ENVIRONMENTAL SAFETY AND BENEFITS OF AGRICULTURAL BIOTECHNOLOGY

> *"A truly extraordinary variety of alternatives to the chemical control of insects is available … They are biological solutions, based on understanding of the living organisms they seek to control, and of the whole fabric of life to which these organisms belong. Specialists representing various areas of the vast field of biology are contributing… all pouring their knowledge and their creative inspirations into the formation of a new science of biotic controls."*
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> Rachel Carson, *Silent Spring*, 1962

Nearly half a century ago, Rachel Carson, the founder of the contemporary environmental movement, envisioned a new, emerging paradigm in biology. Since then, the science of agriculture has reinvented itself. Today, as our growing world population is making unprecedented demands on our food, feed, and fiber supplies, biotechnology is enabling us to meet the world's challenges of growing agricultural production while reducing our environmental impact and increasing agriculture's sustainability.

Over the past decade plantings of crops improved through biotechnology have increased from very small beginnings to more than 252 million acres in 2006.[1] More than 10 million farmers in 22 countries primarily grew biotech varieties of soybeans, corn, cotton, and canola. While the adoption of biotech crops provides farmers with economic benefits (increased farm income, crop quality, and plant productivity), biotech varieties also enable farmers to be better stewards of the land.

- Adoption of No-Till Farming. Perhaps the most profound and far reaching environmental impact of biotech crops has been the rapid increase in no-till[2] agriculture, which is made possible by herbicide tolerant soybeans. In 2006, 89 percent (66.68 million acres) of U.S. soybean acreage was planted with herbicide-tolerant varieties. These biotech varieties enabled farmers to almost completely eliminate plowing on their lands, which results in significant benefits in terms of soil health and conservation, improved water retention and runoff quality.[3]

- Improved Pest Management. Biotechnology has made possible pest control measures that are more precisely targeted at specific problem pests while dramatically reducing impacts on non-target species. Biotech varieties have dramatically reduced farmers'

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[1] James, Clive. January 2007. *Global Status of Commercialized Biotech/GM Crops: 2006*. International Service for the Acquisition of Agri-Biotech Applications (ISAAA).

[2] No-till agriculture is a method that avoids the use of plowing for weed control in order to better conserve topsoil and moisture while reducing erosion.

[3] Sankula, Sujatha. 2006. *Quantification of the Impacts on U.S. Agriculture of Biotechnology-Derived Crops Planted in 2005*. National Center for Food and Agricultural Policy.

needs to use pesticide applications, eliminating 69.7 million pounds in the United States in 2005.[4] Globally it is estimated that pesticide applications decreased six percent in the interval from 1996-2004, eliminating 379 million pounds of pesticide applications.[5]

- Benefits to Biodiversity. Studies conclusively show that biotechnology is delivering biodiversity benefits in numerous ways. No-till agriculture maintains soil health, and the conservation of topsoil and moisture content.[6] These practices, coupled with reduced pesticide applications have played a significant role in encouraging the growth of habitats that support different varieties of wildlife. Studies have shown that songbirds have actually returned to agricultural fields in increasing numbers as biotech crop acreage has increased.[7]

- Supporting Threatened Ecosystems. As agricultural demands continue to increase, many ecosystems such as rainforests are being threatened to being converted to farmland. Agricultural biotechnology can increase yields on existing farmlands, which decreases the pressure from increased demand to convert more wild lands to agriculture. Additionally, biotech traits in the future — such as drought-tolerance, varieties that are tolerant of salty or toxic soils or freezing temperatures — will allow farmers to bring traditionally non-arable lands into production.

- Improved Sustainability. Abundant crops require fertile soil, which in turn depends on healthy microbial communities and moisture retention. All these elements are dramatically enhanced through no-till agriculture. No-till agriculture also reduces the use of agricultural machinery in fields, which leads to a reduction in greenhouse emissions from farm equipment. Studies show that biotech crops have saved farmers 441 million gallons of fuel through reduced fuel operations – which has resulted in eliminating nearly 10.2 million pounds of carbon dioxide emissions since 1996. This is equivalent to removing four millions cars from the road in one year (which is about 17 percent of all registered cars in Great Britain).[8]

Farmers take the environment very seriously — almost nobody lives closer to the land. One of the compelling forces behind the rapid adoption of crops improved through biotechnology is that they help farmers in so many different ways to tread more gently on the land and help provide a sustainable future in agriculture.

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[4] Sankula, Sujatha. 2006.
[5] Brookes, Graham and Peter Barfoot. 2005. *GM Crops: The Global Economic and Environmental Impact — The First Nine Years 1996-2004*. AgBioForum 8 (2&3): 187-196.
[6] American Soybean Association. 2001. *ASA Study Confirms Environmental Benefits of Biotech Soybeans*.
[7] Byford, Jim. 2002. *GMO Systems Good for Wildlife*. *Southeast Farm Press*.
[8] Brookes, Graham. 2006. *Global Impact of Biotech Crops: Socio-Economic and Environmental Effects in the First Ten Years of Commercial Use*. PG Economics.