

Global Adoption of Bt Cotton, 1996-2003

Bt cotton was first introduced in the US on 730,000 hectares in 1996 (James and Krattiger 1996) with additional small hectarage in Mexico and Australia for a global total of approximately 0.8 million hectares (Table 1). In 1997, for the first time, China adopted Bt cotton while the stacked genes of Bt and herbicide tolerance were introduced in the US (James 1997); by 2003 the stacked gene product accounted for 46 % of all the global commercial cotton containing the Bt gene, compared with 54% of the single Bt gene. By 1998 the hectarage of Bt cotton had doubled to 1.5 million hectares and Bt cotton was grown in a total of six countries. By the end of 2003, a total of 23.3 million hectares (Table 1) was grown by nine countries (Table 2).

Figure 1 shows the global adoption of Bt cotton since its introduction in 1996. In eight years, Bt cotton has increased more than seven fold from 0.8 million hectare in 1996, to 5.7 million hectares in 2003. Assuming a global average of 34 million hectares of cotton, the percentage of global adoption of Bt cotton has increased from 2% in 1996 to 21% in 2003.

2002 and 2003 were significant years in terms of Bt cotton adoption worldwide. China increased its Bt cotton area for the sixth consecutive year, from 2.1 million hectares in 2002 to 2.8 million hectares in 2003; this is equivalent to 58% of the total cotton area of 4.8 million hectares. India, the largest cotton-growing country in the world, which accounts for 25% (8.7 million hectares) of the global cotton hectarage, grew 44,500 hectares of Bt cotton for the first time in 2002. In 2003, India doubled its Bt cotton area to approximately 100,000 hectares, a significant increase although below the expectations of some market observers. Colombia, in Latin America, expanded its area of Bt cotton to approximately 5,000 hectares from the initial plantings in 2002. By the end of 2003, there were nine countries that had commercialized Bt cotton, seven

developing countries, three from Asia (China, India and Indonesia), three from Latin America (Mexico, Argentina and Colombia) and one from the African continent, South Africa. The two industrial countries that have already commercialized Bt cotton are the USA and Australia (Table 2).

It is noteworthy that more than 85% of the 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. Millions of farmers in these regions have derived substantial economic, environmental, health and social benefits (Pray et al 2002, Ismael et al 2002 a,b,c) that have contributed to a better quality of life.

In China, the increased income from the use of Bt cotton allows farm families to increase food purchases and food consumption, thus improving nutritional standards (Pray et al 2001). In South Africa, the social benefits that Bt cotton offers as a result of its reduced requirement for water for insecticide sprays, allows farmers, of whom 50% are women, to devote more time to high value activities such as caring for children and the sick and allows them to generate additional income by participating in non-farming activities (Ismael et al 2002a). In a typical season, a woman farmer in the Makhathini Flats in South Africa is relieved of 12 days of arduous spraying, saves over 1,000 liters of water, walks 100 km less, suffers less insecticide poisoning and increases her income significantly by approximately US\$85/season, through using Bt cotton, rather than conventional cotton.

The above are important examples of how Bt cotton can offer social benefits that extend beyond the farmers' fields and into their home and community.

Table 1. Global Adoption of Bt Cotton (Bt and Bt/Herbicide Tolerance) 1996 to 2003 (Millions of Hectares)

	1996	1997	1998	1999	2000	2001	2002	2003	Total
Bt	0.8	1.1	1.4	1.3	1.5	1.9	2.4	3.1	13.5
Bt and HT	0.0	<0.1	0.1	0.8	1.7	2.4	2.2	2.6	9.5
Total	0.8	1.1	1.5	2.1	3.2	4.3	4.6	5.7	23.3

Source: Clive James, 2002, 2003.
HT is Herbicide Tolerance



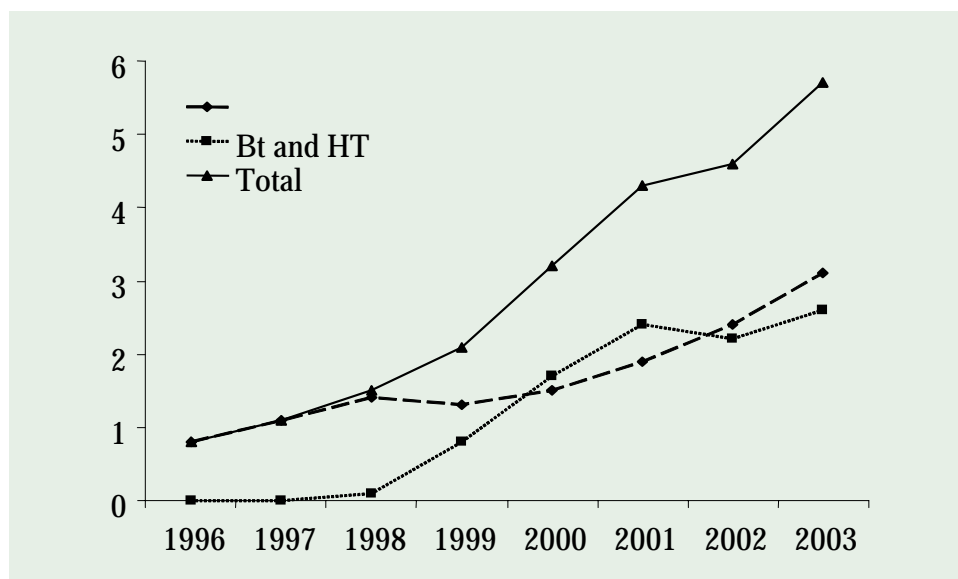
For more information, please contact the Global Knowledge Center on Crop Biotechnology (<http://www.isaaa.org/kc>), International Service for the Acquisition of Agri-biotech Applications (ISAAA) SEAsiaCenter (<http://www.isaaa.org>), c/o IRRI, DAPO Box 7777, Metro Manila, Philippines.
Tel: +63-2-580-5600; Telefax: +63-49-536-7216; E-mail: knowledge.center@isaaa.org

Table 2. Adoption of Bt Cotton, by Country, by Year 1996-2003

Country	1996	1997	1998	1999	2000	2001	2002	2003
USA	X	X	X	X	X	X	X	X
Australia	X	X	X	X	X	X	X	X
China		X	X	X	X	X	X	X
India							X	X
Indonesia							X	X
Mexico	X	X	X	X	X	X	X	X
Argentina			X	X	X	X	X	X
Colombia							X	X
South Africa			X	X	X	X	X	X

Source: Clive James, 2003.

Figure 1: Global Adoption of Bt Cotton (Bt and Bt/Herbicide Tolerance) 1996 to 2003 (Millions of Hectares)



REFÉRENCES:

Ismael, Y., R. Bennett, S. Morse and T.J.Buthelezi. 2002a. Bt cotton, pesticides, labor and health. Presentation at the 6th International ICABR Conference, Ravello, Italy, 11-14 July 2002.

Ismael, Y., R. Bennett and S. Morse. 2002b. Bt cotton, pesticides, labour and health: A case study of smallholder farmers in the Makhathini Flats, Republic of South America. Paper for the 6th International Conference on Agricultural Biotechnology: New Avenues for Production, Consumption and Technology Transfer, Ravello, Italy.

Ismael, Y., R. Bennett, and S. Morse. 2002c. Do small-scale Bt cotton adopters in South Africa gain an economic advantage? 6th International ICABR Conference, Ravello, Italy, 11-14 July 2002. pp. 1-16. Cotton Council. pp. 1048-1051.

James, C. 2003 Preview:Global Status of Commercialized Transgenic Crops: 2003. ISAAA Briefs No. 30. ISAAA: Ithaca, NY.

James, C. 2003. Global Review of Commercialized Transgenic Crops: 2002 Feature: Bt maize. ISAAA Briefs No. 29. ISAAA: Ithaca, NY.

James, C. 2002 Global Review of Commercialized Transgenic Crops: 2001 Feature: Bt cotton. ISAAA Briefs No. 26. ISAAA: Ithaca, NY

James, C. 1997. Global Status of Transgenic Crops in 1997. ISAAA Briefs No. 5. ISAAA: Ithaca, NY, USA. pp. 30.

James, C. and A.F. Krattiger. 1996. Global Review of the Field Testing and Commercialization of Transgenic Plants, 1986 to 1995: The First Decade of Crop Biotechnology. ISAAA Briefs No. 1. ISAAA: Ithaca, NY, USA. pp. 31.

Pray, C., J. Huang, R. Hu and S. Rozelle. 2002. Five years of Bt cotton in China – The benefits continue. The Plant Journal. 31(4): 423- 430.

Pray, C., D. Ma, J. Huang and F. Qiao. 2001. Impact of Bt cotton in China. World Development. 29(5): 1-34.