenic strains for increased chemical resistance. Agricultural chemical use has long been linked to numerous environmental and human health concerns, increasing these chemicals use will only further these problems.

## **Environmental Concerns**

A lot of known and a lot is unknown about the environmental effects of genetically engineered produce being grown today. A few of the most threatening environmental concerns are listed below.

### **Genetic Pollution**

By its very concept, genetic material is intended to replicate and reproduce. Though advances in genetic engineering have been able to stop some reproduction (See Terminator Technology below), other forms of GE material have been able to spread through pollen and escapement.. Examples include, pollen from GE trees which because of their height has been found to travel as much as 400 miles, roughly 1/5 of the distance across the United States, and salmon where genetically engineered farmed fish have escaped and are cross breeding with natural populations. Once released there is no cleanup or recall possible for these mutations, they will escape into the population and be subject to the whims of evolution

### **Loss of genetic diversity and the threat to food security**

A few years ago *Time* magazine referred to the massive trend by large corporations to buy up small seed companies, destroying any competing stock, and replacing it with their patented or controlled brands as "***the Death of Birth.***" Monsanto additionally has had farmers sign contracts not to save their seeds - forfeiting what has long been a farmer's birthright to remain guardians of the blueprints of successive life.

### **Antibiotic resistance**

The application of additional chemical pesticides, as well as advances in integrated biotic pesticides such as *Bacillus thuringiensis* (BT), is sure to speed up an already unfolding process of antibiotic resistance and the evolution of 'superweeds' and 'superpests' - undesirable plant and animal species with a high tolerance for otherwise toxic chemicals. As we use more pesticides, we require more pesticides. And while consumer of Monsanto products may continually be able to purchase their way out the spiral. Non GE and organic farmers are forced to deal with these 'superweeds' and 'superpests' which are not contained to the GE fields.

### **Declining of natural populations**

Example, Monarch butterflies: Two studies by Cornell University and Iowa State University reveal that pollen from genetically engineered corn containing BT, a bacterial pesticide, can cause excessive mortality rates in feeding Monarch butterfly caterpillars. The Iowa study concludes that risks to monarchs "may be substantial" and warned, "the ecological effects of transgenic insecticidal crops need to be evaluated more fully before they are planted over extensive areas." Research later conducted by Greenpeace and an entomologist showed that more than 100 species of butterflies in Europe could also be harmed by engineered Bt corn

### **Religious Support & Opposition**

According to a poll conducted in 2001, 52 percent of American Catholics oppose genetic engineering, while 42 percent are in favor, among Muslims, 46 percent oppose, and 32 percent favor biotech foods. **Jews support it by a 55-35 margin.** (Zogby International poll and the Pew Initiative on Food and Biotechnology, July 26, 2001)

Japan, the European Union, South Korea, China, Australia and New Zealand all have laws requiring some degree of mandatory labeling of GE products.

In February, 2010, Indian Environment Minister, Jairam Ramesh, imposed a moratorium on the cultivation of GMF "for as long as it is needed to establish public trust and confidence".

# *Jewish Ethics of Genetic Engineering*

## **Whose world is it? Do we have the right to manipulate Creation?**

“G-d said ‘Be fruitful and multiply, fill the earth and subdue it [*kivshua*]’” Genesis 1: 28

“G-d said ‘behold, I have given you all herbs yielding seed that is on the surface of the earth and every tree that yields fruit; They shall be your for food.’” Genesis 1: 29

“And G-d took the human [*H’adam*] and placed him in the Garden of Eden to work it and guard it [*L’ovdah u’lshomra*]” Genesis 2: 15

“The heavens are G-d’s Heavens, but their earth was given to Human Kind.” Psalm 115

“The Earth is the Lord’s and the fullness there of.” Psalm 24

In a Midrashic story, Rabbi Akiva is challenged by the Roman general, Turnus Rufus, to defend the Jewish practice of circumcision, the apparent mutilation of a work of the Creator. Rabbi Akiva demonstrates to Turnus Rufus through the comparison of kernels of "natural" wheat with man-made bread, that the works of humanity, as finishing touches to nature, are better than the unfinished works of the Creator. Humanity is permitted, and sometimes commanded, to alter nature in order to perfect the works of the Creator.

"As long as the act of perfecting the world does not violate *halakhic* prohibitions, or lead to results which would be *halakhically* prohibited, then we are given a mandate to use science and technology to improve the world."  
Rabbi Dr. Avraham Steinberg, 21<sup>st</sup> C

***Based on these sources:***

***Do you believe we have the right to alter Creation at a genetic level?***

## **Importance of individual species in Jewish texts**

“And the Earth brought forth vegetation; herbs yielding seeds according to its kind [*l'meenayhu*], and trees yielding fruit each containing seeds according to its kind.” Genesis 1: 12

“From all lives, of all flesh, two of each shall you bring to the ark to keep alive with you; they shall be male and female. From each bird according to its kind [*l'meenayhu*], from each animal according to its kind, and from each thing that creeps on the ground according to its kind, two of each shall come to you to keep alive.” Genesis 6: 19 - 20

"HaShem created species in the world of all animals, plants, and all creatures of movement, and gave them the ability to reproduce as long as HaShem wills the world to existence...as it says (Genesis 1:12, 21 22) "according to their kind" [*l'meenayhu*]...one who grafts plant species is as if one has denied that the holy one blessed be, perfected the world... As well, these new creatures will not be able to reproduce. For both these reasons the actions of combining species is disgusting and void!" Nachmanides commentary on Leviticus 19:19.

"All that G-d did is intended for the perfection of that which is needed in His world...and the species should not be mixed, lest it detract from the perfection and there will not be blessing." *Sefer HaHinukh* Sefer HaHinukh, mitzvah 62.

“Even those things that you think are superfluous in this world, such as flies, gnats and mosquitoes, they to have their place in Creation for as it is written, “And G-d saw all that G-d had made, and behold it was very good.” Genesis Rabbah

## **Halacha (Laws) of Kilayim– The prohibition against crossbreeding of animals and plants**

“Don’t crossbreed your animals with other species. Do not plant your fields with different species. Do not wear clothing that mix wool and linen.” Leviticus 19:19

The prohibition of *kilayim*, in general, applies only to the act of mixing different species and does not forbid deriving benefit from the products of this mixing (except for the prohibition on intermixing grapes). Furthermore, according to almost all rabbinic authorities, the prohibition of *kilayim* applies only to Jews and not to non-Jews.

According to Rabbi Karelitz, the transference of plant juices from one species of plant to another can be considered *kilayim* if the juices have the ability to cause new growth of the donor species in the receptor.

***Based on these sources:***

***Do you believe Jewish ethics and the law of Kilayim allow us to combine the genetics of one species with another?***

## **Halacha (Laws) of Shatnez – the prohibition against mixing wool and linen in clothing**

According to Jewish law it is prohibited for one to wear, as well as to cover oneself, with a garment made of a blend of wool and linen. *Shatnez* is created by joining wool and linen in a permanent manner, whether it be sewn, glued or intertwined. Even an individual fabric of wool attached to a linen fabric, or a woolen fabric stitched with linen thread is considered *shatnez*. Even if the prohibited blend is not an essential part of the garment, the garment is considered *shatnez*.

Rashi comments that it is the act of pressing, weaving, or twisting wool and linen, one animal and one plant, that is forbidden. Loose fabrics or fibers may be worn in combination.

"Anything which we have no reason to prohibit is permitted, without having to find a reason for its permissibility. For the Torah does not mention every permissible thing, but rather only those things which are forbidden." Rabbi Yisrael Lifshutz, Tiferet Yisrael on MishnaYadayim 4:3.

Currently, genetic material from a donor species is often synthesized in the laboratory, and not directly extracted, which may avoid any *halakhic* problems of *Shatnez*.

“The Torah must consider this law (against mixing different species) which G-d implanted in the organic world of nature to be of the very highest importance for our human and Jewish calling, for it has interwoven consideration of it (the prohibition of mixing different species) in the whole of our life. Not only does it forbid us actual interference with this law by the prohibition of interbreeding animals and grafting trees, the unnatural crossing of species of plants and animals which are of different species in nature, but in our whole association with the organic world -- in sowing and planting, in the use of animals for work, in using materials obtained from animal and vegetable sources for our clothes, and in the food we eat....It teaches us to keep such order that brings to our minds again and again the great law of keeping species separate, and its greater Lawgiver.”  
Rabbi Samson Raphael Hirsch (eighteenth century Germany)

***Based on these sources:***

***Do you believe Jewish ethics and the law of Shatnez allow us to combine the genetics of one species with another?***

***Do you believe that there is a difference if the combination is plant and animal?***

## **Kashrut – Can you create a treif tomato?**

Genes originating from pigs, insects, humans and other non-kosher animals are currently being inserted into foods. These include as insect genes used in strawberries to increase cold temperature resistance or (experimentally) human genes in tomatoes, peppers and fish to speed growth rates.

Chabad Rabbi Yossi Serebryanski of Crown Heights, a kashrut supervisor for OK labs in Brooklyn says he has “stopped eating tomatoes and only eats potatoes he knows to be organic.” Rabbi Serebryanski says he fear that genes from non-kosher foods, such as pigs and insects, could be implanted in vegetables and Jews may be unwittingly breaking kosher law by eating them.” (New York Times, May 23<sup>rd</sup>, 1999)

*Batul* - if a product is mixed into a food, potentially rendering it un-kosher, the contaminant is ignored if it constitutes less than 1/60<sup>th</sup> of the complete product. (Many argue this rule only applies if the product was contaminated accidentally or doesn't show a discernible effect.)

Most rabbinic authorities consider genetic material that is separated from or synthesized from the parent organism to be essentially "inert," in other words, independent of the defining characteristics of the parent organism. Rabbi Eliyahu Bakshi-Doron, Former Chief Sephardic Rabbi of Israel, points out that, “generally speaking, the genetic material that is transferred from non-kosher species is not considered ‘food,’ has no taste, and is of negligible quantity relative to the permitted host species -- all important factors negating the effects of the transferred material.”

The Orthodox Union, a leading kosher authority, has ruled that genetically modified organisms do not violate kashrut. It said that since genes are microscopic, they are therefore botul, or nullified, in the new plant.

Star-K of Baltimore, a kosher certifier, explains, “The bottom line is, if it looks like a tomato and smells like a tomato, it is a tomato and may be eaten.” [Editors note, this is known in the world trade as ‘substantive equality’, however if this were the case, why would companies be spending billions of dollars to produce these products if they were equal?)

Another aspect of genetic engineering that relates to the *kashrut* laws involves changes to physical characteristics that are used to indicate the kosher status of certain mammals and marine animals. For example, only mammals that have split hooves and chew their cuds and only marine animals possessing both fins and scales are kosher. What if a non-kosher mammal such as a pig, which has split hooves, is genetically engineered to chew its cud? What if a catfish, which has no scales, is genetically engineered to grow scales?

***Based on these sources:***

***Do you believe GE foods that include genes from non kosher animals should be kosher?***

***Do you believe Batul and substantive equality are applicable in this case?***

## **Human Health / Pikuach Nefesh**

You may supersede any law to save a life, except Idolatry, Adultery and Murder. Talmud Bavli Shabbos 132a

The doctrine of *pikuach nefesh* – the preservation of human life – is a fundamental principle of Judaism. We are told that we must go to great lengths to save a life. The Gemara says “and wherever there is danger to human life, the laws of the Sabbath are suspended.”

“God created food and water; we must use them in staving off hunger and thirst. God created drugs and compounds and gave us the intelligence necessary to discover their medicinal properties; we must use them in warding off illness and disease.” Maimonides

According to Industry representative, genetically engineered seeds can yield higher crop returns, longer shelf lives or increase nutritional content in foods, thereby helping to feed the world’s poor.

Unfortunately, evidence to date has shown that a much larger focus of genetic engineering companies has been to design products capable of withstanding higher quantities of pesticide. (Often produced and sold by the same company who sells the seed.) Pesticide use has been linked to 10,000 deaths each year in China and 5000 per year in Mexico.

"One is forbidden from gaining a livelihood at the expense of another's health." Rabbi Isaac Sheshet 14<sup>th</sup> C

In 1989, a genetically engineered food supplement named tryptophan was placed on the market without clinical trials. The product killed 37 people, disabled 1,500, and left thousands sick. It was later discover that a toxin of less than .01% of the total mass, had formed from an engineered ingredient.

An estimated 2 percent of Americans are allergic to some food, and their reactions can be serious or even fatal. Protein transfer as described above can transfer allergens from one food source into another. A common example of this has been found in soy beans engineered with genes from Brazil Nuts. Consumers allergic to brazil nuts have been shown to be allergic to these engineered soy beans and soy bean products.

***Based on these sources:***

***And the mixed data on the human health effects of GE crops, should genetic engineering be allow, banned or encouraged?***

## **Precautionary Principle**

“When you build a new house, you shall make a parapet (fence) for your roof, so that you do not bring bloodguilt on your house if anyone should fall from it.” Deuteronomy 22:8

"Similarly with all potentially dangerous objects. Remove them far from yourselves and from the way of the community." Maimonides, MT Hilchot De'ot

"A burning coal/object left in a place where the public can be injured by it - one is allowed to extinguish it [even on Shabbat], whether it's of metal or of wood." Yosef Caro *Shulchan Aruch*, Oreh Hayim 334:27; 16<sup>th</sup> C Tzfat

"We don't need an expert [to save a life by violating other laws like Shabbat], since [even] doubtful danger to human life [makes the law] lenient. And it's forbidden to delay the thing [treatment]... " (Tur, 14<sup>th</sup> C Spain) to which Caro adds, "the one who rushes to do so, look, this is praiseworthy! But the one who [stops to] ask, look, this is a murderer."

"See, I have set before you this day life and death, blessing and curse - and [you should] choose life, in order that you and your children may live." Deuteronomy 30:19

*Based on these sources:*

*Should we be proceeding with genetic engineering at this stage or waiting for more data?*