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Report on
The First International Meeting of National
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and
The Second IFARD Global Convention

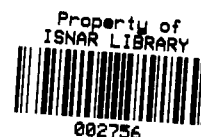
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THE IMPACT OF RESEARCH ON NATIONAL AGRICULTURAL DEVELOPMENT

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IFARD, International Federation of Agricultural Research
Systems for Development

ISNAR, International Service for National Agricultural
Research

CTA, Technical Center for Agricultural and Rural
Cooperation

EMBRAPA, Empresa Brasileira de Pesquisa Agropecuária

COOPERATIVE ACTIVITY AND EFFICIENCY IN AGRICULTURAL RESEARCH

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Introduction

There is a clear agreement nowadays regarding the great importance of agricultural research in the broad process of economic and social development. Nevertheless, two major problems still exist: the scarcity of resources (which is inherent in under-development), and a current trend (in the opinion of many authorities) to give lower priority to agricultural research in the allocation of financial resources.

In the 1980s there has been a tremendous increase in investment for research development, and especially for agricultural research. An ISNAR study has indicated that in a group of 51 developing countries investment in agricultural research increased by 0.3% of the agricultural GDP (AGDP) in 1975 to 0.56% in 1980. For a large number of the less-developed countries, this represented, over the same period, an annual rate of growth in operational funds and personnel, of over 10% (Oram and Bindlish, 1981).

Here, in Brazil, studies by EMBRAPA have indicated that agricultural research investment has reached a level of 1.0% of the AGDP (Da Cruz, Rodrigues et al., 1982). Brazil has thus reached an intermediate position in the international ranking of agricultural research expenditure, which varies from 1.48% AGDP in countries with a per capita income of \$ 1,750 per annum to 0.62% in countries with only \$ 100 p.a. (Evenson, 1981).

Unfortunately, more recent data (Trigo, 1986) show that in Latin America and the Caribbean the growth in agricultural research of the last quarter century, and especially the tendencies observed up to the mid 1970s, has not been maintained. Today we find a stagnating situation in which budgetary support can no longer meet

the demands made on it, resulting in a real decrease in the operational capacity of agricultural research.

Even taking the most optimistic view and hoping that the worst of the crisis in Latin America and the Caribbean can be overcome, and even with an expectation that the wisdom of politicians and government officials might initiate a reversal of the downward trend in research financing, real shortage of resources will continue, and research will still have to compete for funds and resources with other high-priority services such as health, housing, education, and agrarian reform.

Consequently, as and when increased investment is dedicated to agricultural research, to a level more in keeping with its role in development, we must remember that its efficiency must also be improved.

Research organizations must be very efficient and must clearly show the value of their work. There is an old proverb which says, "it is not sufficient just to be, one must be seen to be, and must also be able to prove it." It is not sufficient that research agencies are themselves aware of their efficiency. They must be able to prove, with facts and figures, that they are adequately repaying the society which maintains them.

The social return to research is determined by the relation between its cost to society and the value of its output, expressed as benefits to society. Thus, any option which presents a possibility of increasing benefits, at relatively lower cost, will provide a contribution to the growing efficiency in the performance of the research institution. This is, without doubt, the option offered by cooperation between research agencies in developing countries.

Cooperative Action

This paper will deal more specifically with cooperative activities in the fields of transfer of technology and the integration of research services for combined operations. That is, reciprocal cooperation in the exchange of experiences, knowledge and genetic resources; mutual assistance; cooperative working and joint activities of those institutions in the countries of the region whose role is in agricultural technology and, more specifically, in agricultural research.

In Latin America and the Caribbean, many institutions have, over the years, made various approaches to reciprocal cooperation and joint research. This is true of traditional international agencies, international research centers, and networks, as well as various cooperative programs. IICA, the Inter-American Institute for Agricultural Cooperation, has itself been dedicated to promotion of cooperation and joint efforts for many years. More recently, PROCISUR, which is a cooperative program for agricultural research in the southern cone countries, has also been very successful.

I refer specifically to this program because of all the cooperative programs that have been going on over the last few years, this program has been most regular in its efforts, it is institutionally better structured, its cooperation with research institutions in the different countries is at a higher level, it has received significant external funding, especially from the BID, it receives continuous support from CIAT and CIMMYT, constant budgetary and administrative support from IICA, and it has carried out an impressive number of activities.

PROCISUR is undoubtedly a program which can at present be considered to demonstrate the best aspects of reciprocal cooperation, mutual aid, integrated action and joint programming, and to be a favorable model of the fundamental theories of networking.

PROCISUR succeeded the program IICA/Conosur/BID, which existed from 1980-1983. The present phase – consolidation – has been developing since 1984 and is expected to run for five years, until 1989. It is based on an agreement signed by the governments of Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay, IICA and BID. The program is financed by BID, IICA and participating countries. In its last year it is foreseen that an increased contribution from the member countries will replace the share of BID. IICA, in addition to its role as a donor, also acts as the administrative agency, utilizing its offices in the member countries, especially that in Uruguay, which provides the headquarters.

The ultimate objective of the program is to institutionalize in the member countries a permanent system of support and coordination for mutual assistance and the exchange of knowledge related to agricultural research, through joint cooperative activities.

The program strategy is guided by an Executive Board, composed of the research directors of the six countries of the Conosur. Technical and administrative management is in the charge of a Director, who also acts as Technical Secretary of the Executive Board.

There are four commodity sub-programs within the program, for summer cereals, winter cereals, oilseeds and cattle. These sub-programs, under the general management of the Director, are run by International Coordinators who have their headquarters in Argentina (summer cereals and cattle) and Brazil (winter cereals and oilseeds). Each member country appoints a National Coordinator as appropriate. In addition to the commodity sub-programs, there are four technical assistance sub-programs on Production Systems, Information and Documentation, Technology Transfer and Training, and Communication. The sub-programs Production Systems and Communications are coordinated by international technical assistance personnel, Information and Documentation by EMBRAPA, Brazil and Technology Transfer and Training by INTA, Argentina.

Activities foreseen as leading to achievement of the objectives of PROCISUR are divided into three main groups:

- a) Reciprocal Cooperation – Reunions of sub-program coordinators, annual coordination meetings, technical meetings, seminars and professional exchanges, of which there are three types, national consultancies, observers and participants in congresses and other events.
- b) International Consultancies – Contracts with international consultants and specialist consultants from the IARCs (CIAT & CIMMYT).
- c) Training – This includes short courses, in-service training, training in specialized institutions and postgraduate fellowships.

Financial assistance is also given for the exchange of genetic resources, bibliographic material, certain equipment and maintenance costs, administration and publications, and secretarial assistance.

The Executive Board meets twice a year to review ongoing programs and approve amendments in the current annual plan deemed necessary to better achieve the objectives.

In its first phase, and subsequently, PROCISUR has carried out a considerable number of activities which have forged an instrument for the exchange of information, experience and materials; furthermore, it has given an insight into the requirements for joint programming, operational coordination and cooperative activities. Examples which may be cited include the cooperative selection of maize from among the outstanding national varieties; in wheat, the work of LACOS -- advanced wheat lines from Conosur, ELAR -- the Latin American Rust Trials and ECROS -- Yield Trials of the Conosur; in soya, the exchange of germplasm; in cattle, joint studies to establish the criteria for race evaluation and mating systems, for the collation of information on efficient and profitable management, for the evaluation of sown and natural pastures, and more recently, for the evaluation of temperate-climate pastures; regional-level integration through the promotion of a Regional Plan for Information & Documentation; research manpower development; distribution in the region of details on the utilization of different approaches to research and technology transfer systems, and more.

The importance of the program in strengthening the linkages between national research systems and the IARCs (CIMMYT and CIAT) must also be pointed out. The active participation of IARC specialists has proved to be a major strength of the program, leading to much of its success.

Finally, both as an illustration of the activities undertaken and to demonstrate an important result of its work, the program has issued the following publications in Spanish:

- DIALOGO I – Las Relaciones entre Centros Internacionales de Investigación Agrícolas e Instituciones Nacionales de Investigación Agropecuaria de los Países del Cono Sur.
- DIALOGO II – Seminario sobre Políticas de Adiestramiento de Personal.
- DIALOGO III – Seminario sobre Sistemas en Investigación Agropecuaria.

- DIALOGO IV – Seminario Internacional sobre Generación de Información y Cambio Tecnológico en la Agricultura.
- DIALOGO V – Reunión Técnica sobre Persistencia de Pasturas Mejoradas.
- DIALOGO VI – Seminario sobre Tecnología de Trigo.
- DIALOGO VII – Reuniones sobre Políticas de Adiestramiento de Personal para la Investigación Agropecuaria.
- DIALOGO VIII – Directorio Regional de los Recursos Humanos e Institucionales Involucrados en los Proyectos del Programa IICA-Cono Sur/BID.
- DIALOGO IX – III Reuniao de Melhoristas de Trigo do Cone Sul.
- DIALOGO X – Reunión Técnica sobre Manejo de Pasturas Cultivadas y Suplementación para Producción Lechera.
- DIALOGO XI – Seminario sobre Tecnología para el Incremento de la Tasa Reproductiva de los Rodeos.
- DIALOGO XII – Reunión de Especialistas en Avena, Cebada y Triticale en el Cono Sur.
- DIALOGO XIII – Royas de Cereales de Invierno.
- DIALOGO XIV – Tipificación de Sistemas de Producción.

More details about the characteristics and functioning of this program can be found in the document PROCISUR – 1984, Ed. Gastal. Nevertheless, it is important to point out that in reality we are talking about a set of activities in technical cooperation in which each sub-program carries out activities which are similar to those carried out by networks. Some have a single activity such as Information/Documentation; Production Systems and Communication, while the sub-programs in commodities coordinate networks in various crops; in summer grains such as corn, sorghum and rice; in winter grains such as wheat, oats, barley and triticale; in oil seeds, soybeans, rape, peanuts and sunflowers; in milk and beef production; and finally, two networks in the sub-program, technology transfer and training. This form of organization and management of the cooperative thrusts, apart from consuming more prolonged and integrated action, has the advantage of approaching the optimum in terms of economy of scale, using as it does a single structure for assistance, management and coordination, under the catalyst administration of the management committee.

The Programming System is guided by the provisions of the international agreement, by BID and IICA, and is supported by the national and international coordinators.

Ensuring the Efficiency of Research

There is no doubt that we can take advantage of knowledge generated by other countries and regions and that this can constitute a valuable contribution to the efforts of our countries to keep up with the state of the art in technology. According to Venezian, horizontal cooperation programs "reinforce each country's research, incorporate elements of external technical assistance, they facilitate the exchange of people and knowledge among countries, and they lead to better utilization of resources (financial, administrative or coordinating) from traditional international agencies. It would appear that this type of cooperation, *prima facie*, results in high cost/benefit ratios for all participating countries" (Venezian, 1982).

Cooperative programs permit the identification and evaluation of the degree of commonality or specificity of local problems, allowing us to avoid unnecessary duplication of efforts and facilitate the joining of forces for work on common problems. This allows the saving of all-too-scarce resources and the use of national systems to the best cooperative advantage.

According to Trigo, these cooperative efforts recognize the essentially international character of the technology phenomenon and offer an institutional alternative to ensuring the horizontal exchange of knowledge within a framework which rates cooperation higher than competition. The regional programs of reciprocal cooperation must be seen as an advance, as a new institutional form of a multi-national character which, while reinforcing national systems, also gives them a new perspective. Furthermore, there are certain questions of a technical character related to the organization of research, especially with respect to the scale of operations in these smaller countries in which the achievement of even a minimal critical mass of research proves uneconomical, whereby cooperative efforts can provide viable access to available results and the possibility of taking advantage of existing agro-ecological analogue situations to establish joint efforts for the resolution of problems common to more than one country (Trigo, 1982).

The proper coordination of activities on similar problems to permit the realization of efforts directed to the avoidance of duplication, the joint complementarity of

resources, and to permit joint planning, results in saving of resources, improved productivity in national systems and reorganization of the utilization of researchers. Based on the experience of PROCISUR, we present some elements resulting from reflection on the concepts and operational norms which should be taken into account when organizing and operating cooperative activities in agricultural research.

Justification for Cooperative Projects

According to Nores, these programs can be justified to the extent they provide participating researchers with new technology and technological advances and at the same time have the flexibility to allow the reorientation of activities towards the better characterization of problems and possible solutions, and provide rapid mutual feedback of the results of research between the different participants (Nores, 1983).

An important factor is that researchers should be able to achieve "economies of scale" by benefitting from the work of colleagues studying similar problems and that they should be able to exchange relevant information, and discuss technical themes of mutual interest to complement their own research and avoid any duplication of effort and reach solutions more rapidly. In the opinion of Nores, the heart of a research network must be *the common problem to be investigated*, identified by the researchers (not by outside coordinators) (Nores, 1983).

Horizontal cooperation programs allow national centers to work better with international research centers, without ignoring their primary task of generating knowledge and genetic material, so indispensable in improving national agricultural production.

This improved relationship is reflected in more direct influence of the national scientists on the identification of priorities at the international centers. Cooperative schemes offer an ideal channel for the discussion, review and transmission of problems and priorities at the regional level for the international centers. Furthermore, the structures developed for the horizontal exchange of information are especially appropriate for the transfer of knowledge and available technology, by the international centers.

On the one hand we recognize the advantages to be found in cooperative programs, but on the other hand we must be especially careful with respect to the excessive proliferation of this sort of effort, because unjustified dispersion of efforts leads to very poor utilization of

resources, especially funds, already very scarce in the developing countries of Latin America. So we recommend that, whenever possible, one should use structures and organizations that already exist, allowing them to incorporate new products or activities. We try to avoid unnecessary duplication of efforts, and parallel and uncoordinated efforts as these are obviously poor utilization of resources.

In this context, a word of caution might also be given to the donors and the international centers to the effect that they should not lose the foregoing perspective, and that the spirit of integration and cooperation recommended to the countries is especially valid for them. It would often be preferable to join forces in cooperative activities rather than insist on individual direct action which might bring little benefit to a country because of excessive dispersion of effort, inadequate programming and ineffective execution.

Operational Approach

Cooperation must not be approached incidentally or with a sporadic discontinuous effort. It is a process, and as a process it must involve a series of steps, each characterized by a proper approach suitable to each moment and each need. One must promote meetings among researchers from different countries, and exchanges of knowledge and experience. These are not an end in themselves but should be an instrument which will allow all participants to better know what is going on and to lead gradually into joint programming, integrated action and cooperative programs. These must be the true goal of our horizontal technology transfer programs and networks.

After individual awareness has been created in everyone involved in the program, general awareness or cooperative conscience will be awakened. To talk about cooperation is very easy; what is more difficult is to actually give support and to show real willingness to put cooperation into practice. This willingness must necessarily involve a leap from discourse into practice. It also requires a real belief in the value of cooperation. This demands not only a willingness to support one another, but it also demands comprehension, tolerance and, above all, a healthy interest in knowing what other people are doing and what other countries are carrying out.

This should be a joint effort which each member approaches in the spirit of a common task and an understanding that what others are thinking is just as important as knowing what he himself thinks. In other

words, we are talking about true dialogue, in which listening is just as relevant as speaking.

Continued exchange in horizontal cooperation projects can only be justified as the first step in a process which has much more ambitious objectives in terms of integration, cooperative activities, and coordinated programming.

Projects which do not take this view, or even those which do but are unable to advance markedly and remain restricted just to opportunities for exchanges, do not justify continuity. It is also true to say that some networks, over-structured in relation to their available resources, tend to bog down in good intentions and objectives on paper, with excessively sporadic and discontinuous activities, tending to repetition of "let's begin again", without ever escaping from the first stage and without making concrete steps towards integration or the sharing of significant contributions with member countries.

Everyone involved - directors, research participants, aid officials - must have a clear understanding of the significance and basic characteristics which maintain cooperative activities. For this reason the objectives of cooperation must be explicit and well defined in order to achieve agreement and active participation of people and institutions in the member countries. The defined limits of cooperation, in terms of themes, organizations and budgetary provisions, should never be exceeded.

Programming

An immediate corollary of this approach to cooperative activities involves the need to program our action towards ultimate integration. The recognition that we are dealing with a process in which the steps must be taken gradually demonstrates the need for programmed action within a framework in which the final objectives are constantly kept in view so that the most appropriate actions are readily recognized and the established tasks achieved.

The mere setting of objectives is not enough to properly characterize a planned effort. It is indispensable to carry out continuous activities, carefully selected in advance and based on their contribution towards achieving the agreed objectives. Even when the objectives are highly detailed, if the action is discontinuous or sporadic, or consists only of an occasional meeting, as sometimes happens in existing programs and networks, it does not replace a properly thought out and regularly conducted action program. If the funds available are insufficient to

provide for continuous action and do not allow forward planning, then they should be diverted to other ends, such as projects which have similar objectives but which are better structured.

It is obvious that programs with such ambitious objectives as those of horizontal cooperation must, to be effective, involve the use of a wide range of operational procedures as described in the PROCISUR document. Nevertheless, over and above the use of various procedures, it is indispensable that careful selection and definition be given to the types of activity best adjusted to the given objectives of the program.

The breadth of the objectives in horizontal cooperation is so great that it cannot possibly be covered by one or a few different procedures employed in an occasional, discontinuous or sporadic manner. It needs a combination of various methods, clearly explained and chosen for their best adaptation to the objectives, existing conditions and characteristics of the researchers involved. This can only be achieved through effective programming, undertaken well in advance and using the most appropriate methodology.

Agreed problems should be shared between all the participants, and selected activities are best restricted to a well-defined geographical area to facilitate communication. Participating institutions must become involved in such a way that everyone benefits from the association and, as a consequence, mutually support one another with enthusiasm.

Adequate and appropriate programming involves, therefore:

- the identification of common problems;
- the adoption by consensus of compatible approaches and strategies;
- the selection of the most appropriate activities;
- the availability of leadership at the national level;
- the provision of dynamic scientific support;
- the accessibility of institutional support (Nores, 1983).

These desiderata can only be achieved through a properly designed programming system, institutionally supported and effectively operated in practice.

The Role of the Participants

In any approach to cooperative action, it must be remembered that it deals with joint efforts in which many countries must work together, as well as many organizations and agencies.

The key issue here is that all those involved should, while

not overlooking their own targets and goals, provide support to the group efforts in their speciality. A constant search for, and identification of, complementarities is indispensable. Specifically, with respect to participating countries and regarding the objectives and targets to be sought, a reasonable degree of homogeneity is needed. Nevertheless, a minimum level of heterogeneity is also desirable, as it allows the better integration of action on a broader scale and leads to broader coordination, a better chance of finding complementarities, and more diversity of joint action and programming.

In any multi-institutional activity, each individual and institution involved has a distinct role to play in the conduct of the programs and projects. Clear definition is needed of the responsibilities attaching to national institutions and researchers, to donor organizations, the IARCs, the international organization charged with the administration of the activity, etc.

Without a doubt, this objective identification and understanding of tasks which should be carried out by each individual and each agency involved, and an awareness of their own role and the role of each and every one of the other members, are essential in achieving solidarity and the indispensable "cooperative consciousness."

The most important contribution is that of the national organizations and researchers. Apart from being involved in the basic objective, they are also the principal participants in the action. They are not just participants in the exchange of ideas, programming and cooperational action; they also share the programs, activities and results of the research.

The IARCs, apart from their valuable function in the provision of information and data, advice on methodologies and very important materials, are also essential partners in the promotion and conduct of integrated activities in the search for solutions to common problems.

Regional cooperative organizations, by virtue of their structure, their technical staff, their access to funds and other useful attributes, constitute valuable catalysts to the efforts of cooperative networks towards achieving their objectives. It can be firmly stated that cooperative networks form a most valuable complement to the work of both national research systems (NARS) and the IARCs. It is no exaggeration to suggest that regional cooperative networks utilizing exchange mechanisms and having joint programming and activities between institutions desirous to bring about technological

transformation, form a third leg to the tripod formed with national and international programs, which is supportive of technological change in agriculture in the developing countries.

Donor organizations have an important and complementary role to play both as promoters and in support of the catalytic actions of networks in financial terms, while specialized international technical organizations, preferably regional in nature, are of indispensable assistance in operational and administrative matters.

While not wishing to play down the important role of international agencies, donors, or administrative agencies, one must nevertheless stress the fact that the decisive management role must be carried out by executive committees of the networks. Executive committees, formed by directors of each participating country, must be the highest administrative authority in these programs. They should not be just executive committees; they should also consolidate the links which lead to integration of programs between the participating countries.

Experience has shown that all national directors who have been associated with this type of program recognize the value of the cooperative viewpoint. Even those with more advanced programs of their own recognize that, apart from the political benefits of cooperation, they have also benefitted from the wide experience and knowledge with which they have come into contact, even in countries with relatively less well-developed research services. Research workers from countries with well-developed research programs have also shown that the deeper knowledge of what is going on in neighboring countries often turns out to make a very valuable contribution towards a better understanding of the situation in their own countries, and towards a better approach to possible solutions for their own problems.

Administrative Mechanisms

Special attention should be directed to administrative mechanisms. Management exists to provide the proper instruments at the proper time, so that activities can be smoothly carried out in order to achieve the set objectives of the project. It is natural that the complex functions described demand very careful selection of the administrative mechanism employed.

Only at the commencement of cooperative activities, when projects and networks have still not reached a size which makes them unmanageable, is it possible to

continue to operate without specific administrative machinery. When cooperative activities reach a dimension which really justifies a special structure, it becomes necessary to develop a specific and specialized institutional mechanism with personnel especially dedicated to the clearly differentiated and specifically oriented tasks of promoting exchanges and organizing joint efforts. The utilization of either national or international research centers in the promotion and coordination of cooperative activities tends to divert them from their proper tasks of technology generation as an input to the cooperative activities, and should thus be avoided.

Apart from technical personnel, skilled in cooperative activities, a strong secretariat and administrative support are required. The characteristics of a cooperative program require a tremendous volume of correspondence, communications and publications, which place great demands on the secretariat. Consequently the provision of an efficient and adequate secretariat, backed up by direct administrative advice and assistance, is a fundamental requirement for an efficiently run network.

National-Level Adjustment

The success of horizontal programs often depends on adjustment of the research programs of the individual countries. It is absolutely essential that these countries have institutional and operational models available to them that are strong, flexible and functional, adapted to the dynamics of the modern world and consistent with the rapid advance of science and technology in other sectors.

It is important that NARS give particular attention to adaptive research, oriented towards the identification, modification and adjustment to specific conditions and environments, of technologies developed elsewhere. Equally important is the recovery of traditional local technologies, some of which are subject to improvement, thus permitting advantage to be taken of a store of local knowledge.

Of fundamental importance is the possession by NARS of the means to undertake the necessary adaptations and to have the necessary capacity and dynamism to recognize and transfer the knowledge required. This would include the possibility of utilizing technologies from developed countries, from the IARCs and from partners in other developing countries participating in the same cooperative programs.

It is important that this use of the possibilities of technology transfer should not be exaggerated, as it has been in certain countries which decided to trust implicitly in technology transfer from abroad and tended to ignore their own research and technology development, subsequently paying a very high price as their own research capabilities and institutions were weakened very severely.

It is absolutely essential that both institutional and operational adjustment be carried out so that essential agricultural research will take into account the two important sub-sectors of agriculture in developing countries, the commercial sector and the small-farmer sector. If research only deals with the problems of the commercial sector, it will become profit-oriented and will ignore the need to provide technology which is suitable for small land-holders as well. Both sectors should clearly be considered by agricultural organizations. It is also important to point out the fact that the operational expertise of PROCISUR and other technical cooperative networks indicates that horizontal cooperation within countries is often inefficient. The catalytic mechanism which is created in horizontal cooperation programs between countries could stimulate national programs to intensify efforts at internal cooperation and coordination.

Institution Building

The feasibility of institution building is something that should be considered in every program and project. There are very few cases where a large but temporary effort can be self-supporting. Provisional machinery, in general, can only be justified as preparatory instruments, pending the more formal establishment of an institution by the participating countries.

It is, however, lacking in realism to suppose that the developing countries can consider the creation of a large number of such institutions. The creation of new institutions must be a highly selective process, utilizing to the full the techniques of aggregation and fusion to establish mechanisms of appropriate dimensions.

Neither is it advisable to maintain or attempt to maintain temporary structures beyond their immediate usefulness. After a minimal period they should either be disbanded or, if the programs are running well, should be converted to a more permanent institution.

Institution-building, or "institutionalization", signifies the availability of a minimal permanent or indeterminate administrative structure to propose, study and coordinate technical projects, to handle exchanges,

coordinate cooperative activities and so on; in effect, to manage an integrated program for determined periods.

External assistance from an international organization appears to be indispensable to the proper administration of a program of horizontal cooperation, and it therefore appears to be an essential component of the institution-building process. Not discounting the major role of national researchers and institutions as protagonists, the presence in the institution of an external technical catalyst also seems essential, both to act as technical advisor and to act as a link with the multi-national components of the program.

It is also important to realize that no further doubt exists regarding the value of external donors (financing) to ensure the viability of cooperative programs. This does not mean that the member countries need not contribute; they do indeed contribute, to the extent of their resources. Nevertheless, there is a wide gap between what the countries can contribute and the resources necessary to operate the secretariat, the programs and the additional needs of the participating countries.

Apart from the institutionalization of cooperative programs and projects which effectively impart considerable benefit to the countries, the countries themselves, with the assistance of financing agencies, international centers and organizations, and parallel with the continued operation of cooperative projects, must carry on a continuing search for new opportunities of cooperation and new institutional and operational forms which will facilitate the setting up of new better-defined projects, more concrete action and, in consequence, more ambitious objectives. These could include, for example, the creation of multinational institutional mechanisms, supra-institutional organizations, such as foundations, corporations, associations, etc. -- all aimed at better cooperation between the developing countries for carrying out activities which none, alone, would have the capacity to carry.

To sum up, it should be stressed once again that the real goal of cooperatism is to strengthen scientific and technological advances in the agricultural sector of the developing countries. It is important to remember that since 1965 human beings have doubled their knowledge every twelve years. This means that once in every twelve years humanity has had to accumulate twice as much knowledge as it had before. By the middle of the seventies this had been reduced to a ten-year period, and now, we estimate, and we have recent figures to support this, that every nine years, or something within this range, is the

amount of time which is necessary to double all human knowledge. In some very advanced areas of technology, knowledge is duplicated every four months.

As Dr. Martin Piñeiro, the Director General of IICA, said earlier this morning, the growing interdependence of Latin American and Caribbean countries is one of the most important facts to have emerged within the last few years, and it will be a central element characterizing development in our region over the next few years. The fact that we are all assailed by common problems, such as foreign debt and the protectionist policies of developed countries, together with a homogeneity which is much

greater now in the political organization of our countries, these have all been preponderant factors in a rebirth of solidarity and a desire for regional and sub-regional integration.

All this can be clearly seen in public declarations, as well as in the meetings and discussions which have been carried out in the political and economic spheres over the last few months. What we wish is that each and every one of us, working together, should have confidence in integrated cooperative action. In this way we should be able to turn what used to be thought of as Utopia, into a reality much sooner than we had expected.

