

What Are Some Other Issues?



What are some food safety issues?

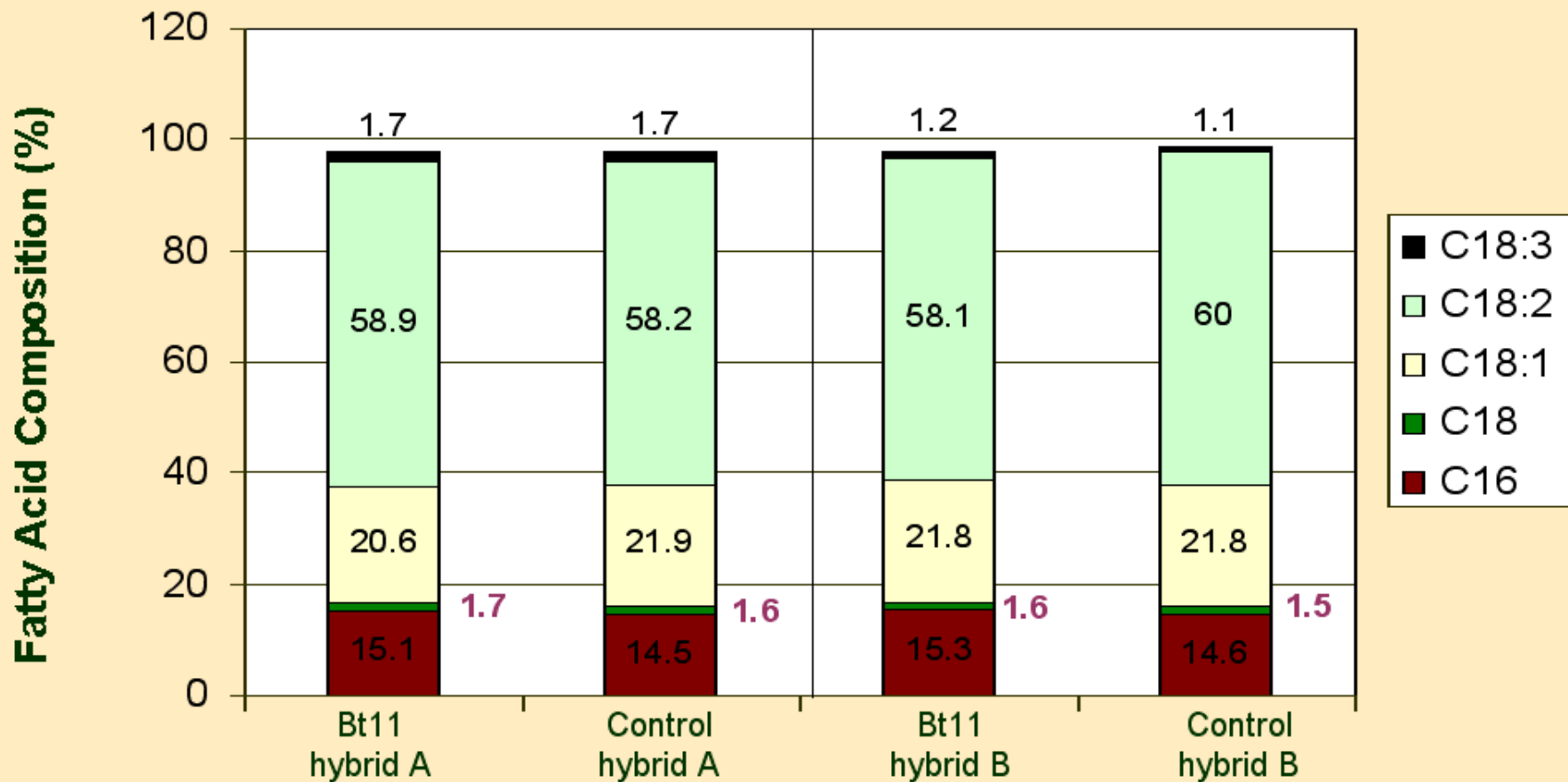
- Lack of peer-reviewed food safety tests
- **Creation of allergens or activation of toxins**
- **Pharma crops contaminating food supply**
- **Labeling**
- **Gene flow from food to intestinal bacteria increasing antibiotic resistance**

FDA uses the concept of
substantial equivalence:

Modified food has essentially all characteristics of nonmodified food with regard to food and feed value except

For introduced genetic material and products made from it. These products are tested and analyzed separately for specificity and mode of action of protein, source of protein, stability during digestion and processing

Substantial Equivalence: Fatty Acids

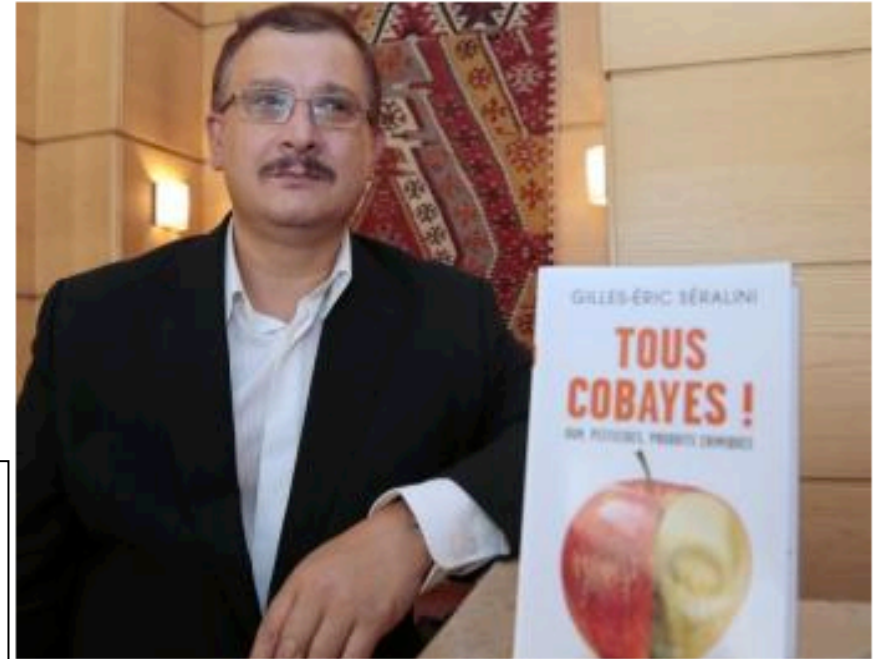


These results have been generated on Event Bt 11. Data showing similar fatty acid composition have been generated on the other corn events.

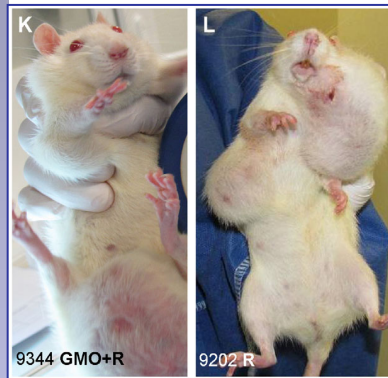
French academies trash GM corn cancer study

By RFI

A controversial study that linked genetically modified maize to cancer in lab rats is a "scientific non-event", six French scientific academies said in a rare joint statement Friday.



The report's author, Gilles-Eric Seralini, with his book All Guinea pigs
AFP / Jacques Demarthon



Claim that
Monsanto's
RR corn
causes tumors
in rats

Intermittent studies are published casting doubts on GE food safety, like this one published by a French researcher in Sept. 2012 –

Subsequently reviewed by European Food Safety Authority and found to have no merit but did consumers "hear this?"

It's studies like these that trigger consumers' food safety fears... featured on Dr. Oz show

2012 Meta-analysis from France Shows GM foods are Safe

Twelve long-term (>90d to 2yr) and Twelve multigenerational (2 to 5 generations) feeding trials in animals of five GE crops

- **Nutritionally equivalent to non GE foods**
- **Can be safely consumed in food and feed**



maize

potato



soy

rice



triticale

Did Consumers “hear” about this?

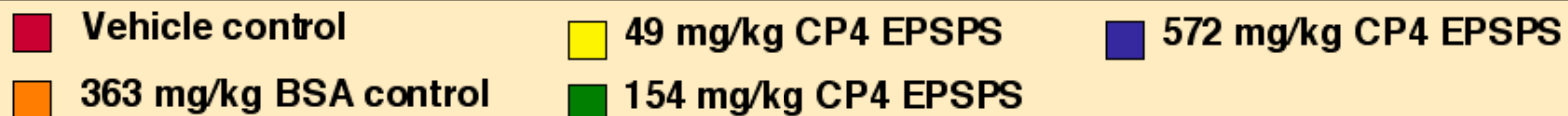
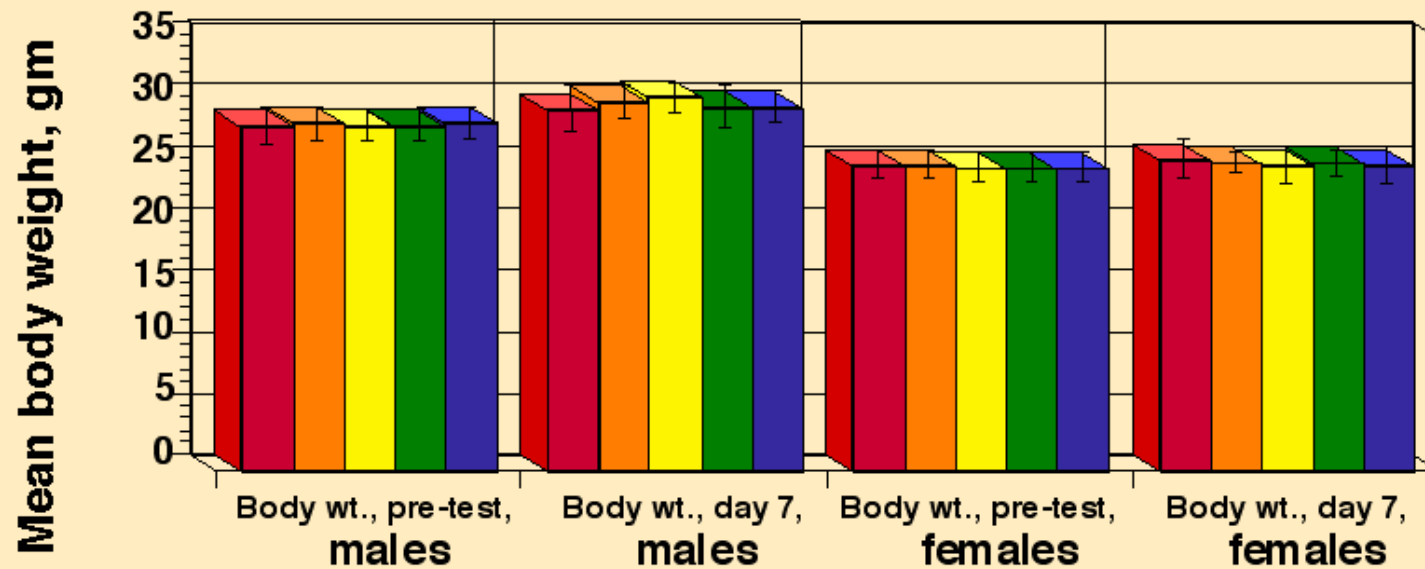
SOURCE: Snell C, Bernheim A, Berge J-P, Kuntz M, Pascal G, Paris A, Ricroch AE. 2012. Assessment of the health impact of GM plant diets in long-term and multigenerational animal feeding trials: A literature review. Food and Chemical Toxicology 50: 1134-1148.

What are some food safety issues?

- Lack of peer-reviewed food safety tests
- **Activation of toxins or creation of allergens**
- Pharma crops contaminating food supply
- Labeling
- Gene flow from food to intestinal bacteria increasing antibiotic resistance

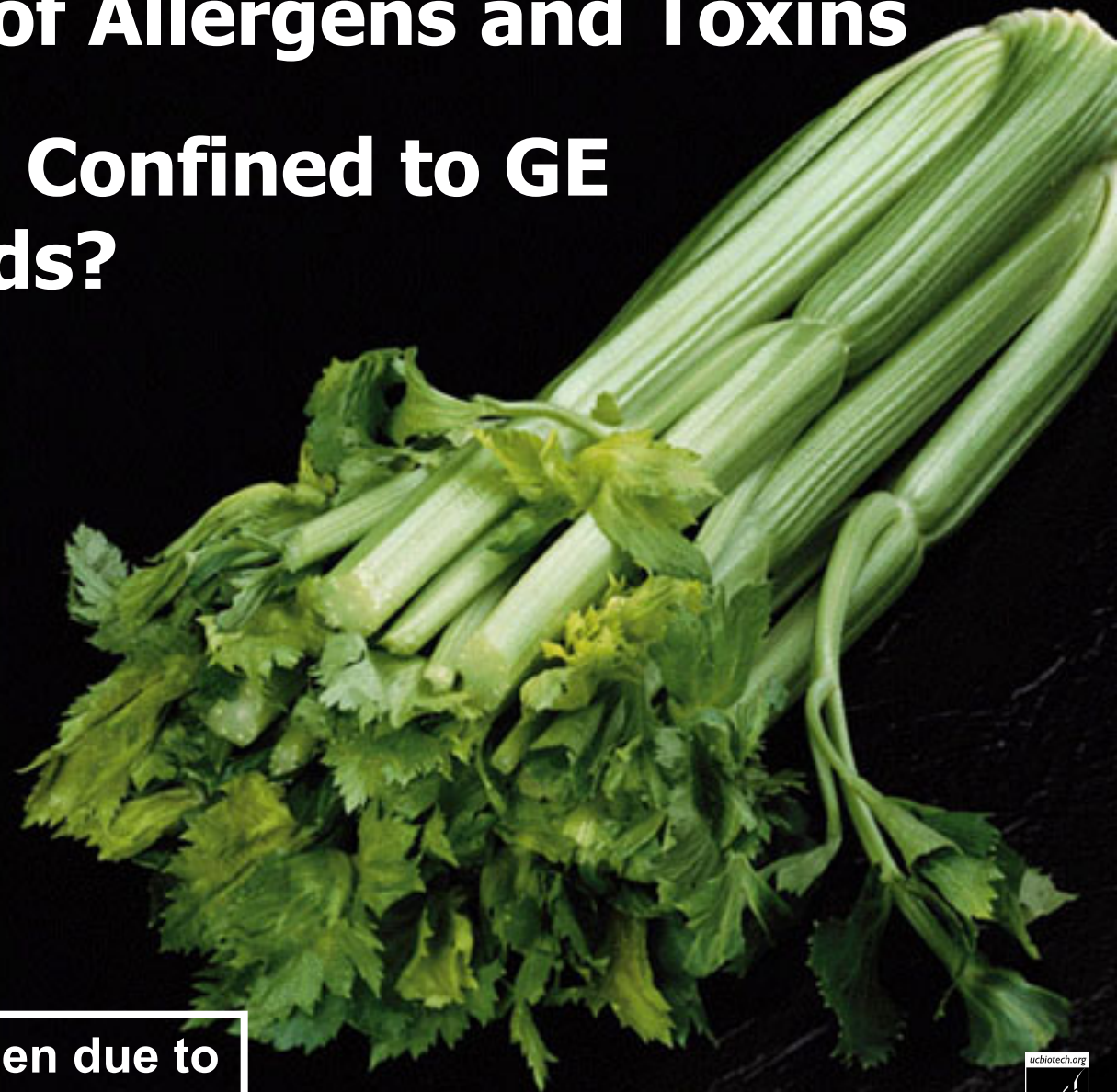
Toxicity Assessment: Roundup Ready/CP4 EPSPS protein

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



Inadvertent Creation of Allergens and Toxins

Is Toxin Creation Confined to GE Foods?



No – naturally occurring toxins happen due to classical breeding efforts also, e.g., potato (glycoalkaloids) and celery (psoralens)

Allergy Creation Confined to GE Foods?

Classically bred foods can cause allergy problems too –

Example: Kiwi



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

Use Engineering to Reduce Toxins: Fumonisin Reduction with Bt-maize



- 1989: High levels of fumonisin cause large-scale outbreaks of lethal lung edema in pigs, brain tumors in horses
- Fumonisin contamination caused by insect infestation
- 20- to 30-fold fumonisin reduction with Bt-maize

Modified from Drew L. Kershen
University of Oklahoma

SOURCE; Hammond, B. et al., (Feb. 2004), Lower fumonisin mycotoxin levels in the grain of Bt-corn grown in the United States in 2000-2002, *J. Agric. Food Chem.* 52: 1390-1397

**Engineering can be used
to mitigate food allergies,
like peanut, soy and
wheat**

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Why Doesn't FDA Have a Labeling Policy for GM Foods?

Actually it does...

Foods produced through biotechnology are subject to same labeling laws as all other foods and food ingredients

Govt-mandated label information relates to composition or food attributes not agricultural or manufacturing practices

No label needed if food essentially equivalent in safety, composition and nutrition

GM food must be labeled if:

1. Different nutritional characteristics
2. Genetic material from known allergenic source e.g., peanut, egg
3. Elevated levels of antinutritional or toxic compounds

BE A STICKLER

PRODUCE CODES DEMYSTIFIED

4 DIGIT CODE
STARTING WITH 3 OR 4



**CONVENTIONALLY
GROWN**



5 DIGIT CODE
STARTING WITH 9



ORGANIC



5 DIGIT CODE
STARTING WITH 8



**GENETICALLY
MODIFIED**



For whole fresh foods, there are existing PLU labels that indicate whether they are GE or organic

PACT

#imPACTfact @wearPACT

SOURCE: WWW.PLUCODES.COM



National GM Labeling Laws and Policies

Type of GM labeling	Countries that enforce labeling policies	Countries with partially enforced or unenforced labeling policies	Countries with probable plans to introduce a labeling policy
<u>Mandatory</u>	Australia, Brazil, <u>China</u> , <u>European Union</u> , <u>Japan</u> , New Zealand, Norway, Russia, Saudi Arabia, South Korea, Switzerland, Taiwan	Croatia, Ecuador, El Salvador, Indonesia, Malaysia, Mauritius, Serbia, Sri Lanka, Thailand, Ukraine, Vietnam	Nigeria, Uganda, UAE, Zambia
<u>Voluntary</u>	Argentina, <u>Canada</u> , Chile, Hong Kong, Kenya, Philippines, South Africa, <u>USA</u>		Peru

One complicating problem: other nations have specific, labeling laws for GE, although the rules and enforcement vary dramatically among countries, making international trade difficult

But, do consumers act on labeling information?



66% of UK consumers think GE food labeling is important...

But only 2% actively look for GE content when buying foods

SOURCE: "FSA survey: Majority of UK consumers back GM labelling", Food Navigator, January 10, 2013. <http://www.foodnavigator.com/content/view/print/728839>
Link to report: <http://www.food.gov.uk/science/research/ssres/foodsafetyss/gm-labelling/#.UPXkHaHr7jm>





In November 2012 California voted on a Proposition to require mandatory labeling of foods with GE ingredients and restrictions on the use of the term “natural” on food labels.

California voters nix biotech labels

Opponents raised \$46 million to fight proposition

By **ALICIA CHANG**
Associated Press

LOS ANGELES — Voters spurned a ballot measure that would have made California the first in the nation to affix labels on breakfast cereals, baked goods and other processed foods containing genetically modified ingredients.

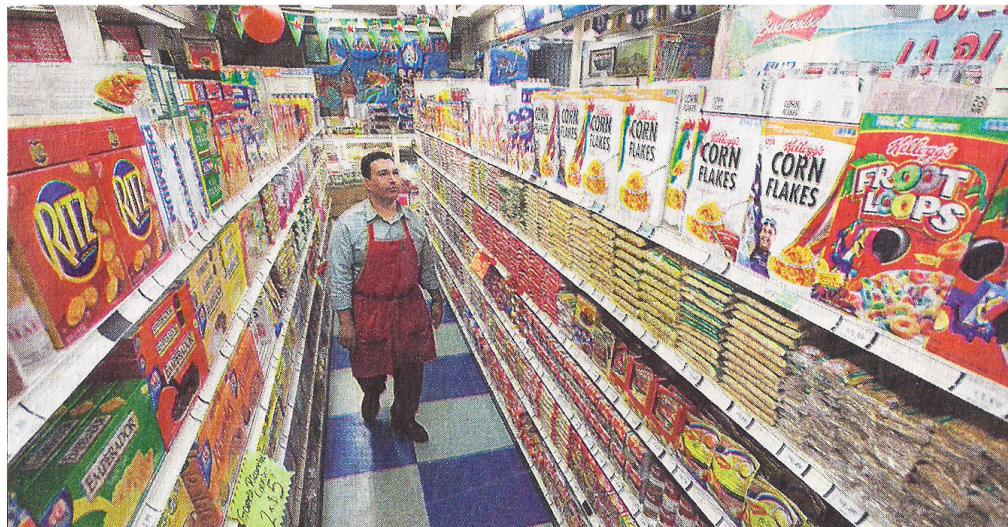
The rejection on Nov. 6 followed an expensive offensive from agri-business and chemical conglomerates, which raised \$46 million to blitz airwaves and mailboxes with negative advertising.

We didn't think they'd like the lawsuits, more bureaucracy, higher costs and loopholes and exemptions. It looks like they don't," spokeswoman Kathy Fairbanks said.

Representatives with the California Right to Know campaign tried to put on a positive face.

"No matter what happens, we've raised awareness of a very important issue," said Grant Lundberg, chief executive of Lundberg Family Farms, who co-chairs the California Right to Know campaign.

Consumer activists and the organic food industry said shoppers crave information about what they're eating and should be given all the information they need to decide for them-



After over \$40M was spent convincing voters one way or the other, the proposition was defeated 51.4% to 48.6%

appeared pleased.

"We've said from the beginning of this campaign that the more voters learned about Prop 37, the less they'd like it.

al government, which does not require such labels because bioengineered foods are not significantly different in taste, texture and nutrition.

has long harvested corn, cotton, soybean and other plants in which the DNA has been tinkered with in the laboratory to resist pesticides and ward off

into food ingredients found in many cereals, baked goods and sodas.

Despite scientific consensus that genetically modified foods

sumers remain leery and efforts have been mounted to force special labels. Mandatory labeling exists elsewhere, including the European Union.

ing bills, but all failed. A citizen's petition to mark genetically engineered foods nationwide is pending before the U.S. Food and Drug Administration.



Organic Bytes

Health, Justice and Sustainability News from the Organic Consumers Association

A weekly e-newsletter edited by Katherine Paul and Bonnie Cummins

End of Story?

ESSAY OF THE WEEK

GMO Food Fight: Round Two 2013

"This gives us hope that you can, with a well-funded, well-organized, well-executed campaign, defeat a ballot initiative and go directly to the voters. We hope we don't have too many of them, because you can't keep doing that over and over again . . .".

- Jennifer Hatcher, Food Marketing Institute, on Big Food and Big Biotech's narrow defeat of Prop 37, the California Right to Know GMO ballot initiative.

Not likely in California, nor a number of other states, like Washington, Oregon, Vermont...

And, outside government, others are addressing the issue of labeling.

, 2013

<http://www.organicconsumers.org/bytes/ob361.htm>





By 2018, all products in U.S. and Canadian stores must be labeled to indicate whether they contain genetically modified organisms (GMOs)

The New York Times

March 8, 2013

Major Grocer to Label Foods With Gene-Modified Content

By STEPHANIE STROM

Whole Foods Market, the grocery chain, on Friday became the first retailer in the United States to require labeling of all genetically modified foods sold in its stores, a move that some experts said could radically alter the food industry.

A variety of companies are becoming involved in different ways in GMO labeling.

grown in the United States, for example, have been genetically modified. The alterations make soybeans resistant to a herbicide used in weed control, and causes the corn to produce its own insecticide. Efforts are under way to produce a genetically altered apple that will spoil less quickly,



THE
HUFFINGTON
POST

GMO Labeling Bill Voted Down In Senate

Posted: 05/23/2013 11:31 am EDT | Updated: 05/23/2013 4:08 pm EDT

WASHINGTON -- The United States Senate decided again Thursday that it simply does not want to let states tell people whether or not they are

And now the labeling issue has moved to the national stage...via numerous proposed bills and amendments

If a decision at the national level is not made – in some way or another – there will be a potpourri of state labeling bills that will make interstate commerce very problematic- similar to existing issues with international trade.

for consumers,"

op diseases and
being done by
though it was not

ucbiotech.org





Consider that 75% of U.S. processed foods have GE ingredients. If mandatory labeling laws were enacted, either manufacturers would have to find alternatives to the GE ingredients – which might be difficult – or the vast majority of processed foods would be labeled that they “contain” or “may contain genetically engineered ingredients”



While the fresh food aisle would change little, the majority of foods in the processed food aisle could contain “warning labels” about GE ingredients.



Consider the following...



Governor Vows to End Prop. 65 'Shake-down' Suits

- ***Prop 65 originally passed to protect citizens of CA from toxic substances***
- ***Often well-meaning and effective, it resulted in frivolous lawsuits. Example: lawsuit against banks for not posting Prop 65 warnings on ATM machines as users might smoke nearby and "contaminate" people using ATM***
- ***Prop 65 warning signs so prevalent that signage has become meaningless***
- ***Could be similar with signage for GE foods: label indicating "may contain genetically engineered ingredient" would become so common it could become meaningless and ignored***

Why not just label?



***Putting a label on a whole food
is relatively easy, but...***

...processed foods are different.
Tomato sauce contains many varieties – a GM variety would have to be tracked to assure correct content information, depending on type of label required.



May contain genetically modified tomatoes

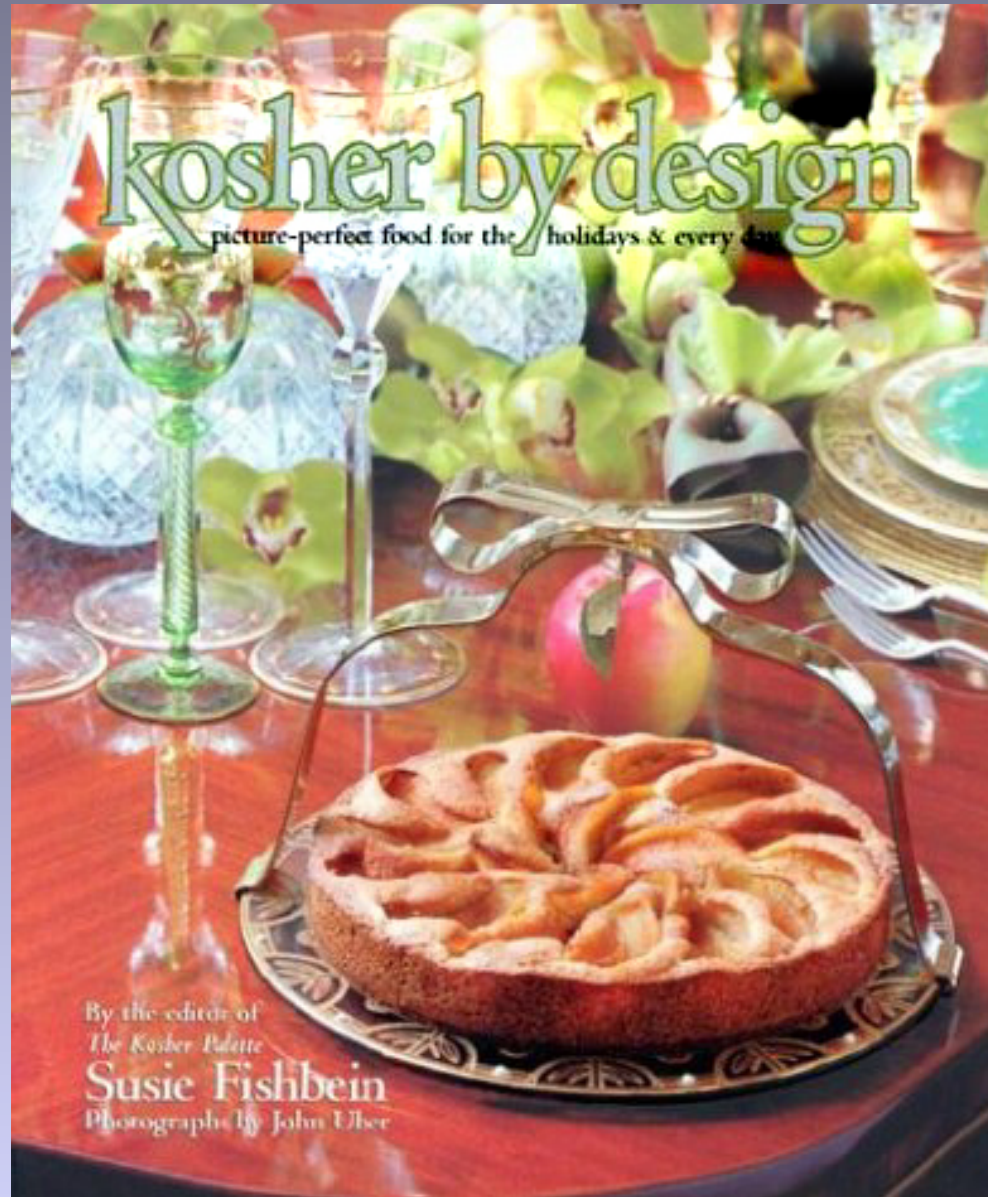
Contains genetically modified tomatoes

But there are foods that are tracked for consumer choice... like organic and...



...Kosher

***For which
people pay
premium
prices***



***Should
everyone pay
a premium
price for GE-
free foods if
there are no
food safety or
nutritional
differences?***

Might another solution be...

If there is demand, might another solution be to allow the creation of a specialty market for GE-free foods for which people pay a premium price and for which farmers are paid premium prices to grow them?

(Lemaux, 2002)

Food industry seeks voluntary GMO labeling

By Associated Press, Published: February 6



WASHINGTON — People who want to know more about genetically modified ingredients in their food would be able to get it on some packages, but not others, under a plan the industry is pushing.

Large food companies worried they might be forced to add “genetically modified” to packaging are proposing voluntary labeling of those engineered foods, so the companies could decide whether to use them or not.

The effort is an attempt to head off state-by-state efforts to require mandatory labeling. Recent ballot initiatives in California and Washington state failed, but several state legislatures are considering labeling requirements, and opponents of engineered ingredients are aggressively pushing for new laws in several states.

The move comes as consumers demand to know more about what’s in their food. There’s very little science that says genetically engineered foods are unsafe. But opponents say there’s too much unknown about seeds that are altered in labs to have certain traits, and that consumers have a right to know if they are eating them. The seeds are engineered for a variety of reasons, many of them to resist herbicides or insects.

***“Food industry lobbying for bill requiring FDA to create voluntary labels for GE foods and to require safety review of GE foods before being sold”
(February 2014)***

SOURCE: “Food industry seeks voluntary GMO labeling”, Washington Post, February 6, 2014.

http://www.washingtonpost.com/politics/federal_government/food-companies-propose-voluntary-gmo-labels/2014/02/06/78d2487c-8f4e-11e3-878e-d76656564a01_story.html



Now to some environmental issues?

- **Transfer of engineered genes to non-GMO/organic crops?**
- **Development of herbicide-tolerant weeds or pesticide-resistant insects**
- **Spread of pharmaceutical genes into commercial crops?**
- **Loss of genetic diversity?**
- **Property rights (gene patents)?**

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Can Organic Agriculture Coexist with GE Crops?

What is Co-existence

- ***Development of best management practices to minimize adventitious presence of unwanted material***
- ***Effectively enable different production systems to co-exist to ensure sustainability and viability of all production systems***
- ***Establish reasonable standards for allowable levels of adventitious presence***



Communicate to avoid pesticide drift, winemaker says

By **MATEUSZ PERKOWSKI**
Freelance Writer

Fifteen years ago, David Adelsheim received some bad news. His vineyard manager had noticed



This is not the first time coexistence between conventional and organic agriculture has been an issue.

was overgrown with blackberry bushes with a growth regulator herbicide containing 2,4-D. Aside from killing the blackberries, some of the herbicide had drifted onto the rows of grapevines growing only 15 feet away.

Roughly five acres were affected by the drift, which was about a third of Adelsheim Vineyards at the time. The first several rows were the most badly damaged, but even grapevines 30 rows down were showing some deformation. Because the neighbor had sprayed in mid-spring – after the grape bud break but prior to bloom – much of the year's crop had been aborted, and the remaining vines were too damaged to ripen any grapes.

In the decade and a half since then, Adelsheim Vineyards has managed to overcome the injury caused by the incident – the company has expanded to 180 acres, and the five acres ravaged by the herbicide have largely recovered. Nonetheless, Adelsheim said the effects of the



MATEUSZ PERKOWSKI/For the Capital Press

David Adelsheim examines some grapes at his vineyards near Newberg, Ore. Fifteen years ago, herbicide drift damaged several acres of his grapevines, and Adelsheim said the affected plants have never fully recovered.





Specialty



Organic



How might a GE crop be a co-existence issue for an organic farmer?



...What Genetic Modification Input Methods Are PERMITTED?

(§ 205.2 National Organic Program)

- they “...include the use of traditional breeding, conjugation, fermentation, hybridization, in vitro fertilization, or tissue culture.”



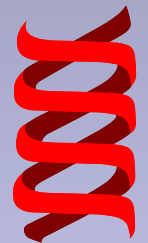
...And What Genetic Modification Input Methods Are PROHIBITED?

(§ 205.2 National Organic Program)

- “A variety of methods...are not considered compatible with organic production. Such

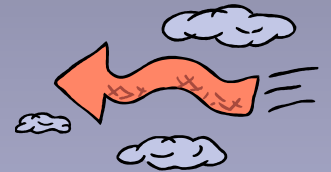
Are There Tolerances for GE in Organic Products?

positions of genes when achieved by recombinant DNA technology).”



There are tolerances for pesticides but not for GM content

☞ Pesticides: “When residue testing detects prohibited substances at levels that are greater than 5% of the EPA’s tolerance for the specific pesticide residue detected...the agricultural product must not be sold or labeled, or represented as organically produced.”



☞ GMOs: At the present time there are no specified tolerances for GMOs in organic products. Organic products are not ‘guaranteed’ GMO-free, although some organic farmers sign contracts guaranteeing GMO-free

What are some environmental issues?

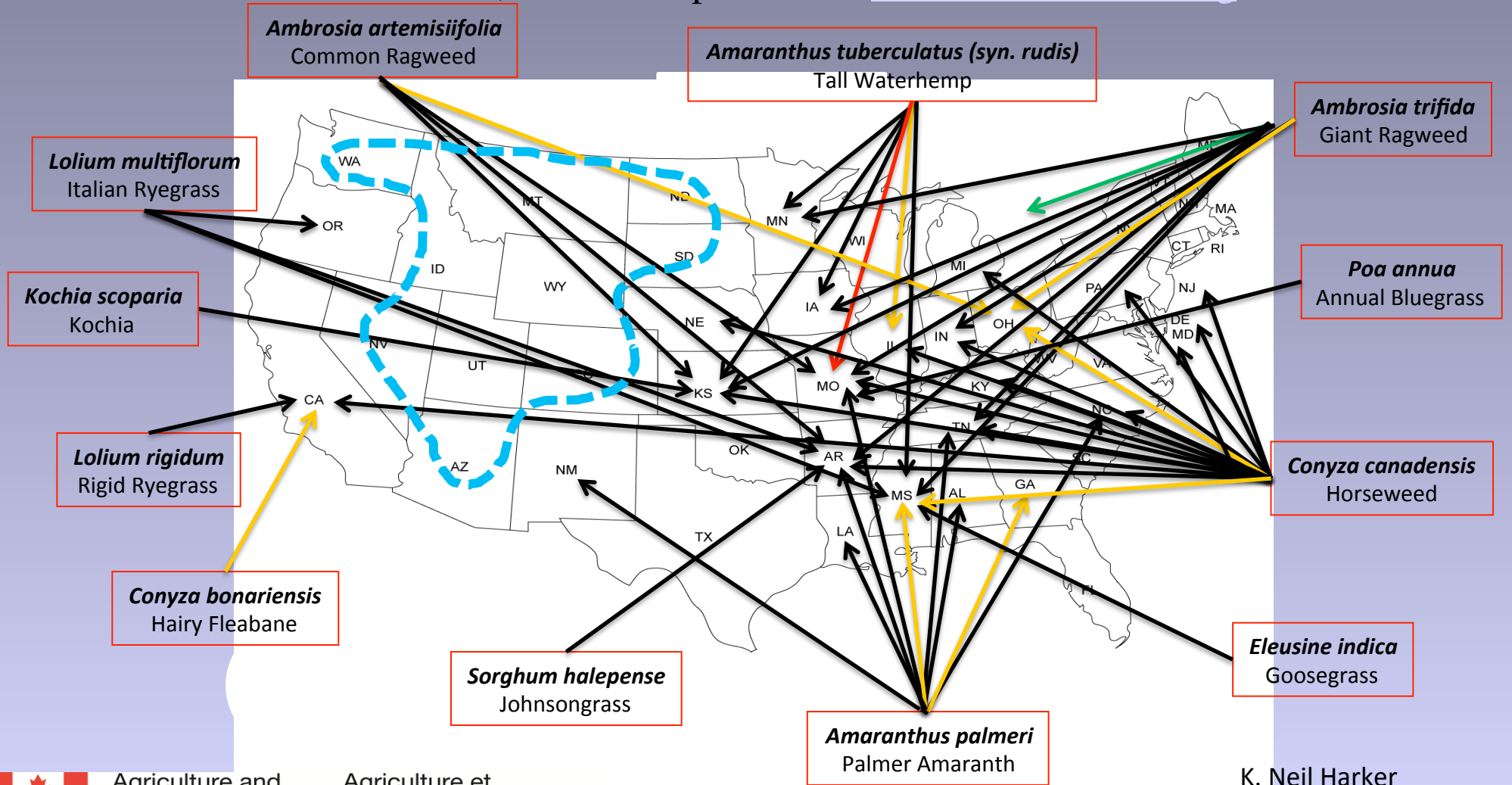
- Transfer of engineered genes to non-GMO/organic crops?
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- Loss of genetic diversity?
- Property rights (gene patents)?

“When any single herbicide mechanism of action is used repeatedly without alternative management tactics, however, selection pressure becomes intense for plants that are tolerant or resistant to that herbicide.”

“There is now a large and growing threat to soil conservation gains because of the dire need... to manage these resistant weeds...”

Glyphosate- Resistant Weeds – USA

December 13, 2010 – adapted from: www.weedscience.org



What are some environmental issues?

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San Francisco Chronicle

GMO experiments receive questionable oversight

Bill Lambrecht

Updated 7:57 am, Monday, September 8, 2014



Washington -- At a secret location among the vineyards of California's Central Coast, a plot of genetically engineered corn is producing proteins for industrial and pharmaceutical uses, including an experimental vaccine for hepatitis B.

The altered corn is growing with federal approval 100 feet from a steelhead stream in San Luis Obispo County, in designated critical habitat for the threatened California red-legged frog. Agriculture Department inspectors have reported two "incidents" at the site, including conventional corn sprouting in a 50-foot fallow zone, but the findings did not rise to the level of a fine or even to a formal notice of noncompliance for the company that planted it, Applied Biotechnology Institute Inc.

Details of Applied Biotechnology's inspections and hundreds of other field trials with genetically modified plants were obtained by Hearst Newspapers under Freedom of Information laws. The inspection reports and other Agriculture Department records present a picture of vast, swiftly expanding outdoor experimentation and industry-friendly oversight of those experiments.

**Applied Biotechnology
growing genetically
engineered corn producing
industrial and
pharmaceutical proteins in
fields in San Luis Obispo
found to violate government
regulations with minimal to
no retribution. Company
president involved in earlier
similar violations with
another company called
Prodigene.**

SOURCE: "GMO experiments receive questionable oversight", San Francisco Chronicle, September 8, 2014
<http://www.sfgate.com/default/article/GMO-experiments-receive-questionable-oversight-5740478.php#photo-3350249>



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Investigative report

Monsanto's practices weed out competition

*Licensing pacts, science
propel seed company
to dominate position*



Companies have taken the lead in creating today's commercial GE crops and control most of the key intellectual property, making it difficult for small companies or the academic sector to play a meaningful role in addressing agricultural challenges with genetic engineering.

of an corn grown in the U.S., the company also is using its wide reach to control the ability of new biotech firms to get wide distribution for their products, according to a review of several Monsanto licensing

A farmer holds Monsanto's Roundup Ready soybean seeds. Confidential contracts detailing Monsanto Co.'s business practices reveal how the world's biggest seed developer protects its dominance over the multibillion-dollar market for genetically altered crops, an Associated Press investigation has found.

Dan Gill/Associated Press

SOURCE: Capital Press, December 18, 2009



US regulators examine competition in agriculture

By **CHRISTOPHER LEONARD**
Associated Press

ANKENY, Iowa — Federal officials concerned about how much control a few corporations have over the nation’s food supply pledged March 12 to begin a new era of antitrust enforcement, seeking to balance agricultural power between companies, farmers and



Related story
See story package —
“Antitrust action looms” —
on Page 1.

brewing sense of powerless and frustration in small towns that was on display March 11 at a farmer’s rally. More than 200 people packed a small ball-

But, among companies there is a lot of competition with just a few companies jockeying for a position. This may or may not be good for agriculture.

side to open the hearing, called the workshop an unprecedented act of cooperation between their agencies.

“I think you will see an historic era of enforcement that will almost inevitably grow from the partnership that we have established,” Holder said.

Some Obama administration officials have made clear

ty production.

Those in the audience at the hearing paid keen attention, trying to discern just how aggressive the Obama administration will be.

For farmers, it is an effort to constrain corporations like Monsanto Co., Archer Daniels Midland Co. and Tyson Foods Inc., which producers say wield

cession and some innovation and investment.

Holder and Vilsack said it’s not clear yet what actions will ultimately result from the five hearings, which will examine competition in the dairy, seed, meatpacking and crop production.

But they said it won’t just be a series of lawsuits. They’re

sumers.


“This is not just about farmers and ranchers,” Vilsack said. “It’s really about the survival of rural America. We’ve seen a significant decline in the number of farmers and ranchers and that translates into a significant decline in the number of people living in rural America.”

The hearings play to a long-

Chuck Grassley, R-Iowa, Iowa Attorney General Tom Miller and others outlined their concerns about consolidation in the farm sector.

“Bigger isn’t per se bad,” Grassley said. “But it can lead to predatory business practices and behaviors and that’s what we’ve got to be concerned about.”





Recent U.S. Supreme Court had an important impact on how patents will play out in the U.S. Justices rendered unanimous decision indicating that patent exhaustion does not permit a farmer to reproduce patented seeds through planting and harvesting without patent holder's permission

If this decision had gone the other way, the patent landscape would have changed dramatically.

*SOURCE: "Supreme Court Supports Monsanto in Seed-Replication Case", New York Times, 5/13/13
<http://www.nytimes.com/2013/05/14/business/monsanto-victorious-in-genetic-seed-case.html>*



Where to get more information on the issues?



ucbiotech.org SCIENCE-BASED INFORMATION & RESOURCES ON AGRICULTURE, FOOD & TECHNOLOGY

ABOUT US | NEWS | ISSUES & RESPONSES | GMO LABELING | RESOURCES | LINKS | GLOSSARY | SEARCH

Select Language ▼

This website provides educational resources focused broadly on issues related to agriculture, crops, animals, foods and the technologies used to improve them. Science-based information related to these issues is available, as well as educational tools and information, which can be used to promote informed participation in discussions about these topics.

FEATURED LECTURE VIDEO

"Feast, Famine and the Future of Food"



Outreach in Biotechnology
Food for Thought Lecture Series
Oregon State University
January 25, 2012

BIOTECHNOLOGY INFORMATION



Labeling:
Informational resources available.



Review articles:
Focused on food, environmental and socioeconomic issues of GE crops and foods.
[Part 1](#) | [Part 2](#)

RESOURCES FOR OUTREACH & EXTENSION, RESEARCHERS & TEACHERS

DNA for Dinner 4-H curriculum:
For grades 5-8, covers topics from plant diversity to genetic engineering. Each of the five lessons has 3 to 5 activities.



New Game: Who's In Your Family?
A free educational game to teach participants about the diversity of fruits and vegetables, and how they are related.

Slide Archive:
Extensive collection of PP slides on agriculture & biotechnology.

Available on loan:

Teaching Aids: Handouts and cards available, in both English and Spanish.



Educational displays: "Genetics and Foods" and "Genetic Diversity and Genomics" available with companion educational cards and teacher worksheet in English and Spanish.

Gene-IE Juice Bar: Interactive activity to isolate DNA from common fruits and vegetables.

HELPFUL SITES

Academics Review
[Academics Review website](#)
Testing popular claims against peer-reviewed science.

Biofortified website
[Biofortified website](#)
Provides factual information to foster discussion about agriculture, especially plant genetics and genetic engineering.

Animal Genomics & Biotechnology Cooperative Extension Program, UC Davis



Provides education on use of animal genomics & biotechnology in livestock production.

