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Biotechnology and biosafety

Instruments for achieving
agricultural competitiveness

**A renewed IICA
for the new hemispheric
dynamic on the 21st Century**

Biotechnology and Biosafety

Instruments for achieving agricultural competitiveness

With its positive impacts on yields and productivity, on the nutritional quality of food products or on resistance to pests and diseases, the appropriate use of biotechnology can play a key role in improving agricultural competitiveness.

Assefaw Tewelde¹

Director of IICA's Hemispheric Biotechnology and Biosafety Program



molecular biology and the applications of reproductive technologies, the definition covers various aspects such as the manipulation and transfer of genes, DNA typification and the cloning of plants and animals (FAO, 2002).

In the context of agriculture, various groups of the international community regard biotechnology as a tool for improving productivity in an agricultural surface that is increasingly shrinking and on marginal lands in developing

Using a wide range of techniques and applications, biotechnology today has a major influence on the agricultural sector in terms of production, productivity, quality and trade. The Convention on Biological Diversity defines the term “biotechnology” as meaning “any technological application that uses biological systems, living organisms or derivatives thereof, to make or modify products or processes for specific use”. If we consider only the new DNA techniques,

countries; for the production of safe foods; and as a means to achieve sustained and accelerated changes in the sector. In addition, biotechnology offers possibilities for environmental mitigation. Particularly useful are the molecular techniques such as DNA sequencing and modification, which allow for genetic mapping, the production of vaccines, faster diagnoses or the production of genetically modified organisms (GMOs) that result in efficient and competitive production systems. In this sense, the countries that have adopted biotechnology are reaping benefits.

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The economic impact that biotechnology has had on the efficiency of the agricultural sector has been positive in all the countries that have adopted it, and particularly in the developing countries (Raney, 2006; Traxler, 2004; McGloughlin, 2004). However, from the point of view of the producers, consumers and those who generate and supply technologies, biotechnology still faces numerous obstacles, which are as significant as the technology itself. These issues acquire even greater importance in developing countries and are associated with institutional aspects, a lack of investment in development, the absence of national policies –including regulatory frameworks – limited capacity for risk analysis and intellectual property issues, among others. Together, these factors mean that the gap between countries that adopt agro-biotechnology and those that do not is widening (Raney, 2006).

Although the benefits produced by biotechnology are not called into question, the generation of biotechnological products, such as genetically modified organisms (GMOs), provokes intense debate and has been a source of discord among various countries, particularly in relation to trade. This is mainly the result of a failure to manage and disseminate scientifically verifiable information, despite the fact that this is a basic input for the development of national policies. It is important to note that with regard to the consumption of agro-biotechnological products, the experiences documented until now indicate that there have been no cases affecting public health or the environment (Fernández et al, 2005).

According to the United Nations Food and Agriculture Organization (FAO), the World Health Organization (WHO) and the Organization for Economic Cooperation and Development (OECD), the consumption of products from livestock fed with transgenics poses no risk to public health, from the point of view of biosafety. Similarly, a recent publication by the United States Department of Agriculture (USDA) documents the country's experience during a 15-year period, and concludes that the consumption of transgenic products has no negative impacts on public health. Other countries or groups of countries, such as Japan, the European Union and Canada, do not

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consider that the consumption of GMOs is of concern from the standpoint of biosafety.

This article reviews the status and adoption of biotechnology in developed and developing countries, the trends observed in the different regions of the Americas, and discusses how IICA plans to meet these challenges through its Hemispheric Biotechnology and Biosafety Program.

Impact of biotechnology on the agricultural sector

As mentioned previously, in general terms, the development, adoption and appropriate use of biotechnology has had a positive impact on the agricultural sector. More specifically, it has had positive impacts on genetic potential, yields and productivity, on improvements in the nutritional quality of products and on resistance to herbicides, insects and diseases, which, together, have made it possible to reduce production costs and minimize environmental pollution. (Burloug, 2005).

The examples cited above refer to the results achieved with crops such as soy, maize, cotton and canola. Genetic engineering has made it possible to incorporate vitamin A into rice crops, with positive effects on the health of millions of people. In livestock production systems, the impacts include improvements in the quality of meat (tenderness); increased amounts of casein in milk, enabling producers to obtain a price differential in the markets (Casas, 2005; Delgado et al., 2005); the production of vaccines, for example, against

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Newcastle disease in birds, using genetically engineered plants cells, a product that recently obtained regulatory approval for its commercial production (Jones and Tewolde, 2006). Similarly, researchers in Argentina are testing vaccines based on genetically engineered plant cells to combat foot and mouth disease, which is regarded as one of the greatest obstacles to the marketing of livestock products in South America.

It is important to note that, despite the positive effects generated by biotechnology, which have been widely documented, its development has basically focused on crops and animal species from temperate zones, due to the fact that the investments have come from the private sector with public sector support; this has been the case in the countries with the most developed economies or those in transition. By contrast, the efforts by developing countries to invest in and develop biotechnology have been limited, and the main impetus has come from the public sector. Thus, biotechnology has had a limited impact on tropical or subtropical species (plants or animals), resulting in the need for additional efforts to design strategies to mobilize public-private resources capable of promoting this technology and generating positive impacts, at different levels. Here, in part, lies the challenge facing the Inter-American Institute for Cooperation on Agriculture (IICA) on this issue.

In general terms, the economic impact of agro-biotechnology on developed and developing countries has been well documented (Raney, 2006). For example, in the industrialized nations, genetic engineering has resulted in improved levels of food production, greater efficiency, healthier plants and animals, better nutritional values and a reduction in the levels of toxins in food for human consumption (Beermann, 2005); all this has translated into benefits that are distributed among producers, consumers and those who generate the technology (Traxler, 2005). In this sense, the producers who do not adopt this technology would be indirectly penalized by not receiving the benefits obtained by those who do.

Although it is widely recognized that biotechnology has had a positive impact, studies

confirm that limiting factors still persist these countries, such as the lack of appropriate regulatory frameworks on biosafety and the environment, or the lack of policies on incentives, intellectual property and research.

The adoption of GMOs by developing countries has been significant (ISAAA, 2005). In fact, developing countries currently account for almost 38% of the total areas planted with transgenic crops. Most of the developing countries (nearly 50%) that have adopted biotechnology products, with clearly identified benefits, belong to the Americas, and their marketing is now the subject of multilateral negotiations. The management and transboundary movement of GMOs used in animal feed and human foods, together with their intentional or non-intentional introduction into the environment are matters that are being negotiated in the context of the Cartagena Protocol and the Codex Alimentarius.

Biosafety and Biotechnology

The process to develop and adopt biotechnology should necessarily be accompanied by regulatory frameworks on biosafety and risk analysis, particularly in relation to the transboundary movement of agro-biotechnological products, such as GMOs. In that context, discussions are under way within the framework of the Cartagena Protocol on Biosafety (CPB). Three meetings have already taken place, in which the countries of the hemisphere have had active participation; in two of these events, IICA has offered its Member States preparatory technical cooperation, in order to position them in the discussions and negotiations with other regions. Several countries in the hemisphere form part of the Protocol; some are signatories but not Parties, while others are neither Parties nor Signatories (see Table 1).

International agreements such as the CPB and its implementation affect, in one way or another, the generation and transfer of technology, trade, the regulatory frameworks on biosafety, institutional

Table 1. Status of the countries of the Americas in relation to the Cartagena Protocol on Biosafety (CPB)

Parties to the Cartagena Protocol on Biosafety (CPB)		
Antigua and Barbuda	Dominica	Paraguay
Bahamas	Ecuador	Peru
Barbados	El Salvador	Dominican Republic
Belize	Grenada	St. Christopher and Nevis
Bolivia	Guatemala	St. Lucia
Brazil	Mexico	St. Vincent and the Grenadines
Colombia	Nicaragua	Trinidad & Tobago
Cuba	Panama	
Countries that have Signed but not Ratified the CPB		
Argentina	Costa Rica *	Jamaica
Canada	Haiti	Uruguay
Chile	Honduras	Venezuela
Countries that have not Signed the CPB		
United States	Guyana	Suriname

Source: CBD, 2006

* Costa Rica is in the process of official publication of the ratification of the CPB.

capacity in risk analysis and management, additional costs in the production systems and intellectual property. This is true, regardless of whether or not a country is a Party to the Protocol. Within the context of the Codex Alimentarius, the countries of the Hemisphere have participated in discussions on aspects of biosafety as related to food products derived from recombinant DNA, according to their respective positions.

Meanwhile, the emergence of international agreements on biotechnology has influenced the development of certain cooperation models between different countries, such as the North American Biotechnology Initiative (NABI) and the Biotechnology Group of the Southern Agricultural Council (CAS), among others, which address important policy matters.

biosafety, which is available to all users at the following address:

www.infoagro.net/biotecnologia

With regard to the CPB, several countries of the Americas have developed - or are in the process of developing - their respective national legislations.

With regard to the CPB, several countries of the Americas have developed - or are in the process of developing - their respective national legislations on biosafety, as shown in Table 2. The data in this Table underscores the need to support the efforts of various countries in formulating their national policies.

In the context of IICA's mission and mandates, it is clear that the exchange of information among countries on the implementation of international agreements, such as the CPB, is essential. Recognizing this fact, the Institute has implemented a specialized information system on biotechnology and

Table 2: Status of the Legislation on Biosafety in the Member States of IICA

Specific Legislation / Regulation	Related Legislation	No Information/ No Access to Legislation
Argentina	Belize *	Antigua and Barbuda
Brazil	Bolivia*	Bahamas
Canada	Chile	Barbados
United States	Costa Rica*	Dominica
Mexico	Ecuador	Guyana
	El Salvador *	Haiti
	Guatemala	St. Lucia
	Grenada	St. Christopher and Nevis
	Honduras	St. Vincent and the Grenadines
	Jamaica*	Surinam
	Nicaragua*	Trinidad & Tobago
	Panama	
	Paraguay	
	Peru**	
	Dominican Republic *	
	Uruguay	
	Venezuela	

* *In the process of generating and/or modifying laws.*

** *Law pending official publication.*

Source: Biosafety Information System. BIS-IICA (2006).

IICA has also coordinated several technical meetings preparatory to the CPB, commonly known as "Meetings of the Parties", whose results are reflected in the agreements reached. These meetings were convened with the participation of public sector representatives in the areas of agriculture, the environment, health and science and technology.

A Hemispheric Program

Bearing in mind the aforementioned points, and having observed the significant advances achieved in biotechnology and its impact on science, technology and trade, as well as the need to develop policies and regulatory frameworks on risk analysis and intellectual property and enlist the active participation of countries in the international negotiations, IICA and its Member

States decided to initiate a process to formalize a program of hemispheric scope in biotechnology and biosafety.

This process culminated with the creation of the Inter-American Biotechnology and Biosafety Program, whose main purpose is to facilitate mechanisms for the development, management and safer use of agro-biotechnologies to promote a competitive and sustainable agriculture for the countries of the Americas. The process to design the Program benefited from a hemispheric task force, composed of experts in the field from fifteen countries (three per region) and a representative of the Biotechnology Group of CAS, coordinated by IICA. Based on a consensus reached by the Parties, the Program was agreed and was subsequently approved by the Institute's highest governing bodies.



The Program contemplates activities of hemispheric scope but also addresses regional specificities and has the following objectives:

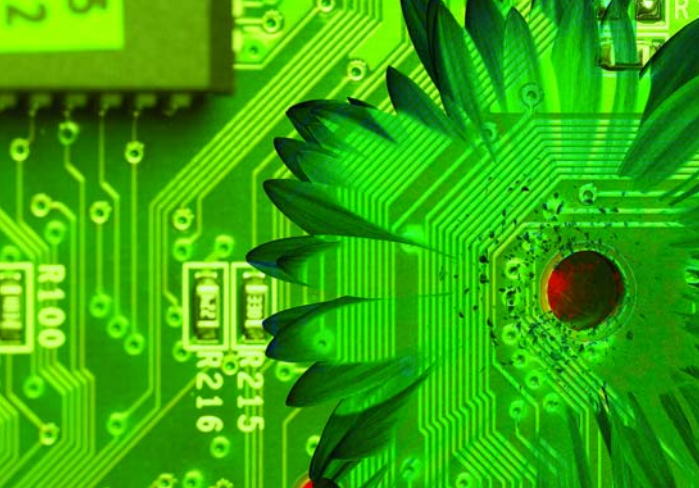
1. To support the gathering, analysis and dissemination of existing information, enabling the authorities in each country to design policies and make decisions based on technical and scientific evidence, and to provide objective information on agro-biotechnologies to the public.
2. To support member countries in identifying their needs at the national and regional levels, in order to promote the development and appropriate use of agro-biotechnologies.
3. To support the development, implementation and dissemination of transparent policies and regulatory frameworks, based on science, and, where appropriate, facilitate their harmonization at the regional level.
4. To promote transparent information concerning the risks and benefits of agro-biotechnology; and, to suggest that the relevant authorities include the issue of public perceptions as an important component of national agro-biotechnology policies and programs.
5. To support the development of scientific-technological capabilities in the field of agro-biotechnology through regional strategies and cooperative actions between countries and regions, considering solutions to address national and local problems.
6. To promote studies, discussion and analysis of the implications of national and international standards and regulations, and of international

negotiations and agreements on issues related to agro-biotechnology and biosafety, with an emphasis on their impact on trade.

With these objectives in mind, IICA has implemented actions in this field in nearly all the regions. In Central America and the Caribbean, the Institute has helped countries to identify their needs by designing and implementing joint initiatives on biotechnology and biosafety; in each case these are accompanied by the identification of projects of regional scope. In the Southern Region, IICA has been working with the Biotechnology Group of CAS on the preparation of technical meetings and conferences on biosafety issues, particularly those related to the implementation of international agreements such as the CPB and the Codex Alimentarius. This last effort has been undertaken in coordination with NABI, an organization with which IICA is also preparing a workshop on Intellectual Property Rights (IPR), to be held in the first quarter of 2007 in the Southern Region. At the same time, IICA is working in Paraguay to support the development of a national policy. In the Andean Region, the Institute is providing technical support in a process to identify needs.

In more specific terms, IICA's Hemispheric Biotechnology and Biosafety Program will include the following lines of action:

1. Supporting the development of an objective and scientific information system on biotechnology and biosafety, including the collection, analysis and dissemination of data to facilitate policymaking and decision-making at country level.
2. Supporting member countries in identifying their needs in relation to agro-biotechnology and biosafety, at national and regional level, for the design and implementation of policies and regulatory frameworks, and in the development of technical and scientific capacities in the context of the hemispheric and regional strategies.
3. Promoting transparent information concerning the risks and benefits of agro-biotechnologies and recommending that the



relevant authorities include the issue of public perceptions as an important component of national policies and programs on agro-biotechnology.

4. Promoting studies, discussions and analysis of the implications of national and international standards and regulations, and of the international negotiations and agreements, on issues related to agro-biotechnology and biosafety, with an emphasis on their impact on trade.
5. Implications for trade and impact on countries that produce GMOs.

Conclusions

Through its Hemispheric Program, IICA seeks to contribute to the improvement of the sector's competitiveness in accordance with its other mandates.

IICA will work to ensure that the countries of the Americas are duly informed and prepared for the international negotiations related to the trade of agro-biotechnological products, as it has done until now. This will contribute to their competitiveness in the international agrifood industry.

IICA will serve as the high-level discussion forum on current trends and issues related to biotechnology, for which purpose it will monitor the progress achieved in this regard at the global and regional levels, and will strengthen its information system.

The Institute will promote regional initiatives on this issue, emphasizing the improvement of institutional capacities and encouraging horizontal technical cooperation between regions, in order to make their successful experiences available to others.

IICA will serve as liaison with other international technical cooperation organizations, with the private sector and with academia in order to benefit countries; this will promote the production of foods that are not only nutritious and safe, but also competitive in the national and international markets of the agrifood industry. IICA promotes biotechnology as an instrument for the conservation and management of genetic diversity.

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