Contemporary Food Fights in California:
Food and Environmental Safety Issues with GMOs

Peggy G. Lemaux
University of California, Berkeley

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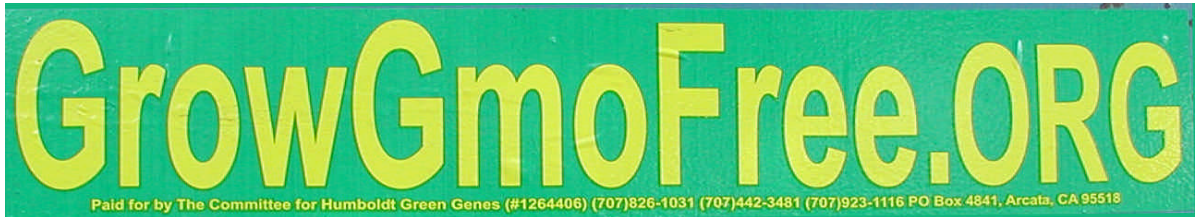
FOOD FIGHTS IN CALIFORNIA

County GMO Ordinances



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IT ALL STARTED IN

MENDOCINO COUNTY

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March 2004 MENDOCINO
MEASURE H -2,579 signatures obtained

- "unlawful for any person, firm, or corporation to propagate, cultivate, raise, or grow genetically modified organisms in Mendocino County" (excludes microorganisms)

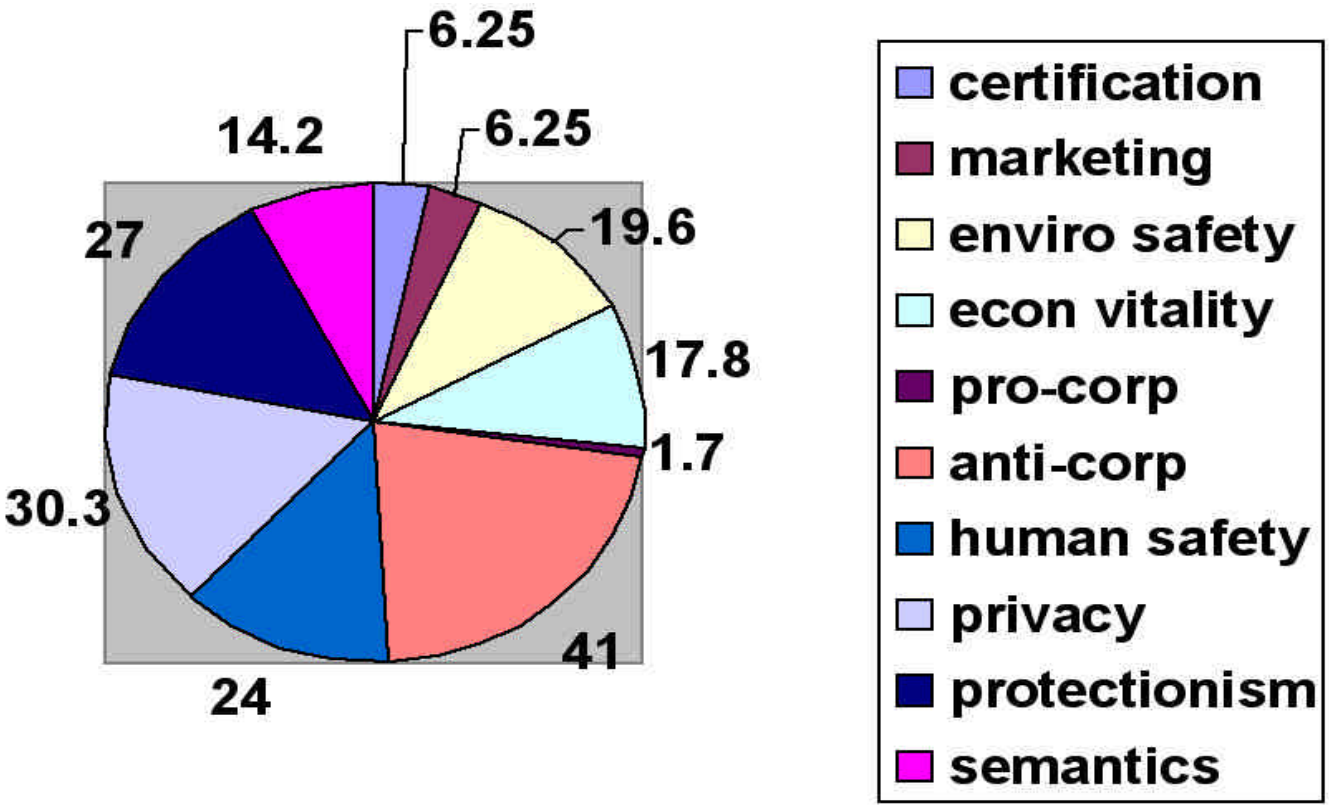
- "DNA or deoxyribonucleic acid means a complex protein that is present in every cell of an organism…"

- The ban does not pertain to properties within city limits, or lands managed by State, Tribal and Federal agencies.

- At election time, no GE organisms were known to be in production in Mendocino County.


We endorse Measure H!
CRAIG BELL
YES
Mendocino considers ban of genetically engineered plan
NORTH COAST
Letters to the Editor, Flyers, Mailings Were Everywhere…
What were they writing about?
Protect our health!
Protect our environment!
Protect our private property!
TONY CRAVER
Keep Mendocino County
GMO FREE!
Join us!

CHARACTERIZATION OF MEASURE H ELECTION RELATED MATERIALS IN MENDOCINO COUNTY



Giusti *et al.* (2004) **Focus on Genetically Engineered Crops and Foods - A Case Study from Mendocino County's Public Debate.**

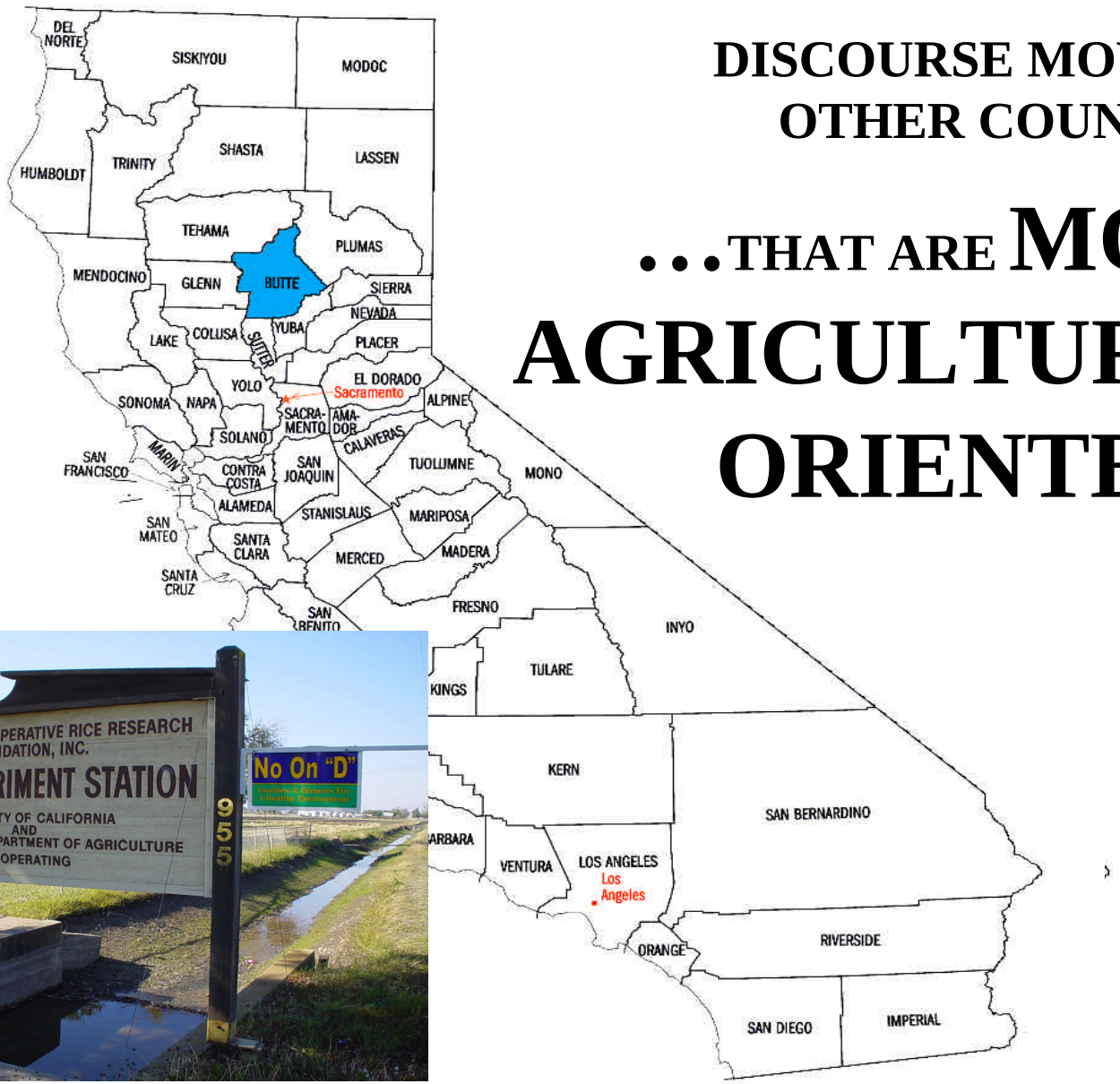
The discourse was driven in many cases by alarming assertions and facts that are not derived from, nor supported by science

"When my son was 6 month (sic) old and receiving chemotherapy for leukemia, he was also receiving soy lipids intraveneously because he had lost the ability to eat or drink. The longer he received the lipids, the higher the dose of chemo. When I asked why, I was told that the soybeans used were genetically modified to be "Round Up Ready," they were putting food into my son's veins that could withstand the chemicals they were using to kill the leukemia blood cells, making the chemo less effective. In order to keep my son alive nutritionally, the higher doses of chemo almost took him away "

Jenny Shattuck-Hale, Ukiah Daily Journal, 2/20/04

DISCOURSE MOVED TO OTHER COUNTIES

…THAT ARE MORE AGRICULTURALLY ORIENTED



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November 2004, Butte
Ballot initiative – 9,649 signatures

"Nothing in this Ordinance shall make it unlawful for (1) a fully accredited college or university to engage in scientific research or education using genetically engineered organisms under secure, enclosed laboratory conditions, taking precautions to prevent contamination of the outside environment, or (2) any licensed health care practitioner to provide any diagnosis, care or treatment to any patient"

"Upon final determination there was a violation of this Ordinance, the Commissioner shall thereafter cause to be confiscated for the public safety any such organisms…

effects which might result from the violation."

EXCERPTS FROM ORGANIC CONSUMERS ASSOCIATION LETTER DISSEMINATED BEFORE NOV. 2 ELECTION

Dear Friends,

While the rest of the country focuses on one presidential candidate or another, Measure D represents Biodemocracy in action. Rarely do we have the opportunity to change the

Contamination is spreading so quickly that we have little time to waste before our entire food supply is lost forever…

statewide ban on GE crops. California's future is organic!

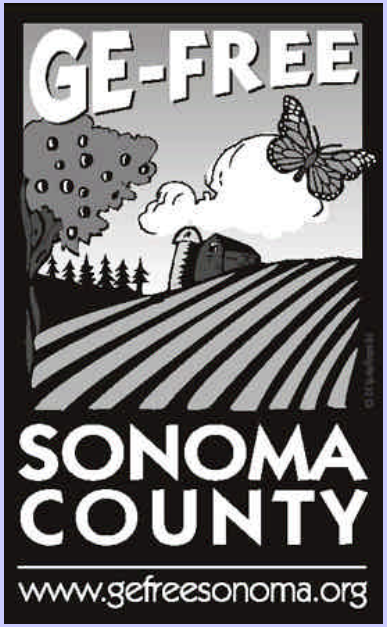
Yours in organics,

Organic Consumers Association

www.organicconsumers.org

WHY DO WE NEED TO PASS THIS "GE-FREE" INITIATIVE

A "GE Free Sonoma County" will be good for our farmers, good for our environment, good for business, good for public health, and good for our democracy!



We need to protect the right to farm. Those farmers who choose to farm without GE crop varieties must have the right to do so…

We need to protect our…environmental, public health and economic future…until there is public, peer-reviewed science available, with multigenerational studies on all the long-term impacts of these very new technologies…

We need to protect the public health of the people of Sonoma County… Such exposure could occur through GE pollen inhaled or plants eaten, or by increased exposure to toxic herbicides and pesticides used to kill the new "super weeds" and "super bugs"…

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ELECTION RESULTS

MEASURE H
MENDOCINO

NO 43%
YES 57%

MEASURE B
MARIN

NO 39%
YES 61%

MEASURE D
BUTTE

NO 61%
YES 39%

MEASURE M
HUMBOLDT

NO 65%
YES 35 %

MEASURE Q
SAN LUIS OBISPO

NO 59%
YES 41%

SONOMA COUNTY ORDINANCE

Qualified for November 2005 Ballot

needed 40,000 signatures

Section 4. Prohibitions.

(a) It is unlawful for any person to engage in the propagation, cultivation, raising, growing, sale or distribution of transgenic organisms in Sonoma County.

(b) It is unlawful for any corporation or other legal entity to engage in the propagation, cultivation, raising, growing, sale or distribution of transgenic organisms in Sonoma County.

(c) Any act in violation of paragraph (a) or (b) of Section 4 of this Ordinance is declared to constitute an imminent endangerment of agricultural health and environmental health and as such is declared a public nuisance.

(d) It is beyond the authority of the governments of the United States or the State of California, or any of their agencies, to deny the right of the people of Sonoma County to prevent Agricultural and Environmental contamination from transgenic organisms.

(b) Nothing in this Ordinance shall make it unlawful for state or federally licensed medical or agricultural research institutions, medical or agricultural laboratories or medical or agricultural manufacturing facilities in Sonoma County to conduct licensed medical or agricultural research or production involving transgenic organisms whose reproduction in the environment can be physically contained (following USDA protocols and guidelines at the BSL-3-Ag containment level or greater as outlined in USDA Departmental Manual No. 9610-001).

Animal Biotechnology and Genomics Education

Feeding the Future

www.feedingthefuture.org

Dear Friend of California's Family Farmer,

While the fundamentals of farming are well known, the actual practice

…special interest groups - professing to have the best interests of family farmers at heart - are challenging the innovation that has made California farmers the leaders in progressive agriculture.

As farmers, we understand that some people are unsure of

As farmers, we understand that some people are unsure of biotechnology…Some activists, however, utilize scare tactics in an effort to ban biotechnology and deny everyone the benefits of the best science and the most extensive research in the world today.

making our planting decisions. We are confident in the future of

Family farmers want to continue to utilize scientific expertise when making our planting decisions. We are confident in the future of biotechnology and support the regulatory process that approves these crops on a case-by-case basis.

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Bill Pauli

BILL PAULI
President
California Farm Bureau Federation

November 2004, Fresno

Passed: Board of Supervisors 5 For; 0 Against

- **Whereas, biotechnology has the potential to greatly improve the health, nutrition and**

County of Fresno affirms the right for farmers and ranchers to choose to utilize the widest range of technologies available to produce a safe, healthy, abundant and affordable food supply, and that the safe, federally regulated use of biotechnology is a promising component of progressive agricultural production.

and ranchers to choose to utilize the widest range of technologies available to produce a safe, healthy, abundant and affordable food supply, and that the safe, federally regulated use of biotechnology is a promising component of progressive agricultural production.

ANTI-GMO ORDINANCES PASSED

ANTI-GMO ORDINANCE VOTED ON AND REJECTED, NOVEMBER 2004

ANTI-GMO ORDINANCES UNDER CONSIDERATION

ANTI-GMO ORDINANCE QUALIFIED FOR BALLOT

PRO-GMO RESOLUTION PASSED

Green outline denotes major GE-crop growing areas

As of 6/16/05

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Georgia
General Assembly

May 9, 2005 - Senate Date Signed by Governor

05 LC 25 3839

Senate Bill 87

Pre-emptive Seed Laws passed in 14 states – pending in CA

provide certain exemptions; to repeal conflicting laws; and for other purposes.

No county…shall adopt or continue in effect any ordinance, rule, reglation or resolution regulating the labeling, packaging, sale, storage, transportation, distribution, notification of use or use of seeds…

notification of use, or use of seeds.

(b) This Code section shall in no way prohibit or impair the legal right of any county, municipal corporation, consolidated government, or other political subdivision of this state to issue business licenses or to make zoning decisions."

SECTION 2.

All laws and parts of laws in conflict with this Act are repealed.

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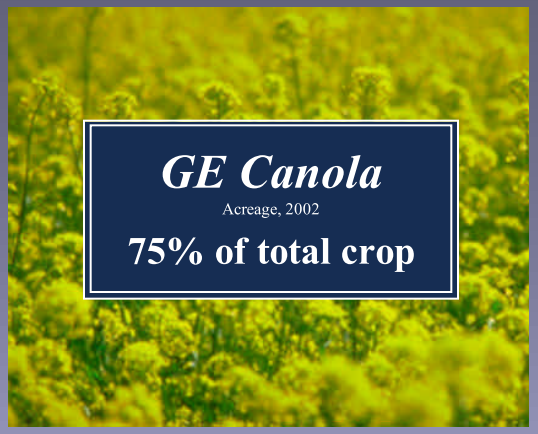
Genetically engineered foods or GMOs

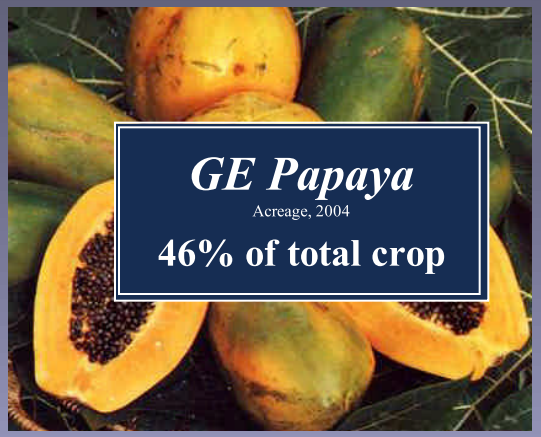
Classical Breeding compared to Genetic Engineering

Classical Breeding	Genetic Engineering
Uses plant machinery in plant	Uses plant machinery in laboratory
Gene exchange is random involving entire genome	Gene exchange is specific, single or a few genes
When/where genes expressed not controlled by breeder	When/where gene expressed can be controlled precisely
Only between closely related or within species	Source of gene from any organism

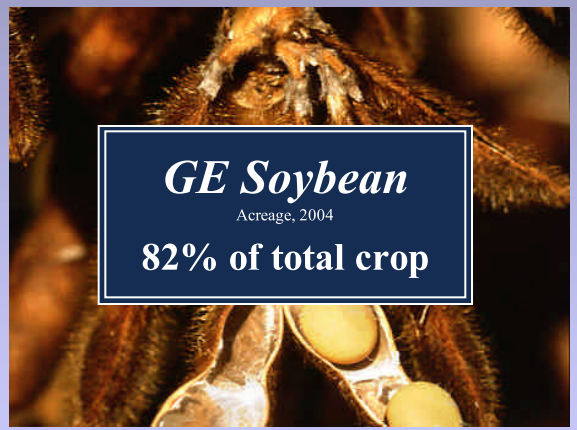
GE Corn
Acreage, 2004
46% of total crop



GE Canola
Acreage, 2002
75% of total crop



GE Papaya
Acreage, 2004
46% of total crop



GE Soybean
Acreage, 2004
82% of total crop

GE Cotton
Acreage, 2004
76% of total crop

GE Squash
Acreage, 2004
19% of total crop

SOURCE: NCFAP, USDA, USA Today

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Estimated 75% of Processed Foods Contain GE ingredient

Regulatory Systems in the U.S. (existing regulations)

GE Foods and Crops: Unregulated?

USDA

- Field testing
  - permits
  - notifications
- Determination of non-regulated status

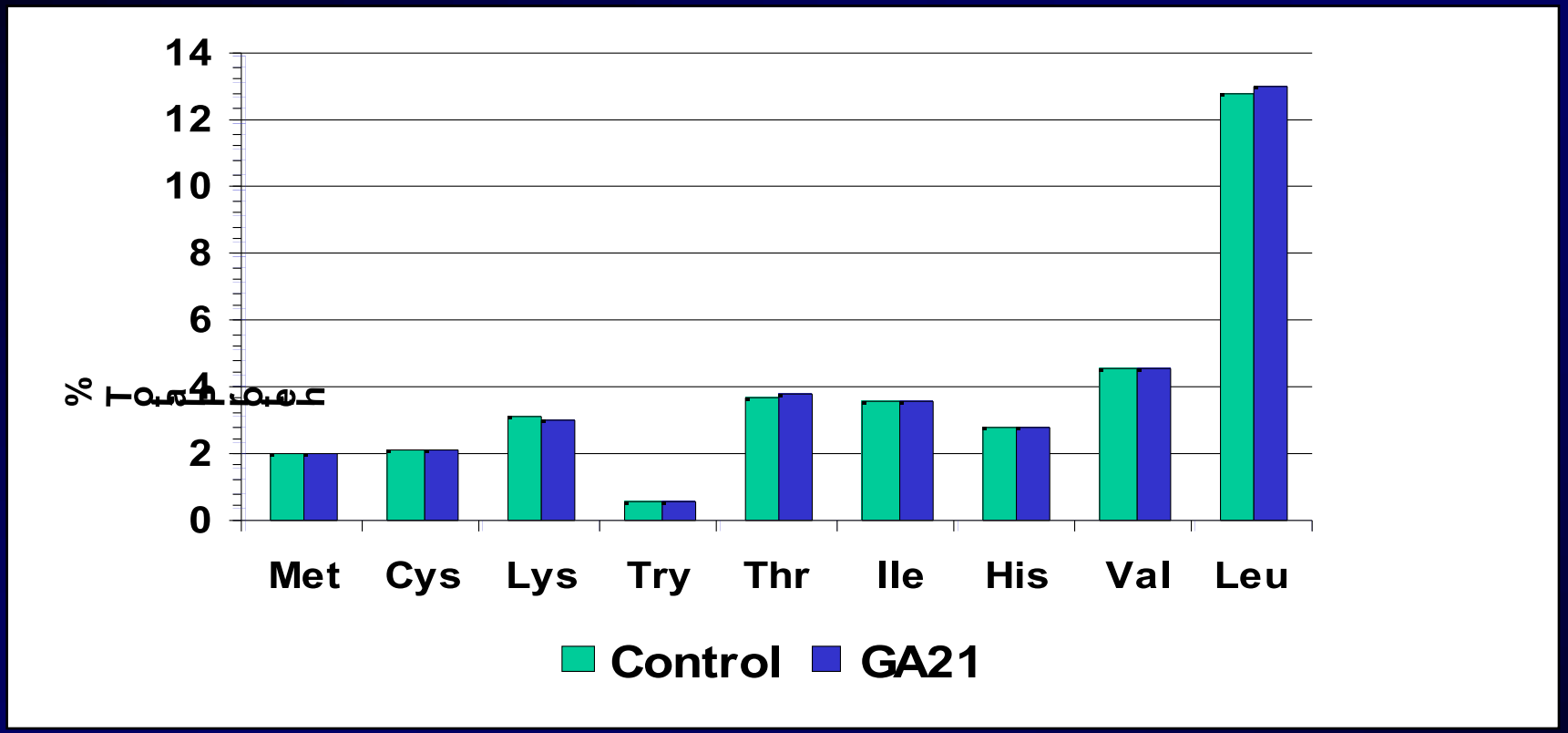
FDA

- Food safety
- Feed safety

EPA

- – tole
- – registration
- Herbicide registration

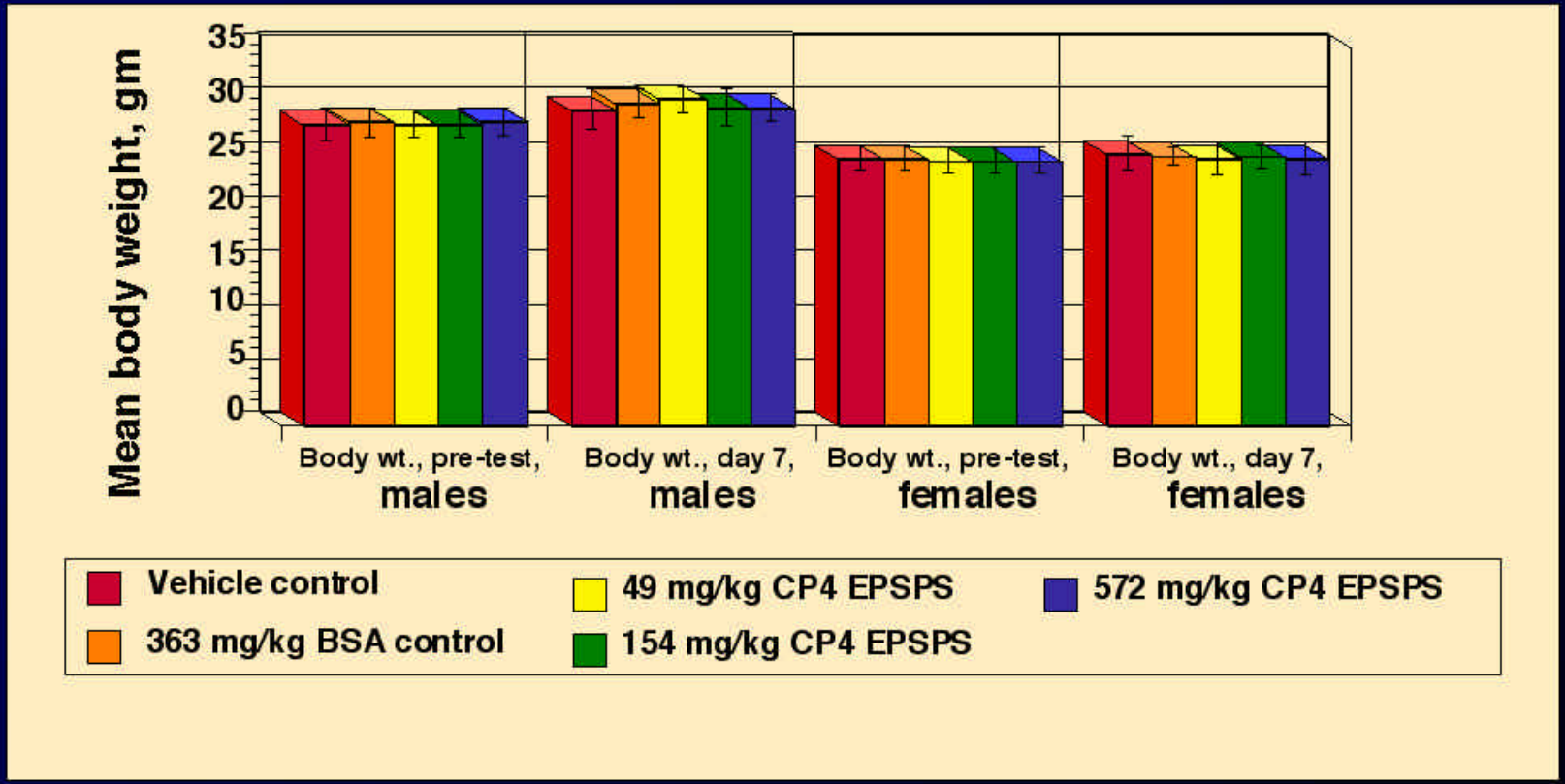
Compositional Equivalence: Amino Acids



These results have been generated on event GA21. Data showing similar amino acid composition have been generated on the other corn events.

Toxicity Assessment: Roundup Ready/CP4 EPSPS protein

No deleterious effects at highest dose (572mg/kg)



Nonexhaustive List of Issues with GMO Foods

- *Food Safety*
- *Environmental*
- *Socioeconomical/Ethical*

Nonexhaustive List of Issues with GMO Foods

Food Safety Issues

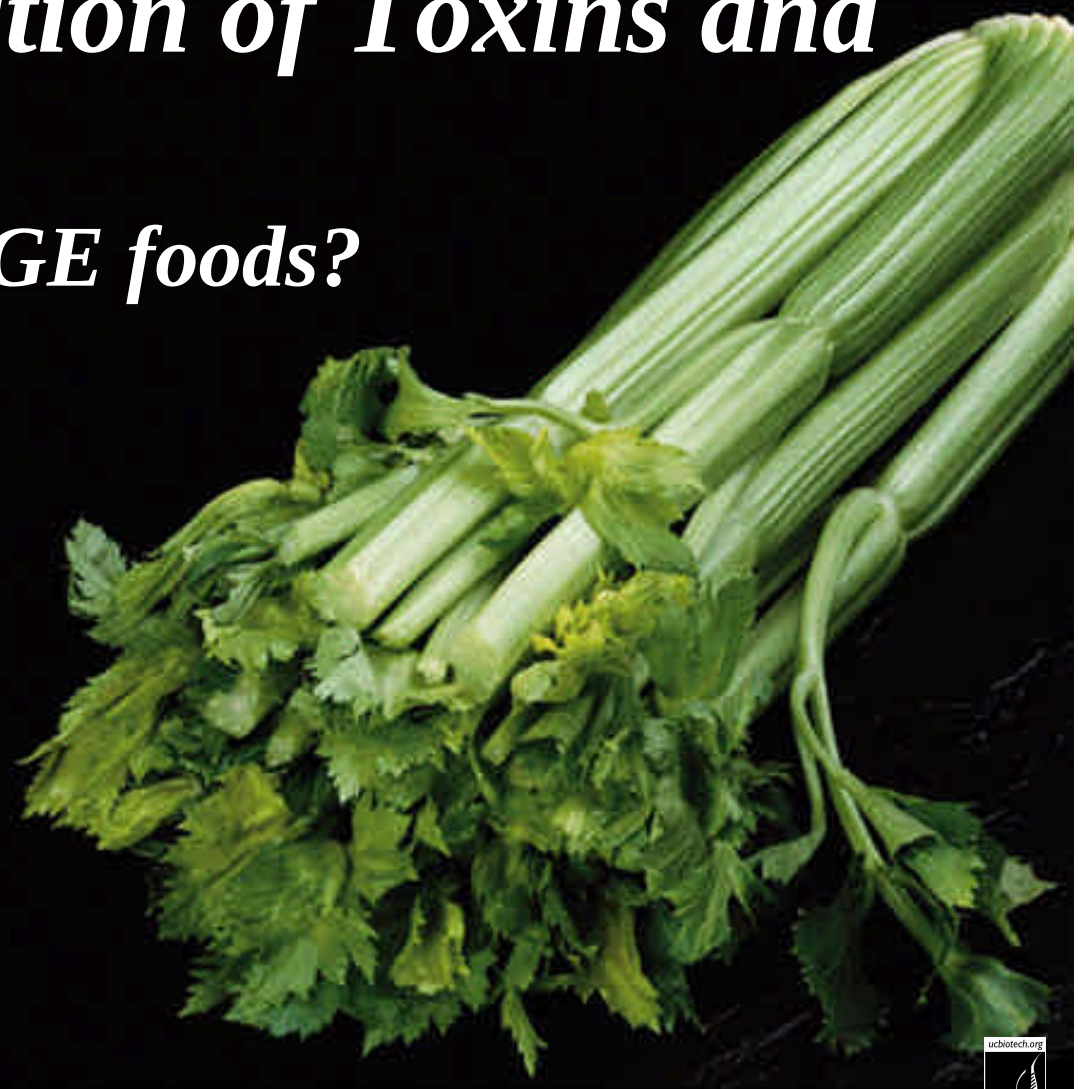
- Create new allergens
- Activate naturally occuring toxins or create new ones
- Removal of existing allergens and antinutritionals

- Adversely affect the nutritional quality of foods
- Enhance the nutritional quality of foods

- Vegetarian and religious issues with GMOs
- Labeling
- Increased antibiotic resistance in intestinal flora
- Horizontal transfer of DNA from plants to humans through foods
- Unknown, unanticipated risks from GMO consumption
- Trust in regulatory agencies

Inadvertent Creation of Toxins and Allergens

Does this just apply to GE foods?



Classically bred foods cause allergies

Kiwi Allergies

Long-term Food Safety Studies: Should They Be Done, How and on What Foods?

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Nonexhaustive List of Issues with GMO Foods

Environmental Issues

- Unintended adverse consequences for beneficial insects
- Unintended beneficial consequences for beneficial insects

- Soil residuals of bio-engineered pesticides
- Soil residuals of nonengineered pesticides used in the absence of engineered varieties

- Degradation of the environment because of GMOs, *e.g.*, residuals, chemical dependence
- Degradation of the environment because of current agricultural practices, *e.g.*, tilling, fertilizers, pesticides
- Improved environmental situation with GMOs, *e.g.*, reduced phytic acid, phyto and bioremediation

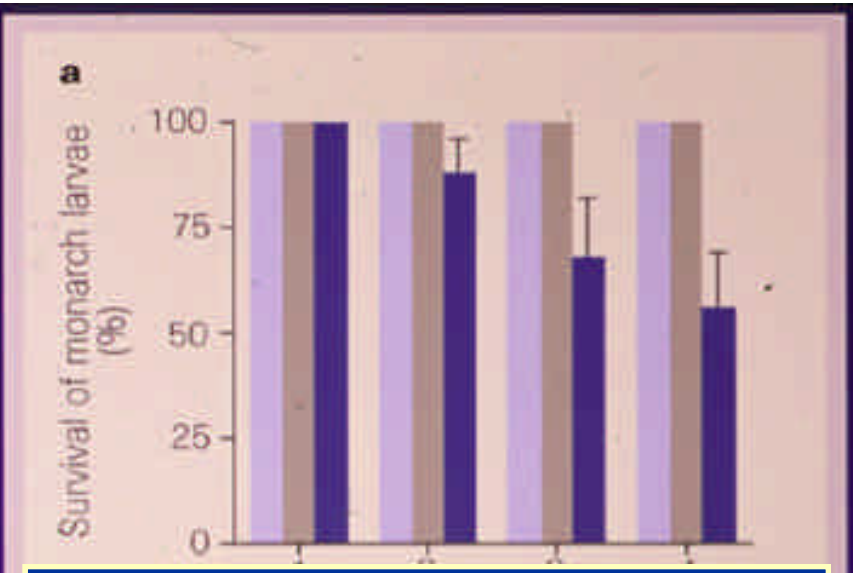
- Herbicide-resistant weeds as a result of GMOs, “superweeds”
- Herbicide-resistant weeds from conventional practices in absence of GMOs

Effect on Bystanders?

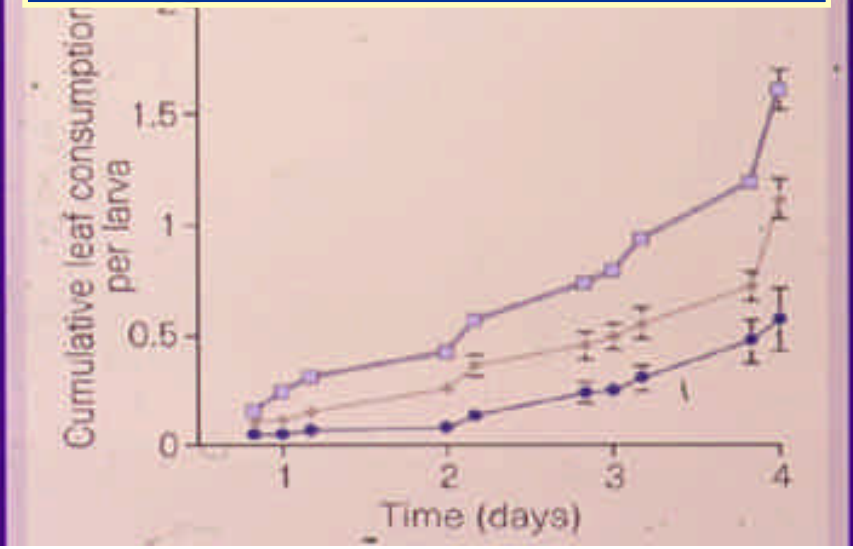
- Monarch butterfly study

Losey et al. 1999

- Criticisms:
  - pollen dosage?
  - lab study



B.t. negative effect on unintended insect?



September 8, 2001

Data on Genetically Modified Corn Reports Say Threat to Monarch Butterflies Is 'Negligible’

By ANDREW POLLACK

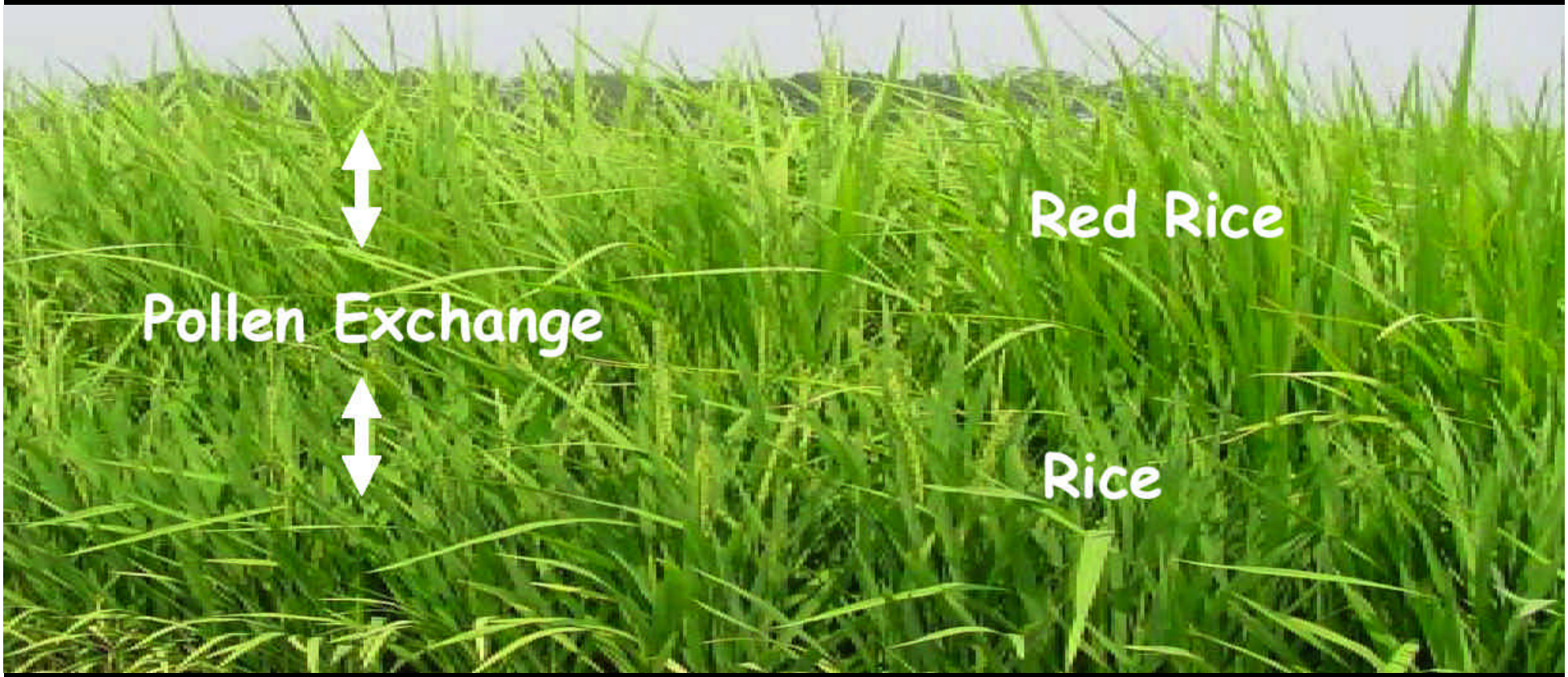
Genetically modified corn poses a "negligible" risk to monarch butterflies, according to a package of six papers that will soon be published in a scientific journal. The papers, the most comprehensive peer-reviewed publications on this issue, could lay to rest one of the biggest controversies over genetically modified crops.

Parasitoid wasp of canola pest not affected by B.t. canola, making it ecologically superior to conventional insecticides that kill the wasp.

SOURCE: Poppy et al., 1999. Parasitoid behaviour and Bt plants. Nature 400: 825.

B.t. – positive effect on unintended pest?

Movement of Genes from Crop Species to Wild, Weedy Species e.g., Commercial Rice to Weedy Red Rice



ISSUES WITH PHARMA CROPS

PRODIGENE

- Planted soybeans in field previously used for transgenic corn.
- USDA discovered "volunteer" corn plants growing among soybeans. Instructed ProdiGene to remove corn plants.
- Soybeans harvested before all corn was removed, mixed with 500,000 bushels of soybeans.
- Soybeans destroyed, ProdiGene paid $250,000 civil fines, reimbursement for lost crops; $1 million higher regulatory fees.

Consequences of Gene Flow on Genetic Diversity: Transgenes in Mexican Landraces

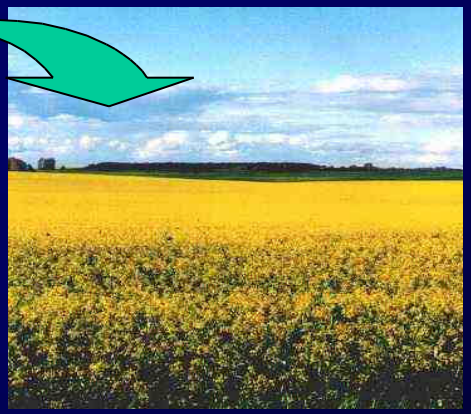
How did pollen and gene flow occur in Mexico?

Is this the first time gene flow into Mexican, maize landraces happened?

What implications does transgene flow have for wild and domesticated maize?

Consequences of pollen spread from GE crops to organic crops in the field

GM canola



non-GM canola

Will an organic farmer automatically lose accreditation if his/her crop is found contaminated with a GE crop?

No.

"As long as an organic operation has not used excluded methods and takes reasonable steps to avoid contact with the products of excluded methods, as detailed in their approved organic system plan, the unintentional presence of the products of excluded methods should not affect the status of an organic product or operation."

SOURCE: AMS National Organic Program Q&A

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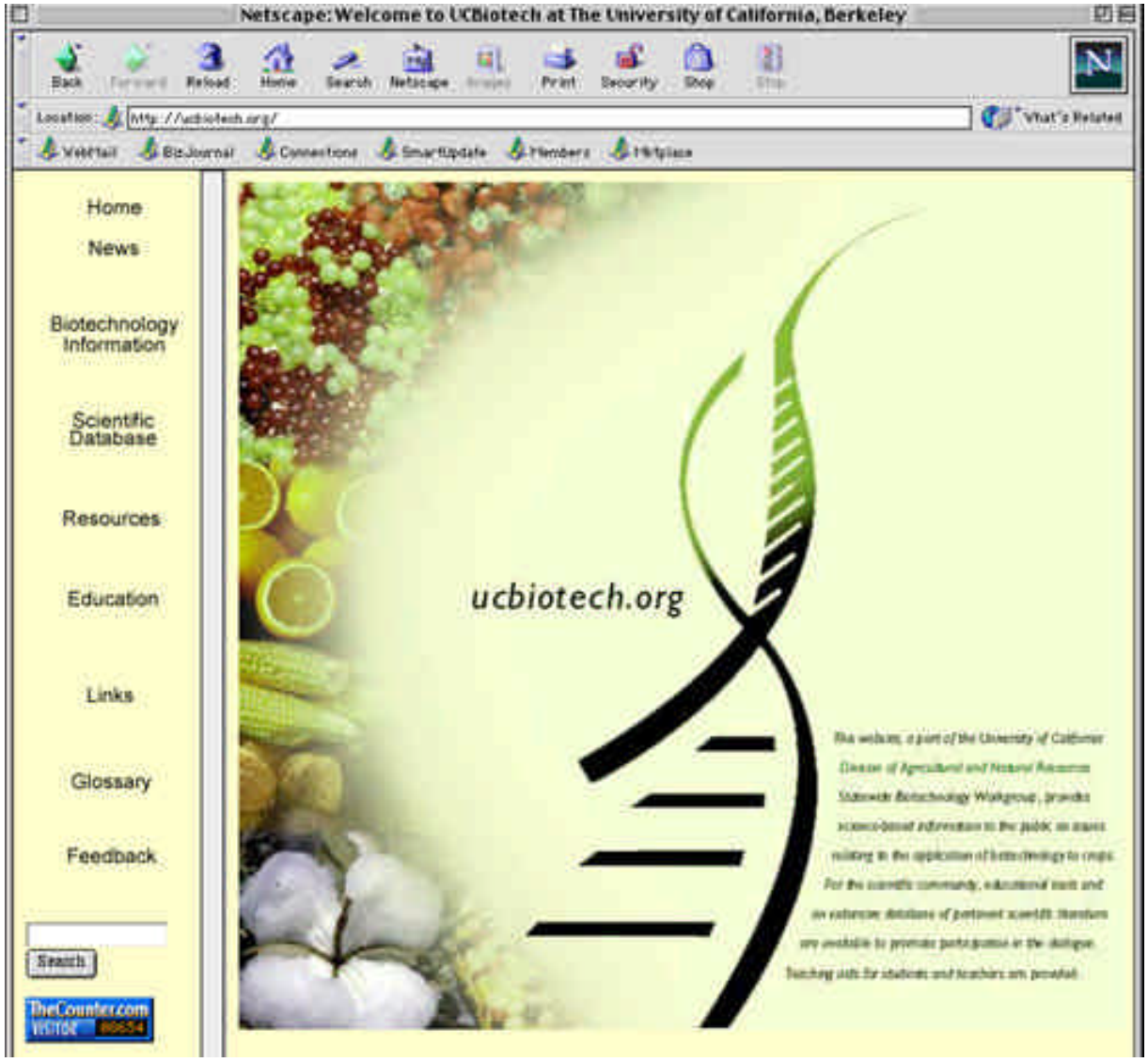

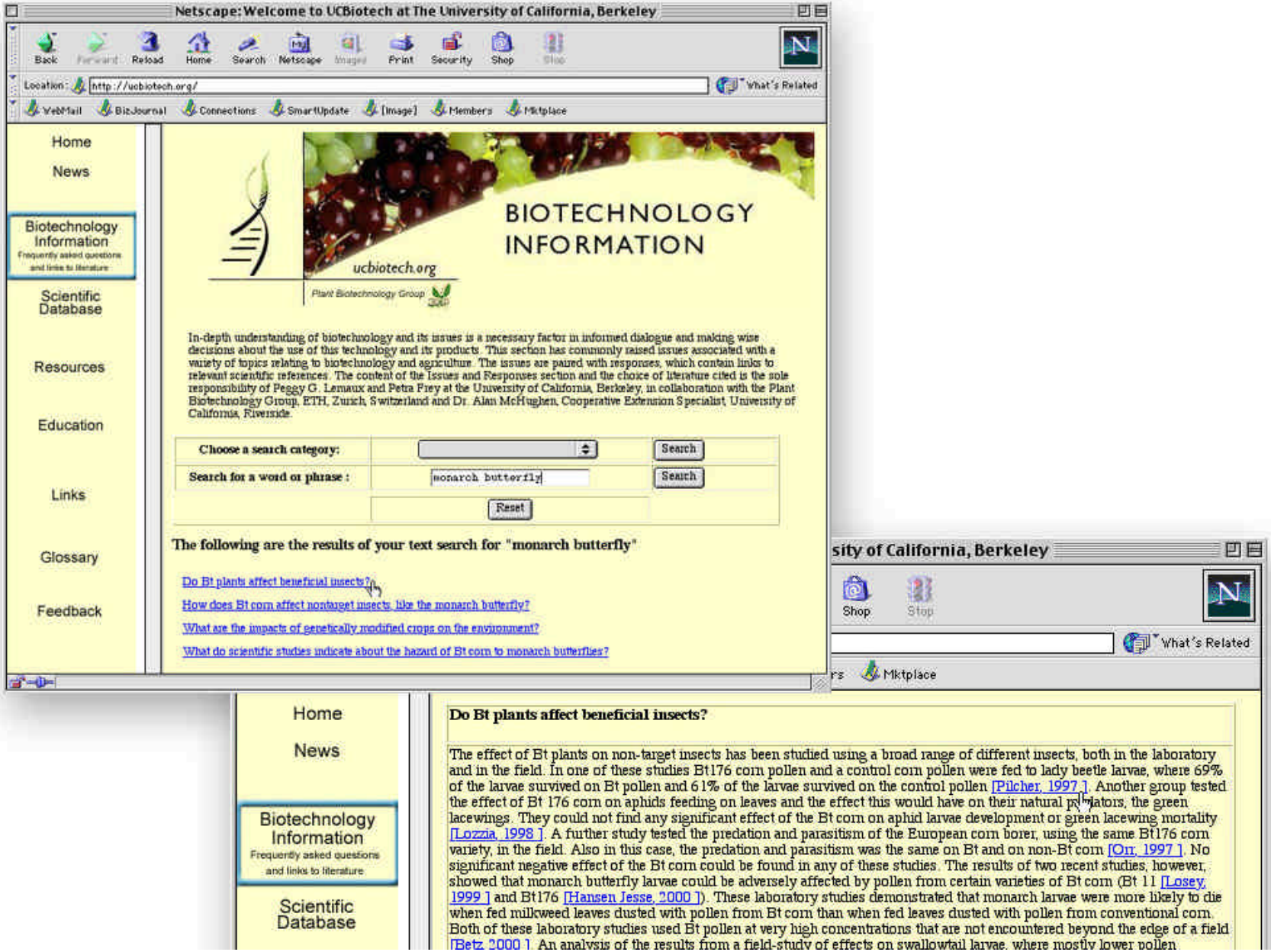
Netscape: Welcome to UCBiotech at The University of California, Berkeley
Back
Reload
Home
Search
Netscape
Print
Security
Shop
Location: http://ucbiotech.org/
What's Related
WebMail
BizJournal
Connections
SmartUpdate
[Image]
Members
Mktplace
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Frequently asked questions and links to literature
Scientific Database
Resources
Education
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Glossary
Feedback
BIOTECHNOLOGY INFORMATION
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Plant Biotechnology Group
In-depth understanding of biotechnology and its issues is a necessary factor in informed dialogue and making wise decisions about the use of this technology and its products. This section has commonly raised issues associated with a variety of topics relating to biotechnology and agriculture. The issues are paired with responses, which contain links to relevant scientific references. The content of the Issues and Responses section and the choice of literature cited is the sole responsibility of Peggy G. Lemaux and Petra Frey at the University of California, Berkeley, in collaboration with the Plant Biotechnology Group, ETH, Zurich, Switzerland and Dr. Alan McHughen, Cooperative Extension Specialist, University of California, Riverside.
Choose a search category:
Search
Search for a word or phrase :
monarch butterfly
Search
Reset
The following are the results of your text search for "monarch butterfly"
Do Bt plants affect beneficial insects?
How does Bt corn affect nontarget insects like the monarch butterfly?
What are the impacts of genetically modified crops on the environment?
What do scientific studies indicate about the hazard of Bt corn to monarch butterflies?
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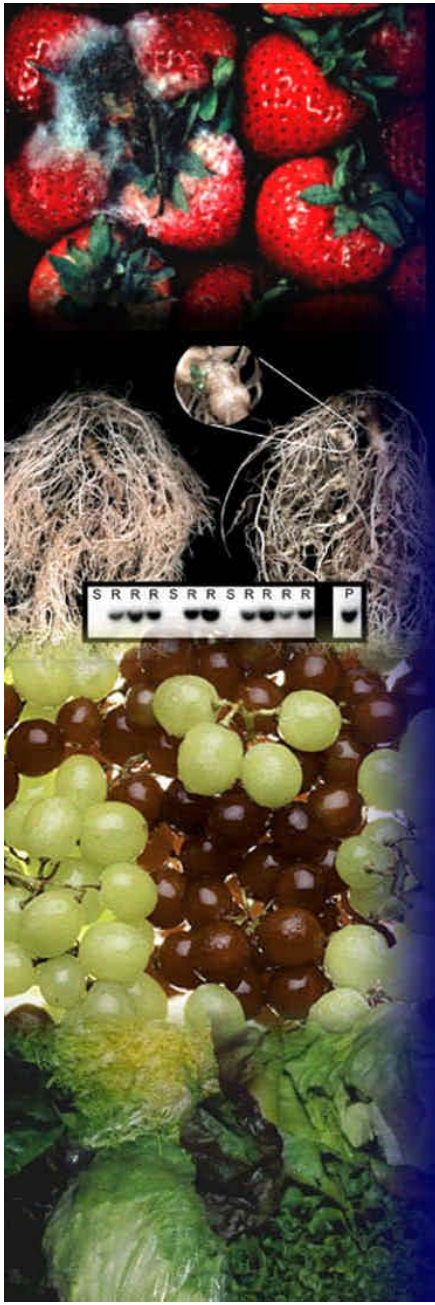
Frequently asked questions and links to literature
Scientific Database
Do Bt plants affect beneficial insects?
The effect of Bt plants on non-target insects has been studied using a broad range of different insects, both in the laboratory and in the field. In one of these studies Bt176 corn pollen and a control corn pollen were fed to lady beetle larvae, where 69% of the larvae survived on Bt pollen and 61% of the larvae survived on the control pollen [Pilcher, 1997]. Another group tested the effect of Bt 176 corn on aphids feeding on leaves and the effect this would have on their natural predators, the green lacewings. They could not find any significant effect of the Bt corn on aphid larvae development or green lacewing mortality [Lozzia, 1998]. A further study tested the predation and parasitism of the European corn borer, using the same Bt176 corn variety, in the field. Also in this case, the predation and parasitism was the same on Bt and on non-Bt corn [Orr, 1997]. No significant negative effect of the Bt corn could be found in any of these studies. The results of two recent studies, however, showed that monarch butterfly larvae could be adversely affected by pollen from certain varieties of Bt corn (Bt 11 [Losey, 1999] and Bt176 [Hansen Jesse, 2000]). These laboratory studies demonstrated that monarch larvae were more likely to die when fed milkweed leaves dusted with pollen from Bt corn than when fed leaves dusted with pollen from conventional corn. Both of these laboratory studies used Bt pollen at very high concentrations that are not encountered beyond the edge of a field [Betz, 2000]. An analysis of the results from a field-study of effects on swallowtail larvae, where mostly lower pollen

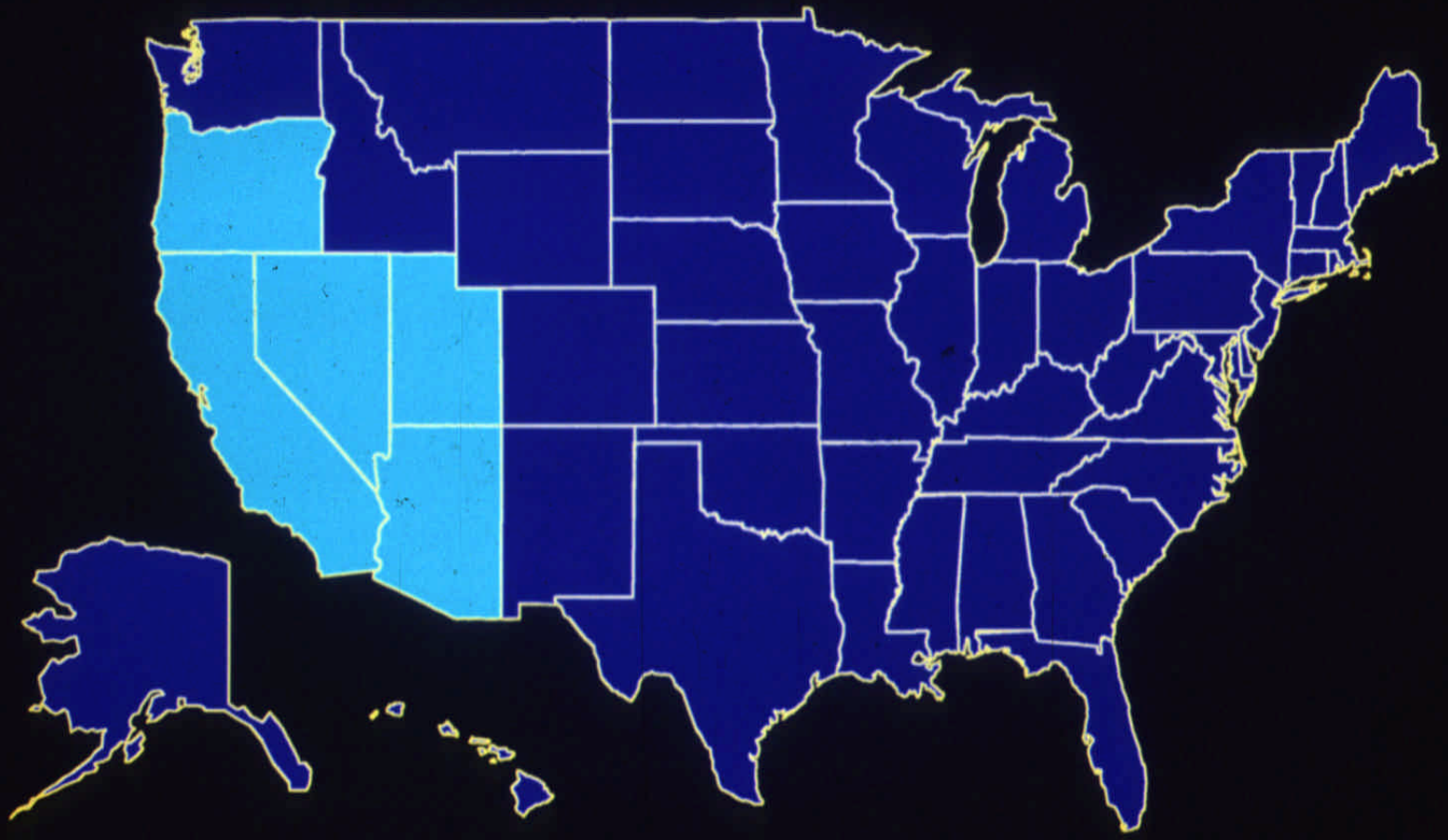


Sample of possible engineered fruits and vegetables

- Strawberries resistant to molds
- Tomatoes not attacked by root nematodes
- Grapes resistant to Pierce's Disease
- Drought tolerant lettuce
- Peppers resistant to bacterial diseases
- Potatoes no longer susceptible to blight
- Sugar pine resistant to white pine blister rust
- Frost-tolerant pears

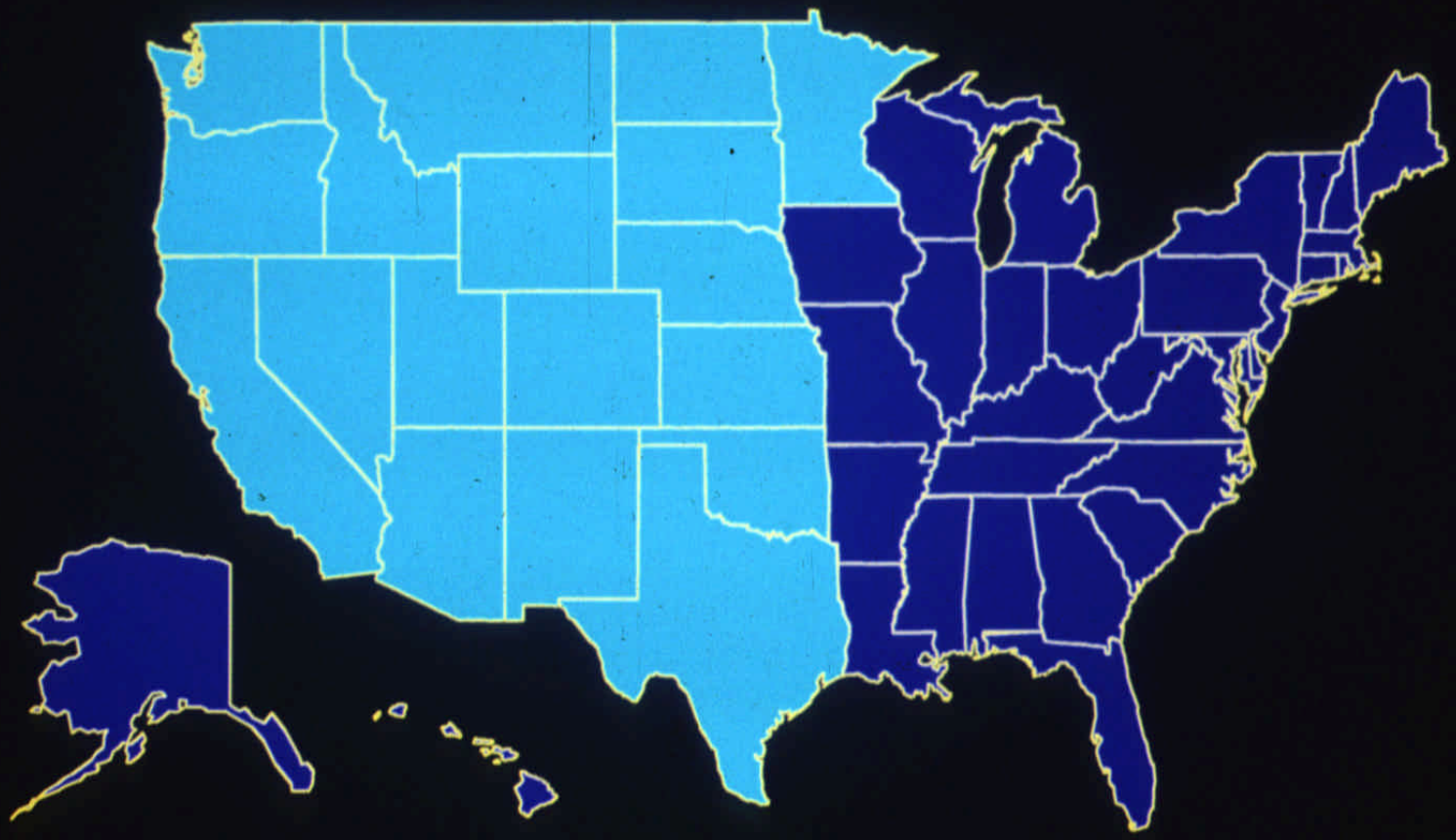
Modern Corn and Ancient Teosinte Relative

U.S. Cultivated Land



1987 Acreage

U.S. Cultivated Land



Acreage Needed at 1929 Production Levels

ELECTION RESULTS

MEASURE H
MENDOCINO

NO	43%
YES	**57%**

MEASURE B
MARIN

NO	39%
YES	**61%**

MEASURE D
BUTTE

NO	**61%**
YES	39%

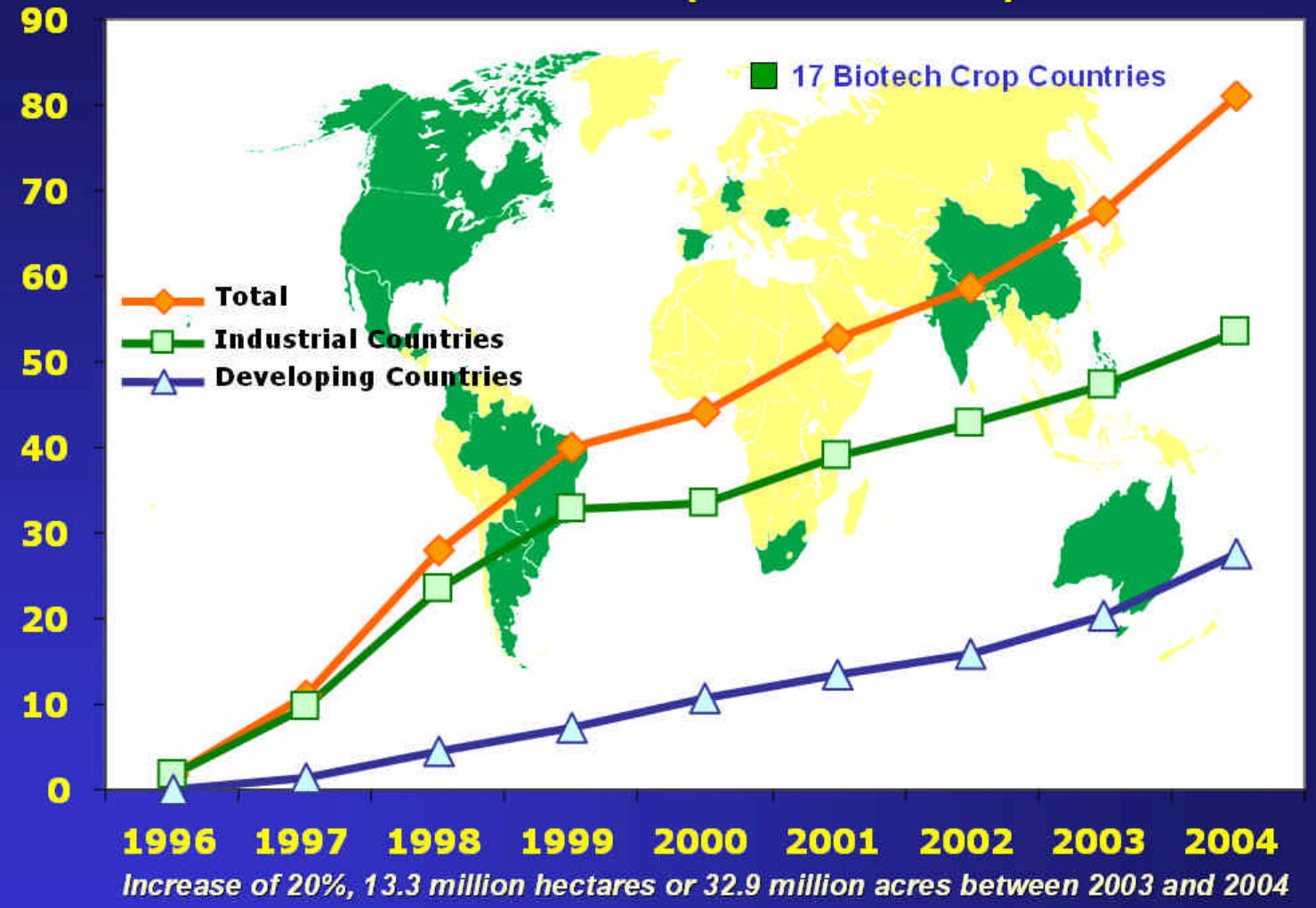
MEASURE M
HUMBOLDT

NO	**65%**
YES	35 %

MEASURE Q
SAN LUIS OBISPO

NO	**59%**
YES	41%

Global Area of Biotech Crops
Million Hectares (1996 to 2004)



Increase of 20%, 13.3 million hectares or 32.9 million acres between 2003 and 2004

Source: Clive James, 2004

ISAAA

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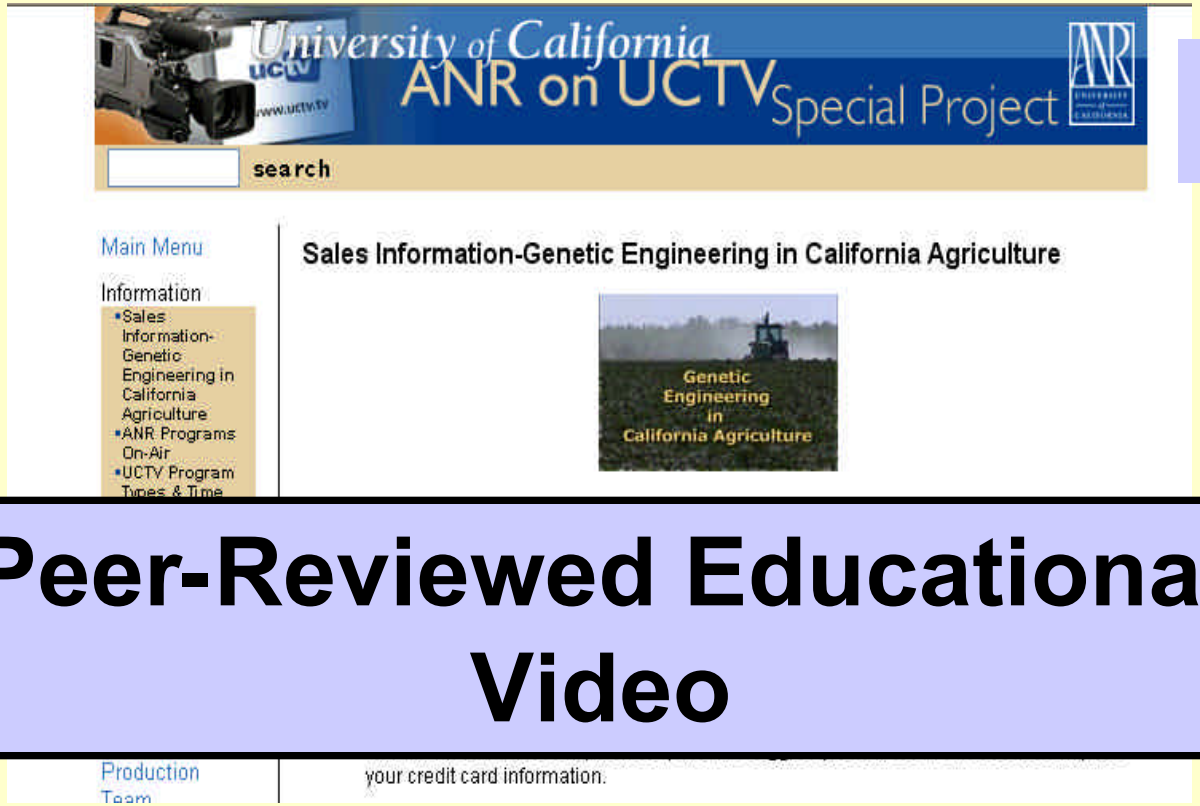
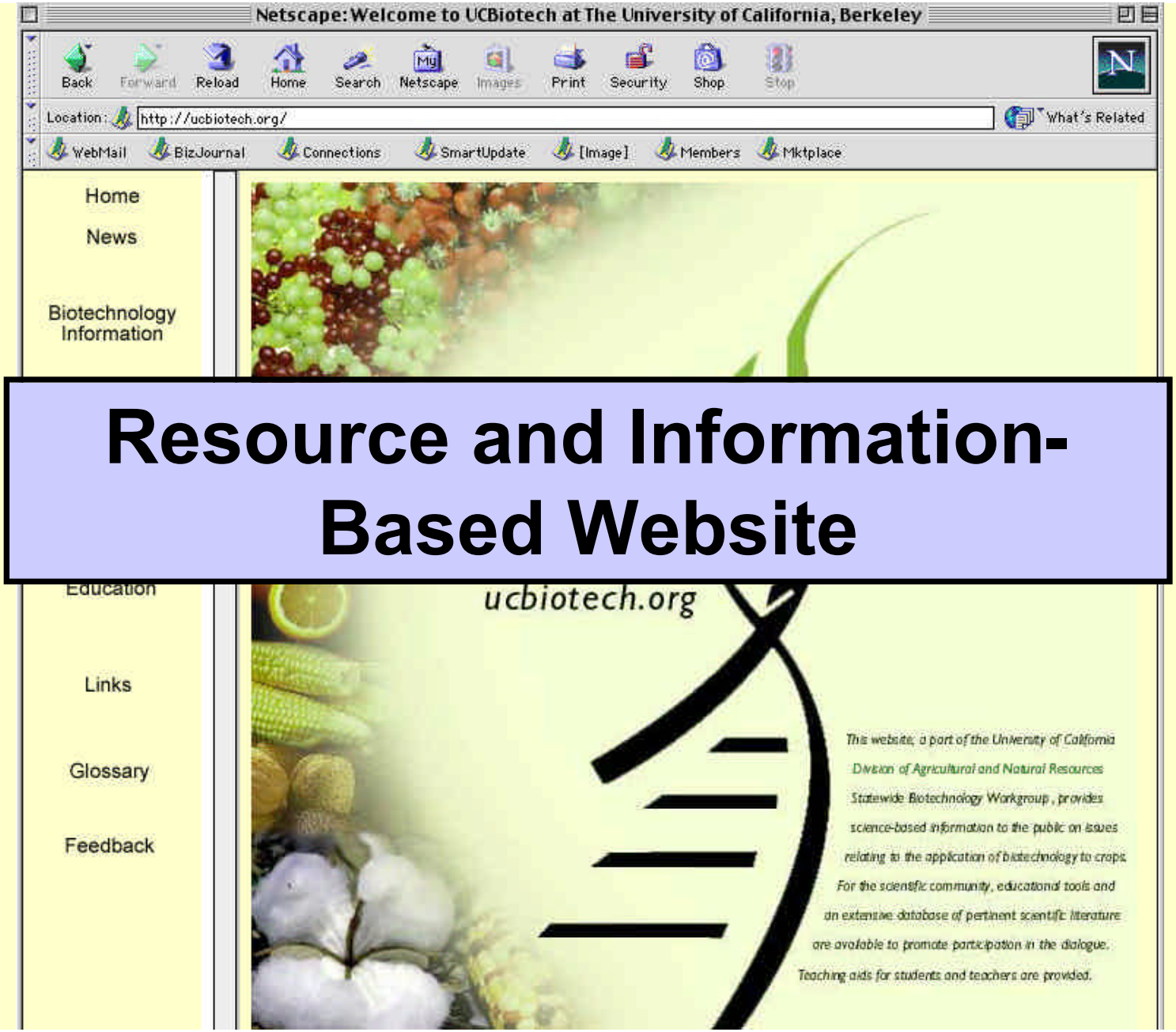


Peer-Reviewed Educational Video

A 30-minute, peer-reviewed video explaining the science behind genetic engineering, its uses in food crops and animals, where and why the technology is being used by California farmers, and some of the science-based concerns pertaining to the use of genetic engineering.

If you want to view the movie

mms://STREAM.ucanr.org/Windows Media/UCTV_04_06.asf



Resource and Information-Based Website

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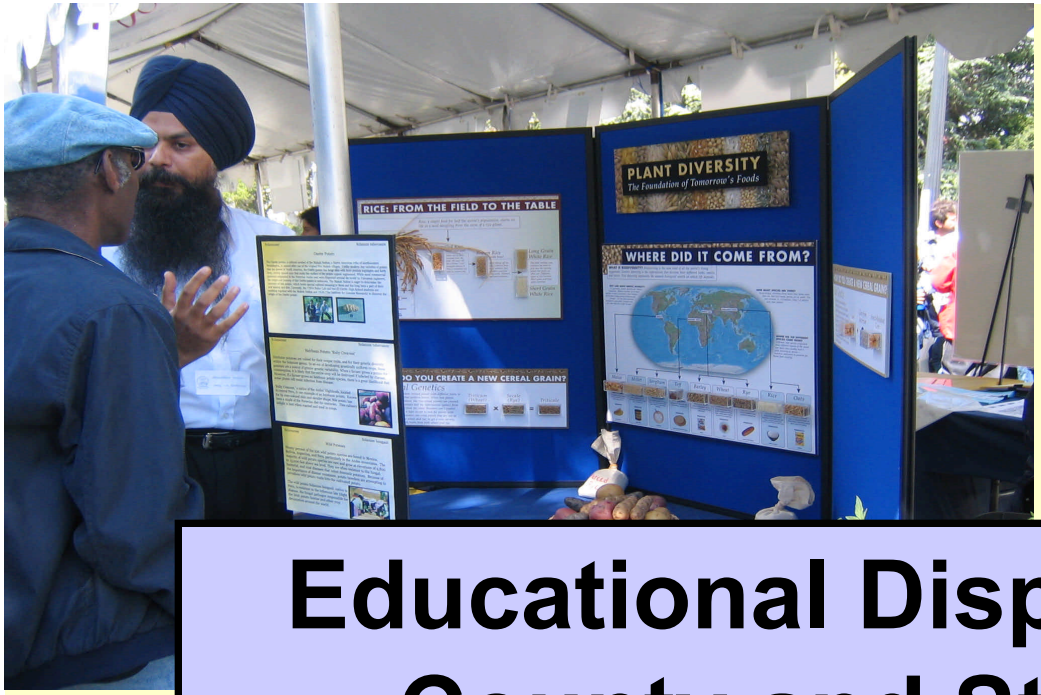

Educational Displays for City, County and State Events

Informational Workshops for County Officials and Staff

ucbiotech.org

PUBLICATION 8153

UNIVERSITY OF CALIFORNIA
Division of Agriculture and Natural Resources
http://anrcatalog.ucdavis.edu

Genetic Engineering and Pollen Flow

NORMAN C. ELLSTRAND, PH.D., Professor of Genetics and Director, Biotechnology Impacts Center, University of California, Riverside

INTRODUCTION

Pollen grains are the vehicles that transport a plant's male cells or gametes. For most plants that produce pollen, it is transported by wind and insects plus many species are able to self-pollinate some or most of their own female cells or eggs. Typically, the

Science-based, Peer-reviewed FACT Sheets on the Issues

What are the consequences when traditionally bred crops cross with wild relatives?

The vast majority of the attention has focused on engineered crop genes in natural populations. For guidance about future problems with engineered crops, we can ask whether traditionally improved crops have hybridized with wild relatives, and if so, whether those hybrids have caused any problems. Most cultivated species naturally hybridize with some wild relative or relatives somewhere in the world (Ellstrand 2003a). In some cases, such as coffee, those wild relatives are geographically restricted. On the other hand, one or more wild relatives of rice are usually found where rice is cultivated worldwide. The vast majority of cases involving hybridization of cultivated plants and their wild relatives has been of little consequence. However, such hybridization, on occasion, has created two classes of problems:

The evolution of new or more difficult-to-control weeds. In particular, the evolution of a new weed beet in Europe – a hybrid of sugar beet and an innocuous wild species - has resulted in well over a billion dollars of damage to Europe's sugar industry in terms of reduced yields and increased management costs (Ellstrand 2003a). In California, hybridization between rye and a wild relative has been implicated in the evolution of a new weedy rye variety that has hurt the wheat and rye industry in the northeastern part of that state (National Research Council 1989).

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