Learn about the biotechnology process, why it’s used in crops, and the advantages and disadvantages.

Discuss consumer concerns regarding biotech crops and what the research says regarding them.
The top 10 hashtags related to #GMO

- GMOs
- eco
- food
- NoGMO
- nonGMO
- Monsanto
- organic
- news
- USA
- GMOfree
STOP GMO

LABEL

BAD FDA

DECEPTION FRANKENFISH WARNING

POISON

RIGHTS

LIES

CONTROLLS

BIO-ENGINEERED

GRAVE BAN

EAT

MODIFIED

OCCUPY FOOD

REAL ANTI-GMO FOOD

WTF OMG

ANTI

REAL

ANNUAL

USD

DEATH
Some Basic Definitions

- **Genetically modified organism (GMO) = DNA changed in a living organism**

- **World Health Organization**: DNA changed in such a way that doesn’t occur naturally.
Teosinte  Corn
Wild Carrot and Today’s Carrot
Parasitic dodder—transfers DNA from parasite to host and host to parasite.
Crown Gall-
Agrobacterium tumefaciens
Some Basic Definitions

- **Genetically modified organism (GMO)** = DNA changed in a living organism
- **Biotechnology** = use of living organisms to make a product or run a process. Modify the genetic material of living cells so they will produce new substances or perform new functions.
- **Genetic Engineering** = certain methods that scientists use to introduce new traits or characteristics to an organism.
- **Organic** = Food or other ag product has been produced through approved methods that integrate cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.
- **Natural** = Foods that are minimally processed and free of synthetic preservatives; artificial sweeteners, colors, flavors and other artificial additives; growth hormones; antibiotics; hydrogenated oils; stabilizers; and emulsifiers.
Traditional Plant Breeding

Species A × Species B

F2 progeny
TRADITIONAL PLANT BREEDING

DNA is a strand of genes, much like a strand of pearls. Traditional plant breeding combines many genes at once.

Desired Gene

Donor Plant

X

Commercial Plant Variety

Many genes are transferred

New Plant Variety
Crown Gall - 
Agrobacterium tumefaciens
TRADITIONAL PLANT BREEDING

DNA is a strand of genes, much like a strand of pearls. Traditional plant breeding combines many genes at once.

PLANT BIOTECHNOLOGY

Using plant biotechnology, you can add a single gene to the strand.
Papaya Ringspot Virus: a $45M industry was saved using GM technology

transgenic

traditional

Field Trial on Hawaii Puna 1995-97
Bt Corn Traits
Golden Rice

- WHO estimates that 250,000 to 500,000 children become blind each year because of a lack of vitamin A in their diets; half die within 12 months.

- Conceived as a public-good project under the Golden Rice Humanitarian Board

- funded by the Rockefeller Foundation, Bill & Melinda Gates Foundation, USAID, the Philippine Department of Agriculture, HarvestPlus, European Commission, Swiss Federal Funding, and the Syngenta Foundation.

- Several companies have provided free access to their patented technologies
“...just eat more carrots”?

REALITY: average share of food-energy intake for individuals in rural Bangladesh (economics/politics/population)

- **Staples (rice)**
- **Non-Staple Plants**
- **Fish and Animal**

Source: H. Bouis, HarvestPlus

Courtesy Dr. Sally Mackenzie, UNL 2013
What has happened to the promise of Golden Rice?

IRRI test plot of Golden Rice, Los Banos, Philippines, being trampled by activists
Many studies have been conducted to assess consumers’ opinions about biotechnology and food. Studies have shown that consumers are more accepting of using biotechnology to change plants vs. animals.

15 years of lab research and field trials: risks posed by gm no greater or different than risks posed by plants produced using traditional breeding methods used for more than 100 years.
Consumer Concerns

- Allergens
- Antibiotic Resistance
- Environment
- World Food Supply
- Food Labeling
Consumer Benefits

- Allergens
- Improved Nutrient Content
- Environment
- Vaccines
- World Food Supply
- Food Labeling
Additional Resources

- http://heuermannlectures.unl.edu/2013-2014
Questions?

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