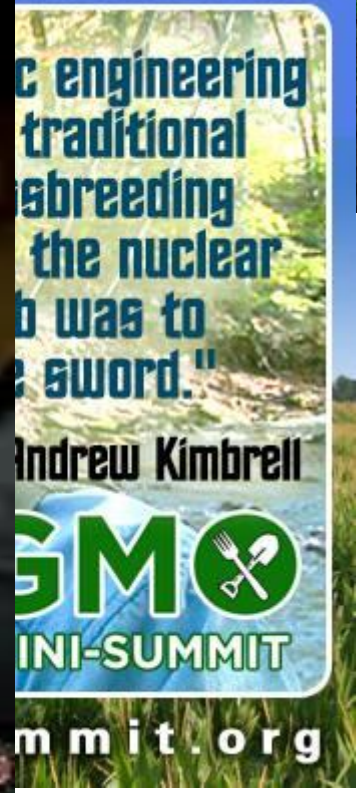


GMO Communication: Addressing Seeds of Destruction



Mahaletchumy Arujanan
Malaysian Biotechnology Information Centre

Seeds of Destruction



Seeds of destruction

- More than 500 activist organisations in North America is spending more than USD2.5 billion annually (2010) on food related campaigns targeting GM food, pesticides, animal welfare and testing, vaccines etc.
- 25 - 100% increase in budget for primary and secondary anti-GMO campaign

Opponent: The Machinery

Funding sources are:

1. Foundations
2. **Corporations**
3. Wealthy individuals
4. Sales/ Subscriptions/
Memberships/ Litigation
5. Other individual donors
6. Government grants

Industry support



Find Events Near You!

Event Count

MOMS ACROSS AMERICA



Profit-motivated

“If threats (*like GMOs, hormones and pesticides*) posed by cheaper, conventionally produced products are removed, then the potential to develop organic foods will be limited,”

Kay Hamilton, Promar, 1999 Organic Food Conference

In 2014 the “natural” products market in North America **exceeds \$290 billion annually** extending beyond organic foods to personal care and alternative health products and services according to the Natural Marketing Institute along with organic growing at record setting paces in the past 10 - 15 years. *Nearly three times the size of the global biotech and crop protection markets combined...*

Primary U.S. NGO Individuals



Primary U.S. Commercial Individuals



YOU SAY, AT LEAST LET ME HAVE A CHOICE TO SAY NO TO MONSANTO WITH A LABEL. AT THAT POINT, THEY TURN AROUND AND POUR MILLIONS INTO SAYING YOU CAN'T. THIS IS

FOOD FASCISM

VANDANA SHIVA



Credibility

- She has no formal training in biology, and has proudly claimed to lack experience and competence in the field saying in 1998, "I ran away from my first Biology class after that. Till now."

Source:

Vandana Shiva speech at <http://www.gene.ch/genet>
would not call what she d



Credibility

- “The University of Google is where I got my degree from.”

Anti-vaccine activist and actress Jenny McCarthy famously said on the Oprah Winfrey Show

Quotable Quotes

“We only destroyed a small part of the field trials. We were unarmed and we did that in broad daylight. How can the authorities charge us for eco-terrorism?”

- At a side event at MOP 4 in Bonn

“Transgenic human being in New Zealand”

**- At Aarhus Workshop, 2008.
Cologne,**

Speaking FOR or TO farmers?

On her way to her lecture on “WTO, Basmati Rice & the Stolen Harvest,” Shiva walked across the road and looked out into a shaggy field.

“They look unhappy,” she said.

“The rice plants. Ours at home look very happy.”

“That,” RiceTec reports, “is because it’s not rice. That’s our test field, it was harvested in August. That’s weeds.”

- Houston, USA

After a whole 30 min of presentation against Bt brinjal, an activist was unable to respond to a question on the number of times brinjals are sprayed with pesticides before harvest.

**- At a side event, MOP6,
Hyderabad**

Opponents: The Strategy

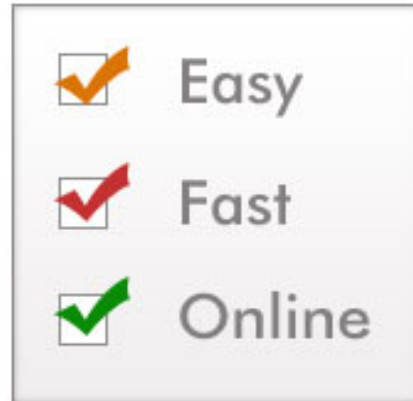
- Risk-driven story telling
 - Villain
 - Victim
 - Heroes

Shapes public opinion and influences policies

Source: Jay Byrne

Seeds of Doubt

- Creating doubts



Ignoring the Facts



Safer

Better

Affordable

Bt Brinjal
(Eggplant)

Misinformation

- Do you know the delicious tomatoes on your plate are inserted with spider genes so that the evil corporations can earn billions of dollars from silk extraction from the tomatoes?

**Blatant lies and
scare mongering
tactics!!!**



Misinformation

Do you know frog genes are inserted to your brinjal so that they have unusually broad spectrum and monstrous power to resist various infections?



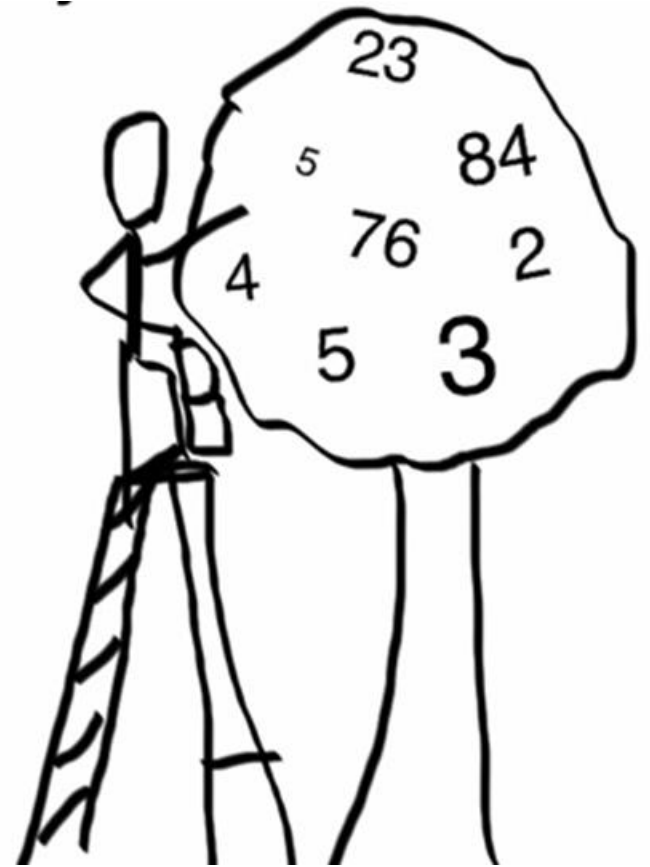
**Blatant lies and
scare mongering
tactics!!!**

www.bic.org.my

The Cherry-picking strategy

Has an agenda first and then seeks evidence to support his/her belief

Try to grab that 84,
it would look really
good in our report



Non-empirical evidence

... so we'll be talking with Dr. Jenkins of the National Institute of Health about the results of his 3-year study. And then for a different take we'll talk to Roger here, who I understand has reached the opposite conclusion just by sitting on his couch and speculating.





“Heroic act”: Vandalism

Page 10 / NATIONAL NEWS

Europe to shun Kenya's GM crops, farmers told

EU warns that it will be difficult for genetically modified crops to gain access into their markets

BY GATONYE GATHURA

Local farmers will find it difficult to export their crops to Europe if they adopt the Genetically Modified (GM) crops, according to the head of the EU delegation to Kenya, Lodewijk Briet.

"We have made this crystal clear to South Africans and I am telling the same to Kenyan farmers that it will be almost impossible to export GMOs to Europe," Mr Briet said during Citizen TV's breakfast show, Cheche, on Wednesday.

could be linked to cancer.

Last week, Health Cabinet Secretary James Macharia told the Parliamentary Committee on Agriculture, Livestock and Co-operatives that there is a lot of local and international pressure to have the ban lifted.

Among the organisations campaigning for the lifting of the ban is the Melinda Gates Foundation. "There has been a lot of lobbying. We had a meeting with Melinda Gates, but we didn't take a position; we had to wait for a report of the task force that we formed to investigate the issue," said Dr Macharia.

TASKFORCE REPORT

The task force, which Macharia said has so far spent about Sh4 million, is said to have completed its work and ready to present the report to the CS, who will then coordinate its presentation to the

have largely been conducted away from the public glare hence the anxieties that the verdict may cause.

Mr Briet was reacting to a question on why Europe is pushing GMOs to Kenyans. "That notion is wrong. May I make it clear that we are highly opposed to genetically modified foods and any Kenyan farmer going that way will find it hard to get a market in our region."

The first GMO crop to be planted in Kenya, most likely cotton and maize, will mainly target the local market.

But some experts fear that importers of other agricultural products may skip the local produce for fear of it being contaminated, even if not intentional.

The American push for Kenya to lift the ban follows setbacks for the US GMO industry with Russia backtracking and



President Uhuru Kenyatta and Pacific Islands leader yesterday. (PHOTO)

Uhuru

BY A

President Uhuru Kenyatta has welcomed the decision of the European Union to allow transport of agricultural products from the region. Speaking at a joint session of the Ministers of Agriculture and Livestock Development and Fisheries and Aquaculture



Vandalism in Europe

- France, Germany, Spain the United Kingdom and Switzerland
- Public research
- Estimated damage for one trial – Euro 1.2 mil
- For each Euro spent on research, 78 cents were spent on security, 31 cents on biosafety and 17 cents on government regulatory supervision.

Source: Marcel Kuntz, GM Crops and Food: Biotechnology in Agriculture and the Food Chain 3:4, 1-7; October/November/December 2012; © 2012 Landes Bioscience review

The Victims



Source: Dennis Gonsalves

A papaya farmer in Thailand



1987



Source: Dennis Gonsalves



Farmers still waiting in
anticipation for GM
crops...

2004

Source: Dennis Gonsalves

Natural Foods

- What are natural foods?
- Are they safer?
- Are all the food we eat natural?



Real Natural Foods



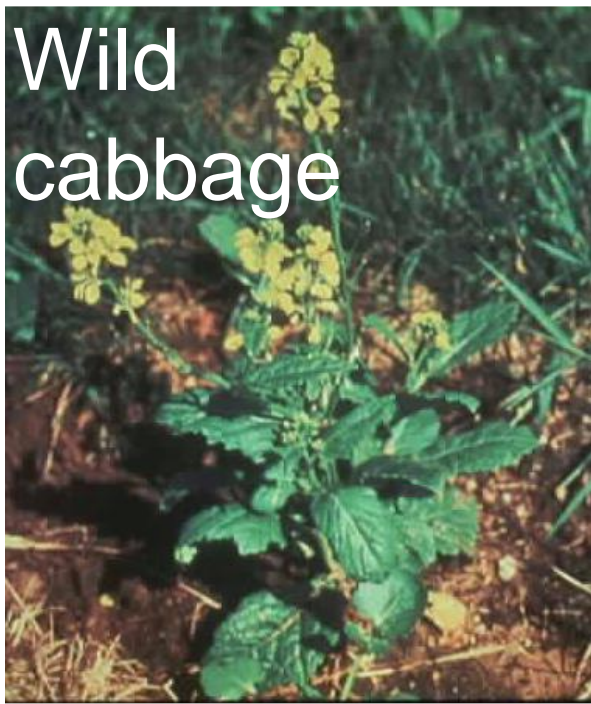
Real Natural Foods



Real Natural Foods



Wild
cabbage



Real Natural Foods



Real Natural Foods



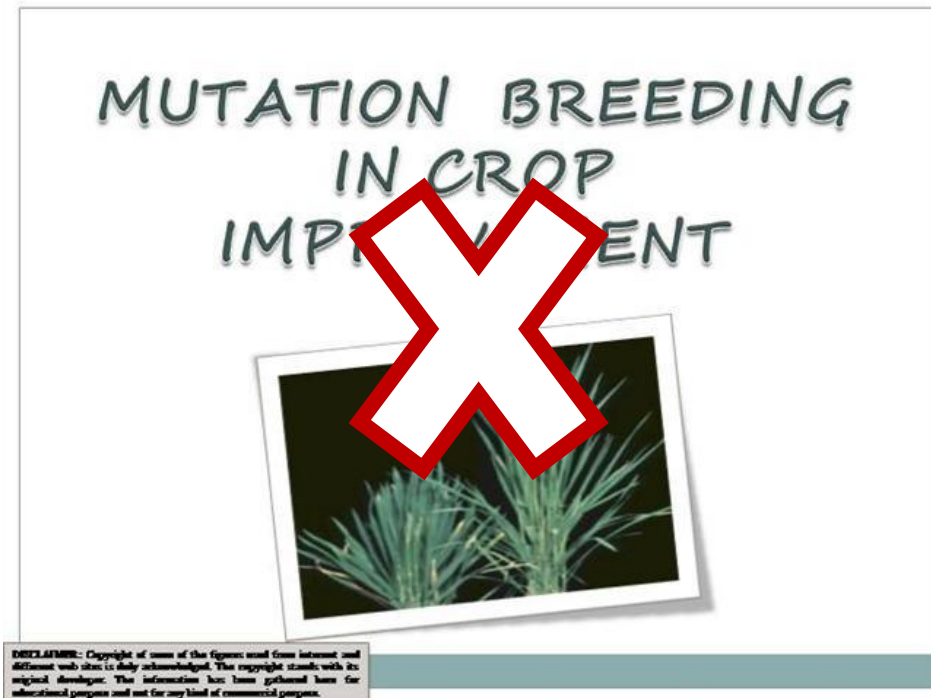
Numerous Examples of Genetic Modification



What is not a GM crop?



Cross Breeding

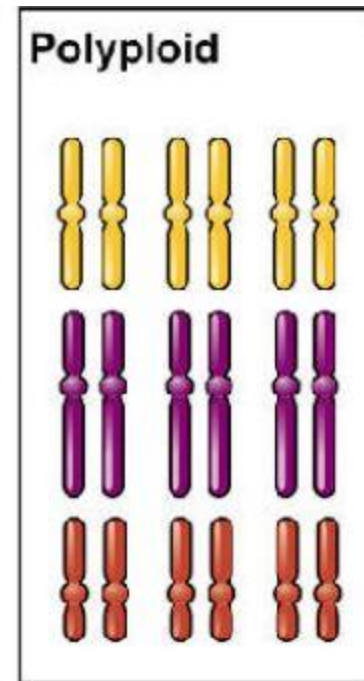
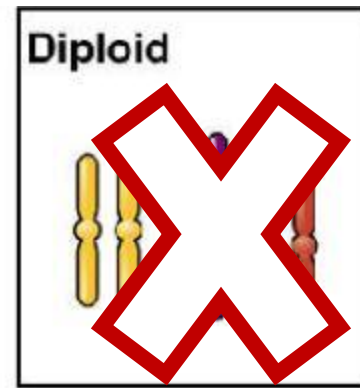
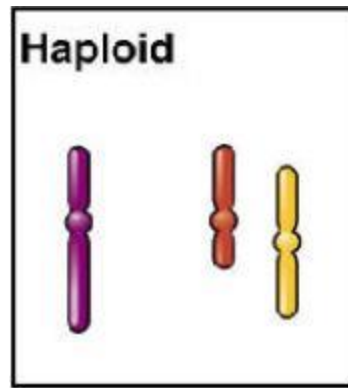


**Mutation with
Chemicals**

What is not a GM crop?



Irradiation



Polyploids

Gamma Field for radiation breeding

**100m
radius**

**89 TBq
Co-60
source at
the center
Shielding
dike 8m
high**



**Institute of Radiation
Breeding
Ibaraki-ken, JAPAN
<http://www.irb.affrc.go.jp/>**

CONTRIBUTION OF BIOTECH CROPS TO SUSTAINABILITY

INCREASES CROP PRODUCTIVITY

contributes to **food, feed, & fiber** security



more **affordable** food

reduced production costs



LESS

ploughing
pesticide sprays
labor

US\$116.9 billion

farm income gains in 1996-2012
GENERATED GLOBALLY BY
BIOTECH CROPS

HELPS CONSERVE BIODIVERSITY

land-saving technology



higher productivity

on world's
1.5 billion
hectares of
arable land



prevents
deforestation
protects
biodiversity

REDUCES AGRICULTURE'S ECO-FOOTPRINT

lowers **CO2** emissions



in 1996-2012, pesticide spraying reduced by
503 million kg

decreased environmental impact from herbicide & insecticide use by **18.7%**

use of **herbicide tolerant biotech crops** conserves **soil moisture**

savings on **fossil fuels**



HELPS MITIGATE CLIMATE CHANGE

fewer **herbicide & insecticide** applications



reduced **FUEL USE**

reduced **CO2 emissions** equivalent to removing **11.9 million cars** from the road for **1 year**



CONTRIBUTES TO THE ALLEVIATION OF POVERTY AND HUNGER

better **livelihoods** from **higher yields**

18 million farmers in **27 countries** planted **biotech crops** in 2013



90%

small, resource-poor farmers from developing countries who got **US\$3.14** for every US\$1 invested in **GM seeds**

biotech crops help farmers **earn reasonable incomes**

biotech cotton has made significant contribution to the incomes of **>16.5 million** farmers and their families in **CHINA, INDIA, PAKISTAN, MYANMAR, BURKINA FASO, & SOUTH AFRICA**



SOURCES:

Brookes, Graham and Peter Barfoot. 2014. GM Crops: Global Socio-Economic and Environmental Impacts 1996-2012. PG Economics Ltd.: Dorchester, UK.
James, Clive. 2013. Global Status of Commercialized Biotech/GM Crops: 2013. ISAAA Brief No. 46. ISAAA: Ithaca, NY.

For more information, visit ISAAA website:
www.isaaa.org



Food Safety Overview

Prior to commercialization

- There must be no changes in nutritional or anti-nutritional composition
 - Compositional analysis
- Is there a new protein?
 - Biochemical characterization
 - The protein must be digestible
 - The protein must not cause allergies
 - The protein must not be toxic
- Feeding trials to detect unexpected changes



Grain compositional analysis

- **Proximates:** crude protein, crude fat, ash, carbohydrates by calculation, and moisture
- **Fiber:** ADF, NDF, and total dietary fiber (TDF);
- **Minerals:** calcium, copper, iron, magnesium, manganese, phosphorus, potassium, sodium, and zinc
- **Amino acids:** alanine, arginine, aspartic acid, cystine, glutamic acid, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, and valine
- **Fatty acids:** palmitic acid, stearic acid, oleic acid, linoleic acid, linolenic acid, arachidic acid, eicosenoic acid, and behenic acid
- **Vitamins:** B1, B2, B6, E, niacin, and folic acid
- **Anti-nutrients:** phytic acid and raffinose
- **Secondary metabolites:** ferulic acid and p-coumaric acid



Safety characterizations

Steps before commercialization

- Molecular characterization of introduced DNA
 - Stability & inheritance over 4 generations
 - Clean inserts
 - Not a single extra bp is now permitted in some countries
- Identity, function & expression of transgenic protein
 - Mass spectrometry, N-terminal sequencing, western blots, enzyme activity, glycosylation analysis
 - Digestibility, allergenicity & toxicity
 - Purified protein costs **\$\$ Millions** to produce
- Bioefficacy, bioavailability, safety for poultry
 - Costs of animal studies

Toxicology

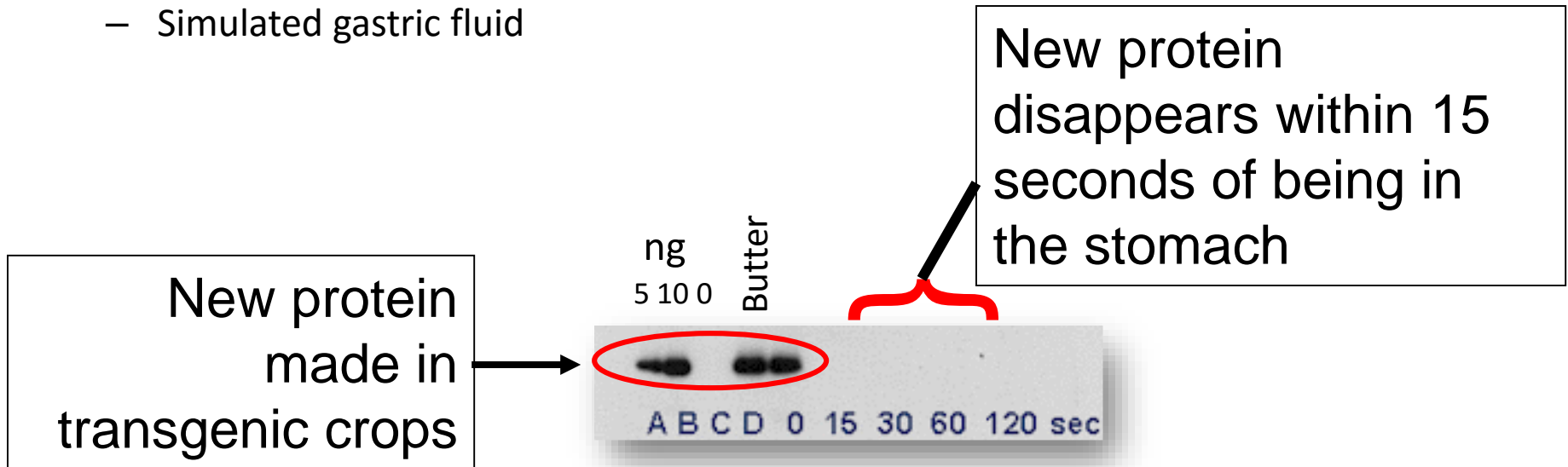
- 42-day study with broiler chickens
 - Serves more as a nutrition study
- Sub-Chronic toxicity
 - 90-day studies with rapidly growing animals
- Acute toxicity
 - 14-days following exposure to high dose



Digestibility

Helps determine allergenicity and toxicity

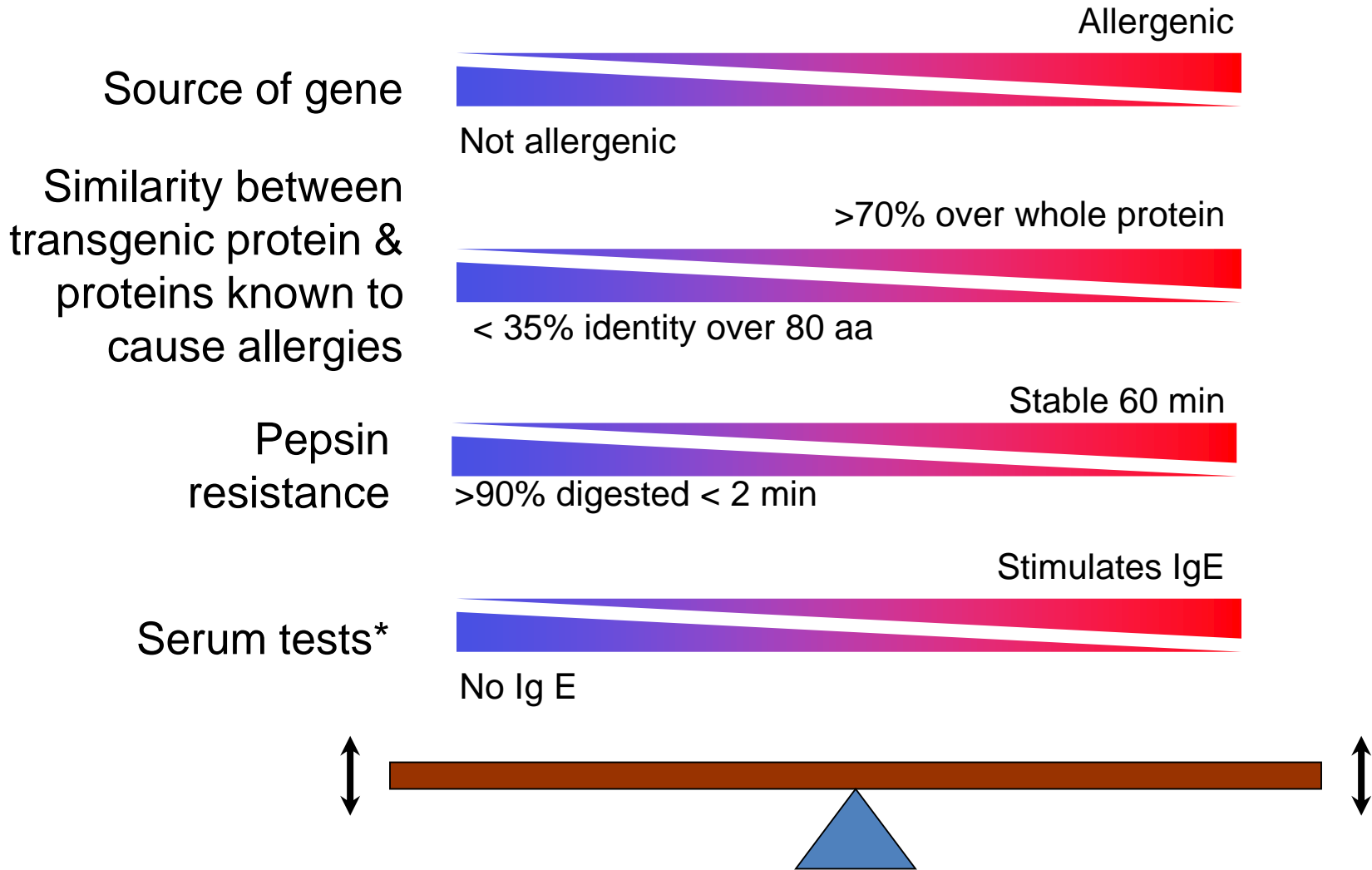
- Before something can cause long-term problems, it must survive the digestive process and enter the body
 - E.g., the protein for herbicide-tolerant crops
 - Simulated gastric fluid



- Point is there is no new chemical or substance that survives and which can cause problems in the long run

Allergenicty: Weight of the evidence

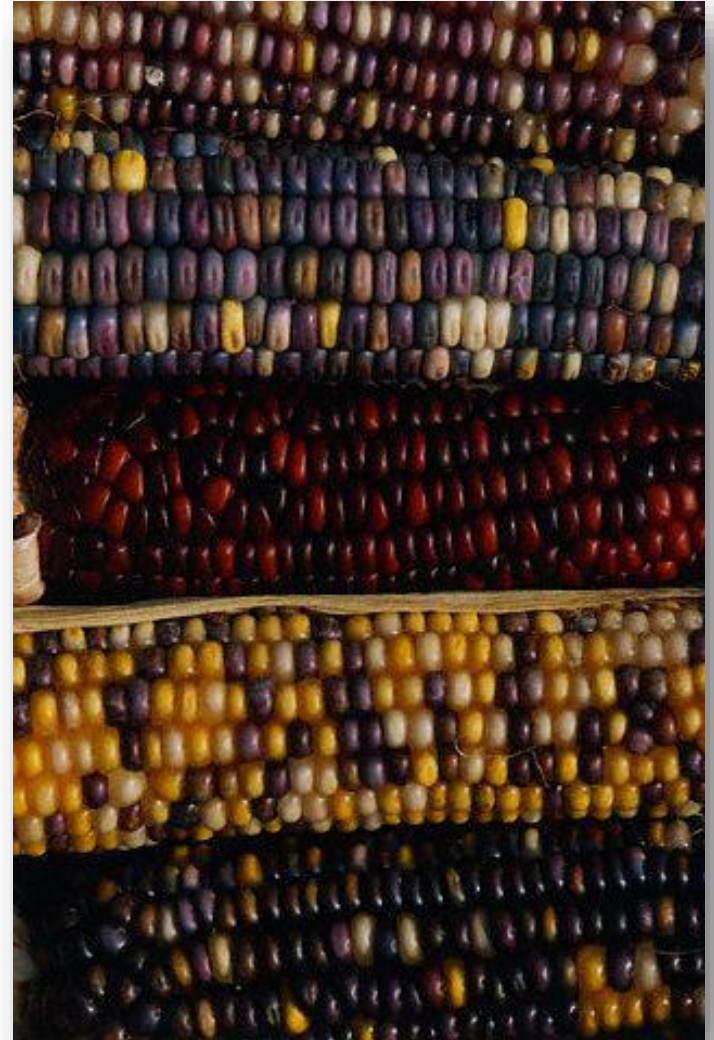
Codex Alimentarius, 2003



*If similarity is <35%

Substantial equivalence

- When a product
 - Has no new health concerns
 - Allergens, toxins
 - Has the same nutrient value as the non-transgenics
 - Has the same agronomic traits as the non-transgenics
 - It is substantially equivalent
 - Otherwise, labels are required
 - And, the difference is targeted for further safety studies



Environmental Impact

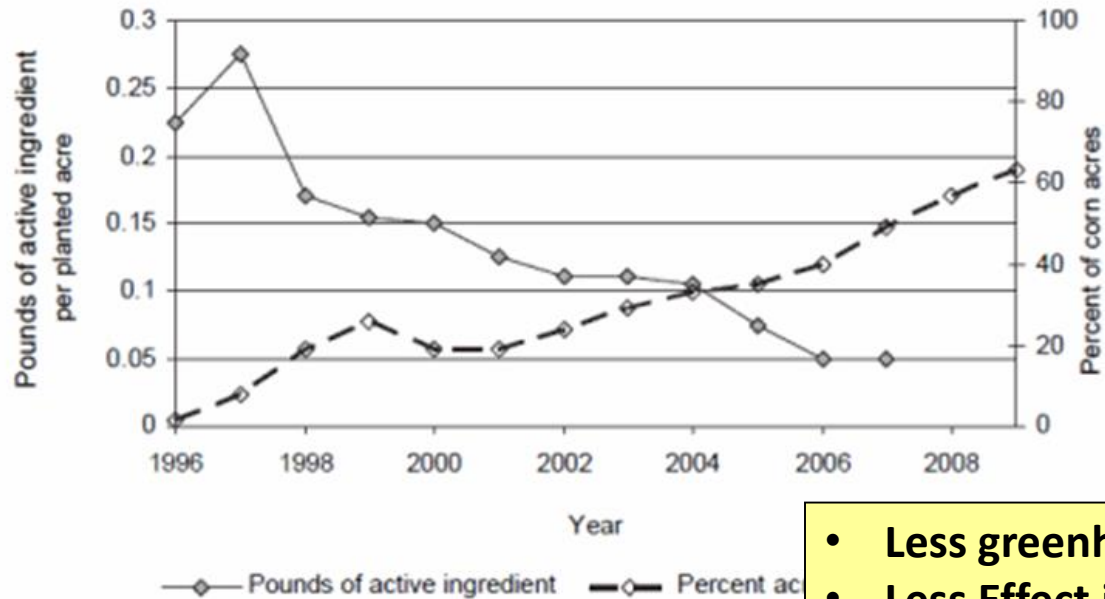


FIGURE S-4 Pounds of active ingredient of insecticide and percent acres of Bt corn, respectively.

National Research Council (2008)

- Less greenhouse gas emissions
- Less Effect in Climate Change
- Less Effect on biodiversity
- Better Food quality
- Improved farmer health

2005: Transgenic crops equivalency to less automobiles

- 962 millions kg of CO₂ saved from combustion
- 8.053 millions kg of CO₂ sequestered in the soil
- = 4.006.854 cars parked for 1 year
 - 17% of the cars in Great Britain



Benefits to farmers or Monopoly?

- Farmers are shortchanged
 - High price of seeds
 - Not allowed to save seeds

The Outrage



The Reality

- Farmers are free to make their choice of seeds
- Companies are not patenting basic food but only their seed varieties
- Hybrid yielding hybrid seeds were introduced in 1920s. Buying new seeds every season is NOT new.
- Seed saving in large scale cultivation results in reduced productivity due to pollination and gene flow, among others

“The less focused and productive agriculture is, the more destructive its effects will be.”

Organic Patents

- **Vermont Organics** has patented five chrysanthemum plants, as well as an “apparatus and method for manure reclamation.” While only the last application specifically refers to organic methods, the patents contradict the idea promoted by activists that patenting and organics just can’t—and shouldn’t — mix.
- **Kalidas Shetty and Iceland Bioenhancers** have applied for a patent for organic fertilizer, based on seaweed extract and fish hydrolysate.
- **Several Chinese companies** have applied for patents, for organic fertilizer.
- **Rogelio Smith** was listed as the inventor of an organic vegan protein shake, “formulated from 100 percent organic and natural plant-based ingredients with the highest grade of protein, vitamins, minerals and other nutrients.”

Who encourages the monopoly?

- There are dozens of GM crop research in developing countries by public sector institutes – China, India, Brazil, Indonesia



- **Stringent regulatory process requires millions of \$\$\$**
- **Pushes the technology to the industry**
- **Strict liability prevents active research and commercialisation in public sector**



se c



w
re h

We allow them to make decisions

for us

- We allow them to take us backwards

Scientific accuracy Vs Gut Feelings

- Can Biotech offer solutions?
- Is it business as usual?
- Can organic and conventional methods single-handedly overcome food security, climate change, sustainable development?

In the last 30 minutes

- Another 7000 more human beings have been added to this planet, further increasing the no. of people per hectare of arable land
- About 500 children have died due to malnutrition somewhere in the third world
- Pests have caused losses equal to about 650,000 tons of milled rice

“To feed a world of >9 billion people in 2050, without allowing for additional imports of food:

Africa has to increase its food production by 300 percent;

Latin America by 80 percent;

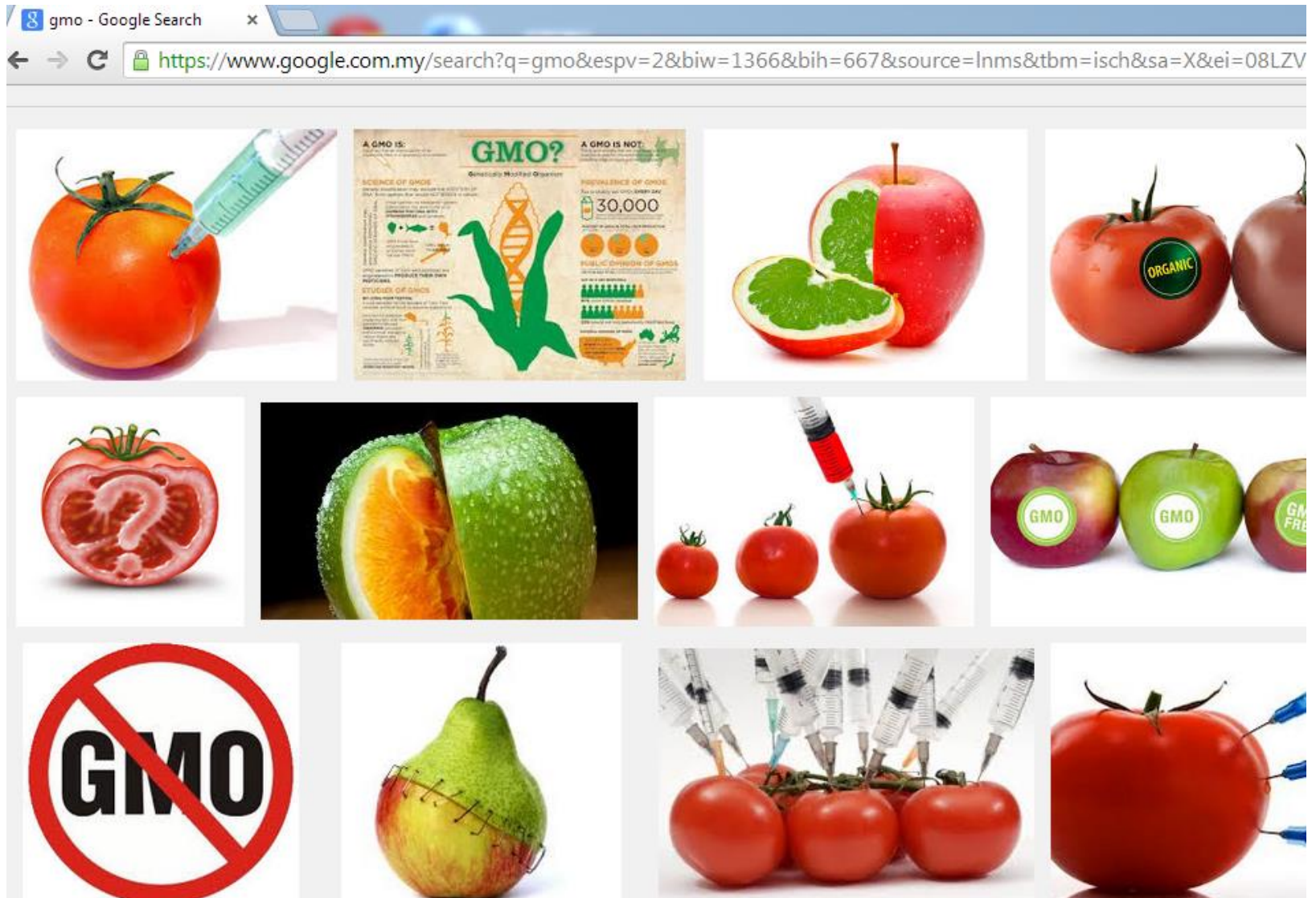
and Asia by 70 percent.

- **800 million people go to bed hungry every day**
- **About 30,000 people, half of them children, die *every day* due to hunger and malnutrition**



“In the next 50 years, mankind will consume as much food as we have consumed since the beginning of agriculture 10,000 years ago - Clive James”

The Success of GMO Critics



Effective communication

The Need to be a Storyteller

- Connecting
- Communicating
- Convincing



GMOs and cancer



Web

Images

News

Videos

More ▾

Search tools

About 805,000 results (0.48 seconds)

Scholarly articles for **GMOs and cancer**

Rectal **cancer** - Bonadeo - Cited by 72

Colorectal **cancer** staging: reappraisal of N/PN ... - Vaccaro - Cited by 29

... iron oxide nanoparticles for targeted **cancer** therapy - Dilnawaz - Cited by 156

New Study Links GMOs To Cancer, Liver/Kidney Damage ...

www.collective-evolution.com/.../new-study-links-gmos-to-cancer-liverk... ▾

Jul 15, 2014 - In November 2012, the Journal of Food and Chemical Toxicology published a paper titled Long Term Toxicity of Roundup Herbicide and a ...

Do GMOs Cause Cancer? - MD Anderson Cancer Center

www.mdanderson.org/...and-cancer.../cancer.../cancer.../gmoscancer.htm... ▾

Health risks of **GMOs** is inconclusive but many people believe altering the DNA of a plant or animal has a significant effect on the chances of developing **cancer**.

You've visited this page 2 times. Last visit: 2/10/15

Top GMO question consumers want answered: Do GMOs ...

geneticliteracyproject.org/.../top-gmo-question-consumers-want-answere... ▾

Apr 9, 2014 - **GMO** Answers plans to address one question per week, beginning with: Do **GMOs** cause **cancer**? The answer to the most asked question is ...

You've visited this page 3 times. Last visit: 1/22/15

10 Reasons to Avoid GMOs - Institute for Responsible ...

www.responsibletechnology.org/10-Reasons-to-Avoid-GMOs ▾

Do GMOs Cause Cancer? -- Submitted as Part of GMO ...

gmoanswers.com/.../do-gmos-cause-cancer-submitted-part-gmo-answers-... ▼

Mar 18, 2014 - The short answer is no, there is absolutely zero reputable evidence that **GMO** foods cause cancer. Cancer is a name applied to a spectrum of ...

Fact or Myth: Do Genetically Modified Foods Cause Cancer ...

undergroundhealthreporter.com/genetically-modified-foods/ ▼

More than 65% of U.S. corn crops are **GMO's**, find out if these foods cause **cancer**. Since these **genetically modified** foods have been sneaking into our diets ...

Shock findings in new GMO study: Rats fed lifetime of GM ...

www.naturalnews.com/037249_gmo_study_cancer_tumors_organ_dam... ▼

Sep 19, 2012 - **GMOs** may be the new thalidomide. "Monsanto Roundup weedkiller and GM maize implicated in 'shocking' new cancer study" wrote The ...

GMO Corn Linked To Cancer Tumors - Food Matters

foodmatters.tv/articles-1/gm-corn-linked-to-cancer-tumors ▼

Jan 7, 2013 - The first ever study to examine the long term effects of eating **GMO's** has ... and **GMO** maize implicated in 'shocking' new cancer study" wrote ...

GMO foods cause cancer—pseudoscience says it's so

www.skepticalraptor.com/...php/gmo-foods-cancer-pseudoscience/ ▼

Sep 4, 2014 - Let's make something clear right here, at the beginning of the article—there is a vast amount of legitimate scientific literature that describes ...

Does genetically modified corn cause cancer? A flawed ...

www.forbes.com/.../does-genetically-modified-corn-cause-cancer-a-flaw... ▼

Sep 24, 2012 - Last week a scientific paper appeared that reported that eating **genetically modified** (GM) corn causes **cancer** in rats. Specifically, the scientists ...
You've visited this page 2 times. Last visit: 2/10/15

Why do we need storytellers?

- Science appeals to our rational brain, but our beliefs are motivated largely by **emotion**
- We believe in scientific ideas not because we have truly evaluated all the evidence but because we feel **an affinity for the scientific community**
- Science presentations are abstract and **disconnected** to everyone's lives

Opponents: The Strategy

- Risk-driven story telling
 - Villain
 - Victim
 - Heroes

Shapes public opinion and influences policies

Source: Jay Byrne

Where are we failing?

the deficit model does not work!



Our Hypotheses

- Scientific information will increase technology acceptance
- The more educated a person is, the more he will understand GM technology
- Education can minimise/dispel risk aversion

- Why opposition to vaccination among educated parents?

What we do wrong?

- One-way communication, educational and too academic
- Deficit model is widely practiced by scientists
 - We tell them what they need to know
 - We feed them with scientific information
- Tools used
 - Don't end up in the public domain
 - Elite websites (universities, science-based organisations)
 - Publications that the public will not read or even have access to



Cultural Cognition

- How do people perceive risks and benefits?
- refers to the tendency of individuals to form risk perceptions that are congenial to their values

Dan M. Kahan (Yale University)

- Behaviour, social and cultural aspects, background, upbringing, beliefs, ideology
 - Strong understanding of sociology



Scientific knowledge takes a
back seat



Cultural Cognition

- Simply educating the public is insufficient
- What happens when we try to educate the public or provide scientific evidence
 - **Cognitive dissonance**
 - When we provide data that is against the individual's predisposed values and views – the natural mental reaction is to resolve the issue
 - How – by dismissing the conflicting information, and seeking reinforcing information from “trusted” sources

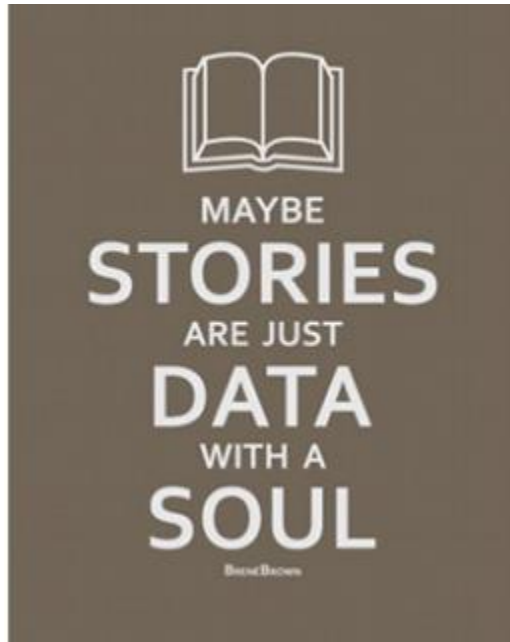
What do we do?

- Education is not obsolete
 - Minimise Cognitive Dissonance by engaging the values of the audience
 - Messages crafted in a way that affirms the values rather than challenging it
 - Showing them we share the same values
 - Likely to be more open to new information

How?

- Peers as spokespersons or messengers
 - Using expert voices widens the views on risks
- Citizen journalism
- Reaching out to uninitiated minds – start young, get to the audience before the NGOs get to them
- Unveil the mask worn by the opponents

GM Stories



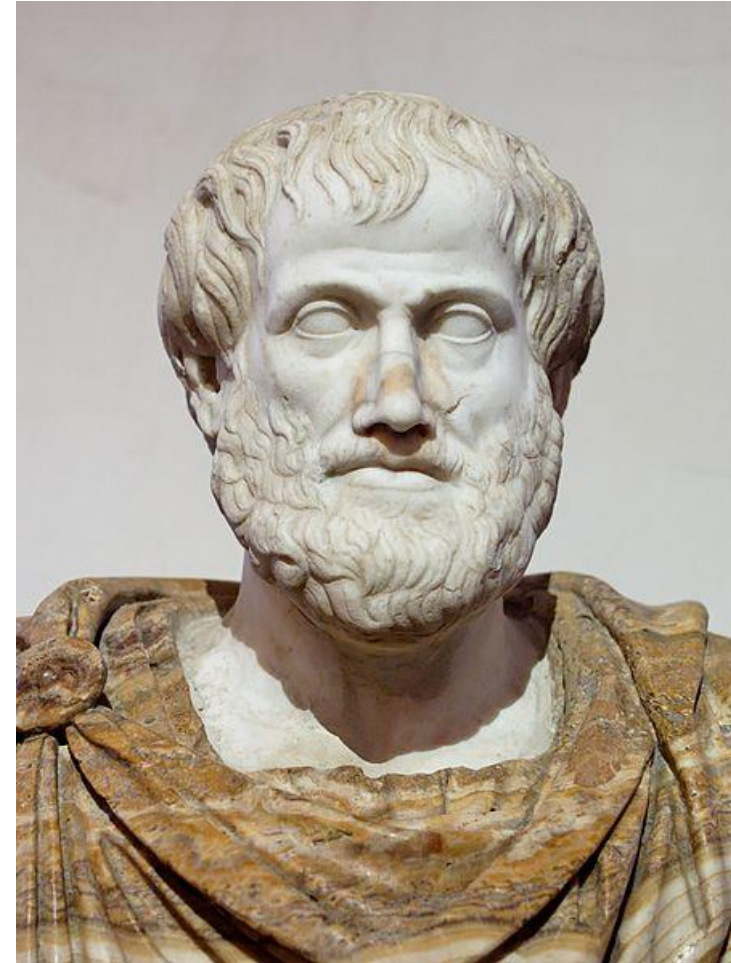
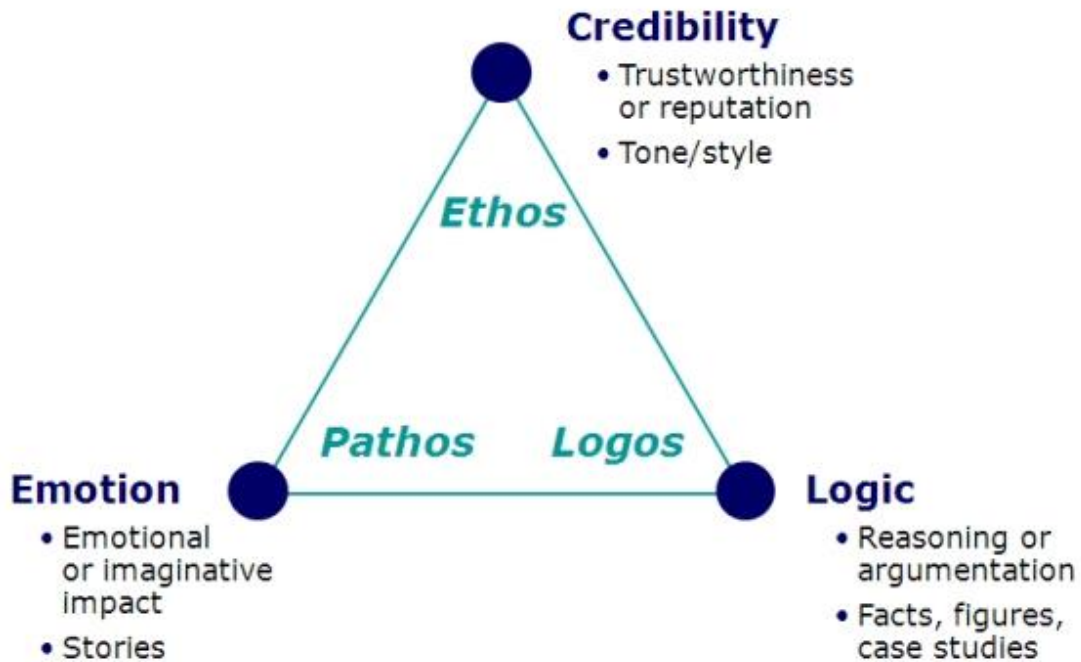
Repackage our data into a story with emotion that reaches the hearts

Communicating in politicised environment

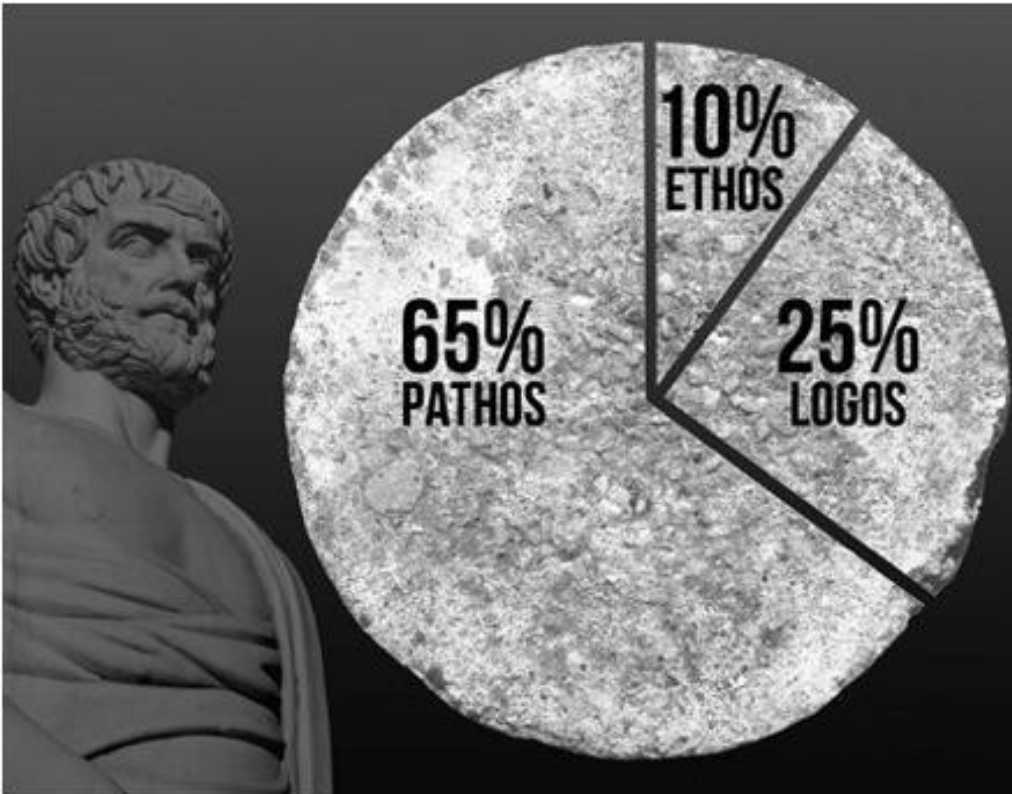
- Less attention to scientific presentation
 - If they trust you – you don't need the science
 - If they don't trust you - science will not help as well
- Make our case more memorable and believable
 - stop intellectualising
 - make our case appealing to their heads and hearts (**most of the time we forget the hearts**)

Don't be so cerebral

Aristotle's theory of persuasion



The Right Balance



TED Talk

Bryan Stevenson – received the longest and loudest standing ovation in TED’s history

He raised USD1.12 mil from his talk for his NGO. He spoke for 18 min.

2.2: Pie Chart: Percentage of Ethos, Logos and Pathos, represented in Bryan Stevenson’s TED 2012 presentation. Created by Empowered Presentations @empoweredpres.

Science in Communication

- If they trust you – you DON'T need Science
- If they don't trust you – you DON'T need Science

Take home messages



- Identify facts and fiction
- Decisions based on facts
- Understand the motives of anti-GM NGOs
- Decisions based on farmers' need, food security and poverty alleviation



Source: Dennis Gonsalves

MEANWHILE
IN 2064 ...

Cox &
Forkum
©2004

REMEMBER BACK WHEN
YOU GUYS **BLOCKED**
CONSTRUCTION OF A
NEW RESEARCH LAB?

