Politics, Perceptions, and Concerns Regarding the Development of Science and Biotechnology in Brazil

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Executive Summary

Brazil's agriculture is quite a showpiece: Agricultural produce accounts for 40 percent of the country's exports, agriculture employs about 20 percent of the entire workforce, and it makes up nine percent of the GDP. 40 percent of these exports go to the EU, although most of the produce is intended for the domestic market.

Brazil's agriculture uses highly-developed technologies; in recent years, however, the challenge has been to avoid unnecessary logging. The loss of forests and, therefore, of biodiversity increasingly gives rise to concern. This is why economic interests should be directed towards sustainability, which includes forest protection.

Knowledge, technology, and innovation are basic factors for developing the economy and social models. What deserves mention in this context is not only conventional vaccines but also human insulin. A good portion of the scientific literature dealing with this issue was penned by Latin American researchers. From 1988 to 2001, the number of quotations from Latin American technical literature has increased threefold, with Chile, Argentina, and Brazil accouting for 70 percent of the publications.

The development of biological and information technology goes hand in hand with increasing investments in research and development. In Brazil, for example, there are currently quite a number of research projects that develop cultivation methods with new qualities, with the public sector – i.e. public research institutes, state universities, and promotion agencies – funding most of the investments. *The genome sequence of the plant pathogen Xylella fastidiosa* by A.J.G. Simpson et al. is one of the most influential Brazilian publications that have so far succeeded in appearing on the front page of the journal *Nature*. This sequencing success motivated new projects, enlivened proteomics and genomics, and even led to the emergence of new companies.

Without a doubt, the standard of scientific research in Brazil is outstanding, although knowledge production is nevertheless dominated by the USA, Europe, and Japan. In countries in which both research and the application of its results are successful, the lion's share of the investments comes from the private sector. Brazil has only a few patents – the main reason for this may lie in insufficient cooperation between the private sector and the public institutions.

The term biosafety generally refers to a broad canon of measures used to assess risks and effectively avoid the negative consequences of biotechnological progress for human health and the environment. A large number of regulations cover the use of new technologies. Brazil's first Biosafety Act goes back to 1995; later, it was amended by Provisional Measure No. 2.191-9/2001 establishing the National Technical Commission on Biosafety (CTNBio). Since then,

numerous regulations have been developed that cover methods to develop, cultivate, manipulate, transport, buy, sell, use, release, and dispose of genetically modified organisms (GMOs) so as to protect the environment as well as human, animal and plant health.

The liberalisation of trade in genetically modified soybeans in 1998 triggered a legal dispute and undermined to some extent the reputation of Brazilian technology as a whole, so that it was cancelled again. As a result, different positions and interests spawned a complex tangle of regulations whose implementation, in turn, caused bureaucracy to get out of hand and harmed Brazil's scientific development.

After an intense debate about the technical, scientific, economic, legal, political, and ethical aspects of the matter, a new version of the Act was formulated in March 2005. It was inspired by utmost caution and a stringent evaluation of national economic interests, the security of the food supply, and the consequences for the environment. Moreover, research on embryonic stem cells produced by in-vitro fertilisation was liberalised for therapeutic purposes. Other issues, such as the prohibition of the Gene Use Restriction Technology (GURT) and the remuneration of CNTBio members who, up to now, have been working without pay, have not yet been cleared up.

Biotechnology has been a part of our life for many years. This is shown by the well-known processes used in the production of beer, cheese, bread, and wine as well as by recent scientific progress in these areas. However, many regard this phenomenon with a mixture of fascination and fear. In this context, the plot of Michael Crichton's novel *Jurassic Park* that was later turned into a film may serve as an example. Is this fear only a figment of the imagination, or does it arise from a science fiction thriller? In fact, the use of genetically modified organisms in agriculture and food has become a controversial issue that is intensely discussed among politicians and the people.

A large part of society is convinced that the use of GMOs implies inacceptable changes in human health and the environment. Yet many technologies that initially met with refusal are an unquestioned integral part of our everyday life today. In 2000, Brazil conducted a pilot project to investigate the extent to which society would accept new biotechnological processes together with their benefits and risks. It showed that the interviewees were more receptive towards these kinds of processes as their level of education and their income increased.

Given the socio-economic importance of biotechnology, its future potential, and its perception-related obstacles, it is a special challenge to communicate the values of these technologies to the public, which knows very little about biotechnology as yet. Therefore, it is necessary to inform the population comprehensively. Those who hardly look into the subject of biotechnology will probably retain their doubtful attitude towards genetically modified food.

However, it is more complicated to inform the people about risks than to communicate scientific facts. After all, it is not only a matter of eliminating information deficits but also of responding sensitively to religious, cultural, economic, and political aspects as well as to the emotions of the population. There certainly is no single and ideal way of solving this problem. The only possible approach is to apply a whole bundle of instruments. However, these only have a chance to be

successful if they are newly and individually adapted to every single situation.