

Suggested Readings

- Gregory, P., Stewart, T., Stavos, S. 2002. Pesticide Outlook (1) 31-34 Adoption of *Bt* cotton by small-scale farmers in South Africa.
- Ismael, Y., Bennett, R., Morse, S., and Buthelezi, T.J. 2002. *Bt* Cotton and pesticides. A case study of smallholder farmers in Makhathini Flats South Africa. Paper presented at the 6th International Conference on Agricultural Biotechnology: New Avenues For Production, Consumption And Technology Transfer. Ravello, Italy, July 2002
- Ismael, Y., Bennett, R., and Morse, S. 2002. Do small scale *Bt* cotton adopters in South Africa gain an economic advantage? Paper presented at the 6th International Conference on Agricultural Biotechnology: New Avenues For Production, Consumption And Technology Transfer. Ravello, Italy, July 2002
- Ismael, Y., Bennett, R., and Morse, S. 2001. Can farmers in the developing countries benefit from the modern technology? Experience from Makhathini Flats. The Republic of South Africa. Crop Biotech Brief Vol.1 No.5 2001. ISAAA Publication (www.isaaa.org/kc)
- Ismael, Y., Bennett, R., and Morse, S., 2001. Biotechnology In Africa. The adoption and economic impacts of *Bt* cotton in the Makhathini Flats, Republic of South Africa. Paper Presented For Africabio Conference:Biotechnology Conference For Sub-Saharan Africa 26th -27th September 2001 Johannesburg South Africa. Paper submitted to the Journal of International Development.
- Ismael, Y., Bennett, R., and Morse, S. 2001. Farm level impact of *Bt* cotton in South Africa. Biotechnology and Development Monitor, No. 48, p. 15-19.
- Ismael, Y., Thirtle, C., and Piesse, J. 2001. Can GM help the poor? Efficiency of *Bt* cotton adopters in the Makhathini Flats of KwaZulu Natal. Paper for the consultation meeting on "Biotechnology and Rural Livelihood – Enhancing the Benefits", The Hague, June 2001
- Ismael, Y., Thirtle, C., and Beyer, L. 2001. Smallholder adoption and economic impacts of *Bt* cotton in the Makhathini Flats. Republic of South Africa DFID Natural Resources Policy Research Programme Project R7946 April 2001.
- Ismael, Y., Thirtle, C., and Beyer, L. 2001. Efficiency effects of *Bt* cotton adoption by smallholders in Makhathini Flats, KwaZulu-Natal. South Africa Paper for the 5th International Conference on Biotechnology, Science and Modern Agriculture - A New Industry at the Dawn of the Century. Ravello, Italy, June 2001. (*To be published by Zilberman*)
- Wambugu, F. 2001. Modifying Africa: How biotechnology can benefit the poor and hungry: a case study from Kenya. ISBN 9966-879-38-2

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Bt Cotton in South Africa





Background

Cotton contributes around US\$50 million annually to the national income of South Africa. Approximately 100,000 hectares are planted to cotton, mostly in hot, dry areas of the country. These farms are planted by about 1,500 commercial scale and 3,600 smallholder farmers.

Cotton has been a major crop for resource poor farmers in the semi-arid Makhathini Flats, South Africa for over 40 years. Since passing the South African GMO Act (Genetic Modified Organisms Act) of 1997, and while the rest of Africa and other developing countries continued debating about biotechnology, these smallholder farmers began planting genetically enhanced *Bt* cotton.

The insect protected cotton, contains a naturally occurring substance, *Bt* protein, which has been the active ingredient in safe and effective biological sprays for over 50 years. By producing this protein directly by the cotton plants, insect control is revolutionized resulting in tangible direct and indirect benefits for these farmers.

Makhathini farmers are among the first in Africa to use this new technology. Evidence from a number of independent studies highlights some major beneficial impacts that farmers from Makhathini have experienced.

Smallholder Benefits

Economic

Bt cotton farmers have benefited from lower production cost due to less pesticide and labor costs, as well as a significant yield increase, between 27%-48%. Although the seed costs more, the lower production cost, combined with higher yield, provides the farmer with higher gross margins of an average US\$ 50 per ha.

Agronomic

The advent of insect protected cotton has typically reduced the number of pesticide sprayings from 10 to 4 per season. Managing crops is easier and the ongoing risk of bollworm attacks, the major insect pest of cotton, has been drastically reduced.

Labor Saving

The significant reduction in time taken for crop management and water collection necessary to make up the pesticidal sprays means that the women and children (who would usually undertake this task) have more free time for other activities, including education. This is said to be one of the main reasons for adoption.

Health Benefits

Pesticide usage, such as organophosphates, has been reduced each season. In parallel there are fewer hospital admissions for pesticide poisoning. (Typically, farmers neither use the protective clothing nor follow all the safety precautions required).

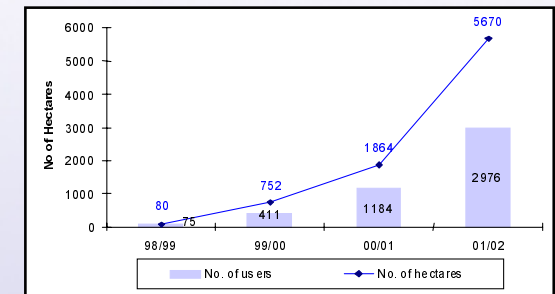


Environmental Benefits

Farmers are reporting an increase in reed frogs where *Bt* cotton is grown. The correlation and exact reasons require further study, but it is generally accepted that an increase in frog numbers is a good indicator of environmental health and well-being and probably reflects the greater than 50% reduction in pesticide sprayings.

Socio-Economic Benefits

Rapid adoption of *Bt* cotton by 92% of smallholders for the 2001/2002 season has resulted from the sharing of positive experiences by word of mouth.



A reduction in labor and pesticide inputs coupled with higher yields (ranging from 27%-48%) and gross margins (average US\$ 50 per ha) have already assisted in improving farmers' lifestyles in the Makhathini. By freeing up time traditionally spent on farming, greater opportunities exist for the family. They can grow other crops and spend more time in school. Benefits to the community are expected to result from these gains.

The public and the environment also win from the health perspective since pesticide reduction use means less production, shipment, storage and exposure to chemicals.

These emerging observations, along with first-hand experience, provides potential users of this technology, especially in developing countries, with useful information to enable a rational choice of adopting or not adopting this new technology.

Farmers in Makhathini Flats benefited from planting Bt cotton. This is proof that agricultural biotechnology along with other farming strategies offer a powerful tool to help farmers in developing countries improve productivity and enhance health, and socio-economic well-being.