Agricultural Biotechnology: Providing for a Sustainable Future

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BIOTECHNOLOGY INDUSTRY ORGANIZATION

BIO

- The Biotechnology Industry Organization (BIO) represents more than 1,180 biotechnology companies, academic institutions, state biotechnology centers and related organizations in 50 U.S. states and 31 other nations.

- BIO members are involved in the research and development of health-care, agricultural, industrial and environmental biotechnology products.

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Biotechnology Supports Sustainability

- Enhances crop production for sustainable food, feed, fiber and fuel supplies.
- Promotes resource conservation and energy efficiency.
- Reduces environmental footprint of agriculture.
- Improves economic viability for farmers and communities.
- Advances product safety.

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Terminology

- Genetic Engineering
  - U.S. Regulations: “The genetic modification of organisms by recombinant DNA techniques.”

- Foods Derived from Biotechnology
  - CODEX: “Recombinant-DNA plant is a plant in which the genetic material has been changed through *in vitro* nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles.”

Source: USDA/ARS

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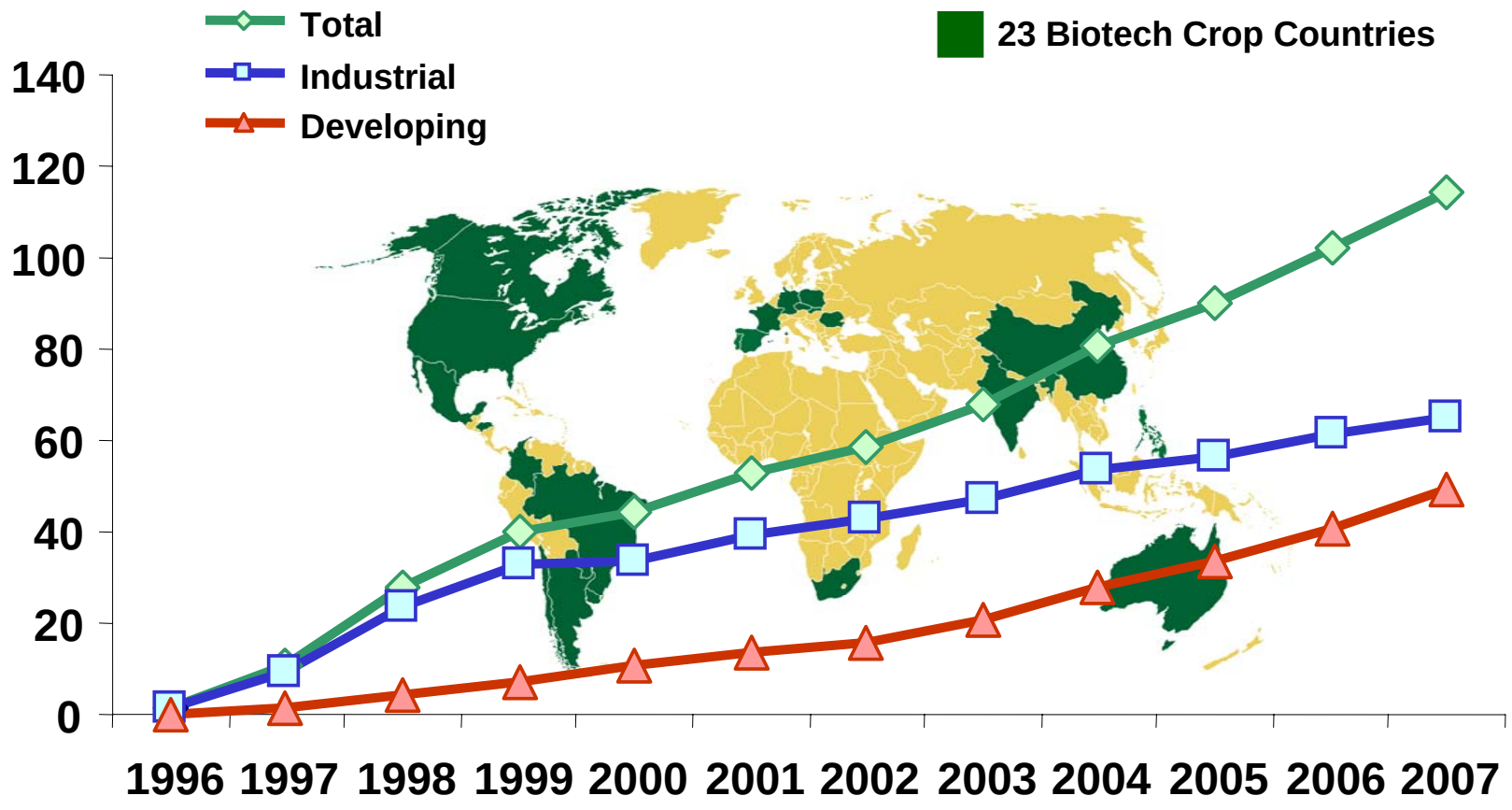
GLOBAL AREA OF BIOTECH CROPS
Million Hectares (1996 to 2007)



Increase of 12%, 12.3 million hectares (30 million acres), between 2006 and 2007.

Source: Clive James, 2007.

U.S. Crop Acreage

Harvested Crop Acreage: 300 million acres

Organic: 1%

Biotech Crops: 48%

- 87 percent of cotton
- 91 percent of soybeans
- 73 percent of corn
- 50 percent of papaya

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Sustainable Agriculture

"An integrated system of plant and animal production practices having a site-specific application that will over the longer term:

- Satisfy human food and fiber needs;
- Enhance environmental quality and the natural resource base upon which the agriculture economy depends;
- Make the most efficient use of non-renewable resources and on-farm resources and integrate where appropriate, natural biological cycles and controls;
- Sustain the economic viability of farm operations;
- Enhance the quality of life for farmers and society as a whole."

Source: USC Title 7, Section 3101

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Satisfy human food and fiber [and fuel] needs

- Increased Yield = More Food
  - Corn: 30 percent increase in yield since 1996
  - Soybean: 22 percent increase in yield since 1996

- Consumer Benefits
  - Fewer saturated fats and no trans-fats
  - Allergen free foods
  - Reduced toxins

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Enhance environmental quality

Pesticide Applications:
Down 500 million pounds

No Till Farming:
Up 35 percent

Carbon Dioxide Emissions:
Down 10.2 million tons

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Efficient Use of Non-renewable Resources

Water Availability

- U.S. cotton farmers saved 93 million gallons of water in last 6 years.
- "More crop per drop"

Fuel

- 441 million gallons of fuel saved

Source: USDA/ARS

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Economic Viability of Farm Operation

Farm Income:

Up $27 billion

Production Costs:

Down $1.3 billion

Source: Conservation Technology Information Center

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Quality of Life for Farmers and Society

Development

- Poverty alleviation
- Improved health care
  - Vaccinations
  - Neo-natal care
- Educational opportunities

Rural Society

- Enhanced farmer income translates to viable rural communities.

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Sustainable Biofuels

Biotechnology provides enabling technology for:

- Yield increases for corn ethanol and soy biodiesel;
- No till cropping for greater residue collection for cellulosic biomass;
- Dedicated energy crops.

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Future Technology: Beyond Yield

- Nutrient Quality
- Nitrogen Efficiency
- Allergen Free Foods
- Trees
- Developing Country Needs
- Biofuels
- Pharmaceuticals
- Animal Diseases

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Conclusion

- Technical nature of involved issues requires experts across many scientific disciplines.

- Technology-neutral standards offer best hope for broad adoption of truly sustainable agriculture to benefit farmers and consumers, particularly in the face of climate change.

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