

# Deforestation

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# Tropical Rainforest in Brazil

- Brazil contains 1.26 million square miles of the amazon rainforest, accounting for 61% of the amazon rainforest
- 173,746 square miles have been cleared for cattle pastures
- 13,514 square miles have been cleared for agricultural use



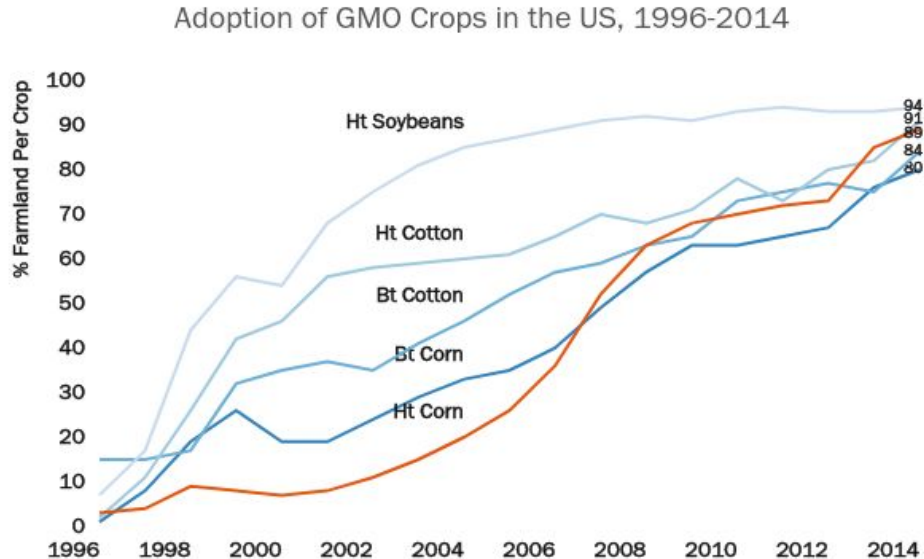
# Soybeans

- Soybeans account for 60% of forest loss in Latin America and roughly 40% worldwide
- 92,665 to 96,526 square miles of land in Brazil are used for soybeans
- 80% of Amazon soy is destined for animal feed
- In 1970 soybeans were genetically modified to be resistant to warm climates and with intensive fertilizer could grow soy in tropical regions
- Soybeans replace existing cow pastures=more deforestation for cattle pastures



# What are GMOs?

- A **GMO** is an organism whose genome has been altered by the techniques of genetic engineering so that its DNA contains one or more genes not normally found there.



# Steps of Genetic Engineering

1. Find a new trait: Growth gene

**IAglu:** The first gene for controlling growth hormone to be cloned from a plant

- Produces an enzyme that regulates the hormone known as IAA or indole-3-acetic acid.
- IAA controls growth hormone

Already contains gene but can be manipulated to create larger soybean

# IAglu

Increased amount of IAglu gene creates smaller plants through the conversion of the growth hormone into its inactive form

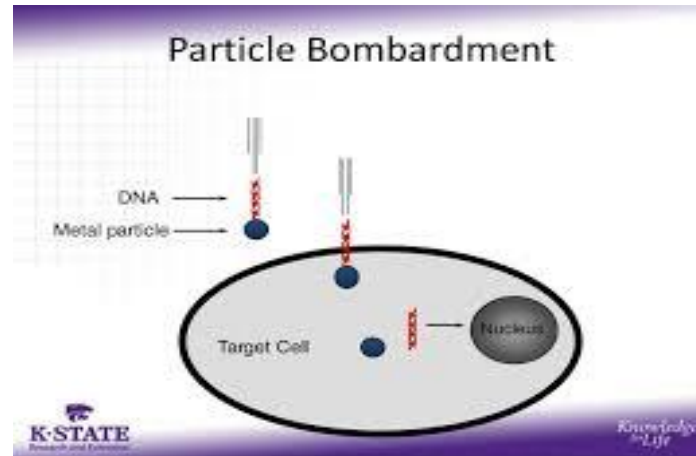
The gene is a segment of DNA that produces a segment of RNA which is a template where the IAglu enzyme is produced. A reverse engineered copy would create a reversed engineered product, therefore the soybean size would increase



# How?

1. Insert a reversed copy IAglu gene through particle bombardment

The reversed IAglu will attach to the IAglu RNA, blocking it from being a template for the original IAglu gene to be expressed



# Particle Bombardment: PDS-1000/He System

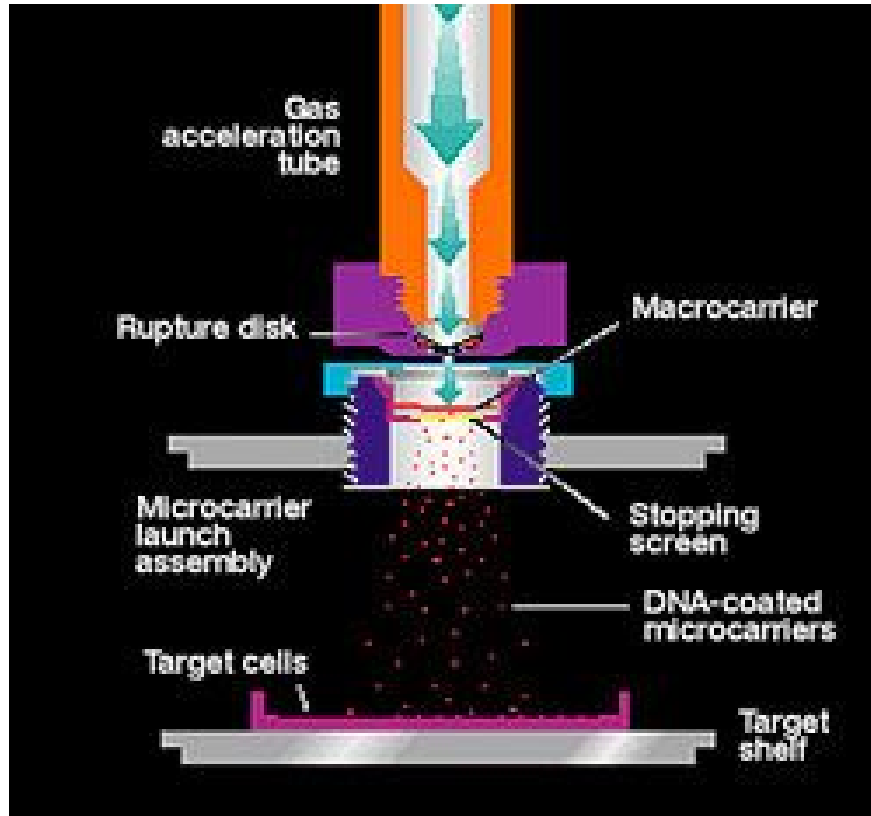
- A Biolistic technology that is a direct physical method of introducing nucleic acids into cells

Our method : bombardment chamber or PDS-1000/He system

- A sample is placed into the bombardment chamber which evacuates the pressure lower than that of the atmosphere
- Helium is released into the gas acceleration tube until the rupture disk bursts
- After the disk bursts, the resulting helium shock waves carry the microcarrier, which holds the particles, to the stop screen
- The stop screen keeps the microcarrier from going through but allows the coated microparticles to pass through into the bombardment chamber to penetrate the target cells



# Particle Bombardment



# Additional Tests:

- Reaction of cows to new soybean
- How new soybeans effect the environment
- Whether or not they can be sustained in their environment
- How much more efficient the new genetically modified soybeans are
- Human consumption
- Rate of growth
- Materials consumption or use of resources

# Triple C's

**Consumer:** soybean farmers and cattle farmers of Brazil

**Cost:** \$124 per acre of genetically modified soybeans

**Competition:** Palm oil production

Global sales for palm oil : 34.7 billion

Global sales for soybean oil : 12.3 billion



# End Goal

Genetically modified seeds will be created in a manufacturing system and will then be distributed to buyers as well as farmers in Brazil

Eventually these genetically modified plants would be able to produce on their own without the need for manufactured seeds

Deforestation in Brazil would be cut down dramatically because the need for more space for cattle and feed would be eliminated





The End

