

Genetically Modified Crops: Boon or Doom

Even before 1866 when Gregor Mendel first published the results of his innovative and insightful garden pea inheritance studies, man has selected the best individuals from crops and

“The whole aim of practical politics is to keep the populace alarmed – and hence clamorous to be led to safety – by menacing it with an endless series of hobgoblins, all of them imaginary.”

H. L. Mencken

Newspaper Columnist, In Defense of Women (1920)

animals for continued domesticated propagation. Cotton Mather, in 1716, reported on natural hybridization. American Indians were very adept at breeding maize plants even before sex in plants was firmly established by Camerarius in 1694. The Assyrians and Babylonians artificially pollinated date palms as early as 700 BC. Nobel Prize winner, Dr. Norman Borlaug developed dwarf wheat varieties that were so productive that Mexico became an exporter rather than an importer of wheat. These “green revolution” varieties, when introduced into India, Pakistan, the Middle East and other subtropical countries, set new records for production.

The Malthusian Theory, introduced by Anglican Reverend Thomas Malthus in 1798, states that food production could only increase in an arithmetic progression, whereas population would increase geometrically. Per acre food production could possibly double or triple but there is limit. Population growth would be limited, at some point in time, by world food production.

“A man who goes without food for 24 hours will quarrel; one who is denied food for 48 hours will steal; and one who is without food for 72 hours will fight. Thus, the difference between peace and anarchy in most countries is a matter of only a few days without food.”

Anonymous

His estimates stated that if the population increased unchecked it would be approximately three times the subsistence capacity by the end of the

19th century. His theory did not come to fruition as “vice and misery”, from natural and political causes, reduced population growth. Malthus was also unaware of the tremendous advances in plant breeding, agronomic production, transportation, and food processing and preservation that

were on the horizon. The present world population of six billion is not too far from the 1965 UN estimate of 6.28 billion. The expected growth will still reach nine billion in the year 2050.

While malnutrition, hunger and starvation are serious problems in certain areas, sufficient food is presently produced worldwide each year to support all the earth's inhabitants. Malthusians continue to predict dire consequences of unchecked population growth. Vice and misery will continue to limit population growth. But what of increasing food production? Is there another green revolution in the 21st century to stave off widespread starvation?

Development of new varieties is a long tedious process. Pollen from a breeding line is introduced to another plant with the exclusion of all other pollen. For plants with separate male and female flowers, such as corn, a bag over the ear is sufficient. However, for plants with male and female parts in the same flower, the stamen has to be physically removed before other pollen can be introduced. This cross is then tested and re-tested to determine its value. If the transfer of only one characteristic is desired, then the offspring is backcrossed several times. Plant breeders today use many methods to develop, improve and test new varieties. Natural selection and crossover of chromosomes, naturally and chemically introduced mutations, variations in chromosome number and genetic engineering; the introduction of DNA segments that contain a desired trait from one plant into another. Moving DNA from widely different species is possible through genetic engineering in the laboratory.

Commercially introduced in 1996, Roundup Ready[®] soybeans have been genetically modified to be resistant to Roundup[®] herbicide. The benefit is mostly to farmers. *Bacillus thuringiensis* (Bt) a naturally occurring soil bacterium produces a protein that is toxic to certain worms and caterpillars. Bt is a registered pesticide. It is used in conventional and organic production systems. Bt DNA has been introduced in several crop species. The plants produce

the protein protecting them from worms. The result has been a tremendous reduction in the use of synthetic insecticides. A Cornell University laboratory study recently reported that 3-day old monarch butterfly larvae had a 44% mortality rate after eating milkweed leaves covered with Bt corn pollen. The conditions of the lab study do not mimic nature. Monarch butterfly larvae feed on milkweed. A cornfield is not an attractive place for monarchs and the timing of pollen shed is different from monarch movement. Monarch migration this year is one of the largest ever. Widespread monarch butterfly decimation will not occur. Some fear “superweeds” or “superbugs” will develop. That nothing will be able to control them. All organisms can develop resistance to outside biotic factors. Farmers have rotated crops and chemicals to minimize the potential for pests to acquire resistance. Any resistance that develops is specific to that pesticide not resistance to all pesticides. Others fear the product itself. EPA regulates pesticides including pesticide-producing plants. FDA oversees food safety including genetically modified food. They say that their regulations are adequate to protect the public.

What sort of genetically modified foods are in the future? Oatmeal and breads that reduce cholesterol. Oranges with enhanced vitamin content. Corn to produce pharmaceuticals and bananas to provide vaccines. Plants to produce polyesterlike fibers and materials for plastics and fuels. Corn that fixes its own nitrogen like legumes do. Plants more adapted to harsh conditions. The future holds great promise for consumers in the USA and untold bounties for developing countries where food is in short supply. Hunger and starvation in the Indian subcontinent and sub-Sahara Africa could be a thing of the past.

87% responded biotechnology would have “a positive effect” or “no effect” on their purchase of oils.

75% believe that biotechnology will provide benefits for their family in the next 5 years.

75% support the current FDA labeling policy (labeled only if they are significantly altered)
NC State Univ. survey, 1998

Yes, companies have profited. But, far from the “Fields of Greed” that they are accused of. The technology of genetic engineering and variety development is not cheap and other future products are the beneficiaries.

Advances in science and genetics have stretched people’s understanding and moral comfort level. Galileo was imprisoned because he espoused the concept that the earth revolves around the sun. “Frankenstein Foods” and “Superbugs” are the catchwords used to evoke an emotional response against genetically modified foods. The Greenpeace True Food Campaign aims to “ban GM food, phase-out

“...dialogue with Greenpeace is difficult or impossible because its activists are not willing to accept scientific standards as the basis of communication.

Hans Mohr
Nature. Oct. 7. 1999

industrial farming, and promote organic food”. Reclaim the Seeds has claimed responsibility for the destruction of research plots at UC Davis and Berkeley. They called for a “National Day of Action” to “destroy their crops, equipment, buildings, vehicles and they get the point. All of a sudden "venture capatlist" [sic] scum realize that biotechnology is not such a great investment and they flee with their bags of cash with them.”

New products are not developed in a vacuum insulated from consumer preference, grower acceptance, government regulations, potential profitability and public mores. New technology acceptance should be based on an evaluation of scientific information and personal principles not embedded in the fear of the unknown.