

# GMOs and Ballot Measure 92

Lebanon Senior Center  
October 20, 2014

Steve Strauss

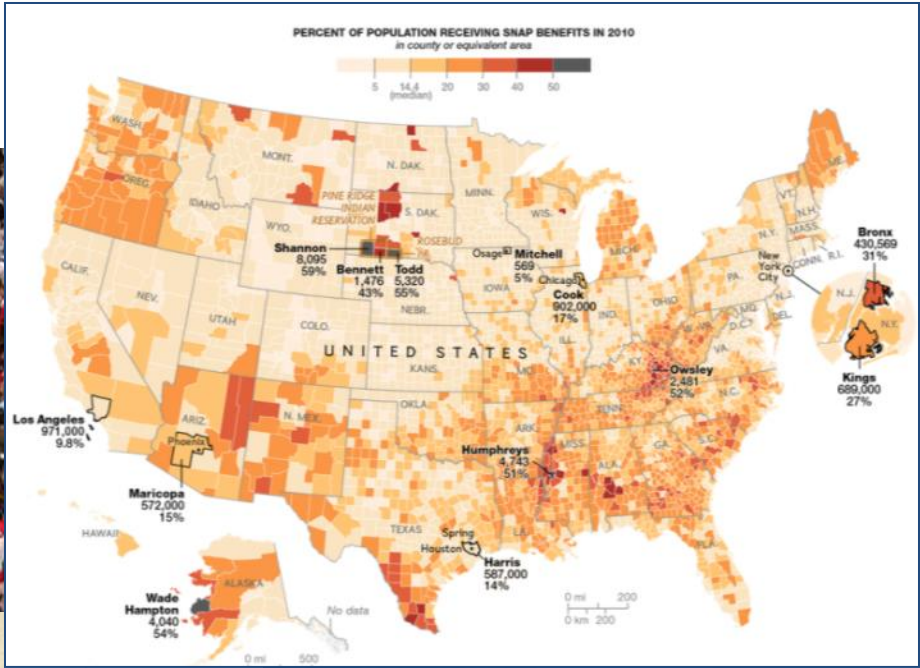
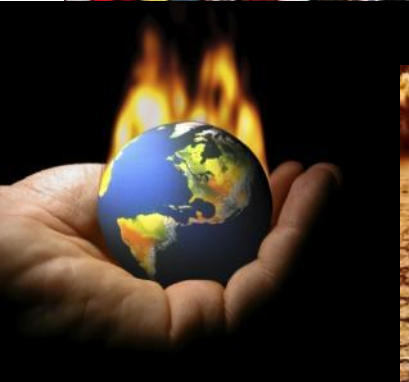
Oregon State University



# Roadmap for talk

- Some broad perspectives
- What are GMOs and where are they?
- Measure 92 – why I am strongly against it

# Billions are malnourished now, and it's a very scary future



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# Climate change & travel creating urgent pest problems

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### This Killer Fungus Could Force the Whole World to Go Gluten-Free

Rust is depleting our bread supply, but how do we feel about genetically modified wheat?

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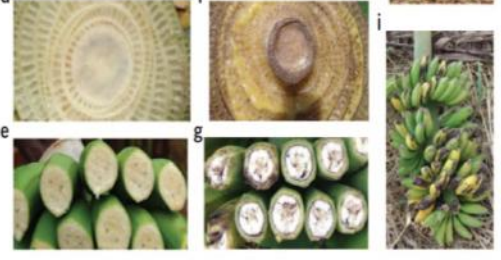
Wheat stem rust fungus (Photo: IAEA Imagebank/Flickr)

July 15, 2014 | By Isabel Weisz  
 Isabel Weisz is an editorial intern for Summer 2014. She is a student at Santa Clara University, majoring in Environmental Analysis & Policy in Santa Clara, Calif.  
 » full bio

### CORRESPONDENCE

### Field trial of *Xanthomonas* wilt disease-resistant bananas in East Africa

**To the Editor:** Banana is a major staple crop in East Africa produced mostly by smallholder subsistence farmers. It is highly susceptible to *Xanthomonas wilt* (XW), a devastating bacterial disease caused by the bacterium *Xanthomonas wilt* (XW) and plant ferredoxin-like protein (*Pflp*) from sweet potato (*Casipian annuum*). Both have been



to intensified production of active species and activation of the hyper response when plants are challenged where the green revolution has had influence. Banana is an important food and cash crop in the Great Lakes region of East Africa. Food security studies reveal that in Uganda, Rwanda and Burundi bananas constitute >30% of the daily per capita caloric intake, rising to 60% in some regions<sup>1</sup>. As elicitor-induced resistance is not specific against particular pathogens, this transgenic approach using *Hrap* and *Pflp* may also provide effective control against other bacterial diseases of banana, such as bacterial wilt, in other parts of the world.

**AUTHOR CONTRIBUTIONS**  
 L.T. conceived the idea and led the study. L.F.S. and W.K.T. designed the study. L.T. and W.K.T. performed the experiments and S.K. analyzed the data. All authors contributed to the interpretation and writing of the paper.

**ACKNOWLEDGMENTS**  
 We thank T.Y. Feng, Academia Sinica, Taiwan, for providing the *Hrap* and *Pflp* gene constructs. We thank the African Agricultural Technology Foundation for negotiating a royalty-free license for the use of the patent holder. This research was supported by the National Science Foundation (NSF) Grant IBN-0948342.

## The New York Times

July 27, 2013

### A Race to Save the Orange by Altering Its DNA

By AMY HARMON  
 CLEWISTON, Fla. — The call Ricke Kress and every other citrus grower in Florida dreaded came while he was driving.



# Pesticide poisoning common in developing world – GMO eggplant, cotton has helped





# Natural toxins in food pose serious problems for the poor – GMO corn has helped

*Child with liver cancer in Mozambique due to consumption of mycotoxins*



photo courtesy of Rick Roush

- Esophageal cancer
- Neural tube defects, spina bifida
- 155,000-172,000 cases per year from aflatoxin (F. Wu, Michigan State U.)



- Bt GMO corn above
- Fungal contaminated, mycotoxin-producing corn below

# Billions suffer from micronutrient deficiency

Widespread, impacts severe, and decades of supplements unable to overcome – Breeding and GMOs help

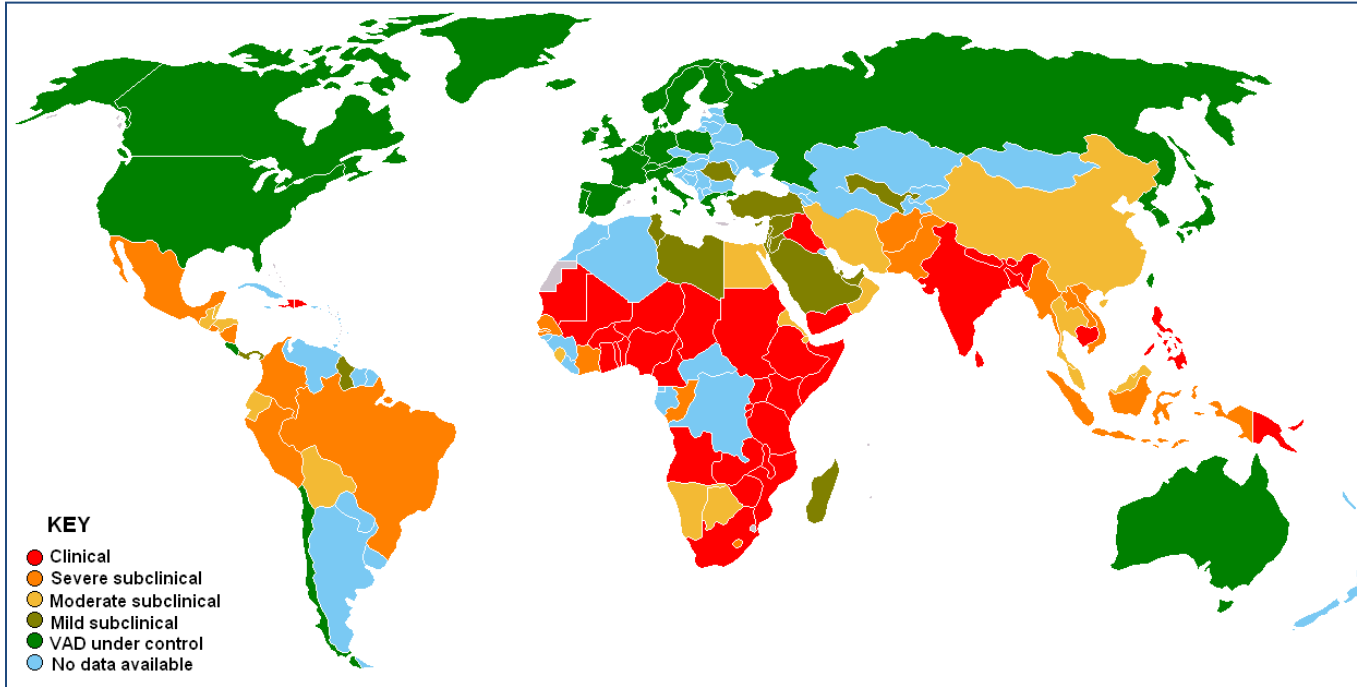
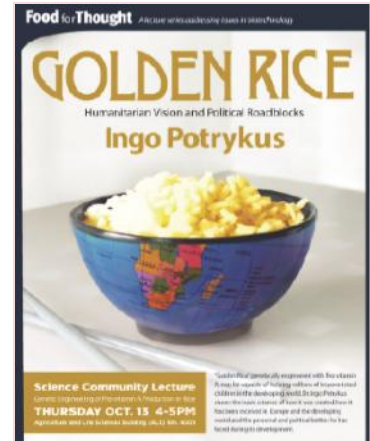


Image sources: [Petaholmes](#) based on [WHO data](#);



Young women suffering blindness due to Vit A deficiency

**Vitamin A deficiency affects one-third of children under the age of five around the world – iron, zinc deficiency also major problems**

# My bottom line

- GMOs are very powerful tools for hunger and sustainability
- But also not silver bullets – Need prudent management and integration with other tools
- Retain and employ the method to aid breeding, while continually improving its management
- Don't throw out the baby with the bathwater! (as measure 92 puts us on the road to doing)



# Roadmap for talk

- Some broad perspectives
- **What are GMOs and where are they?**
- Measure 92 – why I am strongly against it

# Crop domestication the basis of agriculture, enabled civilization



# Radical changes in domesticated animals: All dogs derived from the wolf by breeding





# Breeding continues and is accelerating in age of massive DNA sequencing



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### Plant-Indigo Rose Tomato

80 days. Unlike any tomato that we have seen! Indigo Rose is the first high-anthocyanin tomato commercially available anywhere in the world. The high amount of anthocyanin (a naturally occurring pigment that has been shown to fight disease in humans) creates quite a vibrant indigo, almost blue skin on the 2 inch, round fruit. The purple coloring occurs on the portion of the fruit that is exposed to light, while the shaded portion starts out green and turns deep red when mature. Inside, the flesh reveals the same rouge tone with a superbly balanced, multi-faceted tomatoey flavor. The indeterminate plants have an open habit and are very vigorous producers. Bred at Oregon State University.

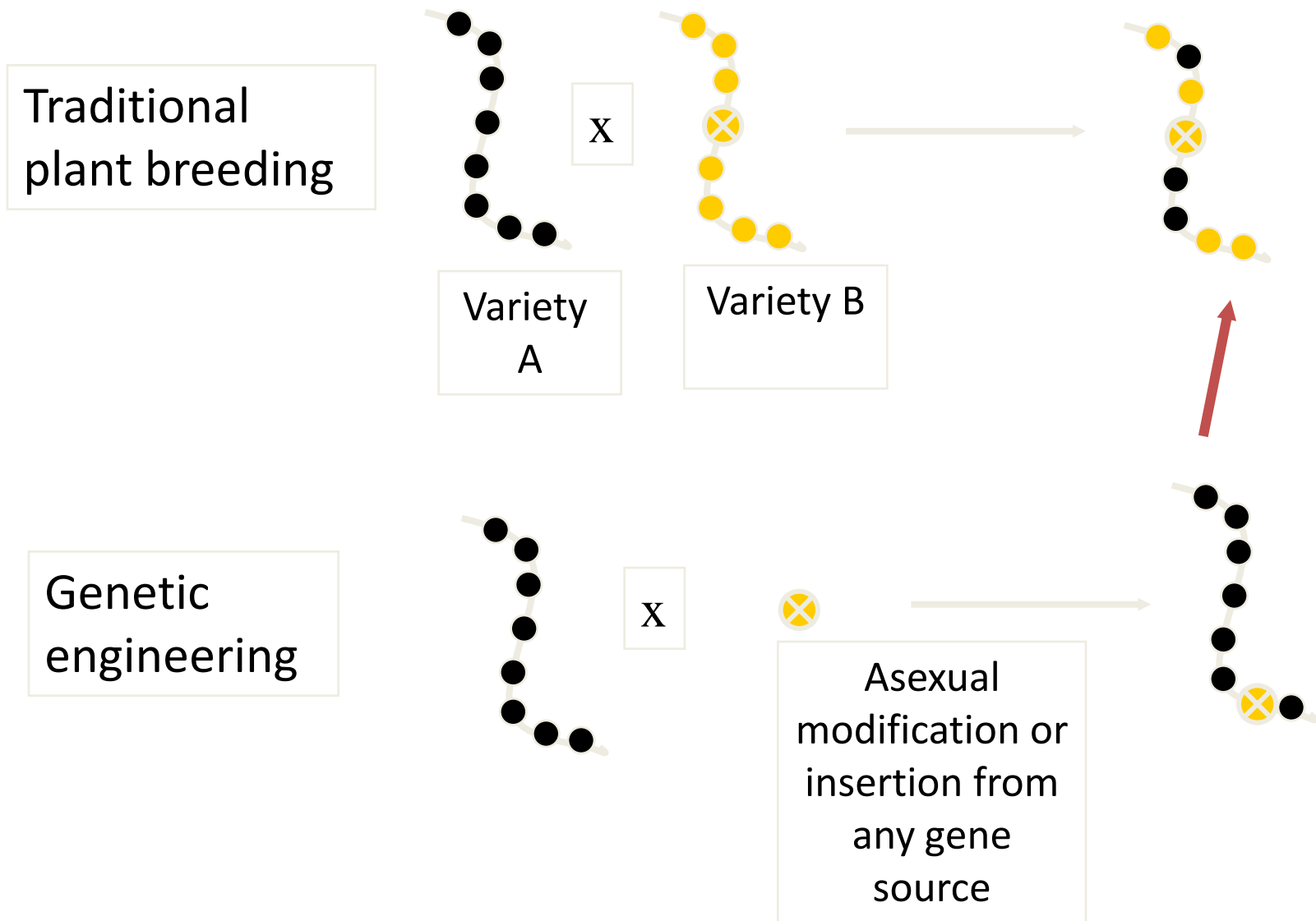
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# Genetic engineering defined



Regeneration  
of GE  
plants from  
modified  
vegetative cells





Then propagated normally (seeds, cuttings) and tested for health and new qualities, incorporated into breeding programs



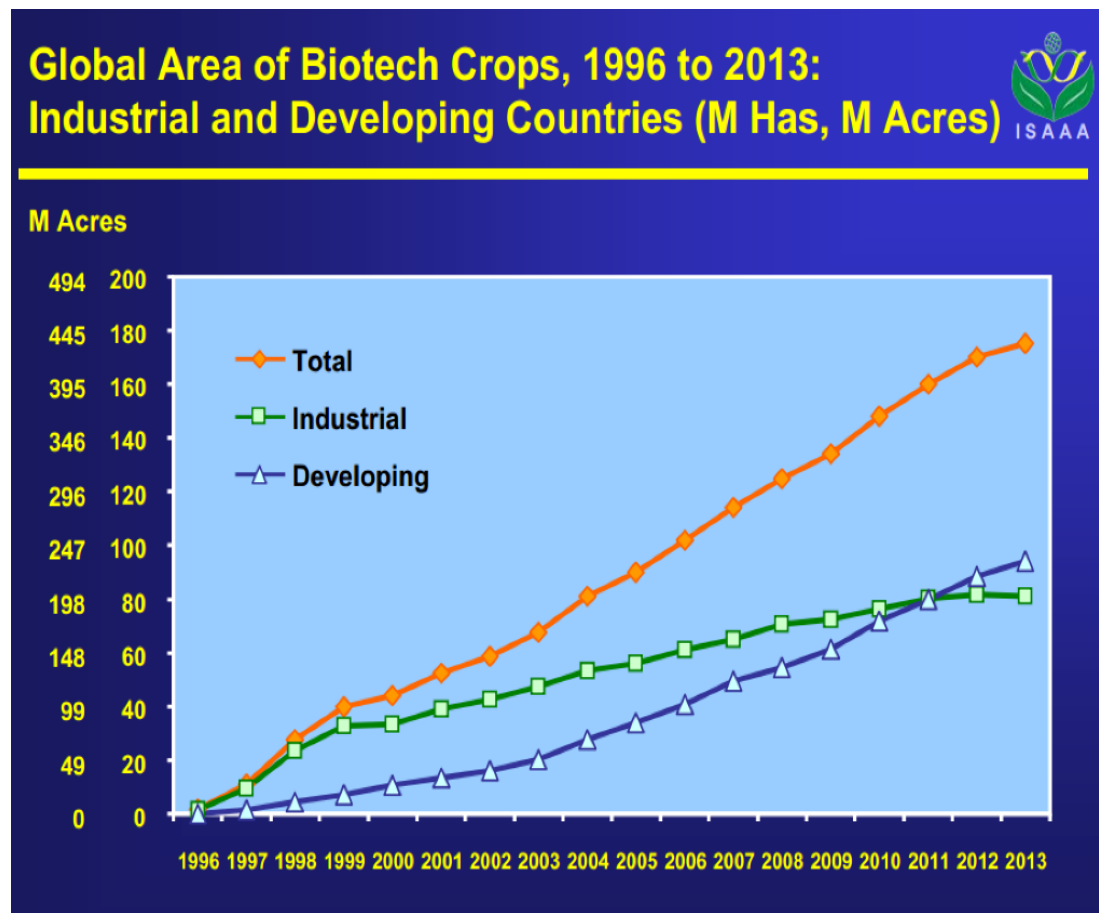
**Propagation of poplars in tissue culture**



**Growth in the field**

# GMO crops widespread, rapidly adopted

Grown on >10% arable land on planet, extensive uptake in developed and developing world

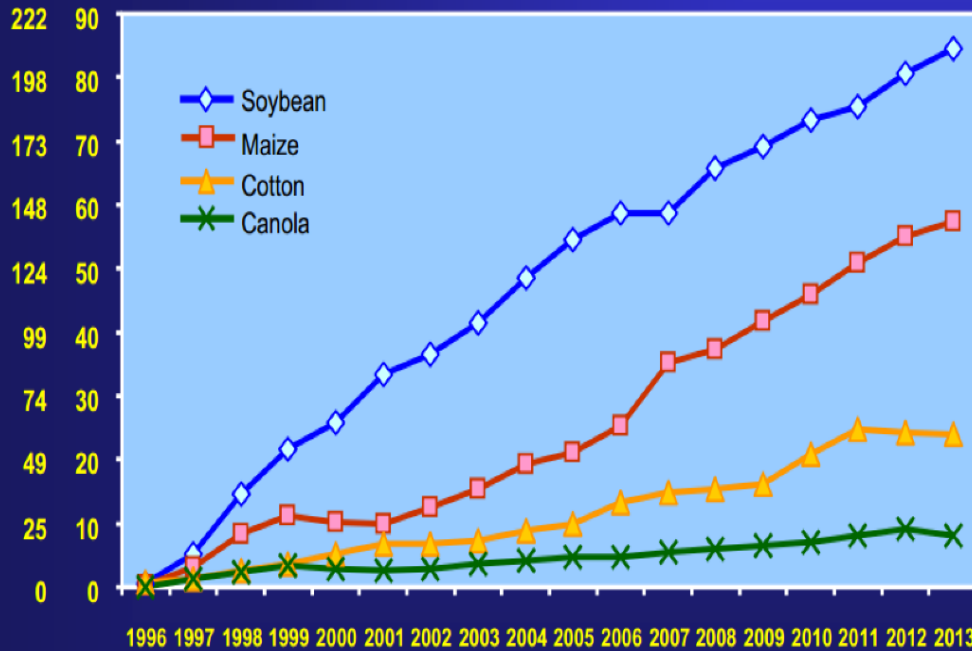


# Four crops dominate, 8 crops grown in USA

Global Area of Biotech Crops, 1996 to 2013:  
By Crop (Million Hectares, Million Acres)



M Acres





# Major reports on GMO crops show very large positive impacts on economics, sustainability, in USA and worldwide

**THE NATIONAL ACADEMIES**  
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## The Impact of Genetically Engineered Crops on Farm Sustainability in the United States

Public Briefing  
NAS Lecture Room  
April 13, 2010

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Institute of Medicine  
National Research Council

**ANNUAL REVIEWS IN ADVANCE**

Review in Advance first posted online on August 14, 2013. (Changes may still occur before final publication online and in print.)

## Agricultural Biotechnology: Economics, Environment, Ethics, and the Future

Alan B. Bennett,<sup>1,2</sup> Cecilia Chi-Ham,<sup>2</sup> Geoffrey Barrows,<sup>3</sup> Steven Sexton,<sup>4</sup> and David Zilberman<sup>3</sup>

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<sup>4</sup>Department of Agricultural and Resource Economics, North Carolina State University, Raleigh, North Carolina 27607; email: [seven.sexton@ncsu.edu](mailto:seven.sexton@ncsu.edu)

Annu. Rev. Environ. Resour. 2013. 38:19.1-19.31  
The Annual Review of Environment and Resources is online at <http://enviro.annualreviews.org>

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10.1146/annurev-environ-050912-124612

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**Keywords**  
genetic modification, genetic engineering, GMO, GM crops, food security

**Abstract**  
Agricultural biotechnology and, specifically, the development of genetically modified (GM) crops have been controversial for several reasons, including concerns about the potential environmental and health impacts of these technologies.

Main beneficial impacts are economic value, and reduced cost or ecological impacts of insect pest and weed control

# Benefits provided by biotech crops, on a global scale: 1996-2012

- Increased crop production valued at **US\$116.9 billion**
- Conserved biodiversity (indirectly) by saving 123 million hectares of land from 1996-2012
- **Helped alleviate poverty** for >16.5 million small farmers and their families totaling **>65 million people**, who are some of the poorest in the world
- Reduced tillage = **less energy use and less greenhouse gas emission: Equivalent to removing 12 million cars/year** from the road

# There are legitimate concerns that GMOs with pest management traits have not been managed well

## THE TROUBLE WITH GMOs

**AGAINST MY BETTER JUDGMENT.** I'm dipping my toe into the genetically modified organism debate.

These are rough waters. GMOs seem to polarize people more than almost anything else — especially in terms of whether they are safe to eat or to grow. I try to stay open-minded on the topic, but it's obvious that the use of GMOs in agriculture has created some big problems.

The problem facing GMOs isn't with the technology per se; it's with how they have been deployed. Despite promises of improved food security, increased yields, decreased chemical use and more nutritious crops, GMOs end up causing many disappointing failures.

To begin, while GMO efforts may have started with good intentions to improve food security, they ended up focusing on crops that are better at improving profits, such as feed corn (mostly for animal feed and ethanol), soybeans (mostly for animal feed), cotton and canola. While the technology might have "worked," it wasn't applied to crops that actually feed the world's poor.

Furthermore, GMOs have had uneven success in boosting yields. Instead of improving plant growth, they have mainly replaced

GMO crops, this was apparently more than offset by an increase in herbicide use on U.S. croplands, likely because weeds have become resistant to Roundup. Here there seems to have been a lack of systems thinking — which would have anticipated the "rebound" problems inherent in chemical weed control.

I also become skeptical when GMO approaches are pursued instead of simpler ways to address the same problem. For example, we hear a lot about biotech crops that are drought tolerant, fix their own nitrogen and so on, but they are a long way from being ready for the real world. Why not focus on agronomic approaches — such as using cover crops, mulching and organic-style techniques — instead, which could yield results *today*?

Similarly, instead of engineering better nutrition into crops to make GMOs such as golden rice, why not grow conventional nutrient-rich crops such as fruits and vegetables? Why focus on more technical solutions, where a simple approach might be as (or more) effective?

Finally, many GMO advocates bristle at efforts to require labeling of GMO food because they see "no substantial biological difference" between GMO and traditional crops. Maybe, but that's not the point. It's



thinking, where the focus is on technology and business models, and less on the social and environmental impacts.

I urge GMO advocates to take a step back and think *more holistically* about GMO technologies in the context of the larger systems connecting agriculture, food, culture, people and the environment. I encourage them to build more *interdisciplinary* research teams — with social scientists, ecologists, organic farmers and GMO critics. I suggest supporting more of their work with public funding, to help ensure that social and environmental benefits are put ahead of profits. And I would strongly urge *both* sides of the GMO debate

**GMOs have frequently failed to live up to their potential, not because they are inherently flawed, but because**

**GMOs have frequently failed to live up to their potential, not because they are inherently flawed, but because they have been poorly deployed into the complex social and environmental contexts of the real world.**

**ensia**

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**The method is not just about weed and pest management**

**It has highly diverse and expanding applications**

Many other crops and traits starting to be used, or in the pipeline for near term use

# Virus-resistant papaya saved the Hawaiian industry in the mid-1990s / ~80% of papaya today

- Nobel prize winning “immunization” in plants – **stimulates natural defenses**
- Great humanitarian potential in developing world



Courtesy of Denis Gonsalves, formerly of Cornell University



**GMO, virus-resistant trees**



**Drought-tolerant maize** – Planted on  
~150,000 acres – Also tested in Africa  
*Important tool given climate change, water  
shortages?*



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# Antioxidants – Purple tomatoes with increased antioxidants and rot resistance

Current Biology 23, 1094–1100, June 17, 2013 ©2013 Elsevier Ltd All rights reserved <http://dx.doi.org/10.1016/j.cub.2013.05.007>

## Anthocyanins Double the Shelf Life of Tomatoes by Delaying Overripening and Reducing Susceptibility to Gray Mold

Yang Zhang,<sup>1</sup> Eugenio Butelli,<sup>1</sup> Rosalba De Stefano,<sup>2</sup> Henk-jan Schoonbeek,<sup>1</sup> Andreas Magusin,<sup>1</sup> Chiara Pagliarini,<sup>3</sup> Nikolaus Wellner,<sup>4</sup> Lionel Hill,<sup>1</sup> Diego Orzaez,<sup>5</sup> Antonio Granell,<sup>6</sup> Jonathan D.G. Jones,<sup>6</sup> and Cathie Martin<sup>1,\*</sup>

<sup>1</sup>John Innes Centre, Norwich Research Park, Norwich, NR4 7UH, UK

They are produced by plants that disperse [9]. Anthocyanin pigments induced under stress conditions [11]. Besides physiological functions, anthocyanins are associated with protection [12], cardiovascular diseases [13].




# Healthier oil: High oleic acid and omega-3 soy oil

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## In a Bean, a Boon to Biotech



DuPont Pioneer

DuPont Pioneer's oil compared with soybean oils with partly hydrogenated oils, the source of trans fats.

By ANDREW POLLACK  
Published: November 15, 2013

A new federal push to purge artery-clogging trans fats from foods could be just what the doctor ordered — not only for public health but for the unpopular biotechnology industry, specifically, two developers of genetically modified crops.

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**“It almost mirrors olive oil in terms of the composition of fatty acids.”**

# Better potato - “Innate” Potato – reduced browning and acrylamide (↓waste, ↑safety)

## Trait #1 - Silenced PPO (Enzyme)

- Non-browning when cut
- Reduced black spot bruise

## Trait #2 - Reduced Asparagine (Amino Acid)

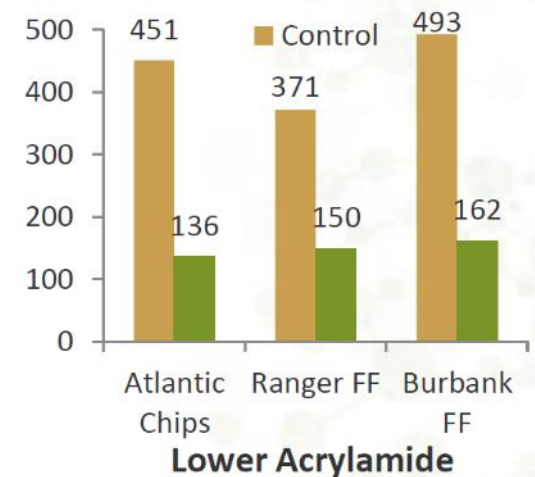
- Yields a 50-80% reduction in acrylamide when baked or fried
- Meets Prop 65 in California

## Four Improved Varieties

- Russet Burbank, Ranger Russet, Atlantic, Snowden
- No effect on taste, texture, or performance
- USDA approval expected in 2014



Non-Browning





# Helping forests: American Chestnut restoration by genetic modification

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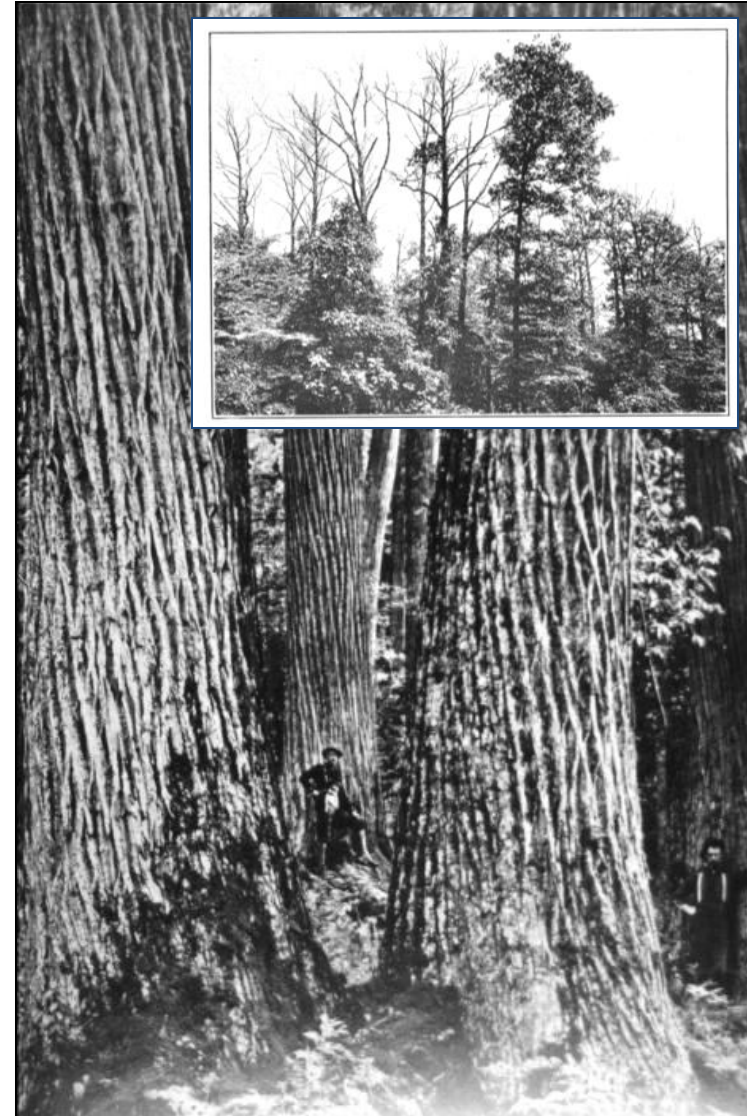
 **The American Chestnut's Genetic Rebirth**  
A foreign fungus nearly wiped out North America's once vast chestnut forests. Genetic engineering can revive them  
By William Powell

In 1876 Samuel B. Parsons received a shipment of chestnut seeds from Japan and decided to grow and sell the trees to orchards. Unbeknownst to him, his shipment likely harbored a stowaway that caused one of the greatest ecological disasters ever to befall eastern North America. The trees probably concealed spores of a pathogenic fungus, *Cryphonectria parasitica*, to which Asian chestnut trees—but not their American cousins—had evolved resistance. *C. parasitica* effectively strangles

**More In This Article**

 **A New Generation of American Chestnut Trees May Redefine America's Forests**

March 2014 issue - Scientific American



# Improved nutrition: Biofortified plants for the poor and developing world





# Vitamin A enrichment for the poor in Africa – “Super banana”

## Vitamin A Super Banana in human trials

The first human trial to test the efficacy of a genetically modified (GM) nutritionally enhanced banana is starting in the US. Conceived by researchers at the Queensland University of Technology (QUT) in Brisbane, Australia, to provide a good source of beta carotene, the Super Banana has \$10 million in backing from the Bill and Melinda Gates Foundation. The genetically enriched, golden-colored banana may help prevent blindness caused by vitamin A deficiency in Ugandan children whose diets are deficient in this nutrient (*Nat. Biotechnol.* **30**, 1017–1019, 2012). But leaders of the banana project are embarking on a historically precarious path. Golden Rice, the previous GM crop developed to alleviate vitamin

ity at  
deve

been commercialized in its target country, the Philippines. Whether the banana will meet a similar fate remains to be seen.

Opposition from anti-biotech activists in the media so far has been minimal, and radical activist presence in Uganda and other African countries is generally small. “I don’t have the feel-



But is it golden? Stephen Buah (left) and James Dale, from Queensland University of Technology, display the Super Banana.



# By far the most carefully studied crops for safety – no question

- Of 129 GE crops commercialized in the US and 129 have had FDA consultation
  - EPA and/or USDA also do evaluations for most types of crops
- Foreign regulatory bodies repeat and verify most safety assessments
  - Health Canada, FSANZ, EFSA, Korea FDA, EFSA, Chinese Ministry of Agriculture, Japan Food Safety Commission

Overwhelming conclusion of food/feed safety from hundreds of studies

**“The experimental data collected so far on authorized GE crops can be summarized as follows: (a) there is no scientific evidence of toxic or allergenic effects.....”**

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REVIEW ARTICLE

**An overview of the last 10 years of genetically engineered crop safety research**

Alessandro Nicolia<sup>1\*</sup>, Alberto Manzo<sup>2</sup>, Fabio Veronesi<sup>1</sup>, and Daniele Rosellini<sup>1</sup>

<sup>1</sup>Department of Applied Biology, Faculty of Agriculture, University of Perugia, Perugia, Italy and <sup>2</sup>Ministry of Agriculture, Food and Forestry Policies (MiPAAF), Rome, Italy

# Numerous studies independently conducted



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### Studies with independent funding

This is a *partial* list of independently-funded studies on genetically engineered crops that we have collected as part of the [GENetic Engineering Risk Atlas](#) (GENERA). This list is out of date as we have been working on GENERA. About 1/3 of the studies about risks of genetic engineering are from independent funding sources. Visit the full [Studies for GENERA](#) list.

#### Independent studies on GMOs:

1. [Powell M, Wheatley AO, Omoruyi F, Asemota HN, Williams NP, Tennant PF. 2009. Comparative effects of dietary administered transgenic and conventional papaya on selected intestinal parameters in rat models. Transgenic research 19\(3\):511-8.](#)
2. [Batista R, Saibo N, Lourenço T, Oliveira MM. 2008. Microarray analyses reveal that plant mutagenesis may induce more transcriptomic changes than transgene insertion. PNAS 105\(9\):3640-5. \(full text\)](#)
3. [Böhme H, Rudloff E, Schöne F, Schumann W, Hüther L, Flachowsky G. 2007. Nutritional assessment of genetically modified rapeseed synthesizing high amounts of mid-chain fatty acids including production responses of growing-finishing pigs. Archives of animal nutrition 61\(4\):308-16. 2007.](#)
4. [Baudo MM, Lyons R, Powers S, Pastori GM, Edwards KJ, Holdsworth MJ, Shewry PR. 2006. Transgenesis has less impact on the transcriptome of wheat grain than conventional breeding. Plant biotechnology journal 4\(4\):369-80.](#)
5. [Brake DG, Thaler R, Evenson DP. 2004. Evaluation of Bt \(Bacillus thuringiensis\) corn on mouse testicular development by dual parameter flow cytometry. Journal of agricultural and food chemistry 52\(7\):2097-2102.](#)
6. [Brake DG, Evenson DP. 2004. A generational study of glyphosate tolerant soybeans on mouse fetal, postnatal, pubertal and adult testicular development. Food and chemical toxicology 42\(1\):29-36.](#)
7. [Atkinson HJ, Johnston KA, Robbins M. 2004. Prima facie evidence that a phytoestrogen for transgenic plant resistance to nematodes is not a toxic risk in the human diet. Journal of Nutrition 134\(2\):431-434. \(full text\)](#)
8. [Bakan B, Melcion D, Richard-Molard D, Cahagnier B. 2002. Fungal growth and Fusarium mycotoxin content in isogenic traditional maize and genetically modified maize grown in France and Spain. Journal of agricultural and food chemistry 50\(4\): 728-731.](#)
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10. [Böhme H, Aulrich K, Daenicke R, Flachowsky G. 2001. Genetically modified feeds in animal nutrition. 2nd communication: glufosinate tolerant sugar beets \(roots and silage\) and maize grains for ruminants and pigs. Archiv für Tierernährung \(Archives of animal nutrition\) 54\(3\):197-207.](#)
11. [Arencibia A, Gentinetta E, Cuzzoni E, Castiglione S, Kohli A, Vain P, Leech M, Christou P, Sala F. 1998. Molecular analysis of the genome of transgenic rice \(Oryza sativa L.\) plants produced via particle bombardment or intact cell electroporation. Molecular breeding 4\(2\):99-109.](#)
12. [Bub A, Möseneder J, Wenzel G, Rechkemmer G, Briviba K. 2008. Zeaxanthin is bioavailable from genetically modified zeaxanthin-rich potatoes. European journal of nutrition 47\(2\):99-103.](#)
13. [Catchpole GS, Beckmann M, Enot DP, Mondhe M, Zywicki B, Taylor J, Hardy N, Smith A, King RD, Kell DB, Fiehn O, Draper J. 2005. Hierarchical metabolomics demonstrates substantial compositional similarity between genetically modified and conventional potato crops. PNAS 102\(40\):14458-62. \(full text\) The metabolite analysis and statistical work was funded by the Food Standards Agency \(London\) as part of its G02006 project.](#)
14. [Chambers PA, Duggan PS, Heritage J, Forbes JM. 2000. The fate of antibiotic resistance marker genes in transgenic plant feed material fed to chickens. Journal of antimicrobial chemotherapy 49\(1\):161-164. Novartis, formerly Ciba-Geigy, provided the genetically modified maize seeds used in this study. This work was funded by a grant from the Food Standards Agency.](#)
15. [Chen ZL, Gu H, Li Y, Su Y, Wu P, Jiang Z, Ming X, Tian J, Pan N, Qu LJ. 2003. Safety assessment for genetically modified sweet pepper and tomato. Toxicology 188\(2-3\):297-307.](#)
16. [Cheng KC, Beaulieu J, Iqura E, Belzile FJ, Fortin MG, Strömvik MV. 2008. Effect of transgenes on global gene expression in soybean is within the natural range of variation of conventional cultivars. Journal of agricultural and food](#)

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<http://www.biofortified.org/genera/studies-for-genera/independent-funding/>

126 independent studies as of July 2014 600 total



# Is GM food safe?

if an overwhelming majority of experts say something is true, then any sensible non-expert should assume that they are probably right



The American Association for the Advancement of Science (AAAS) is the premier body of scientists in the United States. It is the only organization that serves a broad range of scientific disciplines.



The American Medical Association (AMA) is the premier body of physicians in the United States. It is the only organization that serves a broad range of medical specialties.



The World Health Organization (WHO) is the directing and coordinating authority for health within the United Nations system. It is the only organization that serves a broad range of health-related disciplines.



The National Academy of Sciences is an independent organization in the United States that provides a national forum for the advancement of science.



The European Commission is the executive body of the European Union. It is the only organization that serves a broad range of European-related disciplines.



The European Union is a political and economic union of member states located primarily in Europe. It is the only organization that serves a broad range of European-related disciplines.



The American Council on Science and Health (YACSH) is a non-profit organization that provides a national forum for the advancement of science.



The American Society of Animal Biologists (ASAB) is a professional organization for scientists in the field of animal biology.



The American Society for Cell Biology (ASCB) is a professional organization for scientists in the field of cell biology.



The American Society for Microbiology (ASM) represents over 42,000 microbiologists worldwide.



The International Seed Federation (ISF) is a non-profit organization that provides a national forum for the advancement of science.



The Crop Science Society of America (CSSA) is a professional organization for scientists in the field of crop science.



The International Society of African Biologists (ISAB) is a professional organization for scientists in the field of African biology.



The Center for Science, Society, and Policy (CAST) is a non-profit organization that provides a national forum for the advancement of science.



The Society of Environmental Biologists (SEB) is a professional organization for scientists in the field of environmental biology.

Transgenic crops on the market today are safe to eat and are no more allergenic, toxic, or carcinogenic than conventional counterparts, and clearly mark as products of genetic engineering.



The Federation of Animal Science Societies (FAS) is a professional organization for scientists in the field of animal science.



The Society of Toxicology (SOT) is a professional organization for scientists in the field of toxicology.

Meat, milk and eggs from livestock and poultry produced using biotech feeds are safe for human consumption.

The Society of Toxicology (SOT) is a professional organization for scientists in the field of toxicology.

Biotechnology is a powerful tool that has the potential to improve the safety and quality of our food.



The Union of German Academies of Sciences (UDW) is a professional organization for scientists in the field of German science.



The International Council for Science (ICSU) is a professional organization for scientists in the field of international science.

Currently available genetically modified crops and foods derived from them - have been judged safe to eat, and the methods used to test them have been deemed appropriate.

The scientific consensus around the safety of genetically modified foods is as strong as the scientific consensus around climate change. These foods are subjected to more testing than any other, and everything tells us that they're safe.

# Is GM food safe?

if an overwhelming majority of experts say something is true, then any sensible non-expert should assume that they are probably right



The American Association for the Advancement of Science is an international non-profit organization. AAAS serves some 261 affiliated societies and academies of science.

"The science is quite clear: crop improvement by the modern molecular techniques of biotechnology is safe."



The National Academy of Sciences is a non-profit organization in the United States. It is the premier scientific body in the United States.

"To date more than 98 million acres of genetically modified crops have been grown worldwide. No evidence of human health problems associated with the ingestion of these crops or resulting food products have been identified"



The premier body of physicians in the United States

"There is no scientific justification for special labeling of genetically modified foods."

Bioengineered foods have been consumed for close to 20 years, and during that time, no overt consequences on human health have been reported and/or substantiated in the peer-reviewed literature."



England's top medical society, the Royal Society of Medicine is an independent educational organisation for doctors, dentists, scientists and others involved in medicine and health care

"Foods derived from GM crops have been consumed by hundreds of millions of people across the world for more than 15 years, with no reported health problems."



The World Health Organization (WHO) is the directing and coordinating authority for health within the United Nations system.

"No effects on human health have been shown as a result of the consumption of GM foods by the general population in the countries where they have been approved."



The European Commission (EC) is the executive body of the European Union

"The main conclusion to be drawn from the efforts of more than 130 research projects, covering a period of more than 25 years of research, and involving more than 500 independent research groups, is that biotechnology, and in particular GMOs, are no more risky than e.g. conventional plant breeding technologies."

<http://www.axismundionline.com/blog/the-new-is-gm-food-safe-meme/>

# Roadmap for talk

- Some broad perspectives
- What are GMOs and where are they?
- **Measure 92 – why I am strongly against it**

# Why I am against measure 92

## **Its about method, not content of food**

- It stigmatizes one method of genetic modification among many – when there is clear scientific consensus that its “product not process” that matters
  - USA National Academy of Sciences: “There is no evidence that unique hazards exist either in the use of rDNA techniques or in the movement of genes between unrelated organisms.”
- Clearly safer products, such as more healthy corn and potato, will be “warning labeled”

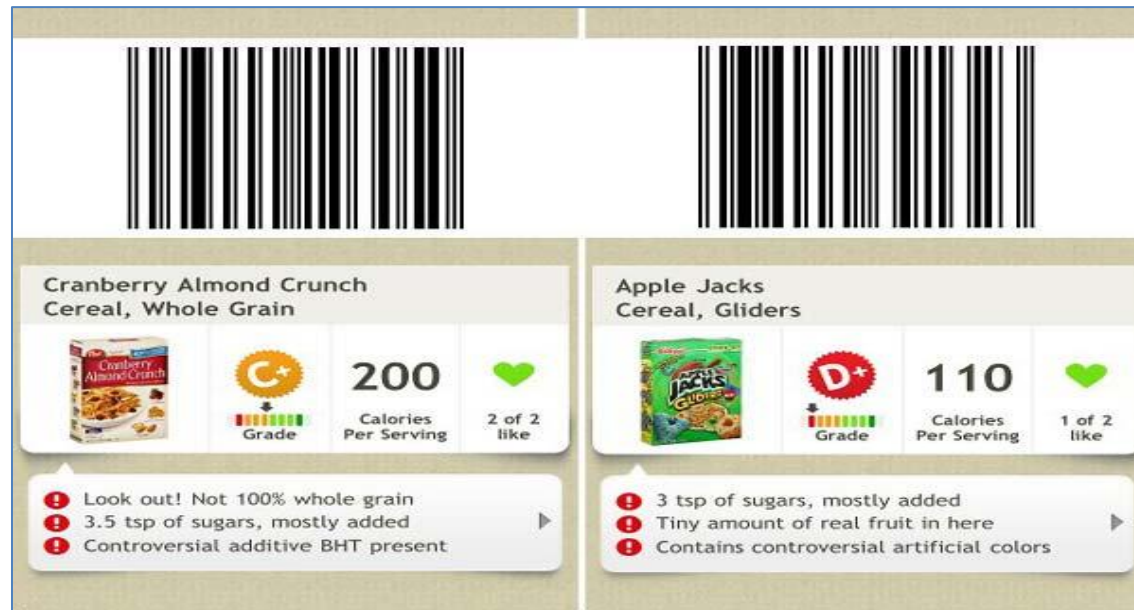
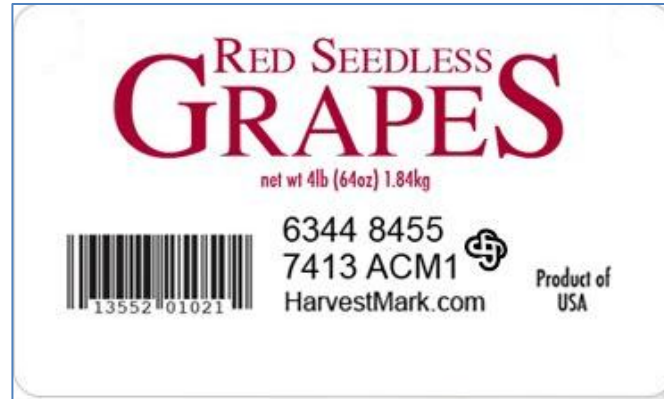
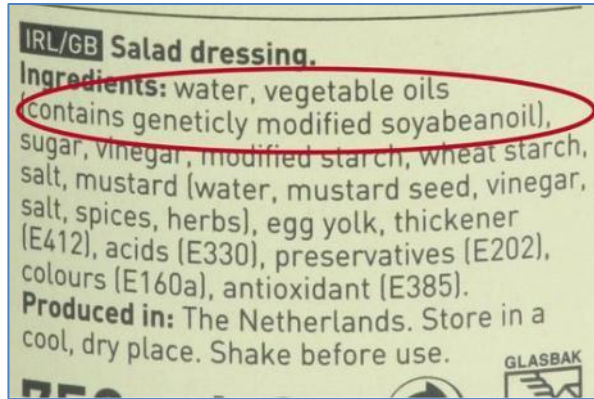


# Why I am against measure 92

## **It is of no value for making health decisions**

- It does not account for different types or amounts or activities of GMO materials in food
- Badly written: It will require a label with trace GMOs present = zero tolerance (misbranding, section 4)
- It requires labels on GMO gene & protein-free materials – like oils and sugars
- Much of the food we eat is exempted (e.g., restaurants, cafeterias, meats)

# Smart labels might make sense, but that is not what 92 would give us



# Why I am against measure 92

## **We have reliable, standardized, national GMO-free choices**



- Organic food is now common and cannot be made with GMO ingredients
- The GMO-free label is rapidly growing, and is more rigorous for those with concerns (e.g., meats from GMO-fed animals are excluded)
- The costs are not imposed on others, they are borne by those with strong concerns





# Why I am against measure 92

## **The cost of food will be increased, disproportionately hurting the poor**

- Recent studies from Cornell University and the Washington Academy of Sciences suggest it may be hundreds-\$\$ per family
  - Oregon administrative cost alone in millions/yr
- Main costs are segregation, tracking, and compliance inspection, not printing
- The stigma of the prominent label is likely to prompt many producers to use higher priced, non-GMO ingredients – raising food prices
  - Ben and Jerry's now trying – 5-20% (Wall St. Journal)
  - Reduced choice? Companies likely to discontinue many products just for Oregon

# Why I am against measure 92

## Investments in consumer education by labeling should start with issues of highest consumer and health concern

### High Risk

Diet: sufficiency, adequacy, over-nutrition

Food borne illness

Untested: organic food, dietary supplements

Natural toxicants

Food allergy

Chance additives

Pesticide and herbicide residues

Food ingredients and additives

GMO foods

### Low Risk

Source: Dr. Bruce Chassy, Prof. Emeritus, U. Illinois

# Microbial food contamination a major problem – often from organic crops



**CNN.com** Member Center: [Sign](#)

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UPDATED: 10:12 p.m. EDT, September 15, 2006

**BREAKING NEWS**



**FDA identifies source of E. coli outbreak**

An E. coli outbreak has spread to 19 states and sickened more than 90 people, federal health officials said Friday afternoon. The FDA is warning people not to eat bagged spinach and to throw it out. "If you wash it, it is not going to get rid of it," said the Center for Food Safety and Nutrition.

**DEVELOPING STORY**

- [CNNMoney: Spinach swept from shelves](#)
- [Map: States hit | What is E. coli?](#)
- [Time.com: Producers need to change practices](#)

- The US Centers for Disease Control (CDC; Atlanta) reports that in 2012, there were 128,000 cases of food-borne illnesses leading to hospitalizations, with 3,000 deaths (<http://www.cdc.gov/foodborneburden/index.html>)



*E. Coli* in German organic sprouts  
Fall 2011



# Public survey: Contamination, handling main food safety concerns

## Food Safety Concerns

- Disease/contamination and handling/prep are still the most mentioned food safety concerns, although to a lesser degree than previous years.

Food safety concerns	Total 2014 (A) n=1000	Total 2012 (B) n=751	Total 2010 (C) n=750	Total 2008 (D) n=1000
Disease/contamination	18%	29% A	29% A	38% ABC
Handling/preparation	18%	21%	23% AD	17%
Preservatives/Chemicals	12% D	13% CD	8% D	6%
Agricultural production	10% CD	7%	7%	5%
Packaging/labeling	9% BCD	5% D	4%	2%
Health/nutrition	7% D	8% D	6%	4%
Biotech	7% BCD	2%	2%	1%
Food sources	6%	7%	8%	9% A
Processed foods	3% BCD	1%	1%	1%
Other	3% CD	1%	1%	<1%

A/B/C/D indicate statistical significance between years

Q12. What, if anything, are you concerned about when it comes to food safety? [OPEN END]

# Why I am against measure 92

## **The stigma and cost will impede future biotechnology innovations, against American's interests**

- Regardless of benefits, it will be risky for companies to produce products with a marketplace stigma and added cost
- Investment in R & D will decline
- New crops in the commercial pipeline with clear benefits may be abandoned, and new innovations left on the shelf

# Poll: A majority of Americans wish to purchase many biotechnology products

## Likelihood to Purchase Plant Biotech Foods

- Consumers show high interest in nutrition & health-related benefits of food biotechnology.
- Nearly three-quarters of Americans say they are likely to purchase foods made with oils modified to provide more healthful fats, such as Omega-3s.

Total 2014 (n=1000)	Not Likely	Likely
Food product made with oils modified by biotechnology to <u>provide more healthful fats</u> , like Omega-3, in the food	28%	72%
Variety of produce modified by biotechnology to <u>reduce the potential for carcinogens</u> (n=501)	31%	69%
Variety of produce modified by biotechnology to be <u>protected from insect damage and required fewer pesticide applications</u>	31%	69%
Bread, crackers, cookies, cereals, or pasta made with flour modified to <u>use less land, water, and/or pesticides</u>	31%	69%
Bread, crackers, cookies, cereals, or pasta made with flour modified to <u>enhance nutritional benefits</u>	33%	67%
Food product made with oils modified by biotechnology to <u>eliminate the trans fat</u> content in the food*	33%	67%
Variety of produce modified by biotechnology to <u>improve vitamin content</u> (n=499)	35%	65%
Variety of produce modified by biotechnology to <u>taste better or fresher</u>	42%	58%

\*Note: Wording change from 2012 - "reduce the saturated fat content"

A/B indicate statistical significance between years

PB5, Q25 Q22 Q23. All other things being equal, how likely would you be to buy...





# The real motive of measure 92 is to provide a tool to further public fear

## IS LABELING REALLY ABOUT OUR "RIGHT TO KNOW" ?

"We are going to force them to label this food. If we have it labeled, then we can organize people not to buy it."

—Andrew Kimbrell, Executive Director, Center for Food Safety

"Personally, I believe GM foods must be banned entirely, but labeling is the most efficient way to achieve this. Since 85% of the public will refuse to buy foods they know to be genetically modified, this will effectively eliminate them from the market just the way it was done in Europe."

—Dr. Joseph Mercola, Mercola.com

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—Dr. Joseph Mercola, Mercola.com

"By avoiding GMOs, you contribute to the tipping point of consumer rejection, forcing them out of our food supply."

—Jeffrey Smith, Founder, Institute for Responsible Technology

"With labeling it (GMOs) will become 0%... For you the label issues is vital, if you get labeling then GMOs are dead end."

—Vandana Shiva, environmental activist

"The burning question for us all then becomes how—and how quickly—can we move healthy, organic products from a 4.2% market niche, to the dominant force in American food and farming? The first step is to change our labeling laws."

—Rennie Cummins, Director, Organic Consumers Association

# Science is against labeling: It increases cost, reduces choice, and increases prices that most hurt the poor

## “Legally mandating such a label can only serve to mislead and falsely alarm consumers”

### Statement by the AAAS Board of Directors On Labeling of Genetically Modified Foods

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE  
20 October 2012

There are several current efforts to require labeling of foods containing products derived from genetically modified crop plants, commonly known as GM crops or GMOs. These efforts are not driven by evidence that GM foods are actually dangerous. Indeed, the science is quite clear: crop improvement by the modern molecular techniques of biotechnology is safe. Rather, these initiatives are driven by a variety

conclusion: consuming foods containing ingredients derived from GM crops is no riskier than consuming the same foods containing ingredients from crop plants modified by conventional plant improvement techniques.

Civilization rests on people's ability to modify plants to make them more suitable as food, feed and fiber plants and all of these modifica-

added, the protein must be shown to be neither toxic nor allergenic. As a result and contrary to popular misconceptions, GM crops are the most extensively tested crops ever added to our food supply. There are occasional claims that feeding GM foods to animals causes aberrations ranging from digestive disorders, to sterility, tumors and premature death. Although such claims are often sensationalized and receive a

Approved by the AAAS Board of  
Directors on 20 October 2012

# The NY Times is against measure 92-like labeling!

The New York Times

## The Opinion Pages

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ENJOY YOUR FOOD  
WITHOUT PULLING

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EDITORIAL

### Why Label Genetically Engineered Food?

By THE EDITORIAL BOARD  
Published: March 14, 2013

Whole Foods Market caused a stir last week when it announced that it would require all products sold in its stores in the United States and Canada to carry labels indicating whether they contain genetically modified ingredients by 2018. Food advocacy groups hailed its action as a possible “game changer” that would push the entire food industry to adopt similar labels.

# The Oregonian is against measure 92

A8 | Saturday, July 5, 2014 | The Oregonian

## OPINION



Contact Editorial: 503-221-8150 • [commentary@oregonian.com](mailto:commentary@oregonian.com) • [letters@oregonian.com](mailto:letters@oregonian.com)



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Advance Central Services Oregon

# GMO food-labeling mandate would only sow confusion

Backers claim labels on GMO products will prevent consumer confusion, but the exact opposite is likely to be true

Backers of an initiative that would require labels for food produced using genetic engineering turned in more than 155,000 signatures this week, virtually guaranteeing a spot on the November ballot. Similar initiatives having failed in California in 2012 and in Washington in 2013, it's now Oregon's turn on the label-it movement's West Coast swing. With any luck, voters here will do justice to the state animal, the beaver, commonly known as nature's engineer.

**Editorial**





# Even our very green Corvallis Gazette-Times is against measure 92!

## Send letters to the editor:

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# Opinion

Monday, October 13, 2014  
Corvallis Gazette-Times, Corvallis, Ore.

A9

## GMO labeling measure 92 merits a 'No'

### EDITORIAL

The campaign over Oregon's Measure 92, which would require the labeling of raw and packaged goods produced by "genetic engineering," has lived up to its early billing as potentially one of the costliest ballot measures in state history.

As of the first of the month, the two main organizations duking it out over the issue had raised more than \$8 million, with opponents holding roughly a 2-to-1 edge in fundraising.

This big-bucks marketing blitz comes as no surprise: The Oregon campaign comes on the heels of a similar battle in Washington state, a campaign that also attracted millions of dollars.

Voters in Washington rejected the measure by a narrow margin. Our recommendation is that Oregon voters follow that example.

The measure would require that genetically engineered raw or packaged food include labels to that effect. It de-

fines "genetically engineered" food as food produced from organisms with genetic material changed through in vitro nucleic acid techniques and certain cell-fusing techniques. It exempts traditional plant-breeding techniques such as hybridization.

If voters approve the measure, it would take effect in January 2016. At that time, supporters of the measure have said, as consumers stroll through their favorite grocery store, most of the items on the shelves will bear a GMO label.

If enacted, the measure won't be particularly costly: The best current estimate is that the measure would cost Oregonians about \$2.30 a year.

But it's always hard to swallow paying any additional amount for something that's unnecessary.

Here's why it's unnecessary: Manufacturers of GMO-free products increasingly are taking advantage of the growing market for those foods by making sure their labels say so, in much the same way that products that have been gluten-free since the beginning of time now brag about that on their labels. In other words, the market is making it easier for consumers who want to avoid GMOs to do so — and that trend likely will only gather speed, along with the whole local-food movement.

There is something unfair about Measure 92 as well, and U.S. Rep. Kurt Schrader of Oregon has put his finger on the reason why: These types of mandatory labels always carry the implication that there's something wrong with the product. Look no further than the labels that have been slapped on cigarettes for a vivid example.

Of course, there is something wrong with cigarettes: They're one of the few

products that, used as the manufacturer recommends, will kill you.

But the scientific consensus about GMO foods is that they do not pose a health risk. A committee of faculty members at Oregon State University's College of Agricultural Sciences reinforced that consensus in a white paper issued this spring. While emphasizing that the committee was taking no position on Measure 92, it reached this conclusion:

"The available scientific evidence suggests that the biotechnology currently used in genetically engineered organisms does not present food safety issues that differ from traditional agricultural or breeding practices.

Furthermore, there is no verifiable scientific evidence that consumption of a GE organism has resulted in adverse health effects."

Oregon voters should reject this unnecessary and unfair ballot measure.

# In summary – why I am against 92

- Its about setting up a costly government system to do this when the private sector has already done it quite well, at the national level
- Its about creating a warning label that goes against the clear and overwhelming scientific consensus about safety
- It promotes a system that increases food costs for all
- It will impede economically beneficial and life-saving innovations – in Oregon and abroad
- **A label can inform or mislead – a misleading label is worse than no label at all**