

# TECHNICAL CO-OPERATION IN LATIN AMERICA AND THE CARIBBEAN

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## Abstract

GEPLACEA (The Group of Latin American and Caribbean Sugar Exporting Countries) was formed in 1974. It now comprises 23 countries from the region that produces two thirds of the world's sugarcane (including cane for alcohol production), half the cane sugar and approximately 45% of world sugar exports. The Group promotes the exchange of scientific and technological knowledge in agriculture, use of cane by-products and the sugar production process. The activities of GEPLACEA are described, and its relationship with the Latin American Association of Sugar Cane Technologists and Research Centres is discussed.

## Introduction

The importance of sugarcane in Latin America and the Caribbean is clear. The countries of the region produce about 60% of the world's sugarcane, although not all cane is devoted to the production of sugar. The sugar production is equivalent to about one quarter of the world total (GEPLACEA, 1993).

Sugar is an important food in the region, providing an estimated 42 kg/capita/year. This translates into more than 400 calories per capita per day, making sugar the single most important calorie source in the diet. Furthermore, the sugar industry employs more than 2,5 million people in the region. Extrapolating from the Colombian situation, where for each direct employment there are about five indirect employment opportunities, it can be inferred that more than 10 million people depend on the sugar industry for their employment.

The region produces 45% of the world's sugar export market and sugar exports are the region's third largest source of foreign exchange after oil and coffee (GEPLACEA, 1993). The region devotes eight million hectares to sugarcane and produces 400 million t cane per year. From this cane about 650 sugar mills produce 28 million t of sugar, which is slightly more than half the world's cane sugar. Brazil as the largest producer of cane with 4,5 million ha and 230 million t cane, extracts 8,6 million tons of sugar and also produces 1220700 million l of ethanol as a gasoline substitute, using sugarcane as the basic raw material (COPERSUCAR, 1992). The ethanol production alone is equivalent to approximately 20 million t of sugar.

The productivity of the different countries that comprise GEPLACEA, in the period from 1980-1990, varied from less than 1 t sugar/ha in Haiti to 12 t/ha in Colombia, with an average of 5,4 t sugar/ha. Sugar yields vary from as low as 7% to slightly more than 11%. The different levels of productivity reflect both differences in the agricultural potential of the region and an enormous range of technology (GEPLACEA, 1992a).

The countries of Latin America and the Caribbean are inhabited by more than 400 million people, which represents about 10% of the world population. However, the region participates in only about 1% of the world's science and technology budget. In the developed countries research expenditure is about US\$80/capita whereas in the region it is

less than 10% of this figure. Research expenditure is about 0,5% of GNP compared with about 2% in the developed countries (Zedillo, 1991).

## GEPLACEA

The Group of Latin American and Caribbean Sugar Exporting Countries (GEPLACEA) is an intergovernmental organisation that brings together 23 countries, of which many are sugar exporters. The Group was formed in 1974 with headquarters in Mexico City (GEPLACEA, 1993).

The objectives of GEPLACEA are to:

- provide member countries with a forum to decide on issues of mutual interest.
- foster united action when these countries face special situations.
- co-ordinate policies that lead to fair and remunerative price levels.
- take action to strengthen co-operation and exchange of knowledge among the bodies and agencies in charge of implementing international marketing policies in member countries.
- promote the exchange of scientific and technological information in the spheres of agriculture, use of cane by-products and sugar production processes.

The Group is recognised by the governments of the countries involved, which delegate representatives from the sugar industry or, in some cases, government officials for meetings. The Group is financed by the governments of the member countries in proportion to the total sugar production of the country, with a limit above a certain tonnage. The Group has a permanent executive secretariat with headquarters in Mexico City. The Executive Secretary is supported by two assistant secretaries: Marketing and Statistics, and Technology. The former is in charge of marketing and international negotiations, and the latter manages all technological aspects. In 1992 the Secretariat formed an Area of Services to offer advisory and consulting services, training opportunities, and assistance in the evaluation and drafting of projects. The Area of Services uses its own in-house expertise and also sub-contracts to carry out its activities (GEPLACEA, 1992b).

The annual meeting of the group is hosted by the member countries, with the venue rotating between the different countries according to their ability and disposition to organise the meetings.

The principal activities of the Group are:

- Concerted, co-ordinated action between importing and exporting members in international organisations, as a more effective means of achieving the objectives of the Group.
- Training of officials and technicians in member countries in all aspects related to the production and marketing of sugar, by-products and derivatives.
- Research in all aspects related to the production and marketing of sugar, by-products and derivatives.

- Transfer of technology among member countries in all aspects pertaining to the production and marketing of sugar, by-products and derivatives as well as the capital goods used in our agro-industry. Similar activities are being organised for Asian and African countries.
- Continuing information to member countries on aspects pertaining to the production and trade of sugar, by-products and derivatives.
- Direct assistance in aspects related to the above activities.
- The establishment of a dissemination system that includes periodical publications as well as pamphlets and books. Services involving the evaluation of projects pertaining to production of sugar, by-products and derivatives.

These activities have been focused on four main areas: international defense of prices and markets; restructuring the sugar industry towards the integral use of sugarcane as an effective means of facing the changing sugar markets; modernisation of the industry to improve productivity and efficiency and reduce costs; and the design and implementation of sugar policies. In addition, the Group is considering the possibility of establishing regional information services, a regional quarantine service and also the possibility of a regional research centre (GEPLACEA, 1992b).

Since its foundation GEPLACEA has carried out various activities, often with the participation of other international or regional agencies, in line with its established objectives and guidelines. GEPLACEA has enabled exchange of information and ideas on the development of the sugar industry in the region. The tangible benefits of these activities are difficult to quantify; nevertheless it is certain that this aspect of GEPLACEA's programme has contributed greatly to the industries' success over the years. In the following paragraphs a brief summary of some of these activities shows the breadth of interest encompassed by the Group.

In conjunction with agencies such as the United Nations Conference on Trade and Development (UNCTAD), the New York Coffee, Sugar and Cocoa Exchange, and the London Sugar Exchange, GEPLACEA has organised international and national seminars on sugar and molasses marketing.

In the field of cane production, workshops and seminars have been organised covering sugarcane genetics, plant pathology, cane fertilisation, mechanisation and cane payment systems among others. These meetings have been organised in co-operation with private or public local agencies from the member countries.

GEPLACEA has promoted various workshops on the rational use of energy within the sugar industry and the potential use of sugarcane as an energy crop. In addition, the Group has been instrumental in the organisation of various seminars directed at diversification of sugarcane based products.

#### *ATALAC*

The Association of Sugar Technologists of Latin America and the Caribbean has close links with GEPLACEA (Zedillo, 1990). In 1978 the Mexican Association of Sugar Technologists (ATAM) invited representatives of various countries to their symposium and took the initiative to form ATALAC. In the following year, at the annual assembly of GEPLACEA, the technology commission indicated that it should 'take advantage of the recent constitution of ATALAC to establish programs of co-operation and joint effort to benefit the countries of GEPLACEA'. In 1980 the first convention of ATALAC was held in Acapulco, Mexico, in conjunction with ATAM, and the second meeting was held in Cuba in 1981. Later the association fell into relative disorder with

its activities limited to specialist meetings of technical groups as an adjunct to the local national associations' meetings. In 1988 in Cali, Colombia, at an international seminar on 'Sugar Cane Harvesting', various sugarcane technologists from the region signed a deed asking GEPLACEA to participate as co-ordinating and liaison office between the various technologist societies in the region. As a result, in 1988, the annual assembly of GEPLACEA gave the mandate to GEPLACEA to 'co-ordinate closer relationships between the technologist societies of the member countries so as to promote the Latin American and Caribbean Society of Sugar Technologists' and, in 1989, GEPLACEA organised a meeting of the presidents of the different societies of the region in Mexico. The objectives of ATALAC were redefined as:

1. To strengthen and encourage technical and scientific collaboration between the technologist associations in the region.
2. To ensure systematic and effective exchange of information in the region about cane cultivation, harvesting, industrial processes and industrialisation of by-products.
3. To stimulate the training of specialists in sugarcane.
4. To guarantee wide divulgation of scientific and technical developments.
5. To improve efficiency in the sugar industry.
6. To organise a triennial scientific and technical congress.

Since then, ATALAC has organised congresses in Cali, Colombia, in 1990 in collaboration with TECNICAÑA (Colombian Association of Sugar Technologists) and in Mexico in 1991 with ATAM (Mexican Association of Sugar Technologists). ATALAC has also played an important role in consolidating co-operation and informal exchange of technology in the region.

#### **Research in the region**

During the late 1980s and early 1990s major structural adjustments in the political economy of the region have occurred. This has resulted in the privatisation of many activities previously controlled by the state, and more open markets, which have led to less protection and hence the need to be internationally competitive. The state has reduced its support for research in several countries in the region, although it has become evident that improved technology based on sound research is essential. The main emphasis of technological development and research has been on agriculture, with little emphasis on the factory or mill processes. The exception is Brazil, which has become a world leader in ethanol from cane production technology. Some examples of the modifications in the organisation of research are described below.

**Brazil:** At the beginning of the 1970s the Brazilian government mobilised resources to revitalise the sugar and alcohol sector. The National Program for Sugar Improvement (PLANALSUCAR) was formed, mainly to develop technology in sugar production. This programme was to be managed by the Institute of Sugar and Alcohol (IAA). PLANALSUCAR played an important role in the development of the national alcohol programme; however at the end of the 1980s the IAA was dissolved by presidential decree and with it, PLANALSUCAR. The decree also indicated that sugarcane research should be carried out by the national agricultural research agency (EMBRAPA); however there was no indication of how this was to be achieved. The universities involved in the old PLANALSUCAR have attempted to carry on activities but this has been at a reduced level; recently, with support from the private sector, the Fed-

eral Universities of the States of Sao Paulo in the south and Alagoas in the north east, have taken over some of the activities previously carried out by PLANALSUCAR.

In their annual report of 1989-1990, COPERSUCAR reflected on the new situation: the dismantling of the IAA, due to its gradual technical and administrative obsolescence, created a vacuum in the interventionist government system directed at the sugar sector. Various efforts to modernise the institution failed, and the sugar and alcohol agro-industry learned to live with a completely destroyed interventionist apparatus. COPERSUCAR decided that it needed to invest more in research at the COPERSUCAR Technology Center (CTC). COPERSUCAR is not only involved in field production research but also in mechanisation and development of factory processes. In addition, COPERSUCAR lobbied for effective legislation for plant breeders' rights and is now able to recover part of its research expenditure from producers that do not provide direct financial support. Furthermore, COPERSUCAR has established joint projects with machinery producers and, if the results of this collaboration are commercially viable, COPERSUCAR will receive royalties. Therefore, in Brazil over the past five years there has been a substantial change in the organisation of research in sugarcane, with a move away from government supported and controlled research to privately funded and contract research with an emphasis on recuperating research costs where possible.

**Cuba:** The Cuban sugar industry has three government research and development institutes which all fall under the Ministry of Sugar. There are also other institutions, which do not fall under the Ministry of Sugar, that carry out research related to sugar production.

The Cuban Sugar Research Institute (ICINAZ) was created in 1973 with the objective of carrying out research and development on sugar. It possesses an experimental sugar mill with a capacity of 1 000 t cane per day and various pilot processing plants. Its principal research areas are development of new products, equipment and technology, generation and use of energy, biotechnology, management of residues, bagasse drying, sugar chemistry, equipment evaluation and instrumentation and control systems.

The Cuban Institute of Sugarcane By-Products (ICIDCA) was founded in 1963, and is considered to be the largest technological/production complex in the world dedicated to the integrated use of sugarcane sub-products and by-products. The Institute emphasises use of sub-products in human and animal nutrition, biotechnology, chemical and natural products such as furfural and waxes, particle board, treatment of residues, and characterisation of raw materials that are the basis of production of by-products.

The third entity, the Sugarcane Research Institute (IN-ICA), is dedicated to the agronomy and mechanisation of sugarcane. The institute comprises 14 experimental stations with 3 000 ha. The main research areas are varietal improvement, disease and pest control, mechanisation, irrigation and soils.

All three institutes have the capacity to carry out technical and economic feasibility studies. They maintain all the support services normally found in research agencies, such as chemical analysis, computer software etc. The Cuban institutes with the Ministry of Education offer post graduate training in sugar technology.

**Mexico:** In 1949, the National Union of Sugar Producers established the Office of Experimental Stations, which was the forerunner of IMPA (Institute for Improvement of Sugar

Production) which came to depend technically and administratively on the parastatal Sugar Company (Zedillo, 1991). For 42 years, IMPA was the only organisation dedicated to sugar research and covered all areas from field production to factory processes and by-products. Despite its contribution of improved varieties and other technology that have increased production, IMPA was closed in 1991 and as yet the private sector has not agreed on a viable means of meeting their future technological needs. However, various representatives have visited Colombia and expressed interest in using the Colombian system as a model for developing a new research effort.

**Colombia:** Organised sugarcane research began in 1938 with the establishment of a small genetic improvement programme at the Palmira Experimental Station. This programme was later absorbed by the national agricultural research institute (ICA); however, in 1975, ICA moved its cane improvement programme from the main sugar producing region, to concentrate on 'panela' or the un-centrifuged sugar that is produced mainly by small farmers. Meanwhile various mills had established their own research or technical departments. One of the mills, Mayagüez, started its own small but highly successful breeding programme that produced the variety MZC 74-275, which was resistant to the local strains of smut when this disease first appeared in the Cauca valley in the early eighties. This variety is still the most widely grown in the region.

With the demise of the ICA programme, the Sugar Producers Association (ASOCAÑA), founded a private non-profit sugar research centre (CENICANA) in 1977. The centre is financed by the growers and mills, according to the sugar produced and sold in the national market.

Initially, CENICANA focused its efforts on varietal improvement and agronomic practices; recently it has broadened its scope to include economic analysis of the performance of the sector, mechanisation, factory processes and an accelerated programme to develop an integrated package for the production of green cane.

It is of interest to note that over the last three years, with the free market or free economic policy of the government, the industry has increased its support to the research centre, with the understanding that improved technology is a prerequisite for the maintenance of an internationally competitive industry.

The official government agricultural research organisation ICA (Colombian Agricultural Institute), has concentrated its efforts on panela (un-centrifuged sugar) production, using the varieties produced by CENICANA as the basis for its field production programme. With support from the Dutch government, ICA established CIMPA (Centre for Panela Improvement), which has concentrated on appropriate technology for improving both the extraction rates and the energy efficiency of the 'trapiches' which produce panela, and also the quality of the final product.

In 1993, with new government policies for the privatisation of many state entities, the research component of ICA has been converted to a private corporation which will be funded by direct grants from the government and by support from private industry.

**Argentine:** There are three main entities involved in sugarcane research. The Obispo Colombres Agro-industrial Experimental Station, which was founded in 1909, is financed by the agro-industrial sector (field and processing) of Tucuman province. The station researches various crops that are important in the region, including sugarcane. The station concentrates on the production of new varieties, agronomy,

and technical assistance for field and factory. The National Agricultural Research Institute (INTA) possesses a station in Tucuman which dedicates a major part of its budget to sugarcane, with special emphasis on new varieties and agricultural extension. Its budget is provided by the national government.

In addition, the Santa Rosa Experimental Farm (Chacra Experimental Colonia Santa Rosa) was created in 1951 through the initiative of the sugar industry of northern Argentina. This small experimental farm has concentrated efforts on varietal improvement and has been extremely successful in producing extraordinarily widely adapted varieties such as NA 56-79.

### Conclusions

It is difficult to measure the benefits that accrue from technical co-operation, especially when much of the technological exchange is not proprietary technology which is sold and, in most cases, no effort is made to evaluate the economic benefits of the innovations adopted. Possibly the most easily measured yardstick of technological co-operation is the distribution of varieties produced in one country and used in others. The small privately supported Santa Rosa Experimental Farm developed the variety NA 56-79 which, it has been estimated, was at one time grown on more than two million ha, mainly in Brazil, and was the most widely grown variety in the world. The value to Brazil, of this co-operation with the Argentine, would easily surpass all the investment made in technological collaboration in Latin America and the Caribbean. In the future, however, with regional moves to privatise research and increasing recognition and legal protection of intellectual property rights, it is likely that much technical co-operation will become more commercially oriented, with research and technology agencies attempting to recover their costs through the sale of technology. Although at first sight this might indicate a

decrease in technical co-operation, we believe that these changes are likely to promote more rapid technological development and international co-operation. Much of the rapid improvement in sugar beet technology over the past twenty years can be attributed to privately financed research by entities such as seed and machinery companies that have actively promoted international technology transfer and co-operation; we believe this tendency will become more important in sugarcane in Latin America and the Caribbean in the coming years. However, this tendency has to be supported by basic research, which is not only expensive but also presents problems in terms of recuperating costs. The recent formation of the International Sugarcane Biotechnology Consortium, with support from the Americas, Africa and Australasia, indicates the likely future direction of international collaboration for basic research. This is necessary to maintain the competitiveness of sugarcane in a rapidly changing world where only the technologically advanced will survive.

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