GMOs and Benton Co. Ballot Measure 2-89

Steve Strauss
Who am I?

• Research: Genetics and biotechnology of forest and horticultural trees – 30 years
• Former director – OSU Outreach in Biotechnology program – 8 years
• Served on governor’s GMO task force – 2014-15

• Though an OSU Distinguished Professor, I am speaking today as citizen, not as OSU official or representing an OSU position
Agenda

- GMO 101
  - What are they
  - Extent of use
- Ballot measure
  - Highlights of OSU analysis
Most crops are highly genetically modified

- Maize
- Rice
- Lettuce
- Tomato
- Banana
Many crops derived from wild cabbage

Wild cabbage

Kohlrabi
Germany, 100 AD

Ornamental kale
Late 1900's

Kale, 500 BC

Cauliflower
1400's

Broccoli
Italy, 1500's

Cabbage, 100 AD

Brussel sprouts
Belgium, 1700's
Many plant varieties derived from induced mutations

Calrose 76 semi-dwarf rice

Over 2,000 crop varieties derived from mutagenesis have been commercialized

High oleic sunflower

Rio Red grapefruit
Genetic engineering defined

Traditional plant breeding

Variety A

Genetic engineering

Variety B

Asexual modification or insertion from any gene source
GMO crops widespread
Among most rapidly adopted innovation in history of agriculture, grown on >10% arable land on planet
Four crops dominate

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

Virus-resistant GM papaya trees
Saved the Hawaiian industry in the mid-1990s, ~80% of crop today

“RNAi immunization” via by implanting a viral gene in the papaya genome

Courtesy of Denis Gonsalves, formerly of Cornell University
Improved soy oil

“The developers, Monsanto and DuPont Pioneer, have manipulated the genes of the soybean to radically alter the composition of its oil to make it longer-lasting, potentially healthier and free of trans fats.”

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

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<tr>
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<th>Atlantic Chips</th>
<th>Ranger FF</th>
<th>Burbank FF</th>
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<td>Control</td>
<td>451</td>
<td>136</td>
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<tr>
<td>Lower Acrylamide</td>
<td>136</td>
<td>150</td>
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USDA approved “Arctic Apple”
Non-browning

The perfect fruit just got better

Yummy, good for us, varieties galore. We all love apples! Until they turn brown, that is. Arctic® apples are everything you love about apples, without the “yuck” factor that you don’t. (Now if we could just get rid of the seeds!)

Learn More
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 the trees, killing them within months.

More In This Article

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

March 2014 issue - Scientific American

http://www.esf.edu/chestnut/resistance.htm
What GMOs are grown in Benton Co?

- No official data on this – not required once authorized by USDA/EPA
- USDA approved: Corn, cotton, soy, beet, alfalfa, squash, papaya, canola, apple, potato
- Reasonable to expect in Benton Co. includes...
  - Corn
  - Alfalfa
  - Sugar-beet
  - (Squash)
What GMO-derived products are in Benton Co?

- Because of ubiquity of GM corn, maize, cotton, sugar beet and their many derived products (oil, protein, sugars), **lots**
- Most types of cotton-derived clothes
- Thousands of processed foods
- Only a couple of fresh foods
  - Papaya, squash
  - In upcoming years, potato and apple likely
Agenda

• GMO 101
  • What are they
  • Extent of use
• Ballot measure
  • Highlights of OSU analysis (from Vice-President for Research Ron Adams, Vice-President for University Relations and Marketing)
  • Draft
Highlights of ballot measure

- Broad but ambiguous as to impacts
  - “Oregon State University (OSU) scientific research experts … say the measure could impact OSU research and education related to medicine, agriculture, forestry, environmental protection, and wildlife conservation.”

- No exemptions for research or medical applications
  - “The ballot measure does not exempt use of genetically engineered organisms for biomedical applications, research, or educational institutions.”

- Sets up independent regulations / legal rights that may be in contradiction to Oregon and federal laws
  - State law passed in 2013 that banned local agricultural laws
  - Extensive federal regulation of GMOs by EPA, FDA, USDA
OSU analysis - impacts

• “OSU estimates the measure might directly impact 120 or more faculty in eight OSU colleges;
• stop research that was valued at $18.3 million from external funding in fiscal year 2014;
• affect the education of 300-400 students;
• and impact 100-200 support university staff.”
Multiple uses of GMOs in research and teaching at OSU

- Research and develop therapies for various human diseases, including Lou Gehrig’s disease;
- Find new ways to prevent or treat some types of cancer, including skin, lung, ovarian, bone, and pancreatic cancers;
- Reduce or prevent the effects of agricultural diseases on Oregon crops, such as eastern filbert blight;
Multiple uses of GMOs at OSU

• Develop improved environmental clean-up methods, including methods to clean up oil spills;
• Improve bioenergy and wood crops;
• Research the safe use of products of genetic engineering;
• Identify endangered species in the wild and detect the unlawful sale of protected species, such as endangered whales; and
• Educate students on modern laboratory tools and procedures, such as DNA sequencing.
Other elements

• “…makes arguments about the inherent rights of people to local and self-government that transcend state and federal law”

• “…outlines a “Bill of Rights” for natural communities, foods and agriculture.”

• “…establishes mechanisms for enforcement; rights of individuals, groups, or the county to sue for enforcement; and stipulates that violation of prohibitions are subject to both civil liability and criminal culpability.”
Other elements

• “It could also make it illegal for new crop varieties to be patented, and uncertainties would exist about the use of licensed or patented plants, whether or not they have been genetically modified or not.”

• Targets all GMO crops yet….
  • “As its use has grown, it’s now been estimated that genetic modification technology in agriculture has reduced chemical pesticide use by 37 percent, increased crop yields by 22 percent, and increased farmer profits by 68 percent.”