

Biotechnology development in the Americas: status and challenges

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GM crops in the Americas - 2016

Total GM area:
185.1 mi hectares
89% in the Americas

(Early and big
adopter)

Local developers
(beyond US)

Soybean
Maize
Cotton
Canola
Alfalfa
Sugar beet
Papaya
Squash
Potato

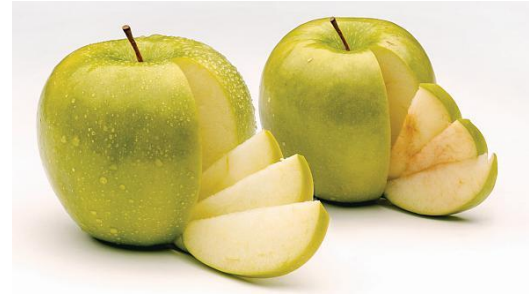
Insect resistance
Herbicide tolerance
Virus resistance
Drought tolerance
Reduced acrylamide and blackspots



Plant biotech pipeline – GM crops

Advanced development (5-7 years)

- Corn (weed and insect control)
- Soybean (weed and insect control)
- Cotton (weed and insect control)
- Canola (weed and oil content)



- Sugarcane (weed, insect control)
- Beans (virus resistance)
- Potato (bruising, acrylamide, virus resistance)
- Apples (non browning)
- Eucalyptus (productivity)
- Wheat (drought tolerance)



Technology Developers Predictions

Based on pipeline data gathered from public and private technology developers

2008 Status



GM events were developed by private sector in the U.S. and EU



GM benefits were predominantly agronomic



Developers sought approval in multiple exporting and importing markets

Predictions for 2015



50% of GM events were predicted to be developed by public sector outside of the U.S. and EU



Greater number of crops and traits, significantly in crop composition and abiotic stress tolerance



Significant number of isolated foreign approvals

Institute for Prospective Technology Studies, Joint Research Commission, EC <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=2420>

Courtesy of CropLife International

Predictions vs. Reality

Number of Commercial GM Events			
Crop	2008 Status	Prediction for 2015	2014 Reality
Soybean	1	17	5
Maize	9	24	15
Rapeseed	4	10	3
Cotton	12	27	16
Rice	0	15	1
Potatoes	0	8	0
Other	7	23	9
Total	33	124	49

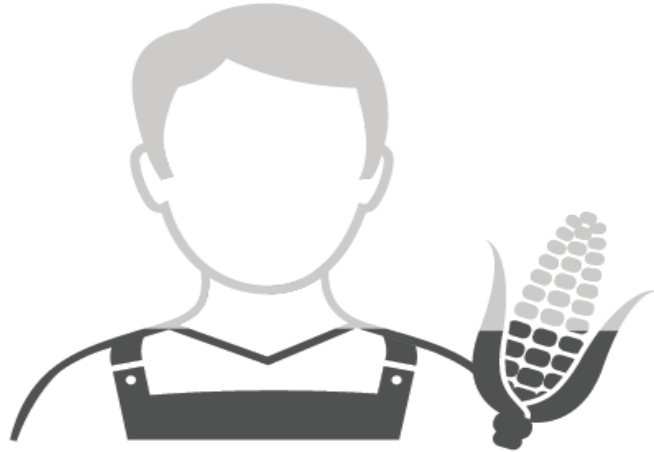
*Commercial = approved **and** marketed in at least one country*

Institute for Prospective Technology Studies, Joint Research Commission, EC

<http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=2420>

Courtesy of CropLife International

Predictions vs. Reality



At best, **less than 20%** of the products on the previous slide will actually make it to farmers by 2020

The global pipeline of GM crops out to 2020. [Nature Biotechnology 34, 31-36 \(2016\)](#).....

Courtesy of CropLife International

Where is the problem?

Regulatory burden:
money, time,
complexity



Where is the problem?



Political, commercial,
perception issues

Anti-GMO activists destroy eucalyptus experiments – Futura Gene facilities, Brazil

Adoption of new plant breeding techniques

✓ **Identify** existing genetic variation

Gene mapping

Molecular markers

Genome sequencing and "omics"

✓ **Increase** the own genetic variation

Induced mutagenesis (at random)

Directed mutagenesis/gene editing



✓ **Extend** genetic variation beyond the species

New genes - transgenesis

Gene silencing (RNAi)

Targeted gene introduction

Gene editing: opportunities and threats



Opportunities:

- 1) Public + private sector, including local developments and small/mid size companies
- 2) More countries (beyond US and Canada, Brazil, Argentina, Colombia and Chile)

Threats:

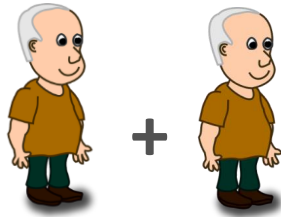
Many countries, including the main importing ones, have NOT yet defined if (or what) regulations will be applied:

Potential over regulation?

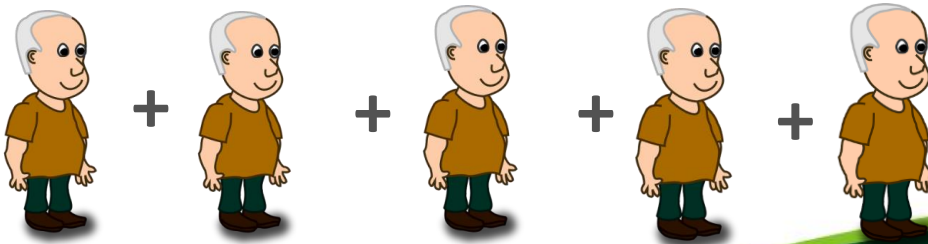
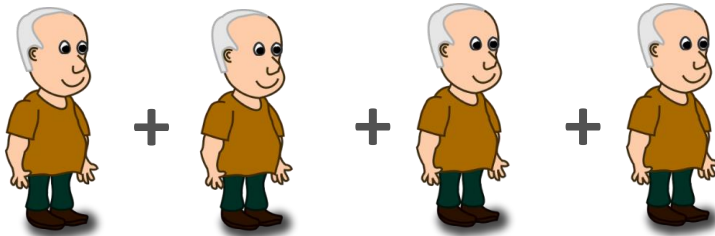
Potential trade disruptions?

(If new genes need to be incorporated, by any method, the resulting product will be considered a GMO)

Reality



Each farmer needs to provide food for more people in the same area



Reality



Reality

¿Are we doing what has to be done?

- In a frame of environmental, social and economic sustainability, increasing the productivity rate by acre/hectare of all crops is probably the only possibility that has no objectionable threats. From 2010 to 2050, the agricultural outcome needs to be doubled.
- In order to comply with the above requirement we need:
 - Investment, research and development
 - Regulatory support:
 - Simplicity, avoid over regulation
 - Predictability
 - Harmonization

Thank you for your attention!

