Agricultural biotechnology: Safe and responsible use*

India is rich in bioresources and biotechnology offers opportunities for converting our biological wealth into economic wealth and new employment opportunities on an environmentally and socially sustainable basis. Our agriculture now faces the challenge of having to produce more farm commodities for our growing human and farm animal populations under conditions of diminishing per capita arable land and irrigation water resources, and expanding biotic and abiotic stresses. Further, factor productivity has to be enhanced and quality and food safety have to be improved if our agriculture is to be globally competitive. To achieve these objectives, the nearly 110 million farm families of our country, most of whom own 1 or 2 hectares of land or less will have to be assisted with the best available technologies such as biotechnology and information, space, nuclear, renewable energy, and precision farming technologies and scientific organic farming methods. In order to specifically address agro-biotechnological applications in improving the productivity, profitability, sustainability and stability of the major farming systems of the country in an environmentally safe manner, the Department of Agriculture, Government of India, set up in May 2003 a Task Force under the Chairmanship of M. S. Swaminathan. The Task Force examined both the potentials and problems associated with biotechnology applications, with particular reference to genetically modified crops arising from the use of recombinant-DNA technology. The recommendations of the Task Force are contained in this Report.

The Task Force kept the following as its basic guiding principle:

'The bottom line of our national agricultural biotechnology policy should be the economic well being of farm families, food security of the nation, health security of the consumer, protection of the environment and the security of our national and international trade in farm commodities.'

*Executive summary of the Task Force on Agricultural Biotechnology chaired by M. S. Swaminathan, submitted to the Ministry of Agriculture, Government of India.

The long-term policy on biotechnology applications in agriculture should aim to provide direction to research and development in relation to priorities, based on social, economic, ecological, ethical and gender equity issues, to devise a system for commercialization of transgenics/GM products, and to formulate a clear policy on GM food and feed in the country. The transgenic approach should be considered as complementary and resorted to when other options to achieve the desired objectives are either not available or not feasible. High priority should be accorded in transgenic approach to the incorporation of resistance to insect-pests and diseases including viruses and to drought and salinity (i.e. biotic and abiotic stresses). Transgenic research should not be undertaken in crops/commodities where our international trade may be affected, e.g., Basmati rice, soybean or Darjeeling tea.

The international guidelines set up by the FAO–WHO Codex Commission for assessing and managing the health risks posed by GM foods should be closely followed. These risk analysis guidelines call for safety assessments to be conducted for all GM foods prior to market approval. It will be useful to develop well-defined national food safety guidelines based on the Report of Joint Parliamentary Committee on Pesticide Residues in and Safety Standards for Soft Drinks, Fruit Juice and Other Beverages, chaired by Shri Sharad Pawar.

There are regions in India which represent either primary or secondary centres of genetic diversity in major crops like rice. These areas should be conserved for posterity as *Agro-biodiversity Sanctuaries*. A Technical Committee may be constituted by ICAR, NBPGR, DBT, Dept of Agriculture and Ministry of Environment and Forests (Botanical, Zoological and Forest Surveys of India) to develop guidelines for earmarking areas as Agro-biodiversity Sanctuaries and Organic Farming Zones.

With regard to application of biotechnology to animal husbandry and fisheries, existing DBT guidelines for rDNA-based vaccines can be used for animal vaccines but the protocol for rNDA-based vaccine needs to be developed on a case-by-case basis. Appropriate mechanisms of safety should be developed for the plant–animal–human food chain. Prioritized target traits in livestock include production of pharmaceutical proteins, enhanced fertility and reproductive performance, improved quality (milk, meat, fiber, eggs) and resistance to diseases so as to reduce drug use.

The Government of India may provide about Rs 1200 crores of additional funds during the remaining 3 years of the Tenth Plan period for the following purposes:

(a) The Department of Agriculture may provide approximately Rs 300 crores to develop and augment capacity building, human resource development, monitoring and surveillance, development of organic farming zones and agro-biodiversity sanctuaries, initiating a special GMO insurance scheme, public and political understanding about applications of biotechnology in agriculture, training and retraining of extension personnel, and assisting farm and home science graduates to set up agri-clinics and agri-business centers for Agricultural Biotechnology.

(b) About Rs 200 crores may be provided during 2004–07 for venture capital.

(c) The strengthening of the regulatory and surveillance mechanisms, including the setting up of a National Biotechnology Regulatory Authority may require about Rs 150 crores during the next three years.

(d) DARE/ICAR, Department of Animal Husbandry and Dairying and DBT may provide an additional Rs 400 crores to upgrade research infrastructure, undertake human resource development, accelerate progress in research and education relating to biotechnology applications in crop and animal husbandry and inland and marine fisheries, and organize a special All India Coordinating Research Project on GM crops.

(e) A provision of Rs 150 crores may be made for the creation of infrastructure for establishing Ag-biotech Parks, on the model of the one developed by ICRISAT in Hyderabad. At least one such park may be established in every State during the next three years in collaboration with NABARD.

Biosafety and agronomic evaluations could be done concurrently. However,

biosafety assessment should be done on a case-by-case basis. The Task Force has suggested changes in the existing review mechanism for approval of GM crops to prevent avoidable loss of time and promote concurrent biosafety and agronomic performance studies.

With rapid growth in R&D efforts in biotechnology, a statutory and autonomous National Biotechnology Regulatory Authority will soon become necessary. The NBRA should have two wings – one for agricultural and food biotechnology, and the other for medical and pharmaceutical biotechnology. NBRA is essential for generating the necessary public, political, professional and commercial confidence in the science-based regulatory mechanisms in place in the country. The NBRA should be autonomous and professionally led but could be attached for necessary administrative support to an appropriate Ministry/Department.

The Monitoring and Evaluation Committees should report to GEAC, which may continue to handle biosafety and environmental safety issues of GM crop candidates until the proposed National Agricultural Biotechnology Regulatory Authority comes into existence.

An All India Coordinated Research Project solely for the testing of GM group varieties should be organized by ICAR with the requisite technical expertise and safety arrangements.

Farmers and consumers should have complete information on the benefits and risks associated with GM crops. The evaluation procedure should include farmer participatory assessment, as is the case of non-GM crop varieties. The procedure of transparent evaluation should apply equally to both private and public sector varieties. A special insurance scheme for GM crops may be devised and introduced by the Ministry of Agriculture. An integrated GM Seed-cum-Crop Insurance System will help to ensure that desirable new technologies confer benefits to resource poor small farm families, without undue risks.

Pre-breeding to generate novel genetic combinations at Advanced Research Centres, coupled with participatory breeding with farming families will help to demystify new technologies and make farm women and men effective partners in biotechnological research.

There are uncommon opportunities for facing successfully the current and future challenges faced by farming families through synergy between technology and public policy. There is need to strengthen both our technological capability and public policy framework especially in the areas of regulation, surveillance and monitoring, as well as in the areas of promotion, facilitation and mentoring. This is the pathway to an era of biohappiness.

The Agbiotech Task Force Report

Suman Sahai

The report of the Task Force on application of Agricultural Biotechnology, headed by M. S. Swaminathan, has collated inputs provided by a variety of stakeholders. It is an important step forward in trying to improve the system for implementing Agbiotechnology in India. Its importance lies in the fact that this is the first recommendation for change from a high-powered source and the first effort to formulate a policy. Civil society organizations have been frustrated in the past by the recalcitrance of the Department of Biotechnology (DBT) and its refusal to engage in any dialogue on public concerns or be receptive to any suggestions for improving a clearly unsatisfactory system. The former head of DBT is famously on record for doggedly insisting that India did not need a biotechnology policy when all around her, from the most exalted in the scientific establishment, the most vocal protagonists to the most determined opponents, were demanding a national policy.

The report contains many positive features that should be built upon, especially by civil society groups. Its basic recommendation is that the national policy should seek the 'economic well-being of farm families, food security of the nation, health security of the consumer, protection of the environment and the security of our national and international trade'. If the recommendations of this Task Force are upheld, no policy implementation can deviate from these goals.

The report is critical of the prevailing gung-ho climate when any proposal for research on a GM crop, however nonsensical the goal, is likely to get sanctioned, often at the cost of solid, conventional research which is more likely to yield results of relevance. It recommends that all alternatives to GM technology should be examined and the GM route used only when other options are not available.

The report highlights the connection between transgenic research in India and the international market. It recommends that transgenic research should not be done on crops that we sell in the international market, like soybean, Basmati rice and Darjeeling tea. Readers will recall the hare-brained schemes of the DBT to promote *Bt* Basmati and introduce the beta-carotene construct of Golden Rice into Basmati rice. Nobody seemed to be thinking that we are exporters of Basmati (and other) rice as well as soybean (to special niche markets) and that our major trading partners are all rejecting GM foods. So who would buy our *Bt* Basmati or our GM Soya?

The socio-economic aspects of GM crops find mention. The report says that our policy on transgenics should be sensitive to biodiversity conservation and the socio-economic context of our composite agrarian system. In other words, small farmer interests have to be protected. In recommending the breeding of both varieties and hybrids and supporting apomixis as a strategy, the recommendation is clearly in favour of the farmers' right to save seed from previous harvests. The report comes out clearly against GM traits like herbicide tolerance that can reduce employment (by taking away the opportunity to earn wages by weeding) and impinge on rural livelihoods (by de-