

Events to Determine the Biotechnology Demand in MERCOSUR

REGIONAL REPORT

AGRICULTURAL AND LIVESTOCK SECTOR

Biotechnology Development Support Program in MERCOSUR (*Programa de Apoyo al
Desarrollo de las Biotecnologías en el MERCOSUR*)

European Union Cooperation – MERCOSUR

BIOTECH



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ABBREVIATIONS AND ACCRONYMS

UG: Management Unit for the Biotechnology Support Program in MERCOSUR – BIOTECH
[*Programa de Apoyo a las Biotecnologías en el MERCOSUR – BIOTECH*]

BIOTECH: Biotechnology Development Support Program in MERCOSUR [Programa de Apoyo a las Biotecnologías en el MERCOSUR – BIOTECH]

CADB: Biotechnology Development Supporting Commission [Comisión de Apoyo al Desarrollo de la Tecnología]

1. LOCATION, DATE AND DURATION

COUNTRY: Argentina

DATE: December 12, 2008

WORKSHOP LOCATION: Liberty Hotel, Av. Corrientes 632, Ciudad Autónoma de Buenos Aires, Argentina

SECTOR: Agriculture and Livestock

2. PARTICIPANTS

Participants: Annex 1

Coordinator: Dr. Angel Cataldi

Moderator: Lic. Gonzalo Fuentes Coiana

3. WORK SCHEDULE

Annex 2 shows the work program developed during the Seminar.

4. ABSTRACT OF SUBJECTS DISCUSSED

Following the general presentation of the Seminar by Dr. Eduardo Trigo from the CADB, the technical coordinators of each country briefly stated the conclusions drawn from the National

Workshops, namely Dr. Angel Cataldi from Argentina, Dr. Marco Dalla Rizza from Uruguay, Dr. Ricardo Pedretti from Paraguay and the Vice-Minister of Science and Technology, Dr. Luiz Antonio Barreto de Castro, from Brazil. Eng. Marcelo Regúnaga made a preliminary overall analysis. Each coordinator presented the status of the sector and the demands of each country, reflecting common problems and needs. Following the presentations, questions and clarifications were briefly made.

4.1 Abstract of the State of the Art in MERCOSUR

As to Agricultural Biotechnology, the employment and evaluation of genetically modified oil seeds and grains (GMO), resistant to pathogens or herbicides must be highlighted. Several laboratories in the region have developed GMO plants for experimentation purposes. Significant progress has been made in the region regarding the implementation of a regulatory framework governing the employment of these crops. Another important development aspect is the generation and employment of molecular markers to contribute both to improvement and traceability. There is a relative lag in the identification and manipulation of genes that would provide better nutritional or adaptation quality in plants. However, this subject is being considered by government and private laboratories in MERCOSUR. An increasingly interesting subject is the contribution of Biotechnology to plant biomass quality for biofuels or to the obtainment of bioproducts, respectively.

As to livestock biotechnology, the region shows good progress in the development and application of veterinarian vaccines. Some of these vaccines have been conceived in MERCOSUR countries. The molecular diagnosis of livestock genotypes or diseases is less developed. For a decade now bovine cloning and transgenesis have played an important role in preserving quality breeders and their employment as biofactories, respectively. The biotechnology of other livestock species, including fish farming and beekeeping, are less developed.

The number of researchers and technologists devoted to and trained in biotechnology is acceptable, though there are dissimilarities among and within countries. The infrastructure and investment level (though lower than that of central countries or that of China and India, respectively) shows remarkable examples, particularly in Brazil. It should be noted that private investment is highly lagged. Cooperation among countries has been lower than required to achieve a critical mass, but it is expected to improve as a result of the Biotecsur EU-MERCOSUR initiative.

4.2 Objectives and Methodology

The objective of this activity was to generate inputs for the strategical planning process that is being promoted by the BIOTECH Project with a view to fostering biotechnological development in MERCOSUR. To that end, the proposal was to reach regional agreements on two topics that had been previously analyzed at country level at the relevant national workshops: i) identification of priority subjects common to the four countries for the development of biotechnology in the sector and ii) reaching an agreement on the analysis of existing capacities to promote biotechnology development regarding those subjects.

A Plenary was formed for the discussion. At a first stage, UGP's representatives submitted a chart with a list of the Priority Subjects identified at the National Workshops, including the score given to each subject in each country, from 1 (no priority) to 5 (top priority); 4 to 5 points (in green in the tables) were given to the subjects that were deemed the most important and urgent; 3 (yellow) to subjects of lesser importance; 1 to 2 (red) to subjects of little importance; white was used for non-applicable cases.

The list further included the average priority score of each subject, calculated as the arithmetic mean of the scores given by each country. The list was submitted for consideration by the group with a view to reaching an agreement as to the exact nature of the prioritized subjects and generating agreements on the priority level given to each of them at the regional level.

At a second stage, UGP's representatives submitted another chart with the Analysis of Capacities conducted in each country for each of the prioritized subjects. The capacities analyzed by the countries were the following: human resources, academic capacity, equipping, financing, industrial capacity, regulations, escalating and transfer, inter-institutional relations, inter-sectorial relations, technological poles and incubators, government investment and risk capital, interdisciplinary approach and technological management. The chart showed the score awarded by each country to the existing capacity for each subject. The score ranged from 1 to 5, 1 being the worst scenario and five the best; 4 to 5 points (green) were awarded to subjects with satisfactory capacity, 3 points (yellow), to those with good capacity, and 1 to 2 points (red) to those with poor and/or deficient capacity. The list was submitted for consideration by the group in order to determine the definition of the analyzed capacities and reach an agreement on the score to be given to each of them at a regional level.

4.3 Discussion

4.3.1 Analysis of priority subjects

Subsequently, a debate was opened to discuss relative positions and developments in the different countries, and changes were proposed to the summary table to reflect each country's priorities according to the conclusions of each national workshop presented by the attending representatives. Relative positions and developments of each country were discussed to subsequently change the summary table reflecting such priorities, resulting from the conclusions of each National Workshop. In addition, the group discussed different terminological aspects among countries as well as subtopics that are top priority for one country but not for the other. In the debate topics and subtopics arising from the relative weight assigned in each country were prioritized to generate a common order, which resulted in a joint relative average. Upon displaying the table, a discussion commenced about the relative weight of valuations, and the difficulties to compare on the basis of mathematical averages arising from the tables.

The subjects were organized and the demands and statements which had been submitted in the conclusions of the National Workshops as reflected in a table agreed by consensus. (Table 1), were distributed. This table shows seven common prioritized subjects, many of which show specific subtopics. Comparison of averages for the entire MERCOSUR, showed a great weighing parity, as it was to be expected in the light of the Workshops previously conducted, where these topics were discussed.

Table 1. Prioritized subjects with valuations for each country and the average for the region, which is highlighted in the column “MERCOSUR”. Table submitted by Eng. Marcelo Regúnaga

	Argentina	Brazil	Paraguay	Uruguay	Mercosur
1. Plant diseases and plagues management	4.5	5	4.2	4.6	4.6
- existing plagues and diseases	4.5	5	4.3	5	4.7
- emerging plagues and diseases	4.4	5	4	4	4.4
2. Quality and differentiation	4.8	5	4	4.2	4.5
- Quality in itself and innocuousness	5	5	4	5	4.8
- New products (e.g. Nutraceuticals)	5	5	4	4	4.5
- Traceability	4.3	5	5	4	4.6
3. Sustainable production increase	4.5	4	4.5	4.4	4.4
- Plant improvement (pastures and crops)	5	5	5	5	5.0
- Efficiency in animal reproduction and production	4.5	5	4.3	5	4.7
- Making good use of unfavorable environments	5	---	4	4	4.3
5. Biomass production (e.g. for biofuels)	5	5	5	5	5.0
6. Animal diseases management	5	5	4.3	4.5	4.7
- existing diseases	5	5	4.5	5	4.9
- emerging diseases	4	5	4.5	5	4.6
7. Sustainable use of genetic resources	4.7	5	5	4.7	4.9
- Preservation, characterization and protection	4.7	5	5	5	4.9
- Bioprospection	4.7	5	5	5	4.9
- Native species improvement	4.7	4	4	4	4.2

Methodological note: The score was given from 1 to 5 in the sense of positive valuation

As a summary, according to the resulting average valuations, the subjects agreed by consensus by priority order are summarized in Table 2.

Table 2. Prioritized subjects for the different countries and for the region in valuation decreasing order.

	Argentina	Brazil	Para guay	Uru guay	Mercosur
4. Process engineering (downstream)	4.7	5	4.3	4.4	4.6
5. Biomass production (e.g. for biofuels)	5	5	5	5	5.0
6. Animal diseases management	5	5	4.3	4.5	4.7
- existing diseases	5	5	4.5	5	4.9
- emerging diseases	4	5	4.5	5	4.6
7. Sustainable use of genetic resources	4.7	5	5	4.7	4.9
- Preservation, characterization and protection	4.7	5	5	5	4.9
- Bioprospection	4.7	5	5	5	4.9
- Native species improvements	4.7	4	4	4	4.2

It can be seen that, in the light of the topics and subtopics included in Table 1, many subtopics show a valuation higher than that of topics. For instance: “Animal diseases management” which is ranked second, has a subtopic, “Existing diseases” with a 4.9 score that would allow it to be at the top in the ranking of prioritized subjects. Moreover, it is important to note that the order of subjects is logical, since if we are to achieve a sustainable increase in productivity, we cannot avoid having a sustainable use of genetic resources, with an adequate disease management, to produce then the necessary quantity of biomass of an according quality, to be then translated it into byproducts following a suitable engineering process. With this

background, not only our value chain would be complete, but also more efficient and sustainable over time. Finally, although the score marks a defined order, the difference between said values is very narrow, with high values in all cases and poorly significant differences among them.

4.3.2 Capacities analysis:

If the data contributed by each national workshop are reviewed, we may observe that Paraguay believes that for the agricultural sector, its human resources avail of a medium development level in micropropagation and genetic transformation, and have a small number of professionals trained in diagnosis and molecular epidemiology. Educational capacity and equipping show a medium-low level while financing shows the lowest level. Likewise, the industrial and regulations capacities are scarcely developed. Institutional relations for genetic markers and genetic transformation; the creation of incubator for these two subjects, to which identification of genetic and metabolic interactions are added, are pointed out as vacancy areas. Public investment and risk capital for genetic transformation are also pointed out as a vacancy area. As to the livestock sector, the Paraguayan workshop believes that the human resources level is low in all areas, except in reproduction technology and nutritional physiology, where level is medium-low. Academic capacity is medium-low for all areas, except for molecular diagnosis and vaccines where the score is lower. In the livestock sector, level of equipping, financing and industrial capacity is low (with certain appreciation in the case of industrial capacity for nutritional physiology). Regulations have a medium-low development for all areas, except for vaccines, where it is low. In this area, escalating and transfer and incubators creation are considered vacancies, though none of these aspects exceeded the medium-low score.

In the case of the Uruguayan agricultural biotechnology, the greatest capacities were found in the regulation structure and educational capacities. The existence of human resources, equipping, inter-institutional and inter-sectorial relations, with an interdisciplinary approach and incubators creation obtained the highest score. On the contrary, public investment was very poor, and levels of technological management, and technology transfer and escalating were low. In some aspects, the workshop found a marked disparity between sectors. Thus, there is a strong development in micropropagation and tissue culture but a poor level of development in genetic transformation. Regarding livestock biotechnology, the Uruguayan national workshop found, in general, lower valuations than in the case of plant biotechnology. In several biotechniques, such as inter-institutional and inter-sectorial relations, a regular medium-high

level was found. In other cases, a general medium-high level conceals marked sectorial disparities; such as the case of human resources and industrial capacities, where there is a strong development in genetic markers and genetic interactions and a very low development in transgenesis. The same as in agricultural biotechnology, a very poor public investment is observed.

In the case of Argentina the highest capacities were identified in the multidisciplinary approach, and public academic capacities (average score equal to or over 4). The greatest weaknesses were identified in escalating and transfer, inter-institutional and inter-sectorial relations, public investment, technological management, financing, industrial and regulation capacities (score equal to or below 2). Human resources and equipping ranked in an intermediate position (average score of 3). No sufficient information was available to qualify capacity in the area of technological poles and incubators.

In the case of Brazil, there were almost no weaknesses, as the average score in all capacities is equal to or over 4. However, a relative weakness was identified in capacities related to diagnosis and molecular techniques, in the area of molecular epidemiology applied to plants.

Table 3, herein below, shows the scores given to each capacity in each country

Table 3: Analysis of capacities (part 1)

PRIORITIZED SUBJECTS	Escalating and transfer				Inter-institutional relations				Inter-sectorial relations				Incubators/Poles				Public investment- risk capital				Interdisciplinary approach				Technological Management			
	A	B	P	U	A	B	P	U	A	B	P	U	A	B	P	U	A	B	P	U	A	B	P	U	A	B	P	U
1. PLANTS																												
1.a. Genetic characterization	na	5	3	0.5	3	5	3	2	1	5	3	3	na	5	5	2.5	1	5	2	2	3	5	3	1.5	1	5	2	2.5
1.b. Genetic markers	3	5	3	1	3	5	4	3	3	5	4	3	na	5	5	2.5	3	5	3	1	3	5	3	2.5	2	5	3	2
1.c. Micropropagation and tissue culture	5	5	3	3	3	5	3	3	5	5	4	3	na	5	3	2.5	3	5	3	1	1	5	2	2.5	2	5	2	2
1.d. Genetic transformation	1	5	2	1	3	5	4	3	3	5	4	3	1	5	3	2.5	3	5	4	1	3	5	4	2.5	1	5	2	2
2. ANIMALS																												
2.a. Genetic characterization. Metabolic interactions	na	5	5	1	1	5	2	3	1	5	2	3	na	5	5	2	3	5	3	1	3	5	3	2	1	5	2	2
2.b. Genetic markers	3	5	4	3	1	5	2	3	1	5	2	3	na	5	5	2	3	5	3	1	3	5	3	2	1	5	2	2
2.c. Reproduction technologies	5	5	4	2	3	5	3	4	3	5	3	4	na	5	5	2	1	5	2	1	3	5	3	2	2	5	3	2
2.d. Transgenesis	1	5	3	1	1	5	2	3	1	5	2	3	na	5	5	2	1	5	2	1	1	5	2	2	1	5	2	2
2.e. Nutritional Physiology	1	5	2	1	3	5	3	3	1	5	2	3	na	5	5	2	1	5	2	1	1	5	2	2	1	5	2	2
3. PLANT AND ANIMAL HEALTH																												
3.a. Diagnosis – molecular techniques. Molecular epidemiology. Plants	1	3	2	2.5	1	3	2	3.5	3	3	3	3	na	3	3	1.5	1	3	2	1.5	3	3	3	3	1	3	2	2.5
3.b. Diagnosis – molecular techniques. Molecular epidemiology. Animals	1	4	2	2.5	3	4	2	3.5	3	4	3	3.5	na	4	2	2.5	3	4	2	1.5	4	4	4	2.5	2	4	2	2.5
3.c. Traditional and recombining vaccines	3	4	3	3.5	3	4	3	3.5	3	4	3	3.5	1	4	3	2	1	4	3	2	3	4	3	2.5	2	4	3	3

Table 3: Analysis of capacities (part 2)

PRIORITIZED SUBJECTS	Human Resources				Equipping				Financing				Industrial Capacities				Regulations				Public Academic Capacities			
	A	B	P	U	A	B	P	U	A	B	P	U	A	B	P	U	A	B	P	U	A	B	P	U
1. PLANTS																								
1.a. Genetic characterization. Metabolic interactions	1	4	2	2	1	3	2	3	1	5	1	1.5	1	3	1	1.5	na	3	1	1	3	5	3	3
1.b. Genetic markers	3	5	3	4	3	5	3	3.5	3	5	2	2.5	3	5	3	2	na	4	1	1	3	5	3	4
1.c. Micropropagation and tissue culture	5	5	5	3.5	5	5	4	3.5	5	5	3	3	5	5	4	4		4	3	1	5	5	4	4
1.d. Genetic transformation	1	5	3	2	3	5	4	2.5	1	5	1	1.5	1	4	1	1	1	3	1	2.5	5	5	4	3
2. ANIMALS																								
2.a. Genetic characterization. Metabolic interactions	1	3	1	2	1	3	1	3	1	4	1	2	1	5	1	1	na	3	3	1	1	3	2	3
2.b. Genetic markers	3	4	2	4	3	4	3	4	3	4	2	2	3	4	2	1	na	3	3	3	3	4	3	4
2.c. Reproduction technologies	5	5	4	4.5	5	5	4	3.5	5	5	3	2	5	5	3	2.5	1	5	2	2	5	5	4	4.5
2.d. Transgenesis	1	3	1	2	1	4	1	1	1	4	1	2	1	2	1	1	1	3	2	1	3	4	3	1
2.e. Nutritional physiology	3	4	3	3.5	1	4	1	2	1	4	1	2	1	4	2	1.5	na	4	3	1.5	5	4	4	3.5
3. PLANT AND ANIMAL HEALTH																								
3.a. Diagnosis – molecular techniques. Molecular epidemiology. Plants	1	5	1	2.5	5	5	4	3.5	1	5	1	1.5	1	3	2	2	na	3	3	2.5	3	4	3	3
3.b. Diagnosis – molecular techniques. Molecular epidemiology. Animals	3	5	1	2.5	3	5	4	3.5	3	5	1	2	3	3	2	2	na	3	3	3	5	4	3	3.5
3.c. Traditional and recombining vaccines	3	4	2	3	3	5	2	4	3	5	2	3.5	3	4	2	4	1	4	3	4	5	5	3	4

5. CONCLUSIONS

Thus, prioritized subjects in decreasing order, were the following:

- 1) Sustainable use of genetic resources.
- 2) Animal disease management and biomass production.
- 3) Quality and differentiation, process engineering and plant disease and plague management.
- 4) Sustainable increase of productivity.

The valuation was high, the score differences being very small between successive scores, wherefore it is recommended that all subjects be prioritized.

As to capacities, there was consensus that development in Brazil was higher than in the rest of MERCOSUR countries.

6. ANNEXES

Annex 1. List of participants

Country	Name	Institution/ Company
Argentina	Susana Levy	BIOGENESIS BAGO
	Angel Cataldi	INTA
	Atilio Castagnaro	EEA Obispo Colombres
	Oscar Taboga	INTA
	Abdres Rogberg Muñoz	UNLP CONICET
	Marina Sansiñena	UCA Ciencias Agrarias
	Patricia Rossini	Universidad de Quilmes
	Lelia Imhof	Universidad Católica de Córdoba
Brazil	Luis Barreto	Min. de Ciencia y Tecnología
Paraguay	Dr. Ricardo Pedretti	INBIO
	Ing. Agr. Lider Ayala	FCA-UNA
	Dra. Vet. Teresa Rovira	FCV-UMA
	Ing. Agr. Carlos Paniagua	PARPOV
Uruguay	Marco Dalla Rizza	INIA
	Enzo Benech	INASE
	Cecilia Cajarville	Universidad de la República
	María Julia Pianzolla	Universidad de la República
	Elena Tavares	Agroplant
	Daniel Baycé	Cámara Uruguaya de Semillas
	Fabián Capdevielle	CADB
Management Unit	Héctor Pralomg	
	Gabriela Clocca	
	Marcelo Regúnaga	
	Eduardo Trigo	
	Esteban Corley	

PROGRAM

Regional Seminar to Identify the Regional Biotechnology Demands in MERCOSUR for the Agricultural and Livestock Sector (*Seminario Regional de Identificación de la Demanda Regional de Biotecnologías en el MERCOSUR para el Sector Agropecuario*)

December 12, 2008 – Buenos Aires, Argentina

- 08.30 Participants accreditation
- 09.00 Explanation of activity objectives
Responsible person: Punto Focal Comisión de Apoyo al Desarrollo de la Biotecnología (CADB) Argentina
- 9.15 Explanation of the methodology to be used and personal introduction of participants
Responsible person: Moderator
- 10.00 Presentation of the Argentine sector and demands
Responsible Person: Sector's representative for Argentina
- 10:30 Presentation of the Brazilian sector and demands
Responsible Person: Sector's representative for Brazil
- 11.00 Coffee break
- 11.30 Presentation of the Paraguayan sector and demands
Responsible Person: Sector's representative for Paraguay
- 12.00 Presentation of the Uruguayan sector and demands
Responsible Person: Sector's representative for Uruguay
- 12.30 Presentation of demand prioritization matrix
Responsible Person: Representative of *Asistencia Técnica Internacional del Programa Apoyo a las Biotecnologías del MERCOSUR – Biotecsur*
- 13.00 Lunch break
- 14.00 Plenary analysis of priorities matrix
Responsible person: Moderator and International Technical Assistance
- 15.30 Presentation of summary of capacities and vacancy areas charts (strengths, weaknesses)

Responsible person: International Technical Assistance

16.00 Coffee break

16.30 Analysis in plenary session of the capacities and vacancy areas matrix
Responsible person: Moderator and International Technical Assistance

17.30 Workshop closure

21.00 Comradeship dinner

