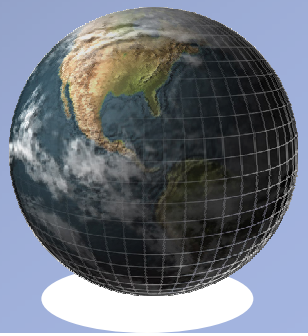
Does South Africa need more regulations for GMOs?

Professor Jocelyn Webster
Executive Director

AfricaBio

July 31st 2007



Thought for the Information Age

“The greatest challenge facing mankind is the challenge of distinguishing reality from fantasy, truth from propaganda.”

He goes on to describe the “misinformation age”

Author Michael Crichton,
speech to San Francisco Commonwealth Club, 2003

Read: *State of Fear*

CAST Commentary
QTA 2005-2 October 2005

CAST
The Science Source for Food, Agricultural, and Environmental Issues

Crop Biotechnology and the Future of Food: A Scientific Assessment

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Introduction

The introduction of agriculture marked the beginning of modern civilization. Over the ensuing 10,000 years, agriculturalists have improved agricultural production to support a growing population. Increased production often resulted from breeding—that is, the genetic modification—of crop plants. The Green Revolution intensified agricultural production, prevented mass starvation, and saved millions of acres of wilderness from going under the plow (Evans 1998; Trewavas 2001), while at the same time permitting agricultural practices that degraded the quality of some agricultural lands. In recent years, transgenic plants—that is, genetically modified plants produced through modern biotechnology (see **Glossary**)—have made it possible to continue the benefits of the Green Revolution while at the same time diminishing the detrimental environmental impact of agriculture.

Comprehensive Reviews in Food Science and Food Safety

Nutritional and Safety Assessments of Foods and Feeds Nutritionally Improved through Biotechnology

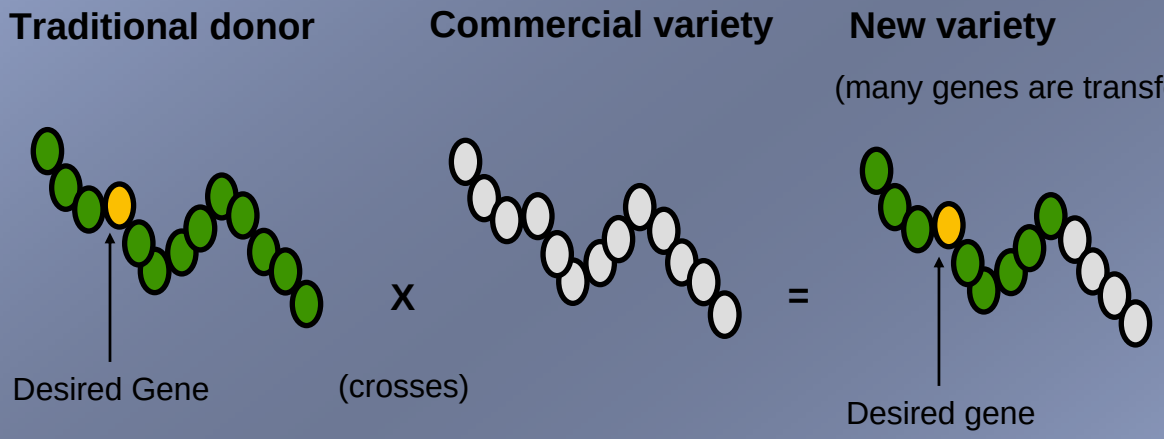
Prepared by a Task Force of the ILSI International Food Biotechnology Committee
as published in IFT's *Comprehensive Reviews in Food Science and Food Safety*

Chassy, B.M. *et al*. 2004. Comp. Rev. Food Sci & Food Saf. 3:35-104

http://www.ift.org/cms/?pid=1000362

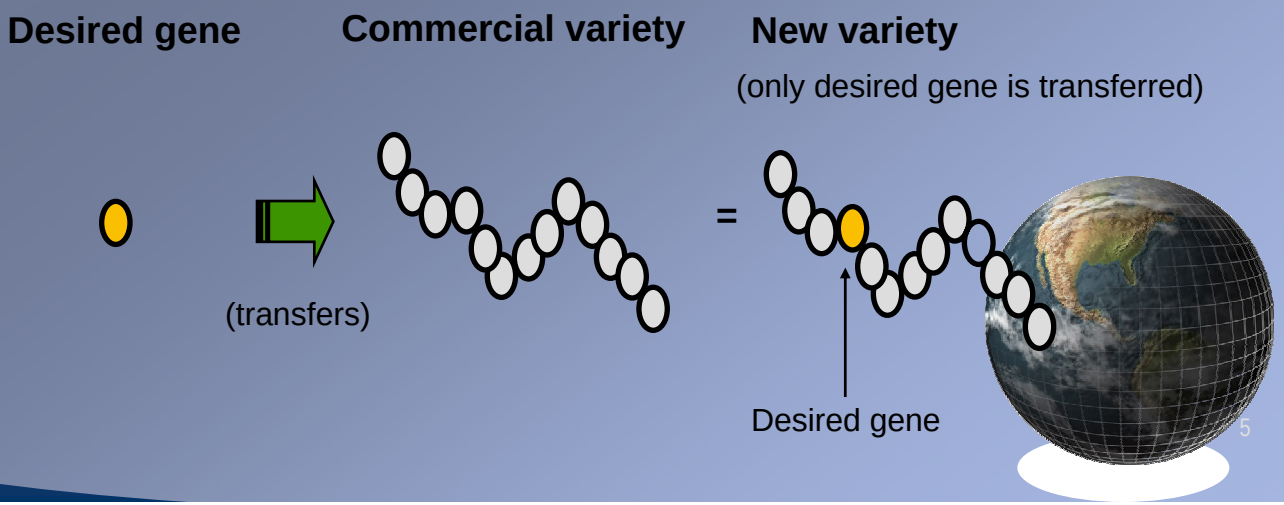
Traditional plant breeding

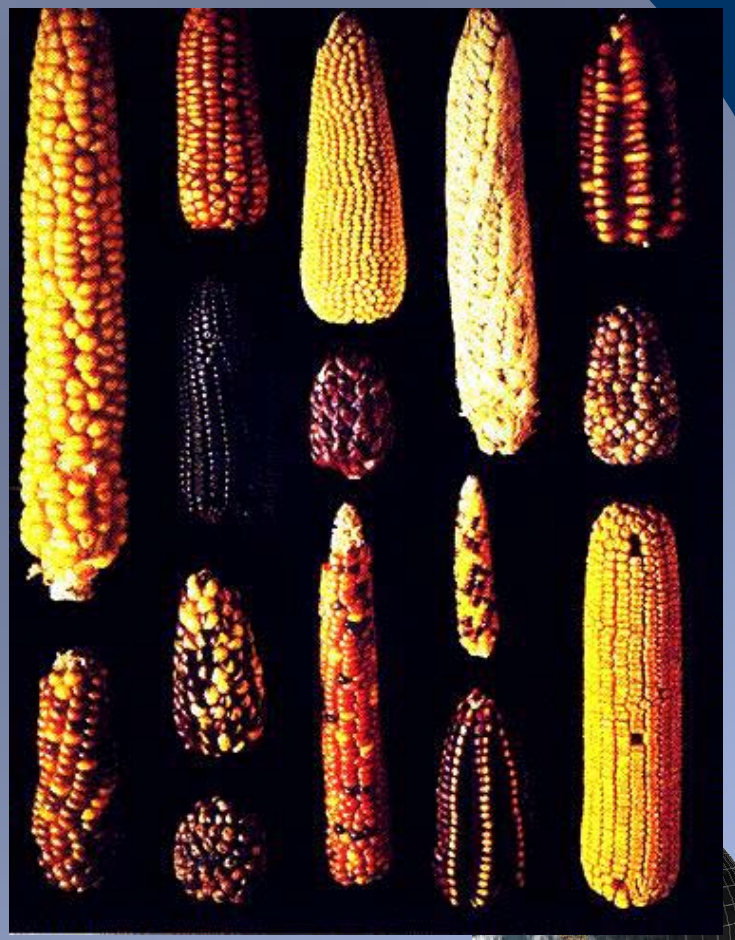
DNA is a strand of genes, much like a strand of pearls. Traditional plant breeding combines many genes at once.



Plant biotechnology

Using plant biotechnology, a single gene may be added to the strand.





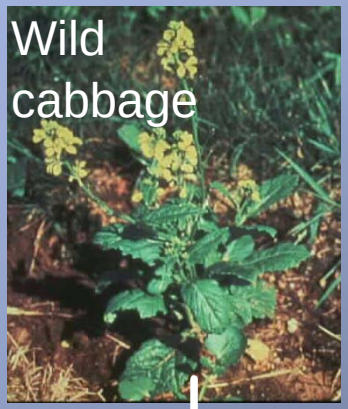
Teosinte

Maize

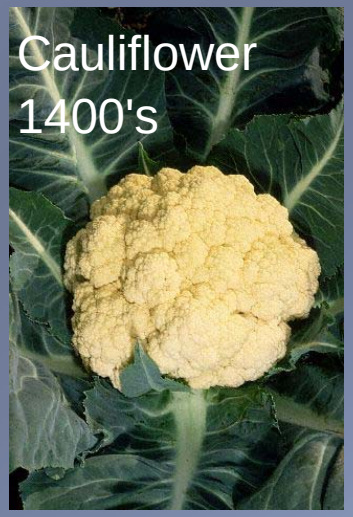
Slide courtesy of Wayne Parrott, University of Georgia

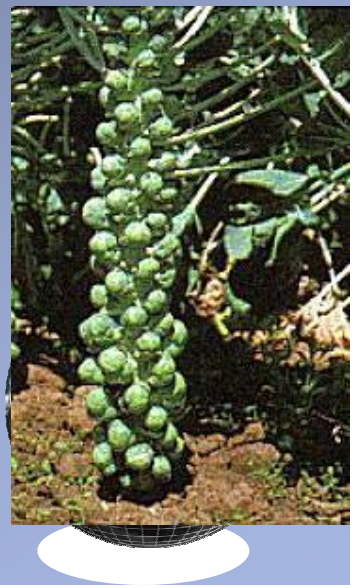
Slide courtesy of Wayne Parrott, University of Georgia

Slide courtesy of Wayne Parrott, University of Georgia



Kohlrabi
Germany, 100 AD

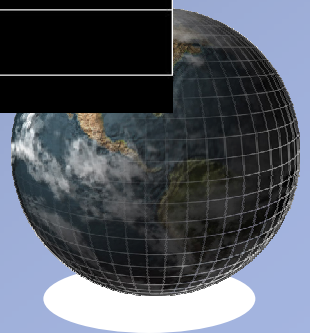




Brussel sprouts
Belgium, 1700's

Slide courtesy of Wayne Parrott, University of Georgia

Crop	Origin
Avocado	Central and South America
Beans	Mesoamerica
Cacao	Aztec (xoco-latl)
Corn	Mesoamerica (10,000 years)
Cotton	South America
Gourds	Americas
Papaya	Tropical America
Peanuts	South America
Peppers	Mexico-Mesoamerica (Nightshade family)
Pineapples	South America
Potatoes	Andes mountains (Nightshade family)
Pumpkins	Tropical America
Squash	South America
Strawberries	Americas
Sunflowers	Central and North America
Tomatoes	Mesoamerica (Nightshade family)



http://www.hort.purdue.edu/newcrop/history/lecture05/lec05.html
Guns, Germs and Steel, Jared Diamond

Crop	Origin
Barley	Fertile crescent
Beets	Europe, Africa, and the Near East.
Broccoli	Europe
Carrots	Central Asia and the Near East (purple)
Eggplant	India and China
Flax	Fertile Crescent
Hemp	China
Lettuce	Europe
Millet	China
Muskmelon	Fertile Crescent
Okra	Africa
Onions	Asia
Peas	Europe and Asia
Radishes	cool regions of Asia
Wheat	Fertile crescent (>9,000 years ago)
Rice	China
Soybean	China
Watermelon	West Africa
Sorghum	West Africa
Yams	Africa

http://www.hort.purdue.edu/newcrop/history/lecture05/lec05.html
Guns, Germs and Steel, Jared Diamond

But Are GMOs Safe?

Not the right question from a scientific point of view

Applications of technology need to be evaluated on a CASE-BY-CASE basis

GMOs are assessed by scientists and regulators before approval

Every review of the risk by, WHO, OECD, EC, National Academies, Royal Societies and Scientific societies have come to the conclusion that GMOs are “as safe as, or safer than, plants produced by conventional breeding”. They pose no new or different risks than conventional crops

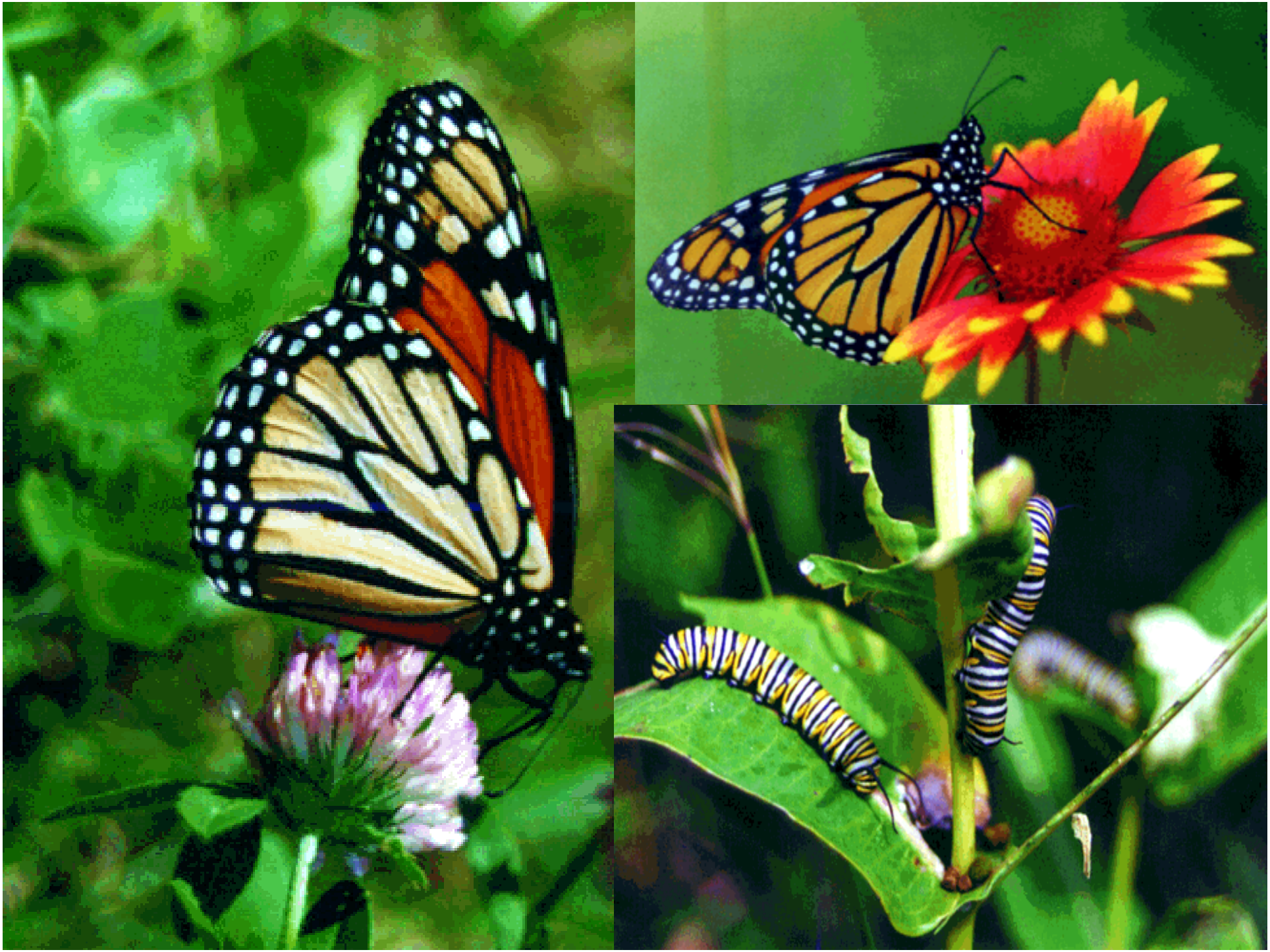
10 years, 400,000,000 ha, 8.5 million farmers. No obvious harm, lots of environmental, agricultural, and economic benefits

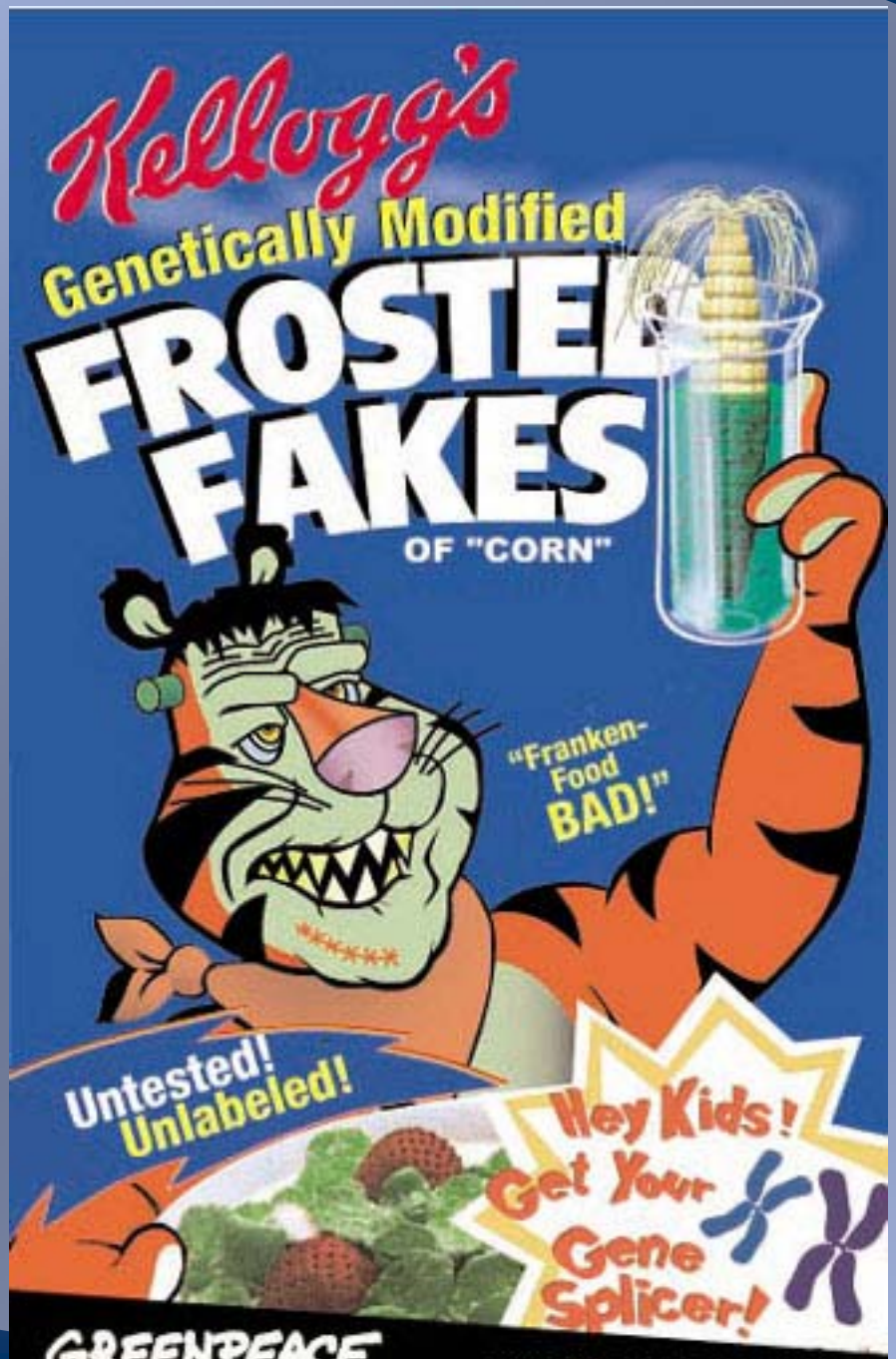
More Income…Less Pesticide… Cleaner Environment

A recent paper by Brookes and Barfoot (2005) summarized the overall global impact of transgenic technology. The analysis shows that there have been substantial net economic benefits at the farm level amounting to a cumulative total of $27 billion. The technology has decreased pesticide spraying by 378 million pounds and has decreased the environmental "footprint" associated with pesticide use by 14%. The technology also has significantly reduced the release of greenhouse gas emissions from agriculture, which is equivalent to removing nearly five million cars from the roads.

Brookes, G. and P. Barfoot. 2005. GM crops: The global economic and environmental impact—The first nine years 1996– 2004, *AgBioForum* 8:187–196.

Chassy, B, W. Parrott, R. Roush. 2005. CAST Commentary: *Crop Biotechnology and the Future of Food: A Scientific Assessment*




Kellogg's
Genetically Modified
FROSTED FAKES
OF "CORN"
"Franken-Food BAD!"
Untested! Unlabeled!
Hey Kids! Get Your Gene Splicer!
GREENPEACE


STOP GENETIC
POLLUTION!
BIOSAFETY NOW!
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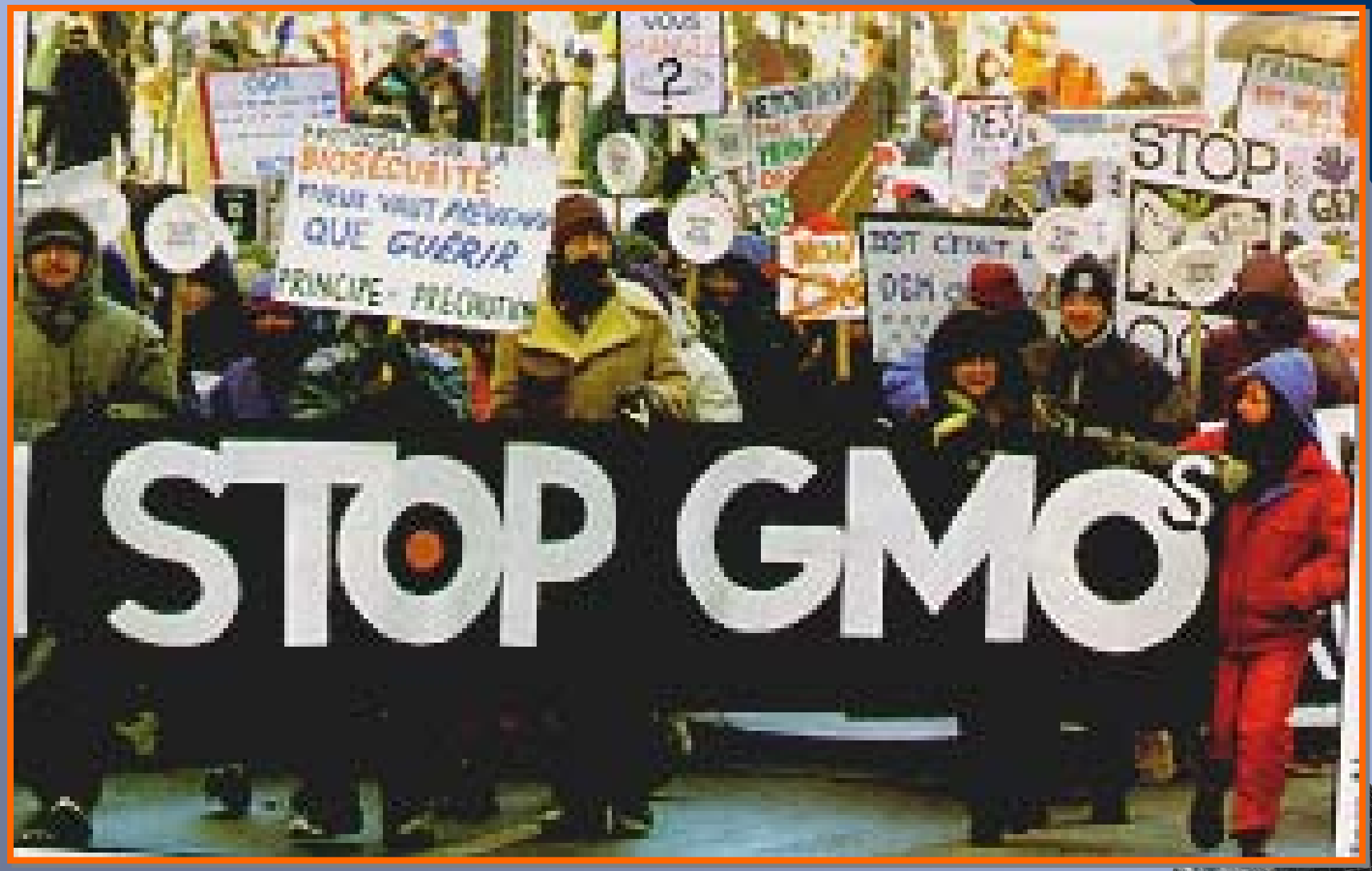
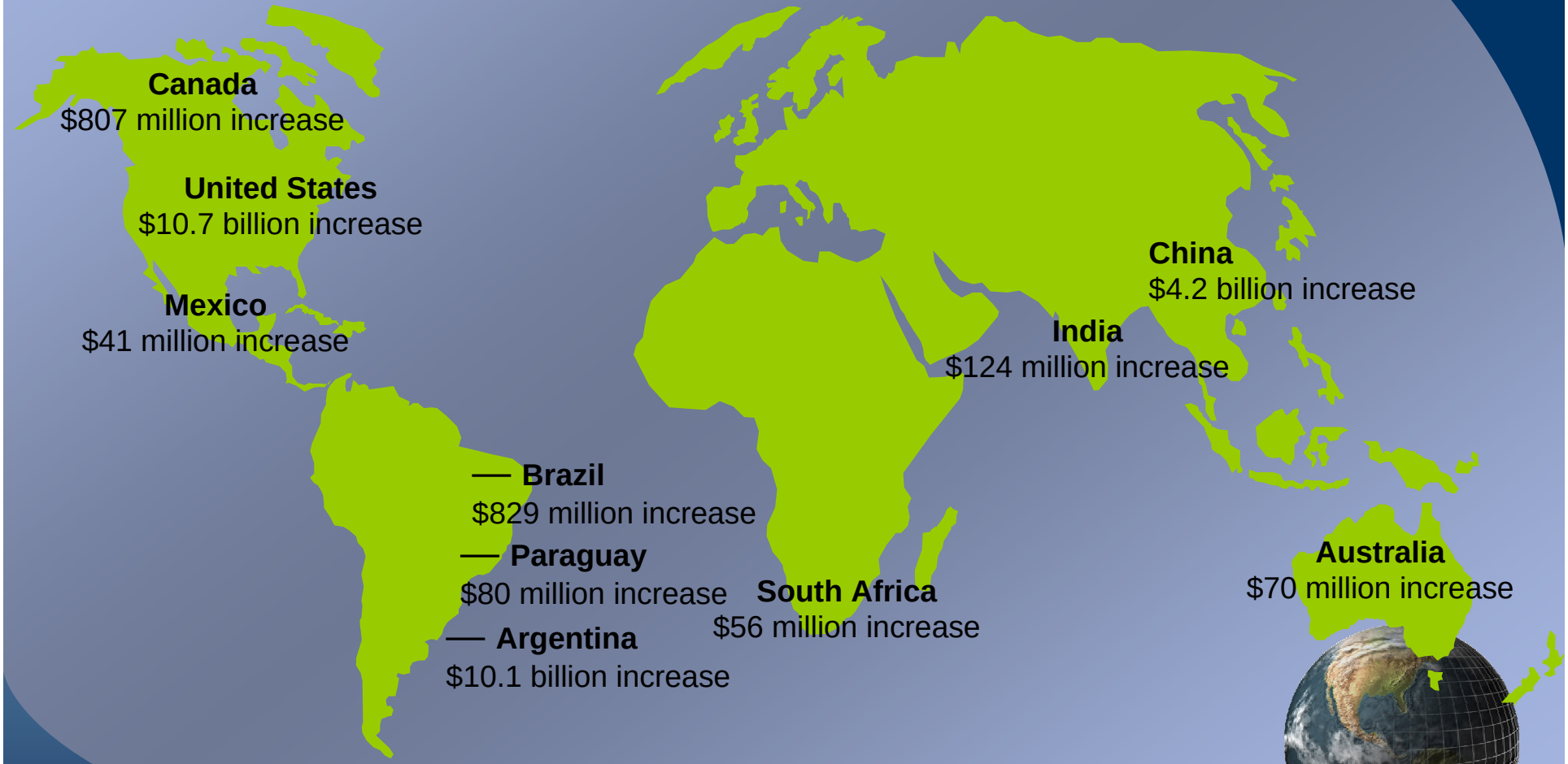

STOP GMOs
STOP

Farm income gains: by country: 1996-2004 million $



Since 1996, biotech crops have increased farm income $27 billion.

FOOD SAFETY RISKS IN PERSPECTIVE

High Risk

Diet: sufficiency, adequacy, over-nutrition*

Food borne Illness*

Untested: organic, “natural” foods, supplements

Natural toxicants*

Food allergy*

Chance additives

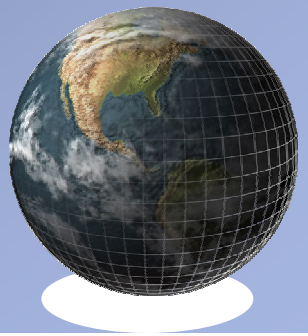
Pesticide and herbicide residues*

Food ingredients and additives*

GMO foods*

Low Risk

* Biotechnology can be part of the solution




I WON'T EAT ANYTHING THAT'S GENETICALLY MODIFIED...
IT COULD BE UNHEALTHY..
CHIPS
NICK ANDERSON
©2000

Consequences Over regulation

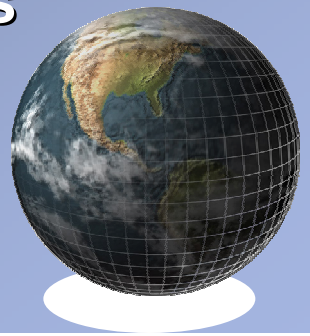
impedes product introduction

Labels raise cost and are interpreted as a warning

Continued disruption of trade

Barrier to diffusion of technology to developing countries

Diminished economic and environmental gains



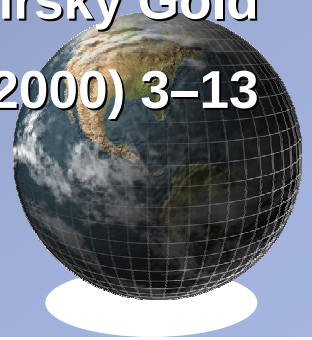
Damage by Distraction: Over-regulation in Situations of Low Hypothetical Risk

Putting huge amounts of money into minuscule hypothetical risks damages public health by diverting resources and distracting the public from major risks.

Paraselsus to Parascience

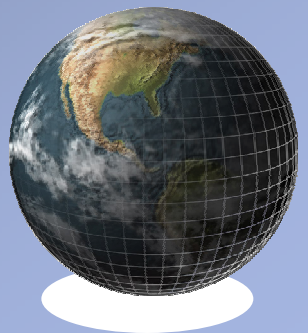
Bruce N. Ames and Lois Swirsky Gold

Mutation Research 447 (2000) 3–13



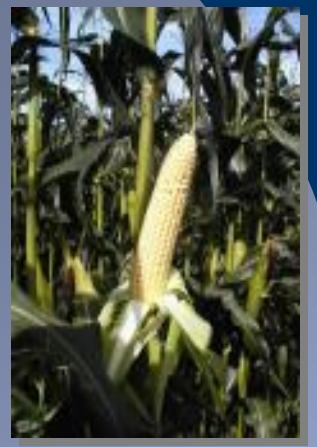
GM in South Africa

- Insect tolerant cotton
- Herbicide tolerant cotton
- Insect and herb cotton
- Herbicide tolerant soya
- Herbicide tolerant maize
- Insect tolerant maize
- Over 90% cotton is GM
- Over 55% soya is GM
- Over 40% maize is GM



GM Maize in South Africa
(Results from independent study Un. Reading UK)

	Conventional Maize	Bt Maize	Herbicide Tolerant Maize
Yield (kg/ha)	518	620	750
Length of Storage (months)	5	9	6

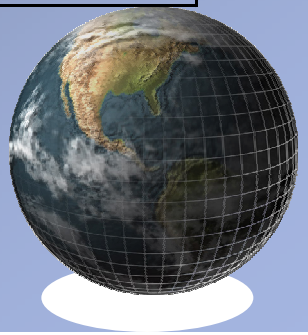


GMO Act Safety Assessment

Biosafety considerations for commercial release (Case-by-case assessment)		
Consumers - includes human safety	+	**Environment**
Toxicity Pathogenicity Allergenicity Digestibility Nutrition Unexpected products Stability Other		Effect on: Living organisms Air, soil, water Sustainable agriculture Biodiversity Stability Other

Non-safety commercialisation considerations:

Socio-economics
Trade
Labour
Public acceptance

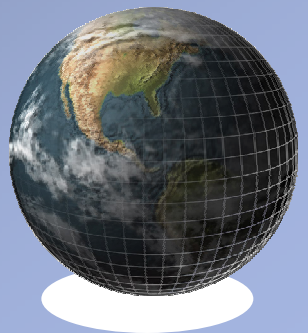


Safety Assessments

- GM crops are the most extensively tested and regulated in the world

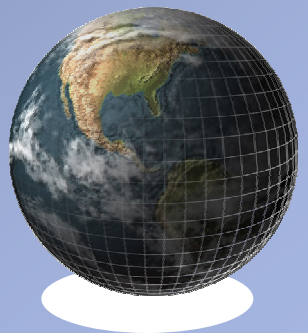
  Nap et al The Plant Journal 2003,33:19-46 etc

Safety assessments are carried out in SA and other countries using standards recognised by Codex (which SA is a member)



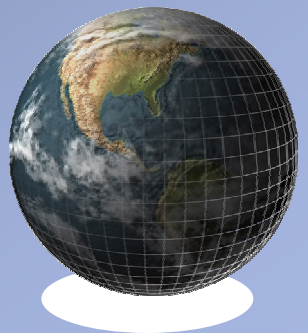
Labelling

- AfricaBio supports the approach of the Dept of Health and Codex
- AfricaBio supports labelling when it can be demonstrated that the composition, nutrition, or intended use of the food differs from the conventional counterpart

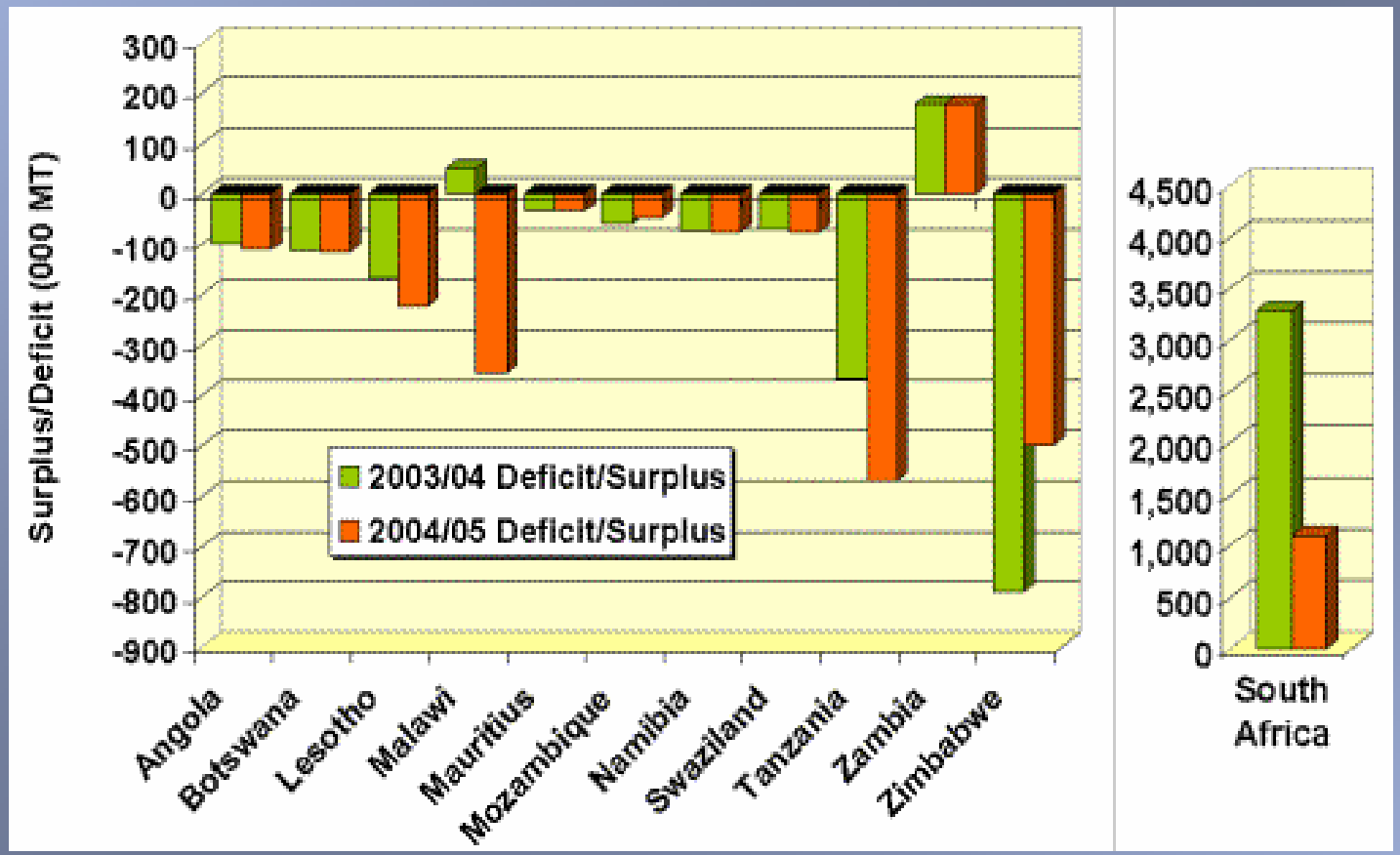


Developing Bitotechnology

- Government strategy –new 10 year strategy highlights developing a biotechnology sector with value added from farmer to pharma
- Calls for investment- investment only takes place if there is an enabling environment. Over regulation will not attract investment



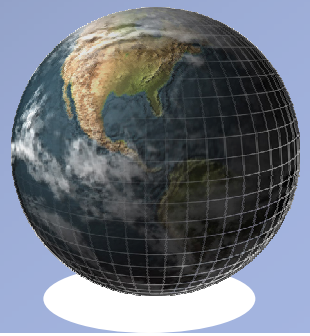
MAIZE DOMESTIC DEFICIT/SURPLUS: 2003/04 COMPARED TO 2004/05 PROJECTIONS



Agricultural biotechnology research in Southern Africa

Maize Focus

- **Insect resistance**
- **Virus resistance**
- **Drought tolerance**
- **Fungal resistance**



Maize streak virus is endemic in Africa causing huge economic losses

For resource poor farmers

Maize Streak Virus

Non-transgenic (8A) Transgenic (7A)

Drought Tolerant Maize

Hydrated

to generate drought tolerant crops

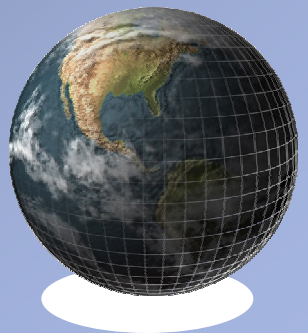
Dehydrated

Healthy Cassava

Virus-infected Cassava

Other Crops

- Sorghum
- Millet
- Bananas
- Sugar cane
- Cow pea
- Cassava

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OPPONENTS