Genetically Modified Organisms in Our Food and on Our Farms

People have been developing new ways to grow food since the Agricultural Revolution. Understanding how natural systems work has led us to adjust those systems to our benefit. Each change has been controversial: how much should we alter the natural order of things? Darwin's understanding of Natural Selection, Mendel's crossing sweet peas to produce predictable results, and now scientists creating genetic modification by transferring genesfrom one species to another have all led to protests from outside and sometimes within the scientific community itself. Breeding plants and animals for the benefit of humans is called Artificial Selection in contrast to Natural Selection. Genetic Engineering (GE) is the process whereby scientists identify genes in one species which do not exist in another, but they believe that trait will improve the species in some way. In order to transfer that trait to the new organism, they cut out the gene from the chromosome of one organism and insert it into the other. We are looking to see if this process is simply an improvement on the way plants and animals are produced or if are there complications which require more research.

Insulin was the first product of GE in 1978. Prior to the transfer of the human gene that dictates the production of insulin to bacteria (E. coli) or yeast, insulin produced in the pancreas of mammals was filtered and given to diabetics. That was a costly and time-consuming process. With this advance, however, insulin could be created on a large scale and be sold world-wide.

Frustration over the loss of crops due to drought along with damage done by insects and disease led scientists to look for solutions using genetic engineering. The early stages of the research were originally conducted by land grant colleges whose charters included agricultural research. Subsequently, the benefits accruing to some companies which create herbicides for herbicide-resistant strains brought in large university grants for research. Eventually, private companies far outpaced independent research and these companies awarded a larger number of more research grants in this area. Now, however, there is evidence that conflicts of interest may be affecting the results reported in these tests. Due to cutbacks in government funds, many of the independent tests are short-term, non-existent, or unable to take place because of restrictions applying to patented GMOs. Opponents warn that heads of many of the government agencies involved have been replaced by former employees of private companies who have vested interests in these products reaching the market.

Research on GMOs is highly controversial among the general public and scientists. Supporters believe there is ample information to consider them safe and more productive than organisms produced conventionally. Opponents believe that such data was produced in studies which had a built-in bias and that tests have been too short term. They also complain about not having access to seeds which are patented with the proviso that forbids testing without permission of the parent company. The American Medical Association, the National Academies of Science and the American Association for the Advancement of Science have agreed that food on the market derived from GM crops poses no greater risk than conventional food and that there is no evidence of any harm to humans from GM food. Nevertheless, there has not been any testing of GMOs on humans to date.

The problems with research on GM foods is that 1) they are unlabeled so it is difficult to do comparison tests; 2) funding tends to be provided by the companies with a vested interest, and 3) in 1984, a US government policy was developed which stated that "GM products are on a continuum with existing products and, therefore, existing statutes are sufficient to review the product". It is difficult to get funds to do long-term studies in view of this policy. The problem with this policy is that substantial equivalence is too vague a term and, therefore, is used by industry to claim that their GMOs are the same as their natural equivalents.

Most of the studies that claim to demonstrate that GM foods are as nutritional and as safe as foods obtained by conventional breeding have been performed by biotechnology companies or associates responsible for commercializing these GM plants.

A problem with the FDA review process for GE foods is that it is voluntary and provides no detailed guidance on how to test GE foods to ensure their safety. At the end of its cursory review, the agency does not approve the safety of these foods, but reminds the company that FDA is relying on the company's assessment of safety. Absent testing on humans, we do not know how safe they really are.

Notification and permitting are two ways to obtain APHIS (Animal and Plant Health Inspection Service) approval for testing new products. Currently almost all field testing is done through the notification process. This process give APHIS 30 days after the manufacturer has notified them to determine whether the information provided is sufficient for field testing. This process involves no public or independent scientific input. The NRC (Natural Resources Council)) is concerned that many of these GMOs should be put through a more extensive permitting process.

Deregulation is the final step in order to commercialize a crop. GM seed is not made available by manufacturers for independent research until after a product has received market approval so regulations are based on data and analyses provided by the manufacturer. It has been recommended that the APHIS process be more transparent and rigorous. Confidential Business Information(CBI) allows the manufacturer to withhold information that may be pertinent to the approval process. Regulatory agencies of other countries receive documents with less CBI than does APHIS.

To summarize much of the controversy:

The main arguments in favor are:
GM helps produce more and better food to reduce world hunger, malnutrition, environmental damage and improve human health. Science-based testing and regulations assure food safety and therefore should reduce public fears about possible harmful effects from biotech foods. These practices limit unnecessary testing and reduce food production costs so food is cheaper around the world. After tests that followed highly publicized complaints against certain biotech products, there is still no scientific evidence of harm to humans or the environment.

The main arguments in opposition are:
The benefits of GE foods are often oversold. Similar productivity gains have been achieved using "best practices" organic farming. More countries are banning GE foods and therefore there is a danger that farmers may not be able to sell their crops

overseas. Others do not ban but require GMO labels. There is the potential for the manufacturer of the seeds to sue a farmer for contamination when GE crop pollen drifts to a non-GE farm. Current controls on production processes, monitoring practices, and public disclosure may be inadequate for preventing or anticipating long term negative impacts on human health, nonbiotech producers, and the environment. Conflict of interest studies show that there is a tendency to produce favorable outcomes for the associated commercial interests. Testing is now conducted over a 90day period, but longer term testing is recommended. Control of the gene pool and food system is concentrated in a few multinational companies. Product liability laws may be inadequate to prevent biotech contamination of non-biotech foods. Allergy testing of these foods by the FDA has been requested by many scientists. So far, their requests have been ignored.