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PROCISUR

STRENGTHENING AND EXPANDING A PERMANENT REGIONAL SYSTEM FOR TECHNOLOGICAL COOPERATION

COOPERATIVE PROGRAM FOR THE DEVELOPMENT OF AGRICULTURAL TECHNOLOGY IN THE SOUTHERN CONE

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MONTEVIDEO, URUGUAY
1995

00004233

Inter-American Institute for Cooperation on Agriculture. Cooperative Program for the Development of Agricultural Technology in the Southern Cone.

Strengthening and expanding a permanent regional system for technological cooperation / Cooperative Program for the Development of Agricultural Technology in the Southern Cone. -- Montevideo : IICA-PROCISUR, 1995.
38 p. --

ISBN 92-9039-261 4

/AGRICULTURAL DEVELOPMENT/ COOPERATION INSTITUTES / MODERNIZATION / /TECHNOLOGICAL CHANGES/ /PLANNING/ /BIOTECHNOLOGY/ /GENETIC RESOURCES / /NATURAL RESOURCES / /AGROINDUSTRY/

AGRIS E 14 CDD 303.483

This is the English version of the document entitled "PROCISUR - Profundización y Proyección de un Sistema Regional Permanente de Cooperación Tecnológica" edited by PROCISUR on October 1993.

FOREWORD

In the new framework of economic opening and regional integration, the **Cooperative Program for the Development of Agricultural Technology in the Southern Cone (PROCISUR)** has undertaken a process to adjust its programs and activities, adopting a disciplinary approach that gives special emphasis to joint research. In this way, it aims to improve its response to the technological demands of member countries and of the group as a whole, especially with a view to improving competitiveness of the agricultural and agroindustrial sectors.

This document recounts how PROCISUR has evolved to its present form as an institutional mechanism for technological cooperation, the context in which this process unfolded, what motivated the changes, and the new proposal for integration put forth herein.

We would be pleased to respond to those interested in further information on PROCISUR's activities, achievements and proposals. Finally, we invite all of those who wish to support the challenging task that this Program represents for the region's national agricultural research institutes (NARIs), to join us in our work. We make this invitation with the conviction that PROCISUR's accomplishments, combined with this new proposal, constitute the basis of a successful future.

Amélio Dall'Agnol
Executive Secretary - PROCISUR

ACKNOWLEDGMENTS

I wish to give special thanks to José A. Silva for the dedication and effort put into the preparation of this document, work vital to the dissemination of this new PROCISUR's proposal.

His capability and technical experience, combined with his first-hand knowledge of the Program drawn from his work as Production Systems Specialist (October 1988-January 1990), Acting Director of PROCISUR (February 1990-February 1991), and Institutional Development Specialist (March 1991-April 1992) were factors essential to this work.

I would also like to offer special thanks to Denise Chifflet, of PROCISUR's Executive Secretariat, who contributed to this enterprise with her broad experience in the Program, her valuable ideas and her full dedication.

To the other members of the PROCISUR team, my gratitude for the contributions each made from their particular work stations in producing this document.

CONTENTS

EVOLUTION TOWARD AN INSTITUTIONALIZED REGIONAL SYSTEM FOR TECHNOLOGICAL COOPERATION

The following is a brief description of how the process of reciprocal technical cooperation evolved among the National Agricultural Research Institutes (NARIs) of the Southern Cone. It refers to the cooperative programs that provided a legal framework for this process and the achievements that have helped to institutionalize PROCISUR as a permanent regional system.

BACKGROUND

The current stage of cooperation is the result of a long process of learning through which the countries of the region became aware of the benefits of working in cooperation, including the efficient and full utilization of an enormous pool of information, know-how, experience and materials that otherwise could not be adequately exploited by the countries.

The **Cooperative Program for the Development of Agricultural Technology in the Southern Cone (PROCISUR)** was formed through a reciprocal technical cooperation agreement signed by the countries of the Southern Cone, represented by their respective NARIs (INTA/Argentina, IBTA/Bolivia, EMBRAPA/Brazil, INIA/Chile, DIA/Paraguay, and INIA/Uruguay) and the Inter-American Institute for Cooperation on Agriculture (IICA), which also serves as the administrating agency. PROCISUR's headquarters are in Montevideo, Uruguay.

Cooperative efforts in the region began in the late 1960s, with a series of technology exchanges among Argentina, Brazil, Chile, Paraguay, and Uruguay, which were promoted by IICA.

These efforts, which Bolivia later joined, were organized and developed under the **Cooperative Program for Agricultural Research in the Countries of the Southern Cone** between 1980 and 1983, with funding from the Inter-American Development Bank (IDB) and IICA. During that period, the countries of the region joined forces in an effort to overcome common agricultural problems and establish a system of cooperation among the NARIs of participating countries. The aim of this interinstitutional cooperation was to strengthen research capabilities through the exchange of information and know-how with a view to boosting corn, wheat, soybean and beef production and productivity. The principal tools used to work toward this goal were information and documentation, training, dissemination of the production systems approach, technical exchanges, and high-level advisory services.

Based on the success of this IICA/Southern Cone/IDB project, a new phase was planned for consolidating regional cooperation. Known as the **Cooperative Program for Agricultural Research in the Southern Cone (IICA/IDB/PROCISUR)**, this program operated from 1984 to 1990 and had the financial support of IDB, IICA, and the participant countries, the latter of which assumed the responsibility of making financial contributions in addition to the goods and services they were already providing.

The objectives of the program were to consolidate activities and procedures among the NARIs, reinforcing mutual assistance in order to share individually developed technologies, to identify new possibilities for cooperative efforts and coordinated actions to take advantage of available resources and search for solutions to common problems, to increase the use of technology developed by the International Agricultural Research Centers (IARCs), and to carry out activities to increase the capability of the NARIs to work with technology and increase their level of efficiency and efficacy.

The final objective was to institutionalize a permanent system of regional coordination, mutual assistance and support, and of the exchange of knowledge through joint and cooperative activities.

In this phase of the program, activities extended to a greater number of products. Subprograms were organized for summer grains, winter grains, oilseeds, and cattle, with complementary subprograms on production systems, information and documentation, technology transfer and training, and communication.

Because PROCISUR developed these first phases within the context of a cooperative technical agreement with the IDB, a certain degree of rigidity existed. Though this is often unavoidable in a program of this nature, it meant there was a predefinition of the areas and topics subject to cooperative activity. Consequently, countries had only a narrow margin in which to plan or incorporate new areas or topics of common interest arising during the course of the Program.

QUANTITATIVE SYNTHESIS OF ACTIVITIES

A synthesis of the activities performed since the Program's inception in January 1980 through December 1992 is provided. This period covers the time during which activities were oriented by products in other words, before the proposed changes described in this document. Actions were of three basic types: reciprocal technical cooperation, international advisory services and training.

As concerns publications, during this period 34 volumes of the technical series DIALOGO (Dialogue), 80 issues of the newsletter PROCISUR Informa (PROCISUR reports), and 9 special bulletins were published. In addition, 174 informational and technical publications were generated from Program headquarters (annual plans, biannual reports, etc.).

RECIPROCAL TECHNICAL COOPERATION	
• Meetings	189
• Seminars	38
• National advisory services	312
• Observation visits	1.052
• Conference participation	30
Subtotal	***1.621***
INTERNATIONAL ADVISORY SERVICES	
• Long-term consultants	1
• Short-term consultants	54
• Consulting from specialists of the Internatioonal Agricultural Research Centers	45
Subtotal	***100***
TRAINING	
• Short courses	24
• In-service training	178
• Training at specialized institutions	113
• Post-graduate scholarships	10
Subtotal	***325***
TOTAL NUMBER OF ACTIVITIES	2.046

Two types of participants were involved in these activities:

Participants whose expenses were covered by PROCISUR	4.012
Participants not financed by PROCISUR	4.368
TOTAL NUMBER OF PARTICIPANTS	8.380

ACHIEVEMENTS

The Program's vast number of individual and collective activities had a direct and concrete impact on the NARIs of the Southern Cone, and also produced intangible or indirect benefits for the participating countries. This is particularly notable considering the political, technical and administrative complexities of multinational programs of this kind.

A brief summary of the achievements of the Program's first two phases must include the following points:

- Technological knowledge developed individually by the countries was made available to the entire group.
- The technical know-how for corn, wheat, soybean, and cattle production used by the different countries were harmonized.
- An inventory was made of the region's human and institutional resource capabilities.
- The meetings of directors, coordinators, and national specialists, combined with the exchange activities, motivated participants to upgrade their organizations in a clear process of institution building.

- There was notable improvement in the attitudes and professional performance of participants in different Program events.
- Support from the international centers was strengthened; especially noteworthy were the contributions of the International Maize and Wheat Improvement Center (CIMMYT) and the International Center for Tropical Agriculture (CIAT), which articulated their action with PROCISUR's process of cooperation, directing their efforts to the group of countries as a whole.
- PROCISUR's work represents concrete achievements, for the agricultural sector, in the enormous task of developing regional integration policies.
- PROCISUR demonstrates the institutional potential in the region for reciprocal cooperation in science and technology.
- PROCISUR's actions not only inspired but also served as a model for creating similar programs in other parts of the hemisphere.
- PROCISUR is a way to ensure ongoing and coordinated action, with the advantage that it offers near-excellent economies of scale given its single structure for support, direction and coordination under the leadership of its Board of Directors.

PROCISUR's activities have had an impact on national agricultural technology generation and transfer systems and also contributed to improving the productivity of crops in the region.

In an economic study of the impact of the cooperative program in the Southern Cone conducted by Dr. Robert Evanson of Yale University (USA), a renowned specialist in the socioeconomic evaluation of agricultural research, it was demonstrated that a 10% increase in the stock made available through PROCISUR boosted the productivity of wheat, corn, and soybean in the region by 0.7%, 0.75% and 1.0%, respectively.

Economic benefit studies showed that an investment of US$1 in PROCISUR generates a benefit stream that, after approximately 10 years, yields US$33, US$11, and US$29 per year for corn, wheat and soybean, respectively. This translates into an internal rate of return of approximately 191, 110, and 179 percent, respectively, for cooperative investments in these areas.

THE INSTITUTIONALIZATION OF COOPERATION

Effective horizontal cooperation cannot be carried out in an unstructured, uncoordinated fashion. It should be envisaged as a process that evolves through a succession of phases. As the process advances, only the goals and procedures most appropriate for the given phase should be employed.

PROCISUR has used a variety of mechanisms in its efforts to develop and deepen the horizontal cooperation process. In past phases, meetings, seminars and technical exchanges were promoted intensely as a means of fostering the regular transfer of knowledge and experience among countries; they were also a powerful method for facilitating mutual understanding and frank dialogue among participating directors and specialists. This also contributed to the identification of opportunities for economies of scale and to the discussion of common interests that could give rise to joint undertakings.

Technical exchanges can only be justified as a basis for horizontal cooperation when they are envisaged as a necessary first step in a process pursuing the more ambitious goal of integration. Since it is almost impossible to justify a temporary program of horizontal cooperation, institutionalization should be the objective from the very start. This has been PROCISUR's perspective since it was founded, and progress has been made in the process of integration. The current agreement provides a suitable legal framework for working toward the institutionalization of a permanent system of horizontal cooperation that will provide continuity of action and create the appropriate environment for formulating a common regional strategy and carrying out joint scientific and technological development in the region.

Institutionalization requires a core infrastructure for a permanent administration that will identify, study, promote and coordinate integrated cooperative projects, to be conducted during specified periods and with the necessary funding.

Another noteworthy aspect of this model for an institutionalized program of cooperation is that participation occurs not through individual specialists of the countries, but rather through the participating institutions which have made a commitment to the endeavor. Senior executives of each institution make the decisions and facilitate all of their institute's capabilities.

PROCISUR's broad experience throughout the region and its important achievements to date constitute a solid basis for defining and developing the new scientific and technological policies that will be required for the process of economic integration occurring in the region and worldwide.

A NEW FRAMEWORK FOR TECHNOLOGICAL COOPERATION AND AGRICULTURAL DEVELOPMENT

A NEW DEVELOPMENT STRATEGY - THE ROLE OF AGRICULTURE

Economic growth in the Latin American and Caribbean countries during the past few decades (especially the post-war period) was based on the view that the agricultural sector should subsidize protected industrial development.

Accordingly, the countries favored policies that promoted import-substitution in a world economy characterized by high levels of protectionism. Countries sought to supply their internal markets with domestic production, ignoring the benefits of specialized economies. As a result, production in every country in the region centered essentially on the same products. It is no coincidence, then, that efforts to encourage scientific and technical cooperation among the countries centered primarily on staple products, the approach PROCISUR took in the past.

While positive growth rates were achieved in the agricultural sector of the countries of the region under the import-substitution model, this model did not generate the foundation necessary for development. As a result, a severe economic crisis occurred in the mid-1970s, generating considerable social instability which had a profound effect on the democratic structures of many of the countries. This critical situation was aggravated in the early 1980s by the external debt situation and a worldwide increase in the stocks of staple products and raw materials of agricultural origin, which brought prices down sharply.

Faced with a crisis of this magnitude, countries began to reform their macroeconomic policies in the mid-1980s, shifting their orientation to export promotion, compression of internal demand, reduction of public spending, and downsizing of the state apparatus. This worldwide economic restructuring can be described as a stage of "recessive adjustment."

During the Ninth Inter-American Conference of Ministers of Agriculture (ICMA), held in Ottawa, Canada, in 1987, the ministers of agriculture acknowledged the profound and painful adjustments made by their countries to stabilize their economies. At the same time, they reaffirmed the need to develop agriculture as the main source of economic growth, promoting modernization and greater productive efficiency in that sector. It was also proposed that countries move toward regional and subregional integration in order to boost competitiveness and the region's share in the world market.

This substantial change in the region's approach to economic development required fundamental transformations in strategies and policies. They would be implemented in a context characterized by a world economy made up of interdependent economic blocs; local markets opening up to form part of the international economy; globalization of the world market; accelerated development of modern technologies; growing understanding of environmental concerns; and emergence of new organizational structures and managerial capabilities.

The Ninth ICMA did more than issue a statement; it called for the development of specific activities to implement the political consensus that had been achieved. To this end, it recommended that IICA, in collaboration with the countries of the region and other international organizations, formulate a Plan of Joint Action for Agricultural Reactivation in Latin America and the Caribbean (PLANLAC).

The PLANLAC strategy to reactivate the agricultural sector was based on the following key ideas: modernization of production and institutions to improve efficiency and competitiveness; equitable participation of low-income groups in the modernization process; and production flexibility and sustainability in order to improve the sector's ability to respond to changes, all of this taking into consideration natural resource conservation and environmental protection.

The commitments assumed in Ottawa by the countries, the actions initiated under the PLANLAC to promote agricultural modernization and the compelling need to move forward on regional and subregional integration, were reaffirmed as a valid strategy for boosting competitiveness and strengthening the region's position in the international market, in the Declaration of Madrid, which was issued at the Tenth ICMA in 1991.

The view of agriculture as a sector that subsidizes a protected industrial sector is definitely obsolete. The concept has evolved to consider that it is an expanded agricultural sector that will contribute to overall development, with the agro-industrial complex as the focal point for economic reactivation. Thus, the challenge for the 1990s is "adjustment with growth."

THE MODERNIZATION OF AGRICULTURE

In order to overcome the economic crisis and reverse their economic situation, the countries of the region will have to accomplish a great productive effort that efficiently taps both available resources and the comparative advantages of the region.

For agricultural growth to play an essential and strategic role in the structural transformation of the countries of the region, agricultural production will have to be modernized to boost efficiency and competitiveness. Accordingly, technological advancement will become the determining factor in economic and social development.

To date, the principal objective of technological development for agriculture has been to increase productivity, reduce the use of expensive inputs and make massive use of relatively less costly inputs. Agricultural production was modeled after the industrialized countries, which was based on mechanization and intensive use of petrochemicals - chemical paradigm- which ignored environmental impact.

Presently, technological innovations to increase supply for the internal market and/or to augment exportable surpluses of agroindustrial products must take into account the growing concern for environmental impact and natural resource conservation, both of which are essential parts of the sustainable agriculture equation in the international context.

This challenge arises at a time when the industrialized countries are making enormous advances in biotechnology, microelectronics, robotics and new materials, all of which are the basis of a new scientific and technological paradigm that will have a strong impact on agricultural production.

The opportunities and challenges of modernizing agriculture must be acted on immediately to prevent the region from lagging far behind in agricultural technology at the close of the century.

The task to find ways to narrow the gap between the region and the industrialized world exceeds national capabilities, making regional and subregional integration and cooperation a vital necessity. Interaction, in turn, is an outstanding opportunity to generate a critical mass of scientific knowledge, attract greater levels of investments, facilitate equal access to new knowledge and technologies, shore up the region's economic force, and, consequently, boost the competitiveness of the region's agricultural products in external markets.

ECONOMIC INTEGRATION AND TECHNOLOGICAL CHANGE

The process of economic integration currently under way is qualitatively different from that of the 1960s. The difference lies in the fact that the present economic situation is characterized by a progressively greater opening of local markets functioning within a globalized international economy giving rise to a growing interdependence of economic blocs.

New ideas for economic integration have emerged with force at the subregional level, which appears to be the most suitable level for coordinating actions to expand trade and strengthening positions in response to the challenges of the international market.

A good example of this was the creation of the Southern Common Market (MERCOSUR) in the Southern Cone. Steady progress toward integration resulted in the signing, by four countries, of the Treaty of Asunción, which calls for the coordination of macroeconomic and sectorial policies for opening up the economies of the signatory countries to form a regional market. The treaty also promises to have a positive impact on agricultural development in this region. In addition, establishment of the Advisory Council for Agricultural Cooperation in the Countries of the Southern Area (CONASUR), which is made up of the ministers of agriculture of the five Southern Cone countries, reaffirmed the political determination of the governments to change the structure of agricultural production and boost the competitiveness of the area's products and thus contribute to opening up external markets.

The opening of economies and the expansion of exportable goods should change the prevailing focus on local markets, earning for competitiveness a position of fundamental importance in the race to enter the international marketplace.

The countries of the region should not rely on the positions they have achieved in the international agricultural market on the basis of their natural resources. Today, competitiveness depends on other factors, especially technology.

This does not mean overlooking the comparative advantages derived from natural resources but rather improving on them. This will require giving technology a key place in the production process as the principal determinant of competitiveness.

Competitiveness appears, then, to be closely linked to the ability to incorporate new scientific and technological developments into production mechanisms, a process that can be particularly complex.

First, the capabilities of the countries in the region are limited and, as far as the technological revolution is concerned, they lag far behind. Moreover, the steady growth in the privatization of research is limiting the work of public institutions to areas and practices that are not appropriable. Indeed, the agricultural inputs industry plus private enterprise are making considerable headway in the development of innovations in biotechnology and microelectronics.

To these difficulties must be added the ever more pervasive practice in developed countries of securing property rights for research results, which effectively closes the door to the possibility of reproducing and adapting innovations to circumstances in developing countries. This makes it imperative for these countries to upgrade their capabilities to develop new technologies.

The barriers to the new agricultural technology paradigm make it necessary to restructure and modernize national institutions and broaden the process of reciprocal technical integration and cooperation in order to develop a regional system for science and technology.

To ensure the political viability of common markets, all members must have equitable access to technology, which is the true source of competitiveness that will allow the free expression of the different members' comparative advantages. Integrated, cooperative programs are central to a successful strategy to bring about a harmonized development of modern technological innovations.

At the same time, in order to guarantee a free expression of competitiveness in expanded markets, the governments must implement actions to level such factors as subsidies, salary levels, work conditions, and so on. They must also create incentives for innovating production by strengthening various services (information, training, organization of foreign trade, and administrative procedures, etc).

All of this demonstrates that economic integration and technological change in agriculture in the region are synergetic mutually reinforcing processes that should develop in tandem with similar timing.

MODERNIZATION OF THE NARIS

The institutional development strategy of the national agricultural research institutes (NARIs) has been basically to serve as technological converters; in other words, their task has been to adapt technologies generated in developed countries. The new context, however, obliges them to reorganize and modernize.

For its part, the private sector has been taking on an ever greater share of both research and development activities in the agricultural sector, due primarily to the impact of the new technological model which is based on innovations in biotechnology and micro-electronics. At the same time, the developed countries are adhering to an international system to protect intellectual and industrial property rights which limits the developing countries' possibilities of copying and adapting these innovations. Moreover, as the modern technological revolution shrinks the distance between basic research and technological modernization, universities and institutions of higher learning will become progressively more important in the technology development process.

While the NARIs are gradually losing their monopoly as suppliers of agricultural technology, their strategic role in information and technology-generating systems will keep them at the head of efforts to drive, broaden, and coordinate technological integration and cooperation among the countries of the region. However, this does not mean bypassing other public and private components of the national systems.

When considering institutional development of the NARIs, special attention should be given to the following: establishing ties with university-linked institutes for training high-level human resources and for research and development; developing new ways to work with the private sector and other funding sources for addressing the growing cost of research into new areas; engaging in strategic planning, institutional marketing, and marketing of technology and services; redesigning physical infrastructure and retraining human resources to adapt them to the new focus of technological change and investment possibilities.

In order to effectively perform their duties, NARIs will have to modernize, within the framework of cutbacks in government spending and general downsizing of the state apparatus. Technological integration and cooperation should be seen as useful tools for maintaining and contributing to institutional reform and to developing greater research capabilities.

In the Southern Cone, there is a relatively wide range of development among the NARIs, some having gained very broad experience over the years. They have had differing and enriching experiences with organizational models and institutional adaptations, new operating structures and modern approaches to linking the private and public components of national systems. All of this combined promises to result in fruitful exchange and progress through cooperation.

THE LINK BETWEEN REGIONAL TECHNOLOGICAL COOPERATION AND INTERNATIONAL ORGANIZATIONS

Several benefits can be obtained by linking regional integration and scientific and technological cooperation with the work of international organizations, one being the possibility of channeling support from the international scientific community to the countries and, in that way, better fitting international cooperation to national needs.

Technological innovations for the region's agricultural sector come from three main sources: the NARIs, multinational cooperation programs, and International Agricultural Research Institutes (IARIs).

The focus of the NARIs is mainly national strategies and capabilities. The IARIs, on the other hand, deal with topics and opportunities that national programs cannot address because of economic constraints or because the scope of the problem extends beyond national borders.

In addition, the IARIs provide information, methodological assistance and new materials, helping to strengthen national institutions and their human resources in efforts to accelerate the identification, generation, adaptation, and utilization of new technologies.

Multinational cooperation programs such as PROCISUR facilitate linkages between the IARIs and the NARIs of the region, without diverting them from their individual goals. They provide a mechanism for discussing problems and exchanging ideas on the regional priorities of the IARIs. Greater harmonization of national and regional goals and priorities is thus achieved, since together, NARIs can have a greater impact on IARIs priorities than they would individually. Similarly, the IARIs can articulate their support and advisory services with the cooperation and integration processes under way among the countries, thereby strengthening them. PROCISUR has played a part in both areas, especially with regard to the advisory services of the IARIs, primarily CIMMYT and CIAT in this region.

Another important aspect of the linkages with international organizations is administrative support. The assistance of an external organization with development capabilities at the international level for managing administrative operations is indispensable for the proper management and performance of the Program. This is not to disregard the important role the NARIs play, through their directors and specialists, in achieving goals. An external catalyst can be an appropriate complement to multinational action.

The steady progress made in consolidating and institutionalizing PROCISUR was made possible, in part, by the support of IICA, which has the operational and functional structure necessary for administering scientific and technological cooperation and integration efforts among the countries.

Another point that must be mentioned in any discussion of the advantages of working with international organizations is the securing of financial resources.

Current economic conditions in the countries of the region clearly show that the viability of cooperative efforts and the execution of joint development, harmonization and use of new technologies, is contingent on the support of external donors.

By and large, the resources of individual countries support the basic technical and administrative structures of central coordination and direction, which are required to ensure continuity and institutionalization of the system. International organizations and donor institutions must contribute to this effort of integration and cooperation among the countries by providing financial support for specific projects that target the aspirations of all the participating countries.

PROCISUR: ITS NEW PROPOSAL FOR TECHNOLOGICAL INTEGRATION

CORNERSTONE OF A NEW COOPERATION STRATEGY

The cornerstone of this new strategy for success in economic integration is that all national participants must have access to agricultural technology. In other words, equal access to knowledge and its physical manifestations must be ensured. This is one of the primary goals of integration and cooperation in the field of agricultural technology.

Integration, the modernization of agricultural production and the opening of economies at the regional level are not only to be pursued in developing a common economic policy; they are also mutually reinforcing and beneficial. To modernize production, economic and trade policies must promote an open economy. Economic opening, in turn, requires that production be modernized in the sector of the economy that offers the region's greatest competitive advantages in the world market. Similarly, economic opening depends on technology to boost competitiveness.

The question arises as to how countries and their respective institutions can work in cooperation in the area of technology while, at the same time, competing within a common market. One can wonder what benefits can be found in this apparent dichotomy between cooperation and competitiveness. The answer is that integration and technological cooperation should be structured in such a way as to create competitors in an expanded economic space that can compete with products from third markets and overcome the barriers to international trade.

Moreover, through the process of integration, the economies of participating countries acquire a certain degree of specialization by reducing economically inefficient processes which are sustained only by the protection afforded by national borders which, as true barriers, complicate trade and the exchange of knowledge.

Several factors support integration and reciprocal cooperation as a strategy for the development of scientific and technological abilities in the region, as opposed to one where the countries address these challenges individually.

The needs generated by efforts to modernize agricultural production envisaged as a shared strategy to promote economic growth require that the development of technological innovations occur in a broad field, involving coordination of actions and horizontal cooperation programs at the regional level.

The amount of investment necessary to keep up with the new technological revolution exceeds the financial capacity of most of the countries, reinforcing the need for cooperative actions at the supranational level. The material and human resources required for some modern technological innovations oblige even developed countries to address them within a framework of cooperation. Two such examples are the Eureka and Science programs in Europe.

Because of the economic situation in the region, governments cannot channel enough investments into research and development to reverse the present situation. To the contrary, the state will have to stimulate private investment in this activity, which will lead to the "quasi-privatization" of certain sectors of the NARIs.

Horizontal cooperation should enable national specialists to identify opportunities for economies of scale and for developing agreements for joint realization of cooperative research and development.

In conclusion, efforts to integrate national systems into an institutionalized regional system for agricultural research and development should continue. Such a system must create the minimum conditions necessary for facilitating equal access of participants to new technological and scientific developments, allowing national systems to assimilate modern technologies, adapt them to local conditions and disseminate them at the production level.

Under this approach, NARIs, universities, basic research institutes, and private business should make up the national systems, which will acquire specializations that reflect territorial conditions and the characteristics of agriculture in each country.

PROCISUR: OBJECTIVES AND SCOPE OF THE PROGRAM

We are presently in the process of institutionalizing the Program, in fulfillment of the final objective proposed during the previous stage. The cooperation agreement signed by the six countries of the Southern Cone and IICA, lays out the terms and means for establishing a permanent cooperative effort with sufficient flexibility for programming activities. While this has meant greater responsibility and commitments for the countries, it is something they have been willing to assume.

The **Cooperative Program for the Development of Agricultural Technology in the Southern Cone (PROCISUR)** was launched in March 1990 for an anticipated six years, with the possibility of extending it for another four years. The present Program differs in some respects from previous phases in that it is an institutionalized mechanism that involves annual financial contributions to provide for continuity of actions; it was restructured and new goals for the integration process, joint actions and expanded markets were added to reflect observations that arose during preparation of the agreement.

The objectives of the Program as established in its Charter, are as follows:

1. To support the joint actions of national agricultural research institutes of participating countries in order to increase the exchange of agricultural technology.

2. To promote reciprocal cooperation among participating countries, with a view to facilitating dissemination and maximum utilization of the technologies developed by individual countries, through the horizontal exchange of knowledge, experiences and genetic materials produced by agricultural research in the participating countries.

3. To identify new possibilities for integrated efforts, cooperative approaches, and/or joint actions among participating countries in order to make maximum use of available resources and search for solutions to common problems.

4. To cooperate in articulating the actions of national agricultural research institutes with those of international agricultural research centers.

5. To support the identification and transfer, from other countries in the world to the participating countries, of knowledge that can contribute to agricultural development.

6. To keep updated information on the organizational and functional situation of the agricultural research institutes in Southern Cone countries.

7. To identify, prepare and execute integrated co-operation projects, including studies that may serve as a foundation for the technological integration process.

PROCISUR's objectives have three dimensions: 1) a regional dimension territorial and geographical of six countries, which targets the largest agroecological zones; 2) a thematic dimension, which targets the study of agricultural production; and 3) an inter-institutional dimension, which pertains to relationships with the international scientific community.

Given the new context surrounding integration and cooperation for agricultural technology, PROCISUR's overall objective can be summarized as follows:

To meet the technology needs of its member countries, and the bloc as a whole, especially for improving the competitiveness of the agricultural and agroindustrial sectors, within the new framework of economic opening and regional integration.

PROCISUR's scope of action was expanded and strengthened with a recent decision by the Advisory Council for Agricultural Cooperation in the Countries of the Southern Area (CONASUR), which charged the Program with:

Coordinating the formulation of a region-wide strategy for technology development.

THE NEW APPROACH AND PRIORITY TOPICS

We are engaged in a process of transition toward a new technological paradigm that has already been consolidated. At the same time, changes are occurring at unprecedented speed throughout the world, resulting more from developments in countries and societies than from a planned and conscious process.

It is fitting, then, that the strategy pursued should emphasize flexibility rather adherence to predetermined topics and structures. Consequently, the technological integration and cooperation efforts that PROCISUR fosters in the region must be flexible in nature and consist of very concrete and specific activities, executed within certain deadlines, and organized on a case-by-case basis to address shared needs of general scope.

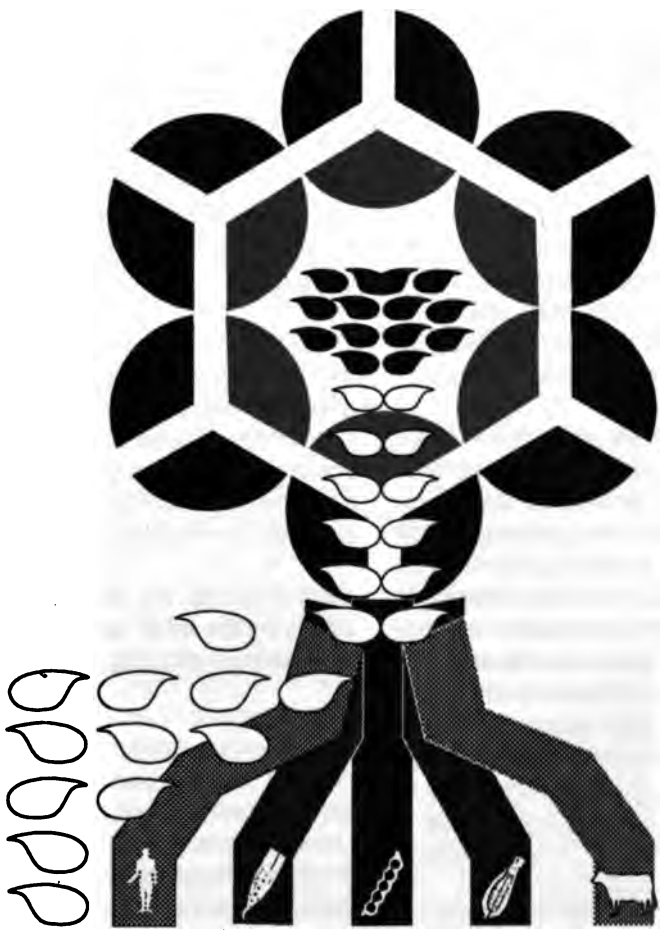
Flexibility should be ensured through projects that directly involve both public and private institutions in joint undertakings. The willingness of the NARIs to work with other public and private agencies in PROCISUR, through specific projects, will enhance the possibilities of success and the benefits of joint efforts.

The possibility should also exist for limited agreements between parties interested in working together for specific purposes.

The objective of cooperative and joint actions must be to build a common base of scientific and technological know-how that allows the region and each of the participating countries to access new forms of agricultural technology.

From the range of possibilities that can be approached, priority should be given to those that can be justified by the economies of scale achieved, since the investments needed are high and do not justify individual efforts by the countries. Another important criteria to be considered in selecting the topics should be that the scope of the topic transcends national borders.

The nature of modern technologies require that new cooperative research and development efforts be undertaken systemically addressing broader and more comprehensive concepts such as "sustainable agriculture," "biodiversity," "biological assets," "environmental preservation," "agroecology," and "agroindustrial complexes," as well as those related to biotechnology, which is the basis of the new technology model.



PROCISUR's current focus is not product-oriented, as it was in the past, but rather thematic. This facilitates a more accurate identification of opportunities for joint research, the possibility of addressing them in greater depth, and brings together national specialists with similar academic backgrounds and interests. Because PROCISUR is moving away from product-oriented cooperation, new thematic disciplines, including cooperative activities that have a strong impact on the development of scientific and technological capabilities at the regional level, will acquire a key role. Products will be addressed as part of the direct, applied research of the disciplines.

As a result of the change in PROCISUR's approach, the NARIs will also have to change, as they have traditionally structured and organized their research activities around specific products. The new disciplinary approach to cooperation and the adjustments the new framework demands modernization and institutional development.

In this new structure, PROCISUR's efforts now focus on the thematic areas of biotechnology, genetic resources, natural resources and agricultural sustainability, agroindustry, and institutional development, with priority being placed on the execution of joint research projects.

OPERATING STRUCTURE OF PROCISUR

PROCISUR's change in focus has required a period of adaptation since its activities used to be product-oriented, which changes under the new approach to being discipline-oriented. Despite this substantial change in focus, however, the operating structure will require only minor adjustments. Greater flexibility and a single, central structure for support, coordination and management will continue to characterize the Program.

According to the agreement establishing PROCISUR, it consists of two separate but highly interactive components: the basic structure and the projects.

The **Basic Structure** consists of the Board of Directors, the technical staff, and the administrative/secretarial structure.

The Board of Directors is PROCISUR's highest governing body, and is made up of NARIs authorities from participating countries and IICA. It directs, organizes and supervises Program execution, approving activities, budgets, reports and selecting and defining the tasks of the technical staff. Also participating in the meetings, but without the right to vote, are invited representatives of IDB, CIMMYT, CIAT, ISNAR, CIP, FAO, IDRC, etc. Regular meetings are held twice a year, with chairmanship being rotated among the countries.

The technical staff is made up of the Executive Secretary and two Support Specialists, all hired by IICA and stationed at PROCISUR headquarters, as well as the International Subprogram Coordinators and National Subprogram Coordinators, who are stationed in their respective countries.

The Executive Secretary, who also serves as Technical Secretary for the Board of Directors, directs, coordinates, and supervises the planning, implementation, and follow up of PROCISUR activities, and is responsible for the performance of the technical and administrative/secretarial staff.

The Support Specialists, collaborate directly with the Executive Secretary, and are responsible for the areas of institutional development and communications/document publication.

International Subprogram Coordinators are responsible for coordinating and monitoring Subprogram activities, and for finding new opportunities to expand actions in their respective areas.

National Subprogram Coordinators support the work of the International Subprogram Coordinators and provide information on the needs of their countries.

Projects are the basic units for planning and execution and address topics identified by the Subprograms. They are carried out for fixed periods of time, pursue specific objectives, and use funds provided by the countries or negotiated with donors, or are financed through a co-funding arrangement. Project execution involves Project Leaders, who are responsible for formulating and executing the project; National Specialists, who participate in activities; and International Consultants and Specialists from the IARIs, who provide advisory services.

Projects that receive external funding are structured according to the agreement reached with the donor, which must first be approved by the Board of Directors and IICA, and signed by the donor or donors, the NARIs, and the Director General of IICA.

PROGRAM STRUCTURE

BASIC STRUCTURE

TECHNICAL-ADMINISTRATIVE STRUCTURE

EXECUTIVE SECRETARY

SUPPORT SPECIALISTS

INTERNATIONAL SUBPROGRAM COORDINATORS

NATIONAL SUBPROGRAM COORDINATORS

ADMINISTRATIVE AND SECRETARIAL STAFF

PROJECTS BY SUBPROGRAM

TECHNICAL TEAM

PROJECT LEADERS

NATIONAL SPECIALISTS

SPECIALISTS FROM INTERNATIONAL CENTERS

INTERNATIONAL CONSULTANTS

ACTIVITIES

RECIPROCAL TECHNICAL COOPERATION

INTERNATIONAL ADVISORY SERVICES

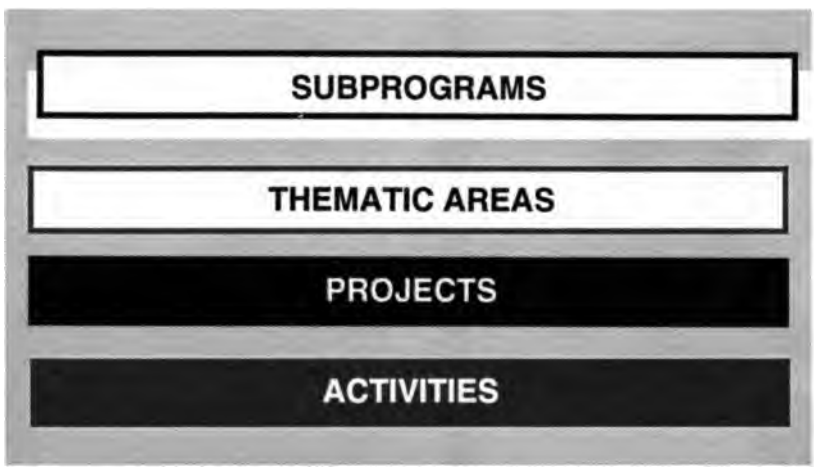
TRAINING

STUDIES AND ANALYSES

JOINT RESEARCH

PLANNING AND MONITORING OF ACTIVITIES

The hierarchy used by PROCISUR for planning and monitoring activities is the following:



In line with the concept of flexibility, the number of Subprograms being implemented by PROCISUR can vary at any given time, depending on the number of topics it wishes to address. Presently, there are five Subprograms:

- ✓ Biotechnology
- ✓ Genetic resources
- ✓ Natural resources and agricultural sustainability
- ✓ Institutional development
- ✓ Agroindustry

Although agroindustry has been identified as a priority by the Board of Directors, analysis of the framework for identifying the thematic areas for cooperation has not yet taken place. This will require the participation of other national institutions working with agroindustry, since the NARIs have dealt with the topic in only individual and isolated instances.

The other Subprograms have identified and organized by degree of priority the work of their respective areas, which is discussed in greater detail later on in this document. This work serves as a framework and orientation for formulating cooperative projects.

Projects include, as necessary, the following activities:

- **Reciprocal technical cooperation** (meetings, seminars, national advisory services, and observation visits).
- **International advisory services** (international consultants and experts from international centers or other specialized organizations).
- **Training** (short courses, applied or in-service training, training at specialized institutions).
- **Studies and analyses**, to provide updated information on the situation of the agricultural sector and, especially, on organizations involved in technology generation and transfer in participating countries and others that can contribute to technological integration.
- **Joint research**, for carrying out research by multinational teams, the results and achievements of which are of interest to participating countries and which contribute to scientific and technological development in the region.

Projects can include any or all of these activities; PROCISUR, however, intends to emphasize joint research, and studies and analysis. Technical cooperation and training, which were successful in earlier phases of the Program and which helped it evolve to its present maturity, will be used to encourage the first contacts with national specialists involved in the new thematic areas of the Subprograms.

PROCISUR now intends to move beyond the exchange of knowledge and technology, training and skills development to the upgrading of institutions and staff. As an institutionalized entity, the Program can now promote integration through joint efforts. This means that countries will advance in the same direction and work toward specific goals, in a reciprocal relationship in which each offers its knowledge and resources. Without neglecting the specific needs of their country, all participants will contribute the best of their expertise to the group. In contrast to technical cooperation activities (meetings, seminars, exchanges), in which transfer of knowledge (a donor-recipient relationship) is the goal, joint research involves building a new reality simultaneously in the different countries, providing, in general terms, equal benefits. Joint efforts are a fitting means of providing participating countries with equal access to technology, which has been, and still is, a goal in itself for PROCISUR.

Projects designed by national specialists will address the subject areas established for each Subprogram, which are selected during coordination and planning meetings, when ideas are exchanged between International Subprogram Coordinators and Specialists invited by the Program because of their particular expertise.

The Executive Secretariat draws up specific guidelines which are to be followed during project formulation. The proposals are first presented to the International Subprogram Coordinator, who submits them for review during the coordination and planning meetings, which ensures project viability. (In these meetings, the group actually serves as a technical committee.) Recommendations of this committee are presented to the Executive Secretariat and after a technical and financial review, they are submitted to the Board of Directors for final consideration and approval.

Besides addressing the project's technical and methodological aspects, the coordination and planning meetings take special care to ensure that the proposal addresses the interests of all PROCISUR member countries even though direct participation by all is not required. Upholding the essentially cooperative spirit of the Program, the anticipated results of all projects must benefit all the countries.

As a general rule, all necessary activities, except those related to coordination (i.e., planning, follow-up and evaluation) should be contained in a project. This ensures appropriate regulation and annual assignment of financial resources, as well as follow-up and objective evaluation of intermediate and final results.

Each project is implemented under the direction of a technical Leader, who, besides participating directly in project activities, coordinates the actions of participating specialists and serves as liaison with the Executive Secretariat and the International Subprogram Coordinator for the purposes of annual planning and any adjustments required during implementation. The International Subprogram Coordinators are responsible for overseeing all Projects in their respective Subprogram and monitoring, with the help of the National Subprogram coordinators, the actions planned and approved annually by the Board of Directors.

The technical structure for planning and following up on general actions and for implementing the specific activities of each project at PROCISUR is described in the next page.

It is worth recalling that, in pursuit of flexibility, the tendency at PROCISUR is to develop a structure that is not too rigid or heavy. The goal is to progressively upgrade the role of Project Leaders, who are directly responsible for the cooperative actions of each project. National Coordinators would concentrate mainly on Project analysis and selection, and would explore new opportunities and harmonize them with the requirements of the countries.

The Executive Secretariat is currently committed to developing a planning, follow-up and evaluation system that maximizes efficiency at every level for adjusting the mechanisms used thus far to the changes made in the organizational structure and functions of PROCISUR. The basic procedures were described above for informational purposes only.

ADMINISTRATION AND FUNDING

IICA is an international organization with offices in all the countries of the region and outside it, and has very close ties with all of them. For this reason, the administration of PROCISUR by IICA facilitates PROCISUR's activities in two ways: first, it provides PROCISUR with the necessary mechanisms for efficiently carrying out multinational activities; second, it brings PROCISUR into an international network that can expand the possibilities of relationships with other organizations.

Besides a strictly administrative role, IICA also provides important technical support through its Program II: Technology Generation and Transfer, as well as through the contributions of representatives and technicians from different countries, especially at PROCISUR headquarters in Uruguay.

The Program is funded by the quotas of the six participating countries and IICA, which ensures the execution of the activities of PROCISUR's basic structure, preinvestment activities and specific projects under each Subprogram.

However, given the scale of investment required for developing innovations that will make agriculture competitive in the region, this funding system is insufficient for addressing topics with the breadth and depth necessary to enter the new technological paradigm as equals.

Due to the countries' present economic constraints, it is unlikely that their quotas can be increased. Therefore, complementary funds must be obtained from external donors in order to enable PROCISUR to carry out specific multinational projects, activities of crucial importance to the process of integration and the cooperation initiated by the participating countries.

FOCUS AND OBJECTIVES OF THE SUBPROGRAMS

In order to define the actions to be carried out by the Subprograms approved by the Board of Directors, the Executive Secretariat prepared, with the help of technical groups in the participating countries and coordinated by a high-level specialist from the NARIs, framework documents for each Subprogram. A brief summary of the focus and objectives of each follows, indicating the central issues that PROCISUR will address in the immediate future.

BIOTECHNOLOGY

Biotechnology consists of the information, applications, methods, and techniques that make it possible to modify, reproduce and accelerate processes in living organisms through the manipulation of genetic materials. This process makes possible the private appropriation of genetic materials and the technologies used for planned reproduction and modification of organisms. As a result, national and transnational private industries have become active in this area, having a growing influence on the development of production and on technical innovations in the region.

Agrobiotechnologies have become a useful tool for solving agricultural problems worldwide. The new techniques originated in experimental molecular and cellular biology, and have grown at a spiralling rate since DNA manipulation and sequencing techniques were developed.

Development in the area of biotechnology has occurred at different rates in different countries. The central focus of the strategy is to foster cooperation among the countries in order to strengthen skills through human resource training, tackling common problems, and complementing existing infrastructure.

In the early 1980s, research in molecular biology and genetic engineering made it possible to introduce foreign genes into plants. It is presently expected that a significant amount of transgenic plant products will soon be released into the environment, which is expected to have an important impact on trade and the world economy.

In view of the fact that the release of transgenic materials is earning widespread approval, it is important for developing countries to have biosafety regulations that ensure the harmless nature of these products so that they do not become testing grounds for risky materials.

Although the establishment of regulations to govern the release into the environment of genetically modified organisms is a biological issue, political considerations are also involved. The Southern Cone countries have little experience in this area and therefore, the development of mechanisms for cooperation and consultation among the governments is imperative for harmonizing the development of biosafety regulations in the region.

Envisaging cooperation as a means of upgrading the region's technological capabilities brings us to consider the issue of competition among countries. Subprogram proposals emphasize the development and execution of joint projects to address specific areas of precompetitive technologies seeking facilitate cooperative agreements, while allowing fair competition among specific products. The aim is for cooperative development of technologies in the region to provide competitive advantages that can be used by all the Southern Cone countries.

With this in mind, proposed goals for the area of biotechnology are as follows:

General objectives

- To strengthen the technological capabilities of PROCISUR countries to use the biotechnologies they consider suitable for their agricultural development.
- To harmonize existing differences in application of various biotechnologies.
- To guarantee the access of all countries of the region to available technologies, through horizontal technological exchange and interdisciplinary training programs.

Specific objectives

- To upgrade the scientific and technological capabilities of the region's NARIs to solve problems and overcome production limitations in the agricultural sector through the use of suitable biotechnologies.
- To establish technical cooperation projects that focus on cell and tissue culture, genomic genetics, and genetic engineering, for crops and animal species of importance to production in the region's agrosystems.
- To monitor and evaluate the applicability of agricultural biotechnologies in the region and worldwide, seeking to disseminate and exchange information among researchers from the participating countries.
- To promote and disseminate data and new technologies generated by individual countries or through multilateral joint research projects, via direct or remote consultation of regional databases on agrobiotechnologies.
- To promote the implementation of an Agricultural Biotechnology Information System (SIBA) to facilitate access of different users (researchers, producers, businessmen) to the entirety of biotechnologies available in the region, allowing the consolidation of joint research, technology transfer and training of the biotechnology Subprogram.

Priority subject areas

A study was carried out on the scientific methodologies in use at the NARIs of the region in order to better design cooperative actions. Four subject frequently addressed with these methodologies for solving problems related to animal and plant production were identified and selected to reflect the degree of development of the different techniques used in the region.

The fields of interest are listed below:

- *In vitro cell and tissue culture.*
  - Genetic improvement of plants.
  - Production of propagation materials.
  - Conservation and exchange of germ plasm.
  - Production of secondary metabolites.
- *Genomic genetics.*
  - Molecular markers for genetic improvement of plants.
  - Diagnosis of pathogens.
  - Molecular characterization of germ plasm.
- Genetic engineering.
  - Transgenesis for genetic improvement.
  - Protein engineering.
  - Genetically modified micro-organisms.
- *Animal biotechnology.*
  - Diagnosis of pathogens.
  - Molecular markers for genetic improvement.
  - Advanced reproduction techniques.

GENETIC RESOURCES

The Southern Cone has a wide diversity of ecosystems ranging from deserts to humid subtropical forests, which contain a wide variety of genetic resources. At the same time, in that region, subsistence agriculture exists side-by-side with extensive modern operations that supply inter-and extraregional markets.

In this context, it has become increasingly important to invest in basic and applied research on agricultural products, with the aim of improving quality, reintroducing abandoned crops and domesticating new species, in this way increasing the range of biological resources people can depend on for subsistence.

Each country in the region has native or introduced genetic capital that has been improved genetically to varying degrees, and from which numerous valuable species have been diversified and bred. The exchange of germ plasm and information, therefore, is useful for promoting genetic improvement in the countries of the Southern Cone. PROCISUR has acquired a wealth of experience in this area through the development of regional evaluation networks, which have had a great impact on breeding programs and spurred the process of germ plasm exchange.

The extension of agricultural frontiers to the region's fragile ecosystems, combined with the technological model of the past that intensified use of petro-chemicals and mechanization, has resulted in environmental degradation and a loss of plant populations and species. This trend is only expected to grow in the years to come. If countries do not take action to reverse this situation, the biological variety of the ecosystems in the region could be irrevocably lost. To address this situation, biodiversity programs that aim to conserve genetic resources will be developed.

This situation, and the fact that the Southern Cone is a source of diverse valuable species, provide a meaningful framework for implementing, through PROCISUR, joint actions at the regional level to protect our genetic resources. The aim is to strengthen and expand the research structures that work to conserve genetic diversity.

Another relevant area for cooperative work with genetic resources is the formulation of legislation and regulations to govern the exchange of germ plasm in the region and ensure its sanitary condition. The importance of this is underscored by the recognition of ownership rights and economic value of genetic materials with commercial potential. A first step in this direction was the approval, by PROCISUR's Board of Directors, of a code of ethics concerning the exchange of germ plasm. The rights of the donor and the obligations of the recipient are outlined therein.

Moreover, work in this area is related to the issue of agricultural sustainability, since the possibility of establishing a sustainable agriculture with a greater diversity of better crops, uncontaminated by the indiscriminate use of agrochemicals, will depend on the germ plasm available. This will constitute the main competitive advantage of the region, as well as its principal challenge.

The objectives proposed for the Genetic Resources Subprogram are as follows:

General objectives

- To generate, through joint action, a regional policy on genetic resources to ensure their availability for present and future research.
- To strengthen national gene banks, both to fulfill their specific functions as such and to support national breeding and technology programs.
- To improve the terms of trade and use of germ plasm, promoting a better understanding of the utility of the genetic material.
- To support the harmonization of national legislation to foster the exchange of genetic resources.
- To train and upgrade human resources.

Specific objectives

- To collect species and populations, etc., the priority of which will be based on the following factors:
  - Genetic erosion of the conserved material.
  - Old collections of germ plasm in a poor state of conservation.
  - Abandonment of cultivation and/or disuse of indigenous varieties and/or original crops (due to rural migration or substitution of original crops with modern ones).
  - Areas not yet surveyed or not sufficiently explored for development of a taxonomy.
  - Species in danger of extinction.
  - Destruction of natural habitats where great biodiversity exists (due to overgrazing, highway infrastructure, incorporation of new areas into agricultural use, and modification of vegetation resulting from constructions such as urban developments or dams).
- To develop appropriate techniques for in situ conservation of genetic resources, such as cryoconservation, in order to reduce germ plasm loss and the cost of conservation.

- To characterize and select genetic resources.

- To develop networks of data bases for the publication of: 1) catalogs of germ plasm, 2) lists of useful species (agrochemical, pharmacological, and/or in danger of extinction), and 3) maps of vegetation.

- To train and upgrade human resources in the national institutions.

- To characterize genetic resources both in agronomic (quality, resistance to disease, yield, etc.) and botanical (taxonomic identification) terms.

Priority subject areas

- Evaluation of germ plasm.
  - Wheat.
  - Forages.
  - Soy.
  - Rice.
  - Peanuts.
- Conservation of germ plasm.
  - Seeds.
  - Cryoconservation of plant species.
  - Cryoconservation of semen and embryos from native cattle stock.
  - Organization of data bases.
- Collection of germ plasm.

NATURAL RESOURCES AND AGRICULTURAL SUSTAINABILITY

The main challenges faced by the countries of the region this decade are long-term maintenance of production capabilities in the agricultural sector and environmental conservation.

It has been estimated that there are sufficient natural resources in the world to meet human demand, but that there is a problem of unequal distribution relative to population. This means that in some areas demand surpasses availability, which can result in an overexploitation of a region's production capability, frequently giving rise to grave environmental problems.

Soil overuse and the destruction of forest resources are problems that have a clear biophysical dimension, but their origins, and thus their solutions, are not to be found at that level. In most cases, they are the result of incentive programs or the pressure of growing populations that are obliged to eke out a living in areas considered unsuitable for agricultural production, where problems of degradation are very common and occur very rapidly.

The Southern Cone has ample forested areas that have suffered severely from an indiscriminate felling of trees, a trend which has intensified in recent decades. The expansion of farming areas has also produced widespread deforestation, even in areas unsuitable for agricultural production. Frequently, this process continues with an uncontrolled exploitation or abandonment of the land, under conditions that do not favor recovery. The end result, even greater loss of production potential, erosion, and flooding of watercourses. These problems are often the consequence of development policies that encourage the transformation of new areas for agricultural or livestock activity.

The current emphasis on economic growth, as the basis of the development model, is at the root of the problem of sustainability of agricultural development. Institutional innovations are needed that will allow for a correct appraisal of the value of natural resources and that lay the foundations for decisions related to their use in each country.

The growing awareness of this problem should lead to the development of criteria and methods for making sustainable production possible, first by assessing the production capacity of natural resources in different ecosystems, and then by adapting these criteria and methods to the different agro-socioeconomic conditions of each subregion.

In general, actions that negatively affect the environment are not subject to adequate control. Not one country in the region has implemented an ambitious program to protect the environment. It is only very recently that the first, but not very aggressive, signals of change are being detected.

Financial constraints, as evidenced in a lack of investment in public institutions and shortcomings in training and educational systems, among others, are at the root of environmental destruction. The need to always produce more, pushes agricultural activities to their spatial, temporal and technical limits, and the consequences of these processes are often not well understood.

The total area of the Southern Cone countries is some 13.7 million square kilometers. Although this entire territory could be targeted by the Subprogram, operational aspects and the availability of resources made it necessary to select some specific areas for special attention, based on the following criteria: (a) level of common interest; (b) preliminary signs of environmental problems relevant to agricultural sustainability and indirectly to the rural and urban populations inhabiting these regions, established in earlier studies; (c) existence of agricultural development programs and/or research projects that address natural resources; and (d) level of institutional, technological and human resource development in the selected areas; this can include national border areas.

Based on this information, the Subprogram proposal directly targets an area of approximately 3.7 million square kilometers, which was classified into 10 ecosystems and 22 different agroecosystems.

Subprogram activities aim to help maintain the production capacity of the agricultural areas over time, reducing the undesirable impact of factors that cause damage to the environment. The objective of Subprogram initiatives is to upgrade the countries' operational, technical and scientific capabilities for detecting, identifying and quantifying the types of damage caused during the agricultural production process. Another objective is to develop and coordinate the activities of projects that deal with the conservation, recovery and appropriate utilization of natural resources. It will also foster the correction of distortions that give rise to environmental damage, through changes in the structures and systems of agricultural production.

The rationale behind the sequence of actions of this Subprogram is as follows. First, capabilities must be upgraded in each country for working with their particular agroecosystems in a way that is compatible with current conditions and takes into account the priority problems of each. Next, technical and material capabilities must be structured and organized to allow for joint efforts to address the more serious problems of sustainability.

In order to learn about and measure the overall progress of both national activities and the subprogram, a system for monitoring technical and scientific activities will be implemented in each country for evaluating their impact in social and environmental areas.

The general and specific objectives of the Subprogram are described below:

General objective

- To promote the implementation of actions in the Southern Cone that will improve the management and conservation of natural resources and foster technological and institutional changes with a view to ensuring the satisfaction of human needs at present and in future generations.

Specific goals

- To develop technical training in accordance with present needs for addressing the problems of sustainability.
- To strengthen institutions' capabilities to formulate policies and programs for the development, adaptation and application of new technologies that will contribute to environmental conservation.
- To identify, quantify and monitor present and potential problems of environmental deterioration.
- To foster the integration of regional capabilities.
- To coordinate proposals for integrated research and implementation of environmentally sound technologies.

Priority subject areas

- Environmental monitoring.
  - Systematization of information.
  - Indicators of sustainability.
  - Land use planning.
- Soil management.
  - Crop rotation.
  - Biological fertilization.
  - Minimum tillage techniques.
- Integrated pest management.
  - Phytosanitary control/ biological agents.
  - Phytosanitary control/ management of agricultural systems.
- Ecosystem management.
  - Recovery of degraded areas.
  - Management of native species with economic potential.

INSTITUTIONAL DEVELOPMENT

From the point of view of their legal standing, the NARIs of the Southern Cone range from state organizations to private organizations with state participation. This makes them highly diverse as far as their conceptualization, development and policy formulation is concerned, as well as in the way they are organized for operations.

PROCISUR's present institutional setting, its new responsibilities (expanded in response to the regional integration process) and the new technological model, form a suitable setting for discussing and exchanging ideas on the institutional reforms needed at the participating NARIs and for promoting integration among public and private technological institutions and universities.

Funding cutbacks in recent years have forced the NARIs to develop strategies for expanding their financial base by marketing their products. This will require the design of new mechanisms for linking the NARIs with clients, users and beneficiaries, and for incorporating modern marketing techniques and improving managerial capabilities.

The enormous changes in technology occurring worldwide that have an impact on the production and marketing of agricultural products have created the need for an organizational process within the NARIs for establishing better ties with their surroundings, identifying opportunities and risks, and defining possible alternative scenarios for framing institutional action in the future.

The purpose of this Subprogram is to promote institutional consolidation and modernization within the present context of open economies and economic integration, and to harmonize national and subregional capabilities to generate and exchange agricultural technology.

Its general and specific objectives are:

General objectives

- To support the modernization and harmonization of policies for technical change, innovation and strengthening of agricultural research and technology transfer institutions.
- To promote modernization and prospective planning of the cooperation mechanisms existing in this field, both in individual countries and at the regional level, by generating and disseminating a new type of institutional strategic thinking, and by providing technical assistance for applying it to institutional processes that require it.

Specific objectives

- To develop proposals for research and technology transfer policies.
- To prepare proposals on modernization and institutional development, including assistance for implementing strategies and related operational mechanisms.
- To develop inventories of policies, institutional capabilities and operational mechanisms, as well as analytical tools of use to the Subprogram.
- To prepare studies, analyses and materials on strategic topics associated with the institutional context of agricultural technology.
- To hold discussion forums, training workshops and other activities for the dissemination, validation, harmonization, and promotion of exchanges about progress being made to address institutional reform in the technological area.
- To selectively and strategically assist in specific instances of adjustment, reform or re-engineering of national institutions, or of national mechanisms associated with the aforementioned processes.

Priority subject areas

- Planning.
  - Strategic planning.
  - Development of project strategies.
- Human resources.
  - Management skills development.
- Organization, structure, and modernization.
  - Decentralization.
- Funding.
  - Development of internal resources: marketing of technologies, services, and products.

AGROINDUSTRY

Under a shared region-wide strategy reaffirmed on the occasion of the Tenth Inter-American Conference of Ministers of Agriculture (Madrid, 1991), which envisaged agriculture as an "expanded agricultural sector," economic growth of the agricultural sector is considered the motor force for general economic reactivation in the Latin American and Caribbean countries.

The modernization of agriculture, as part of a broad and modern complex of agroindustrial systems, views agricultural products as the raw materials needed to supply transformation processes.

While the NARIs will continue to focus on developing technologies for solving production problems in rural areas, the growing economic importance of agroindustrial systems will stimulate a growing demand for new technologies for that field. NARIs will therefore have to consider the needs of industry, especially as regards the quality of raw materials and certain processing technologies which are closely tied to the characteristics of the production process.

Bearing in mind the extremely broad range of agroindustry, the actions of this Subprogram will focus on nontraditional products, especially foods. Priority will be given according to their importance on the regional market, and on their potential in third markets with the greater value added.

The subprogram will strive to link NARIs with those agroindustrial chains that can contribute the most to economic reactivation in the region, and to ensure that research related to food production addresses the issue of the technology of industrial processes.

The first challenge of the Subprogram will be to identify common areas of interest among the NARIs, food technology institutes and the agroindustrial sector, specifying subject areas that would be used for developing fruitful reciprocal intersectoral cooperation within the framework of PROCISUR.

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FECHA DE DEVOLUCION

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E14-51

Autor

PROCISUR. Strengthening and
Título expanding a permanente
regional system for technological

Fecha Devolución | Nombre del solicitante

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