



# Genetically Modified Organisms

# Genetically Modified Organisms

## ➔ What is GMO?

- A genetically modified organism is one whose genetic material has been altered using genetic engineering.
- Genetically modified organisms, or GMOs, are commonly used in foods and medicines. This has led to concern about the dangers they might cause to the environment and to human health





→ How?

By eliminating, modifying or adding copies of specific genes often from other organisms through modern molecular biology techniques.

● Other names: Recombinant DNA (rDNA)  
Genetic engineering  
Gene splicing





The two most common types of GMO's are

- Foods - canola, soya bean, golden rice corn and aspartame
- Medicines - Insulin, hormones and vaccine



## → Food GMO's

- Crops are modified so when farmer kill weeds with herbicides the crops can with stand the exposure to the herbicide – killing - the weeds and not the crop
- Although it is not as common, some types of GMOs are modified to increase their nutrient content. Corn and soybeans are two examples of crops that have higher-nutrient GMO versions available.



## ➔ Medicine GMO's

- Genetically modified medicines can be produced cheaper and easier.
- Some GMO's are: insulin, thyroid hormones and the hepatitis B vaccine (insulin being the oldest)





## Other Types of GMO's

- Plants and Crops
- Microbes
- Mammals
- Insects
- Aquatic Life





## GMOs History

- First GMO created in 1973
- After years of testing and research, GMOs were introduced to farmers
- In the 1990s, genetically modified foods became available in stores





→ 1978

## Genentech

"Becomes the first to synthesize insulin, later they create a human growth hormone which was used to enable dwarf children to grow to a normal size. Genentech's Humulin is the first consumer product developed through modern bioengineering.



→ 1982

Monsanto

Introduced a bovine growth hormone used in cows to increase milk production. They were among the first to genetically modify a plant cell in 1983.



1992

## Calgene's Flavr Savr

tomato is approved for commercial production by the US department of agriculture. This was genetically engineered to remain firm for a longer period of time. The FDA declares that genetically engineered foods are not dangerous and do not require special regulation (History of genetic engineering, 2012).



# Examples of the potential benefits and risks of GM

**Sweet corn**



**Golden Rice**



**Tomatoes**



# Examples of the potential benefits and risks of GM

## Sweet corn

Advantages:

No longer use of insecticides

The farmer don't need to deal with toxic

Disadvantages:

Insects can become resistant to the poison

Endangered butterflies are in bigger threat



## Golden Rice



## Tomatoes



# Examples of the potential benefits and risks of GM

## Sweet corn



## Golden Rice

Advantage:

It contains Vitamin-A, so children in developing countries won't become blind

Disadvantage:

Poor countries become dependent on rich countries which have the techniques for engineering



## Tomatoes





### Golden Rice



### Sweet corn



## Examples of the potential benefits and risks of GM

### Advantages:

GM tomatoes can remain fresh longer  
GM tomatoes can tolerate a lengthier  
transport time

### Disadvantage:

Tomatoes are resistant to antibiotics



# Examples of the potential benefits and risks of GM

**Sweet corn**



**Golden Rice**



**Tomatoes**





# **Genetic Modification of Conventional Crops**

**61% of corn**

**83% of cotton**

**80% of canola**

**89% of soybeans**

**Other crops: rice, tomatoes, potatoes,  
Hawaiian papaya, chicory, crook neck**





# Advantages

- Reduce use of pesticide and other Toxic chemicals
- Desired characteristics of food are achieved and in a shorter time
- Improves nutritional value.
- Many people rely on GM food for medicines.
- Gene technology is the best solution to the problem of world hunger.



# **Environmental Hazards from Pesticides**

- Substantial health impacts on workers
- Pollution of natural ecosystems/ waterways
- Loss of insect biodiversity in agroecosystems
- Creation of secondary pests
- Creation of insect races resistant to pesticides



# Genetically Modified Organisms with a limiting factor





# Disadvantages

- Unacceptable to some groups to copy genes.
- Interfere in food chain
- Genetically engineered animals may suffer more health problems
- Allergic reactions
- "Genetic Pollution"



# Agriculture has narrowed the gene pool and caused a loss of biodiversity

- Wild Progenitors and Relatives
- Land Races
- Elite Lines





Agriculture is the main cause of  
environmental change and  
degradation

