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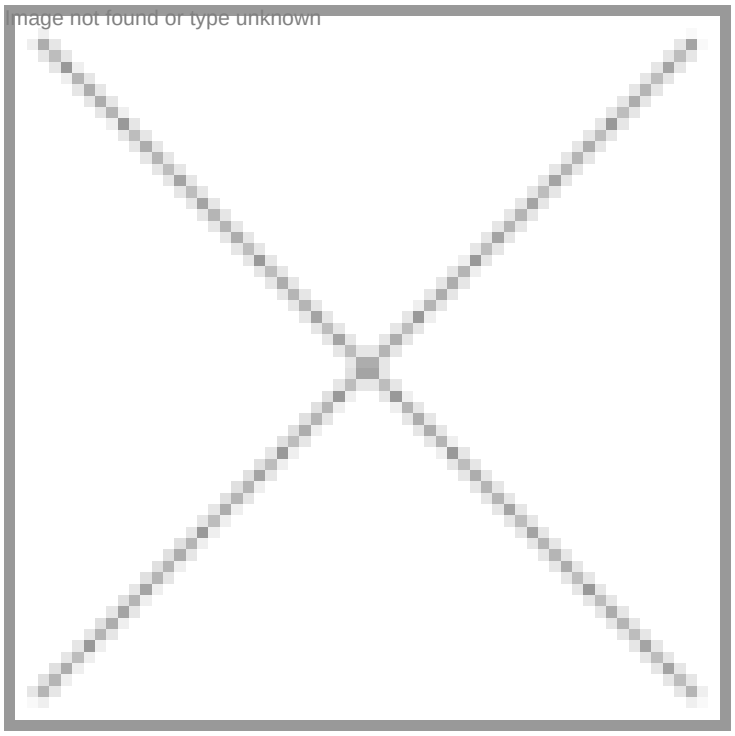


Biotech crops reduce pesticide use, green house emissions: Global study

An eminent agricultural economist, Graham Brookes, specializes in examining the impact of policy, trade agreements and technology change or agricultural and related sectors. He also has been providing research and consultancy in the farm sector for a wide range of clients in both public and private sectors. During his recent visit to India, he shared the findings of his study "GM Crops: The global socio-economic and environmental impact-the first nine years 1996-2004". Excerpts from the report in the Indian context:

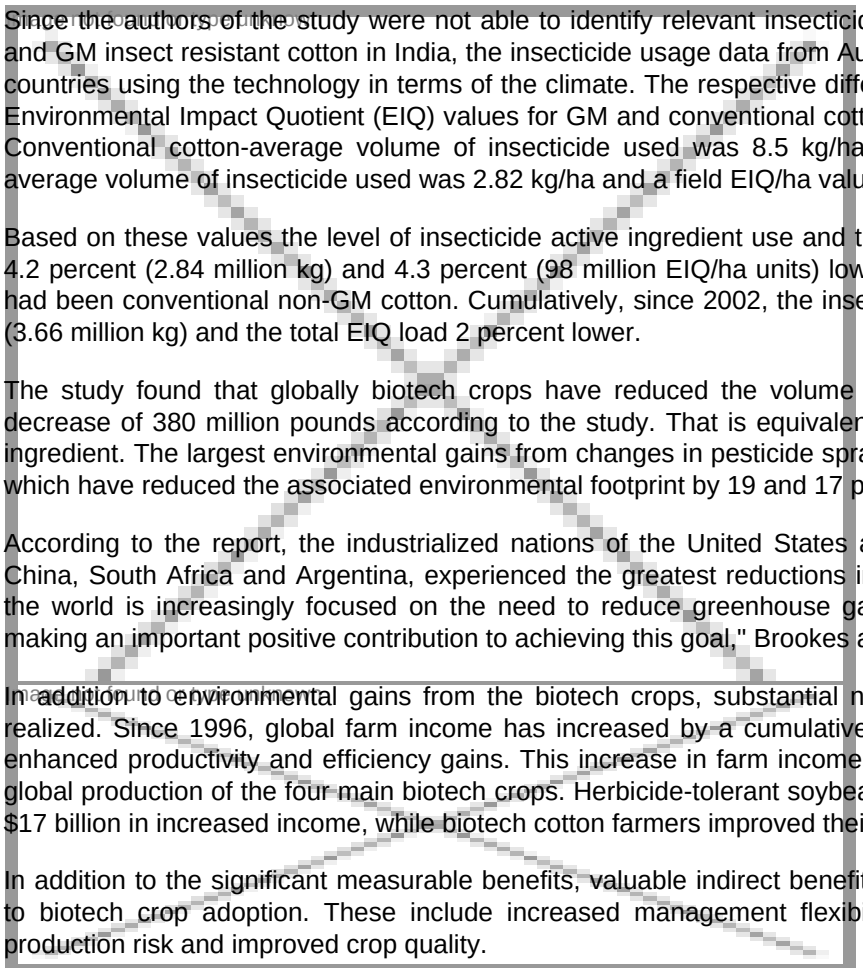
After almost a decade of commercialization, biotech crops have made a significant impact on the global economy and environment, decreasing the reliance on pesticides and reducing the environmental footprint associated with pesticide use by 14 percent, according to a global study on the socio-economic and environmental impact of biotech crops.

"Since 1996, adoption of biotech crops has contributed to reducing greenhouse gas emissions from agriculture and decreased pesticide spraying," said Graham Brookes, director of UK-based consulting firm PG Economics and one of the authors who conducted the study. Sharing the findings of his study, he said, "While greatly enhancing, the way farmers in 18 countries produce food, feed and fiber, biotech crops have reduced the environmental footprint associated with agricultural practices. This study offers the first quantifiable global look at the impact of biotech crop production."

The study, "GM Crops: the global socio-economic and environmental impact-the first nine years 1996-2004," reported that biotech crops contributed to significantly reduced greenhouse gas emissions from agricultural practices. This reduction

results from decreased fuel use, about 475 million gallons in the past nine years and additional soil carbon sequestration because of reduced ploughing or improved conservation tillage associated with biotech crops. In 2004, this reduction was equivalent to eliminating more than 22 billion pounds of carbon dioxide from the atmosphere or removing 5 million cars-10 percent of cars registered in India-from road for one year.

Globally insect resistant cotton has increased farm income by $ 5.7 billion since commercialization. GM insect resistant Bt cotton has been planted commercially in India since 2002. According to the study, in India the adoption of insect-resistant cotton has increased its farm income by Rs 558 crore.



Since the authors of the study were not able to identify relevant insecticide usage data by active ingredient for conventional and GM insect resistant cotton in India, the insecticide usage data from Australia and China was used as they are the nearest countries using the technology in terms of the climate. The respective differences for pesticide active ingredient use and field Environmental Impact Quotient (EIQ) values for GM and conventional cotton used as the basis for the analysis in India were: Conventional cotton-average volume of insecticide used was 8.5 kg/ha and a field EIQ/ha value of 256/ha; GM Cotton-average volume of insecticide used was 2.82 kg/ha and a field EIQ/ha value of 60/ha.

Based on these values the level of insecticide active ingredient use and the total EIQ load, in India in 2004 was respectively 4.2 percent (2.84 million kg) and 4.3 percent (98 million EIQ/ha units) lower than would have been expected if the total crop had been conventional non-GM cotton. Cumulatively, since 2002, the insecticide active ingredient use was 1.8 percent lower (3.66 million kg) and the total EIQ load 2 percent lower.

The study found that globally biotech crops have reduced the volume of pesticide spraying by 6 percent since 1996, a decrease of 380 million pounds according to the study. That is equivalent to eliminating 1,514 rail cars of pesticides' active ingredient. The largest environmental gains from changes in pesticide spraying have been from biotech soybeans and cotton, which have reduced the associated environmental footprint by 19 and 17 percent, respectively.

According to the report, the industrialized nations of the United States and Canada, as well as the developing nations of China, South Africa and Argentina, experienced the greatest reductions in the environmental impact of crop production. "As the world is increasingly focused on the need to reduce greenhouse gas emissions, it is clear biotech crops are already making an important positive contribution to achieving this goal," Brookes added.

In addition to environmental gains from the biotech crops, substantial net economic benefits at the farm level have been realized. Since 1996, global farm income has increased by a cumulative total of $27 billion derived from a combination of enhanced productivity and efficiency gains. This increase in farm income is equivalent to adding 3-4 percent to the value of global production of the four main biotech crops. Herbicide-tolerant soybeans have generated the greatest gains at more than $17 billion in increased income, while biotech cotton farmers improved their income by $6.5 billion in the past nine years.

In addition to the significant measurable benefits, valuable indirect benefits that are more difficult to quantify can be credited to biotech crop adoption. These include increased management flexibility, facilitating reduced tillage practices, reduced production risk and improved crop quality.

The report stated that more than 8.25 million farmers in 18 countries around the world have adopted biotech crops, and 90 percent of those are resource-poor producers located in developing countries.