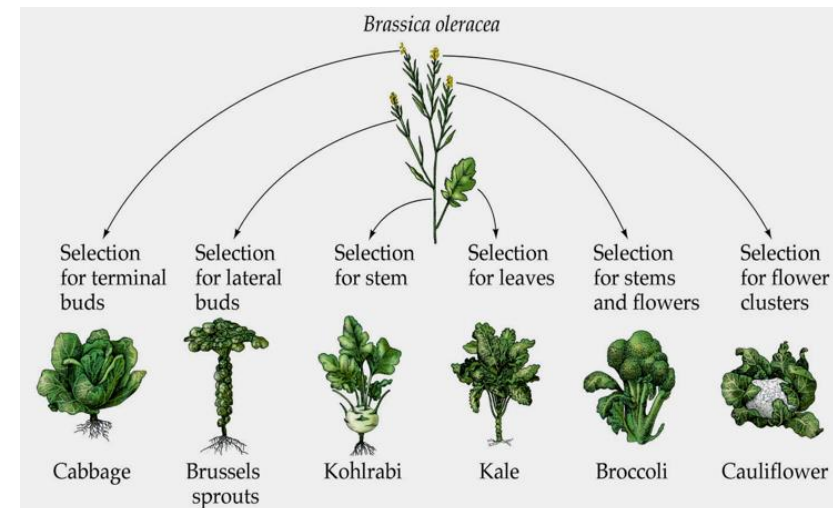
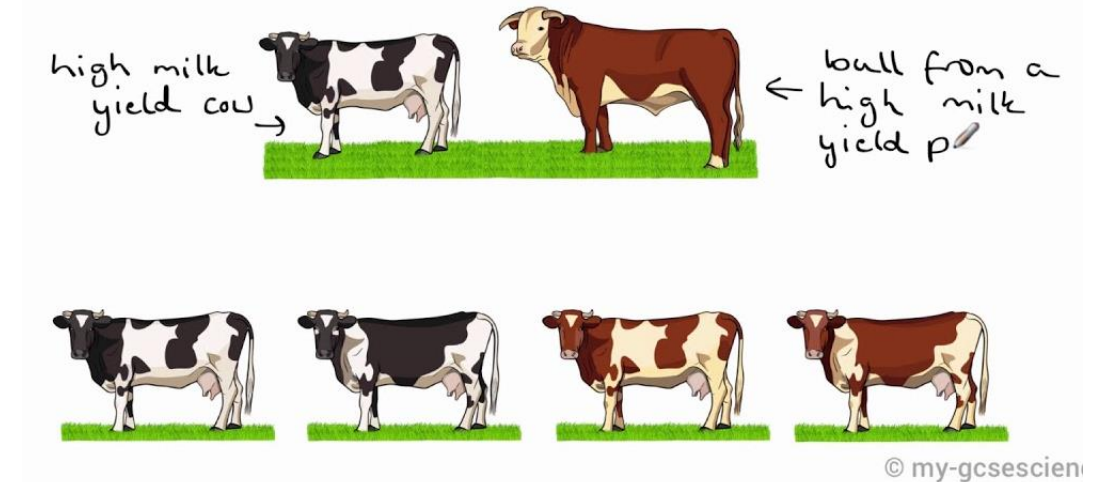




**GENETICALLY MODIFIED ORGANISMS**

# SELECTIVE BREEDING

Is when humans artificially select the animals or plants they want to breed together so that the genes for a desired characteristic can remain in a population



# BIOTECHNOLOGY



- Use of biological systems, living organisms or derivatives thereof, to make or modify products or processes for a specific use

# GENETIC ENGINEERING

- technique that allows genes and DNA to be transferred from one source to another, leading to the production of living modified organisms (LMOs) or genetically-modified organisms (GMOs)
- is the direct manipulation of an organism's genes using biotechnology.



# GENETICALLY-MODIFIED ORGANISM (GMO)

- Plant, animal, microorganism, or other organism whose genetic makeup has been modified using recombinant DNA methods



# ROLE OF GMO IN FOOD AND AGRICULTURAL INDUSTRIES

1. Pest resistance
2. Virus resistance
3. Herbicide tolerance
4. Fortification
5. Cosmetic preservation
6. Increase growth rate



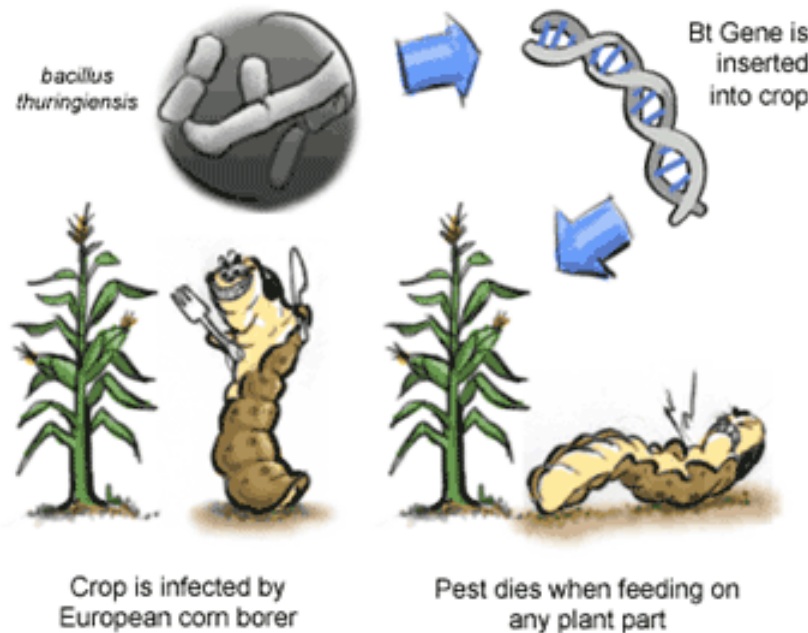
# PEST RESISTANCE

- Genetically modified plants to resist pests



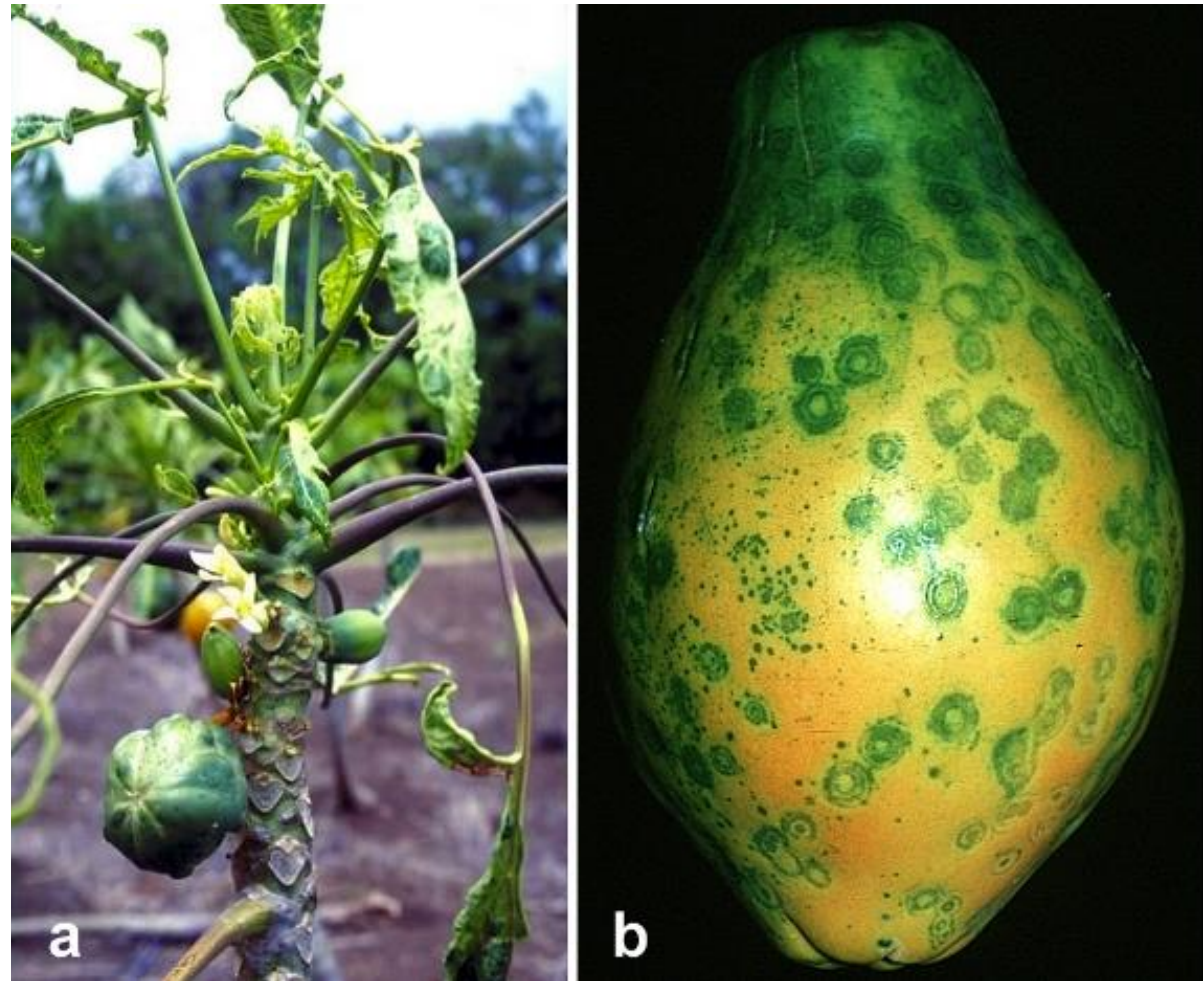
## BT Corn

Gene from bacterium lets engineered plants produce protein that destroys the digestive system of specific insect pests



# VIRUS RESISTANCE

- Genetically modified plants to resist viruses
- introducing a protein from the PRSV into plant tissue, which confers resistance to the virus.



Papaya Ringspot Virus (PRSV)

# HERBICIDE RESISTANCE

- Genetically modified plants to tolerate herbicide
- Roundup ready soybean
- Glyphosate, an herbicide used to kill weeds



Roundup Ready Soybeans are tolerant to the glyphosate (an herbicide) sprayed into them



# COSMETIC PRESERVATION

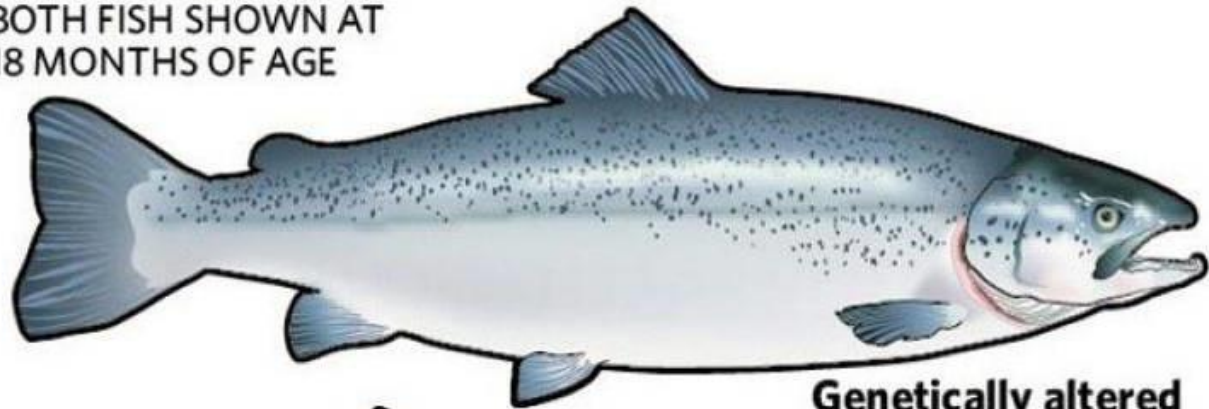
- Genetically modified plants resist natural discoloration
- Suppress the browning of apple due to superficial damage



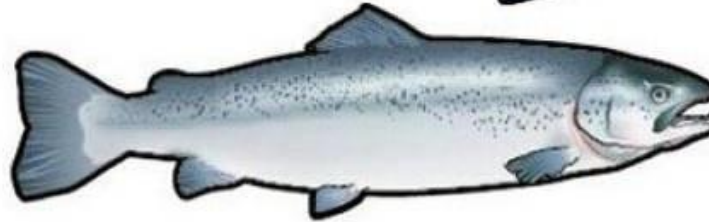
# INCREASE GROWTH RATE

- Genetically modified plants that has higher yield in growth than normal species
- A gene from an ocean pout, an eel like fish was introduced to Pacific Chinook salmon, making the salmon grow faster than its normal rate.

BOTH FISH SHOWN AT  
18 MONTHS OF AGE



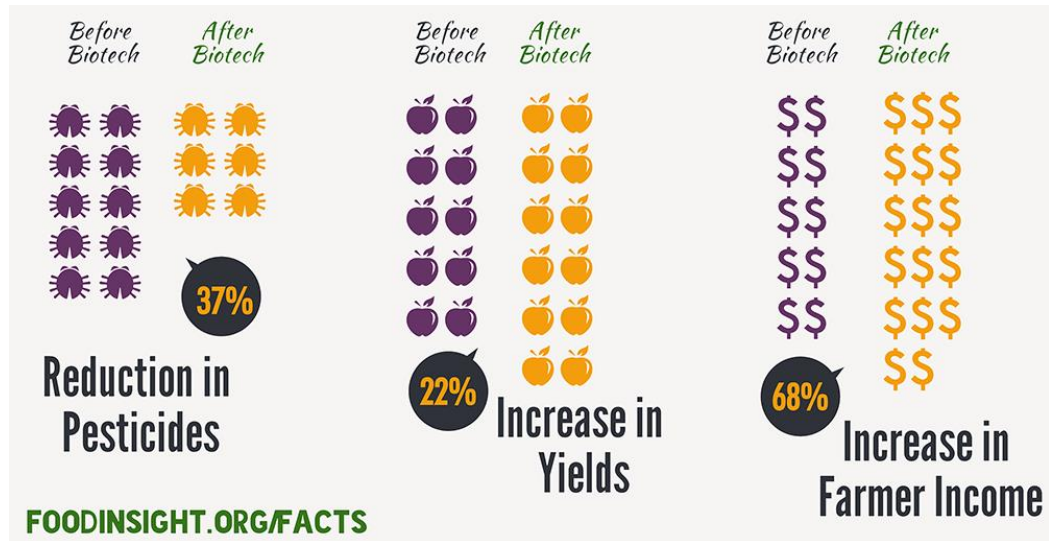
**Genetically altered**  
Length: 24 in. (61 cm)  
Weight: 6.6 lb (3.0 kg)



**Normal DNA**  
Length: 13 in. (33 cm)  
Weight: 2.8 lb (1.3 kg)

- AquaBounty AquAdvantage salmon can reach adult size in 16 to 28 months instead of 36 months for regular Atlantic salmon. These transgenic salmon eat 25 per cent less feed and are about 20 per cent more efficient at converting that food to flesh

# BENEFITS OF GMO



1. Higher efficiency in farming
  2. Increase in harvest
  3. Control in fertility
  4. Increase in food processing
  5. Improvement of desirable characteristics
  6. Nutritional and pharmaceutical enhancement
- Biodiversity!!! No need to expand land use for farming.

# POTENTIAL RISKS OF GMO



1. Inadequate studies on the effects of GMO to humans and the environment
2. Promotes mutation in organisms, which the long-term effects are still unknown
3. Human consumption might have the following effects:
  - More allergic reactions
  - Gene mutation
  - Antibiotic resistance
  - Change in nutritional value

# BIOSAFETY ON GMOS

1. *Codex Alimentarius Commission (Codex)* – responsible for the development of standards, codes of practices, guidelines, and recommendations on food safety (has developed principles for the human health risk analysis of GM food products)
2. *Cartagena Protocol on Biosafety* – international environmental treaty that regulates the transboundary movements of LMOs
3. *International Trade Agreement on Labeling of GM food and food products* – an agreement that requires exporters of GM food and food products to label their products and give rights to importing parties to reject or accept the GM products (consumers have the right to know and the freedom to choose)