

Genetically modified foods are species which have been altered- modified, in a laboratory to enhance specific and desired traits. This can be done by removing an existing strand of DNA or by adding a new gene altogether. Reasons for altering a plants DNA structure could be for example to extend the shelf life of a plant, improve its resistance against certain pesticides and herbicides or increase its nutritional value.

Genetically modifying species to achieve specific traits is not a new concept and has been around for many, many years. Traditionally the enhancement of a plant was accomplished by selective breeding although this method was time consuming and often not very accurate.

Today however genetic engineering can create the desired plant very quickly and accurately. It is possible to transfer genes from plant to plant, animal to plant or from animal to animal this is because all genes are made from the same material- DNA.

An example of genetically modifying a plant would be when the gene responsible for drought tolerance is isolated and inserted into a different plant therefore giving both types of plant a tolerance towards drought.

Genes from non plant organisms can also be used, one of the best and most documented cases of this would be the use of the B.t genes in corn and other cereal crops. B.t stands for *BACILLIUS THURINGIENSIS* and is a naturally occurring protein that is deadly to insect larvae. When the gene was inserted into the crops it enabled the plants to produce their own pesticides against insects such as the European corn borer.

The following few slides of the presentation show how something may be genetically modified.

### **The diagram of flounder and tomato.**

### **What are the benefits of GM crops.**

#### **PEST RESISTANCE:**

Growing genetically modified foods such as B.t corn which we mentioned earlier can help to eliminate the application of chemical pesticides. This also has a chain reaction in the amounts of agricultural waste from fertilizers and pesticides which finds its way into natural water supplies and reduces hazards on the environment.

#### **HERBICIDE TOLERANCE:**

It can be very cost effective to remove weeds by physical means so people in agriculture often spray large quantities of different herbicides (weed killer) onto their crops to destroy weeds. This is very time consuming and expensive task and also needs to be safe to use on the crop itself. As a result if a crop was genetically modified to be tolerant against one very powerful strain of herbicide then the environment would be less damaged because the amount of herbicide needed would be reduced.

#### **DISEASE RESISTANCE:**

Genetic engineers are currently working on reducing many viruses, fungi and bacteria that cause plant diseases.

#### **COLD TOLERANCE:**

Cold weather can be responsible for the destruction of whole crops such as potato, tobacco or as shown earlier tomato plants. The introduction of the anti-freeze gene into plants would therefore save many crops and make them more adaptable.

### **DROUGHT TOLERANCE:**

This could prove to be a major life line for less economically developed countries who have poor growing conditions and suffer from drought and starvation. The introduction of such enhancements could also mean that plants could grow in previously inhospitable conditions.

### **NUTRITION:**

This is a similar scenario to the above advantage as third world countries who suffer from malnutrition don't receive the necessary food groups from their usual food sources such as rice. Therefore if rice could be genetically modified to include vital minerals and vitamins nutritional deficiencies could be alleviated. E.G blindness is said to be the result of a deficiency in Vitamin A in many 3<sup>rd</sup> world countries however this problem could be relieved with the introduction of GM crops.

### **PHARMACUTICALS:**

Often in 3<sup>rd</sup> world countries medicines and vaccines are difficult to attain and costly to produce. If 'edible' vaccines could be introduced into plants such as potatoes the vaccines would be easier to transport, store and administer than traditional methods.

### **HAZARDS OF GMF**

#### **Unintended harm to other organisms**

Last year a laboratory study was published in showing that pollen from B.t corn caused high mortality rates in monarch butterfly caterpillars. Monarch Caterpillars consume milkweed plants, not corn, but the fear is that pollen from B.t corn is blown by the wind onto neighboring fields and subsequently onto milkweed plants. The fear is that the caterpillars are eating the corns pollen because it is on the milkweed and as a result are perishing.

#### **Reduced effectiveness of pesticides.**

When DDT was introduced many populations of mosquito became resistant to its effects. Many people now fear that the same will happen to crops that have been modified for example becoming resistant to the protein B.t.

#### **Allergenicity.**

Allergic reactions to peanuts and other foods have become increasingly common over the past decade. There is a possibility that introducing a gene into a plant may create a new allergen or cause an allergic reaction in susceptible individuals.

### **UNKNOWN EFFECTS ON HUMAN HEALTH.**

There are many harmful possibilities to human health which are currently only suspected however is it right to be using GM crops when the health risks are still not confirmed