**Effects Of Genetic Engineering On Agriculture**

The Effects of Genetic Engineering on Agriculture Agribiotechnology is the study of making altered agricultural products. Agribusiness is trying to alter the genes of already existing products to try to enhance the biocompetitiveness and adaptability of crops by enhancing plant resistance to drought, salinity, disease, pests and herbicides. They are going to try to enhance their growth, productivity, nutrient value, and chemical composition. The old way of doing this was through selective breeding, special fertilizer, and hormones. This seems now somewhat outdated with today’s technology. Genetic engineering comes with many downfalls. Increased production through genetic engineering could exhaust nonrenewable resources more rapidly and fail to feed a larger and more dependent human population. In Africa, and South and Central America, super breeds of crops, irrigation and hydroelectric dams, chemical fertilizers, pesticides, and agripoisons exported to less developed countries produced great short-term profits but destroyed already existing, more regenerative, traditional farming practices, ultimately destroying the communities and fragile land. Natural deserts, swamps and salt marshes need to be preserved to protect biodiversity and the integrity of the Earth’s ecology. Introducing genetically engineered organisms into the environment means that these areas could be invaded by these new species therefore furthering loss of natural ecosystems. A major concern of farmers and scientists regarding engineered crops is that they are afraid that these new plants which would be resistant to herbicides and other chemicals would breed with a nearby weedy relative and thus creating a superweed that would be resistant to herbicides. These plants would then choke out the crops. Another example of this would be with Pseudomonas syringae. This is a common bacterium on plants that causes frost to form on them. The lipoprotein coating of this bacterium is blown from the plants and soil into the atmosphere. Once in the upper atmospheric regions, these particles act as nuclei around which water collects and freezes to form ice. Some scientists consider this process absolutely essential for rain to fall. Genetic engineers are working on a strain of P. syringae that would not form frost on plants. Some scientists are concerned that these strains could conceivably cause serious climatic perturbations that inhibit rainfall and cause drought. Farmer’s fields are not the only places that are threatened. Scientists are looking for a way to destroy lignin, an organic substance that makes trees rigid, by use of a genetically engineered enzyme. They believe that it would be of use to clean up the effluent form paper mills or for decomposing biological material for energy. This poses a threat to forests because it could destroy massive amounts of them by eating away their lignin. We could end up with no trees. Engineers could try to create organisms with a “suicide” gene so they only live for a very short time, but they would be alive long enough to do damage. These engineers and businesses, like Pioneer, Sandoz, Imperial Chemical Industries, Dow, Ciba-Geigy, Monsanto, Upjohn, Elanco, and Pitman-Moore to name the leading corporations in agribiotechnology, don’t understand the impact that these engineered organisms can have on the existing fragile ecosystems. It is clear that the biotechnology industry is potentially one of the most serious threats to the biodiversity and ecological integrity of planet Earth. The threat will become a reality if this technology is applied with the same values and attitude toward life and the biosphere that sanctioned and promoted the wholesale application of pesticides and the development of capital-intensive monoculture farming and forestry. But this is not to say that this new technology could not be used appropriately. For example, it could be used to engineer plants to help halt the spread of deserts; to develop microorganisms and plants to synthesize essential biologics, such as insulin and antibodies; to help in water treatment to remove pesticides (bioremidiation), heavy metals, and other industrial and agrochemical poisons. Scientists must be extremely cautious about releasing genetically engineered organisms into the environment. The deliberate and accidental release of exotic, nonindigenous plant and animal species has caused considerable harm to the ecosystem already. Modern agriculture operates so close to the edge of disaster that the U.S. Department of Agriculture Research Service spent $23.5 million in 1991 on biological control programs. Exotic foreign weeds, such as the field star thistle, and bugs such as the Russian wheat aphid, accidentally imported in contaminated agricultural produce and seeds, along with indigenous agricultural pests such as grasshoppers and medflies, are a serious and costly problem. The rationale of using high-risk “biological controls”- such as releasing Australian wasps to control grasshoppers- as an alternative to more costly pesticides is the same rationale that the biotech industry is employing to justify the use of various genetically engineered products as alternatives to chemical pesticides. The plethora of “biological immigrants”- exotic plant and insect pests that are a threat to agriculture and are responsible for millions of dollars of crop damage and loss in the United States every year- should serve as a warning to those who see no problems in releasing new genetically engineered life forms into the environment. Some of these biological immigrants include the blue water hyacinth and hydrilla that are now clogging Florida’s waterways; the Eurasian carp and other deliberately introduced foreign fish species that have decimated indigenous fish species across the United States; and the Middle East sweet potato whitefly. Other ecologically harmful exotics include Eurasian Kentucky bluegrass, the Africanized honeybee, Chinese kudzu, the Asian tiger mosquito, European purple loosestrife, the European starling, and the zebra mussel. Although many exotics have been deliberately introduced, many come in accidentally in agricultural produce and imported plants and seeds. And estimated 10 percent of established immigrants have major adverse ecological consequences, but there is a new urgency because of the “homogenization of the world” via import and export of agricultural commodities and deliberate introduction of new plant and animal species. The biotech industry is also trying to promote the idea that genetic engineering is good for all life because it can help increase the Earth’s biodiversity. This is absurd. A biotechnology – supported livestock industry that expands to meet the public demand for meat and dairy products as dietary staples, coupled with more people on the planet, will lead to a loss of natural biodiversity as more and more wildlands and wildlife are obliterated. More trees will be cut down, more swamps drained and more dams built to convert more land into pasture and cropland. Pesticides and fertilizers from genetically engineered pest-killing and nitrogen-fixing bacteria, along with crops that produce their own pesticides, herbicide- and disease-resistant seeds and feed-efficient, disease-resistant livestock, will cause the displacement and extinction of wild plant and animal species. It is vital that ecosystems be saved from loggers, dam builders, monoculture foresters, and cattle and sheep ranchers, since recent studies have shown that large areas of natural habitat must be preserved in order to prevent a decline in species diversity. In addition to the displacement of wildlife and destruction of natural habitats by the expansion of agribiotechnologies, the long-term rebound effects on remaining wildlife populations and habitats need to be considered. If you have a large acreage of herbicide and disease-resistant trees, what would happen to the insects and their predators? They could be forced to find new niches and compete in other ways with indigenous creatures in adjacent, foreign land. Because living organisms are highly complex, genetic engineers cannot possibly predict all of the effects of introducing new genes into them. This is the case for even the simplest bacterium, not to mention more complex plants and animals. This is because the introduced gene may act differently when working within its new host, the original genetic intelligence of the host will be disrupted, the new combination of the host genes and the introduced gene will have unpredictable effects and therefore there is no way of knowing the overall, long-term effect of genetically engineered foods on the health of those who eat them. Unnatural gene transfers from one species to another are dangerous. Biotechnology companies erroneously claim that their manipulations are similar to natural genetic changes or traditional breeding techniques. However, the cross-species transfers being made, such as between fish and tomatoes, or between other unrelated species, would not happen in nature and may create new toxins, diseases, and weaknesses. Biotechnology companies also claim their methods are precise and sophisticated. In fact, the process of inserting genes is quite random and can damage normal genes. Genetic research shows that many weaknesses in plants, animals, and humans have their origin in tiny imperfections in the genetic code. Therefore, the random damage resulting from gene insertion will inevitably result in side effects and accidents. When genetic engineers insert a new gene into any organism there are “position effects” which can lead to unpredictable changes in the pattern of gene expression and genetic function. The protein product of the inserted gene may carry out unexpected reactions and produce potentially toxic products. There is also serious concern about the dangers of using genetically engineered viruses as delivery vehicles in the generation of transgenic plants and animals. This could destabilize the genome, and also possibly create new viruses, and thus dangerous new disease. Genetically engineered products also carry more risks than traditional foods. The process of genetic engineering can thus introduce dangerous new allergens and toxins into foods that were previously naturally safe. Already, one genetically engineered soybean was found to cause serious allergic reactions, and bacteria genetically engineered to produce large amounts of the food supplement, tryptophan, have been suspected to produce toxic contaminants that killed 37 people and permanently disabled 1,500 more. Genetically Engineered foods will also lead to and increase in pollution of food and water supply. More than 50% of the crops developed by biotechnology companies have been engineered to be resistant to herbicides. Use of herbicide-resistant crops will lead to a threefold increase in the use of herbicides, resulting in even greater pollution of our food and water with toxic agrochemicals. In my opinion, genetically modified organisms pose a serious risk to human health and to the environment. More research needs to be done to determine all the consequences of releasing genetically modified organisms into the natural environment. 