The Rights of a Citizen for Safe Food and Safe Environment

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Einstein

The Right to search for truth implies also a duty; one must not conceal any part of what one has recognized to be true

Questions?

- TO EAT OR NOT TO EAT ?
- TO PLANT OR NOT TO PLANT?

Natural Breeding

- Splicing of genes, add new traits without sacrificing genes organisms possess Therefore, Competitiveness of wild-type organism increases

The CaMV 35S promoter 528 base pairs of the CaMV 35S promoter sequence

- The Cauliflower Mosaic virus (the CaMV 35S promoter) is a real plant virus, and GMO companies do purposely inject it into plants they'd like to modify.
- Recent findings suggest that it modifies plants in untended ways –
- the most commonly used genetic regulatory sequence (i.e. that which drives the gene expression within the plant), called CaMV 35S promoter, also encodes a gene fragment of the virus, in addition to the desired genetic
- We now know, however, that for over twenty years neither of those simple expectations have been met.
- Major public universities, biotech multinationals, and government regulators everywhere, seemingly did not appreciate the relatively simple possibility that the DNA constructs they were responsible for encoded a viral gene. trait being inserted."

In the course of analysis to identify potential allergens in GMO crops, the European Food Safety Authority (EFSA) has belatedly discovered that the most common genetic regulatory sequence in commercial GMOs also encodes a significant fragment of a viral gene (Podevin and du Jardin 2012) GM Crops and Food 3: 1-5

- The Many Functions of Gene VI
- 1) Gene VI Is an Inhibitor of RNA Silencing
- 2) Gene VI Is a Unique Transactivator of Gene Expression
- 3) Gene VI Interferes with Host Defenses

figwort mosaic virus (FMV)

- commercially approved viral sequences having overlapping genes that were never subjected to risk assessment.
- These include numerous commercial GMOs containing promoter regions of the closely related virus figwort mosaic virus (FMV) which were not considered by Podevin and du Jardin.
- Inspection of commercial sequence data shows that the commonly used FMV promoter overlaps its own Gene VI (Richins et al 1987).
- A third example is the virus-resistant potato NewLeaf Plus (RBMT-22-82). This transgene contains approximately 90% of the P0 gene of potato leaf roll virus.
- The known function of this gene, whose existence was discovered only after US approval, is to inhibit the anti-pathogen defenses of its host (Pfeffer et al 2002). Fortunately, this potato variety was never actively marketed.

Biotech Industry Claims:

- GMO technology is precise and predictable
- Their own competence and self-interest would prevent them from ever bringing potentially harmful products to the market
- To assert that only well studied and fully understood transgenes are commercialized
- It is hard to imagine a finding more damaging to these claims than the revelations surrounding Gene VI.

Yield

Why the yield has been low?

- Influence on many other genes, thereby resulting in more complex genetic effects.

- Such genes typically have multiple effects on a crop, and early research is confirming that some of these effects can be detrimental

Lower Amounts of Herbicide Used

Benbrook *Environmental Sciences Europe* 2012, **24**:24
http://www.enveurope.com/content/24/1/24

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RESEARCH **Open Access**

Impacts of genetically engineered crops on pesticide use in the U.S. – the first sixteen years

Charles M Benbrook

Abstract

Background: Genetically engineered, herbicide-resistant and insect-resistant crops have been remarkable commercial successes in the United States. Few independent studies have calculated their impacts on pesticide use per hectare or overall pesticide use, or taken into account the impact of rapidly spreading glyphosate-resistant weeds. A model was developed to quantify by crop and year the impacts of six major transgenic pest-management traits on pesticide use in the U.S. over the 16-year period, 1996–2011: herbicide-resistant corn, soybeans, and cotton; *Bacillus thuringiensis (Bt)* corn targeting the European corn borer; *Bt* corn for corn rootworms; and *Bt* cotton for Lepidopteron insects.

Results: Herbicide-resistant crop technology has led to a 239 million kilogram (527 million pound) increase in herbicide use in the United States between 1996 and 2011, while *Bt* crops have reduced insecticide applications by 56 million kilograms (123 million pounds). Overall, pesticide use increased by an estimated 183 million kgs (404 million pounds), or about 7%.

Conclusions: Contrary to often-repeated claims that today's genetically-engineered crops have, and are reducing pesticide use, the spread of glyphosate-resistant weeds in herbicide-resistant weed management systems has brought about substantial increases in the number and volume of herbicides applied. If new genetically engineered forms of corn and soybeans tolerant of 2,4-D are approved, the volume of 2,4-D sprayed could drive herbicide usage upward by another approximate 50%. The magnitude of increases in herbicide use on herbicide-resistant hectares has dwarfed the reduction in insecticide use on *Bt* crops over the past 16 years, and will continue to do so for the foreseeable future.

Keywords: Herbicide-resistant crops, Herbicide-tolerant soybeans, Glyphosate, 2,4-D, *Bt* crops, Genetically engineered corn, Roundup Ready crops, Biotechnology and pesticide use, Glyphosate resistant weeds

Background

Public debate over genetically engineered (GE) crops is intensifying in the United States (U.S.), driven by new science on the possible adverse health impacts associated with herbicide-resistant (HR) crop pesticide use, and the rapid spread of glyphosate-resistant weeds. Still, many pesticide use trends are substantial and obvious, especially in recent years as a result of the growing number and geographical spread of glyphosate-resistant (GR) weeds.

Stable reductions in insecticide use in *Bt*-transgenic corn are also now in jeopardy as a result of the emergence of corn rootworm (CRW) populations resistant to the Cry

Quality of GMOs

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Compositional differences in soybeans on the market: Glyphosate accumulates in Roundup Ready GM soybeans ☆

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ABSTRACT

This article describes the nutrient and elemental composition, including residues of herbicides and pesticides, of 31 soybean batches from Iowa, USA. The soy samples were grouped into three different categories: (i) genetically modified, glyphosate-tolerant soy (GM-soy); (ii) unmodified soy cultivated using a conventional "chemical" cultivation regime; and (iii) unmodified soy cultivated using an organic cultivation regime. Organic soybeans showed the healthiest nutritional profile with more sugars, such as glucose, fructose, sucrose and maltose, significantly more total protein, zinc and less fibre than both conventional and GM-soy. Organic soybeans also contained less total saturated fat and total omega-6

Table 3

Composition of sugars and fibre (g/100 g fresh sample) in pooled soybean samples, i.e., mixing of all samples from GM ($n = 10$), conventional ($n = 10$), and organic ($n = 11$) origin.

	Glucose	Fructose	Sucrose	Maltose	Fibre
GM	0,37	0,20	3,24	0,02	27,1
Conv.	0,62	0,31	4,18	0,02	28,4
Organic	1,04	0,62	4,82	0,54	24,7

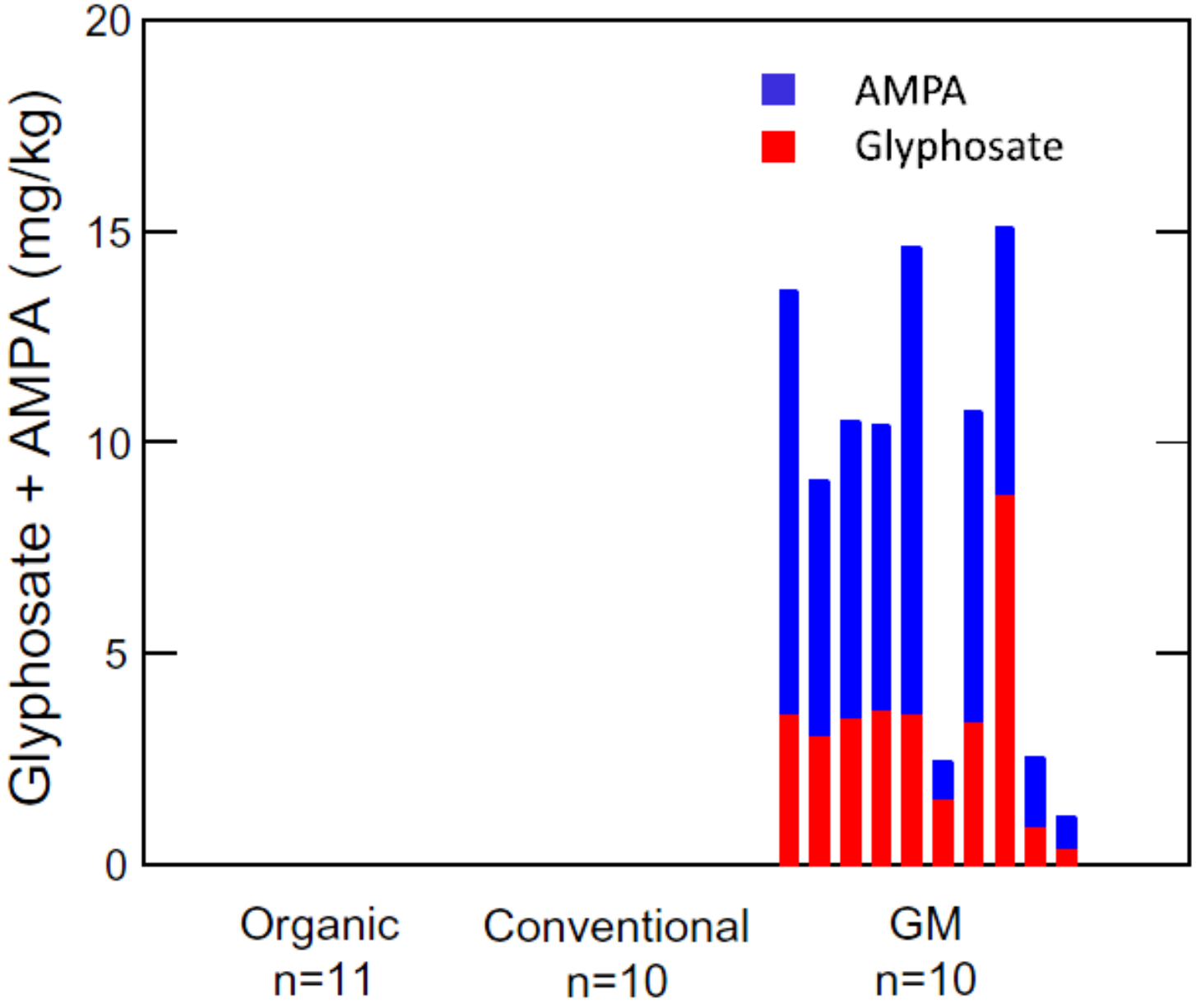

Fig. 1. Residues of glyphosate and AMPA in individual soybean samples ($n = 31$).

Long Term-Toxicity

Séralini et al. Environmental Sciences Europe 2014, 26:14
http://www.enveurope.com/content/26/1/14

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Republished study: long-term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified maize

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Abstract

Background: The health effects of a Roundup-tolerant NK603 genetically modified (GM) maize (from 11% in the diet), cultivated with or without Roundup application and Roundup alone (from 0.1 ppb of the full pesticide containing glyphosate and adjuvants) in drinking water, were evaluated for 2 years in rats. This study constitutes a follow-up investigation of a 90-day feeding study conducted by Monsanto in order to obtain commercial release of this GMO, employing the same rat strain and analyzing biochemical parameters on the same number of animals per group as our investigation. Our research represents the first chronic study on these substances, in which all observations including tumors are reported chronologically. Thus, it was not designed as a carcinogenicity study. We report the major findings with 34 organs observed and 56 parameters analyzed at 11 time points for most organs.

Results: Biochemical analyses confirmed very significant chronic kidney deficiencies, for all treatments and both sexes; 76% of the altered parameters were kidney-related. In treated males, liver congestions and necrosis were 2.5 to 5.5 times higher. Marked and severe nephropathies were also generally 1.3 to 2.3 times greater. In females, all treatment groups showed a two- to threefold increase in mortality, and deaths were earlier. This difference was also evident in three male groups fed with GM maize. All results were hormone- and sex-dependent, and the pathological profiles were comparable. Females developed large mammary tumors more frequently and before controls; the pituitary was the second most disabled organ; the sex hormonal balance was modified by consumption of GM maize and Roundup treatments. Males presented up to four times more large palpable tumors starting 600 days earlier than in the control group, in which only one tumor was noted. These results may be explained by not only the non-linear endocrine-disrupting effects of Roundup but also by the overexpression of the EPSPS transgene or other mutational effects in the GM maize and their metabolic consequences.

Conclusion: Our findings imply that long-term (2 year) feeding trials need to be conducted to thoroughly evaluate the safety of GM foods and pesticides in their full commercial formulations.

Keywords: Genetically modified; GMO; Roundup; NK603; Rat; Glyphosate-based herbicides; Endocrine disruption

Dr. Stephanie Seneff at MIT

- Monsanto has steadfastly claimed that Roundup is harmless to animals and humans because the mechanism of action it uses (which allows it to kill weeds), called the shikimate pathway, is absent in all animals. However, the shikimate pathway IS present in bacteria, and that's the key to understanding how it causes such widespread systemic harm in both humans and animals.

Glyphosate causes extreme disruption

- Glyphosate causes extreme disruption of the microbe's function and lifecycle. What's worse, glyphosate *preferentially* affects *beneficial* bacteria, allowing pathogens to overgrow and take over
- At that point, your body also has to contend with the toxins produced by the pathogens. Once the chronic inflammation sets in, you're well on your way toward chronic and potentially debilitating disease

Glyphosate inhibits cytochrome P450 (CYP) enzymes

- A large and diverse group of **enzymes** that catalyze the oxidation of organic substances
- One of the functions of CYP enzymes is to detoxify xenobiotics
- By limiting the ability of these enzymes to detoxify foreign chemical compounds, glyphosate *enhances* the damaging effects of chemicals and environmental toxins you may be exposed to.

Consequences for Human Health

- *"Consequences are most of the diseases and conditions associated with a Western diet, which include: gastrointestinal disorders, obesity, diabetes, heart disease, depression, autism, infertility, cancer and Alzheimer's disease. ... [T]he recent alarming increase in all of these health issues can be traced back to a combination of gut dysbiosis, impaired sulfate transport, and suppression of the activity of the various members of the cytochrome P450 (CYP) family of enzymes."*

GM Corn and level of Glyphosate

- Contains 13 ppm of glyphosate, compared to zero in non-GMO corn.
- At *13 ppm*, GMO corn contains more than *18 times* the "safe" level of glyphosate set by the EPA

Genetic Diversity and GMO Resistant Crops

MONARCHS IN PERIL

HERBICIDE-RESISTANT CROPS AND THE DECLINE OF MONARCH BUTTERFLIES IN NORTH AMERICA

CENTER FOR FOOD SAFETY

FEBRUARY 2015

Prediction of Herbicide Use

- 1996-2011 6.1% lower use of pesticides on GM cottons
- David Mortensen, a plant ecologist at University Park Pennsylvania State University: Predicts 2013-2025, herbicide use to go from 1.5 kg per Hectare to 3.5 kg for GM crops
- In the past 9 years Herbicide use has increased as GM has been used due to herbicide-resistant superweeds
- Southeastern US: Palmer amar an herbicide developed resistance to Glyphosate
- This superweed has spread to 76 countries by 2011
- Roundup tolerant crop and glyphosate introduction in 1996

GMOs and Laws Regarding its Use

Switzerland

In 2005, the Swiss voted by referendum a 5-year moratorium against the commercial cultivation of GM crops and animals.

- The Swiss government decided to extend this moratorium till 2013.
  In 2012 the Swiss Parliament voted for a second extention of the moratorium until December 2017 and then until 2022.

Pope Francis Slams GMOs and Pesticides for Environmental and Social Damage

June 16 , 2015

Pope Francis
June 16 , 2015

- “The most fragile among them become temporary workers and many farm workers migrate to end up in miserable urban settlements. The spread of these (GM) crops destroys the complex web of ecosystems, decreases diversity in production and affects the present and the future of regional economies”

GM foods = Greater Risks

Numerous scientists (including those on the FDA's Biotechnology Task Force) have concluded that the process of creating genetically modified food radically differs from conventional breeding and entails greater risk.

There has never been a consensus within the scientific community that GM foods are safe, and many eminent experts have issued cautions – as have respected scientific organizations such as the Royal Society of Canada and the Public Health Association of Australia.

RISK

- Risk analysis consists of three steps: risk assessment, risk management and risk communication.
- Risk is often defined as "the probability of harm". Thus assessing risk involves answering the following three questions: What might go wrong? How likely is it to happen? What are the consequences? The risk associated with any action depends on all three elements of the equation:

  Risk = hazard x probability x consequences.

Steven Druker: Altered Genes and Twisted Truth

- Druker says: "Contrary to the assertions of its proponents, the massive enterprise to reconfigure the genetic core of the world's food supply is not based on sound science but on the systematic subversion of science – and it would collapse if subjected to an open airing of the facts.