South Africa: an early adopter of GM crops

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South Africa led the way among countries in the African continent to introduce genetically modified cotton (*Bt* cotton). There are a number of reasons for this, including the early role of an interim biosafety regulatory body, the formation of an organisation, AfricaBio, which aided information dissemination on GM crops, and finally the fact that South Africa is home to many highly sophisticated commercial farmers.

South African Committee for Genetic Experimentation

This body – SAGENE – was established by the South African Council for Scientific and Industrial Research (CSIR), which was then the research-grant-giving agency of the government. The CSIR did this to ensure that research grants would comply with the US National Institutes of Health (NIH) 1976 Guidelines for research involving recombinant DNA molecules. One of the beneficial outcomes of this was that before a scientist could apply to the CSIR for research funding in this field SAGENE had to approve the laboratories in question as being compliant with the NIH Guidelines. As many universities in the country were eager to foster this type of research, they were forced to upgrade and equip laboratories to a given standard. The scientists in question also had to give evidence of having been trained in the correct safety standards. This approach led to a number of training courses on genetic modification and biosafety being held in South Africa, resulting in a network of scientists working on a variety of projects using genetically modified organisms (GMOs). This stimulated the growth of modern biotechnology in the country.

After some years, members of SAGENE felt it had accomplished much of what it was set up to achieve and therefore went into abeyance during the late 1980s, although it continued to meet from time to time. However, this semi-retirement was to change radically with the advent of GM crops. In 1990 an application was received from the multinational company, Calgene Inc., for field trials of GM cotton resistant to the herbicide, bromoxynil (BXMTM). These trials were permitted by SAGENE following guidelines and regulations that were applicable in the USA and authorised by the South African Department of Agriculture in terms of the South African Agricultural Pests Control Act.

Shortly thereafter an application by Clark Cotton to conduct a US 'winter nursery production' of Bollgard® cotton seed in South Africa was also approved. Faced with these applications the government officially reconstituted the SAGENE committee, announcing it in the *Government Gazette* of 15 May 1992. This allowed SAGENE to represent the interests of the public and not only the scientific community. In addition, it could advise *mero motu* (by free will) and not only on request, and

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was empowered to liaise with relevant international groups concerned with biotechnology. Furthermore, it could advise on legislation or controls with respect to importation or environmental release of organisms with re-combinant DNA. The terms of reference were amended on 14 January 1994 to broaden the scope from 'organisms with recombinant DNA' to 'genetically modified organisms', the term used internationally. In March 1996 SAGENE published its *Guidelines and Procedures for Work with Genetically Modified Organisms*. The document contained two questionnaires, one for the trial release of GMOs, which included field trials for GM crops, and one for the general release of GM plants.

Monsanto was the first company to apply for general release of *Bt* cotton and SAGENE recommended that they investigate the value of the new varieties to smallholder and subsistence farmers. In 1997 Monsanto managed to convince four farmers in the Makhatini Flats region of northern KwaZulu-Natal to plant some of their *Bt* cotton seeds. At the end of that season the farmers' results were sufficiently impressive to convince more than 70 more farmers to plant *Bt* cotton. The next year over 600 followed suit and by 2010 almost all farmers in the cotton-growing regions of KwaZulu-Natal planted *Bt* cotton.

However, 1997 saw the beginning of the end of SAGENE as the Genetically Modified Organisms Act was published in the *Government Gazette* on 23 May of that year. The Act could not be implemented until the Regulations were approved and thus it only came into effect on 1 December 1999.

To give an idea of the number of applications SAGENE was handling in 1997, of a total of 27, there were 13 for maize, four for cotton, two for soya, one each for canola, strawberry, eucalyptus and apple, and four for microorganisms. The applicants included companies such as Carnia, Calgene, Infruitec (local),

Rhone Poulenc, Pannar (local), Monsanto, Delta and Pine Land, Novartis, AgrEvo and Pioneer Hybrid International (personal communication, Muffy Koch). The traits being tested included insect resistance, fungal and viral resistance and herbicide resistance.

AfricaBio

The second reason why South Africa was an early adopter came from the activities of an organisation called AfricaBio.[1] Although it was started by Professor Jocelyn Webster, a member of SAGENE, in 1999, three years after the initial adoption of the first GM crop (*Bt* cotton) by smallholder farmers in South Africa, it played an extremely important role in the subsequent enthusiastic uptake of this and other GM crops by both small-scale and commercial farmers. AfricaBio is an independent, non-profit biotechnology stakeholders' association aimed at educating government officials, regulatory authorities, the media and the public at large about agricultural biotechnology. Its membership included academics, farmer organisations, grain traders, biotechnology companies, seed companies, food manufacturers and retailers, and consumers. AfricaBio was officially registered as a non-profit, Section 21 Company in 2000. Over the years it has proven its worth as a provider of accurate and objective information on biotechnology to consumers, the media and decision makers. It has provided a regular forum for exchange of information not only between South Africans but between people from many South African Development Community (SADC) countries. In addition, AfricaBio assisted other countries such as Kenya and Malawi to develop their own biotechnology stakeholder organisations. Their workshops, which provided information and training to stakeholders from countries such as Malawi, Namibia, Zimbabwe and Mozambique, have

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been particularly successful. They have also run training and advice programmes for small-scale farmers interested in planting GM crops.

Over the years AfricaBio has put out a series of position papers on such issues as GM and biodiversity, the impact of GM on biodiversity, bioethics, intellectual property rights and farmers' rights, and GM impacts on sustainable agriculture. These and other publications provided farmers with invaluable information on the role GM crops played in various aspects of agriculture and food security both within South Africa and beyond. Later booklets were produced on *Agricultural Biotechnology: Facts for Decision Makers* and *Biotechnology: Biosafety, Food Safety and Food Aid*. For many years they have sent out monthly newsletters called *BioLines*, later *GMO Indaba* and more recently *GMO Insight*, which are quick guides on topical issues.

A few examples:

- *The Impact of Biotechnology on Africa in the 21st Century* (June 2001 – a meeting held in preparation for the World Summit held in Johannesburg in September 2002)
- *Zambia Launches its First Biotech Outreach Society* (July 2003 – and they're still working on it)
- *SA GMO Maize Crops Set to Grow* (April 2004 – and they are still growing)
- *Tanzania Jumps on GM Bandwagon – Agricultural Ministry Says They Cannot Afford to Be Left Behind* (March 2005 – but it seems they are)
- *Kenyan Minister Asks Journalists to Highlight Biotech Benefits* (June 2006 – and some of them got it right)
- Bt *Toxin Resistance: An Evolutionary Action* (March 2008 – a cautionary note on responsible stewardship of the new technology)
- Bt *Awareness Campaign for Kenya Launched plus Kenya Approves GMO Bill* (April 2009 – Kenya making great strides forward)

- *Consumer Protection Regulation Effective October 2011* (October 2011 – all food in South Africa containing more than 5 per cent GMO ingredients to be labelled)
- *AfricaBio and Partners Host Successful IRM Workshop* (December 2011 – ways to prevent insects from developing resistance to the *Bt* toxin)

Commercial farmers

The third reason is the presence of many highly sophisticated commercial farmers, not found anywhere else in Africa. These farmers are sufficiently sophisticated to be willing to test the latest technologies. As many of them export internationally they need to remain competitive. They are therefore in a position to evaluate the latest scientific developments and compare their advantages with what is already available. As a result South Africa is currently number nine in the ranks of adopters of the technology, with more than 70 per cent of the maize crop totalling some 1.8 million hectares planted.[2]

References

1 www.africabio.org
2 James C. (2011) *Global Status of Commercialized Biotech/GM Crops: 2011*, ISAAA Brief No. 43. Ithaca, NY: ISAAA.

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