

COTTON TRADE AND GMO's

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To the question 'Is Australian raw cotton or cottonseed oil genetically modified?' The answer is 'emphatically, NO!'

No biotechnology resulting in, or even influencing, the production of genetically modified fibre or oil, is registered for use in Australia. Research progress suggests that it will be many years before any such technology could be successfully registered in Australia.

Australia has a particularly strict and robust registration system which is implemented through the Federal Department of Health. To maintain credibility and public confidence the registration process will rightfully remain dominated by environment, consumer and public health considerations.

For over fifty years cotton plant breeders have utilised the principles of genetic engineering, or biotechnology, - but in a slow and cumbersome way. Now that has changed because scientists have successfully sought the knowledge behind cell and gene activity. The new tools will enable plant breeders to advance in a much more precise way. The first achievements have now reached commercialisation.

Environmental benefit is a major outcome from the first and only registered use of biotechnology in commercial Australian cotton. This involves the use of Monsanto's Ingard® technology in some 25 to 30% of Australian cotton production. Transformed plants are able to produce a crystalline protein derived from *Bacillus thuringiensis* (Bt). Bt is a widely occurring natural organism which is also used in such products as Dipel®, strongly favoured as an organic pesticide by home gardeners. The Bt proteins used in cotton plants or Dipel® specifically control larvae of Heliothis, and some other major Lepidopteran pests of Australian cotton, but have little or no impact on other organisms. Bt protein is not expressed in fibre or cottonseed oil - whether it is applied topically or internally produced by the cotton plant.

Heliothis species around the world vary in tolerance of Bt. Unfortunately the Australian species appear less susceptible than their American counterparts, which means we need highly effective Bt cottons to begin with.

On Australian Ingard® crops industry figures confirm that, on average, farmers have been able to reduce their use of traditional pesticides by over half. However the field results are variable and this

variation cannot be fully explained. Individual crop management, environmental factors, and physiological factors influencing protein production, appear to interact with cytogenetic factors to cause differences in expression and efficacy.

Thus for some farmers 'Bt cotton' may not have been cost effective, purely as a pest control option. Yet those farmers remain committed to the technology because of its indirect benefits to the environment and the community.

Monsanto recently provided plant breeders with a second acceptable 'Bt' gene. Both CSIRO and Deltapine are now busy backcrossing this two gene material into high performance varieties. In this process care must be taken to preserve the right adaptability, yield, agronomic, disease resistant, and fibre quality traits. These need to be combined with robust and reliable efficacy to achieve better cost benefit. Then follows thorough plant selection pressure, elite line seed increase and field testing over a range of regions and seasons. It simply takes time to get it right.

The other technology awaiting registration is Monsanto's 'Roundup Ready®'. This should allow farmers to shift away from prophylactic use of residual herbicides to 'when needed only' use of non persistent Roundup®. Again the environment would indirectly benefit from such a development.

The Future - Confidence

Public confidence in gene technology has been eroded by lobbyists and journalists seeking to exploit 'fear of the unknown, fear of change'. This nervousness can only be overcome by demonstrating, by example, the benefits to consumers and the environment, coupled with an increasing public understanding of the science.

Another feature of this process must be the maintenance of a transparent, efficient and scientifically sound regulatory process.

This process must extend to international trade and must be reciprocal. Strict international protocols and safeguards must be implemented and protected from abuse, e.g. as a non-tariff trade barrier, or through the lack of, or inappropriateness of, patent rights.

The Future - Opportunities

The main force driving support for genetic engineering of Australian cotton is environmental sustainability of production by further 'reducing dependence on traditional pesticides'.

Right now we need to focus on the need for 'back ups' to follow or augment the Bt technology. Ideally this next generation of technology should be totally unrelated to Bt - new genes, new modes of action, no cross-resistance etc.

In conjunction with this our industry needs gene technology which will assist in controlling other pests, especially sap sucking and boll piercing insects. Other aspects of Integrated Pest Management will need to be reviewed so that all aspects, including biotechnology, work in harmony.

In the fight against disease, we have already commenced isolating appropriate genes to help control Fusarium Wilt. We need to extend this to the whole range of cotton diseases.

Next in priority may be physiological genes which improve the plants water use efficiency, drought tolerance, waterlogging tolerance, photosynthetic and nutrient use efficiency, adaptability to shorter seasons, and even harvest efficiency.

Consumers would benefit from other genetic engineering opportunities. Examples include Australian research aimed at increasing the Oleic oil content of cottonseed oil, and at modifying fibre characteristics to make cotton more competitive with synthetic fibres - many of which originate from non renewable petro-chemicals (as do many traditional pesticides).

A key component of any Australian strategy regarding biotechnology is that we must strive to be innovative in developing key components of gene technology. This will, of course, use up research funds, but without it we could find ourselves with no bargaining capacity and exploited by others.

We need to be vigilant in protecting the 'ethics' and the 'business ethics' involved. In doing so we should support the public comments regarding free access to 'genomics' by US President Clinton and UK Prime Minister Tony Blair. Private investment to further develop this genomic research should be stimulated through adequate incentives and rewards. But at the same time ethical considerations must be observed to retain public confidence.

Australian farmers need access to gene technology to remain internationally competitive. Australian consumers need access to the improved products developed using this front line science and the Australian environment will benefit by enabling the cotton industry to utilise biotechnology to reduce its dependence on traditional pesticides.

