6th Seed Congress of the Americas

Promoting Seed Business in the Americas

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Biotechnology development in the Americas: status and challenges

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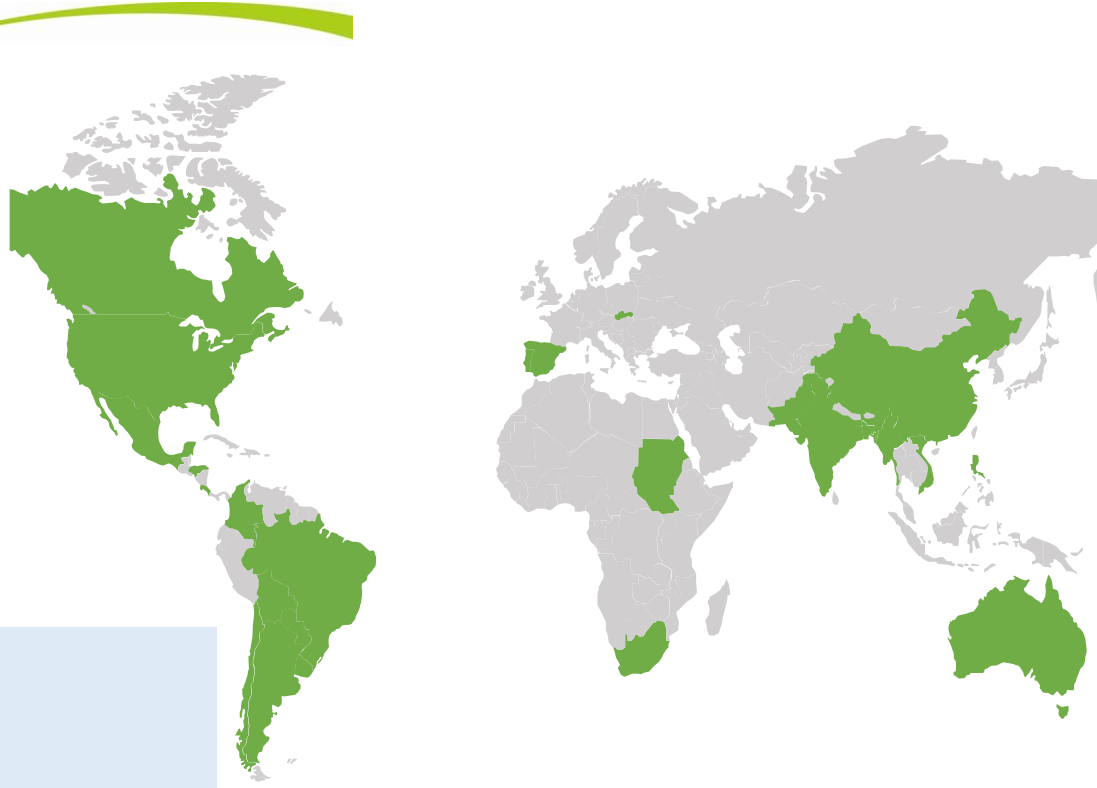
GM crops in the Americas - 2016

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	Predictions for 2015
GM events were developed by private sector in the U.S. and EU	50% of GM events were predicted to be developed by public sector outside of the U.S. and EU
GM benefits were predominantly agronomic	Greater number of crops and traits, significantly in crop composition and abiotic stress tolerance
Developers sought approval in multiple exporting and importing markets	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

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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 eucaliyptus 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

- Gene silencing (RNAi)
- New genes - transgenesis
- Targeted gene introduction

Courtesy of ArgenBio

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:

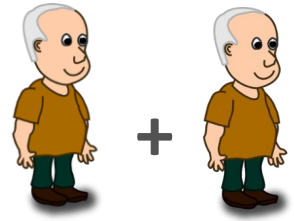
Potential over regulation?

Potential trade disruptions?

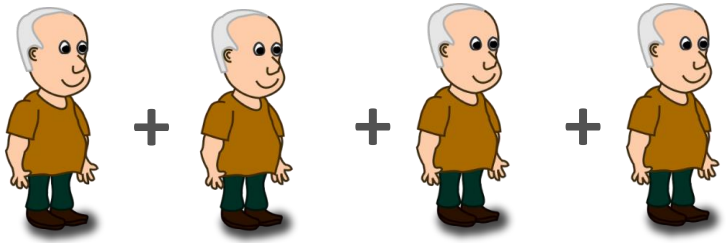
(If new genes need to be incorporated, by any method, the resulting product will be considered a GMO)

Reality

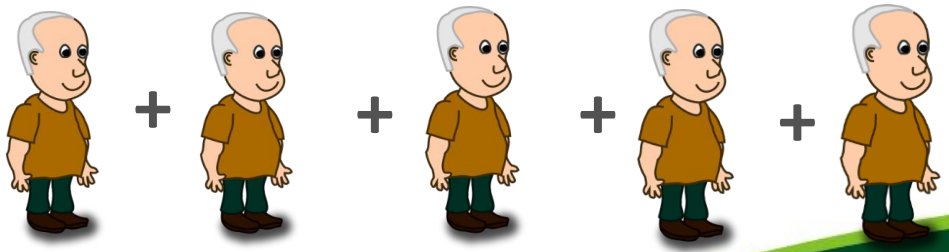












Each farmer needs to provide food for more people in the same area

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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 tha has no objectionable threats. From 2010 to 2050, the agricultural outcome nee 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!