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Agriculture in Brazil: *plant genomics networks and internacional intellectual property rights.*

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1. Objectives

Since the late 1990's, more than 30 Genome Projects¹ and 200 so called biotechnological companies have been created in Brazil, originated from a diversification process carried out by companies already established in the market or governmental research institutions. The most part of that projects, funded by the public sector, are "genomics agricultural biotechnologies" (GAB) initiatives, colaborative research programs with private agroindustrial sector².

There is a debate whether the investment in genomic based research - incorporated into the obtaining of innovation in agriculture - is or not the best option to stimulate Brazilian agricultural biotechnology development (Fonseca, Silveira & Dal Poz, 2003).

Is it advisable to suport public GAB basic research whith innovation potencial in Brazil, if there is a minor catching up capability? In this context, technological appropriation is a crucial factor to attain market gains and competitive advantages for developing countries (Juma, 1999).

In order to utilize the new and emerging tools of biotechnology, nations must take an integrated approach and build capability in all these areas. Developing capability in policy areas includes fostering experience and expertise in intellectual property rights (IPRs), biosafety and commercial linkages.

IPRs have been seen as primordial factors in the definition of the forms of diffusion of biotechnologies for future systematic gains and new patterns of competitiveness in agricultural markets. So, there is an ordinary confidence about the necessity of IPRs capability building in agricultural biotechnology.

The international IPRs context, given by WTO-TRIPS Agreements³, has been seen as a guarantee of globaltrade harmonization (CIPR, 2002). Innovation dynamics and market competitiveness are the focus of these agreements, which adresses a new regime for global

¹ Science of sequencing DNA. The term *genomics* is used in a broader sense, including proteomics, in which the gene expression into proteins is noted for *biotech* innovation and bioinformatics.

² As seen in "From Double to Triple Helix: the *Xylella Genome Project*". Dal Poz, M. E. Master degree dissertation. University of Campinas, Campinas, Brazil, 2001.

³ WTO-TRIPS: World Trade Organization-Agreement on Trade Related Intellectual Property Rights; cluster of conventions in order to "get a minimun of trade harmonization".

markets regulation. As formal and normative tool of knowledge based economy, the IPRs international regime is indeed the tangible entity by which biotechnology innovation is recognised for market aims (Lesser, 2000).

IPRs regime improve is not, by itself, enough to assure technological catching up for development countries. It is necessary to consider that technology nature and competition environment interpose on the private appropriation of innovation results (Teece, 1986). Intellectual Property is only one of the mechanisms involved in innovation appropriation; its importance varies among sectors, industries and markets, in a globalized economy.

Among different national systems of innovation, plant biotechnologies appropriation seems to be the result of dynamic processes, in which different actors strategic appropriation performances happen. IPRs legal systems negotiations is the formal legal base by which the stakeholders display their concerns, drifting and disclosing many of their strategic interests. These games do not have only a legal or diplomatic nature, performed in the IPRs international fora or by the IPRs legal context. They are also embodied in biotechnology networks specific innovation *modus operandi*, and depend on the S&T policy base and actors' capacity of integrating many sorts of scientific, technological and market assets.

For Brazilian S&T&I policy making and biotechnology national innovation system governance⁴ it is critical to qualify IPRs building capacity for GAB research networks.

The general objective of this thesis is to demonstrate that GAB appropriation depends on a systemic IPRs capability building, supported by S&T policy tools, addressing (i) awareness creation; (ii) human resource development; (iii) institutional development; and (iv) information access.

The practical objective is to generate IPRs capacity building benchmarks, to integrate intellectual property rights and Brazilian development policy.

⁴ Tasks of XXI century Brazilian S&T Ministry – *Science, Technology and Innovation: challenges for brazilian society*. The Green Book. Silva, C.G. & Mello (coord.). Brasília, 2001.

Results

Two groups of inter-connected evidences about the GAB appropriation dynamic may be pointed:

1. Evidences concerning legal IPRs instruments.

- ✓ There is a normative assymetry between IPRs global law and discussion fora: TRIPS-WTO, Convention on Biological Diversity, UPOV⁵, WIPO⁶, etc. As a result of particular processes of internal discussion, there is a diversified ensemble of national laws regarding IPRs in the WTO signatory group of developing countries. This is not a neutral factor concerning developed and developing countries biotechnological catching up (Dal Poz & Brisolla, 2003).
- ✓ TRIPS agreements legal structure presents a high level of adherence with developed countries IPR legal systems⁷, what is not true for the developing ones.
- ✓ TRIPS pipeline imperative guarantees high level of innovation, IPRs protection in any WTO signatory country, independently of the geografic region in which scientific information was generated.

2. Evidences concerning GAB innovation dynamics

- ✓ Biotechnology can be defined as a robust block of knowledge and information, combining existing research protocols and methodologies with new scientific concepts derived from distinct disciplines such as genetics, molecular biology, *proteomics*, functional *genomics*, and biochemistry. This definition holds a great potential for new combination and interaction with other technologies activities and academic fields such as the ones representing computer science and information technologies (Fonseca and Silveira, 2002). The genetic information-based matrix characterizes a particular combination of technological protocols and scientific procedures, in which the stock of knowledge does not cease to develop in new sources of information, new disciplines and new forms of capabilities and fitness (Holland, 1998).
- ✓ Biotechnological activities support the development of important class of *feed-backs* between

⁵ UPOV - Internacional Union for Plant Variety Protection.

⁶ WIPO – World Intellectual Property Organizaton.

⁷ The legal focus of appropriation games is TRIPS 27.3(b) article, about genes and genetic resources innovation products ownership.

industries of chemical and the agriculture sectors. Biotechnological organization holds up a complicated network of laboratories, from universities and other governmental institutions and multitude of medium and small specialized firms. Together, these activities represent a complex, but dynamic amalgamation of expertise, capabilities and proficiency.

- ✓ GAB scientific networks are semi-public bodies of knowledge available in international “genebanks”, freely obtained for innovative strategies playing a central role in agribusiness and *biotech* corporate sectors market strategies. It has been difficult to keep productivity profits acceleration, based only in mature biotechnologies. Despite of Genetic Modified Organisms based products polemic issues, the market strategy mixes old biotechnologies, genomics *in house* R&D and collaborative research.
- ✓ The institutional dimension of IPRs appropriation depends on specific competences in the level of the firm and in key public research institutions (Silveira, Fonseca & Dal Poz, 2001). This concerns intra-firm and in house R&D and public key institutions capability for IPRs management and technology transfer (Lesser,2002).

Conclusions

The evidences concerning IPRs instruments show that GAB appropriation has close relationships with legal international context of globalized economy. But evidences concerning *biotech* innovaton dynamics show that GAB technological catching up depends on stakeholders' dynamic games performing capacity, given this international IPRs setting. So, IPRs are not self-sufficient for biotech appropriation, what points to the necessity of designing the internacional scenario in which the appropriation games are played.

To answer the question about the relevance, for developing countries, to suport basic GAB research, a multi-dimension analysis of IPRs capability building is necessary, in terms of its: (i) awareness creation; (ii) human resource development; (iii) institutional development; and (iv) information access. This will be the next stage challenge of this doctoral work, in order to generate some IPRs benchmarks for Brazilian S&T policy-making.

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