

Biotechnology for Socio-Economic Development: A Policy for Jamaica

**National Commission on Science and Technology
Draft 5
September 2006**

Table of Contents

	Page
1. Introduction	
2. Situational Analysis	
(i) Historical Contexts	
(ii) Institutional Arrangements	
(iii) Legislative and Policy Environment	
(iv) Linkages with other policies and programmes	
3. Vision Statement	
4. Policy Objectives	
5. Key Strategic Areas	
6. Priority Target Groups	
7. Responsibilities of Stakeholders	
(i) Government Responsibilities	
(ii) Research and Development Institutions	
(iii) Private Sector	
8. Implementation Mechanisms	
(i) Management and Coordination	
(ii) Choice of Applications and Technologies	
(iii) Diversity in Natural Resource Base	
(iv) Funding and Incentives	
(v) Human Resource Requirements	
(vi) Monitoring and Evaluation	
9. Review of Policy	

1. Introduction

For centuries, biotechnology has been at the forefront of developments for food, feed, fibre and medicine. Although recent international scrutiny of genetic engineering particularly relating to genetically modified organisms (GMOs) often restricts the perception of biotechnology, the field however also extends to traditional biotechnology used for many years in the food industry, for the production of beer, rum, vinegar and cheese, to agro-industry, for the micro-propagation of disease-free plants, and to the field of medicine for the development of pregnancy test kits and the production of insulin. In fact, biotechnology refers to “any technique which uses living organisms or parts thereof to make or modify products, improve plant and animal productivity or to develop micro-organisms for specific use”. “High end” biotechnology, involves recombinant DNA, cell fusion and novel bio-processing and engineering techniques, such as gene transfer, embryo-manipulation and monoclonal antibodies. Nations across the globe including the USA, Canada, Argentina, China, Australia, Mexico, Spain and South Africa have made considerable progress in the application of agro-biotechnology, to the extent that the estimated economic benefit from growing genetically improved crops in the USA and Canada was expected to reach \$US6billion in 2005.

Developments in biotechnology in Jamaica are essential to agro-industrial development, human and environmental health, biosafety and biodiversity, and protection of natural resources. Several of the island’s research and teaching institutions have commenced excellent work in this field, but to a great extent, the vast potential afforded by biotechnology for national social and economic development, remains largely untapped. With the primary foundations laid, the time to invest in the underpinnings of this science has arrived and Jamaica must now move with alacrity to establish the mechanisms which will lead to optimal derivation of the requisite benefits that may be reaped with usage of this far-reaching tool. For competitive purposes in the trade of natural resources and

products derived thereof, it is imperative that the country develops the competence, skills, laws and regulations to compete in this area. Additionally, new biotechnologies in forensic medicine have particular significance towards a scientific approach to crime management on the island and this technology must also be used to evaluate and utilize the richness of the marine and terrestrial environments to contribute to the increased food security of the nation.

Policy imperatives outlined by the Government of Jamaica relating to biotechnology include the recently revised Science and Technology (S&T) Policy (2006), which is expected to be promulgated shortly. A major strategy which has been identified in this Policy is “the expeditious use of the island’s biological resources and building additional biotechnological competence”. This statement provides the background against which this sectoral policy should be read.

2. Situational Analysis

i. Historical Contexts

Policy: A policy document focussing exclusively on biotechnology is the first of its kind to be elaborated by the Government of Jamaica. However, the area of biotechnology has been duly recognized as a priority area in the current, revised S&T Policy (2006), as well as that promulgated in 1990, especially for enhanced agricultural, crop and animal production as well as microbial and formulation processes. The Policy also recognizes that research and development activities in selected areas should be promoted and intensified.

Prior to the commencement of transgenic research trials by researchers at the Biotechnology Centre in 1997, the National Biosafety Committee (NBC), operating under the auspices of the National Commission on Science and Technology (NCST), was legislated through the Plants (Importation) Control Regulation (1997), under the Plants (Quarantine) Act to monitor importation of living modified organisms (LMOs) for experimental use. In addition to oversight responsibilities of the experimental trials on transgenic papaya and more

recently, laboratory trials on transgenic cotton, the NBC has been involved in sensitizing the public to the issues related to biosafety and have been central contributors to improving the public's perception of biotechnology in Jamaica. In the international arena, Jamaica was integrally involved in the negotiation of the text of the Cartagena Protocol on Biosafety, which, while recognizing the great potential of modern biotechnology for human well-being, seeks to address the safe use, transfer and handling of the products of modern biotechnology. Jamaica then became a signatory to the Protocol in June 2001. Since then, through funding received from the United Nations Environment Programme/Global Environment Facility (UNEP/GEF) in 2004, a National Biosafety Framework Project was implemented which produced a draft Biosafety Policy and Act. These are expected to be finalized by the end of 2006 and will form the basis for the establishment of the requisite legislation prior to the ratification of the Protocol.

Research and Development: Meanwhile, the most intensive biotechnological research activities by the island's R&D institutions have been conducted by the Biotechnology Centre of the University of the West Indies (UWI), which was established in 1989. Research projects of the Centre and other Departments of the UWI have been largely focussed on improving resistance to pests and diseases and improving crop varieties such as yam, scotch bonnet pepper and tomato. Preliminary developments of transgenic papaya and cotton have also commenced, but far-reaching developments in increasing productivity have yet to be realized. To its credit, the Bodles Research Station of the Ministry of Agriculture was central in the development of new breeds of cattle and in the more recent past, research activities have produced high yielding pumpkin varieties of uniform size and shape for the domestic and export markets. Ongoing work continues towards the improvement of breeds of pigs, sheep and goats. Also of significance is the work of the Scientific Research Council in tissue culture plants and more recently, efforts at the acquisition of competence in tissue culture by the Potato Grower's Cooperative to produce disease-free

planting materials for farmers. Meanwhile, the Government Forensic Laboratory and the recently established Caribbean Genetics Laboratory of the UWI, have been developing capacity in forensic sciences. Other players in biotechnology research include the work of the Northern Caribbean University, the College of Agriculture, Science and Education and the Coconut Industry Board. The Scientific Research Council has also elaborated a Biotechnology Strategy for future developments.

It is clear that the rudimentary foundations for Jamaica's biotechnological infrastructure have been laid over the years, and, given the critical role and potential of biotechnology in the transformation of especially the country's agricultural sector, it is imperative that specific policy imperatives be elaborated in this area, at this time, to assist in rationalization and priority setting and to provide guidance for the strategic utilization of biotechnologies for national socio- economic development.

ii. Current Programmes/Institutional Arrangements

Institutions presently involved in biotechnology research include the Universities, their centres and departments, particularly the Biotechnology Centre, Basic Medical Sciences, Life Sciences and the Tropical Metabolism Research Institute of the University of the West Indies (Mona), Northern Caribbean University and the College of Arts, Science and Education and government research agencies including the Scientific Research Council, Bodles Research Station, Coconut Industry Board and the Forensics Laboratory. The institutional capacities of many of these organizations require much strengthening.

It is recognized that biotechnology requires the full support of the private sector even though this is an extremely research intensive area. A close working relationship between the private and public sectors is therefore required. The various research institutions will invariably play a critical role, but the outcome will be maximised when linkages and partnerships are forged and both groups are

brought together. The NCST then, has a primary role to play because it is the body that can facilitate linkage, plug the existing gaps and ensure best results. The Commission's National Biotechnology Coordination Committee will play a critical role in monitoring, coordinating and providing advice for biotechnology developments at a national level.

iii. Legislative and Policy Environment

Under the Plants (Importation) Control Regulations (1997), the NBC is legislated to monitor the importation of plant, seed, cutting or slip, which has been genetically modified and imported into Jamaica for the purpose of experimentation and under controlled conditions. Hence, the NBC has monitoring the importation of transgenic material as well experimental transgenic trials being conducted by researches at the Biotechnology Centre. The NBC has also been considering new regulations for the confined release of GMOs into the environment.

Jamaica ratified the Convention on Biological Diversity in 1995, which recognizes the intrinsic value of biotechnology, and the potential risks associated with products of modern biotechnology, particularly that affecting the conservation and sustainable use of biodiversity. Subsequently, the country also signed the Cartagena Protocol on Biosafety in 2001, indicating general support for the principles of the Protocol and signalling its intention to ratify the instrument. Meanwhile, efforts are being made to establish the requisite legislation prior to accession. This has been advanced through the UNEP/GEF National Biosafety Framework Project which has so far produced a draft legal and regulatory framework for the country, which is expected to be finalized in 2006.

The S&T Policy framework which has been elaborated provides the overarching framework for developments in all areas of S&T, including biotechnology and is the framework within which this Policy is being elaborated. Aspects relating to agro-biotechnology are linked to the Government of Jamaica's agricultural

policies. The newly formulated NCST Act and the SRC Act form the basis of the legislative framework for the Policy.

These legislative frameworks are adequate for the implementation of aspects of this Policy.

iv. Linkages with other policies and programmes

The emphasis of this Biotechnology Policy is guided by the priorities outlined in the Science and Technology Policy (2006). It is also linked to the (draft) Biosafety Policy, and the government of Jamaica's agricultural policies. Associated programmes include the National Biodiversity Strategy and Action Plan and the Biotechnology Strategy.

3. Vision Statement

The vision which drives this Biotechnology Policy is that Jamaica, which is a biological-rich country, should utilize the best technological methods to improve the way of life of its people and also in fulfilment of the Millennium Development Goals. Biotechnology is one such set of techniques.

4. Policy Objectives

The objectives of Jamaica's Biotechnology Policy are:

- To create an enabling environment for the growth of the biotechnology industry
- To promote an enabling environment for research and development in biotechnology and allied fields through the development of infrastructure, incentives and regulatory framework
- To build a network of excellence in biotechnology and engineering, with the selection of a few, specific areas to be developed to the hilt.
- To promote the emergence and development of new bio-business
- To encourage human resources development in biotechnology

- To develop high quality infrastructure with the required support services for manufacturing units through specialized Biotechnology Parks
- To address biosafety, bio-surveillance, bio-ethics and intellectual property rights.
- To obtain an inventory of bio-resources by the Universities, research institutions, NGOs, and private agencies
- To leverage existing competences in Information and Communication Technologies to develop bioinformatics
- To build close operational, marketing and research relationships between the public and private sector.
- To explain to civil society the scientific details of the technology and their impacts on lives and livelihoods.

5. Key Strategic Areas

Jamaica's biotechnological strategies should be focussed on areas including agricultural biotechnology, industrial biotechnology, diagnostics, therapeutics, pharmacogenomics, bioinformatics, marine biotechnology and environment-focused biotechnology. These focus areas have been arrived at based on industry analysis of the sector and inputs from experts in the field.

Key strategies include:

- 1. *Setting National Biotechnology R&D Agenda:*** Government will set up commonly agreed biotechnology R&D targets among key organizations in agreed priority areas. In this regard, research at the university level will be linked to industry needs and special efforts will be given to linking science faculties and their centres to businesses locally and overseas. Government will also support and encourage the transfer of the technology ensuring that research results are moved to commercialization.

To further promote the development of the biotechnology/industry interphase, scientists will also be offered special training courses in business and marketing to augment a business/entrepreneurial culture.

2. Promotion of agricultural research to include a higher biotechnology component

The Government will encourage the establishment and development of Centres of Excellence in biotechnology and bio-engineering. An enabling environment for R&D in biotechnology and allied fields will be promoted through the development of infrastructure, incentives and regulatory frameworks. Priority will be given to agro-biotechnological research, particular to increase agricultural productivity and food security on the island.

3. Choice of Application and Technologies: Comparative advantage is to be gained by the application of biotechnology in problem solving e.g. improving disease resistance in some of our major crops especially the starchy roots and tubers; application of biotech to the creation of marketable value-added products from traditional and non-traditional crops, in this connection there is the need to expand and intensify product and process development work which would improve the competitiveness of agriculture and industry for an emerging global market.

An efficient electronic system as well equipped public or private laboratories are necessary. This also requires an efficient internet system, hand in hand with state of the art computers to facilitate ease of communication and instructional activities.

Also well equipped laboratories owned privately and publicly and commercial tissue culture facilities should be established

- 4. Diversity in Natural Resource Base:** A reasonably to very good natural resource base is required, more particularly with respect to indigenous fauna and flora in which diversity is significant in assuring a successful enterprise including nutraceuticals and pharmaceuticals. At present diversity in Jamaica's flora exist but will require a lot of effort for its sustainability.
- 5. *Enhancing Value-Added Production:*** Government will encourage and support the formation of clusters of high value-added manufacturers in the supply chain. As such, biotechnology is to be applied as the core in increasing productivity, breeding plants and livestock, reducing chemicals and improving quality to meet market needs. In particular, biotechnology will be applied in the area of value-added extraction of flavours and essences to better compete on the international market. In this regard, special linkage will be encouraged with the GOJ's Spinning Cone Column Extraction Project.
- 6. *Development of Tissue Culture Facilities and Competencies:*** Develop tissue culture facilities and competencies to initiate more biotechnological operations in key national and commercial institutions.
- 7. *Development of Biological Control and Pest Management:*** Special attention will be given to the utilization of biotechnology to develop and produce biocontrol agents for pest management to significantly reduce the use of chemicals.
- 8. *Research in Soil Biotechnology:*** To ensure sustainability, promotion of research and development in soil biotechnology will be encouraged.
- 9. *Support for Diagnostics:*** Government will support the establishment of new companies related to test kits/diagnostic kits and genetic testing service business to substitute imported products and services.

10. Infrastructure and Human Resources Development:

Government will support the establishment of infrastructure and development of the requisite human resources to facilitate development of new biotechnologies, such as genomics and bioinformatics, thereby encouraging investment in the life sciences.

Particular emphasis will be placed on internships, beginning at the secondary school level, for teachers and students. Also, in an effort to develop national capability in biotechnology, at the highest international standard, a specific programme will be implemented to provide training of top students identified at the tertiary level, through the award of scholarships and fellowships to support training at reputable overseas institutions.

11. Managing Food Safety: Special emphasis will be placed on the development and use of biotechnology for quick, precise and specific detection and diagnosis in managing food safety

12. Promoting Research for Risk Assessment and Management:

Conduct of research to collect scientific data needed in risk assessment will be encouraged to ensure adequate management, particularly related to biodiversity and biosafety.

13. Management Mechanisms for Bioethical, Legal and Societal

Issues: The establishment of appropriate management mechanisms and implementation strategies in bioethical, legal and societal issues will be given special attention.

14. Protecting Intellectual Property: The Government will play a proactive role in creating awareness of the importance of IPRs in biotechnology research and innovation through the development of databases and assistance to scientists and entrepreneurs through the Jamaica Intellectual Property Office.

15. Promoting Public Awareness on the Impact of Biotechnology:

Implementation of a public education on biotechnology, specifically

geared towards outlining the benefits of the technology and demystifying modern biotechnology. Special emphasis will be placed on appropriate packaging of information for public consumption, to include information packages for dissemination at the primary school level and the provision of information to farmers to ensure proper understanding and utilization for agro-industrial development.

16. *Promoting Awareness among Leaders:* To ensure buy-in and support, a special programme will be developed specifically for national leaders and executives to increase understanding and awareness of the importance of biotechnology and its role in advancing socio-economic development.

6. Priority Target Groups

The priority target groups in the utilization of biotechnology are the agricultural sector and agro-processors on the one end, and sectors impacted by issues involving biosafety on the other.

7. Responsibilities of Stakeholders

i. Government

Government has the responsibility of developing and outlining national priorities in biotechnology, supporting research and developmental activities through specific budgetary allocations and incentives, coordinating, monitoring and managing development activities in strategic sectors and fostering development of local and international partnerships. Government should specifically encourage private sector participation in commercialisation of biotechnology.

ii. Research and Development Institutions

A concerted effort should be made to strengthen biotechnology R&D infrastructure and this should be done not only by the government, but also those institutions conducting research. Active partnerships should be pursued among

local institutions and linkages forged with the private private sector and regional and international organizations.

iii. Private Sector

The private sector must be willing to support R&D in biotechnology and themselves be willing to conduct R&D to make locally produced products more competitive. A close working relationship with training institutions should be maintained to improve domestic working skills and productivity.

8. Implementation Mechanisms

A strategic plan for biotechnology has been developed and includes the following:

a. Management and Coordination

The Biotechnology Coordinating Committee of the National Commission on Science and Technology will play the pivotal role in the coordination and management of the Biotechnology Policy. The Committee, led by the NCST include the Universities and colleges involved in biotechnological work, government research organizations as well as key members in the agro-industrial sector. The Committee will provide advice to the NCST and review and monitor developments in biotechnology in the country and address the issue of creating awareness about the benefits of new and emerging biotechnologies.

b. Funding and Incentives

Ease of Obtaining Funds for Capital Development: Single digit interest rates should be made available on loans for capital development of biotechnology infrastructure, which would encourage entrepreneurship in establishing an enterprise in biotechnology development. This becomes even more desirable in an economy like Jamaica's which is not very buoyant.

Tax Credit System: More flexibility in the tax credit system will be explored to encourage private sector investment in the biotech industry. At present, tax credits have to be formally requested from the government whereas in the US it is automatic once you are eligible.

Special Grants: In partnership with the private sector, special grants will be established for capital expenditure and training in industry-specific biotechnology development. In this regard, government will seek to provide counterpart funding for biotechnology research, and specifically will ensure that a minimum of 10% of the revenue invested in R&D nationally, is dedicated to biotechnology. Priority will be given to moving research results to commercialization. In addition, 3% of the profit gained through biotechnology R&D will be reinvested in biotechnology research.

Tax Incentives Scheme: Special consideration will be given to import duty and GCT exemption of industry-specific biotechnology research under the GOJ Tax Incentives Scheme. The GOJ will also seek to ensure that procedures for approval and clearance for commercialization of biotechnology will be simplified and expedited.

c. Human Resource Requirements

There is need for training of adequate numbers of biotechnologists in our tertiary institutions of higher education locally which should also be supported by apprenticeships at and institutions abroad. A development strategy based on society's needs should be done to ensure that practitioners can find suitable employment in which their knowledge and experience can be appropriately utilized.

d. Monitoring and Evaluation

Monitoring and evaluation of the policy imperatives outline in this policy will be monitored by the National Commission on Science and Technology in

conjunction with key stakeholders involved in the implementation of biotechnological activities. The effectiveness of implementation will be comprehensively monitored at least once every other year.

9. Review of Policy

Within the context of the dynamic and rapidly advancing technological developments in biotechnology, the implications of this policy will be subject to regular review by the Commission on Science and Technology at least every three years, especially to facilitate the inclusion of the impacts of emerging cutting-edge products of global biotechnology research for domestic purposes, especially the application towards the reduction of poverty.

Appendices

Appendix 1 Methodology

Appendix 2 Persons Consulted

Appendix 3 Acknowledgements