

# **BIOTECH: Catalyzing the Progress of the Philippine Agro-Industry**

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BIOTECH UPLB

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*The global train of biotechnology has left the station. It is picking up speed.*

-- Arthur Kornberg

**Moore's Law:** Computer power doubles every 18 months

**Venter's Law:** Biotechnology will outstrip Moore's Law

## **National Issues**

- 1. Poverty**
- 2. Resource Limitations**
- 3. Competitiveness**

**World Trade Organization**

**Initiatives of neighboring countries**

## **Objectives are:**

- 1. To produce more with less land, less water, and less agricultural chemicals,**
- 2. To increase value through quality enhancement, e.g.**
  - prolong shelf life
  - increase intrinsic value

## **How do we achieve our objectives?**

- 1. Evaluate what is happening in the world, and**
- 2. Chart the nation's initiatives based on our needs as well as our capabilities.**

## **World Summit on Sustainable Development 26 August – 4 September 2002**

### **Johannesburg Declaration**

- representatives of the peoples of the world reaffirm commitment to sustained development
- commitment to build a human, equitable and caring global society cognizant of the need for human dignity for all
- respond positively to the need to produce a practical plan that should bring about poverty eradication and human development

## **Historical Background**

**10 years ago in Rio de Janeiro:**

- > **protection of the environment and social and economic development are fundamental to sustainable development**
- > **to achieve such development: adopted the global programme entitled Agenda 21**

## **Challenges**

- **poverty eradication**
- **ever-increasing gap between the developed and developing worlds poses a major threat**
- **global environment continues to suffer: loss of biodiversity; fish stocks continue to be depleted; desertification; air, water and marine pollution continues**
- **globalization: benefits and costs are unevenly distributed**

## **Commitment to Sustainable Development**

We welcome the focus of the Johannesburg Summit on the indivisibility of human dignity and are resolved, through decisions on targets, timetable and partnerships, to speedily increase access to such basic requirements as clean water, sanitation, energy, health care, food security and the protection of biodiversity. We will work together to help one another to have access to financial resources, benefits from the opening of markets, and make sure that there is technology transfer, human resource development, education and training to banish underdevelopment forever.

We recognize the reality that global society has the means and is endowed with the resources to address the challenges of poverty eradication and sustainable development confronting all humanity. We will take extra steps to ensure that these available resources are used to the benefit of humanity.

## **Making it happen!**

- Agree that this must be an inclusive process, involving all the major groups and Governments that participated in the historic Johannesburg Summit.
- Commit ourselves to act together, united by a common determination to save our planet, promote human development and achieve universal prosperity and peace.
- Commit ourselves to the Plan of Implementation of the World Summit on Sustainable Development and to expedite the achievement of the time-bound, socio-economic and environmental targets contained therein.
- Pledge to the peoples of the world, and the generations that will surely inherit this Earth, that we are determined to ensure that our collective hope for sustainable development is realized.

## **AGENDA 21**

### **Program Areas**

- A. Increasing the availability of food, feed and renewable raw materials**
- B. Improving human health**
- C. Enhancing protection of the environment**
- D. Enhancing safety and developing international mechanisms for cooperation**
- E. Establishing enabling mechanisms for the development and the environmentally sound application of biotechnology.**

## **Increasing the availability of food, feed and renewable raw materials**

### **Basis for action**

To meet the growing consumption needs of the global population, the challenge is not only to increase food supply, but also to improve food distribution significantly while simultaneously developing more sustainable agricultural systems. Much of this increased productivity will need to take place in developing countries. It will require the successful and environmentally safe application of biotechnology in agriculture, in the environment and in human health care.

### **Objectives**

- 1 to increase to the optimum possible extent the yield of major crops, livestock, and aquaculture species, by using the combined resources of modern biotechnology and conventional plant/animal/micro-organism improvement. Forest product yields should similarly be increased
- 2 to reduce the need for volume increases of food, feed and raw materials by improving nutritional value, and to reduce post-harvest losses

### **Objectives**

- 3 to eliminate overdependence on agrochemicals
- 4 to develop the agricultural potential of marginal lands
- 5 to increase the efficiency of nitrogen fixation and mineral absorption by the symbiosis of higher plants with micro-organisms
- 6 to improve capabilities in basic and applied sciences and in the management of complex interdisciplinary research projects

### **Activities**

#### **Management-related activities**

Governments, with the assistance of international organizations and with the support of NGOs, the private sector and academic and scientific institutions, should improve both plant and animal breeding and micro-organisms through traditional and modern biotechnologies, to enhance sustainable agriculture output to achieve food security, with due regard to the prior identification of desired characteristics before modification, taking into account the needs of farmers, the socio-economic, cultural and environmental impacts of modifications and the need to promote sustainable social and economic development, paying particular attention to how the use of biotechnology will affect environmental integrity.

#### **Management-related activities**

1. improve productivity, nutritional quality and shelf-life of food and feeds
2. develop resistance to diseases and pests
3. promote the use of underutilized crops of possible future importance
4. increase the efficiency of symbiotic processes that assist sustainable agricultural production
5. facilitate the conservation and safe exchange of plant, animal and microbial germplasm by applying risk assessment and management procedures
6. develop improved diagnostic techniques and vaccines
7. broaden the capacity and scope of existing research centers to achieve the necessary critical mass

### **Data Collection**

- Comparative assessments of the potential of the different technologies for food production, together with a system for assessing the possible effects of biotechnologies on international trade in agricultural products.
- Maintenance and development of data banks of information on environmental and health impacts of organisms to facilitate risk assessment
- Acceleration of technology acquisition, transfer and adaptation

## International and Regional Cooperation

- a) Cooperation on issues related to conservation of, access to and exchange of germ plasm; rights associated with intellectual property and informal innovations, including farmers' and breeders' rights; access to the benefits of biotechnology; and bio-safety;
- b) Promotion of collaborative research programs to support outlined activities, with particular reference to cooperation with local and indigenous people in the conservation of biological diversity and sustainable use of biological resources, as well as the fostering of traditional methods and knowledge of such groups in connection with these activities;

## International and Regional Cooperation

- a) Acceleration of technology acquisition to support activities that promotes food security through the development of systems for substantial and sustainable productivity increases that do not damage or endanger local ecosystems;
- b) Development of appropriate safety procedures, taking account of ethical considerations.

## Means of Implementation

- a) Financing and cost evaluation

The Conference secretariat has estimated the average total annual cost (1993-2000) of implementing the activities of this program to be about \$5 billion, including about \$50 million from the international community on grant or concessional terms

- b) Scientific and technological means
- c) Human resource development - one of the most essential components of any program of this kind

Capacity-building: Institutional upgrading or other appropriate measures will be needed to build up technical, managerial, planning and administrative capacities

Output of National Workshop on Biotechnology After the World Summit on Sustainable Development: The Way Forward, February 21, 2003, New World Renaissance Hotel, Makati City

> **Move for Senate ratification of the Cartagena Protocol**

## What are our neighbor countries doing?

## Taiwan

- President Chen Shui-bian is trying to build Taiwan into a regional biotechnology powerhouse through a 5-year, US\$1.53 billion government investment plan. The private sector invested US\$4 billion through conglomerates like *Uni-President Enterprises, China Steel*, and more than 200 venture capital firms.
- *BiotechEast* launched a new website, [www.biotecheast.com](http://www.biotecheast.com), promoting the nation's biotechnology and pharmaceutical industries to the rest of the world, in English. It maintains an online database of nearly 600 Taiwanese companies.

## Singapore

- investment in life sciences for 2001 was about US\$4 billion
- established a permanent ministerial committee under the Deputy Prime Minister and the creation of an international advisory committee
- major initiative is in the hands of the co-chairman of the Economic Development Board (EDB) and the chairman of the National Science and Technology Board
- the project's goal is to establish a biomedical hub with world-class capabilities across the entire value chain
- goal: to be home to 15 world-class biomedical sciences companies by 2010 and to become the regional center for clinical trials and drug development

## Singapore

- Investment in education and strong legal and regulatory support
- \$S1 billion R&D fund to encourage pharmaceutical companies to establish R&D centers
- \$S1 billion available through the Biomedical Science Investment funds for Singapore-based joint ventures, overseas biotechnology companies and local start-ups
- Physical infrastructure is available through *Tuas Biomedical Park*, covering 194 hectares close to the National University of Singapore.

## Malaysia

- convergence of biotech platforms with IT provides greater understanding of the biology of plants, animals, humans and microorganisms at the molecular level, enabling the country to develop better strategies and approaches to deal with current and future challenges
- two major challenges in its agricultural sector:
  - 1 addressing national food security
  - 2 creating wealth for the nation through production of value-added food and food products

## Malaysia

### Institutional Development

- three phases of agricultural biotechnology development in Malaysia:
  - 1 period of establishment (prior 1995)
  - 2 development phase (1995-2000)
  - 3 advancement phase (beyond 2001)
- the National Working Group on Biotechnology was set up under the Ministry of Science, Technology and Environment (MOSTE) to oversee and coordinate biotechnology activities in the country

## Malaysia

### R&D: four programmes being implemented

- 1 top-down research: genetic engineering of rice and papaya for virus resistance, improved shelf life of fruits and flowers
- 2 experimental development projects: up-scaling projects developed after laboratory-scale R&D before these are commercialized; public research institutions and universities are encouraged to form partnership with the private sector
- 3 partnership programme: e.g., Malaysia-MIT Biotechnology Partnership Programme
- 4 bilateral programme: supportive programme linking existing research interests/projects in Malaysia with similar counterparts in other countries

## Malaysia

### Consumer Acceptance, Transfer of Technology, Globalization

- the National Biotechnology Directorate is stepping up efforts to implement public awareness programmes on biotechnology during the 8th Malaysia Plan (2001-2005)
- includes lectures at both nationwide public forums and in schools; preparing and distributing pamphlets; and promoting understanding on biotechnology through mass media
- two new issues to be addressed: transfer of technology and threat of globalization
- Malaysia views technology transfer as a critical agenda since the nation is still far behind in expertise, infrastructure, and financial support

## Malaysia

### Future Strategies

- 1 focus on key research fields and key platform technologies; support capacity building such as infrastructure, human resource development and management
  - 2 develop innovative projects which ensure that research is translated into commercial projects for global market
- biotechnology will be a strong driving force energizing the shift into a knowledge-based economy

## The Philippine Experience

### Timeline of Biotechnology Research and Policy Initiatives in the Philippines

- 1979: Under Marcos, National Institutes of Biotechnology & Applied Microbiology (BIOTECH) established at UPLB
- 1986-92: Under Aquino, DOST identified biotechnology as a flagship of leading edge technologies, "as a strategic tool for achieving sustained economic development"
- 1990: NCBP was created thru EO 340 to review and monitor R&D involving GMOs
- 1992-98: Under Ramos, biotechnology remained as a major program of DOST's S&T program
- 2000: Under Estrada, institutionalization of biotechnology in government programs was approved

### Timeline of Biotechnology Research and Policy Initiatives in the Philippines

- 2001: Under Macapagal-Arroyo, the Policy Statement on Modern Biotechnology was issued
- 2002: Department of Agriculture AO No. 8 was signed; covers the importation and release into the environment of plants and plant products derived from modern biotechnology
- 2003: First harvest of Bt corn in the Philippines

## Recommendation

- The establishment of a BIOTECHNOLOGY COMMITTEE to focus exclusively on biotechnology to guide the country.
- Members:
  - Department of Health
  - Department of Science and Technology
  - Department of Trade and Industry
  - Department of Agriculture
  - Department of Environment and Natural Resources
  - National Learned Societies: NAST, NRCP
  - Universities
  - Professional Health Societies
  - Private Sector Organizations

## Recommendation

The key person in this Biotechnology Committee is the CHIEF BIOTECHNOLOGY OFFICER. This person must not only have a vision of the possibilities of biotechnology but, in addition, have a keen appreciation of biotechnology as a science. While steeped in biotechnology as a science, this person must also be knowledgeable about revenue generation and the legal framework that guides international trade. If all these attributes cannot be found in one person, other players in this proposed committee must have the needed expertise. The Philippine government must create and finance this committee until biotechnology will have outgrown its infancy and surge into a powerhouse.

## Take Home Message

Unlike some neighboring countries, the Philippine government may not have huge financial resources to underwrite expenses associated with development and marketing of biotechnology products.

Recognizing that biotechnology is a unique and powerful engine for growth which is evolving rapidly, let us collectively work closely together to be able to find niches. The technology is huge and varied.

We need the input of all who can help.