

Public Health and Environmental Impacts of Genetically Modified Organisms (GMOs)

Sarah Janssen, M.D., Ph.D., M.P.H

**SF-Bay Area Chapter
Physicians for Social Responsibility
and
Natural Resources Defense Council**



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Overview of presentation

1. What are GMOs?
 2. Where are GMOs?
 3. What are the concerns?
 - a. Human Health
 - b. Environmental
 4. Recommendations for Healthcare Institutions
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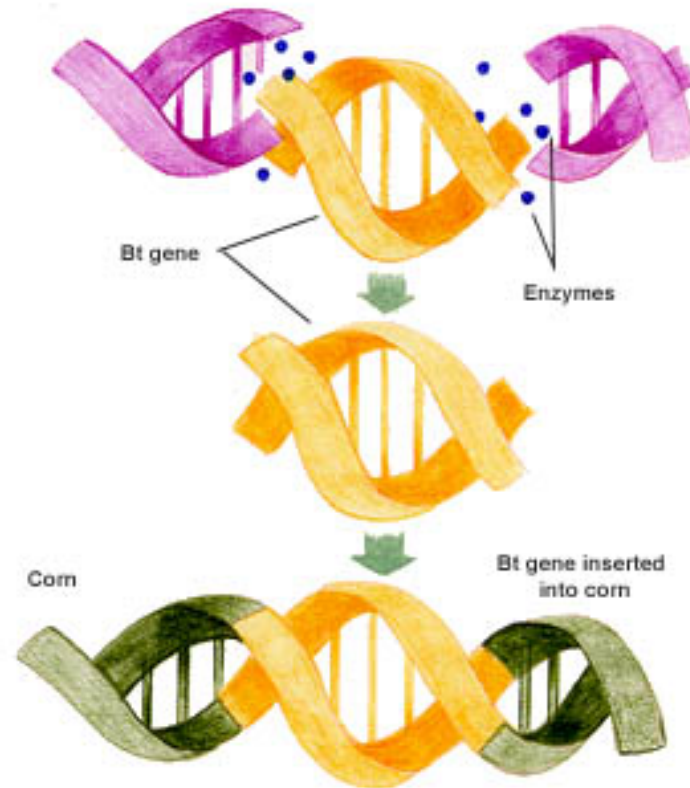
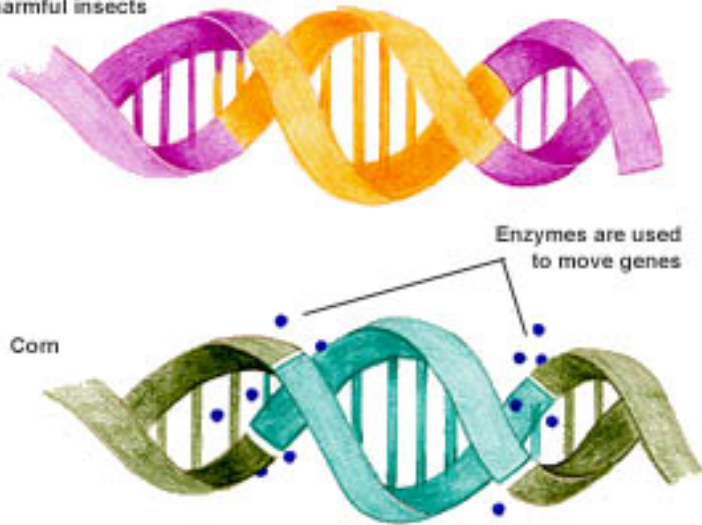
What is a 'GMO'?



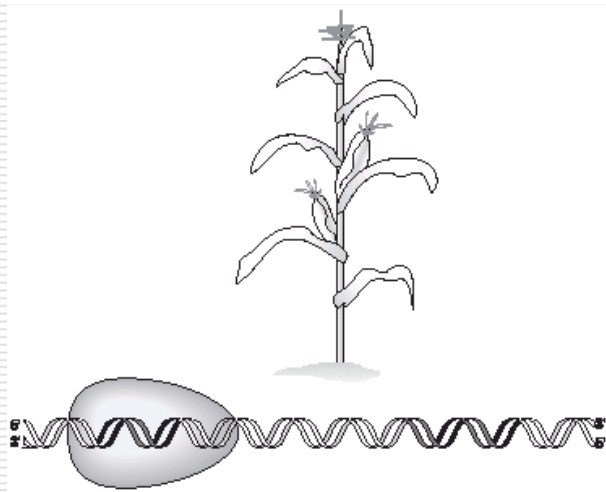
"genetically modified organism (GMO)" means an organism in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination

Introducing a new gene

Bt gene will help corn resist harmful insects



GMOs are used to confer:

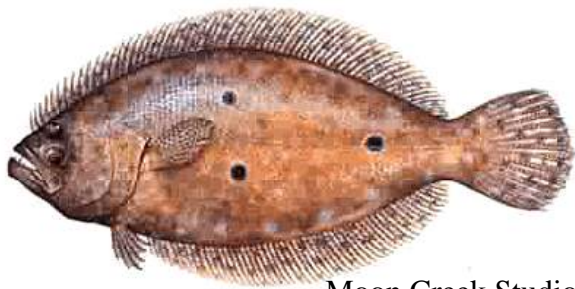


- Pest Resistance
 - Herbicide Tolerance
 - Viral Resistance
 - Drought Resistance
 - Improved Fruit
 - Altered Ripening
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Opponents argue the result is:



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- Creation of super pests
 - Creation of super weeds
 - Loss of biodiversity
 - Biotechnology companies control agriculture
 - Health concerns
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Moon Creek Studios

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- In the early 1990's, the biotech company DNA Plant Technology, attempted to genetically engineer a frost resistant tomato by isolating the “antifreeze protein” gene in the arctic flounder, and splicing it into tomatoes.
- The U.S. Department of Agriculture approved a field test to grow these new tomatoes, but the test crop was not successful, and the tomatoes never entered the marketplace.

More Biotech Creations

- Others include inserting the firefly luciferase gene into a tobacco plant to produce tobacco that glows, and genetically engineering pigs with human growth hormones to produce leaner and faster growing pigs.
 - Currently, the majority of genetically engineered crops are either herbicide tolerant (e.g. - Roundup Ready soy, corn, canola, and cotton) or pest tolerant (e.g. - Bt corn and cotton).
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Some Common GE Crops

Soy, corn, cotton and canola account for 99% of the genetically engineered crops on the market. However, a number of other common crops have been engineered, some of which never made it onto the market or are no longer on the market.



Images by Genetic ID

Slide compliments of Center for Food Safety

GMO Foods Are a Regular Part of The U.S. Diet

- First GMO – FlavorSavr Tomato, 1994
- 80% of soy planted in 2003
- 38% of corn planted in 2003
- Derivatives are in 70% of processed foods
- 70% of cotton seed oil
- 60% of canola oil
- 75% herbicide resistant, 17% produces insecticide, 8% do both

Source: Seeds of Deception, J. Smith, 2003

Federal Regulation Policy: GRAS

- ❑ In 1992, the FDA declared genetically modified foods to be **substantially equivalent** to conventional foods, deeming these new organisms “**generally recognized as safe**” (**GRAS**).
- ❑ This policy made the FDA exempt from requiring mandatory safety tests and meant that GE foods would not require any special labeling.
- ❑ The determination of substantial equivalence was made despite the FDA’s knowledge that there was no scientific consensus on the safety of GM foods, and even though FDA’s own scientists specifically warned that there was reason to believe GM foods might not be safe.

Other countries require labeling

- EU
- Russia
- Japan
- Australia
- China

“the health risks to humans (allergies, nutritional effects, etc) so far have hardly been examined....(and) there is yet no reliable information concerning their medium and long term environmental effects.”

Parliamentary Assembly of the Council of Europe, 2005.

Genetically Modified Organisms (GMO's): Should We Worry?



Slide compliments of Jeff Ritterman, SF PSR

Human Health Hazards

Just 10 peer-reviewed studies of potential toxicity of GMOs in 2003.

Possible Human Health Hazards

Allergenicity

Antibiotic Resistance

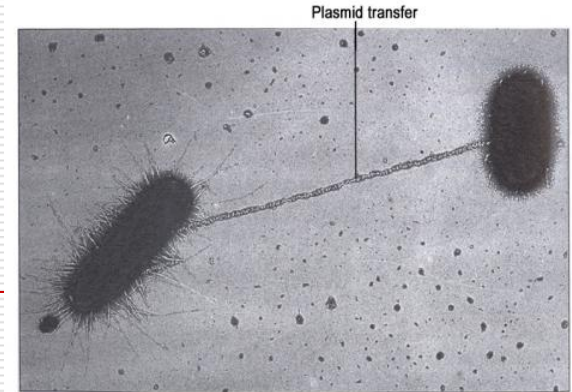
Contamination of other foods

Allergies



- ❑ Introduction of novel proteins into food supply
 - ❑ Soy engineered with brazil nut gene shown to cause reactions in people with nut allergies
 - ❑ For the majority of GE crops, novel genes are not assess for allergenicity before introduction
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Antibiotic resistance



- ❑ Genes that confer antibiotic resistance are intentionally added to GE organisms for identification purposes
 - ❑ Bacteria are promiscuous and often exchange genes
 - ❑ Concern is that antibiotic resistance genes will be transferred to bacteria in guts of livestock animals or humans
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Antibiotic resistance concerns

- ❑ British Medical Association
- ❑ World Health Organization
- ❑ Royal Society of Canada
- ❑ EU Scientific Steering Committee

“the use of (GE food) technology without antibiotic resistance genes has been encouraged by a recent FAO/WHO expert panel”

<http://www.who.int/foodsafety/publications/biotech/20questions/en/>

Contamination of Other Food

- ❑ Over 200 incidents of contamination of non-GE foodstocks have been documented in 57 countries in a 10 year period.
(<http://www.gmcontaminationregister.org/>)
 - ❑ Use of GE organism was not approved.
 - ❑ Pharma crops have contaminated natural crops.
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The Starlink Incident - 2000



Photo: USDA



www.commondreams.org

- ❑ Unapproved corn contaminates food supply
- ❑ \$1 billion in food recalls; \$110 million to growers
- ❑ Less than 1% of corn grown; 12% contaminated
- ❑ 2003 – 1% of corn still tests positive

Sources: A. Segarra and J. Rawson, "Starlink Corn Controversy: Background," Congressional Research Services, Jan. 10, 2001;

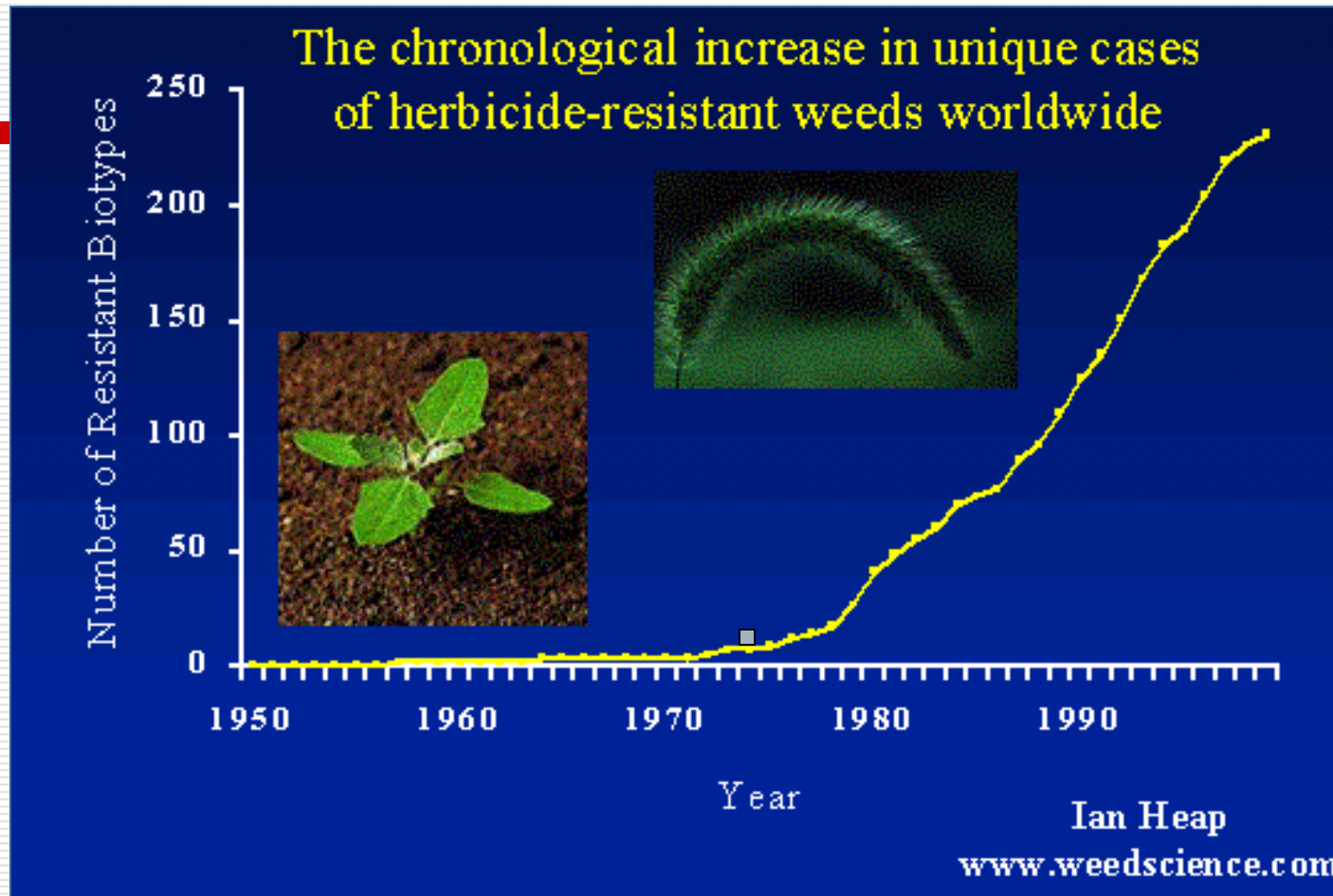
Paul Jacobs, "Banished biotech corn not gone yet," San Jose Mercury-News, Dec. 1, 2003.

Environmental concerns about GMOs.

Benefits of GMO use have not been realized and may cause harm.

- ❑ Increased herbicide use
 - ❑ Threat to non-target species and soil ecology
 - ❑ Threats to organic farming – Bt resistance
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Super Weeds



GAO, 1999

More than 500 insect pests, 270 weed species, and 150 plant diseases are now resistant to one or more pesticides, making these pests harder and more costly to control

Environmental Contamination



Jon Wikne



R. Grant



Murray State College

Ripple effects in food chain:

Mammals/fish: Especially human/animal drugs meant for oral or dermal use; ex. – contraceptive corn

Insects: Aprotinin shortens lives of honeybees; avidin a broad-spectrum insecticide

Soil: “Leakage” from roots may impact microorganisms, worms, etc.

Biotech companies prevent scientists from researching ecological impacts of GE Crops

New York Times

Statement From Leading Researchers to EPA:

"Technology/stewardship agreements required for the purchase of genetically modified seed explicitly prohibit research. **These agreements inhibit public scientists from pursuing their mandated role on behalf of the public good** unless the research is approved by industry. As a result of restricted access, no truly independent research can be legally conducted on many critical questions regarding the technology, its performance, its management implications, IRM, and its interactions with insect biology. **Consequently, data flowing to an EPA Scientific Advisory Panel from the public sector is unduly limited.**"

http://www.nytimes.com/2009/02/20/business/20crop.html?_r=2

Regulations. Gov Document ID: EPA-HQ-OPP-2008-0836-0043

Conclusions

- ❑ Lack of information about health and eco - toxicity of GMO foods
 - ❑ When asked directly, the vast majority of Americans, **94%**, agree that GM ingredients should be labeled as such.
(Rutgers, Food Policy Institute, October, 2003)
 - ❑ Lack of labeling puts consumers at disadvantage. (Organic food is not allowed to contain GMOs.)
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Why Focus on GMOs in Food?

- ❑ Public concern about GMOs
 - ❑ Increasing concern about in patients and healthcare providers allergies, antibiotic resistance
 - ❑ Increased attention to food practices of healthcare organizations
 - ❑ A leadership opportunity in healthcare
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Steps Hospitals Can Take to Minimize Use of GMOs

1. Understanding which foods may have GMO ingredients

Corn, Soy, Canola and Cotton

2. Identify foods with potential GMO ingredients
 3. Survey suppliers for non-GMO foods or organic foods. Express a preference for non-GMO items
 4. Buy local
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Resources

A Purchasing Guide
to Sourcing Food
Produced Without
Genetically Engineered
Ingredients



<http://www.noharm.org/details.cfm?ID=1653&type=document>

Resources



Position Statement on Genetically Engineered Food

<http://www.noharm.org/details.cfm?ID=1540&type=document>

Resources



www.centerforfoodsafety.org



www.sfbaypsr.org/
