Global Status of Commercialized Transgenic Crops: 2003*

Global Status of GM Crops in 2003

In 2003, the global area of transgenic crops continued to grow for the seventh consecutive year at a sustained double-digit growth rate of 15 per cent compared with 12 per cent in 2002. The estimated global area of GM crops for 2003 was 67.7 million hectares; this includes a provisional conservative estimate of 3 million hectares of GM soybean in Brazil (the final hectarage could be significantly higher), officially approved for planting for the first time in 2003. It is noteworthy that a double-digit rate of 10 per cent growth in GM crops was sustained in 2003, even excluding the Brazilian hectarage. The 67.7 million hectares of GM crops in 2003, equivalent to 167 million acres was grown by 7 million farmers in 18 countries, an increase from 6 million farmers in 16 countries in 2002. The increase in area between 2002 and 2003 of 15 per cent is equivalent to 9 million hectares or 22 million acres.

During the eight-year period 1996 to 2003, global area of transgenic crops increased 40 fold, from 1.7 million hectares in 1996 to 67.7 million hectares in 2003, with an increasing proportion grown by developing countries. Almost one-third (30 per cent) of the global transgenic crop area of 67.7 million

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hectares in 2003, equivalent to over 20 million hectares, was grown in developing countries where growth continued to be strong. It is noteworthy that the absolute growth in GM crop area between 2002 and 2003 was almost the same in developing countries (4.4 million hectares) and industrial countries (4.6 million hectares), with the percentage growth more than twice as high (28 per cent) in the developing countries of the South compared with the industrial countries of the North (11 per cent).

GM crop area, by country, crop and trait

In 2003, six principal countries, compared with four in 2002, grew 99 per cent of the global transgenic crop area; this reflects the broadening participation of the lead GM countries with ten countries now growing 50,000 hectares or more, of GM crops. The USA grew 42.8 million hectares (63 per cent of global total), followed by Argentina with 13.9 million hectares (21 per cent), Canada 4.4 million hectares (6 per cent), Brazil 3 million hectares (4 per cent), China 2.8 million hectares (4 per cent) and South Africa 0.4 million hectares (1 per cent). Of the six leading GM crop countries, China and South Africa had the highest year-on-year increase with a 33 per cent growth rate. China increased its Bt cotton area for the fifth consecutive year from 2.1 million hectares in 2002 to 2.8 million hectares in 2003, equivalent to 58 per cent of the total cotton area of 4.8 million hectares in 2003. South Africa increased its combined area of GM maize, soybean and cotton to 0.4 million hectares in 2003 with particularly strong growth in white maize used for food, which has increased rapidly from 6,000 hectares in 2001 to 84,000 hectares in 2003. Canada's GM crop area grew at a significant 26 per cent between 2002 and 2003 to reach 4.4 million hectares with increases totaling almost 1 million hectares in the three crops, canola, maize and soybean. Despite the continuing economic constraints in Argentina, and soybean adoption rates already close to 100 per cent in 2002, its GM crop area grew at 3 per cent with strong growth in Bt maize. A growth rate of 10 per cent was achieved in the USA (3.8 million hectares) reflecting strong growth in both Bt and herbicide tolerant maize, and continued growth in herbicide tolerant soybean. GM crop hectarage in Australia decreased slightly because of the continued severe drought, which is the worst in centuries, with total

area planted to cotton at approximately one third of normal plantings. India increased its Bt cotton area by 100 per cent; Spain also increased its Bt maize area by one third to reach over 6 per cent of the national maize crop in 2003. Uruguay and Romania also reported significant growth, exceeding 50,000 hectares of GM crops for the first time, whilst countries that introduced GM crops for the first time in 2002, such as Colombia and Honduras reported modest growth.

Two countries, Brazil and the Philippines approved planting of GM crops for the first time in 2003. Brazil officially approved herbicide tolerant soybean in late September 2003, immediately before the start of the planting season. This late approval has exacerbated the difficulties in projecting provisional estimates of GM soybean hectarage in Brazil for the 2003/2004 season. At the time when this publication went to press, in late 2003, only 50 per cent of soybeans had been planted in Brazil. A provisional conservative estimate of 3 million hectares of GM soybean has been projected for Brazil in 2003, in the knowledge that the final planted hectarage of GM soybean in Brazil in 2003 could be significantly higher. The Philippines grew approximately 20,000 hectares of Bt maize for the first time in 2003. Brazil and the Philippines joined 16 countries that already grew GM crops in 2002 for a total of 18 GM crop countries in 2003; notably, 11 are developing countries compared with 7 industrial countries. Thus, the number of countries growing GM crops has increased steadily from 6 in 1996, to 9 in 1998, to 13 in 2001, and 18 in 2003.

Globally, in 2003, growth continued in all four commercialized GM crops: GM soybean occupied 41.4 million hectares (61 per cent of global GM area), up from 36.5 million hectares in 2002; GM maize was planted on 15.5 million hectares (23 per cent of global GM area), up substantially from 12.4 million hectares in 2002, with the highest growth rate for all crops at 25 per cent - this follows a 27 per cent growth rate in GM maize in 2002; transgenic cotton was grown on 7.2 million hectares (11 per cent of global GM area) compared with 6.8 million hectares in 2002; and GM canola occupied 3.6 million hectares (5 per cent of global GM area), up from 3.0 million hectares in 2002.

During the eight-year period 1996 to 2003, herbicide tolerance has consistently been the dominant trait followed by insect resistance. In 2003, herbicide tolerance, deployed in soybean, maize, canola and cotton occupied 73 per cent or 49.7 million hectares of the global GM 67.7 million hectares, with 12.2 million hectares (18 per cent) planted to Bt crops. Stacked genes for herbicide tolerance and insect resistance deployed in both cotton and maize continued to grow and occupied 8 per cent or 5.8 million hectares, up from 4.4 million hectares in 2002. The two dominant GM crop/trait combinations in 2003 were: herbicide tolerant soybean occupying 41.4 million hectares or 61 per cent of the global total and grown in seven countries; and Bt maize, occupying 9.1 million hectares, equivalent to 13 per cent of global transgenic area and grown in nine countries. Whereas the largest increase in Bt maize was in the US, growth was witnessed in all seven countries growing Bt maize. Notably, South Africa grew 84,000 hectares of Bt white maize for food in 2003, a substantial 14 fold increase from when it was first introduced in 2001. Bt/herbicide tolerant maize and cotton both increased substantially, reflecting a continuing trend for stacked genes to occupy an increasing percentage of the area planted to GM crops on a global basis.

A useful way to provide a global perspective of the adoption of GM crops is to express the global adoption rates for the four principal GM crops as a percentage of their respective global areas. In 2003, 55 per cent of the 76 million hectares of soybean planted globally were transgenic - up from 51 per cent in 2002. Twenty-one percent of the 34 million hectares of cotton were GM, up from 20 per cent last year. The area planted to transgenic canola in 2003 was 16 per cent, up from 12 per cent in 2002. Finally, of the 140 million hectares of maize grown globally, 11 per cent was GM in 2003 equivalent to 15.5 million hectares, up substantially from 9 per cent or 12.4 million hectares in 2002. If the global areas (conventional and transgenic) of these four principal GM crops are aggregated, the total area is 272 million hectares of which 25 per cent, up from 22 per cent in 2002, was transgenic in 2003. Thus, for the first time one quarter of the aggregate area of the four crops, totaling over one quarter billion hectares is GM. The biggest increase in 2003 was a 4.9 million hectares increase in GM soybean equivalent to a 13 per cent year-on-year growth, followed by a 3.1 million

hectare increase in GM maize equivalent to a substantial 25 per cent year-on-year growth, which follows a 27 per cent year-on-year growth in 2002.

The potential contribution of GM crops

The World Food Programme recently reported that the number of people suffering from malnutrition increased by 25 million from 815 to 840 million. The most compelling case for biotechnology, and more specifically GM crops, is their capability to contribute to increasing crop productivity, and thus contribute to global food, feed and fiber security; conserving biodiversity, as a land-saving technology capable of higher productivity; more efficient use of external inputs, for a more sustainable agriculture and environment; increasing stability of production to lessen suffering during famines due to abiotic and biotic stresses; and, to the improvement of economic and social benefits and the alleviation of abject poverty in developing countries.

The experience of the first eight years, 1996 to 2003, during which a cumulative total of over 300 million hectares (approximately 750 million acres, equivalent to almost one-third of the total land area of the US or China) of GM crops were planted globally in 21 countries, has met the expectations of millions of large and small farmers in both industrial and developing countries. In 2003, coincidental with evidential confirmation that commercialized GM crops continue to deliver significant economic, environmental, and social benefits to both small and large farmers in developing and industrial countries, the global area of transgenic crops continued to grow at an annual sustained double-digit growth rate of more than 10 per cent. The number of farmers that benefited from GM crops continued to grow and reached 7 million in 2003, up from 6 million in 2002. Notably, more than 85 per cent of these 7 million farmers benefiting from GM crops in 2003, were resource-poor farmers planting Bt cotton, mainly in nine provinces in China and also in the Makhathini Flats in KwaZulu Natal province in South Africa.

The global value of GM crops

In 2003, the global market value of GM crops is estimated to be $4.50 to $4.75 billion, having increased from $4.0 billion in 2002 when it represented

15 per cent of the $31 billion global crop protection market and 13 per cent of the $30 billion global commercial seed market. The market value of the global transgenic crop market is based on the sale price of transgenic seed plus any technology fees that apply. The global value of the GM crop market is projected at $5 billion or more, for 2005.

Concluding comments and future prospective

Despite the on-going debate in the European Union, there is cause for cautious optimism that the global area and the number of farmers planting GM crops will continue to grow in 2004 and beyond. Taking all factors into account, the outlook for the next five years points to continued growth in the global hectarage of GM crops to approximately 100 million hectares, with up to 10 million farmers growing GM crops in 25, or more, countries. The global number and proportion of small farmers from developing countries growing GM crops is expected to increase significantly. Established GM country markets are continuing to grow in GM area, with a more diversified portfolio of GM crop products available. New GM countries from the South, like India and Brazil, have increased their hectarage of Bt cotton and herbicide tolerant soybean respectively, and some like Uruguay have also approved new products such as GM maize, already deployed in other countries. New input trait products from industry that will contribute to sustained growth include the dual Bt gene (cry1Ac and cry1Ab) in cotton and two new traits introduced into maize in North America. The cry3Bb1 for corn rootworm control, and the cry1Fa2 gene in Bt maize, with broader control of lepidopteran pests were both introduced in the US in 2003. Furthermore, five new Bt and novel gene products for maize insect resistance are expected to be launched in the next three years. Thus, the global GM maize area with insect resistance and herbicide tolerance traits, as well as the stacked traits, is likely to increase significantly in the near to mid-term. With the approval of GM soybean in Brazil for 2003/04, global GM soybean area is likely to experience renewed high growth rates in the near to mid-term.

In 2003, the three most populous countries in Asia – China, India, and Indonesia (total population 2.5 billion and a combined GDP of over $1.5

trillion), the three major economies of Latin America – Argentina, Brazil and Mexico (population 300 million and a GDP of $1.5 trillion) and the largest economy on the continent of Africa - South Africa (population 45 million and GDP of $130 billion) are all officially growing GM crops. Their combined populations of 2.85 billion with a total GDP of over $3 trillion are recipients of the significant benefits that GM crops offer. The top ten GM crop countries, each of which grew 50,000 hectares or more of GM crops in 2003, had a combined population of approximately 3 billion, close to half the world's population, with a combined GDP of $13 trillion, almost half of the global GDP of $30 trillion. In 2003, GM crops were grown in 18 countries with a combined population of 3.4 billion, living on six continents in the North and the South: Asia, Africa and Latin America, and North America, Europe and Oceania. Thus, despite the continuing controversy about GM crops, the hectarage and number of farmers growing GM crops have continued to grow at a double digit rate or more, every year since their introduction in 1996, with 7 million farmers benefiting from the technology in 2003.