

# **Panela production as a strategy for diversifying incomes in rural area of Latin America**



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# Contents

## ACKNOWLEDGEMENTS

## PREFACE

## LIST OF ACRONYMS vii

## EXECUTIVE SUMMARY ix

## INTRODUCTION 1

<b>1. POLICIES AND PROGRAMMES TO SUPPORT THE PROCESSING ACTIVITIES OF SMALL-SCALE RURAL PRODUCERS: CASE ANALYSES OF COLOMBIA, BRAZIL AND GUATEMALA</b>	<b>4</b>
COLOMBIA	4
THE PANELA AGRO-INDUSTRY IN COLOMBIA	7
GENERAL CHARACTERISTICS OF COLOMBIA'S PANELA MARKET	8
PANELA CONSUMPTION	12
GUATEMALA	15
THE PANELA AGRO-INDUSTRY IN GUATEMALA	18
BRAZIL	23
THE PANELA (OR "RAPADURA") AGRO-INDUSTRY IN BRAZIL	25
<b>2. CHARACTERISTICS OF PANELA PRODUCTION IN THE REGIONS OF HOYA DEL RÍO SUÁREZ, CUNDINAMARCA AND CAUCA</b>	<b>31</b>
HOYA DEL RÍO SUÁREZ	31
WESTERN CUNDINAMARCA	32
CAUCA	34
INSTITUTIONAL SUPPORT FOR PANELA PRODUCTION	37
<b>3. IMPACT OF RURAL PROCESSING ACTIVITIES ON THE WELFARE OF RURAL ECONOMIES: THE CASE OF THE PANELA AGRO-INDUSTRY</b>	<b>38</b>
COMPARATIVE ANALYSIS OF THE THREE REGIONS UNDER STUDY: CUNDINAMARCA, CAUCA AND HRS	39
ANALYSIS OF COSTS AND REGIONAL COMPETITIVENESS	41
STRENGTHS AND WEAKNESSES OF THE PANELA AGRO-INDUSTRY IN HRS, CUNDINAMARCA AND CAUCA	44
IMPORTANCE AND IMPACT OF PANELA PRODUCTION ON THE CONTINUANCE AND SUSTAINABILITY OF FAMILY PRODUCTION UNITS	48
CONCLUSIONS IN THE CHAPTER	51

<b>4. IDENTIFYING THE PROBLEMS AND DESIGNING STRATEGIES AND LINES OF ACTION TO STRENGTHEN AND MODERNIZE COLOMBIA'S PANELA AGRO-INDUSTRY</b>	53
PROBLEMS IN HOYA DEL RÍO SUÁREZ	53
PROBLEMS IN CUNDINAMARCA	54
PROBLEMS IN CAUCA	55
IDENTIFICATION OF STRATEGIC LINES OF ACTION FOR STRENGTHENING AND MODERNIZING COLOMBIA'S PANELA AGRO-INDUSTRY	56
PANELA TECHNOLOGY TRANSFER PROGRAMME	58
PANELA INFORMATION SYSTEM	58
FINANCING PROGRAMME FOR MODERNIZING THE PANELA AGRO-INDUSTRY	59
RESEARCH PROGRAMME FOR IMPROVING SUGARCANE CULTIVATION	59
RESEARCH PROGRAMME FOR IMPROVING SUGARCANE PROCESSING AND PROGRAMME FOR DIVERSIFYING PANELA PRODUCTION	60
PROGRAMME FOR REDUCING CARBON EMISSIONS IN THE PANELA AGRO-INDUSTRY AND INCENTIVE PROGRAMME FOR THE ADOPTION OF CLEAN TECHNOLOGIES	61
SOCIO-BUSINESS MANAGEMENT PROGRAMME	62
PROGRAMME TO PROMOTE THE PANELA MARKET	63
SCOPE AND IMPLEMENTATION OF THE ACTION PLAN	63
<b>BIBLIOGRAPHY</b>	65
<b>ANNEX 1</b>	67
<b>ANNEX 2</b>	70
<b>TABLES</b>	
1 Plans and programmes in the Plan to modernize Colombia's rural economy	5
2 Products and regions included in the Plan to modernize Colombia's rural economy	7
3 Colombia's agriculture policy instruments	6
4 Panela consumption as a share of the family shopping basket and of food spending, by city and income bracket	14
5 Per capita consumption of panela and sugar (kg/year) in six Colombian cities, according to socio-economic stratum	15
6 Per capita consumption of panela, syrup and sugar in 26 rural municipalities of Boyacá, Cundinamarca and Santander, based on the existence of unsatisfied basic necessities (UBN) (kg/person/year)	15
7 Plans and programmes in Guatemala's Agricultural Policy, 2000-2004 period	20
8 Production of sugarcane, sugar and panela	22
9 Panela agroprocessing in the departments of Santa Rosa and Quiche	23
10 Production cost structure in Santa Rosa, Joybac, Chicaman. 2003 (US\$/ton of panela)	25
11 Use of labour (person-hours/ton of panela)	26
12 Brazil's Crop and Livestock Farming Plan, 2003-2004	28
13 Panela production in São José do Egito, Solidão, Santa Teresinha and Tabita	32
14 Production cost structure in Valle do Pianco, Brazil, 2003	29

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15	Use of labour (person-hours/ton of panela)	29
16	Factors constraining and promoting Brazil's panela sector	30
17	Main characteristics of panela production in Hoya del Río Suárez, western Cundinamarca and Cauca	43
18	Production activities carried out in the panela production units of Hoya del Río Suárez, Cundinamarca and Cauca	46
19	Production parameters in the three Colombian regions	49
20	Labour force requirements (person-hours/ton of panela)	
21	Panela production costs (US\$/ton of panela)	
22	Analysis of the strengths, opportunities, weaknesses and threats to the panela rural agro-industry HRS	51
23	Analysis of the strengths, opportunities, weaknesses and threats to the panela rural agro-industry in Cundinamarca	53
24	Analysis of the strengths, opportunities, weaknesses and threats to the panela rural agro-industry in Cauca	54

#### **DIAGRAMS**

1	Seasonal wholesale price index for panela in Bogotá	12
2	Trend in the real wholesale price for panela in Bogotá	13
3	Flow chart of problems in Colombia's panela agro-industry	65



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## Preface

In the context of broader developmental thinking, the 1990s and early 2000s could be seen as an era of interest in farm commercialization and small enterprise development. Many farm and community level programmes were launched around the world to support enterprise development. There were in many cases notable successes for some people in some locations. There have been three lingering shadows looming over these success stories. One is that the real dynamics behind successful enterprise diversification and development are not well understood. The second is that the field projects, almost by definition, have created abnormal and unsustainable levels of support. The third is that the various projects rarely, if ever, have led to "success at scale" - in other words, big changes affecting the livelihoods of many people.

In the above context, the Agricultural Management, Marketing and Finance Service (AGSF) launched a series of "sectoral diversification" case studies a number of years ago. The objectives of the case studies were to:

- Document experiences and impacts related to farm and sector diversification;
- Draw lessons on how to support positive patterns of change leading to sustainable increases in farm incomes;
- Provide guidance to governments and donors on potential risks and responses.

The criteria for case selection included:

- Rapid uptake of new enterprise by a substantial number of farmers;
- Legitimate public interest in the specific sub-sector and agro-enterprise;
- Potential for replication/extension to other areas with similar circumstances;
- Basis for drawing lessons on how to support future diversification.

At the time of this publication, seven cases have been completed. This is the third to be published as an AGSF Working Document. Each case provides relevant information for decision makers and development specialists in the particular countries. In the near future, AGSF will produce a synthesis report giving a comparative appraisal of the lessons learned.

The present report considers panela development as a diversification strategy for farm-level income generation, by analyzing patterns of change and associated success factors. The panela production constitutes a vertically integrated system in which the rural producer participates in the entire process of producing sugarcane, processing it into panela and selling the finished product. The vertical nature of the panela industry has facilitated the development of more flexible and effective livelihood strategies than those that may arise from horizontal or primary production-type processing technologies.

The report examines the viability and commercial sustainability of the panela industry in Colombia and makes a comparative review of the panela industry in Brazil and Guatemala, where panela is a major local production item. It assesses the impact of panela production on

producer incomes and livelihoods in Colombia and provides information on the institutional and financial support required for Colombia to improve panela's commercial viability and increase profits for small-scale farmers.

The report, originally published in Spanish, was translated into English in order to increase awareness of issues involved in panela processing and to broaden understanding of support required for improvement in other countries where similar products are produced. Panela is known with different names: *Jaggery* in India and Sri Lanka; *Muscovado* in the Caribbean and the Philipines; *Demerara* in Guyana and Mauritius and *htanyet* in Myanmar. Commercially, it is known as natural brown sugar.

The report is aimed at policy makers and extension staff of government, private and non-government organizations and at donors' organizations that support agro-processing technologies for small and medium-scale entrepreneurs.

Doyle Baker  
Chief Agricultural Management, Marketing and Finance Service  
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## List of acronyms

<b>AGS</b>	Rural Infrastructure and Agro-Industries Division of the Food and Agriculture Organization of the United Nations
<b>ASOBOYSAN</b>	Asociación de Paneleros de Boyaca y Santander (Association of Panela-producers of Boyaca and Santander), Colombia
<b>BNDES</b>	Banco Nacional de Desenvolvimento Econômico e Social (Brazil's National Economic and Social Development Bank)
<b>CEISA</b>	Centro de Investigaciones en Salud Animal-CORPOICA (Animal Health Research Centre of the Colombian Corporation for Agricultural Research)
<b>CENICAÑA</b>	Centro de Investigación de la Caña de Azúcar de Colombia (Sugarcane Research Centre of Colombia)
<b>CEPEA/USP</b>	Centro de Estudos Avanzados en la Economía Aplicada de la Universidad de Sao Paulo (Centre for Advanced Studies in Applied Economics of the University of Sao Paulo, Brazil)
<b>CIMPA</b>	Centro de Investigación sobre Panela (Panela Research Centre of the Colombian Corporation for Agricultural Research)
<b>CIPAV</b>	Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria (Centre for Research on Sustainable Agricultural Production Systems), Colombia
<b>CNA</b>	Confederação da Agricultura e Pecuária do Brasil (Agriculture and Livestock Confederation of Brazil)
<b>COLCIENCIAS</b>	Instituto Colombiano para el Desarrollo de la Ciencia y la Tecnología (Colombian Institute for the Development of Science and Technology)
<b>COOPAGEL</b>	Cooperativa dos Profissionais em Atividades Gerais e Específicas Ltda. Secretaria de Agricultura Familiar (Cooperative for Professionals in General and Specific Activities of Brazil's Family Farming Secretariat)
<b>CORPOBOYACÁ</b>	Corporación Autónoma Regional de Boyacá (Autonomous Regional Corporation of Boyacá), Colombia
<b>CORPOICA</b>	Corporación Colombiana de Investigación Agropecuaria (Colombian Corporation for Agricultural Research)
<b>CORPOICA-CIMPA</b>	Centro de Investigación sobre Panela (Panela Research Centre of the Colombian Corporation for Agricultural Research)
<b>CORPOTUNIA-CIAT</b>	Corporación para el Desarrollo de Tunía (Tunía Development Corporation), Colombia
<b>DANE</b>	Departamento Administrativo Nacional de Estadística (Colombia's National Statistics Department)
<b>EAP</b>	Economically active population

<b>ECLAC</b>	United Nations Economic Commission for Latin America and the Caribbean
<b>FAG</b>	Fondo Agropecuario de Garantías (Agricultural Guarantee Fund), Colombia
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FEDEPANELA</b>	Federación Nacional de Productores de Panela (Panela Producers' Federation), Colombia
<b>FINAGRO</b>	Fondo para el Financiamiento del Sector Agropecuario (Fund for Financing the Agricultural Sector), Colombia
<b>FIS</b>	Fondo de Inversión Social (Social Investment Fund), Guatemala
<b>FOMIPYME</b>	Fondo de Modernización y Desarrollo Tecnológico de las Pequeñas y Medianas Empresas (Fund for the Modernization and Technological Development of Small and Medium-size Enterprises), Colombia
<b>FONAGRO</b>	Fondo Nacional para la Reactivación y Modernización de la Actividad Agropecuaria (National Agricultural Recovery and Modernization Fund), Guatemala
<b>FONAPAZ</b>	Fondo Nacional para la Paz (National Peace Fund), Guatemala
<b>FONMUR</b>	Fondo de Fomento para Mujeres Rurales (Development Fund for Rural Women), Colombia
<b>GDP</b>	Gross domestic product
<b>GFP</b>	Good farming practices
<b>GMP</b>	Good manufacturing practices
<b>HACCP</b>	Hazard Analysis and Critical Control Point system
<b>HRS</b>	Hoya del Río Suárez region
<b>IBGE</b>	Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics)
<b>ICA</b>	Instituto Colombiano Agropecuario (Colombian Agriculture and Livestock Institute)
<b>ICR</b>	Incentivo de Capitalización Rural (Rural Capitalization Incentive), Colombia
<b>IICA</b>	Inter-American Institute for Cooperation on Agriculture
<b>IMA</b>	Instituto de Mercadeo Agropecuario (Agricultural Marketing Institute), Guatemala
<b>ISO</b>	International Standards Organization
<b>LEC</b>	Línea Especial de Crédito (Special Line of Credit), Brazil
<b>MAGA</b>	Ministerio de Agricultura, Ganadería y Alimentación (Ministry of Agriculture, Livestock and Food), Guatemala
<b>MEGA</b>	Associative Management Business Models (Colombia)
<b>MERPANELA</b>	Panela marketing company (Colombia)
<b>PADEMER</b>	Programa de Apoyo al Desarrollo de la Microempresa Rural (Rural Micro-enterprise Development Programme), Colombia
<b>PAIPPEC</b>	Programa de Apoyo Integral a Pequeños Productores de Economía Campesina (Integrated Support Programme for Small Producers in the Rural Economy), Colombia
<b>PRAN</b>	Programa de Reactivación Agropecuaria Nacional (National Agricultural Recovery Programme), Colombia

<b>PROAGRO</b>	Programa de Oferta Agropecuaria (Agricultural Supply Programme), Colombia
<b>PROCANA</b>	Programa de Incentivo ao Aproveitamento Integral da Cana-de-Açúcar (Incentive Programme for fully exploiting Sugarcane), Brazil
<b>PROUCHU</b>	Proyecto Desarrollo Rural Sierra de los Cuchumatanes (Rural Development Project for Sierra de los Cuchumatanes), Guatemala
<b>PRODERT</b>	Proyecto Desarrollo Rural Sostenible en Zonas de Fragilidad Ecológica en la Región Trifinio (Project for Sustainable Rural Development in Ecologically Fragile Zones of the Trifinio Region), Guatemala
<b>PRONACAMPO</b>	Programa Nacional de Capacitación Masiva para Reducir el Desempleo y la Pobreza (National Mass Training Programme to Reduce Unemployment and Poverty), Guatemala
<b>PRONATTA</b>	Programa Nacional de Transferencia de Tecnología (National Technology Transfer Programme), Colombia
<b>PROZACHI</b>	Proyecto Desarrollo Zacapa-Chiquimula (Zacapa-Chiquimula Development Project), Guatemala
<b>RAI</b>	Rural agro-industry
<b>REDAR</b>	Rural Agro-industry Network
<b>SEBRAE/PE</b>	Serviço de Apoio às Micro e Pequenas Empresas do Estado de Pernambuco (Brazilian Micro- and Small Enterprise Support Service of the State of Pernambuco)
<b>SEBRAE-Pernambuco</b>	Serviço Brasileiro de Apoio às Micro e Pequenas Empresas (Brazilian Micro- and Small Enterprise Support Service/Pernambuco Office)
<b>SENA</b>	Servicio Nacional de Aprendizaje (Colombia's National Training Service)
<b>SIAL</b>	Local Agrifood Systems
<b>SIPSA</b>	Sistema de Información de Precios y Mercados del Sector Agropecuario (Information System on Agricultural Prices and Markets), Colombia
<b>SME</b>	Small and medium-size enterprises
<b>UBN</b>	Unsatisfied basic necessities
<b>WTO</b>	World Trade Organization



## Executive summary

One of the main aims of Latin American and Caribbean Governments over the past two decades has been to integrate the region into the global market. Its ties and linkages with production chains in the region make rural agro-industry (RAI) a key element in allowing small-scale agricultural production units to maintain or increase their market share in a more dynamic, sustainable and cost-effective manner, by carrying out activities for processing and adding value to agricultural raw materials at peasant farm level.

One of the planned activities of the medium-term project by the Agricultural Support Systems Division of the Food and Agriculture Organization of the United Nations (FAO-AGS), entitled “Enhancing Smallholder Livelihoods”, was to evaluate the panela agro-industry as a strategy for diversifying farm income by analysing patterns of change and associated success factors. The reason for this choice is that the panela production unit is a vertically integrated system in which the rural producer participates in the entire process of producing sugarcane, processing it into panela and selling the finished product. The vertical nature of the panela agro-industry has facilitated the development of more effective and flexible livelihood strategies than any that may arise from horizontal or primary-production type processing activities.

The specific objectives of this study were to: (i) conduct an in-depth assessment of the viability and commercial sustainability of Colombia’s panela agro-industry and to make a comparative overview of the panela agro-industry in Brazil and Guatemala, where panela is a major local production item; (ii) assess the impact of panela production on producer incomes and livelihoods in Colombia; and (iii) provide information on the institutional and financial support required for Colombia to improve its commercial viability and to increase profits for small-scale farmers.

Panela production is one of the most traditional rural agro-industries in Latin America and the Caribbean. Panela is a foodstuff made from the juice of sugarcane (*Saccharum officinarum* L.) in small rural sugarcane mills called *trapiches*. World production of this type of whole unrefined non-centrifugal sugar, which is generally sold to consumers in the form of solid blocks of brown sugarloaf, is close to 13 million tons per year. Panela differs from white and demerara sugar not only in physical appearance, but also in chemical composition. Panela contains sucrose, as well as glucose, fructose and various minerals, fats, proteins and vitamins, making it nutritionally richer than sugar.

Unlike sugar, which in Latin America is produced by a small number of large-scale industrial sugar mills, on fertile, mechanized plains where sugarcane monoculture predominates, panela is produced on small peasant farms, in mountain areas with limited fertility and mechanization, where farming families endeavour to diversify panela production with livestock production, crop cultivation and processing activities, using primarily family labour. From a market standpoint, there are also great differences between industrial and



artisanal sugarcane mills. Unlike sugar, which is produced under oligopolistic conditions, is often subsidized and has an extensive domestic and international market, panela is produced by a large number of scattered unsubsidized producers who generally serve a local or national market and seldom export abroad to cater to Latin American expatriate communities in comparatively more developed countries.

There are an estimated 50,000 *trapiches* in Latin America and the Caribbean, together employing more than one million people (PRODAR, 1994). According to the latest FAO statistics, panela production in the region was around 2 million tons in 2001, representing roughly 17 percent of world production. In order of importance, the panela-producing countries on the continent are cited as: Colombia, Brazil, Mexico, Guatemala, Venezuela, Haiti, Peru, Ecuador, Honduras, El Salvador, Costa Rica, Nicaragua, Panama, Dominican Republic, Bolivia and Argentina.

In Colombia, panela production is one of the main income-generating activities for more than 70,000 families in the Colombian Andes. Other indicators of the importance of panela production in Colombia are that: directly and indirectly it involves 350,000 people, including producers, workers, traders and others. It generates the equivalent of 120,000 permanent jobs. A total of 226,000 hectares are given over to growing sugarcane for panela. It accounts for a 6.7 percent share of agricultural gross domestic product (GDP). It accounts for 2.18 percent of consumer food spending. Colombia is the second world producer of panela after India and has the largest per capita apparent consumption, with around 32 kg/person/year (Rodríguez, 2001). Almost all the panela produced is sold on the domestic market for direct consumption. It is estimated that less than 1 percent of the panela produced is used as an input for industrial processes and around 0.4 percent is destined for export. In the 1990s, Colombia's total panela production value averaged around US\$ 500 million per year (CORPOICA, 2001).

Colombia's panela production sector comprises around 15 Local Agrifood Systems (SIAL), with varying scales of production and levels of technology, each with its own specific agro-ecological and socio-economic conditions. This study makes an in-depth analysis of three cases in the regions of Hoya del Río Suárez, western Cundinamarca and northern Cauca.

The Rural Micro-enterprise Development Programme (PADEMÉR) provides direct support for Colombia's rural agroprocessing activities, encompassing the full range of production, business, organizational and market development aspects. Direct support also comes from the Integrated Support Programme for Small Producers in the Rural Economy (PAIPPEC), which is designed to consolidate an associative rural enterprise base for involving rural producers in agricultural recovery, thereby increasing the efficiency of production, processing and marketing systems.

In Guatemala, panela production is an age-old activity in which families endeavour to diversify production with both livestock and crop-growing activities. Panela production is the principal source of income and employment for many farming families, especially in the departments of Santa Rosa, Quiché, Baja Verapaz, Chiquimula, Zacapa and Retalhuleu. Panela producers employ a large percentage of family labour, especially women, in sugarcane cultivation and processing. Panela production units tend to be low technology.

As regards job creation, according to data from this study, in the regions of Santa Rosa, Joyabaj and Chicamán, panela production requires between 2,375 and 3,091 person-hours/hectare/year. Producers' net profits range from US\$ 108 to US\$ 8,497, depending on their scale of production and level of technology.

Guatemala's Agricultural Policy focuses on guaranteeing food security, providing training, providing access to finance, promoting the marketing of agricultural products, providing technical support to small- and medium-size producers and promoting the country's fruit sector. There would seem to be no specific plans or policy measures for improving productivity and competitiveness in Guatemala's panela sector.

Brazil is the second largest panela producer in Latin America, where this sector represents a major source of income for many farming families, especially in north-east Brazil. Most panela production units tend to be low technology, in terms of both sugarcane cultivation and panela production. In many cases, *trapiches* produce both panela and "cachaça", a popular spirit made artisanally by distilling the alcohol from fermented sugarcane juices. Panela is a basic staple in the diet of production unit members, not only as a sweetening agent but also because income can be generated from selling surpluses. According to data from this study, around 689 person-hours/hectare/year are spent on panela production in the region of Vale do Pianco, with a annual net return per producer of US\$ 1,734.

Brazil's 2003-2004 Crop and Livestock Farming Plan focuses on the capitalization of rural producers' cooperatives, access to finance, investment programmes, dairy programmes, production redeployment and rural insurance. In addition, Brazil's National Programme for Agro-industrialization in Family Farming seeks to support agro-industrialization and marketing of family farmers' products, in order to add value to rural production and generate revenues and job opportunities in the rural sector. At regional level, Brazil's Programme for Agro-industrial Production Chains supports the organization and implementation of government plans to promote the development of priority production chains.

## **IMPACT OF PROCESSING ACTIVITIES AT RURAL LEVEL: CASE OF COLOMBIA**

In the regions under study (Hoya del Río Suárez, Cundinamarca and Cauca), the crisis in the region's own traditional crops in centuries past - such as tobacco, coffee and cotton - led to these crops being displaced by more agro-industrial and commercial activities. In the three regions under study, revenue from panela production currently forms more than 50 percent of family incomes. Cauca is the panela-producing region where sugarcane cultivation and processing forms the largest proportion of the family income, with 73 percent, followed by Hoya del Río Suárez (HRS), with 60.5 percent, and Cundinamarca, with 58.2 percent.

As regards total farmland given over to growing sugarcane, in HRS sugarcane accounts for 68 percent of total farmland, with farms averaging 55.2 hectares; in Cundinamarca 58.3 percent of the average 15-hectare farm is under sugarcane; and in Cauca 54 percent of the average 9-hectare farm is under sugarcane.

The annual regional income from panela is estimated to be US\$ 70.2 million for HRS, US\$ 52.8 million for Cundinamarca and US\$ 24.2 million for Cauca.

Job creation is another important aspect in sustaining panela-producing families and the other people involved. In Cauca, from an average family unit of six people, four work in sugarcane cultivation and processing; that is to say, it occupies two-thirds of family members. In Cundinamarca it occupies approximately 60 percent of family members, with an average of three working in panela production out of a family of five people. In HRS, the share of family labour is relatively low: of an average family of five people, only one or two work in panela production.

The regional analysis reveals that, in HRS, each panela production unit works an annual average of 48,303 person-hours, in Cundinamarca, 8,215 person-hours and in Cauca, 7,530 person-hours, together generating the equivalent of around 42,200 jobs in the three regions under study. This shows just how important the panela agro-industry is in employing the rural labour force.

Producers were seen to have a diverse combination of strategies for increasing their revenues, mostly linked with improving the sugarcane production system, growing and processing sugarcane and using the by-products for livestock activities.

Producer strategies for countering adverse market effects, particularly unstable panela prices, vary. Some producers choose to stop production until prices rise, others choose to reduce production costs to a minimum or to seek alternative markets that pay better prices for panela, whilst yet others prefer to seek alternative uses for sugarcane, such as animal feed.

A key element in family livelihoods and in local and regional economic and social stability is the relationships of kinship, neighbourliness and shared identity among local people, which allow monetary and non-monetary exchanges that are crucial for the movement of labour, land and capital. Also, associations are often formed among rural producers and between rural producers and agricultural investors to help to minimize risks arising from uncertain and unstable markets.

The general conclusion is that the panela production system's adaptability and stability stems in great measure from the way in which the system is organized and from solidarity networks that give panela producers certain advantages, like flexible production lines, a combination of production activities, a significant contribution to the household income from self-consumption and associations among rural producers and between rural producers and agricultural investors.

## **ANALYSIS OF REGIONAL COMPETITIVENESS**

HRS has the highest land productivity, measured in terms of panela produced per hectare/year, owing to the introduction of agronomic technologies such as new sugarcane varieties, the application of fertilizers, weed control, periodic replanting of crops and, indirectly, because of

improved extraction of sugarcane juice in mills, which increases the amount of sugarcane processed into panela.

HRS has the lowest labour force requirement per ton of panela produced, owing mainly to production efficiency in the sugarcane cultivation and processing phases. However, Cundinamarca gains in competitiveness because of its more efficient sugarcane transportation system and the shorter distances between sugarcane fields and *trapiches*.

The cost of panela production is slightly lower in Cundinamarca than in HRS, mainly on account of more efficient sugarcane transportation and to the fact that wages for panela processing are comparatively lower in Cundinamarca. In Cauca, although production costs are higher owing to the small scale of production and low level technology, the region's panela still manages to compete because it uses a high proportion of unpaid family labour and because panela fetches a higher market price. Traditionally, prices have been similar in HRS and Cundinamarca markets but significantly higher in Cauca, and in western Colombia generally, where there are lower production levels and higher per capita consumption of panela.

Net revenues per production unit (farm/*trapiche*) are comparatively high in HRS because of its large-scale production and low production costs, stemming from the introduction of cultivation and processing technologies. Not all of these earnings go to the *trapiche* owner but are usually shared with other stakeholders in the region, such as sharecroppers with no land or *trapiche* who grow sugarcane jointly with landowners. Another type of panela producer is landowners who grow sugarcane but who hire a *trapiche* as they do not own one. It has been estimated that, in HRS, in addition to the *trapiche* owner, around two to three sharecroppers and four to five sugarcane growers with no *trapiche* benefit from a farm with a *trapiche*.

In the other regions, it is common for *trapiche* owners and sugarcane growers without a *trapiche* to share milling operations, as in Cundinamarca, or to hire *trapiches* for which payment is in panela or labour, as in Cauca.

## **STRATEGIES FOR STRENGTHENING AND MODERNIZING COLOMBIA'S PANELA AGRO-INDUSTRY**

After making a feature-oriented domain analysis (FODA) in regional participative workshops and holding discussions with the panela-producers' association, lines of action were identified for designing a research and technological innovation plan for Colombia's panela agro-industry. The Strategic Plan includes three projects, each corresponding to the Plan's strategic objectives:

Project 1: Development of clean technologies for the sustainable and competitive development of Colombia's panela agro-industry. The project includes the following technology components: (i) development of a set of recommended good farming practices (GFP) for growing sugarcane in different Colombian ecosystems; (ii) development of a set of recommended good manufacturing practices (GMP) for panela production and (iii) design of ecological furnaces (self-sufficient in energy) for different scales of production, aimed at eliminating or significantly cutting the consumption of wood and used tyres and at reducing carbon emissions into the atmosphere.

Project 2: Improvement of panela quality, presentations and uses. The project includes the following technology and market components: (i) prospective analysis of the panela market and of commercial opportunities for new panela presentations and uses; (ii) technical assistance to panela companies in implementing GMP and other quality assurance systems (HACCP, ISO, organic production) in export and certification programmes; (iii) development of processes and design of equipment for producing new types of panela presentation and packaging (granulated panela, liquid panela, inverted syrups, flavoured panela, etc.); and (iv) development of industrial processes for using panela and syrups as an input for making food and beverages, pharmaceuticals, cosmetics and other products with market potential.

Project 3: Development of diversification alternatives for exploiting sugarcane, by-products from sugarcane processing and other farm species in livestock production programmes. The project includes the following technology components: (i) adaptation of recommendations on the diet and management of cattle, pigs and poultry on sugarcane farms, based on feeding animals with sugarcane and other by-products from sugarcane cultivation and processing; (ii) adaptation of recommendations on composting waste from panela processing with animal manure from livestock production for use as organic fertilizer; (iii) production of proteinaceous materials from sugarcane and bagasse; (iv) adaptation of recommendations for sugarcane farms to grow and manage plant species as a source of protein in animal feed; and (v) assessment and technological support for programmes to produce alcohol fuel in panela-producing areas.

The implementation of the Action Plan and of the proposed projects is expected to help to raise the social and economic level of the rural population involved in Colombia's sugarcane agroprocessing chain. This will provide new technological options for diversification to enable producers to respond to market trends. The Plan will also help to make local sugarcane agroprocessing systems sustainable at peasant farmer level by means of coordinated measures for improving producer organization, for technology development and transfer and for market management and promotion, with the participation of the panela-producers' association and of governmental and non-governmental organizations.

# Introduction

One of the main aims of Latin American and Caribbean Governments over the past two decades has been to integrate the region into the global market. The structural transformation of the economy, based on the systematic incorporation of technological change to increase labour productivity, has been one of the most significant elements in their bid for true integration into the world economy.

According to the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), in the past decade the region as a whole has shown one of the best growth rates in world merchandise trade, as well as a profound change in export composition. However, trade flows were not, as hoped, consolidated into a virtuous circle of investment and growth. Evidently the process of trade policy modernization that has taken place in Latin America and the Caribbean has still not succeeded in substantially changing the region's export specialization.

During the three years from 1999 to 2001, one third of Brazil's total exports comprised high and medium technology manufactured products (ECLAC 2003). In Mexico, which accounts for around 47 percent of total Latin American and Caribbean exports, almost half its exports were from the export assembly (*maquila*) sector. Argentina, Uruguay, Colombia and Venezuela increased their share of medium technology-intensive manufactured products. These include consumer durables like motor vehicles, for which trade has been stimulated by special agreements in Mercosur and the Andean Community. Chile, which has presented the highest export growth in the region, still depends on primary and manufactured products based on natural resources (90 percent).<sup>1</sup>

The countries of the region increased their share of more technology-intensive products, although this must be viewed with caution since it occurred mainly in the stages requiring less skilled labour.

Manufactured products based on natural resources, as well as agro-industrial manufactured products, endowing national economies with a positive dynamic of high productivity growth rates, technology learning and upstream and downstream linkages, just as in the high-technology manufacturing sector. However, the factor that triggers this process has to be the introduction of technology and efficient services in order to gradually increase local processing of natural resources, adding value throughout the production, distribution and marketing chain.

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<sup>1</sup> CEPAL, 2003.

As ECLAC points out, this can be achieved by promoting cooperation between local and transnational firms, as well as by incorporating small and medium-size enterprises (SME) into production chains. This would be done by setting up a variety of business partnership schemes, forming clusters and consolidating an integrated trade policy that re-evaluates each country's natural resource endowment, either for industrial purposes or to promote tourism services.

In the face of this world integration scenario, based on the export of agricultural products and a lack of competitiveness, Latin American and Caribbean countries find that their specific local conditions and clusters or local production systems represent a key factor for their industrialization and development and for building their capacity to maintain or increase their world market share in a more dynamic, sustainable and cost-effective manner.

Some analyses of the new world economy and of the local and regional economy indicate that local production systems enable small- and medium-size production units to overcome problems of access to credit, technological innovation, labour recruitment and risk-taking, which constraints usually deny them access to more complex production processes. Furthermore, the grouping of firms from the same sector in a given geographical area (or clusters) leads to a greater concentration of resources and specific assets<sup>2</sup>, an increased scale of production within an intercompany cooperation framework and access to larger and remoter markets.<sup>3</sup>

Rural agro-industry (RAI) in Latin America and the Caribbean can therefore be considered, at least in some respects, as a clustering process because it is found in specific geographical areas and is not confined to a single activity but encompasses a set of activities linked at the level of production chains, some of which may include non-agricultural production or service activities. Furthermore, RAI involves a group of local and national firms and institutions working towards the development of specific areas.

Owing to its ties and linkages with production chains, RAI helps to create non-farm employment especially in rural areas, which promotes rural production, supplies goods and creates added value and incomes that help to improve rural welfare. RAI therefore plays a major role in rural development and poverty alleviation.

Within this framework of local agrifood development and rural dynamics, RAI can be incorporated into Local Agrifood Systems (SIAL) because it is a local production system geared towards agrifood activities, where the rural area is a key factor of competitiveness.

In view of this and of the importance of local production systems for the region's competitiveness and for its integration into the world market, RAI needs to be studied as a key factor for achieving product differentiation, export diversification and a more dynamic share of the world market for Latin America and the Caribbean in order to build a strategy for local, regional and national competitiveness.

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2 Specific assets are mobilized resources which are closely linked with the characteristics of a specific geographical area [translated from the Spanish] (Colletis and B. Pecqueur, 1995).

3 Denis Requier-Desjardins, 1999.

As part of this rural agro-industry approach, this present study analyses the specific case of the panela agro-industry in three Latin American countries to assess how far the processing activities of small-scale rural producers' impact on production diversification, income and job creation, local and regional food security, natural resource conservation and the integration of rural economies into local, regional, national and international markets.

Section one of this study characterizes agricultural policies in Colombia, Brazil and Guatemala, with the focus on policies for diversifying and promoting processing activities at small-scale rural producer level and analyses the sectoral instruments that have been implemented specifically to enhance the competitiveness of the panela sector. It also describes the socio-economic and technological characteristics of panela production in the three countries under study.

Section two analyses the factors of competitiveness in rural agro-industry, taking Colombia's panela agro-industry in three different regions as a case study: Hoya del Río Suárez, western Cundinamarca and northern Cauca.

Section three assesses the impact of processing activities by Colombia's panela agro-industry on the quality of life of producers, income generation, employment, producers' production assets, resource productivity, conservation of natural resources and family food security.

The fourth and final section identifies and prioritizes the problems of Colombia's panela agro-industry, as seen by different actors and regions and on this basis it puts forwards strategies and lines of action that will allow panela producers to maintain their domestic market whilst achieving integration into the world market, within a free market approach.





# **1. Policies and programmes to support the processing activities of small-scale rural producers: case analyses of Colombia, Brazil and Guatemala**

Within the new scenario of trade opening and world integration, agricultural policy management in Latin America and the Caribbean, especially as regards small and medium agricultural producers, has been designed to consolidate local, regional, national and international markets, by incorporating and modernizing technology and supporting the development of diversified and competitive forms of rural enterprise.

Below is a description of the most important aspects of agricultural policy in the three countries under study for supporting and promoting rural agro-industry in general and the panela sector in particular.

## **COLOMBIA**

The current government plan sums up public policy towards Colombia's farming sector in its programme for the social management of rural areas, with its 15 social impact initiatives ("Manejo Social del Campo: 15 Iniciativas de Impacto Social"). The programme proposes the reasonable protection of domestic production, job protection and creation and food security, within the free-market framework and in line with WTO agreements.

As regards rural agro-industry, the Plan to modernize the Rural Economy identifies and prioritizes the most promising and competitive production items. The Programme for the period 2003 to 2007 can be summarized as follows:

**Table 1: Plans and programmes in the Plan to modernize Colombia's Rural Economy**

Plans and programmes	Objectives
<b>Support for Production Alliances</b>	To structure production projects in such a way as to consolidate lasting relations between small producers, agroprocessors and marketers.
<b>Rural Micro-enterprise Development Programme (PADEMER)</b>	To support rural microbusinesses as a strategy for job and income creation for the poorest families.
<b>Social Business Projects</b>	To set up socio-business alliances and rural microbusinesses with small producers and the private sector.
<b>Programme for Rural Women (FONMUR)</b>	To support rural women in getting easy and timely access to credit. The Development Fund for Rural Women is part of FONMUR.
<b>Agricultural Supply Programme (PROAGRO)</b>	To improve the competitiveness of agroprocessing chains with extensive potential for expanding into the domestic and foreign market.
<b>National Technology Transfer Programme (PRONATTA, ends in 2003)</b>	To facilitate small agricultural producers' access to, and adoption of, technologies that meet their real needs and are environmentally sustainable, competitive and equitable, thereby building social capital.
<b>Environmental Sustainability (Concerted Policy and Action Plan)</b>	The first aim is to guarantee the lifespan of projects and to control and properly manage internal and external factors that could undermine project implementation, preventing the achievement of project objectives. The second aim is to satisfy needs without damaging the physical, human and environmental resources of future generations.

## **PLAN TO MODERNIZE THE RURAL ECONOMY**

The aim of Colombia's Integrated Support Programme for Small Producers in the Rural Economy is to facilitate the access of small producers to sectoral policy instruments by building their entrepreneurial and associative capacity, as well as by enhancing the efficiency of their production, processing and marketing systems. Table 2 shows the plans and programmes receiving support.

All of these activities are concentrated at regional level in those production sectors with the most promise which contribute significantly to the formation of agricultural GDP and are characteristic of rural production. The projects will receive integrated support for three years.

**Table 2: Products and regions included in the Plan to modernize Colombia's Rural Economy**

Productos	Regiones
Banana	Eje Cafetero, Meta, Urabá - Córdoba, Magdalena
Sisal	Cauca, Santander, Nariño
Yam	Bolívar - Sucre - Magdalena
Cassava	Costa Atlántica, Valle, Piedemonte Llanero, Tolima
Sesame	Costa Atlántica
Haricot bean	Valle del Sibundoy, Sur de Bolívar, Antioquía, Huila, Eje Cafetero
Tobacco	Montes de María (Bolívar and Sucre), Santander, Huila
Barley and wheat	Altiplano Cundiboyacense
Sugarcane	Hoya del Río Suárez, Cundinamarca, Cauca - Nariño
Maize	Córdoba, Sucre, Tolima, Huila, Valle, Llanos, Cesar, Santander,
Bolívar	
Cocoa	Santanderes, Cesar - Guajira - Magdalena, Huila - Tolima, Nariño - Cauca, Viejo Caldas, Antioquia, Arauca, Orinoquía
Potato	Nariño, Boyacá - Cundinamarca, Antioquía, North Santander
<b>Fruit trees:</b> Citrus fruits: orange, mandarin orange, lime and grapefruit	Costa Atlántica
<b>Deciduous trees:</b> apple, peach, plum and pear	Eje Cafetero - Antioquía
<b>Promising products:</b> night-blooming cereus, granadilla, husk tomato, grape, tree tomato and baby banana	Valle - Cauca - Nariño
<b>Agroprocessing:</b> mango, blackberry, guava, passionfruit, lulo fruit, banana passionfruit and pineapple	Llanos Boyacá - Cundinamarca
<b>Fresh products:</b> papaya, avocado and melon	Santanderes
<b>Hortalizas: Agroindustria:</b> tomate y ajo	
<b>Fresh products:</b> onion, pea, carrot, green bean, lettuce and cabbage	Tolima - Huila
<b>Promising products:</b> asparagus, mushroom, pepper and broccoli	

Another programme to assist small- and medium-size producers is the Rural Financing Programme, which aims to increase individual and collective loans to Colombia's small- and medium-size producers. Table 3 lists the instruments and measures through which this funding is channelled.

### **Cuadro 3: Instrumentos de Política Agropecuaria en Colombia**

<b>AGRICULTURE POLICY INSTRUMENTS</b>	<b>OBJECTIVE</b>
<b>Fund for financing the Agricultural Sector (FINAGRO)</b>	To finance farming activities by channelling and administering sufficient and timely resources. To provide lines of credit for working capital. It finances projects such as: construction work, purchase of machinery, purchase of animals, establishing crops. The beneficiaries are small-, medium- and large-scale producers.
<b>Agricultural Guarantee Fund (FAG)</b>	To underwrite the rediscounted value of new credits submitted to FINAGRO for producers who do not have sufficient guarantees or whose guarantees are already committed. It is aimed at small-, medium- and large-scale producers.
<b>Rural Capitalization Incentive (ICR)</b>	To provide a government cash grant to people who implement new investment projects for capitalizing and modernizing agricultural and fishery production. The aim is to improve competitiveness, reduce risk and guarantee sustainable agricultural production. It is targeted at small-, medium- and large-scale producers.

The current Government's planned sectoral policy for the panela sector mainly comprises credit access programmes and a continuation of the Agricultural Recovery Programme (PRAN), whose objective is to restructure the agricultural loan portfolio and to rehabilitate producers to allow them access to new loans in a bid to keep them in farming.

Colombia's Integrated Support Programme for Small Producers in the Rural Economy includes actions and projects for sugarcane cultivation and panela production. It will also continue to co-finance technical assistance and scientific research programmes and the social restructuring and development programme.

The Sectoral Competitiveness Agreement for the sugarcane and panela chain was concluded in 2002, focusing on markets, the coordination of public investment, technological development, credit, environmental development, training and information for the various operators in the production chain.

Also in 2002, the regional competitiveness agreement for panela was signed in Nariño and some of the principal activities have been to: organize and train producers, transfer technology,

provide technical assistance with growing sugarcane, processing and marketing panela, improve producers' service infrastructure and upgrade rural housing.

In western Cundinamarca and Hoya del Río Suárez, which are the leading panela-producing regions, consultations are under way for concluding a sectoral competitiveness agreement.

Again in 2002, resources totalling US\$ 2 billion were earmarked for setting up six centres for producer services, for technology research and transfer, for pest management, for training to improve panela quality, for improving processing and for upgrading rural housing. Co-financing was provided by the Panela Development Fund (Fondo de Fomento Panelero) and a number of institutions: Ministry for Economic Development, Inter-American Institute for Cooperation on Agriculture (IICA), the National Training Service (SENA), CORPOICA, the Agriculture and Livestock Institute (ICA) and the departmental Agriculture Secretariats.<sup>4</sup> The Fund is managed by the National Panela Producers' Federation (FEDEPANELA).

## THE PANELA AGRO-INDUSTRY IN COLOMBIA

Panela production is one of the most traditional rural agro-industries in Latin America and the Caribbean. In contrast to the sugar industry, panela is produced artisanally in small peasant farms using a high proportion of family labour, very few of which have introduced mechanized technologies or are highly capital-intensive (Rodríguez, 2001).

Virtually all the Latin American and Caribbean countries produce panela. The main panela-producing countries are cited as: Colombia, Brazil, Mexico, Guatemala, Venezuela, Haiti, Peru, Ecuador, Honduras, El Salvador, Costa Rica, Nicaragua, Panama, Dominican Republic, Bolivia and Argentina. In 1998, panela production in Latin America was around 1.8 million tons per year, representing roughly 12.3 percent of world production (PRODAR, 1994).

Panela is known by different names in the various Latin American countries: *panela* (Colombia, Guatemala, Panama, Ecuador, Bolivia), *chancaca* (Peru, Chile), *rapadura* (Brazil, Argentina), *raspadura* (Dominican Republic, Ecuador), *papelón* (Venezuela), *piloncillo* (Mexico), *tapa dulce* (Costa Rica), *atado de dulce* (Nicaragua), *empalizado* (Bolivia).

The panela agro-industry is one of the principal economic activities in the Andes region of Colombia. It provides income for more than 70,000 farming families, who serve the significant domestic demand for a product that is rooted deep in Colombia's urban and rural consumer traditions. Some indicators of panela's importance in Colombia are as follows (Rodríguez, G. 2000):

- Colombia is the second world panela producer, after India, and accounts for around 10 percent of world production (13 million tons/year).
- It involves 350,000 people including producers, workers, traders and others.
- It generates the equivalent of 120,000 permanent jobs.

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<sup>4</sup> Ministry of Agriculture, 2002, p. 79.

- A total of 226,000 hectares are given over to growing sugarcane for panela.
- The panela processing infrastructure includes 20,000 *trapiches*.
- It accounts for a 6.7 percent share of agricultural GDP.
- It accounts for 2.18 percent of consumer food spending.
- Colombia has the largest per capita consumption of panela in the world, with around 32 kg/person/year.

Sugarcane is grown mainly in the Andes region on the slopes of the three mountain ranges that traverse the country, at an altitude of between 700 and 2,000 metres above sea level. Although sugarcane is grown under a wide variety of physiographic conditions in the different regions, it tends to be concentrated mainly on medium to high hillsides with a gradient of 10 percent to 40 percent (Hoya del Río Suárez, Cundinamarca, Nariño, Antioquia, Eje Cafetero and North Santander regions).

Panela production is dispersed widely throughout Colombia and is a common economic activity in virtually all departments of the country. The largest panela-producing departments are Boyacá, Santander, Cundinamarca, Antioquia, Huila and Nariño, where more than three quarters of domestic production is concentrated. The yields obtained per hectare vary widely, owing to the differing socio-economic and technological contexts in which panela is produced. The highest yields are in the Hoya del Río Suárez region (in the departments of Boyacá and Santander), where there has been the greatest technological development in both sugarcane cultivation and processing.

As mentioned earlier, Colombian panela is produced in a variety of regional contexts, each with its own specific technological and socio-economic conditions. For instance, in the Valle del Cauca and Risaralda regions there are some large-scale farms with production capacities exceeding 300 kg of panela per hour. On these farms, where panela production is eminently commercial, workers are hired continually, subject to the labour legislation in force. In such cases it is common for sugarcane plantations to be more than 50 hectares in size and to be owner-farmed. In other cases, *trapiche* owners buy batches of sugarcane from growers for processing into panela.

Medium-size farms predominate in the regions of Hoya del Río Suárez (Boyacá and Santander), Nariño and some municipalities of Antioquia, where panela production capacities vary from 100 to 300 kg/hour. Although such farms are integrated into the market on a commercial basis, in terms of recruiting workers, buying inputs and selling panela, some characteristics of the traditional economy remain, such as sharecropping.

In parts of western Cundinamarca, such as the provinces of Gualivá, Rionegro and Tequendama, as well as in most of the municipalities of Antioquia, Tolima, Huila and North Santander with a temperate climate, farms are small scale. In fact, small-scale farms can be considered as most representative of Colombia's panela agro-industry. In this case, panela is produced mainly within a rural economy context, with farms ranging in size from 5 to 20 hectares and in mechanically-powered *trapiches* with panela processing capacities of 150 to 100 kg per hour.

In this type of small production unit, hiring of *trapiches*, joint milling and sharecropping are common practices. Another characteristic feature of small farms is the intensive use of labour, especially family labour, and the hiring of temporary workers for milling tasks. There

has still been little introduction of technology into small-scale production. In fact the greatest technological change has been the introduction of motors to drive sugarcane mills.

Lastly, Colombia has many small producers of panela and syrup, who make their products in smallholdings or microholdings on farms of less than 5 hectares and who frequently process sugarcane jointly with neighbours who own *trapiches*, in mills powered by small motors or by animal traction with production capacities of less than 50 kg of panela per hour. In these cases, there is little labour market integration and most of the growing and processing tasks are done using family labour, as mentioned earlier.

### **GENERAL CHARACTERISTICS OF COLOMBIA'S PANELA MARKET**

Almost all the panela produced in Colombia is sold on the domestic market for direct consumption. It is estimated that less than 1 percent of the panela produced is used as an input for industrial processes and around 0.4 percent is destined for export. For instance, in 2000 only 4,808 tons of panela were exported, mainly to countries where the majority of Colombian expatriates are concentrated, like Venezuela and the United States. Switzerland, Italy, France and the Netherlands also import small quantities. An important development in recent years has been registered imports of panela from Ecuador.

There are predominantly two types of panela distribution channel. The first is in the plains of Valle del Cauca and Risaralda, where producers dispatch panela directly to supermarkets or to local markets for sale to consumers. The second (and most common) distribution channel can be found in Colombia's other panela-producing regions, where small- and medium-size producers predominate, in which there is a longer distribution chain of intermediaries.

In this second type of channel, the commonest types of intermediary are the stockpiler, wholesaler and retailer. There are, of course, variants in this chain, with other intermediaries of varying size involved, and in some regions, producer cooperatives.

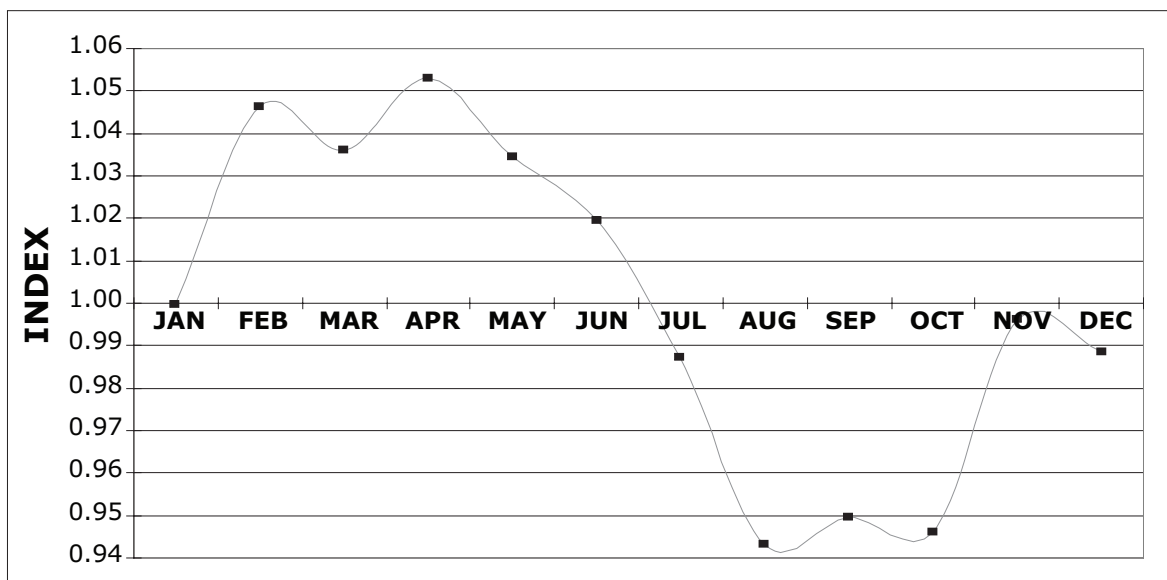
There are seasonal and cyclical variations in panela production and prices. Seasonal variations in production are usually associated with climatic and rainfall factors and with some economic factors stemming from competition for labour between panela production and other farming activities, which affects prices in the short term (see diagram 1). The normal trend is to plant sugarcane during the rainy months, which increases the supply of panela and reduces prices.

Moreover, as sugarcane is very often grown in the same areas as coffee, the number of panela millings is seen to decrease during the coffee harvest because workers switch to picking coffee, thereby reducing the supply of panela and increasing its price.

Cyclical variations in panela production and prices stem from climatic factors and from other eminently economic factors.

One of the most influential climatic factors is the Pacific phenomenon, which, at irregular intervals, causes very dry years with a low sugarcane production rate and high prices, or very rainy years with high production and low prices.



**Diagram 1: Seasonal wholesale price index for panela in Bogotá (1981-2002)**

Source: Corporación de Abastos de Bogotá (CORABASTOS) and Producer Price Index of Colombia's National Statistics Department (DANE), 1981-1998.

The impact of economic factors is more complex to explain. First and foremost, panela and sugar are competing or substitute products in both production and consumption terms, as they come from the same plant species (*Saccharum officinarum*) and are both sweeteners in daily use. This means that the sugar supply trend and market have a direct impact on panela production and prices.

The structure of the sugar industry is capital-intensive, whereas that of panela is labour-intensive. Sugar is produced using sophisticated technology, which makes it possible to obtain three times higher sugarcane and sugar yields than in the case of panela.

The sugar produced is largely for export and so sugar prices are influenced by world market conditions. Moreover, the world sugar market, particularly the United States, sets quotas for the various sugar exporting countries. So, whenever there is a reduction in the export quota or a drop in world sugar prices, Colombian producers are obliged to sell their sugar on the domestic market, causing the price to fall. As panela generally fetches higher prices, it again becomes attractive to divert sugarcane into panela production or to convert sugar into panela.

This leads to an oversupply of panela which depresses the panela price, with serious repercussions, especially on less efficient producers who, if the situation continues for a long time, are unable to compete on costs and are forced to exit the market. By contrast, when the inter-national sugar market improves, the sugarcane growers of the plains once again send their production to industrial sugar mills, reducing the supply of panela and raising panela prices once more.

When panela prices fall to unprofitable levels, it discourages farmers from planting new sugarcane fields and/or leads them to neglect to maintain sugarcane crops for panela, causing

a decline in yields and production. The supply of panela then falls to a level at which prices rise and it again becomes attractive to plant seed cane and maintain sugarcane fields properly, triggering a new production and price cycle. The duration of these alternating cycles is rather irregular as it is influenced by factors in both the sugar and panela markets (diagram 2).

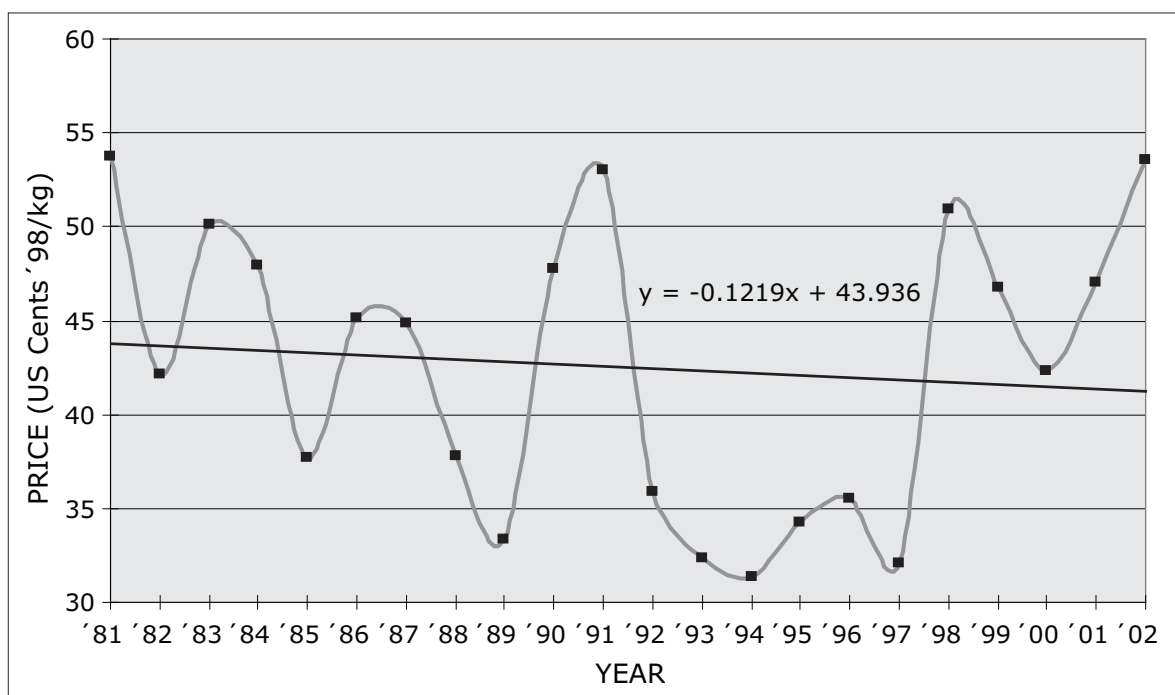
The direct correlation between the price of sugar and the price of panela mean that official sugar policies and sugar price controls impact on panela production.

A long term retrospective analysis for the period from 1981 to 2002 revealed that panela prices have tended to fall in real terms, owing to an increase in supply coupled with only a slow increase in demand and a gradual change in consumer preferences.

In spite of market imperfections in the panela marketing structure, large-scale intermediaries play a useful role in regulating prices in the medium to long term, even though they may obtain windfall profits that have a short-term impact on price levels, because they achieve economies of scale by reducing the costs of panela storage and transportation.

Windfall profits for large-scale intermediaries distort the market and are directly related with the concentration of volumes sold. This concentration is not as marked in the case of panela, where an estimated 75 percent of panela production is bought by stockpilers, each purchasing less than 5 percent of total production. In addition, the total sales mark-up between the producer price and the consumer price has decreased steadily over the years, from 100 percent in 1960 to less than 30 percent in 1990. The latter mark-up is considered to be fairly small, in view of the product's perishability.

**Diagram 2: Trend in the real wholesale price for panela in Bogotá**



Source: CORABASTOS and Colombia's National Statistics Department (DANE), 1981-2002.

## **PANELA CONSUMPTION**

Panela serves two main purposes. The first is as a foodstuff whose special nutritional characteristics make it a staple food for Colombian people, meeting some of their dietary needs for carbohydrates, minerals and vitamins. The second is as an ingredient for sweetening other foodstuffs.

Concerning panela as a foodstuff, some of the closest substitute foods are milk, chocolate, coffee and so on. Indeed, the gradual urbanization that has taken place in Colombia and the so-called process of modernization have led many former panela consumers to switch their preferences to other manufactured goods.

Concerning panela as a sweetening agent, its direct substitute products are sugar and honey and its indirect substitute products are low-calorie artificial sugars, generically called dietary sweeteners. As a sweetening agent, sugar is the commonest substitute for panela and, as mentioned earlier, it is made from the same raw material: sugarcane. This point is worth examining in closer detail.

On the one hand, panela production and prices cycles, for both producer and consumer prices, follow the same trend as sugar cycles. So, when the price of sugar falls below that of panela, consumers may switch over to sugar to save on family spending. The substitution elasticity between sugar and panela has been calculated as -0.65, which is to say that a 1 percent reduction in the relative price of sugar (price of sugar/price of panela) causes a 0.65 percent reduction in the relative consumption of panela (consumption of panela/consumption of sugar).

On the other hand, the aforementioned process of urbanization and poor panela presentation and quality have led modern consumers to prefer sugar as a sweetening agent because it is easy to use and quick to dissolve and it also comes in standard packaging. By contrast, panela is not easy to use and the panela sold in the market has traditionally varied in quality. Even where panela is sold at a cheaper price than sugar, sugar is the preferred sweetening agent.

In economic terms, panela has been defined as one of the so-called wage goods because of the share of panela consumption in the family shopping basket and food spending of the lowest-income rural and urban workers. On a regional scale, the highest levels of panela consumption are found in Colombia's coffee-producing departments. Of the cities which Colombia's National Statistics Department (DANE) studies to build the consumer price index, Manizales, Pereira and Medellín are those where panela forms the largest share of the family shopping basket and food spending, in both the low-income and middle-income brackets (see table 4).

In economic terms, panela is also considered to be an inferior good, in that its consumption is falling while real consumer income levels are rising. There is an estimated -0.5 income elasticity of demand, meaning that a 1 percent increase in consumer income leads to a 0.5 percent drop in demand for panela.

**Table 4: Panela consumption as a share of the family shopping basket and of food spending, by city and income bracket**

CITY	Percentage of the family shopping basket			Percentage of food spending		
	Low income bracket	Middle income bracket	Total	Low income bracket	Middle income bracket	Total
Bogotá	0.59	0.17	0.30	1.46	0.60	0.94
Medellín	2.35	0.75	1.31	5.60	2.44	3.78
Cali	0.80	0.30	0.47	1.85	0.98	1.33
Barranquilla	0.31	0.16	0.22	0.65	0.49	0.56
Bucaramanga	1.35	0.41	0.73	3.04	1.37	2.11
Manizales	4.02	1.73	2.56	8.98	5.08	6.75
Pasto	0.27	0.15	0.19	0.58	0.42	0.48
Pereira	3.16	1.35	2.00	7.65	4.07	5.54
Cúcuta	1.58	0.58	0.94	3.66	1.87	2.65
Montería	0.16	0.15	0.15	0.34	0.47	0.41
Neiva	0.58	0.29	0.40	1.40	0.88	1.11
Cartagena	0.21	0.10	0.14	0.45	0.30	0.36
Villavicencio	1.32	0.56	0.86	3.08	1.67	2.30

Indeed, according to socio-economic research by the Panela Research Centre of the Colombian Corporation for Agricultural Research (CIMPA) into the panela demand structure, panela consumption diminishes as household incomes rise, in both urban and rural areas. Table 5 shows the average per capita consumption of panela and sugar for six Colombian cities according to socio-economic stratum, and table 6 details the average per capita consumption of panela, sugarcane syrup and sugar in various panela-producing and non-panela-producing rural areas, according to the socio-economic strata in these areas.

**Table 5: Per capita consumption of panela and sugar (kg/year) in six Colombian cities (Bogotá, Barranquilla, Bucaramanga, Cúcuta, Tunja and Sogamoso), according to socio-economic stratum**

Socio-economic stratum	Panela	Sugar
Low	20.92	18.44
Medium	17.30	21.40
High	13.64	34.91
Weighted average	18.22	21.69

Source: Panela Research Centre of the Colombian Corporation for Agricultural Research (CIMPA), 1990.

**Table 6: Per capita consumption of panela, syrup and sugar in 26 rural municipalities of Boyacá (1), Cundinamarca (2) and Santander (3), based on the existence of unsatisfied basic necessities (UBN)(4) (kg/person/year)**

Households	Panela	Syrup	Sugar
With UBN	46.00	46.72	8.17
Without UBN	38.36	9.80	14.36
Weighted average	43.00	32.21	10.61

SOURCE: Panela Research Centre of the Colombian Corporation for Agricultural Research (CIMPA), 1991

(1) Chitaraque, Gámbita, Moniquirá, Santa Ana, San José de Pare, Toguí, Arcabuco, Cóbbita, Santa Sofía, Saboyá, Ventaquemada and Villa de Leiva.

(2) Chocontá, Gachantivá, Sesquilé, Suesca, Sutatausa, Tausa and Toncancipá.

(3) Barbosa, Chipatá, Güepsa, Puente Nacional, San Benito, Suaita and Vélez.

(4) Classification of households by Colombia's National Statistics Department (DANE), based on the existence of unsatisfied basic necessities.

Tables 5 and 6 show that, in both urban and rural areas, the highest relative consumption of panela and a simultaneously lower relative consumption of sugar are in the lowest income strata.

There is also a marked difference between rural and urban areas in the levels of per capita consumption of panela and sugar. In rural areas, panela consumption tends to be much greater than in urban areas and, conversely, sugar consumption tends to be lower. Elsewhere, in rural areas there is a significant consumption of sugarcane syrup for making *guarapo*, a spirit traditionally consumed by farm workers.

Lastly, there is some concern in the sector over the increase in sugarcane crops in recent years, which could lead to serious imbalances in the sugar and panela market.

According to the Ministry of Agriculture and Rural Development<sup>5</sup> the increase in sugarcane crops, prompted by the belief that the production of alcohol fuel will require large additional quantities of sugarcane, could serve to undermine the economic conditions of sugar and panela producers. This concern stems from the following indicators:

The domestic production of sugar rose from 1,893,236 tons in 1992 to 2,522,637 tons in 2002, equivalent to 33.2 percent growth. This was due to an increase in the area under cultivation, which grew from 142,224 hectares in 1992 to 203,069 hectares in 2002, and to a marked improvement in productivity, which stood at 14.3 tons of sugar per hectare in 2002.

Meanwhile, domestic sales fell from 1,326,895 tons in 1992 to 1,204,017 tons in 2002, while exports rose from 515,264 tons (27.2 percent of production) to 1,127,229 tons (44.7 percent of production) in the same period. In 2003, sugarcane and sugar prices fell even lower

<sup>5</sup> Ministerio de Agricultura. Agronoticias, Septiembre 30 de 2003. Disponible [www.minagricultura.gov.co](http://www.minagricultura.gov.co)

than in 2002 as international prices continued to sink and the share of exports has reached around 60 percent of domestic production.

Export prices are much lower than domestic prices. The weighted average price of sugar fell from US\$ 0.40/kg in January 2001 to US\$ 0.25/kg in August 2003, which, in current prices, means a 20 percent reduction in the income of sugarcane growers and sugar manufacturers during the period. This poses a threat to the sustainability of sugarcane production for sugar and it is logical to assume that growing areas will shrink, with the ensuing loss of jobs.

In the case of panela, the area under sugarcane rose from 196,817 hectares in 1992 to 248,790 hectares in 2002, but the greatest increase was observed in 2000 and 2002, when the area under cane grew by 27,700 hectares.

Production rose from 1,175,648 tons in 1992 to 1,587,893 tons in 2002. This is an additional 400,000 tons, which is equivalent to a 35 percent increase. The highest rise occurred between 2000 and 2002, when 286,000 extra tons were produced. This was due to an increase in sugarcane-growing areas and in productivity, which rose by around 400 kg of panela per hectare during the period from 1992 to 2002. During the same period, the per capita supply of panela increased by around 19 percent.

Average producer prices for panela fell from US\$ 0.4/kg in the first semester of 2002 to US\$ 0.3/kg in the first semester of 2004. In July, the price fell as low as US\$ 0.25/kg, when the sector went through a sticky period.

Alcohol fuel has emerged as an alternative use for current sugarcane production, which will lead to a reduction in sugar exports and will cripple the supply of panela, creating better price terms for sugarcane growers and manufacturers.

From September 2005 onwards, estimated sugarcane requirements for alcohol are roughly 52,000 hectares of sugarcane, although a total of some 440,000 hectares have been planted in Colombia. This makes it advisable, in the short term, to diversify the use of existing sugarcane plantations. Colombia's Ministry of Agriculture and Rural Development will comply with its commitment under the Sectoral Competitiveness Agreement on Panela to refrain from promoting new plantings of sugarcane. The new crops that are being promoted, without defining projects to guarantee their competitive use for alcohol production after September 2005, will face very difficult market conditions as well as further undermining the conditions of existing farmers, manufacturers and panela-producers.

## **GUATEMALA**

Agricultural production is Guatemala's most important economic activity, generating 25 percent of the country's gross domestic product (GDP), absorbing 52 percent of the economically active population (EAP) and generating 60 percent of foreign currency from exports.<sup>6</sup>

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<sup>6</sup> Cifras con base a información del Banco de Guatemala.

Guatemala has an estimated total population of 10.7 million, of whom 67.3 percent live in rural areas where there are the highest levels of poverty and extreme poverty (75 percent and 60 percent respectively)<sup>7</sup>, as well as illiteracy, malnutrition and limited access to public services (e.g. medical care, drainage and drinking water). The majority of the rural population works in the farming sector.

In the past three decades, renewable natural resources have declined rapidly owing to the use of unsuitable technologies and of unsustainable production practices which prevent the attainment of acceptable competitiveness levels. It is estimated that around 90,000 hectares of natural forest are being destroyed every year and, in some areas of Guatemala, the rate of soil erosion is now as high as 1,100 tons/hectare/year.

Guatemala's Agricultural Policy for 2000-2004<sup>8</sup> focused on involving producers from the country's poorest areas in agricultural and rural development processes and in the development of competitive agricultural markets. Below is a summary of the principal plans and programmes in Guatemala's agricultural policy:

A meeting of panela producers was held in November 2003. This was organized by the Ministry of Agriculture's Technical Assistance Office, with the assistance of professional staff from the Santa Rosa Departmental Coordination Office.

The aim of the meeting was to inform panela producers about prospects and opportunities for panela and about technological developments in panela production. The meeting was attended by panela producers from the municipalities of Casillas, Nueva Santa Rosa and Santa Rosa de Lima, leading producers from the department of Santa Rosa and technical personnel from ADECOSAR, from the Rural Agro-industry Network (REDAR) and from the Technical Assistance Office and Departmental Coordination Office of Guatemala's Ministry of Agriculture, Livestock and Food (MAGA).

The main issues addressed at the meeting were the status of panela in Guatemala, prospects and opportunities, presented by René Arias, executive secretary of REDAR. There was also a video forum on granulated panela, a new type of presentation for a traditional Colombian mass consumer product. During Mr. Arias' presentation, meeting participants were offered the opportunity to taste granulated panela, made by a producer from the Chicamán municipality in the department of Quiché and the comparative advantages of the granulated form over the more traditional forms of panela were explained.

In addition, the Technical Assistance Coordinator of the Ministry of Agriculture, Livestock and Food was given material, documents and videos mainly on improving the quality of panela, syrup and guava paste (bocadillo) and on the production of granulated panela. This material was provided by CORPOICA professionals who went on a technical visit to Guatemala during the first week of October 2004.

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7 Según información de SEGEPLAN

8 Ministerio de Agricultura, Ganadería y Alimentación – MAGA –. Disponible en [www.maga.gov.gt](http://www.maga.gov.gt)

**Table 7: Plans and programmes in Guatemala's Agricultural Policy, 2000-2004 period**

Plans and programmes	Objective	Actions
<b>Nutritional food security guarantee</b>	Garantizar el abastecimiento To guarantee that Guatemalan people have sustainable supplies of and proper access to nutritional basic foodstuffs	Supporting the domestic production of white maize, rice, yellow maize and haricot beans via Guatemala's Basic Grains Programme. Delivering food to rural families, rural school children, children in community day-care centres and breastfeeding mothers in various regions of Guatemala. The food-for-work programme (Programa de Alimentos por Trabajo) of the National Peace Fund (FONAPAZ), run jointly with Guatemala's Ministry of Agriculture, Livestock and Food (MAGA), the Social Investment Fund (FIS) and the Ministry of Education.
<b>Human resource training and education</b>	To reduce the problems of unemployment and under-employment among Guatemala's rural population	The National Mass Training Programme to Reduce Unemployment and Poverty (PRONACAMPO) to provide people from rural areas and city suburbs with mass training in business and professional organization.
<b>Support for small and medium agricultural producers</b>	To improve the production conditions of Guatemala's small- and medium-size agricultural producers	Delivering fertilizers, providing technical training in the management of inputs and agrochemicals, building mini-irrigation systems, embankments, breakwaters, dams and dykes.
<b>Marketing</b>	To reduce intermediation costs between producers and final consumers	Creation of the Agricultural Marketing Institute (IMA). Consolidation and implementation of the farmer marketing project (Mercadeo del Agricultor). Business support and training for partnerships between agricultural producers and traders in Guatemala. Construction of collection, storage and primary processing centres.
<b>Promotion of the fruit-growing sector</b>	To increase the area given over to fruit growing	Via the Promotion of Fruit-Growing project (Fomento a la Fruticultura), providing small and medium fruit producers with technical assistance, expanding the amount of farmland currently given over to fruit growing and creating new sources of employment.
<b>Access to finance</b>	To support the granting of credit to producers' organizations by means of a second-tier portfolio with preferential rates, as well as credit for the production of basic grains and vegetables through special trusts deposited in the same bank	Placing funds in the National Agricultural Recovery and Modernization Fund (FONAGRO). Granting rural credit via the Zacapa-Chiquimula Development Project (PROZACHI), the Rural Development Project for Sierra de los Cuchumatanes (PROCUCHU) and the Project for Sustainable Rural Development in Ecologically Fragile Zones of the Trifinio Region (PRODERT)



Even though panela agroprocessing is a major economic activity for Guatemala's small producers, the Government's agricultural plan does not seem to show any further interest in improving the sector's productivity and competitiveness. There is currently no specific plan or programme to encourage and promote panela production, nor any policies to support producers in the panela sector.

## **THE PANELA AGRO-INDUSTRY IN GUATEMALA**

Panela production in Guatemala is an age-old tradition which has continued despite scant government support and the extensive economic and technological development of the country's sugar industry. It is the main source of income and employment for many farming families, especially in the departments of Santa Rosa, Quiché, Baja Veraz, Chiquimula, Zacapa and Retalhuleu.

Panela is an essential ingredient in the production of sweets, confectionery and traditional Guatemalan dishes. However, its consumption diminished drastically throughout the twentieth century, among both the rural and urban populations, mainly because of rising production costs owing to the technology lag in the panela sector, the poor quality of panela, the change in eating patterns and the substitution of panela by white sugar.

The panela agro-industry is concentrated mainly in the department of Santa Rosa, which is home to 182 of Guatemala's 194 *trapiches* (93.8 percent), according to the 1990 industry directory (*directorio industrial*).<sup>9</sup>

Between 1982 and 1989, panela production fluctuated, with an average production volume of 197.3 tons between 1986 and 1988, when production increased steadily in Guatemala. The volume of panela production is equivalent to one third that of sugar (half of which is exported).

Another major consideration is local consumption, where the sugar/panela ratio is 1.5:1, that is to say, the volume of panela produced is equivalent to two thirds of the sugar produced for local consumption. These factors show that panela is an important economic activity in Guatemala.<sup>10</sup>

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9 Rene Arias B. 1991. Pp. 1.

10 Rene Arias B. op. cit., p. 19.

**Table 8: Production of sugarcane, sugar and panela**

Year	Surface area (hectares)	Surface (tons)	Sugar (tons)	Panela (tons)
1982	79,52	6 192,91	523,56	193,11
1983	69,94	5 450,28	523,65	169,91
1984	70,08	5 459,26	508,36	170,37
1985	72,95	5 492,01	525,85	171,39
1986	72,25	6 617,11	581,31	175,33
1987	81,19	6 324,00	614,24	197,42
1988	81,61	7 019,91	616,90	219,14
1989	92,44	6 908,60	720,00	215,63

Source: Rene Arias, 1991.

As mentioned earlier, panela is produced in a rural economy context where most is sold to make alcohol and a tiny amount is for self-consumption, especially in the Quiché region. Panela producers take part in sugarcane cultivation and processing.

Production units tend to be low technology, with predominantly old, low-yield plantations, manual weed control practices, trapiches that are more than 20 years old and operated using motors powered by animal traction or diesel engines, the latter especially in the Santa Rosa region. Trapiches are built mainly from adobe, with an earthen floor and a galvanized metal roof, where iron boiling pans are used in furnaces and wood and rubber are used as fuel for the furnace.

Sugarcane is harvested manually. The whole crop is harvested in regions where there are industrial sugar mills, such as the department of Santa Rosa, but in the majority of Guatemala's panela-producing regions it is harvested selectively, that is to say, by selecting and cutting only the maturest stalks.

Guatemala's panela production system is characterized by four types of producer. First there are producers who own both sugarcane and a trapiche and who produce sugar and panela. The second type of producer owns a trapiche but buys in sugarcane to produce panela.

There are also producers who own sugarcane but who hire a trapiche to produce panela. And lastly there are producers who buy in sugarcane and hire a trapiche to make panela.

Panela is marketed via intermediaries, who are responsible for selling it on to distilleries or producers of artisanal spirit. Generally producers sell panela to a rural stockpiler, who in turn sells it to a wholesaler, after which the wholesaler sells it to a retailer, who finally sells it to the final consumer. In some cases, panela producers sell directly to a wholesaler and the latter transports the panela from the place of purchase to the end market.

Table 9 describes the main characteristics of panela production in two of Guatemala's leading panela-producing regions

**Table 9: Panela agroprocessing in the departments of Santa Rosa and Quiché**

	Departament of Santa Rosa Santa Rosa	Departament of Quiché	
		Chicaman	Joyabaj
<b>Socio-economic conditions</b>	<p>Farm size ranges from 3.2 to 9.6 hectares.</p> <p>The predominant crops are sugarcane, maize, coffee, gama grass and pasture. 100% of the panela is sold by men.</p> <p>100% of food preparation for the workers is done by women.</p> <p>Panela production is seasonal; milling lasts for 5 months.</p> <p>Average production of panela: 64.8 tons of panela/year. Average yield: 8.2 tons of panela/hectare/year.</p> <p>Total area under cultivation: 5.1 hectares/year.</p> <p>Day's wage for fieldwork, excluding food: US\$ 3.3.</p> <p>Day's wage for milling: US\$ 5.8.</p>	<p>Farm size: 1 to 2 hectares of sugarcane/woodland/fruit trees/haricot beans/maize. 100% of the panela is sold by men.</p> <p>100% of food preparation for the workers is done by women.</p> <p>Panela production is seasonal; milling lasts for 4 months.</p> <p>Average production of panela: 12.96 tons of panela/year.</p> <p>Average yield: 6.4 tons of panela/hectare/year.</p> <p>Total area under cultivation: 2.01 hectares/year.</p> <p>Day's wage for fieldwork and milling: US\$ 3.25.</p>	<p>The predominant crops are sugarcane and maize.</p> <p>Farmers carry out livestock activities, especially cattle-raising.</p> <p>100% of the panela is sold by men.</p> <p>100% of food preparation for the workers is done by women.</p> <p>Panela production is seasonal; milling lasts for 5 months.</p> <p>Average production of panela: 16.2 tons of panela/year. Average yield: 7.7 tons of panela/hectare/year.</p> <p>Total area under cultivation: 2,112 hectares/year.</p> <p>Day's wage for fieldwork and milling: US\$ 3.3.</p>
<b>Technical conditions</b>	<p>Sugarcane crops managed using modern technology: replanting of ratoons, selected seed cane, weed control and the use of chemical fertilizers.</p> <p>Milling: Monday to Saturday; hours of work from 07:00 to 16:00.</p> <p>Production capacity: 60 kg/hour.</p> <p>Trapiches: mainly horizontal mills powered by a diesel engine.</p> <p>Furnace: set of four boiling pans, in some cases flat boiling pans. Boiling pans made from iron.</p> <p>Seven workers are employed for milling.</p> <p>Use of wood and rubber tyres as fuel for the furnace. An average of 24 tyres is used for each milling batch.</p>	<p>Old plantations, with no replanting.</p> <p>Selective harvesting of sugarcane.</p> <p>No fertilization or weed control is done.</p> <p>Total no. of trapiches: 144 (117 with animal traction and 26 with a diesel engine).</p> <p>Traditional technology.</p> <p>Milling: Monday to Saturday; hours of work from 03:00 to 14:00.</p> <p>Production capacity: 12.2 kg/hour.</p> <p>Five workers are employed for milling.</p> <p>Furnace: a single boiling pan with no chimney.</p> <p>Use of wood and rubber tyres as fuel. An average of 12 tyres for each milling batch.</p>	<p>Whole-crop harvesting of sugarcane.</p> <p>Fertilizers and manual weed control.</p> <p>Total no. of trapiches: 70 (67 with animal traction and 2 with a diesel engine).</p> <p>Traditional technology.</p> <p>Milling: Monday to Saturday; hours of work from 03:00 to 23:00.</p> <p>Production capacity: 16.9 kg/hour.</p> <p>Five workers are employed for milling.</p> <p>Furnace: a single large boiling pan with no chimney. Use of wood as fuel.</p> <p>Price for hiring a trapiche: US\$ 9.7 per day.</p>

	Departament of Santa Rosa Santa Rosa	Departament of Quiché	
		Chicaman	Joyabaj
<b>Waste</b>	Sugarcane tops are used as seed cane. Bagasse is used as fuel for the furnace.	Sugarcane tops are used in animal feed. Bagasse is used as fuel for the furnace.	Silage for animal feed is made from sugarcane/maize. Bagasse is used as fuel for the furnace.
<b>Marketing</b>	100% of the panela is for sale. 100% of producers sell to intermediaries. Panela is used for the production of artisanal spirit. Price of panela: US\$ 0.35 kg/panela.	Approximately 5% of the panela is for self-consumption. 95% is for sale. 100% of producers sell to intermediaries or brokers. Panela is used for the production of artisanal spirit. Price of panela: US\$ 0.29 kg/panela.	Approximately 10% of the panela is for self-consumption. 90% is for sale. 100% of producers sell to intermediaries. Panela is used for the production of artisanal spirit. Price of panela: US\$ 0.32 kg/panela.
<b>Problems</b>	Lack of technical assistance. Difficulty in obtaining credit. Panela production has declined owing to increased control and legalization of artisanal spirit production.	Lack of technical assistance. Difficulty in obtaining credit. There is a panela producers' cooperative with 45 members, which receives support from REDAR.	Lack of technical assistance. Difficulty in obtaining credit. Decline in the number of operational trapiches owing to the poor profitability of panela production.

As can be seen, Santa Rosa has the highest level of technological development. This region produces an average of 64.8 tons of panela/year, in contrast with Chicaman, which produces 12.9 tons of panela/year and Joyabaj, with 16.2 tons of panela/year. Furthermore, Santa Rosa produces 24.5 percent more panela hectare/year than Chicaman and 5.4 percent more than Joyabaj.

A comparative analysis of panela production costs in the three regions reveals that growing costs in Joyabaj and Chicaman represent 12.2 percent and 10.3 percent of total production costs respectively, both of which are lower than in Santa Rosa, where growing costs represent 27.8 percent. This is because in Santa Rosa growing activities involve planting new crops as well as maintaining existing crops, whereas in Joyabaj and Chicaman, growing activities involve only maintaining existing sugarcane crops. In the panela harvesting and transportation phase, costs in the three areas are very similar. However, in the processing phase, costs in the Santa Rosa region are the lowest because it makes more efficient use of labour and of other factors of production.

In general Santa Rosa shows the lowest production costs, which are 14.7 percent lower than in Joyabaj and 21.6 percent lower than in Chicaman. Differences in growing and processing costs indicate the critical points affecting the regional competitiveness of each of these areas. The processing phase is the most important factor in improving local and regional competitiveness because of its impact on production costs.

An important point is that in the Chicaman area some factors of production are not remunerated, such as family labour, mainly during the processing phase where family labour represents more than 60 percent of labour used. This has helped to give the family production unit its continuance and sustainability.

**Table 10: Production cost structure in Santa Rosa, Joyabaj and Chicaman (US\$/ton of panela), 2003**

Phases	Departament of Santa Rosa Santa Rosa (US\$)	Departament of Quiche	
		Joyabaj (US\$)	Chicaman (US\$)
Growing	61.13	31.27	28.86
Harvesting and transportation	42.09	57.72	48.10
Processing	116.30	168.35	202.98
Total	219.51	257.34	279.94

Source: Data from this study

Santa Rosa shows the highest profits per ton of panela, with US\$ 131.1, followed by Joyabaj, with US\$ 67.3 per ton. Chicaman, with only US\$ 8.4 per ton, derives the least profits. The Santa Rosa region, where producers earn a net annual income of US\$ 8,497.6 and the annual production value is US\$ 22,722.1, shows the highest annual profits, compared with Joyabaj, with a net annual income of US\$ 10.91 and an annual production value of US\$ 5,259.7, and Chicaman, with a net annual income of US\$ 108.5 and an annual production value of US\$ 3,736.5.

In terms of labour productivity, expressed as person-hours per ton of panela, in the growing stage, the values in the Chicaman and Joyabaj regions were found to be very similar, with 77 and 71.1 person-hours per ton of panela respectively, compared with 89.6 person-hours/ton in Santa Rosa. However, as shown in table 11, in the harvesting and transportation stage, Chicaman is the least efficient region, with 118.5 person-hours/ton of panela. In the processing stage, Santa Rosa has the lowest man-hour requirement per ton of panela, with 50.8 percent less than Joyabaj and 52.3 percent less than Chicaman, showing a more efficient use of processing workers.

As regards the use of labour, Santa Rosa was estimated to require a total of 18,168 person-hours per year, followed by Joyabaj, with an average of 6,528 person-hours/year, and lastly, by Chicaman, with 5,625.6 person-hours/year. This demonstrates the importance of panela production in the requirement and use of labour, both locally and regionally. An important point is that family labour is used in a large number of growing and milling activities, especially in the Chicaman area.

With regard to workers' wages, the average sugarcane fieldworker's wage is similar in all three regions, with an average US\$ 0.41 per man-hour, and in the production phase, Santa Rosa (with US\$ 0.67/man-hour) has the highest average wage for processing, compared with Joyabaj and Chicaman, with US\$ 0.41 /man-hour.

**Table 11: Use of labour (person-hours/ton of panela)**

Fases	Departament of Santa Rosa Santa Rosa	Departament of Quiche	
		Joyabaj	Chicaman
Use of labour for fieldwork	89.6	77.0	71.1
Use of labour for harvesting and transportation	74.1	88.9	118.5
Use of labour for processing	116.7	237.0	244.4
Total use of labour	280.4	402.9	434.0

Source: Data from this study

Panela production is seen to be important in the requirement and use of regional and local labour, ranging from an average of 18,000 to 5,000 person-hours/year. Producers' annual profits vary from US\$ 8,000, for the most technologically developed region, to US\$ 100 for the least developed one.

## BRAZIL

In the past two years the Brazilian economy has showed positive, though modest, growth, with the most marked increase in the agribusiness sector. According to data from the Brazil's Agriculture and Livestock Confederation (CNA) and the Centre for Advanced Studies in Applied Economics of the University of Sao Paulo (CEPEA/USP), the gross domestic product of Brazil's agribusiness sector, which encompasses primary production as well as the processing, inputs and service industry, grew by 8.37 percent in 2002, rising from US\$ 133.62 billion to US\$ 144.82 billion. The indicators in a segmented analysis show that agricultural GDP rose by 10.2 percent in 2002, whereas livestock sector GDP grew by 4.3 percent. GDP from the agribusiness sector represented 32 percent of Brazil's GDP in 2002.<sup>11</sup>

In addition, agro-industry grew by 7.9 percent, higher than Brazil's industry average of 2.4 percent for the same period and the highest growth recorded since 1991. The 15.7 percent increase in agricultural inputs and tools was substantially higher than in 2001 (2.5 percent), reflecting the growth in both agricultural machinery and equipment (17.7 percent) and fertilizers (13.9 percent).

Brazil's 2003-2004 Crop and Livestock Farming Plan focuses its activities and programmes on the agribusiness sector as both a lever for Brazil's development and a means for promoting the social inclusion of rural sectors into the domestic and foreign market under competitive conditions. This is designed to create more jobs, to enhance the incomes of

11. Salomão João Antonio F. 2003, p. 15

agricultural producers and to expand and diversify Brazilian exports. The Plan also aims to promote food security in both rural and urban areas.

The main programmes and policy measures in Brazil's Farming Plan for fostering the development and competitiveness of RAI are summarized below:

Another recently consolidated programme is Brazil's National Programme for Agro-industrialization in Family Farming, which seeks to support family farmers in industrializing their agroprocessing activities and marketing their products, to add value to rural production and create revenues and job opportunities in the rural sector.

For the 2003-2006 period, the programme plans to cater directly for 77,000 families, to implement 7,700 agro-industries, to create 138,000 jobs and to raise the monthly income of each beneficiary family by US\$ 102.4, for which US\$ 394.19 million will be made available for rural credit and operating costs.<sup>12</sup>

## **THE PANELA (OR "RAPADURA") AGRO-INDUSTRY IN BRAZIL**

Brazil's rural producers have used agroprocessing as a strategy for improving their revenues. According to Graziano de Silva's study<sup>13</sup>, a clear social and economic change has occurred in Brazil's countryside in recent years, spearheaded by the expansion of non-farming activities like agroprocessing, craftwork and rural tourism. According to Graziano, approximately 4 million rural people work in non-agricultural activities. Other data show that four out of every ten adult workers in rural areas are paid to carry out non-agricultural activities.

According to the Brazilian Institute of Geography and Statistics (IBGE), the average income of a family working in traditional farming activities is US\$ 90.1 per month, whereas the income of families in non-agricultural activities is US\$ 185.32 per month.<sup>14</sup>

Brazil is Latin America's second biggest producer of panela (or "rapadura" as it is known in Brazil), where panela production is the main source of income for farming families, especially in north east Brazil.

Panela agroprocessing is a traditional activity in which families endeavour to diversify production with both livestock and crop production activities. Crops include sugarcane, haricot beans, maize, rice, coffee, cassava and fruit in general. Family livestock activities combine poultry, pig and cattle farming. Several of the outputs from these activities are processed in the same family unit: for instance, families process cassava into cassava flour, milk into cheese and sugarcane into panela.

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12 Boletín do DESER (Department of Rural Socioeconomic Studies) no. 132 of October 2003, p. 29.

13 Novo Rural Brasileiro. Cited in the document by Durnedes Maestri, Maria Das Dores Perim Gomy 2003, p. 3.

14 Durnedes M., et al. 2003 op. cit., p. 3.

**Table 12: Brazil's Crop and Livestock Farming Plan, 2003-2004**

<b>Plans and programmes</b>	<b>Objectives</b>	<b>Actions</b>
Programme for the capitalization of rural producer cooperatives	To create a programme for the capitalization of cooperatives in order to integrate quota-shares	Placement of funds for producer cooperatives in Brazil's Economic and Social Development Bank (BNDES).
Access to finance	To consolidate a Special Line of Credit (LEC) for marketing	Creation of lines of credit for marketing.
<b>Investment programmes:</b> Flower-growing	To renew the programme for more than one year.	Maintenance of interest rates.
Fruit-growing	To renew the programme for more than one year and to support the melon programme.	Maintenance of interest rates
Aquaculture	To raise the funding limit to US\$ 59,230.	Maintaining interest rates.
Cooperative Development Programme for adding Value to Agricultural Production (PRODECOOP)	To increase the competitiveness of the agro-industrial complex of agricultural producer cooperatives. To gradually increase funding to a target of US\$ 256 million per year for infrastructure and agroprocessing.	Modernization of its production and marketing systems by means of equalized funding. Maintenance of interest rates. Adaptation, jointly with BNDES, of national standards on procedures for financeable production chain items.
Dairy programme (PROLEITE)	To create special lines of credit for producers with yields of more than 40 litres of milk/day and who derive 80% of their gross income from farming	Implementation of a special line of credit for dairy producers who meet the specifications of the plan.
<b>Proposal for the creation of new investment programmes</b> Production redeployment of farms	To create a programme that includes integrated lines of credit for production redeployment of farms	Establishment of the production redeployment programme, under which farms are upgraded to the recommended scale and technology. Programme for adapting environmental standards. Sponsoring the adjustment of the investment programme for rural properties to meet environmental standards, with funding ranging from the recovery of private nature reserves to building dykes and waste processing for rural producers and cooperatives.
Rural insurance	To create a farm income insurance scheme.	Stabilization of agricultural producer incomes by boosting the Rural Insurance Stability Fund with federal government funding.

Source: Agriculture and Livestock Confederation of Brazil (CNA), 2003.



On-farm tasks and activities are usually carried out by the various family members. On the farm, the proportion of female labour is very large, because women carry out domestic tasks and also share in the family's various production activities. In addition, women participate in off-farm activities, which generally make a major contribution to the family's income.<sup>15</sup>

Panela production is an activity restricted mainly to rural producers over the age of 50, which is why it is considered to be old people's work and so does not attract young people. Only 3 percent of producers are under 30 years of age.<sup>16</sup> Panela producers have a very low level of education and 80 percent<sup>17</sup> have not completed the first year of schooling.

Another major characteristic of the panela production system is sharecropping. Sharecroppers are generally sugarcane producers with no *trapiche*. This form of production arises where producers have only a small quantity of sugarcane and need to employ both family labour and non-family labour, where there is a shortage of job opportunities, where producers wish to help a neighbour or relative to prevent them from losing their sugarcane crop, or where they need money. Another reason tends to be that *trapiche* owners hire out their *trapiche* to sharecroppers when they have no time to make panela themselves, to enable sharecroppers to produce their own panela.

One of the main problems facing sharecropper producers is lack of investment capital to build a *trapiche*. In cases where community *trapiches* have been set up, the lack of available labour makes production impossible.

Panela is a staple in the diet of panela production unit members, not only because using it as a sweetener avoids spending on sugar but also because surplus panela can be sold to produce income.

Most panela production units tend to be low technology. Sugarcane fields tend to be sited on undulating and sloping ground, where the use of rudimentary cultivation techniques, lack of awareness of proper fertilization techniques and lack of suitable seed cane have led to soil erosion and salinization. An estimated 47 percent of panela-producers produce 20 tons of sugarcane per hectare, with only 5 percent producing more than 50 tons/hectare.

In the panela production phase, sugarcane is transported to the *trapiche* on the back of mules and/or donkeys. Approximately 50 percent of producers use mules or donkeys, 30 percent use ox-drawn carts and only 20 percent use motor vehicles. The principal fuel used for the furnace is wood, followed by bagasse. The great majority of *trapiches* and industrial sugar mills have obsolete, unmaintained equipment and use unsuitable materials like iron and copper to make boiling pans. In addition, producers' lack of awareness of health standards has served to undermine panela quality.

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15 Monção Geraldo Nobre and Dahlen Ulrika. 1993, p. 7.

16 Agroindústria o Rapadura. Available at Internet:[www.geocities.com](http://www.geocities.com)

17 Idem.

According to a study by SEBRAE/PE and COOPAGEL (2002)<sup>18</sup>, this situation has, to a large extent, arisen from the rapid technological change which took place in Brazil in the mid-twentieth century, for which the industrial sugar mills of north east Brazil were not as prepared as those in the rest of the country. Changes were not assimilated quickly, leading to a technology lag and subsequent stagnation in Brazil's panela sector.

As regards marketing, the small scale of production, combined with producers' lack of knowledge of the current market and poor product quality, have led to low panela prices and to lack of opportunities for making differentiated products, for brand positioning or for expanding the domestic and foreign market.

**Table 13: Panela production in São José do Egito, Solidão, Santa Teresinha and Tabita**

No. of producers	Itapetim 29	São José do Egito 38	Solidão 35	Santa Teresinha 22	Tabita 28
Economic conditions	37.9% of sugar mills are operational. 62.1% are non-operational. 0-40 hectares: 37.9% 41-120 hectares: 31% 121-400 hectares: 6.9% 400 hectares: 3.4% No reply: 20.8% 27.3% produce panela. 18.2% produce syrup. 4.5% produce cachaça (sugarcane spirit). 0.6% produce alfenim sugar candy.	44.7% of sugar mills are operational. 55.2% are non-operational. 0-40 hectares: 10.5% 41-120 hectares: 18.4% 121-400 hectares: 18.4.9% 400 hectares: 2.6% No reply: 20.8% 4.2% produce panela. 39% produce syrup. 2.6% produce alfenim sugar candy. 45% produce nothing.	53.4% of sugar mills are operational. 45.7% are non-operational. 0-40 hectares: 60% 41-120 hectares: 11.4% No reply: 28.6% 100% produce panela and syrup.	47.8% of sugar mills are operational. 52.2% are non-operational. 0-40 hectares: 42.9% 41-120 hectares: 38.1% 121-400 hectares: 9.5% 400 hectares: 4.8% No reply: 4.8% 100% produce granulated panela, muscovado sugar and cachaça.	60.7% of sugar mills are operational. 35.7% are non-operational. 3.6% are in the start-up phase. 0-40 hectares: 53.6% 41-120 hectares: 32.1% 121-400 hectares: 7.14% No reply: 7.14% 100% produce panela and syrup.
Gender relations	100% of the sugarcane is grown and processed by men. Women prepare 100% of the food for family and workers. 100% of the panela is sold by men.	Sugarcane is grown and processed 89% by men and 11% by women. Women prepare 100% of alfenim sugar candy and food for the family and workers. 76% of the panela is sold by men and 24% by women.	90% of the sugarcane is grown and processed by men and 10% by women. Women prepare 100% of alfenim sugar candy and food for the family and workers. 100% of the panela is sold by men.	100% of the sugarcane is grown and processed by men. 95% of alfenim sugar candy is prepared by women. Women prepare 100% of the food for family and workers. 100% of the panela is sold by men.	100% of the sugarcane is grown and processed by men. Women prepare 100% of alfenim sugar candy and food for the family and workers. 76% of the panela is sold by men and 24% by women.

18 SEBRAE/PE/COOPAGEL, 2002.

No. of producers	Itapetim 29	São José do Egito 38	Solidão 35	Santa Teresinha 22	Tabita 28
Technical conditions	Electric motor: 22% Diesel motor: 69% Animal traction: 1.9% 100% have a sugar mill. 0.3% use organic fertilizers, soil analysis and selected seed cane. 0.7% use irrigation. 100% do not use soil amendment, chemical fertilizers or chemical weed control. 100% use bagasse as fuel for the furnace.	Electric motor: 0.8% Diesel motor: 54% Animal traction: 33% No reply 5% 100% have a sugar mill. 100% do not use soil amendment, fertilizers or chemical weed control and do not use selected seed cane. 13% apply organic compost. 5% use irrigation. 100% use wood as fuel for the furnace.	Diesel motor: 60% Animal traction: 40% 89% have a sugar mill. 100% do not use soil amendment, fertilizers or chemical weed control and do not use selected seed cane. 5.4% use irrigation. 2.7% use organic fertilizer. 100% use wood and bagasse as fuel for the furnace.	Electric motor: 14% Diesel motor: 73% Animal traction: 14% 100% have a sugar mill. 100% do not use soil amendment, fertilizers or chemical weed control and do not use selected seed cane. 14% use organic fertilizer. 100% use bagasse as a fuel for the furnace	Electric motor: 17.8% Diesel motor: 60.7% Animal traction: 21.5% 89% have a sugar mill. 100% do not use soil amendment, fertilizers or chemical weed control and do not use selected seed cane. 100% use wood and bagasse as fuel for the furnace.
Waste	Vinasse: 60% use it in animal feed. Bagasse: 36% use it as fuel for the furnace and 47% use it for animal feed. 17% did not reply.	Vinasse: 92% use it in animal feed. Bagasse: 97% use it for animal feed, 24% use it as fuel for the furnace and 16% use it as organic compost.	Vinasse: 55.9% use it in animal feed and 38.2% throw it away. 5.9% did not reply. Bagasse: 40.6% use it as fuel for the furnace, 31.9% use it as organic compost and 27.5% use it for animal feed	Vinasse: 90% use it in animal feed. Bagasse: 4.5% use it as fuel for the furnace, 36% use it as organic compost and 86% use it for animal feed.	Vinasse: 50% throw it away and 29% use it in animal feed. 21% did not reply. Bagasse: 46% use it as fuel for the furnace, 17% use it as organic compost and 29% use it for animal feed.
Marketing	81% of panela production is marketed; 19% is for self-consumption; 57% is sold in the same municipality; 28.6% is sold in other municipalities in the same region; 14.4% is sold outside the region; 54% is sold to intermediaries; 32% is sold on the open market; 14% is sold to shops and supermarkets. 100% of producers use no stickers, labels, or packaging	39.5% of panela production is marketed; 34% is for self-consumption; 26.5% did not reply; 65% is sold in the same municipality; 20% is sold in other municipalities in the same region; 15% is sold outside the region; 45% is sold to intermediaries; 40% is sold on the open market; 15% is sold to shops and supermarkets. 100% of producers use no stickers, labels, or packaging.	78.6% of panela production is marketed; 18.6% is for self-consumption; 2.8% is warehoused; 57% is sold in the same municipality; 28% is sold in other municipalities in the same region; 14.4% is sold outside the region; 85% is sold to intermediaries; 15% is sold to shops and supermarkets. 100% of producers use no stickers, labels, or packaging.	35% of panela production is marketed; 44% is for self-consumption; 21% did not reply; 46% is sold in the same municipality; 45% is sold in other municipalities in the same region; 0.9% is sold outside the region; 4.5% is exported abroad; 86% is sold to intermediaries; 32% is sold on the open market. 100% of producers use no stickers, labels, or packaging.	53.4% of panela production is marketed; 10.4% is for self-consumption; 36.2% is warehoused; 86% is sold in the same municipality; 14% is sold outside the region; 83% is sold to intermediaries; 17% is sold on the open market. 100% of producers use no stickers, labels, or packaging

Source: SEBRAE/PE/COOPAGEL, 2002.

Brazil's leading panela-producing regions include Vale do Piancó, Itapetim, São José do Egito, Solidão, Santa Teresinha and Tabita. Like the rest of Brazil's panela-producing regions,

these regions are characterized by a low level of technology and a high percentage of non-operational trapiches, with the exception of Tabita, which has the largest number of operational trapiches, (around 60.7 percent)<sup>19</sup>, as shown in table 13.

The table shows that the Tabita region has the largest percentage of operational industrial sugar mills or *trapiches*, compared with Itapetim with 37.9 percent, São José do Egito with 44.7 percent, Solidão with 53.4 percent and Santa Teresinha with 47.8 percent. Virtually all the regions produce *panela*, syrup, *cachaça* spirit and *alfenim* sugar candy, with the exception of Tabita, where only syrup and *panela* are produced. There is low level technology throughout the region.

An analysis of *panela* production costs in the Vale do Pianco region in the state of Paraíba reveals that cultivation and production costs are very similar, with a 46 percent share for cultivation and 54 percent for processing. In general this region's production cost is much the same as that of Joyabaj in Guatemala.

**Table 14: Production cost structure in Vale do Pianco, Brazil, 2003 (US\$/ton of *panela*)**

Phases	State of Paraíba - Vale do Pianco (\$EE.UU.)
Cultivation	126.6
Processing	148.6
Total	275.2

Source: SEBRAE, 2004.

Net profits per ton of *panela* were estimated to be US\$ 137.6 and net annual profits to be US\$ 1,734.4, with an annual production value of US\$ 5,203.24.

As regards labour productivity, the region's total use of labour (for the growing and processing phase combined) is 154.1 person-hours per ton of *panela*, which is much lower than that in the Santa Rosa and Quiché regions of Guatemala. Lastly, there was an estimated annual labour requirement of 1,941.4 person-hours.

**Table 15: Use of labour (person-hours/ton of *panela*)**

Department of Paraíba - Vale do Pianco	
Use of labour for fieldwork	—
Use of labour for harvesting and transportation	—
Use of labour for processing	140.2

Source: SEBRAE, 2004.

<sup>19</sup> Ibid, p. 109.

The average processing worker's wage was estimated to be US\$ 0.58, very similar to that of the Santa Rosa, Joyabaj and Chicaman regions of Guatemala. However, there is not enough information available to estimate the average fieldworkers' wage and the wage for harvesting and transporting sugarcane.

Panela production in this region of Brazil is shown to be important because of its significant share in the requirement and use of regional and local labour. The value of production and producers' annual profits are also significant in this region.

Again according to the study by SEBRAE and COOPAGEL (2002), the factors constraining and promoting Brazil's panela sector can be summarized as follows:

**Table 16: Factors constraining and promoting Brazil's panela sector**

### Factores limitantes

INTERNAL FACTORS	EXTERNAL FACTORS
Poor condition of access routes. Lack of capital for production. High production costs Small scale of production Lack of market knowledge Poor storage practices Scant availability of raw material Low technological level for cultivation and processing Low maintenance level of sugar mills. Low levels of product diversification and differentiation Contamination of reservoirs and water sources. Lack of product information and promotion. Poor producer organization Lack of involvement of young people and young producers Lack of training Lack of specialized labour	Unfavourable credit policies Panela which is produced using sugar costs less than conventional panela Lack of price-support policies for panela para la panela Reduction in urban and rural consumption of panela Poor product quality and emergence of substitute products Lack of technological development policies Lack of technical assistance

## Promoting factors

INTERNAL FACTORS	EXTERNAL FACTORS
Sale of products in periods between harvests Creation and consolidation of panela producers' cooperatives Consolidation of panela producers' organizations. Abundant family labour Experienced producers Production of natural panela Good rural electrical power supplies Fertile soil Supply of land to increase the area under sugarcane Good supply of water	Market opportunities. Contract with Federal Governments for school lunches Support from town councils Training opportunities (producer training projects). Existence of new technologies Provision of good quality seed cane by Brazil's National Family Farming Programme (PRONAF) - cost and investment

In late 1999, a four-year regional agreement of intent was signed between the large public bank active in the north east Brazil, Banco do Nordeste do Brasil S.A. and the state of Bahia, which can be extended by mutual consent between the parties. The programmes and actions undertaken are targeted at micro and small rural producers, as well as at producer cooperatives and associations and at micro and small agroprocessors. The purpose of the agreement is to coordinate forms of association and to define the role of government bodies in achieving the objectives of the Incentive Programme for fully exploiting Sugarcane (PROCANA).

Capital was invested using Banco do Nordeste lines of credit targeted at micro- and small-holdings and at agroprocessors. Support was also provided and special lines of credit were created for costs and investment and for marketing products and by-products.



## 2. Characteristics of panela production in the regions of Hoya del Río Suárez, Cundinamarca and Cauca

Colombian panela is produced in a number of different regional contexts, each with their own specific technological and socio-economic conditions. This section describes the local conditions of production systems in the regions of Hoya del Río Suárez, situated in the departments of Santander and Boyacá; Gualivá in the western Cundinamarca department; and Santander de Quilichao in northern Cauca.

### HOYA DEL RÍO SUÁREZ

This region is located in the middle basin of the Suárez river, with altitudes ranging from 1,200 to 1,900 metres above sea level. It includes the municipalities of Santana, San José de Pare, Togui, Chitaraque and Moniquirá, in the department of Boyacá, and the municipalities of Barbosa, Vélez, Chipatá, Puente Nacional, San Benito, Güepesa, Suaita and Oiba, in the department of Santander. The characteristic topography is mountainous, with slopes classed as medium to high. HRS has the highest level of agricultural technology use, with average sugarcane yields of 120 tons per hectare, and in some cases as much as 200 tons/hectare.

Most farming units are larger than 20 hectares in size, of which around 50 percent is given over to growing sugarcane.

Panela production in HRS is organized in accordance with regional development characteristics and with the integration of panela production into the domestic market.

Panela production in HRS is therefore a vertically-integrated production system which is fully integrated into the market, where the sugarcane growers themselves take care of processing the raw material into panela, as well as for selling it on local markets.

Production is organized mainly in one of three ways, each of which involves different production agents.

The first form of organization is where panela is produced by the owner of the land and capital, where the owner of the farm and *trapiche* is responsible for growing the sugarcane, processing it and selling the panela. The share of family labour is very small and, where children assist with farm activities, they are paid like any other worker.



The second form of organization is where *panela* is produced by sharecroppers who do not own land, have very little capital and contribute their own labour or hired labour. In this form of organization, the owner of the production unit establishes a verbal contract with the sharecropper for sharing the costs between the two parties. The sharecropper generally takes care of planting and maintaining the sugarcane fields and occasionally some of the milling work.

The farm owner undertakes to pay for the ground preparation work, to supply the fertilizers and agrochemicals for sugarcane cultivation and to transport the cane. The farm owner also pays the wages of most of the mill workers. After production is complete, *panela*, or its cash equivalent when sold on the market, is distributed equally between the sharecropper and the landowner.

The third form of organization is when *trapiches* are hired for the production of *panela* by sugarcane growers or sharecroppers who do not own a *trapiche* or whose sugarcane crops are far from their own *trapiche*. In this case, the owner charges rent for the *trapiche*, called “*maquila*”. A price is set for each batch of *panela* produced, so the total rental amount depends on the total number of batches milled.

This makes the farm-*trapiche* unit an epicentre where all the production actors associated with the area’s *panela* agro-industry congregate: owners of land and a *trapiche*, landowners, sharecroppers, field workers and mill workers.

All these operators are linked economically by virtue of a wage or hired service. However, another type of non-economic relationship operates within these units, such as allowing neighbours to collect the sugar-mill filter-cake (*cachaça*)<sup>20</sup> for animal feed and other by-products, like bagasse, to use as fuel for domestic cookers.

As a result of using filter-cake to make by-products like molasses, new economic activities have started to emerge, such as the production of molasses, which is creating new jobs and better incomes for mill workers. At the same time, the use and exploitation of these by-products has helped to expand opportunities for diversifying production unit activities, as well as for integrating rural women into work that they have not traditionally done, such as managing and administering animal production activities.

The final link in the *panela* chain is the market. Under the region’s *panela* production system, *panela* is sold by rural stockpilers. Those responsible for selling *panela* are usually the owners of farms with a *trapiche* (or their managers) or sugarcane owners without a *trapiche*. Sharecroppers very seldom sell *panela*.

In HRS there are three main centres for marketing *panela*, which are well known because of the volume of *panela* which they market: Santana, Guepsa and Moniquirá. These trade

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<sup>20</sup> Waste from the process of clarifying sugarcane juice, which is used as animal feed, although the recent trend for using this waste to make molasses has led to a lack of regulation of filter-cake or of measures for regulating the amount given to neighbours.

centres all supply regional markets that are defined and differentiated mainly by the weight, size, colour and packaging of panela sold there.

At regional level, the panela market consists of a weekly market where rural producers and stockpilers meet to negotiate terms for buying and selling panela. Many producers attend these markets and a smaller number of stockpilers. The bargaining takes place in the town square without the need for all the panela sold having to be physically present, as it is delivered at the *trapiche* at a later date.

## **WESTERN CUNDINAMARCA**

Panela production in Cundinamarca is characterized by a heavy predominance of small sugarcane farms, which places it in a rural economy context, associated with the market.

Sugarcane cultivation is widespread in western Cundinamarca. The main panela-producing regions are the provinces of Rionegro, Gualivá and Tequendama and, within these provinces, the chief panela-producing municipalities are Caparrapí, La Peña, Nocaima, Villeta, Quebradanegra, Útica, Quipile, Guaduas, Nimaima, Vergara, La Mesa, El Peñón and Sasaima. The predominant topography is of steeply sloping highlands.

Sugarcane plantations in Cundinamarca vary widely in size, with an average of 8 hectares per farm. The low level of agricultural technology is a general feature of Cundinamarca's panela-producing regions, where most crops are more than 20 years old, with low replanting rates, low levels of fertilizer and herbicide use and selective harvesting of sugarcane, which consists of harvesting only fully mature stalks. For the farmer, this production system does not require much cultivation work, which is generally confined to manual weed control and harvesting of sugarcane.

This system of selective harvesting, repeated two or three times per year in each field, has been found to encourage the panela granulation process, because the selection of only the maturest stalks raises sucrose levels. This characteristic of the regional system for managing sugarcane cultivation and harvesting is an asset for producers embarking on granulated panela production.

The sugarcane production environment in Cundinamarca is suitable for targeting organic markets, since the low use of fertilizers and agrochemicals means that the majority of farms meet the requirements of certification bodies like Corporation Colombia International.

Panela production in this region is characterized by the direct involvement of mainly producers and their families in panela growing, production and selling.

There are basically two forms of production in Cundinamarca. The first and most common form is where the owner of the farm-*trapiche* unit is directly involved in panela cultivation, processing and sale and in running the production unit. In this case, family labour makes a major contribution, especially in units where the children have not moved away, where they assist with the various farm activities. Family labour is usually unpaid.

A second form of production is where sugarcane producers without a *trapiche* take their sugarcane to farm-*trapiche* units to produce panela either jointly with the *trapiche* owner<sup>21</sup> or by hiring the equipment.

Under this form of sharecropping (*compañía*), the sugarcane owner takes care of cutting the sugarcane while the *trapiche* owner collects it, transports it and processes it into panela. The profit is shared equally between the two parties, that is to say, they divide the total number of batches milled into two equal parts. The panela is sold in one of two ways: either jointly with the *trapiche* owner or each producer sells it separately, depending on the arrangement they have come to.

An important point is that, owing to the labour shortage, some producers have resorted to labour recruitment strategies specific to the region, especially for more labour-intensive tasks. The first form is contract labour, based on a verbal agreement. Where a contractor is used for harvesting sugarcane, the contractor agrees to find, pay and feed the workers and to carry out the other harvest-related activities. To calculate payment for this labour, a price is set for each batch of panela produced, so the total amount paid for the harvest depends on the total number of batches produced in the mill.

The second form of labour recruitment, called “ministra”, is where the price of harvesting the sugarcane includes feeding and paying the workers and transporting the sugarcane. Transportation is generally by mule and therefore the payment is for the freightage<sup>22</sup> with its respective mule driver. The contractor is responsible for taking the sugarcane from the field where it is cut as far as the *trapiche*.

Despite the fact that women help in running the family unit and in some farm production activities, in both units with a *trapiche* as well as those without one, women do have no major share in decision-making, in running the production unit, or in the profits from the production process, as they are viewed as unpaid family helpers who make no representative contribution to the family income.

This could be described as a dual production system based on domestic and paid work, where greater importance is given to work done by the head of the family unit and by male children, who are considered to be the main family income providers, and to women’s work when it supplements men’s activities.

With regard to marketing, the main regional market is in Villeta, where producers from the entire region go to sell their panela to rural stockpilers. Most of the panela bought in Villeta is then sold on the Bogotá market.

Panela sellers tend to be farm owners with a *trapiche* or sugarcane owners without a *trapiche*. Women very seldom sell panela and, when they do, it is usually because they are widows or their husband is sick.

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21 Producers who use this sharecropping system of milling are called *compañideros*.

22 Freightage is the payment made for hiring the mules.

## CAUCA

In the panela-producing region of Cauca department, most farms are less than 5 hectares in size, that is to say, they are smallholdings where *trapiche* owners process sugarcane jointly with neighbours and where mills are powered by small motors or by animal traction, with production capacities of less than 50 kg/hour. Roughly 14,000 hectares have been planted with sugarcane, with an average yield of 50 tons/hectare, from which 4.5 to 5 tons/panela are produced.<sup>23</sup>

Seventeen or so municipalities are involved in panela production, with the highest-producing municipalities located in northern Cauca. They include Santander de Quilichao, Suárez and Caldosó, with a production of approximately 4,000 tons of panela per year.

The region's sugarcane cultivation is characterized by low-level technology. Just as in Cundinamarca, most of the plantations in this region are more than 20 years old, with low rates of replanting, low levels of fertilizer and herbicide use and selective harvesting of sugarcane, which consists of harvesting only fully mature stalks. For the farmer, this production system does not require much fieldwork, which is generally confined to manual weed control and harvesting of sugarcane.

As with sugarcane cultivation, sugarcane milling and processing technology is low level, with 75 percent of *trapiches* extracting low juice yields. The average extraction rate is about 46 percent, which means that every 100 kilos of crushed sugarcane yields 46 kilos of juice and 54 kilos of bagasse. This shows that a huge amount of juice is being lost in the bagasse as a result of poorly calibrated rollers and rollers in poor condition requiring regrooving.

Panela tends to be of poor quality, since virtually no *trapiches* have storage tanks or precleaning methods and no beating and moulding rooms. The juice is collected in plastic or metal drums (diesel oil drum) and transferred with buckets into the first boiling pan. Then the process of filtering, clarification, evaporation and concentration begins. The resulting syrup is collected in a wooden trough for beating. After that, it is transferred to a counter for moulding and, when cold, it is packed and placed in store rooms (Tunía Development Corporation, CORPOTUNIA, 2000). Most panela is produced artisanally, using low levels of technology.

Family labour plays a major role in panela cultivation and production. According to CORPOTUNIA, the share of family labour is 75 percent and that of hired labour, 25 percent.

The social players involved in the system include producers who own both sugarcane and a *trapiche* and producers who own only sugarcane. As in Cundinamarca and HRS, producers who own both sugarcane and a *trapiche* are involved in the entire process of growing sugarcane and in producing and selling the panela.

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23 CORPOTUNIA-PRONATTA. 2002. Pp 3.

Sugarcane owners without a *trapiche* tend to have two types of relationship with a *trapiche* owner. Either they hire the *trapiche* and pay their rent in panela, or they form a sharecropping relationship with the *trapiche* owner. Under the sharecropping system, the sugarcane grower is responsible for cutting and collecting the sugarcane, while the *trapiche* owner pays the milling costs. In some cases, the sugarcane grower also provides the labour.

In Cauca, as in the other regions, families use panela production as an alternative for increasing their revenues and this has contributed to local and regional development, in addition to generating specific and specialized knowledge on the sugarcane cultivation and panela production processes. These have become specific assets and resources of Cauca's panela-producing areas, as demonstrated by the following accounts:

*“In any case, coffee has always been the main product in the area...but panela became an alternative during periods when there is no coffee harvest or when there is a coffee crisis, in addition to other products such as haricot beans, green beans, tomatoes and livestock.”*

*“...He had lost his drugstore and was on the point of losing his house when he decided to return to Calotoño to work in his brother's trapiche which used to belong to the family. After a while he bought the trapiche from his brother and got his other brothers in to help. He saved his house and now his brothers have built their own houses with the money they have earned from the trapiche”.<sup>24</sup>*

There are two types of marketing channel for panela. The first is when panela producers sell panela directly in the marketplace, to shops or supermarkets or to a rural stockpiler who takes care of distributing and selling it in nearby municipalities and cities.

The second type of marketing channel is when the producer is a member of a panela-producers' association and sells the product directly to the association, as with the Association of Panela Producers of Santander de Quilichao, which buys panela directly from its members and takes charge of distributing and selling it mainly in Cali and cities in the Eje Cafetero region, such as Manizales, Pereira and Armenia.

In Cauca, different panela presentations are produced, including panela in round or square blocks, granulated panela and *panelin*, the weights of which vary from 250 grams to one kilogram.

Lastly, following a natural disaster in the region in 1994 - the Río Páez avalanche - which cost many lives and wreaked serious material and economic damage on the region, poverty increased in the disaster area. Given the seriousness of the situation and the conditions of the population, in the same year the Colombian Government promulgated Law 218 (known as the Páez Act), which seeks to promote economic revival in the disaster area by granting incentives for overcoming the crisis and fostering entrepreneurship.

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24 González Carolina. 2003, p. 20.

Based on a 10-year income tax exemption, exemption from value added tax (VAT) and tariffs on imported raw materials, plus tax deductions or allowances for investors who buy new shares or holdings in the company set up under the Páez Act, the aim was to boost the economy of the affected municipalities and areas, some of which are panela-producers.

Under the Páez Act, the industrial sugar mill Ingenio Panelero del Cauca was set up in Padilla Cauca, although it has not yet been put into operation because of opposition from panela producers and producer's associations. This initiative has now been totally suspended, largely because the chief promoters and partners in the sugar mill own several industrial sugar mills, the financing corporation Corporación Financiera del Valle and a number of insurance companies. What is more, there is no certainty that when this company comes into operation it will not quickly displace small panela producing units and ruin many panela producers and families and cause unemployment (as the present labour-intensive system creates jobs). This will increase poverty in many of Colombia's panela-producing areas.

Table 17 summarizes the main characteristics of panela production in the three Colombian regions under study.

**Table 17: Main characteristics of panela production in Hoya del Río Suárez, western Cundinamarca and Cauca**

Practices and organization	Hoya del Río Suárez	Cundinamarca	Cauca
Field design	Row planting	Row planting/ spaced drilling	Spaced drilling
Crop replanting	Yes	No	No
Fertilization	Chemical	Organic	Organic
Weed control	Chemical and manual	Manual	Manual
Harvesting system	Whole crop	Selective	Selective
Cleaning of sugarcane	No	Yes	Yes
Juice extraction	Mills with a diesel/ electric engine	Mills with a diesel engine	Mills with a diesel motor/Chatanogas
Juice clarification agent	Balsa	Guazuma	Grandcousin/balsa
Greasing agent in the concentrating pan	Vegetable lard/ castor oil	Grease/lard/oil	Laurel wax
Duration of milling	Continuously for 6 days	Discontinuously for two 14-hour days	Discontinuously for one day lasting 14 - 18 hours
Number of milling operatives	11 to 12	5 to 6	3 to 4
Work specialization	Specialized	Fairly specialized	Not specialized
Type of labour	Hired labour	Hired and family labour	Family and hired labour
Form of payment	Piecework basis	Piecework basis/ daily wage	Piecework basis /daily wage

Source: Data from this study

## **INSTITUTIONAL SUPPORT FOR PANELA PRODUCTION**

In 1985, the Colombian and Dutch Governments concluded a cooperation agreement for enhancing Colombia's panela agro-industry. The aim of the agreement was to help improve the living conditions of panela producers by creating, adapting and disseminating technologies suited to the agro-ecological and socio-economic conditions of Colombia's panela-producing regions.

Under the agreement, CORPOICA-CIMPA conducted research activities between 1985 and 1998 which generated estimated profits of US\$ 63.1 million, with a 76 percent return on investment.<sup>25</sup> An estimated 45 percent of these profits went to the producers. The producers who adopted the greatest amount of technology were estimated to have cut their costs by the equivalent of 37 percent and increased their total profits by 110 percent compared with producers who did not adopt any technology.

As a result of CORPOICA research via the National Agro-industrial Processes Programme and CIMPA, coupled with the efforts of private producers, new types of panela presentation have been successfully positioned in the market in recent years. They include granulated panela, panela tablets, *panelines* and liquid panela. At the same time, research is being conducted into the use of panela as a raw material for other industrial processes, to make products like guava paste, confectionery, bakery products and carbonated beverages. Recently CORPOICA has engaged in joint research with hospitals and the medical profession into the use of panela for healing human and animal wounds. The aim of these technological research projects is basically to recover domestic demand for direct and industrial panela consumption and these projects are turning into a key element for capturing international panela markets.

In Cauca in 2002, the Tunía Development Corporation (CORPOTUNIA), with the support of Colombia's National Technology Transfer Programme (PRONATTA) implemented a project for the integrated improvement of the panela agroprocessing chain, with small producers from the municipalities of Santander de Quilichao, Suárez and Caldoso in the north of Cauca department. The aim was to increase the income-generation capacity of Cauca's panela producers by adapting to local conditions the cultivation and furnace technologies developed by CORPOICA-CIMPA.

Some of the main results included the formation of rural agro-industry research groups (GIAR) made up of producers from the main panela-producing areas in the municipalities of Santander de Quilichao, Suárez and Caldoso, as well as the distribution of technical booklets on panela.

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25 CORPOICA-CIAT. 1999.

### **3. Impact of rural processing activities on the welfare of rural economies: the case of the panela agro-industry**

As part of the research to assess panela production as a strategy for diversifying incomes in rural areas of Latin America, three regions of Colombia were selected as representative of the country's panela agro-industry (Cundinamarca, Cauca and Hoya del Río Suárez). The aim was to measure the impact of panela-based production strategies on:

- Income and job creation.
- Types and patterns of family production assets and their link with the various livelihood strategies.
- Resource productivity.
- Fears and motivations for adopting panela-based production systems.
- Natural resource conservation.
- Local, regional, national and international markets.

This study seeks to examine and assess how the dynamic of Colombia's panela production system impacts on the income structure of the family unit, the strategies for marketing and product diversification and the production unit's capacity to cope with and survive times of crisis in sugarcane cultivation.

It is important to analyse the contribution of panela production to building production units' sustainability and ability to remain in operation, as well as to creating family and paid employment, incomes, knowledge and specific assets in order to establish the extent to which sugarcane cultivation and panela processing activities influence the dynamic of local production systems and poverty reduction strategies.

Lastly, potential factors must be identified for improving the competitiveness and strategic positioning of panela in local, regional and national markets, as well as for implementing clean technologies, in order to be able to identify and establish a plan and strategic lines of action to strengthen and modernize the panela agro-industry in Colombia, Latin America and the Caribbean.

A total of 30 surveys were carried out for this study: ten in Hoya del Río Suárez; ten in Cundinamarca and ten in Cauca. The aim was to ascertain the production structure of family units, the contribution to family incomes and assets from panela production and other complementary activities, cost structures, marketing and diversification strategies, resilience and the ability to adapt to adverse production and market situations. The surveys also examined producers' business prospects and projections for their production unit.



Meetings and interviews were held with regional experts in order to identify the strengths, opportunities, weaknesses and threats to panela production at local and regional levels, panela positioning criteria, enhancing competitiveness in the domestic market and integration into the world market under favourable long-term conditions.

### **COMPARATIVE ANALYSIS OF THE THREE REGIONS UNDER STUDY: CUNDINAMARCA, CAUCA AND HRS**

In the three regions under study, as well as in many of Colombia's other panela-producing regions, the consolidation of their specialization in panela production was the result of a boom and subsequent crisis in crops that had hitherto played a major role of Colombia's economy: tobacco, cotton and coffee.

In Hoya del Río Suárez, the tobacco and cotton crisis of the late nineteenth and early twentieth century led to these traditional crops that were specific to the region being displaced by more agro-industrial and commercial activities like sugarcane and coffee growing.

In regions like Cundinamarca and Cauca, the coffee crisis in the mid-twentieth century led these regions to specialize more in sugarcane cultivation, switching from producing syrups to producing panela. Sugarcane became the leading crop, although producers continued to grow coffee and other secondary crops.

*“He was born in the 1950s in the Tambo district in the municipality of Suárez (Cauca)... Although coffee was grown in this region, the man said that later diseases such as leaf rust started to occur in coffee crops, which forced him to switch from picking coffee to cutting sugarcane. Also, during that period sugarcane cultivation was beginning to be promoted in the districts because of municipal policies”<sup>26</sup>.*

This led panela to become the foremost production item at regional, local and production-unit levels, turning it into a lynchpin of development and a key economic alternative for family units in these regions.

The tradition and production specialization of panela producers and their families in the three regions under study are result of the length of time they have been growing sugarcane, the amount of land devoted to sugarcane cultivation and the diversification and combination of production activities to complement the main crop - in this case sugarcane. In HRS, panela producers have devoted an average 31.9 years to panela production, followed by 30.5 years in Cundinamarca and 19.9 years in Cauca.

In terms of the surface area devoted to growing sugarcane, in HRS, the average farm size is 55.2 hectares, of which 68 percent is given over to growing sugarcane; in Cundinamarca sugarcane makes up 58.3 percent of the total, with an average farm size of 15 hectares; and in Cauca 54 percent is devoted to sugarcane, with an average farm size of 9 hectares. The region with the least production diversification is HRS, with only 40 percent of all producers carrying out more than two production activities, unlike Cundinamarca and Cauca, where the figure is 60 percent and 90 percent respectively.

**Table 18: Production activities carried out in the panela production units of Hoya del Río Suárez, Cundinamarca and Cauca**

Production activity	HRS (%)	Cundinamarca (%)	Cauca (%)
Sugarcane/citrus fruits	40		
Sugarcane/livestock		20	10
Sugarcane/coffee		10	
Sugarcane/forest	20	10	
Sugarcane/livestock/citrus fruits	20		10
Sugarcane/livestock/coffee	20		10
Sugarcane/coffee-cocoa/banana/ subsistence crops/forest			20
Sugarcane/maize/forest fallow		10	
Sugarcane/cassava/subsistence crops			10
Sugarcane/pineapple/tomato/subsistence crops			10
Sugarcane/livestock/subsistence crops/forest		30	30
Sugarcane/livestock/subsistence crops/coffee		20	
Total	100	100	100

Source: Data from this study

As table 18 shows, livestock and coffee-production activities in the three regions are more important production alternatives in the panela production system because they are generally complementary to sugarcane cultivation. However, at present, owing to the crisis in the coffee sector caused by domestic and international coffee prices, producers are starting to replace coffee-growing with other more profitable and complementary activities, particularly cattle-raising.

According to one producer: “... people already know about sugarcane and you know that, even if the price is bad, you still can get by, but you can't make a living from panela alone and livestock needs less labour and leaves a bit of money over...”. Another producer says: “... I was fed up with coffee before that, but with prices in this state I started pulling it up bit by bit and bringing in livestock. The price of livestock doesn't go up and down as much. The bit of coffee I have left is for the home and for selling.”

Panela production also makes a major contribution to the family income. This can rise to almost 80 percent but, owing to the low panela prices in the past year, its share has diminished significantly, as one producer from Cundinamarca describes: “More than a year ago, I managed to sell panela at US\$ 85,000 per batch but now I'm selling it at US\$ 75,000 and I've even been forced to sell it as low as US\$ 60,000. Now the return I get from panela is only enough to plant sugarcane and maintain the family”. In this case, the secondary activity has come to play a crucial role in the family's livelihood strategy and the survival of the production unit.

In all three regions, panela production contributes more than 50 percent of the family income. In Cauca, sugarcane cultivation and processing represents 73 percent of the family income, followed by HRS, with 60.5 percent and Cundinamarca, with 58.2 percent. As already mentioned, complementary production activities make up a large proportion of the remainder. For instance, the second most important production activity contributes 24.8 percent of family incomes in Cundinamarca, 18.5 percent in Cauca and 11.7 percent in Hoya del Río Suárez.

In the case of Hoya del Río Suárez, producers tend to carry out or invest in non-farming activities mainly in periods of high prices and in periods of crisis in panela production, non-farming activities turn into one of the main sources of income. The opposite occurs in Cundinamarca and Cauca, where producers tend to invest and rely more on farming activities.

Job creation is another important aspect in sustaining panela-producing families and others involved in panela production. In Cauca, four people out of an average family unit of six persons work in sugarcane cultivation and processing, meaning that it occupies approximately 66.7 percent of family members. The same happens in Cundinamarca, where an average of three people out of a family of five work in sugarcane cultivation and processing, or approximately 60 percent of its members. This contrasts with HRS, where the share of family labour is comparatively low: of an average five-person family, only one or two work in panela production, that is to say, between 20 percent and 40 percent.

As regards hired labour, in proportion to the scale of production in each region, the contribution of hired labour to job creation is similar. In HRS, the region with the largest-scale production, the average number of contract workers is 35, in Cundinamarca it is 12 and in Cauca, eight.

Lastly, solidarity and exchange networks are important in incorporating technology, maintaining production infrastructure, producing new types of product presentation and finding new markets, especially in Cundinamarca and Cauca.

In Cauca, for example, producers tend to maintain and adapt their milling equipment and infrastructure in line with their neighbours' practices and recommendations. They also form reciprocal farm labour groups or community gatherings to help with harvesting sugarcane or tidying up plots and jointly hire transport for inputs. According to the producers' own accounts, these practices facilitate their access to resources and give them new ideas for panela presentation and for getting into new markets.

In conclusion, non-monetary exchange networks and relationships are seen to be significant social and cultural factors that determine the continuance and sustainability of panela production units in times of crisis, especially in regions of small producers. Both sectoral and national policies should therefore place greater emphasis on strengthening these networks and the local and regional social fabric.

## **ANALYSIS OF COSTS AND REGIONAL COMPETITIVENESS**

Production parameters like land productivity, measured mainly in terms of the amount of panela produced per hectare/month and labour and production costs, are important for analysing the regional competitiveness of panela production. Table 19 presents the consolidated analysis of production parameters in the three Colombian panela-producing regions.

**Table 19: Panela production parameters in the three Colombian regions**

Parameter	Cundinamarca	Hoya Río Suárez	Cauca
Sugarcane harvest period (months)	12	17	15
Sugarcane yield (kg/hectare)	69,756	127,892	70 000
Sugarcane brix (%)	19.2	18.3	19.0
Juice extraction (%)	54.2	60.4	46.0
Processing of sugarcane into panela (%)	10.9	11.6	8.0
Panela yield (kg/hectare)	7,600	14,800	5 600
Land productivity (kg panela/hectare/month)	633	871	373
Labour productivity (kg panela/worker/hour)	5.4	5.5	3.2

Source: Data from this study

Given the selective harvesting characteristics in the Cundinamarca and Cauca regions, the harvest period is 12 months, during which time each field is selectively harvested two or three times. In Hoya del Río Suárez, where the whole crop is harvested simultaneously, the harvest period coincides with the sugarcane growing season, which is 17 months on average. Hoya del Río Suárez has the highest sugarcane yield per hectare harvested, with average values of around 130 tons/hectare. The concentration of soluble solids (brix degrees) is comparatively higher in Cundinamarca and Cauca because only the maturest stalks are harvested.

Juice extraction in mills is significantly higher in Hoya del Río Suárez, where there has been more intensive adoption of recommendations for the proper adjustment of rollers and where, in some instances, there are sets of two mills or mills with five rollers. Hoya del Río Suárez also has the highest average rate of processing sugarcane into panela, which depends directly on the sugarcane brix and on juice extraction. Hoya del Río Suárez presents the highest values for panela yields per hectare, which is a result of sugarcane yields and the industrial yield (processing of sugarcane into panela). This is because of the region's greater technological development in both panela cultivation and processing, as a result of CIMPA research and technology transfer activities in the region over the past 15 years.

Based on the above data, land productivity was calculated in terms of the quantity of panela produced per hectare per month. Hoya del Río Suárez turns out to have 57.2 percent higher productivity than Cauca and 27.3 percent higher than Cundinamarca.

As regards labour productivity, expressed in terms of the average quantity of panela produced per man-hour, table 20 shows that Hoya del Río Suárez has the lowest labour force requirement per ton of panela produced. This is because the use of fertilizers increases the yield per hectare and the use of herbicides reduces the need for manual weed control. HRS also has a lower labour force requirement for harvesting, as the yield per cutter is greater using the whole-crop harvesting method than it is with selective harvesting of cane stalks. However, labour force requirements in the sugarcane transportation phases are lower in Cundinamarca and Cauca because the distances between the harvested field and the *trapiche* are shorter in these two regions. In the processing phase, Hoya del Río Suárez once again has a lower labour force

requirement than Cundinamarca and Cauca, with the latter making the greatest use of processing labour. This shows that Hoya del Río Suárez makes more efficient use of milling workers (five to six workers in Cundinamarca and Cauca, compared with 11 to 14 in Hoya del Río Suárez).

With regard to annual labour force requirements, Cundinamarca and Cauca have a lower labour force requirement (8,215.1 and 7,530.3 person-hours/year respectively) than Hoya del Río Suárez (48,302.8 person-hours/year), demonstrating the importance of HRS in the requirement and use of the local and regional labour force.

**Table 20: Labour force requirements (person-hours/ton of panela)**

Phase	Cundinamarca	Hoya Río Suárez	Cauca
Sugarcane cultivation	35.4	58.1	50.5
Harvesting and transportation	77.0	47.9	64.0
Processing	67.6	76.6	112.0
Total	180.0	182.6	226.5

Source: Data from this study

To analyse the cost structure, the costs of producing one ton of panela were calculated for each production phase. Table 21 compares production costs in the three regions.

**Table 21: Panela production costs (US\$/ton of panela)**

Phase	Cundinamarca	Hoya Río Suárez	Cauca
Sugarcane cultivation	42.0	41.5	59.2
Harvesting and transportation	61.8	44.1	42.6
Processing	99.5	101.1	117.1
Total	203.3	186.7	218.9

Source: Data from this study

The table shows Cundinamarca to be the region with the lowest production costs because, unlike HRS, the region benefits from a number of unpaid factors of production (particularly family labour). This makes panela production costs in Cundinamarca 8.2 percent lower than in HRS and 14.7 percent lower than in Cauca.

As regards profits per ton of panela, Cundinamarca with US\$ 74.3 and Cauca with US\$ 70.8 per ton of panela have higher net profits than HRS, owing mainly to the fact that panela from Cundinamarca and Cauca fetches a higher price in local and regional markets, in recognition of the special quality attributes of panela from these two regions.

As regards producers' annual profits, HRS is the region with the highest annual earnings (US\$ 13,884.4) and an annual production value of US\$ 68,454.2, followed by Cundinamarca, with annual earnings of US\$ 3,343.8 and an annual production value of US\$ 11,743.2 and lastly Cauca, with annual earnings of US\$ 2,354.5 and an annual production value of US\$ 9,634.2.

As regards workers' wages, Cundinamarca and HRS are the areas with the highest wages for farm labour, with US\$ 0.67 and US\$ 0.62 per man-hour respectively, whilst Cauca has the lowest wage, with US\$ 0.45 per man-hour. Cundinamarca and HRS also pay the highest wages for processing workers, with US\$ 0.67 per man-hour in HRS and US\$ 0.64 per man-hour in Cundinamarca, as compared with 0.52 US\$/man-hour in Cauca.

It can be concluded that panela production in Colombia, as in Guatemala and Brazil, is an important activity in the requirement and use of family and hired labour, as well as in the family, local and regional economic dynamic.

### **STRENGTHS AND WEAKNESSES OF THE PANELA AGRO-INDUSTRY IN HRS, CUNDINAMARCA AND CAUCA**

Meetings were held with producers and technicians in each region to identify the strengths, weaknesses, opportunities and threats to panela production. These are shown in tables 22, 23 and 24 respectively.

**Table 22: Analysis of the strengths, opportunities, weaknesses and threats to the rural panela agro-industry in HRS**

Strengths	Weaknesses
<p>The social and economic importance of RAI for the region.</p> <p>Panela production and consumption are part of the region's cultural identity.</p> <p>The wide range of adapted sugarcane varieties, offering better yields, a shorter growing season and better phytosanitary characteristics.</p> <p>Multiple possibilities for the economic exploitation of sugarcane.</p> <p>Continual production of sugarcane and panela throughout the year.</p> <p>A rich technological baggage amassed on the basis of traditional know-how and institutional research (CIMPA-CORPOICA).</p> <p>Existence of local services for building furnaces, maintaining equipment and so on.</p> <p>Large scale of production.</p>	<p>Lack of coordination between panela-producing local agrifood systems in regulating production and marketing activities.</p> <p>Production of panela of non-standard size.</p> <p>The marked individualism of producers and their wariness of forming associative schemes.</p> <p>Panela is sold without brand marks, labels of origin or quality logos.</p> <p>The use of bleaching and colouring agents banned for panela production.</p> <p>Environmental damage caused by energy-inefficient furnaces and poor waste management.</p> <p>Lack of linkages and coordination between institutional support activities.</p> <p>Reduction in the size and weight of panela.</p>

Opportunities	Threats
<p>Strengthening panela producers' associations at regional and national level.</p> <p>Forming and consolidating regional business partnerships.</p> <p>Modernizing production by means of research, technology transfer and credit programmes.</p> <p>Diversifying sugarcane uses (animal feed, alcohol, sucrochemicals).</p> <p>Promoting the use of panela as an input for industrial processes (foodstuffs, pharmaceuticals, cosmetics, etc)</p> <p>Expanding the domestic market with programmes to promote panela consumption and improve panela quality and presentation.</p> <p>Opening up international markets by promoting organic panela.</p> <p>Developing certification systems (for quality, organic labels, agri-environmental labels and so on).</p>	<p>Large-scale panela production by the sugar sector or powerful economic groups.</p> <p>Entry onto the domestic market of cheaper panela from neighbouring countries.</p> <p>Widespread reduction in the consumption of sweetening agents.</p> <p>Competition from low-calorie artificial sweeteners.</p> <p>Emergence of pests and diseases such as the leaf-cutting ant and the moth borer.</p> <p>Constant price rises in inputs for sugarcane cultivation and panela production.</p>

**Table 23: Analysis of the strengths, opportunities, weaknesses and threats to the rural panela agro-industry in Cundinamarca**

Strengths	Weaknesses
<p>The social and economic importance of RAI for the region.</p> <p>Production of a product with a good size and weight.</p> <p>Panela production and consumption are part of the region's cultural identity.</p> <p>The conservationist character of sugarcane cultivation.</p> <p>Multiple possibilities for the economic exploitation of sugarcane.</p> <p>Continual production of sugarcane and panela throughout the year.</p> <p>A rich technological baggage amassed on the basis of traditional know-how and institutional research (CIMPA-CORPOICA).</p> <p>Existence of local services for building furnaces, maintaining equipment and so on.</p> <p>Existence of certified rural enterprises, like the Hunzahua company, which export organic panela. 100% natural product.</p>	<p>The marked individualism of producers and their wariness of forming associative schemes.</p> <p>Lack of coordination and consultation between panela producers.</p> <p>Panela is sold without brand marks, labels of origin or quality logos.</p> <p>The use of bleaching and colouring agents banned for the production of panela</p> <p>Environmental damage caused by energy-inefficient furnaces and poor waste management.</p> <p>Lack of linkages and coordination between institutional support activities.</p> <p>Poor product quality containing sludge, bagacillo and insects.</p> <p>Poor investment capacity.</p> <p>Small-scale production.</p> <p>Producers' association with no sense of comradeship or commitment.</p>

Opportunities	Threats
<p>Forming and consolidating regional business partnerships.</p> <p>Modernizing production by means of research, technology transfer and credit programmes.</p> <p>Diversifying sugarcane uses (animal feed, alcohol, sucrochemicals).</p> <p>Promoting the use of panela as an input for industrial processes (foodstuffs, pharmaceuticals, cosmetics, etc.).</p> <p>Expanding the domestic market with programmes to promote panela consumption and improve panela quality and presentation.</p> <p>Opening up international markets by promoting organic panela.</p> <p>Developing certification systems (for quality, organic labels, agri-environmental labels and so on).</p>	<p>Large-scale panela production by the sugar sector or powerful economic groups.</p> <p>Entry onto the domestic market of cheaper panela from neighbouring countries.</p> <p>Widespread reduction in the consumption of sweetening agents.</p> <p>Fall in the price of sugar.</p> <p>Constant price rises in inputs for sugarcane cultivation and panela production.</p>

**Table 24: Analysis of the strengths, opportunities, weaknesses and threats to the rural panela agro-industry in Cauca**

Strengths	Weaknesses
<p>The social and economic importance of RAI for the region.</p> <p>Production of a natural product with a good size and weight.</p> <p>Panela production and consumption are part of the region's cultural identity.</p> <p>The conservationist character of sugarcane cultivation.</p> <p>Multiple possibilities for the economic exploitation of sugarcane.</p> <p>Continual production of sugarcane and panela throughout the year.</p> <p>Existence of jointly validated local technologies and research into panela markets.</p> <p>Existence of local services for building furnaces, maintaining equipment and so on.</p> <p>Coordination and good relations between producers.</p>	<p>The marked individualism of producers and their wariness of forming associative schemes.</p> <p>Panela is sold without brand marks, labels of origin or quality logos.</p> <p>Environmental damage caused by energy-inefficient furnaces and poor waste management.</p> <p>Poor product quality containing sludge, bagacillo and insects.</p> <p>Poor investment capacity.</p> <p>Small-scale production.</p> <p>Lack of linkages and coordination between institutional support activities.</p> <p>Producers' association with no sense of comradeship or commitment.</p>



Oportunidades	Amenazas
<p>Existing markets in Valle del Cauca with better prices, in addition to other potential markets.</p> <p>Large local markets with stable prices.</p> <p>Participating in fairs and shows to present panela.</p> <p>Forming and consolidating regional business partnerships.</p> <p>Modernizing production by means of research, technology transfer and credit programmes.</p> <p>Diversifying sugarcane uses (animal feed, alcohol, sucrochemicals).</p> <p>Promoting the use of panela as an input for industrial processes (foodstuffs, pharmaceuticals, cosmetics, etc.).</p> <p>Expanding the domestic market with programmes to promote panela consumption and improve panela quality and presentation.</p> <p>Opening up international markets by promoting organic panela.</p> <p>Developing certification systems (for quality, organic labels, agri-environmental labels and so on).</p>	<p>Construction and entry into operation of the Padilla industrial sugar mill.</p> <p>Large-scale panela production by the sugar sector or powerful economic groups.</p> <p>Entry onto the domestic market of cheaper panela from neighbouring countries.</p> <p>Widespread reduction in the consumption of sweetening agents.</p> <p>Fall in the price of sugar.</p> <p>Constant price rises in inputs for sugarcane cultivation and panela production.</p>

### **IMPORTANCE AND IMPACT OF PANELA PRODUCTION ON THE CONTINUANCE AND SUSTAINABILITY OF FAMILY PRODUCTION UNITS**

The sustainability of panela production units in the three regions under study depends not only related on its contribution to the creation not only of income and of family and paid jobs, but also of social solidarity and exchange networks, which are a real cushioning and support factor in times of crisis. In Cauca, practices such as “mingas” (traditional gatherings of an entire community to work on a task) and “convites” (gatherings for reciprocal farm labour) help to reduce labour costs, allowing production units to compete and remain in the market even during periods of low prices.

Another important factor is producer strategies for adapting to the conditions and resources in their environment. The reasons why producers opt for sugarcane as their main crop and diversified production systems are other factors that help to explain their success and continuance in the market. The two main activities of production units are sugarcane/livestock or sugarcane/coffee. For 46 percent of producers, sugarcane with livestock is the main farm activity, 20 percent farm sugarcane with coffee, 10 percent farm sugarcane alone and the remaining 24 percent farm sugarcane with citrus fruits or maize or forest.

For 53.3 percent of producers, panela production is a family tradition which, together with the region’s agro-ecological conditions and labour specialization, create a climate conducive to panela production. For 43.3 percent of producers, panela production is a profitable and job-creating activity, which is important as a means of maintaining public order

in the region. As a result of the coffee crisis, 3.3 percent of producers switched to producing panela because it was their second most important activity after coffee and offered better prices and market opportunities.

As regards producers' reasons for engaging in another production activity, 74 percent of the 27 producers who carry out more than one production activity do so because they do not wish to rely totally on growing sugarcane, as one producer from HRS explains: *"You can't have only one thing. It's better to diversify and sugarcane gives a lot of added value to livestock, so the two become complementary: sugarcane provides feed for livestock and livestock provides fertilizer for sugarcane"*. Of the remaining producers, 15 percent carry out another production activity to complement sugarcane cultivation because the price is more stable and the remaining 11.1 percent do so because it allows them to combine sugarcane with other crops, especially subsistence crops.

As regards the investment of earnings, in periods of low prices, profits are spent mainly on sustaining the family and the farm, as mentioned earlier. Thus, 46.7 percent of producers spend their profits in sustaining crops, on the *trapiche*, the farm, the family, children's education and family savings; 16.7 percent spend their profits on sustaining the family, the farm and buying livestock and the remaining 36.5 percent spend their profits mainly on sustenance, as well as on home improvements, increasing the sugarcane-growing area, buying equipment, reimbursing loans and purchasing vehicles.

During the boom period of high prices, profits are spent mainly on production assets for capitalization purposes, such as: replanting and/or increasing the sugarcane-growing area, improving the *trapiche*, purchasing equipment and machinery, buying livestock and on commercial activities such as supermarkets, restaurants and so on. During the sharpest price peaks, producers invest in commercial activities that enable them to consolidate a highly flexible method of production organization, which allows them to change their production lines as a livelihood and sustainability strategy during times of crisis in sugarcane growing.

Women play a major role in allocating profits, especially capital assets. Even though the head of household is in principle responsible for distributing profits, from the sidelines women have a decisive influence on the investment of profits, as one producer describes: *"... you know that very often the man says that he's the boss, while dipping his hand in his pocket, because it's the woman who says what to do. Women are the ones who tell you that you have to buy such and such, or that such and such is running out... You might consult her to see whether she thinks it would be a good idea to invest money in livestock or not..."*

Concerning the strategies and capacity of rural panela-producing families to cope with adverse production and market situations, an important consideration is the solidarity and reciprocal exchange network on which farming families rely when faced with economic problems, as these non-monetary elements can be crucial in the continuance and sustainability of the poorest households.

In the case of panela, relationships of kinship, neighbourliness and non-monetary exchange are fundamental to the movement of labour, land and capital and are a key element in family livelihoods and in local and regional economic and social stability. A clear example of this type of relationship is sharecropping in the region of Hoya del Río Suárez, where labour

is scarce. Landowners use sharecropping agreements to secure the labour of sharecroppers and their families and, in turn, the latter gain access to land and capital.

In the case of Cundinamarca and Cauca, practices like joint milling, paying for the hire of a *trapiche* with panela, assistance and solidarity in loaning equipment or tools when a neighbour suffers damage to *trapiche* equipment, or credits and loans from suppliers to producers with cash-flow problems, sometimes because milled panela has not been paid for in full, show the importance of networks and relationships like these in the rural panela production economy.

Another strategy associated with such solidarity and exchange networks among panela production units is to form associations of rural producers and associations of rural producers and agricultural investors to minimize risk by exchanging land, capital and labour. Good examples include: the Panela Producers' Association of Santander de Quilichao in Cauca; MERPANELA panela marketing company and the associative worker enterprise, Empresa de Trabajo Asociativo San Isidro, in Cundinamarca; and the Associative Business Management Models (MEGA) of producers in Hoya del Río Suárez. Most of these have been consolidated to increase producers' bargaining power with intermediaries and to develop systematic programmes for training human resources and improving technology, with the aim of introducing more sustainable and competitive technologies.

The distinctive nature of the areas where panela is produced is another important factor in the continuance and sustainability of panela production units. The existence of specific assets such as: know-how; the region's panela production tradition; social relations; the institutional network and collective action represent a series of advantages which, in times of crisis, allow producers to develop effective livelihood options and strategies. For instance, in Cauca, the know-how and panela production tradition of a municipality like Santander de Quilichao makes it possible to get specialized labour easily which, in turn, has led to the production of good quality panela, positioning it in local and nearby regional markets and differentiating it from adulterated panela made by panela counterfeiters (*derretideros*).

Another consideration is producer business strategies in the production and marketing sphere, that is to say, what producers do when faced with a production drop or a delay in payment for panela. For instance, when they lose a batch of panela<sup>27</sup>, 60 percent of producers melt it back down again and add it little by little to other batches; 26.7 percent prefer to use it as animal feed; 6.7 percent produce the panela anyway and sell it at the highest price they can get; and the remaining 6.7 percent throw the batch of panela out. In general producers seek to minimize the impact of such setbacks on their revenues.

Faced with damage that could delay milling work for more than two days, 40 percent of producers replied that they would stop milling while the damage was repaired, 23.3 percent would stop milling and would continue milling in a neighbour's *trapiche*, 16.7 percent would ask a neighbour to lend them the damaged part and would try to repair the damage, 16.7 percent would stop milling and leave it until the following week and the remaining 3.3 percent would

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<sup>27</sup> Panela is produced in batches (*puntos*) or stocks, which are called *cochadas* or *rayas* depending on the region.

stop milling and would leave the sugarcane as syrup, because a delay for repairing the damage would reduce panela quality.

Producers tend to maintain their equipment and facilities frequently to avoid situations like this and many, mainly in HRS, offer their workers incentives by giving them extra panela for leaving the workplace, equipment and tools clean.

In cases where there is a delay in full payment for production, 70 percent of producers resort to asking for a cash loan, usually from a relative or friend, or credit from suppliers and wait until the intermediary finishes paying for the panela. Another 16.7 percent of producers choose to stop selling to that particular trader, with some saying that they usually have one buyer to whom they almost always sell; and the remaining 13.3 percent say they would never have this problem because they do not usually sell to a single buyer. As one producer from HRS states: *“My marketing system is to work with three customers to whom I have been selling for eight years...”* According to another producer: *“Selling to only one buyer would allow them to mess you around and you shouldn’t let that happen. What’s more, you mustn’t rely on a single market. It’s better to have several alternatives”*.

It is important to clarify that buyers do not generally pay cash for the full production amount; they make a down payment to allow the producer to pay the workers and to purchase the necessary inputs for the next milling session. The balance is usually paid fifteen days after the panela is sold. This causes great anxiety to producers on account of the risk they are running: as panela is bought and sold in the informal market, there is no legal instrument or mechanism that binds the intermediary to pay the producer and, in many cases, intermediaries do not pay and the producer suffers the loss.

In situations where the price of panela fails to offset production costs for a period of two months or more, producers resort to a number of different strategies. Many producers (56.7 percent) would choose to stop producing panela until the price rises again and would use their savings and income from other activities to sustain them during the crisis period; 13.3 percent would continue to mill but would reduce production costs to a minimum; 13.3 percent would seek alternative markets where panela fetches higher prices; 10 percent would seek alternative uses for their sugarcane, such as animal feed; and the remaining 6.6 percent would ask for a loan and would minimize production costs.

Factors like unstable prices, coupled with a lack of political power and empowerment, have contributed to giving panela producers and their families the collective and individual impression of being outcasts and misfortunates, which is manifested as an individual attitude of compassion and a family attitude of scepticism.

This is shown by the accounts of a number of producers: *“... we panela-producers are very much on our own. Here there’s nobody to help us. We’re getting poorer all the time and there’s no government aid for us panela-producers. These panela prices are awful and the Government doesn’t do a thing about it...”*; *“...you try to carve out a better future for your children that has nothing to do with farming”*; *“...you want your children to have a good life and to be professionals and farming is not a good option for that”*; *“if you have children and you want them to live well and to find a good job, you have to get them to study to achieve something better, something that brings in a higher return than panela...”*

Lastly, some of the factors that cause producers the greatest uncertainty and make them reluctant to incorporate technology include: a lack of soft loans or loans for buying inputs, especially for small producers; fluctuating panela prices and a lack of panela cooperatives or marketing firms that offer producers better guarantees and would regulate the price of panela at local and regional levels.

Our general conclusion is that the adaptability and stability of panela production is due in great measure to way in which the production system is organized and to solidarity networks which give panela producers certain advantages, such as:

- Access to land, labour and capital resources.
- A combination of marketing activities, using a production system that is highly adaptable to market changes.
- The significant contribution of self-consumption to household incomes and flexibility to increase the share of self-consumption in times of crisis.
- Associations among rural producers and between rural producers and agricultural investors for exchanging land, capital and labour and for minimizing risk.

## **CONCLUSIONS OF THE CHAPTER**

As mentioned earlier, panela production units form a vertically integrated system in which producers are involved in all phases of panela cultivation, production and sale. This has enabled producers to take a wider view of the market and of the commercially most profitable activities, as shown by the organization of their production system. The system is based on a combined set of marketing activities, which makes their production lines highly adaptable to market changes, a feature that has provided panela producers with greater adaptability and stability at times of crisis than other rural producers like coffee-growers. Indeed, this raises the important question of whether a vertically integrated panela agro-industry would not actually be more effective in developing livelihood strategies than horizontal or primary-production type processing activities.

The contribution of panela production to the dynamic of the economy and of family, local and regional employment, coupled with the net annual profits for producers, are crucial in explaining the continuance and importance of this subproduction sector for the sustainability of family units and for the local and regional economy in the panela-producing regions of Guatemala, Brazil and Colombia. Regions like Santa Rosa in Guatemala, Valle do Pianco in Brazil and Hoya del Río Suárez in Colombia are a clear example of this.

Santa Rosa in Guatemala has an average annual labour force requirement of 18,168 person-hours, an annual production total of 64.8 tons of panela and a net annual income of US\$ 8,497.6. Valle do Pianco in Brazil has an annual labour force requirement of 1,941.4 person-hours, an annual production total of 12.6 tons of panela and net annual earnings for producers of US\$ 1,734.4. And lastly, Hoya del Río Suárez in Colombia has an average annual labour force requirement of 48,302.8 person-hours, an annual production total of 268.3 tons of panela and a net annual income of US\$ 13,884.4. All these figures show the importance and contribution of panela production to the dynamic of the family, local and regional economy.

The panela agro-industry serves multiple functions at local, regional and national level: as a creator of jobs, income, added value, food security, social stability, environmental services and local and regional identity, amongst other things. All this shows that its contribution and role are not confined to the economic sphere alone but encompass the social, cultural and environmental spheres as well, confirming the multifunctional nature of panela production in the three countries under study.



## **4. Identifying the problems and designing strategies and lines of action to strengthen and modernize Colombia's panela agro-industry**

Three regional workshops were held with producers and technicians in the regions of Hoya del Río Suárez, western Cundinamarca and northern Cauca in order to identify the problems with panela production in the region and to establish priority lines of action for resolving these problems.

Between 10 and 15 people were invited to each meeting, using a participative methodology for identifying and prioritizing problems proposed by COLCIENCIAS.<sup>28</sup>

Using this methodology, the first step was to hold a brainstorming session on the main problems facing the panela agro-industry at regional level. Next, the problems were grouped into categories: technical, market-related, organizational and social problems. Based on comparing each of the problems with the other problems in a Vester matrix, an order or hierarchy of priorities was established, distinguishing active problems (which cause other problems) from passive problems (which are generally caused by other problems).

This led to identifying the priority problems in each region that must be tackled first in order to help resolve the other problems. The results of these workshops formed the basis of a proposed Action Plan to help strengthen and modernize Colombia's panela agro-industry.

This section describes the main results of the regional workshops on identifying and prioritizing problems, based on which strategic guidelines are proposed for designing an Action Plan.

### **PROBLEMS IN HOYA DEL RÍO SUÁREZ**

Two workshops were held on the Hoya del Río Suárez region: one in the city of Bucaramanga and the other in the Panela Research Centre of the Colombian Corporation for Agricultural Research (CIMPA) in Barbosa, Santander. The workshops were attended by panela producers from Boyacá and Santander, represented by ASOBOYSAN and FEDEPANELA, the Agriculture Secretariat of Santander, CORPOBOYACÁ and CORPOICA-CIMPA.

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<sup>28</sup> Duarte, Oscar, 2003.



The key problems in the Hoya del Río Suárez region include: the poor competitiveness of small *trapiches*; poor quality panela; environmental damage from the consumption of wood and rubber in panela furnaces and restrictions on expanding the panela market.

The following problems were prioritized:

### **Technical problems**

Consumption of wood and rubber owing to low furnace efficiency Producers lack knowledge about technology Lack of knowledge about managing varieties Lack of knowledge about managing organic fertilizer Lack of awareness of new furnace models High transportation costs for sugarcane Inefficient management of sugarcane at the *trapiche* Poor hygiene in *trapiches* Poor panela quality (impurities, additives) Diminishing weight of panela Poor diversity in sugarcane species grown; food dependency Little technological development in organic production Poor juice extraction

### **Market-related problems**

- Demands on producers from supermarkets The market revolves around intermediaries Restricted and static marketing of panela Marketing unsuitable for new presentations
- Price instability
- Inadequate industrialization for new panela uses and presentations
- Small *trapiches* are uncompetitive in getting workers

### **Organizational problems**

- Poor trade organization and business development
- Unreliable statistics on the panela sector
- Producers are limited in carrying out research
- Lack of production programmes for granulated panela
- No associative culture exists
- Poor institutional management
- Poor linkage of the panela chain with other production chains

## **PROBLEMS IN CUNDINAMARCA**

For the region of western Cundinamarca, a workshop was held in the CORPOICA Animal Health Research Centre (CEISA) in Bogotá. Twelve people attended, including producers and technicians from FEDEPANELA, SENA, MERPANELA, the Agriculture Secretariat of Cundinamarca, ICA and CORPOICA.

A brainstorming session on the panela agroprocessing chain in Cundinamarca identified the main problems affecting panela production. The two key problems identified were low productivity and poor panela quality, which have led to a gradual decline in the market, in turn reducing incomes and ultimately worsening welfare conditions in the panela-producing regions of Cundinamarca department.

### **Technical problems**

- Producers and operatives have low-level technology training
- Poor infrastructure and hygiene in *trapiches*
- Inefficient furnaces are causing environmental damage (deforestation and atmospheric pollution)
- Lack of awareness of the most appropriate sugarcane varieties and their proper agronomic management
- Imbalance between the area under cultivation, engine power, mill capacity and furnace capacity
- Producers lack information about available technologies and market options
- Lack of knowledge of the most appropriate harvesting system
- Wastage of by-products and other species in the production system
- Low juice extraction at the mill
- Use of harmful additives as a result of poor processing management
- Impact of pests and diseases on sugarcane (chiefly the moth borer and sugarcane smut)
- High harvesting and transportation costs for sugarcane

### **Market-related problems**

- Production and marketing of adulterated panela, made with sugar
- Small-scale production is uncompetitive
- Low selling prices for panela
- Rules on weights and measures are not applied
- Depressed panela market

### **Organizational problems**

- Lack of business training
- Poor linkages between institutional activities
- There is no follow-up to the introduction of technology
- The municipal technical assistance service is inadequate

### **PROBLEMS IN CAUCA**

Field research and a meeting with producers were conducted in the municipality of Santander de Quilichao in northern Cauca. The technicians consulted were from CORPOTUNIA and CIAT, two organizations that support the region's panela agro-industry. A point of note is the establishment of the Association of Panela Producers and Marketers of Santander de Quilichao in the municipality, comprising 54 members.

The following problems were identified:

### **Technical problems**

- Low sugarcane yields
- Lack of awareness of appropriate varieties

- Inappropriate growing practices
- Inappropriate processing infrastructure
- High production costs
- Detrimental environmental impact owing to the use of wood
- Poor capacity of local operatives

### **Market-related problems**

- Scant development of new panela presentations
- Poor brand positioning
- Price instability
- Non-standardized product

### **Organizational problems**

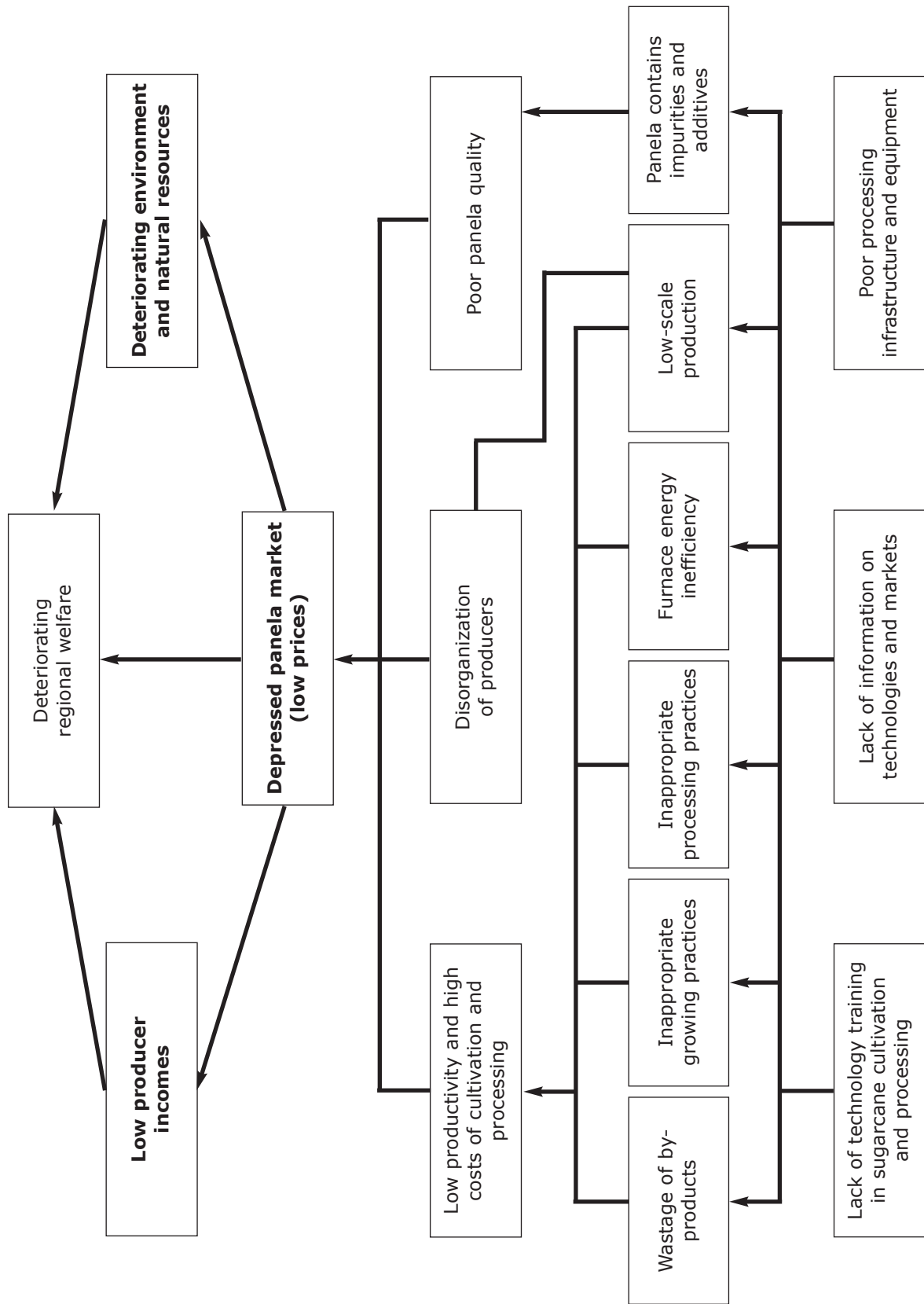
- Even though there is a municipal association of panela-producers, its members have little sense of comradeship
- Poor communication between leaders and members
- Insufficient working capital
- Low generational replacement
- The association's goals are unclear

## **IDENTIFICATION OF STRATEGIC LINES OF ACTION FOR STRENGTHENING AND MODERNIZING COLOMBIA'S PANELA AGRO-INDUSTRY**

Diagram 3 shows a flow chart outlining the problems of the panela agro-industry, based on the results of the regional workshops. An analysis of this diagram makes it easier to identify the causative problems to be tackled and to propose strategic lines of action for resolving them.

Below is a description of each causal problem, together with strategic lines of action for helping to resolve each problem.

The bottom row of boxes in the diagram shows the basic causal problems: insufficient training of producers and operatives in technological aspects of sugarcane cultivation and processing; lack of information on technologies and markets and poor processing infrastructure and equipment.



**Diagram 3: Flow chart of problems in Colombia's panela agro-industry**

## **PANELA TECHNOLOGY TRANSFER PROGRAMME**

Insufficient training of producers and operatives in technological aspects of sugarcane cultivation and processing is a problem that was mentioned at all the regional workshops and it has the heaviest impact in western Cundinamarca and northern Cauca. As mentioned earlier in this study, the research conducted by CORPOICA-CIMPA and other institutions in Colombia has led to the development of appropriate technology for improving the cultivation, processing and economic exploitation of sugarcane and of by-products from panela processing. Great progress has been achieved in the adoption of technology, especially in the region of Hoya del Río Suárez, where an intensive programme of technology creation and dissemination was conducted between 1986 and 1994 via CIMPA, with financial support from the Dutch Government.

In the western Cundinamarca region, CORPOICA has been conducting technology adaptation and transfer projects since 1995 with funding from ICA, the Dutch Government, PRONATTA and Cundinamarca's Agriculture Secretariat. In Cauca, ad hoc projects for improving production have been carried out via a number of organizations, including CORPOTUNIA-CIAT in northern Cauca and the Smurfitt-Cartón Colombia Foundation and COIMPRACAUCA in west central Cauca, with advice from CORPOICA and funding from PADEMER. However, due to the ad hoc nature of most of these projects, the large number of producers to be catered to, the dispersed nature of panela production and, basically, to insufficient finance, a great number of production units still need improvements, with technology geared to the specific agro-ecological and socio-economic conditions and potential of Colombia's main panela-producing regions.

Any high-impact Action Plan should therefore include a **Panela Technology Transfer Programme** covering Colombia's main panela-producing regions, with an integrated production-system approach to sugarcane that involves not only processing it into panela but also diversifying sugarcane into other value-creating activities, such as using sugarcane and sugarcane cultivation and milling by-products in livestock production programmes. This would have the effect of: generating additional revenues and jobs within the family production unit and in the region; reducing the environmental impact caused by poor management of processing waste and improving the nutritional quality of people's diets in panela-producing regions. The Panela Technology Transfer Programme should be geared to the specific regional conditions and should use participative methodologies to encourage more producers to adopt and "appropriate" technology.

## **PANELA INFORMATION SYSTEM**

Inadequate information on technology and markets is a problem linked closely with the above problem. There lack mechanisms for producers to acquire a steady flow of reliable information on available technology and the conditions of the panela market, to make their production decision-making more efficient.

To help resolve this problem, a **Panela Information System** should be implemented on an information medium suited to the cultural and educational characteristics of the

majority of panela producers. This would keep them abreast of available technologies, their characteristics and benefits, costs and implementation possibilities. In addition, market information should be provided on such matters as: legislation on panela production and marketing; desirable product characteristics; the various presentation possibilities; marketing opportunities; standard volumes and prices and opportunities for access to new domestic and international markets.

To ensure that the information is effective, it is proposed to produce and publish simple periodic bulletins containing clear, easily-understood messages. These bulletins could contain information about technologies validated by CORPOICA-CIMPA and other research organizations, as well as panela data from the information system on agricultural sector prices and markets (SIPSA), which is currently run by Corporation Colombia International (CCI). This information could be distributed to producers via FEDEPANELA service centres, research centres and local offices of CORPOICA and other regional organizations that support panela-producers. The information could also be supplied in electronic form for distribution among technicians and others with Internet access.

## **FINANCING PROGRAMME FOR MODERNIZING THE PANELA AGRO-INDUSTRY**

In all three regions under study, there was manifestly a problem with poor infrastructure in *trapiches* and a lack of processing equipment and tools suited to what should be a food factory that meets health and hygiene requirements, implements good manufacturing practices and provides a safe workplace for *trapiche* operatives. In addition, problems are reported with low sugarcane juice extraction, stemming from the poor condition and operation of mills and with poorly-designed energy-inefficient furnaces necessitating the consumption of wood and rubber from used tyres, with the resulting environmental impact of deforestation and the emission of heat, carbon monoxide, carbon dioxide and other polluting gases into the atmosphere.

To facilitate the adoption of technology and the modernization of panela production infrastructure and equipment, adequate and timely credits must be provided to producers interested in incorporating new technologies, together with technical and financial assistance. A **Financing Programme for modernizing the Panela Agro-industry** could be set up for the purpose. In addition, funding should be provided for diversifying sugarcane production, such as animal production based on feed from sugarcane and by-products from sugarcane cultivation and processing, or the production of organic fertilizers from bagasse and animal manure. Furthermore, these diversification activities, which complement panela production, help to: enhance incomes and jobs for small producers; improve the nutrition of families and the region and reduce environmental problems arising from poor management of processing waste.

The credits for the technological modernization of farms and *trapiches* could be channelled through FINAGRO and other funds like PADEMÉR and FOMIPYME which specialize in supporting micro-, small and medium-size rural enterprises, with the backing of the Agricultural Guarantee Fund (FAG).

## **RESEARCH PROGRAMME FOR IMPROVING SUGARCANE CULTIVATION**

A set of problems were identified with agronomic practices in sugarcane cultivation, which tend to lead to low harvest yields, poor quality sugarcane for panela production, high farming costs and environmental damage.

The problems most commonly cited are: lack of awareness of appropriate sugarcane varieties for producing good panela which are suited to the various regional environments and lack of knowledge about the agronomic management of propagating stock, the treatment of seed cane, planting distances and systems, fertilizers and soil amendment, methods for controlling insect pests, diseases and weeds, the most appropriate harvesting periods and systems and ratoon management.

This set of problems warrants the implementation of a **Research Programme for improving Sugarcane Cultivation** in which technology recommendations would be adapted to the agro-ecological conditions of the various regions, emphasizing the testing and selection of the best sugarcane varieties for producing conventional panela, granulated panela and animal fodder. The research programme would also develop a set of good farming practices that involve organic fertilization systems; organic pest and disease control; cultural and mechanical weed control; assessment and recommendations for managing whole-crop and selective harvesting systems; the definition of optimum harvesting times and the introduction of other plant species associated with the system; the production of plants to serve as natural clarifying agents for use in panela production, such as balsa, guazuma and grandcousin (*Triumfetta lappula* L.); the production of plants to serve as greasing agents, such as castor or laurel; and the production of plants with a high protein content to supplement a livestock feed system based on sugarcane and sugarcane by-products.

To achieve this, a multidisciplinary team of researchers should be set up, including specialists in plant breeding, biotechnology, ecophysiology, entomology, plant pathology, agroforestry and integrated crop management, who would stage regional trials, with the direct involvement of producers, regional technicians and students. This Programme could make use of CORPOICA-CIMPA scientific research and links with CENICAÑA and universities in the regions.

## **RESEARCH PROGRAMME FOR IMPROVING SUGARCANE PROCESSING AND PROGRAMME FOR DIVERSIFYING PANELA PRODUCTION**

A set of problems were identified in the sugarcane processing and panela production process that lead to poor processing efficiency, poor processing of sugarcane into panela, poor product quality, high production costs and environmental damage.

The commonest problems are high costs for transporting and handling sugarcane; low juice extraction levels due to the poor condition and inappropriate selection and operation of mills; poor cleanliness and clarification of cane juice, owing to the presence of impurities, which in turn leads to the use of additives and bleaching and colouring agents not desirable for panela production; energy losses and the use of fuels to supplement bagasse because of poor combustion and heat transfer in furnaces; poorly-textured panela owing to sucrose inversion

in reducing sugars, caused by juices being left too long in the furnace; microbial contamination and the presence of impurities in panela stemming from poor hygiene conditions in panela processing, packaging and storage and occupational accidents caused by a lack of industrial safety measures in *trapiches*.

To help to resolve this set of problems, it is recommended to set up a **Research Programme for improving Sugarcane Processing**, which would develop and adapt appropriate technologies for varying scales of production, with the emphasis on: the design of processing plants, equipment and tools; the design and implementation of environmentally-friendly furnaces; the establishment of a set of recommendations for good manufacturing processes; clean production and the development of new alternatives for presenting and using panela and panela processing by-products.

The research team could comprise agricultural, mechanical, chemical, food and industrial designers from CORPOICA-CIMPA, in alliance with universities and other research centres. The tests must be conducted with the involvement of producers and regional technicians.

This could usefully be viewed less as a problem and more as an opportunity for diversifying the sugarcane production system, by exploiting sugarcane and the by-products from growing it, such as sugarcane tops and foliage, as well as by-products from the panela production process, including filter-cake, bagasse, bagacillo and ash, for livestock production programmes, for the production of organic fertilizers for sugarcane and other crops, or for other processes, such as making cardboard or handmade paper from bagasse, making yeast from filter-cake or cultivating mushrooms using bagasse and bagacillo as a growing medium.

To exploit this opportunity, a **Programme for diversifying Panela Production** could be set up, focusing on the development of systems for the production of pig, cattle, poultry and other animal species of regional interest, based on a diet of sugarcane and sugarcane by-products, with protein sources produced on sugarcane farms themselves as complementary feed.

Just as with the two previous programmes, the research team must be multidisciplinary and could include animal health technicians, veterinarians, nutritionists, biologists and engineers. Regional tests could be carried out, with the direct involvement of producers, technicians and interested students, to develop and adapt the recommendations on the use of materials and on managing animal species and to conduct trials on using them for other production purposes, as mentioned above. To achieve this, CORPOICA-CIMPA could form alliances with Colombia's Centre for Research on Sustainable Agricultural Production Systems (CIPAV) and with universities.

## **PROGRAMME FOR REDUCING CARBON EMISSIONS IN THE PANELA AGRO-INDUSTRY AND INCENTIVE PROGRAMME FOR THE ADOPTION OF CLEAN TECHNOLOGIES**

This problem was prioritized in all three regions and has had the heaviest impact in Cauca and Cundinamarca. Energy-inefficient sugarcane furnaces lead to energy losses during combustion and heat transfer, which in turn prompt the use of fuels, such as wood, coal and rubber from



used tyres, to supplement bagasse. Furnace energy inefficiency causes deforestation as trees are felled for fuel, as well as the emission of heat, carbon monoxide, carbon dioxide and nitrogenous and sulphurous gases that pollute the atmosphere and contribute to the greenhouse effect.

Panela production in Colombia is estimated to consume 1 million tons of wood and to emit 5.8 million MW of heat and 511,000 tons of carbon into the atmosphere every year. (García, 2003).

The efficient furnace designs developed by CORPOICA-CIMPA provide technological alternatives for reducing wood consumption by more than 80 percent and eliminating the consumption of used tyres. In addition, the new furnace models can reduce carbon and heat emissions into the atmosphere by more than 60 percent for each unit of panela produced. The widespread adoption of efficient furnace technology would contribute enormously to reducing environmental damage.

It is therefore proposed to establish a **Programme for reducing Carbon Emissions in the Panela Agro-industry**, aimed at reducing the environmental impact of panela production via the mass dissemination of efficient furnace technology. This programme should be accompanied by an **Incentive Programme for the Adoption of Clean Technologies**, under which credits would be granted for installing energy-efficient furnaces, building and adapting safe and hygienic *trapiches* and incorporating good farming practices (GFP) and good manufacturing practices (GMP).

It would be justifiable to charge preferential interest rates for this purpose, notably as social recognition for environmental services in reducing carbon emissions into the atmosphere for each unit of panela produced, for conserving forest resources and for contributing to social stability by creating new jobs and incomes in rural areas.

## **SOCIO-BUSINESS MANAGEMENT PROGRAMME**

Small scale production and producer disorganization are problems stemming from highly fragmented panela production. In Colombia, there are more than 20,000 panela producers, most of whom are small scale and, because they approach the market as individuals, have little influence in determining panela prices and find it very hard to compete.

According to FEDEPANELA (2001), there are structural problems that cannot be resolved solely by redistributing land ownership. Instead, an alternative for recreating smallholdings needs to be found. If sectors like sugarcane are to be developed, smallholdings must be of a minimum capacity and size to generate revenues and must be grouped with other medium or small units to create wealth. This means that, while in some Colombian regions and types of production, work is required to deconcentrate land ownership, in panela-producing regions it is necessary to devise ways to concentrate land ownership by producer cooperation and other means, in precisely the areas where smallholdings undermine productivity. This is linked with equity and social justice, which are political and social issues of such great magnitude that they require government measures for the whole farming sector.

Another structural issue that has received very little attention is how to strengthen medium-sized farms. As they are the sole focus of development in any democratic and wealth-creating system, medium-sized farms need to be strengthened and provided with the necessary incentives. The entrepreneurial capacity does exist.

Accordingly, it is proposed to establish a **Socio-Business Management Programme** for consolidating the private panela agroprocessing sector by creating business organizations and extending and promoting panela producers' associations via FEDEPANELA.

This programme could include the provision of socio-business training to workers in the panela agro-industry, with the direct participation of SENA and FEDEPANELA and support for the development and consolidation of successful Associative Business Management Models (MEGA), with technical and business support and assistance from SENA and CORPOICA in grouping together small producers for production and marketing activities. The Financing and Incentive Funds should promote support for associative initiatives.

Furthermore, a **Competitiveness Programme for the panela agro-industry** should be implemented via FEDEPANELA and the Ministry of Agriculture, to work on designing and implementing strategies for consolidating trade organizations, establishing Regional Competitiveness Agreements in the panela production chain and strengthening the competitiveness observatory of the panela agroprocessing chain.

## **PROGRAMME TO PROMOTE THE PANELA MARKET**

Problems in the panela market stem from endogenous factors arising from the way in which the panela production chain is structured at national level, as well as from exogenous factors relating to Colombia's economic performance. According to FEDEPANELA (2001), marketing has become one of the worst bottlenecks in the panela chain. The lack of an integrated domestic market, fragmented and insecure regional markets, high intermediation costs and a lack of producer organizations or forms of cooperation for addressing these problems, have turned them into structural problems. Some of the pressing matters that the chain needs to address include: poor panela quality; increasing irregularities like the illicit production of adulterated panela; packaging and advertising problems and the role of large supermarkets.

The markets for various sugarcane products need to be explored with a view to increasing demand, promoting sugarcane as a raw material and diversifying panela production. It is particularly important to study prospects for making alcohol fuel from sugarcane juice, as well as the technical and economic feasibility of using syrups and panela in the food industry (for instance by forming alliances with the guava paste and confectionery industries), in the beverages industry (soft drinks, aromatic and alcoholic beverages), or in the pharmaceutical and cosmetic industries.

To this end, it is proposed to establish a **Programme to promote the Panela Market**, which would: implement measures for the sustained improvement of panela quality, presentation, packaging and distribution to the consumer; foster product segmentation and brand positioning and instigate campaigns to promote panela consumption.

The Market Programme will need to design and implement strategies for promoting panela in the domestic market; to design and implement strategies for promoting panela in international markets and to conduct prospective studies of markets for sugarcane products and by-products. The programme should be led by FEDEPANELA, in partnership with regional marketing firms and with the support of organizations like Corporation Colombia International for market intelligence and CORPOICA for advice on technology.

### **SCOPE AND IMPLEMENTATION OF THE ACTION PLAN**

The implementation of the Action Plan and the proposed programmes is expected to help to raise the social and economic level of rural people involved in Colombia's panela agroprocessing chain. In particular, it should strengthen and modernize Colombia's panela agroprocessing chain, by means of coordinated actions to organize producers, to develop and transfer technology and to manage and promote markets, with the involvement of panela-producers' associations and of governmental and non-governmental organizations.

To implement the proposed Action Plan, inter-institutional consultation is needed to develop each of the programmes, to calculate their budgets and to seek national and international funding for them.

## Bibliography

- Arias, B Rene. 1991. *Caracterización de la agroindustria de la panela en Guatemala*. Guatemala, CUNSUR/USAC, (copy).
- Boletín do Dese.* 2003. Número 132, October 2003. Brazil, p. 29.
- Centro de Estudios Avanzados en la Economía Aplicada de la Universidad de Sao Paulo (CEPEA/USP). 2003. *Boletín Informativo 2003*. Sao Paulo, Brazil, CEPEA /USP.
- Centro de Investigación sobre Panela (CIMPA). 1990. *Consumo per capita de panela y azúcar en seis ciudades colombianas, según estratos socioeconómicos*. Informe de trabajo. Barbosa, Santander, Colombia, CIMPA.
- Centro de Investigación sobre Panela (CIMPA). 1991. *Consumo per capita de panela, miel y azúcar en 26 municipios rurales de Boyacá, Cundinamarca y Santander*. Informe de trabajo. Barbosa, Santander. Colombia, CIMPA.
- Colletis, G. & Pecqueur, B. 1995. «Le rôle des politiques technologiques locales dans la création de ressources spécifiques et d'avantages dynamiques de localisation», in Rallet, A. et Torre, A. *Economie industrielle et économie spatiale*, (eds), Paris, France, Economica.
- Confederación de la Agricultura y Ganadería de Brazil (CNA). 2003. *PIB da Agropecuária e do Agronegócio*. Brazil, (copy).
- Corporación Colombiana de Investigación Agropecuaria (CORPOICA) 2001. *Informe anual del Programa Nacional de Maquinaria Agrícola y Postcosecha*. Centro de Investigación Tibaitatá. Bogotá, Colombia, CORPOICA.
- Corporación Colombiana de Investigación Agropecuaria y Centro de Investigaciones en Agricultura Tropical (CORPOICA-CIAT). 1999. *Aprendiendo del pasado para proyectarnos hacia el futuro: adopción e impacto de la tecnología de panela en la Hoya del Río Suárez y Cundinamarca. Informe de proyecto*. Centro de Investigación Tibaitatá, Bogotá, Colombia, CORPOICA,
- Corporación para el Desarrollo de Tunía-Programa Nacional de Transferencia de Tecnología (CORPOTUNIA-PRONATTA). 2002. *La investigación participativa para el mejoramiento de la agroindustria panelera del norte del Cauca*. Cartilla Técnica. Popayán, Colombia, CORPOTUNIA, p. 3.
- Denis, Requier-Desjardins. 1999. *Agro-Industria Rural y Sistemas Agroalimentarios Localizados: ¿Cuáles Puestas?* Ponencia en el X Aniversario de PRODAR, November 1999. Quito, Ecuador.
- Departamento Colombiano Nacional de Estadísticas (DANE). 1989. *Participación del gasto en alimentos dentro de la canasta familiar. Listado del Índice de Precios al Consumidor*. Bogotá, Colombia, DANE.
- Duarte, Oscar. 2003. *Identificación y jerarquización de problemas*. Programa Nacional de Ciencia y Tecnología Agropecuarias. Bogotá, Colombia, COLCIENCIAS.
- Federación Nacional de Productores de Panela (FEDEPANELA). 2001. *Informe anual*. FEDEPANELA, Bogotá, Colombia.
- García, Hugo. 2003. *La panela granulada. Manual Técnico*. CORPOICA, Centro de Investigación Tibaitatá, Bogotá, Colombia.
- González, Carolina. 2003. *Sistemas Agroalimentarios Localizados de Trapiches paneleros en Santander de*

- Quilichao*. CORPOTUNIA, CIAT, PRODAR, IICA. Informe de proyecto. Cali, Colombia. P. 20, (copy).
- Maestri, Durnedes., Maria Das Dores & Perim Gomy. 2003. *Planejamento Estratégico da Agricultura para o Estado do Espírito Santo. Área temática atividades não agrícolas*. SEAG/INCAPER, Brazil. p. 3.
- Ministerio de Agricultura y Desarrollo Rural. 2002. Informe al Congreso 1998-2002. Reactivación y Modernización con Visión de Futuro. Bogotá, Colombia. p. 79.
- Monção, Nobre Geraldo & Ulrika, Dahlen. 1993. *Para Fazer o Engenho Cantar: um estudo sobre a produção e comercialização da rapadura na região de Montes Claros*. Brazil, p. 7, (copy).
- Programa de Desarrollo de la Agroindustria Rural (PRODAR). 1994. La Agroindustria rural en América Latina y El Caribe. El caso de los países andinos. *Serie de Estudios de Agroindustria Rural No. 5*. IICA-Centro Regional Andino-CREA. Bogotá, Colombia.
- Rodríguez, Gonzalo & Gottret, María. 2001. *Evaluación de la adopción y el impacto de la tecnología en la agroindustria panelera colombiana*. In: Memorias de la Primera Conferencia Regional de Desarrollo Rural Sostenible. Fundación CIARA, Caracas, Venezuela.
- Rodríguez, Gonzalo. 2000. *La Panela en Colombia frente al nuevo milenio: Un análisis de la cadena agroindustrial*. In: Manual de caña de azúcar para la producción de panela. CORPOICA-FEDEPANELA. Bucaramanga, Colombia.
- Salomão, João Antonio F. 2003. O Moderfrota e a política de Modernização da Agricultura Brasileira. *Revista de Política Agrícola* – Ano XI N° 04 – Out–Nov–Dez – 2002 e Ano XII N° 01 – Jan – Fev – Mar – 2003. p. 15. Brazil.
- Servicio Brasileiro de Apoyo a las Micro y Pequeñas Empresas - Cooperativa de Profesionales en Actividades Generales 2002. *Diagnóstico participativo cadeia produtiva dos derivados da cana-de-açúcar*. SEBRAE/PE /COOPAGEL, Sertão do Pajeú, Brazil.
- United Nations Economic Commission for Latin America and the Caribbean (ECLAC). 2003. Latin America and the Caribbean in the World Economy. United Nations. Santiago, Chile. ECLAC, p. 95.

### **Web-based information consulted:**

- www.geocities.com Agroindústria o Rapadura
- www.minagricultura.gov.co Ministry of Agriculture. *Agronoticias*, 30 September 2003.
- www.maga.gov.gt Ministry of Agriculture, Livestock and Food (MAGA). *Política Agropecuaria*. Guatemala. 2003.

# Annex 1: Production costs in Brazil, Colombia and Guatemala

CONCEPT	COLOMBIA			GUATEMALA		BRASIL	
	HRS	CUNDINAMARCA	CAUCA	SANTA ROSA	JOYABAJ ROSA	CHICAMAN	VALLE DO PIANCO
<b>PRODUCTION CHARACTERISTICS</b>							
AREA UNDER CULTIVATION (hectares of sugarcane/year)	26.3	8.4	7.4	7.7	2.1	2.0	2.8
AGRICULTURAL YIELD (tons of panela/hectare/year)	10.2	5.4	4.5	8.5	7.7	6.4	4.5
ANNUAL PRODUCTION (tons of panela/year)	268.3	45.0	33.3	64.8	16.2	13.0	12.6
TRAPICHE PRODUCTION CAPACITY (kg/hour)	88.7	78.1	25.0	60.0	16.9	12.3	43.8
ANNUAL MILLING TIME (milling hours/year)	3,024	576	1,330	1,080	960	1,056	288
<b>COST AND INCOME STRUCTURE PER TON OF PANELO</b>							
TOTAL GROWING COST (US\$/ton of panela)	42.04	41.45	59.24	61.13	31.27	28.86	126.64
HARVESTING AND TRANSPORTATION COST (US\$/ton of panela)	61.82	44.09	42.64	42.09	57.72	48.10	N.A.
TOTAL PRODUCTION COST (US\$/ton of panela)	99.55	101.11	117.06	116.30	168.35	202.98	148.66
TOTAL COST (US\$/ton of panela)	203.41	186.65	218.94	219.51	257.34	279.94	275.30
SALE PRICE (US\$/ton of panela)	255.16	260.96	289.75	350.65	324.68	288.31	412.96
PROFITS (US\$/ton of panela)	51.75	74.31	70.81	131.14	67.34	8.37	137.65
COST/BENEFIT RATIO	25.4%	39.8%	32.3%	59.7%	26.2%	3.0%	50.0%
<b>PRODUCTION VALUE AND NET INCOME</b>							
PRODUCTION VALUE PER SURFACE AREA UNIT (US\$/tons of panela/hectare/year)	2,602.68	1,401.61	1,298.08	2,970.00	2,490.26	1,845.19	1,845.91
ANNUAL NET INCOME PER SURFACE AREA UNIT (US\$/tons of panela/hectare/year)	527.90	399.10	317.22	1,110.72	516.50	53.56	615.30
ANNUAL PRODUCTION VALUE (US\$/year)	68,454.20	11,743.17	9,634.19	22,722.08	5,259.74	3,736.52	5203.24
ANNUAL NET INCOME (US\$/year)	13,884.42	3,343.79	2,354.34	8,497.60	1,090.91	108.47	1,734.41
Hours/hectare	481.333	312,000	282.667	89.571			
Hours of Harvest and transport of cane per milling	984	180	40				
Hours per milling	1,152	288	70				
2,136							
<b>LABOUR EMPLOYMENT PARAMETERS</b>							
USE OF FIELD LABOUR (man-hours/ton of panela)	35.4	58.1	50.5	89.6	77.0	71.1	N.A.
USE OF HARVESTING AND TRANSPORTATION LABOUR (man-hours/ton of panela)	77.0	47.9	64.0	74.1	88.9	118.5	
USE OF PROCESSING LABOUR (man-hours/ton of panela)	67.6	76.6	112.0	116.7	237.0	244.4	140.2
TOTAL USE OF LABOUR (man-hours/ton of panela)	180.0	182.6	226.5	280.4	403.0	434.1	154.1
ANNUAL USE OF LABOUR PER SURFACE AREA UNIT (man-hours/hectare/year)	1,836.507	980.518	1,014.613	2,374.737	3,090.726	2,778.074	688.738
ANNUAL USE OF LABOUR (man-hours/year)	48,302.831	8,215.102	7,530.333	18,168.000	6,528.000	5,625.600	1,941.408
AVERAGE FIELDWORKER'S WAGE (US\$/man-hour)	0.621	0.673	0.450	0.406	0.406	0.406	N.A.
AVERAGE PROCESSING WORKER'S WAGE (US\$/man-hour)	A	0.640	0.519	0.668	0.406	0.406	0.579



## Annex 2

# Study methodology

The study was divided into three phases:

In the first phase, secondary information was compiled and analysed on policies and programmes to support the processing activities of small-scale rural producers and panela production activities. For this, contacts were established with Guatemala's Ministry of Agriculture, Livestock and Food (MAGA) and its Rural Agro-industry Network (REDAR), with SEBRAE-Pernambuco in Brazil and with a number of financing, research, technical assistance, marketing and rural agro-industry development organizations in Colombia.

The second phase was field work, which involved meetings with producers and technicians and interviews with producers in farms and *trapiches*. In Guatemala, a visit was made to the panela-producing regions of Santa Rosa, Chicamán and Joyabaj, with the support of MAGA and REDAR officials. Meetings were held with producers in the three regions to gather information on the production characteristics of each region and presentations were made on the technological development achieved by CORPOICA-CIMPA, with the distribution of publications and a video. In Brazil, a visit was made to the regions of Paraíba, Pernambuco and Ceará, where a number of *trapiches* were inspected and information was gathered on the production structure of Valle do Pianco.

In Colombia, three regions were selected as representative of the panela agro-industry: Hoya del Río Suárez, western Cundinamarca and northern Cauca. In each region, 10 interviews were held in *trapiches* to ascertain the production structure of the family unit and the ways in which panela production units diversify and adapt to an adverse environment. In addition, three meetings were held with regional experts to define the strengths, opportunities, weaknesses and threats to panela production at regional level and to identify priority lines of action for resolving problems in the panela sector.

In the third phase, the information gathered during the previous phases was consolidated and meetings were held with experts from CORPOICA, Colombia's Ministry of Agriculture, the Departmental Secretariats for Agriculture, the Panela Producers' Federation and representatives of other organizations, to define the guidelines for an Action Plan to strengthen and modernize Colombia's panela agro-industry.



The present report considers panela development as a diversification strategy for farm-level income generation, by analyzing patterns of change and associated success factors. The panela production constitutes a vertically integrated system in which the rural producer participates in the entire process of producing sugarcane, processing it into panela and selling the finished product. The vertical nature of the panela industry has facilitated the development of more flexible and effective livelihood strategies than many horizontal or primary production-type processing technologies.

The report examines the viability and commercial sustainability of the panela industry in Colombia and makes a comparative review of the panela industry in Brazil and Guatemala, where panela is a major local production item. It assesses the impact of panela production on producer incomes and livelihoods in Colombia and provides information on the institutional and financial support required for Colombia to improve panela's commercial viability and increase profits for small-scale farmers.

The report, originally published in Spanish, was translated into English in order to increase awareness of issues involved in panela processing and to broaden understanding of support required for improvement in other countries where similar products are produced. Panela is known with different names: *Jaggery* in India and Sri Lanka; *Muscovado* in the Caribbean and the Philipines; *Demerara* in Guyana and Mauritius and *htanyet* in Myanmar. Commercially, it is known as natural brown sugar.

The report is aimed at policy makers and extension staff of government, private and non-government organizations and at donors' organizations that support agro-processing technologies for small and medium-scale entrepreneurs