

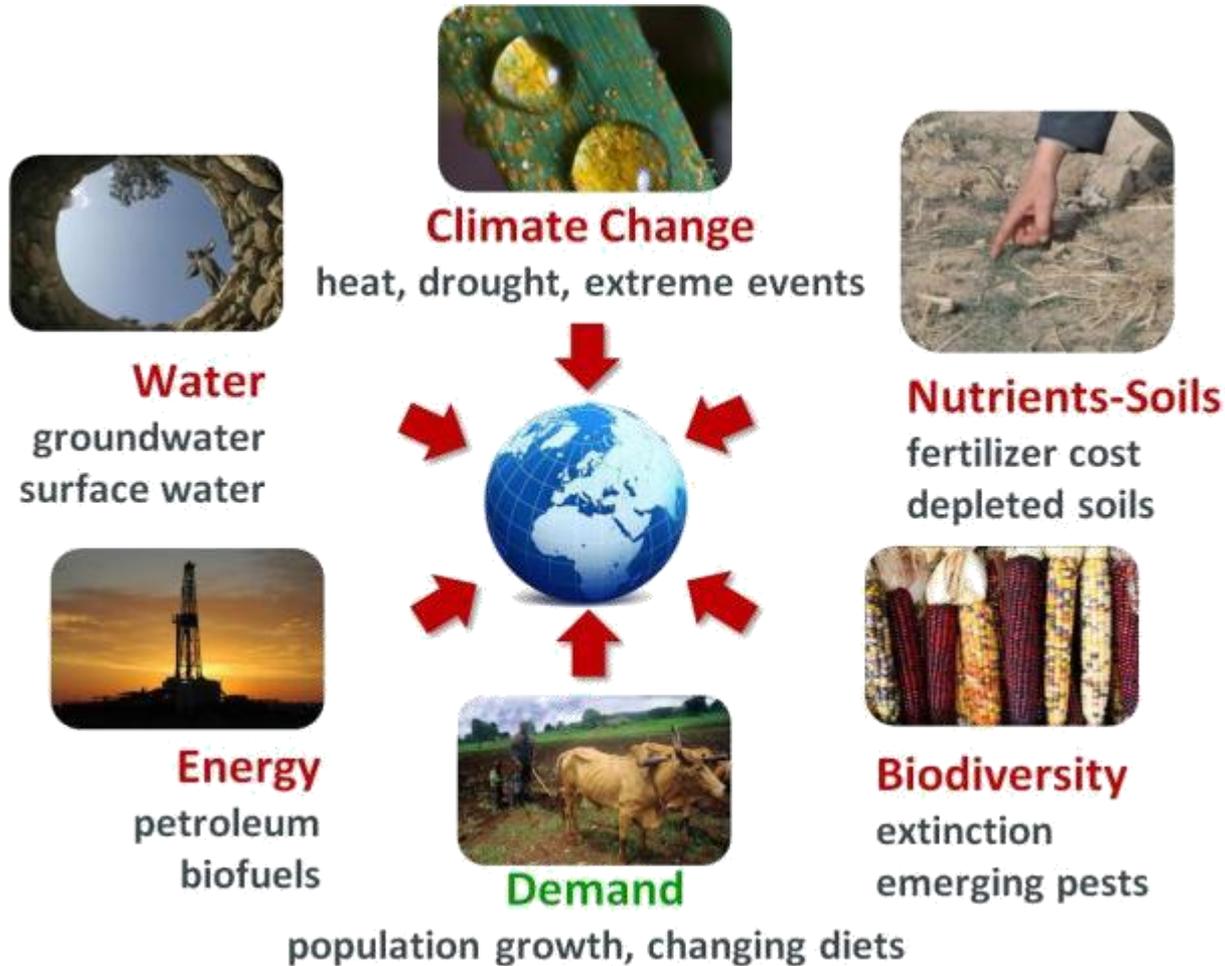
Worldwide and local programs to preserve, characterize and utilize maize genetic diversity

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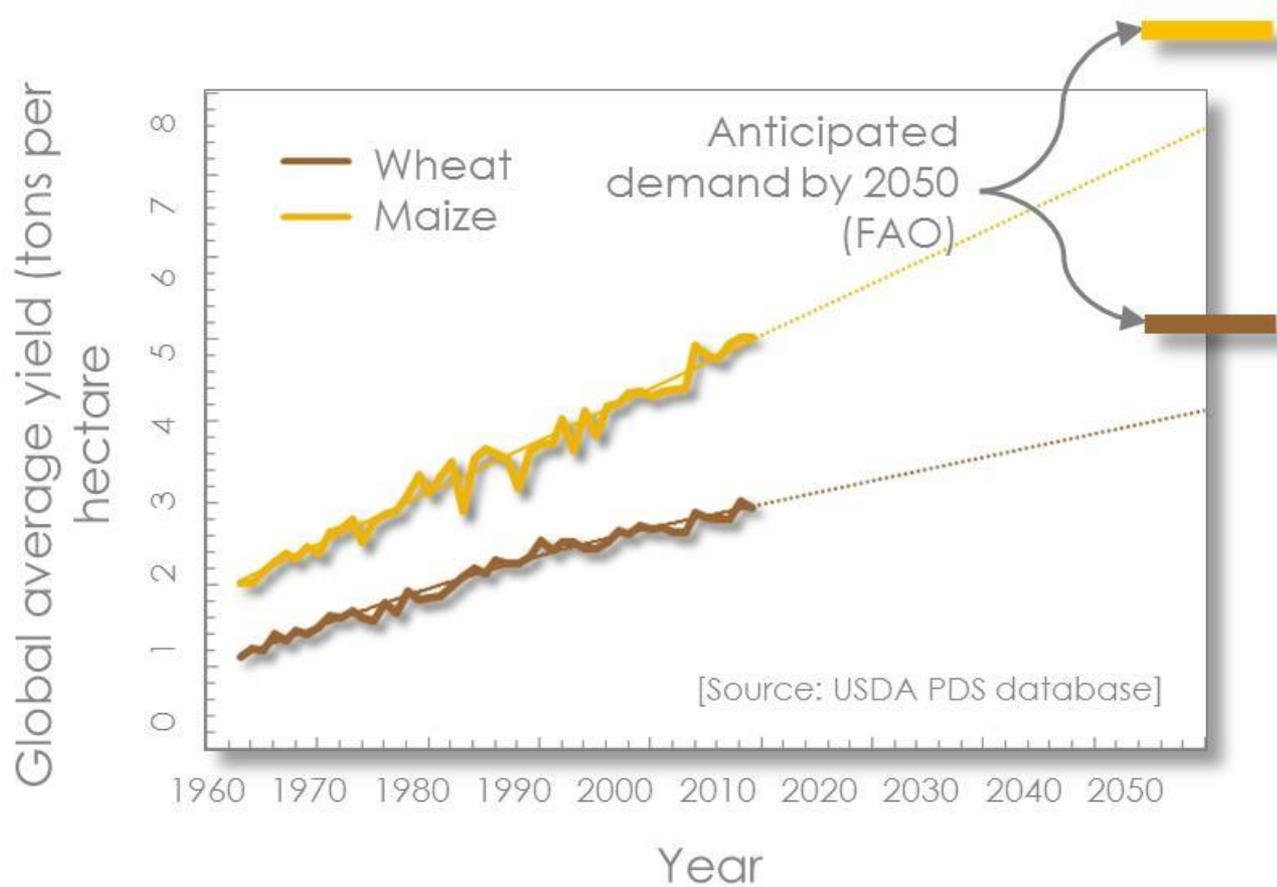
COP13, Cancún, México – 8 December 2016

Converging Challenges to Global Food Security



“In the next 50 years we will need to produce as much food as has been consumed over our entire human history.” Megan Clark, CSIRO CEO

Population & demand are growing: we are not on-track for food security



It's not only about food security: Increased productivity conserves land for other uses, e.g. biodiversity reserves

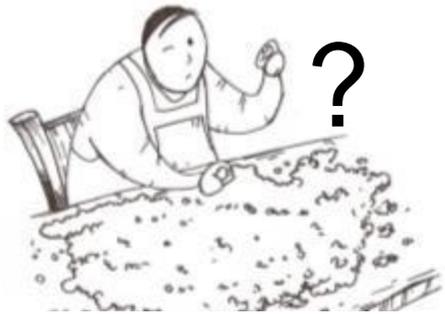
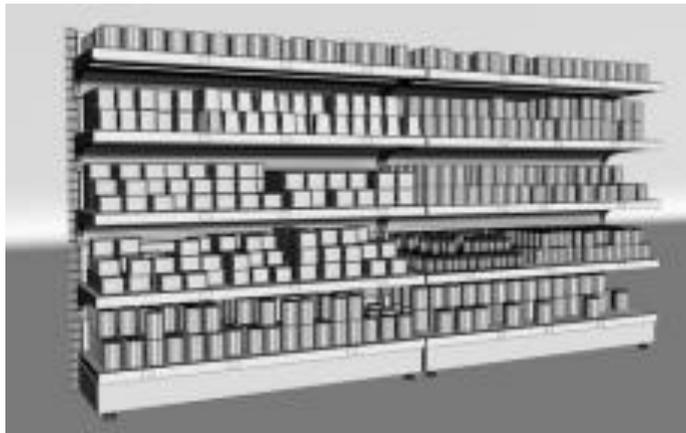
(Byerlee et al., Global Food Sec., 2014)





MasAgro Biodiversidad

Vision: Efficient and Equitable Use of Genetic Diversity



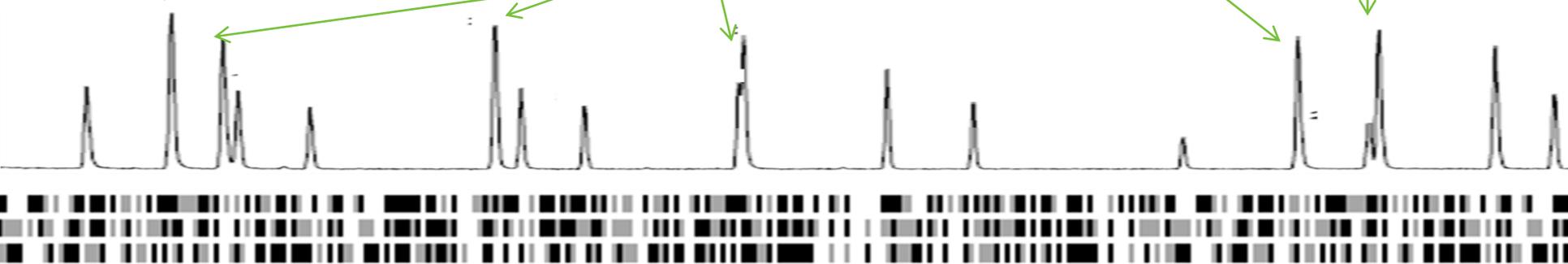
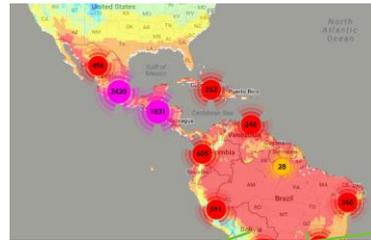
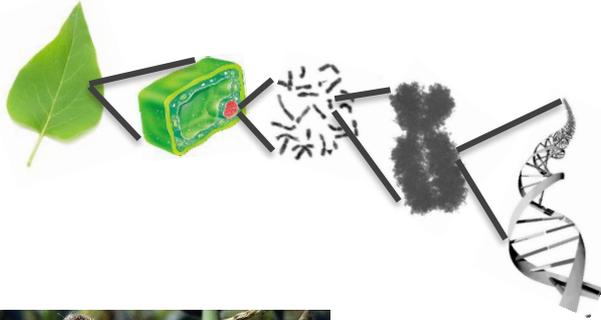
Maize Molecular Atlas



Before MasAgro Biodiversidad

With MasAgro Biodiversidad

DNA is the common language for all living organisms



Products of MasAgro Biodiversidad: International Public Goods

Equity



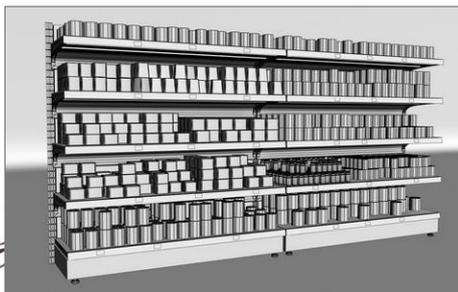
- **Data:** genotypic and phenotypic
- **Software tools (E)**
- **Germplasm** = genetic diversity
 - Sources of resistance or added value (E)
- **Services (E)**
 - Genotyping
 - Capacity development;
 - ~290 workshop participants;
 - ~30 thesis projects;
 - 5 visiting scientists
- **Knowledge (E)**
 - Publications, methodologies

Who are the principal users of MasAgro Biodiversidad's products?

- **Breeders:** new diversity for improved varieties
 - Benefit farming communities, national production, world food prices
- **Seed companies:** understand their germplasm diversity
- **Value added markets:** certify quality, authenticity
- **Researchers:** stimulate scientific discoveries
- **Students:** a new generation of agricultural scientists
- **Professors:** curricula to train the next generation of scientists
- **Genebanks:** optimize conservation of genetic resources
- **Policy Makers:** inform models for equitable use and benefit sharing



Vision: Efficient and Equitable Use of Genetic Diversity

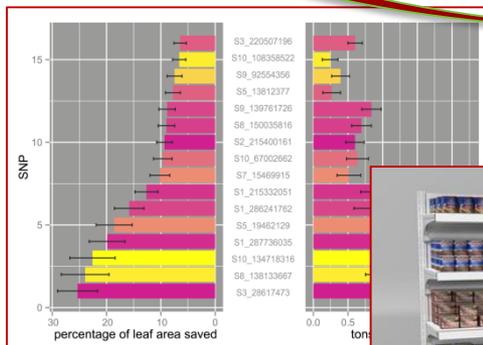


Before MasAgro
Biodiversidad

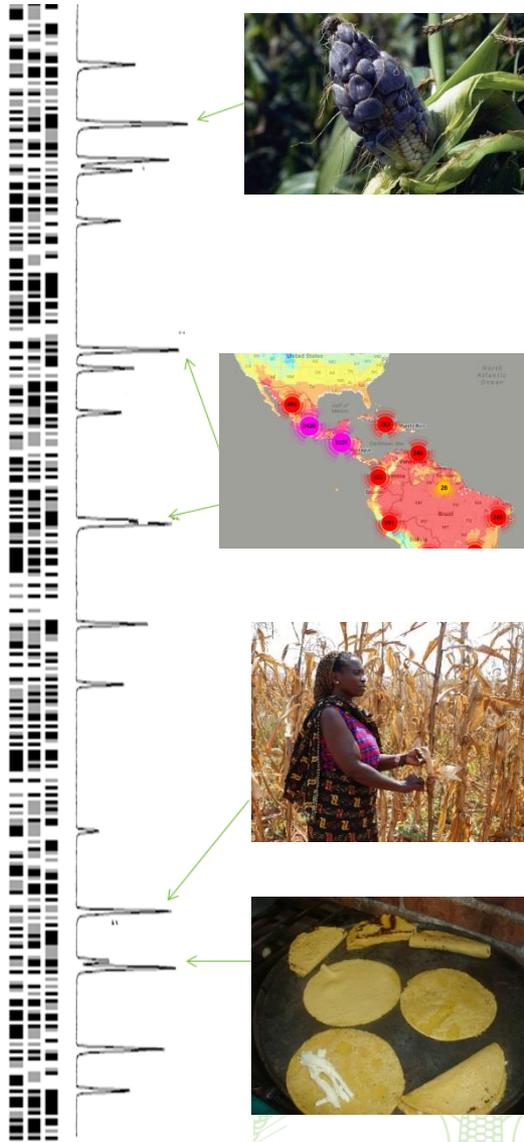
With MasAgro
Biodiversidad



Maize Molecular
Atlas



Using novel diversity to develop new varieties



- ✓ Genotyping of bank accessions
- ✓ Identify useful alleles
- ✓ Options for breeding programs
 - Native variation
 - Genome editing
 - Transgenics

GE Crops: Experiences and Prospects

The majority of scientists agree

National (USA) Academies of Sciences, Medicine and Engineering (2016)

No conclusive evidence of adverse effects of GE crops on human health or the environment

It is not unanimous; it is the opinion of the majority of the scientific community

This conclusion agrees with numerous reports

“88% of scientists members of AAAS (American Society for the Advancement of Science) believe it is safe to consume foods from GE crops.

McFadden y Lusk, 2016

“To date, no adverse health effects related to the consumption of GE crops have been documented in the human population.” National Research Council (2004)

“Indeed, the science is quite clear: crop improvement by the modern molecular techniques of biotechnology is safe.” American Association for the Advancement of Science (2012)

“Bioengineered foods have been consumed for close to 20 years, and during that time, no overt consequences on human health have been reported and/or substantiated in the peer-reviewed literature.” – Council on Science and Public Health of the American Medical Association House of Delegates (2012)

“[Genetically modified] foods currently available on the international market have passed safety assessments and are not likely to present risks for human health. In addition, no effects on human health have been shown as a result of the consumption of such foods by the general population in the countries where they have been approved.” World Health Organization (2014)

“Foods from genetically engineered plants intended to be grown in the United States that have been evaluated by FDA through the consultation process have not gone on the market until the FDA’s questions about the safety of such products have been resolved.” - U.S. Food and Drug Administration (2015)

“The main conclusion to be drawn from the efforts of more than 130 research projects, covering a period of more than 25 years of research, and involving more than 500 independent research groups, is that biotechnology, and in particular GMOs, are not per se more risky than e.g. conventional plant breeding technologies.” European Commission (2010a)

GE Crops: Experiences and Prospects

www.nap.edu/23395

- 7 Dec 2016: Forum of Scientific Society Leaders:
 1. American Society for Nutrition
 2. Society of Toxicology
 3. Society for Risk Analysis
 4. Rural Sociological Society
 5. Applied Economics Association
 6. International Consortium of Applied Bioeconomy Research
 7. Society for Social Studies of Science
 8. Ecological Society of America
 9. Crop Science Society of America
 10. Weed Science Society of America
 11. Entomological Society of America
 12. Phytochemical Society of North America
 13. American Phytopathological Society
 14. American Society for Plant Biology
 15. Metabolomics Society
 16. Society for in vitro Biology
 17. Center for Science in the Public Interest

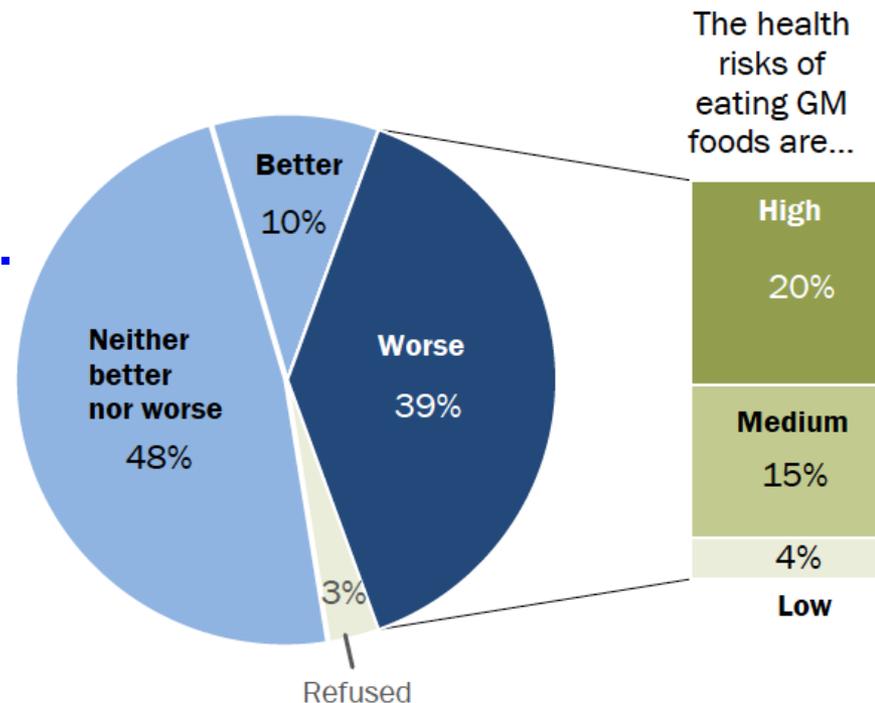


GE Crops: Experiences and Prospects

www.nap.edu/23395

- 7 Dec 2016: Forum of Scientific Society Leaders:
 - Every society in attendance widely endorsed the report
 - Concern: How to effectively communicate with the public?

Percentage of USA Adults who think that GE foods are....



December 1st 2016 Pew Report

GE Crops: Experiences and Prospects

www.nap.edu/23395

- How to effectively communicate with the public?
 - Need short, clear, unambiguous messages
 - As scientists, this is difficult, especially for very complex issues!

Communications experts suggested, e.g. instead of saying:

“No conclusive evidence of adverse effects of GE crops on health or the environment”

Say:

“GE crops are as safe as non-GE crops”



GE Crops: Experiences and Prospects

www.nap.edu/23395

- Need short, clear, unambiguous messages
 - There are risks to using any technology
 - Societies need to legislate and regulate
 - There are risks to not using GE technologies, for example:
 - More pesticides will be used if insect resistant GE crops are not available
 - More hazardous pesticides may be used → more ecological damage
 - We might be slower or unable to respond to some arising challenges: diseases, climate change
 - We will forfeit important health benefits, e.g. reduced acrylamide or mycotoxins; increased micronutrients
 - Small-holder farmers will be “left behind” and fail to benefit from novel technologies



Clarifications & Conclusions

- CIMMYT produces international public goods
 - CIMMYT proactively pursues equity in benefits from its products
 - CIMMYT is signatory of ITPGRFA under Article 15
 - Effective, equitable use of genetic diversity will be crucial to global food and nutrition security
-

- MasAgro does not work with genetic engineering
 - CIMMYT does not work with GE maize in Mexico
-

- GE crops have benefited many farmers, but they are not a “silver bullet”
- Newer technologies already exist; others will emerge and may likely displace transgenics
- Therefore, new varieties must be evaluated for their traits and not for the technologies used in their development





**Thank You
for Your
Interest!**