Governments' Attitudes towards GM Food Crops and Developing World Agriculture

William G. Padolina

Paper prepared for presentation at the "Food for the Future: Opportunities for a Crowded Planet" conference conducted by the Crawford Fund for International Agricultural Research, Parliament House, Canberra, Australia, August 8, 2002

Governments' Attitudes towards GM Food Crops and Developing World Agriculture

WILLIAM G. PADOLINA

Introduction

In May 2002, representatives of eighteen Asian countries gathered in New Delhi for a conference sponsored by the Indian government and the International Union for Conservation of Nature and Natural Resources. The countries formed an alliance to deal with all issues surrounding the adoption of Genetically Modified Organisms (GMOs) in the region. Two of the countries represented did not have regulatory bodies to oversee the introduction of GMOs. Another delegate expressed the view that the country he represented is 'cautious' but not averse to GMOs, and that there must be transparency in GMO research. One other country does not favour blanket introduction of GMOs but a 'cautious case-by-case approach.' Still others were concerned that GM crops would 'eliminate some of the need for agricultural labor.' The deliberations centred around the basic point that developing countries would adopt GMOs only if they were convinced of the safety of human health and the environment (Jayaraman 2002).

The cautious attitude shown by the governments of many developing countries reflects a general lack of confidence in being able to manage the technology and the issues associated with GM food crops. Developing countries have difficult choices in attempting to satisfy many competing demands with limited resources.

Recently it was reported that a southern African country suffering from political turmoil and food shortages initially rejected an offer from the US to send whole-grain corn for fear that the shipment would contain GM corn. It appears that the rejection was based on pressure from some countries in Europe importing beef and ostrich meat, and wanting assurance that the feed used did not contain any GM crops (Gidley 2002). The government eventually accepted the shipment. A senior scientist from a developing country in Southeast Asia clearly expressed the dilemma faced by those governments, noting that 'although the government does not have a policy that says it is against biotechnology development, there is no policy that clearly states that the government supports biotechnology either.' (Anon. 2002b).

Thus, the adoption of GM food crops in developing countries has been slow. In recent years, many governments have been influenced by the alleged undesirable effects of GM crops on other plants, human health and the environment (Taylor and Fauquet 2000). Although we cannot consider biotechnology as a panacea for world hunger and malnutrition, there is increasing evidence that it will be pivotal in overcoming many technical difficulties in efforts to improve agricultural productivity (Conway and Toenniessen 1999; Persley and Lantin 2000; Pinstrup-Andersen and Schioler 2000; Commission of the European Communities 2001). Technical improvements over the last decade have greatly reduced the time required to develop a stable improved variety, and have expanded the sources of many agronomically desirable traits. Genetic information coding for desirable traits has been transferred from other organisms, some of which may be sexually incompatible. The transfer of such agronomically beneficial traits offers

DR WILLIAM G. PADOLINA is Deputy Director General for Partnerships, International Rice Research Institute. From 1968 to 1992 he was Professor of Chemistry, University of the Philippines, Los Banos, and Executive Deputy Director and then Director of the Philippine National Institutes of Biotechnology and Applied Microbiology from 1980 to 1989. He was cabinet Secretary (Minister) of Science and Technology, Republic of the Philippines, 1994-1999, and President of the 40th General Conference, International Atomic Energy Agency, 1996. He has published in natural products chemistry, biotechnology and the chemistry of the coconut. He obtained his BSc in agricultural chemistry (*magna cum laude*) from the University of the Philippines in 1968 and his PhD in phytochemistry from the University of Texas in 1973.

diverse possibilities to reduce risks and improve performance of farms belonging to resource-poor farmers, as indicated in the report of seven prestigious academies of sciences in the world (Anon. 2000b). Many of these constraints can no longer be overcome using conventional breeding methods. Furthermore, in the search for more environmentally friendly farming operations, GM food crops with herbicide and pesticide resistance provide promise for lowering inputs of agricultural chemicals and reducing tillage.

Despite pressure to improve food security without inflicting heavy environmental damage and the increasing evidence demonstrating the ability of GM food crops to help alleviate hunger and poverty, developing countries have approached the issue of adoption of GM food crops with some reluctance.

There is no doubt that the debate raging on GM food crops in developed countries has influenced the situation in developing countries. Sir John Marsh (2001) observes:

In affluent and traditional societies, including much of the EU, negative voices tend to dominate the debate. There is a persistent questioning of the integrity of the scientist, of the objectivity of scientific committees that advise governments and a strong emphasis on possible but improbable catastrophic outcomes. Allied to a sense that 'things are alright as they are' governments are reluctant to confront such anxieties and readily succumb to the convenience of the precautionary principle. This avoids the need for decision now but does not take account of the long-term damage that may result from such inertia.

A study has been conducted on factors affecting the adoption of GM crops by farmers in the USA (Fernandez-Cornejo and McBride 2002). The conditions in developing countries are different, and it is clear that many factors can influence the attitudes of their governments with regard to GM food crops. This paper discusses the major reasons that seem to have retarded the diffusion of GM food crops in developing countries.

Limited access and high transaction costs

The production of GM crops is still dominated by the developed countries. In 2001, the estimated global area of GM crops was 52.6 million ha. Of this, 68% was grown in the US. The rest were grown in Argentina (22%), Canada (6%) and China (3%). GM soybeans continue to be the most extensively-grown crop, covering 33.3 million ha globally. (James 2001).

The first GM food crops which were commercialized were products of private sector research (James and Krattiger 1996), and consequently they were covered with appropriate intellectual property protection. It has been noted that the first GM food crops developed were herbicide tolerant and thus easily associated with the vested interests of multinational agrochemical companies. This has caused many developing countries to suspect that these multinationals are using GM crops to maintain global control of agriculture.

Commercial production of GM food crops needs a license from the private-sector owner. Licensing agreements require resources and an appropriate legal and regulatory system to enforce licensing agreements. These are upfront costs, and considering the risks that have been publicly discussed, often in very negative terms, developing country governments are reluctant to invest under a cloud of doubt. In contrast, conventionally-bred crops are more widely available as public goods and can be freely accessed. Furthermore, conventionally-bred crops need not pass through the very stringent, time-consuming and costly regulatory and clearance procedures required for GM crops.

Hurdles to the adoption of GM food crops include safety tests, environmental impact studies and other requirements, and intellectual property protection associated with such crops. Since these crops have been developed by private institutions, they tend to be covered by proprietary rights (Lesser 1997). Access to these GM food crop varieties has to be negotiated before they can be utilized. A legal support system and sophisticated technical expertise is necessary to be able to leverage mutually acceptable terms for the distribution and use of the material. This requires the guidance of technical and legal experts who have a good grasp of the conditions under which the material is to be transferred and used.

The private sector will always prefer to maintain maximum control of the movement of its material, including 'reach through' rights which extend ownership to varieties that may have been derived using the original proprietary material. This issue

is relevant where the GM food crop is to be used as breeding material.

Governments have relied on the Convention on Biological Diversity as leverage for the use of genetic resources. However, such leverage is based on monopolistic contracts with governments that afford opportunity for market manipulation. As a consequence, access is limited and transaction costs are increased (Jackson and Lettington 2002). For example, negotiations for a contract of this type by one CG centre in Southeast Asia has reached its fourth year and discussions are still ongoing.

High cost of maintenance and adoption

The biotechnology-based tools used to develop GM food crops rely on new knowledge and basic research. Massive new investments in a good research and development infrastructure are necessary to be able to exploit the full potential of GM food crops. The final product, unremarkable seeds or planting materials, gives no hint of the tremendous amount of investment and testing required to get to the point of commercialization (Charles 2001). This involves not only investments in laboratory facilities but also in the human resources needed to undertake essential research. Few developing countries are prepared to conduct research and development activities leading to GM food crops because of many years of under-investment in science and technology.

Research laboratories and scientific staff are necessary even if GM food crop varieties developed elsewhere are to be introduced. Evaluating the performance of such introduced crops, and other regulatory requirements, needs a system which is able to generate the information necessary to assess the impact of the crops on health and the environment. While some aspects of this technical support system can be outsourced, a major portion of the work will have to be done *in situ* and local capacity must be developed. Such requirements can be daunting for governments with only limited resources. Under these circumstances, governments tend to regard scientific activity as a dispensable component of national development. Politicians rarely obtain political mileage from long-term investments in research and development. Furthermore, considering the raging public debate regarding the safety and environmental effects of GM food crops, governments tend to delay decisions to avoid unwanted political consequences.

Regulatory requirements

No other agricultural technology has been subjected to such close scrutiny through intensive tests and evaluation as GM food crops. This has necessitated the establishment of regulatory bodies that can assess the safety of novel food crops, supported by a well-informed effective legal system to settle disputes (Pownall 2000). All these require additional investment in the governance structure. International agreements, particularly the Cartagena Protocol on Biosafety (Anon. 2000a) require that a competent local authority be established to perform these regulatory activities.

Since regulatory activity is an exercise of national sovereignty and considering the difficulties in harmonizing regulatory systems across countries, trade involving GM food crops has become a risky activity. Trade considerations – particularly for products exported to countries which restrict imports of these crops – may discourage their adoption, especially in an agriculturally-based economy (Smith 2000). One country in Southeast Asia is proceeding cautiously in planting GM food crops as pressure mounts from importing countries to restrict imports of such commodities.

Consequences

These considerations, reinforced by debates in advanced countries, can have many consequences for developing economies. At the very least, the flow of benefits from GM food crops is being delayed, even as resource-poor farmers need new science to help overcome constraints and improve productivity. It is unfortunate that new tools – which can produce public goods – are not being used due to public objections. Furthermore, scientific activity such as field-testing of GM food crops is being criminalized and threatened with violence.

In the accumulating experience of the commercial cultivation of GM food crops, we find no indications of adverse effects on human health or the environment. Although the debate continues in developed countries, and as a result regulatory requirements are increasing day by day, investment in the development of GM food crops

also continues. Meanwhile, the apocalyptic tone of these debates and careless press coverage reinforce government reluctance in developing countries to adopt GM food crops. In this situation, it is clear that the knowledge gap between developed and developing countries will continue to widen. These developments lead to higher costs and consequently make it more difficult for developing countries to use the new tools of biotechnology. Consequently the risks of inhibiting the development of biotechnology will be borne by developing countries (Smith 2000).

Recommendations

Capacity building

It is to the advantage of a developing country to have indigenous technical and legal capacity to assess the relative benefits and risks of GM food crops. Thus, developing countries must strive to train human resources and establish institutions that can assess technical and legal information related to GM crops on a sound scientific basis. This includes not only the scientific expertise but also the regulatory and legal expertise capable of handling the emerging concerns on GM food crops such as biosafety and environmental effects, as well as matters related to intellectual property rights. The harnessing of genetic diversity can be effective only if there is local research capacity to introduce genes and subsequently adapt and test safe and effective varieties of crops.

Balance public and private investment in research and development on GM crops

We must strive to achieve a balance in the participation of private sector and public institutions in research and development on GM crops. In view of the present imbalance in favour of the private sector, public investment in biotechnology must be increased if developing countries are to benefit from GM food crops and use the new tools to improve their competitiveness. In addition, the private sector must be encouraged to adopt mechanisms to make available proprietary knowledge and material to research institutions mandated to produce public goods that will benefit resource-poor farmers. Current efforts of big corporations to make public genomic databases are a move in the right direction.

Public awareness

The apocalyptic tone picked up by media regarding GM food crops has instilled fear in the public. A worry and anxiety industry has been established, and there is a need to instil sobriety and civil discussion in the debate.

In a recent public forum, Peter Raven (2002), head of the prestigious Missouri Botanical Garden, observed that 'thousands of papers and analyses' have been done on the subject of safety to human health and the environment. The problem is that some sectors prefer to ignore this information and then claim that nothing has been done.

Prof. Sir Colin Berry (2001) observes that public discussion of risks, such as the one that is currently taking place regarding safety of GMOs, 'consistently overestimates dangers and undervalues the benefits.' He further avers 'information is probably the answer, but it must be provided in a way that allows the requirements of society to be reflected in the content.'

The information campaign should be geared to build public confidence in the regulation and the science behind it. In the UK it has been reported that an independent steering board will oversee the process of public debate on GM food crops to be launched in September 2002 (Anon. 2002a).

A clear and transparent public information campaign about the regulatory system, and how the risks to health and environment are going to be managed, will go a long way in restoring public trust (UK House of Commons Select Committee on Environment, Food, and Rural Affairs Fifth Report 2002).

Conclusions

It is felt in many quarters that the debate will take a while to resolve. It is lamentable that most of the discussions and debates have been based on uncritical belief, and are an unfavourable reflection on citizens who expect to thrive in a knowledge-based world. History reminds us that damage inflicted by prejudice and bigotry is very difficult to repair. Thus physical violence in the form of destruction of experiments and burning of laboratories and offices must be stopped. Legislation all over the world to criminalize field-testing of GMOs is a very counter-productive move. Prime Minister Tony Blair says that 'we

must not stifle vital research simply because some people regard it as controversial.' (Blair 2002).

Finally, if we believe that technology can add value to our development agenda and increase capital investment, why can we not work together in good faith to assess, with all the rigor we can bring to bear, the vast amount of new information that is generated everyday? In good faith, let us have reasoned and informed public discussion, knowing full well that our understanding of genetics has deepened, thus challenging traditional ideas and values.

References

Anon. (2000a) *Cartagena Protocol on Biosafety.* www.biodiv.org/biosafe/BIOSAFETY-PROTOCOL.htm

Anon. (2000b) *Transgenic Plants and World Agriculture.* Report prepared under the auspices of the Royal Society of London, the USA National Academy of Sciences, the Brazilian Academy of Sciences, the Chinese Academy of Sciences, the Indian National Academy of Sciences, the Mexican Academy of Sciences and the Third World Academy of Sciences. Royal Society Document 08/00, 19 pp. Pdf file available at http://www.royalsoc.ac.uk/policy/index.html

Anon. (2002a) Britain to launch debate on gene-modified foods. Reuters. As reported in Agnet 26 July 2002. http//www.131.104.232.9/agnet/2002/7-2002/agnet_july_26.htm#BRITAIN TO LAUNCH

Anon. (2002b) Face off- labeling law rekindles debate. *The Nation* 16 July 2002. As reported in Agnet 19 July 2002. http//www.131.104.232.9/agnet/2002/7-2002/agnet_july_19.htm#FACE OFF-labelling

Berry, C. (2001) *Risk, science and society.* www.Spiked-online.com/printable/00000002d29c.htm

Blair, A. (2002) Making Newton proud. *New Scientist.com.* http://www.newscientist.com/flat/pages/2353_comment.jsp

Charles, D. (2001) *Lords of the Harvest.* Perseus Publishing, Cambridge, Massachussetts. 348 pp.

Commission of the European Communities (2001) Communication from the Commission. Towards a strategic vision of life sciences and biotechnology:Consultation Document.

Conway, G. and Toenniessen, G. (1999) Impacts: feeding the world in the twenty-first century. *Nature* **402,** C55.

Fernandez-Cornejo, J. and McBride, W. (2002) Adoption of bioengineered crops. *ERS Agricultural Economic Report* No. AER810. 67 pp. May 2002. http://www.ers.usda.gov/publications/aer810/

Gidley, Ruth (2002) African crisis fuels debate over GM food. Reuters-AlertNet 19 July 2002. As reported in Agnet 19 July 2002. http//www.131.104.232.9/agnet/2002/7-2002/agnet_july_19-2.htm

Jackson, M. and Lettington, R. (2002). Conservation and use of rice germplasm: an evolving paradigm under the international treaty on plant genetic resources for food and agriculture. FAO commissioned paper.

James, C. (2001) Global review of commercialized transgenic crops: 2001. *International Service for the Acquisition of Agri-biotech Applications (ISAAA) Briefs* No. 24: Preview. ISAAA, Ithaca, NY. 20 pp.

James, C. and Krattiger, A. (1996) Global review of the field-testing and commercialization of transgenic plants, 1985-1995: The first decade of crop biotechnology. *ISAAA Briefs* No.1. ISAAA, Ithaca, NY. 27 pp.

Jayaraman, K.S. (2002) India promotes GMOs in Asia. *Nature Biotechnology* **20,** 641-642. http://www.nature.com/biotech/

Lesser, W. (1997) The role of intellectual property rights in biotechnology transfer under the convention on biological diversity. *ISAAA Briefs* No. 3. ISAAA, Ithaca, NY. 22 pp.

Marsh, J. (2001) Agiculture in the UK- its role and challenge. A discussion paper for the UK Government Food Chain and Crops for Industry Foresight Panel, September 2001.

Persley, G. and Lantin, M. (eds) (2000) *Agricultural Biotechnology and the Poor.* Proceedings of International Conference, Washington DC. 21-22 October 1999. Consultative Group on International Agricultural Research, Washington DC.

Pinstrup-Andersen, P. and Schioler, E. (2000). *Seeds of Contention.* John Hopkins University Press, Baltimore. 164 pp.

Pownall, I. (2000) An international political economic view of the biotechnology industry. *Electronic Journal of Biotechnology* **3**(2). http://www.ejb.org/content/vol3/issue2/full/7

Raven, P. (2002) Environmental savior or saboteur? Debating the impacts of genetically modified food and biotechnology. 04 February 2002. *Pew Initiative on Food and Biotechnology.* www.connectlive.com/events/pewagbiotech020402/transcript.html

Smith, F. (2000) The biosafety protocol: the real losers are developing countries. National Legal Center for the Public Interest. www.nlcpi.org

Taylor, N. and Fauquet, C. 2000. Biotechnology's greatest challenge: Can the great potentials of biotechnology be directed towards ensuring food security and economic development for the developing world? *Forum for Applied Research and Public Policy*; Fall 2000 issue; http://forum.ra.utk.edu

UK House of Commons Select Committee on Environment, Food, and Rural Affairs Fifth Report (2002). *Genetically Modified Organisms.* 18 June 2002 http://www.publications.parliament.uk/pa/cm200102/cmselect/cmenvfru/767/76703.htm