



GM CROPS

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Introduction

An artificial selection to change the genetic characteristic of populations with similar genes.

Animals or plants can be selected.

- Eg. **Tomato, Wheat, Fruit, or dog.**

Selective breeding ends with populations of species containing large no. of individuals with the desired traits.

Recently scientist are using genetic engineering to speed up the manipulation of genes.

AI15!

Original



Now

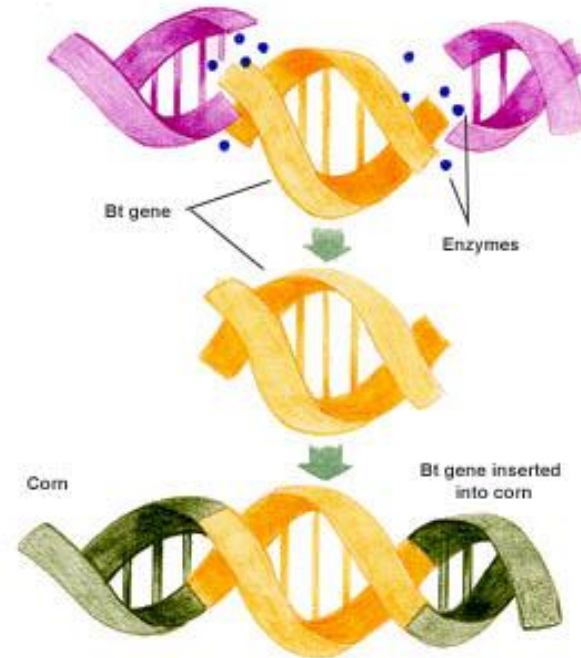
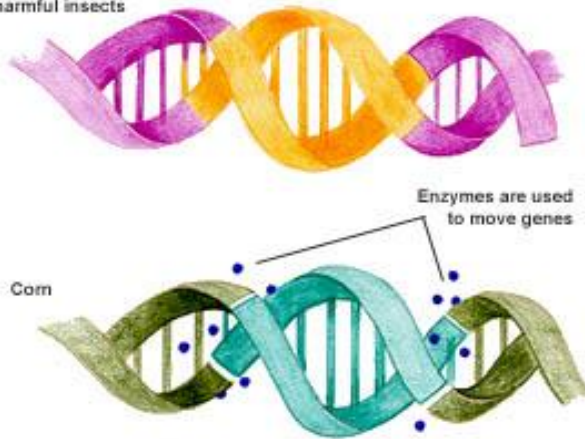




Definition

Genetic engineering or gene splicing is the alteration of an organism's genetic material, thro' adding, deleting, or changing segments of its DNA

Bt gene will
help corn resist
harmful insects



Genetically Modified Organisms

Eg: Genes from a fish species can be transferred into a tomato plant to give its properties.

The resulting organism are called as **Genetically modified organisms (GMOs) or Transgenic Organisms.**

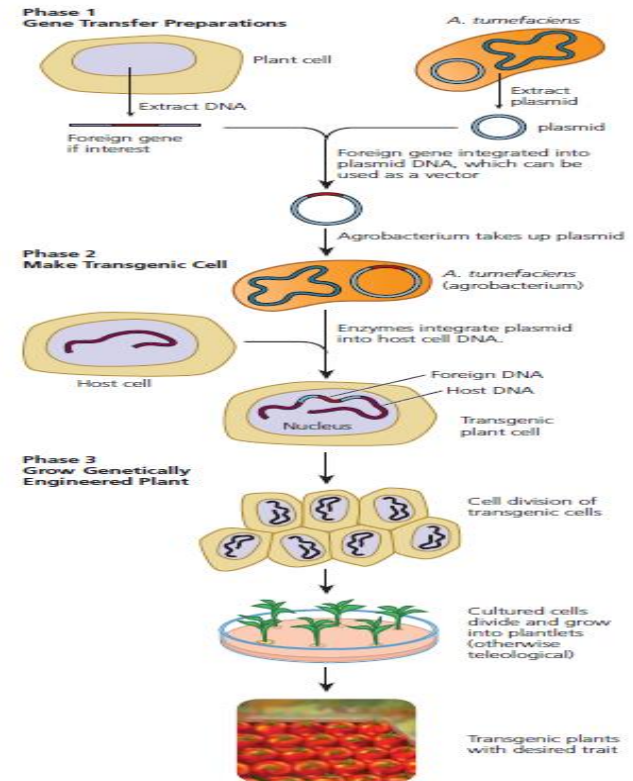


Figure 4-8 Genetic engineering: steps in genetically modifying a plant. **Question:** How does this process change the nature of evolution by natural selection?

Examples

- Bioengineers have developed many beneficial GMOs that may low the cholesterol eggs.
- Wheat that thrives in drought conditions
- Bananas that don't rot on the way to market.
- Tomatoes with genes can help to prevent some type of cancer.
- Genetic engineers have produced two mice – schwarzenegger mouse- muscle building genes and marathon mouse – never seems to tire.



Figure 4-9 An example of genetic engineering. The 6-month-old mouse on the left is normal; the same-age mouse on the right has a human growth hormone gene inserted in its cells. Mice with the human growth hormone gene grow two to three times faster and twice as large as mice without the gene. **Question:** How do you think the creation of such species might change the process of evolution by natural selection?

What are GM crops?

- Plants which have been genetically altered to express a desirable trait (Perry 2003)
 - Herbicide resistance
 - Virus resistance
 - Insecticides
 - Environmental Tolerance
 - Increased nutritional value

Genetically Modified Crops and Foods

Projected Advantages

Need less fertilizer

Need less water

More resistant to insects, disease, frost, and drought

Grow faster

Can grow in slightly salty soils

May need less pesticides

Tolerate higher levels of herbicides

Higher yields

Less spoilage



Projected Disadvantages

Irreversible and unpredictable genetic and ecological effects

Harmful toxins in food from possible plant cell mutations

New allergens in food

Lower nutrition

Increase in pesticide-resistant insects, herbicide-resistant weeds, and plant diseases

Can harm beneficial insects

Lower genetic diversity

Critics to GM crops

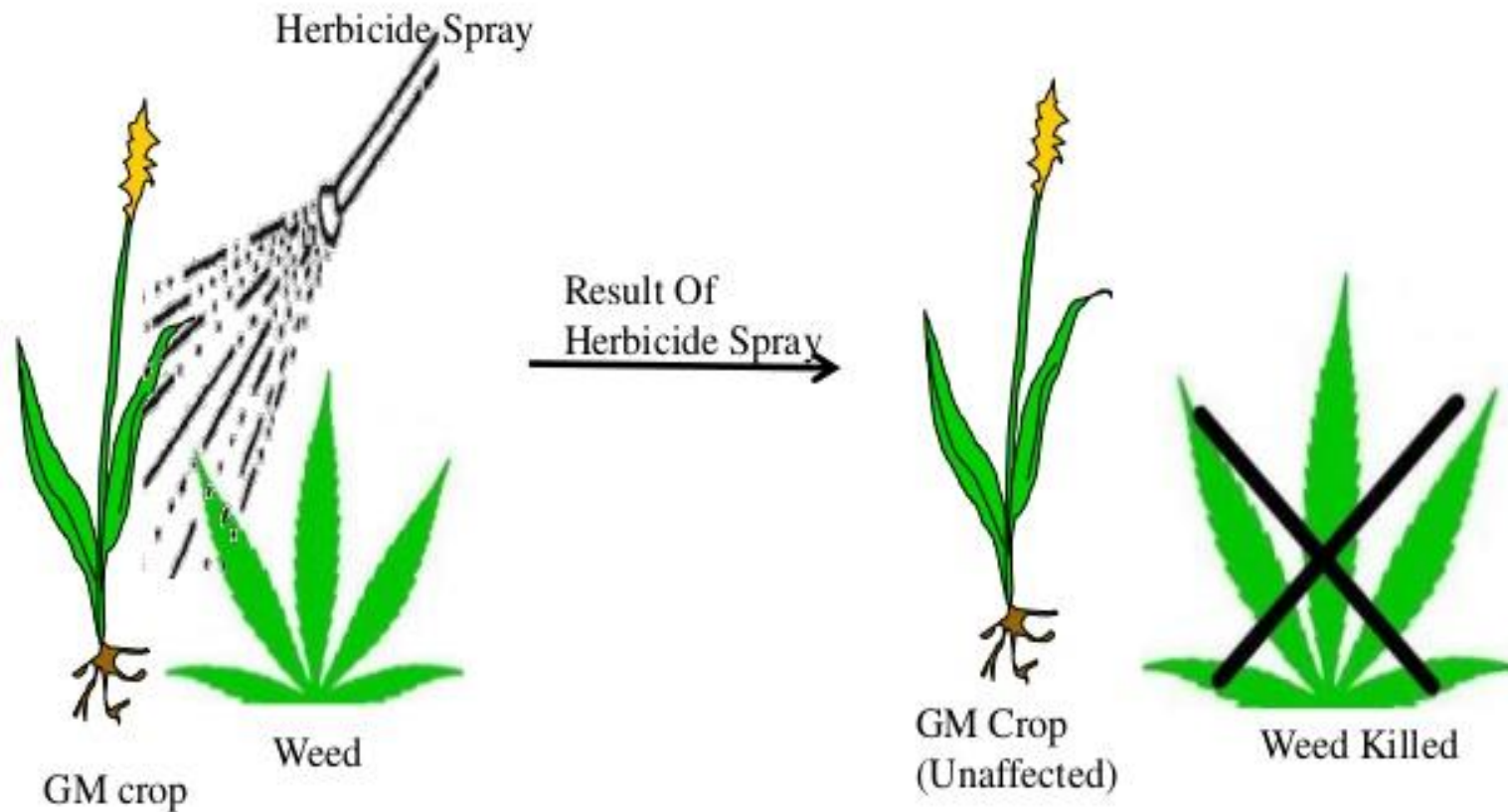
- ❖ Safety issues
- ❖ Ecological concerns
- ❖ Economic concerns
- ❖ These organism are subjected to IPR.

Benefits to GM foods

- ❖ Easing for worlds hunger
- ❖ Reduced use of pesticides and herbicides
- ❖ Improved crop quality
- ❖ Improved Nutritional quality,

Herbicide Tolerance

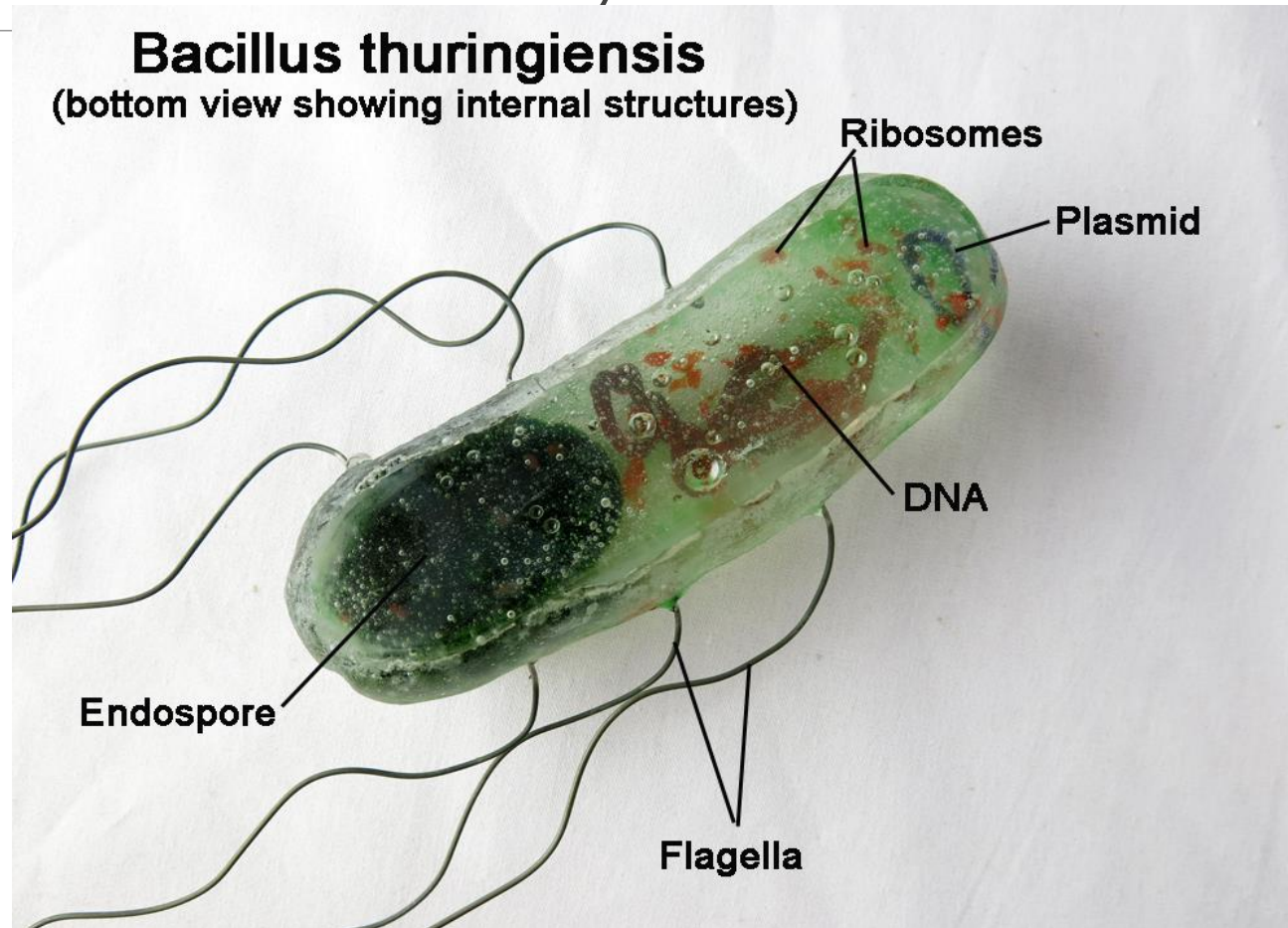
- Over 63% of Gm crops grown globally have herbicide tolerance traits.
- Herbicide tolerance is achieved through the introduction of a gene from a bacterium conveying resistance to some herbicides. In situations where weed pressure is high, the use of such crops has resulted in a reduction in the quantity of the herbicides used.



Our concern.....



Bt cotton – a new plant to add to biodiversity?



Bt Brinjal

The **Bt brinjal** is a suite of transgenic bringals (also known as an eggplant or aubergine) created by inserting a crystal protein gene (*Cry1Ac*) from the soil bacterium *Bacillus thuringiensis* into the genome of various brinjal cultivators.

The insertion of the gene, along with other genetic elements like Promoters, Terminator and an antibiotic resistance marker gene into the brinjal plant is accomplished using Agrobacterium -mediated genetic transformation



Why should we are worried in eating Brinjal

- ❖ Antibiotic resistance
- ❖ Toxicity of the proteins released in brinjal
- ❖ No long term safety for usage
- ❖ Babies are at high risk
- ❖ Organic risk
- ❖ Increase of cost
- ❖ Irreversible gene transformation
- ❖ Regulatory problem



Bt targets.....

Cry1A-K; Cry2A
Cry7B; Cry8D
Cry9A-C,E; Cry15A
Cry22A; Cry32A
Cry51A



Lepidoptera



Diptera

Cry1A-C; Cry2A
Cry4A-B; Cry10
Cry11A-B; Cry16A
Cry19A-B; Cry20A
Cry24C; Cry27A
Cry32B-D; Cry39A
Cry44A; Cry47A
Cry48A; Cry49A
Cyt1A-B; Cyt2A-B



Coleoptera

Cry1B, I; Cry3A-C; Cry7A
Cry8A-G; Cry9D; Cry14A
Cry18A; Cry22A-B; Cry23A
Cry34A-B; Cry35A-B; Cry36A
Cry37A; Cry43A-B; Cry55A
Cyt1A; Cyt2C

Cry5A-B; Cry6A-B
Cry12A; Cry13A
Cry14A; Cry21A
Cry55A



Rhabditida



δ -Endotoxins



**Human-cancer
cells**

Cry31A
Cry41A
Cry42A
Cry45A
Cry46A

Cry2A
Cry3A
Cry11A



Hemiptera



Hymenoptera

Cry3A
Cry5A
Cry22A



Gastropoda

Cry1Ab

Non- target organisms



37 MILLION DEAD BEES

"Once the corn started to get planted our bees died by the millions..."

Europe got the message. When will we?



**// LOOK
DEEP INTO
NATURE,
and then you
will understand
everything better."**

– Albert Einstein



Thank You