



STRENGTHENING THE COMPETITIVENESS OF THE STEVIA VALUE CHAIN IN PARAGUAY

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July 2012

Duke

CENTER on GLOBALIZATION,
GOVERNANCE & COMPETITIVENESS
at the Social Science Research Institute

IMIN

Multilateral Investment Fund
Member of the IDB Group



The project focused on improving the volume and quality of stevia production in Paraguay to expand supply, upgrading into the higher extraction stage of its value chain, and ultimately raise small producers' incomes. The project also contributed to formalize and strengthen the producer-exporter relationship, an important milestone for an industry.

This case study assesses the project "Strengthening the competitiveness of the Stevia Value Chain in Paraguay", one of more than 40 projects implemented in the Latin American and Caribbean Region, within MIF's "Linking Small Producers to High Value Agriculture Markets" thematic work area. These projects provide technical assistance, technological solutions, and access to finance to organized farmer groups (cooperatives, social enterprises and others) whose products have proven market demand in a variety of sectors and industries such as fisheries, horticulture, dairy, coffee, cocoa, and stevia, to name a few.

The CGGC – Duke University researchers assessed five of these projects using a four-pillar framework designed to identify key areas that improve sustainable inclusion to value chains. Each case study in the series synthesizes common challenges and best practices implemented by MIF's partner agencies, while providing valuable insights for ensuring successful outcomes and long-term impacts in inclusive value chain projects.

This case study is part of a more comprehensive study titled "Assessment of Five High-Value Agriculture Inclusive Business Projects" which encompasses other four case studies (available also in Spanish):

- ▶ Development of Micro and Small Rural Apicultural Producers in Nicaragua and Honduras.
- ▶ Strengthening the competitiveness of Organic Producers in Andean Micro Watersheds.
- ▶ Upgrading to Organic Cocoa Cultivation in Peru.
- ▶ Supporting the Competitiveness of Central American Coffee.

Other reports that complement the assessments are (available only in English):

- ▶ Inclusion of Small – and Medium-Sized Producers in High-Value Agro-Food Value Chains.
- ▶ Basic Principles and Guidelines for Impactful and Sustainable Inclusive Business Interventions in High-Value Agro-Food Value Chains.
- ▶ Recommendations to Enhance IDB-MIF Interventions for the Inclusion of Small- and Medium-Sized Producers in the High-Value Agro-Food Chains.

"STRENGTHENING THE COMPETITIVENESS OF THE STEVIA VALUE CHAIN IN PARAGUAY"

The present case study "Strengthening the Competitiveness of the Stevia Value Chain in Paraguay" was elaborated by Penny Bamber and Karina Fernandez-Stark from the Center on Globalization, Governance & Competitiveness (CGGC) of the Duke University in collaboration

with Alejandro Escobar, Anabella Palacios, Yolanda Strachan, Dora Moscoso and Ana Castillo members of the thematic work area “Linking Small Producers to High Value Agriculture Markets” of the Multilateral investment Fund (a member of the Inter-American Development Bank (IDB) Group). This report is part of a group of studies that analyzed some of the MIF projects to identify best practices that successfully integrated small producers to national and international value chains.

Acknowledgements

The authors would like to thank Carlos Ortiz, MIF Specialist in Paraguay, Fernando Diaz de Vivar, and all the anonymous interviewees who provided valuable information to produce this report.

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The views and interpretations expressed in this report are those of the authors and do not necessarily represent the views of the companies mentioned, the individuals interviewed or the Multilateral Investment Fund (MIF). The authors welcome comments and feedback at **penny.bamber@duke.edu** & **karina.stark@duke.edu**.

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Duke University, Center on Globalization, Governance and Competitiveness (Duke CGGC)

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The Multilateral Investment Fund (MIF) - a member of the **Inter-American Development Bank (IDB) Group** - is the largest provider of technical assistance for private sector development in the Latin American and Caribbean region. Established in 1993, the MIF supports economic growth and poverty reduction by encouraging increased private investment and advancing private sector development. The MIF collaborates with institutions from the private, public and nonprofit sectors to develop and execute business models that support entrepreneurs and poor and low-income households by providing technical assistance grants, equity investments and lending through its different units, organized by strategic thematic agendas.

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INTRODUCTION

The key to sustainable inclusion in any value chain is competitiveness; that is, the ability to provide the desired quantity and quality of a specific product in a more economical and timely manner than other suppliers. In high value agricultural markets, improved cold chain management and transport have facilitated the expansion of global trade, and now producers must compete with suppliers from all over the world. This requires continuous improvements in productivity and quality to meet product specifications of end buyers, cost-efficient market ready packaging, timely logistics, and, of course, economies of scale.

↘ FOUR-PILLAR MODEL FOR VALUE CHAIN INCLUSION

Small- and medium-sized producers, in particular, face constraints that limit their competitiveness and prevent their participation in the value chain. The researchers have identified four major pillars that every intervention should include to raise the competitiveness of smallholders in order to include them in a sustainable way in the national or international value chain.

1. Access to market:

Small producers, in general, do not have the required contacts to establish relationships with potential buyers due to broad geographic, cultural and educational factors, amongst others. Inclusive business interventions must fill an important role of establishing a connection between producers and buyers. This connection requires educating lead firms about the business potential of sourcing from small producers, as well as facilitating interactions until the small producers are in a position to sustainably manage

the relationship independently. Generally, this is the weakest link in any value chain intervention.

2. Access to training:

While many small producers may have worked in agriculture their entire lives, specific training is often required in order to improve productivity and product quality, introduce new technologies and plant varieties, and facilitate compliance with food safety and other certification requirements that govern entry into the national, regional and

international value chains. The training component should include technical education, entrepreneurship, financial literacy and any other social/soft skills necessary to help insert producers in the value chain. In addition, peer knowledge transfer components; such as field visits to successful farms and demonstration plots should be included. These can be powerful tools for teaching and motivating producers.

3. Coordination and collaboration building:

Because small producers need to achieve economies of scale in order to compete in the marketplace, it is important they collaborate and work together. Additionally, and perhaps equally as important, collaboration facilitates the exchange of ideas to manage common problems, reduces information asymmetries in production and builds social capital that empowers producers to sell their products in more sophisticated markets. However, producers often fail to self-organize formally. Producers thus often need the encouragement and support of external actors to appreciate the payoffs of collective action and establish themselves as formal, legal organizations. These horizontal linkages facilitate producers' connections with other upstream and downstream value chain actors, such as input and service providers.

4. Access to finance:

Entry into the value chain requires certain investments such as infrastructure, equipment and obtaining certifications. Small producers, however, often face liquidity and credit constraints as they have no access to formal finance channels. In addition, they often lack

the necessary financial literacy to apply for or manage potential loans. These limit their potential to make the required investments. These credit constraints have been found to prevent small producers from investing in necessary equipment, such as irrigation systems, greenhouses or cold storage, to achieve productivity improvements, to develop unused portions of their land or to upgrade into higher value products, thereby limiting their potential to participate in coordinated value chains. Interventions can play an important role in reducing information asymmetries and helping the banking sector to create appropriate, yet profitable, financial instruments to meet the needs of this group.



▼ PROJECT DESCRIPTION

The project focused on improving the competitiveness of the stevia value chain in Paraguay. The project consisted of three key components 1) increasing the quality and quantity of stevia production by small producers, 2) strengthening producer groups or associations, and 3) fostering innovation and technology transfer to improve both plant variety quality and prospects for in-country value added processing. The largest component of the project was the inclusion of new producers into the value chain. Participating firms recruited and contracted new producers, provided them with specific inputs for production, training and technical assistance (TA) and guaranteed purchase of their harvest. The project also organized and consolidated producer groups. The groups received legal advice regarding how to formalize their organizations and skills development to improve teamwork and collaboration. The project also included competitive awards for innovative projects and technology development. Winning projects included a service-based initiative to empower producers to bypass intermediary brokers and connect directly with buyers in foreign markets, and a project focused on developing new varieties of stevia, with higher content of Rebaudioside-A (Reb-A).¹ The project took place during a time of considerable shifts in the world market for Stevia. In 2008, the Food and Drug Administration in the United States approved Reb-A for human consumption; this was followed by Reb-A approval in several countries in Europe and overall, European approval was granted by the European Union in 2011. Many producers had expected the approval of a broader range of stevia derivatives. Specifically, the substance “stevioside” was not approved, despite its long term use as a sweetener in Asian markets.




¹ Several natural substances can be derived from the stevia plant (scientifically known as steviol glycosides, which includes glucose as part of its structure). One of the best-tasting and sweetest of all the steviol glycosides is high purity Rebaudioside-A (Reb-A), which can be up to 400 times sweeter than sugar. For more information regarding Stevia, please see www.globalstevainstitute.com.

↳ LESSONS LEARNED

- ▶ The term “small producers” encompasses a broad range of producers, with different levels of production skills and social and economic development. These differences inherently require distinct approaches to facilitate inclusion in the value chain. The project’s design did not distinguish between different levels of producer development (experience, infrastructure, socioeconomic level, etc.), which provided challenges both for project implementation and evaluation.
- ▶ Stevia is a niche product and requires significantly more work than many other crops, raising the opportunity costs for the small producers, whose key investment is time. Establishing an ongoing relationship between the producer and the buyer, is a critical factor in the inclusion of small producers in the value chain. It takes approximately three years for a producer to master the production of stevia and see significant returns on the investment of their time. Ongoing technical support is key during this period of time to ensure the producer does not abandon production.
- ▶ The project initially considered the inclusion of 4,000 new producers to grow 1ha of stevia each. Given the shifting market conditions during the proposal evaluation, historical tensions in small producer production of stevia and the lack of adequate irrigation and vulnerability to climate change, the potential for this scale should have been revisited. Context specific conditions must be taken into account.

↳ OVERALL ASSESSMENT OF SUSTAINABLE INCLUSION

<p>SUSTAINABLE INCLUSIVENESS</p>	<ul style="list-style-type: none"> ▶ The competitiveness of small producers in stevia is likely to weaken as mechanization increases, however, the strong demand for stevia will continue to provide access to market. ▶ The project provided access to all four pillars through the out-grower model, although the economies of scale through formation of cooperatives was weak, as was access to finance. ▶ Social and environmental sustainability aspects were strong, although economic sustainability will depend on exporter firms developing a better variety. 	<p>MEDIUM</p> 
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↳ INSTITUTIONAL ARRANGEMENT

CAPASTE, the stevia private industry association in Paraguay, was the executing agency for this project. Each of the CAPASTE member firms that participated in the project was required to contract small producers to cultivate the product, provide them with key inputs and technical assistance and a guarantee of purchase. The Federation for Productive Cooperatives in Paraguay (FECOPROD) was contracted to help strengthen producer groups. Firms were permitted to work with FECOPROD to strengthen any of their producer groups, and not only those that had joined the sector under the scope of the IDB-MIF project. Member firms could also apply for financing for innovative projects and those focused on technology transfer.

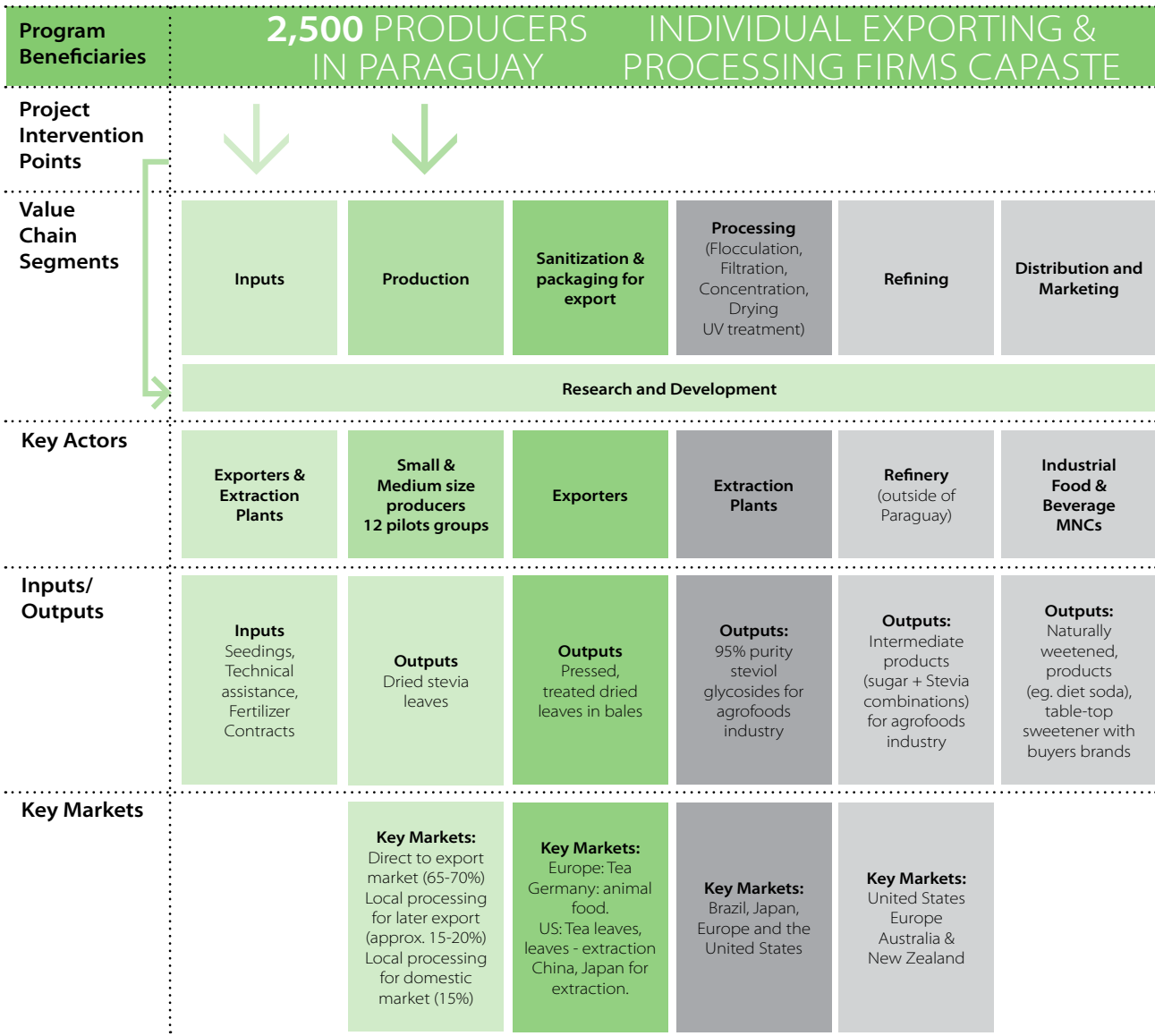
Project Stakeholders

ORGANIZATION	ROLE	DESCRIPTION
CAPASTE (Paraguayan Chamber of Stevia)	EXECUTING AGENCY AND CO-FUNDER	CAPASTE is a private industry association, which accounts for over 80% of stevia exported from Paraguay. The association was formed in 2006 to help facilitate the expansion of the industry in the country. Seven member firms participated in different components of this project. CAPASTE was primarily responsible for the project design, coordination of financial aspects of the project and monitoring.
Small producers	BENEFICIARIES	Estimated at approximately 2,500 producers by project end. These producers presented varying levels of development, and were located in different areas of the country. Producers participating in the project had to be new to the production of stevia. Most producers have 5-10ha of land, and cultivate a variety of crops in addition to stevia including soya, cotton, yucca and sesame. Producers began with either ¼ or ½ ha of stevia production; the maximum extension of production estimated for small producers is 1 -1 ½ ha of stevia, based on labor limitations of the family unit.
SteviaPar S.A.	PARTICIPATING FIRMS	SteviaPar has 21 years of experience in the stevia industry. Key export markets were the United States, Europe and Japan. Product was exported in bales of dried pressed leaves, or as crushed leaves depending on the market.
NL Stevia S.A.		NL Stevia was founded in 2006; it inaugurated its extraction plant in 2009. The extraction plant (with a production capacity of 100T) was designed to produce steviol glycosides at 90% purity. Approval of stevia consumption in the United States (2008) and Europe (2011) required a minimum of 95% purity. The extraction plant stopped production in December 2011 pending the installation of new technology to increase purity. NL Stevia did not export leaves during the course of the project, as it was stockpiling raw materials for its extraction plant.
Granular S.A.		Granular is a Swedish owned firm with local partners established in 2006; the firm is committed to organic production of stevia for the herbal tea market. In 2011, Nicolas Leoz, of NL Stevia, purchased a significant share of Granular and the firm, now Granular NL, is planning on establishing an extraction plant in Caaguazú in 2013.

ORGANIZATION	ROLE	DESCRIPTION
Pure Circle S.A.	PARTICIPATING FIRMS	Pure Circle is the largest producer of steviol glycosides in the world; their extraction plant is based in China and their headquarters in Kuala Lumpur, Malaysia. The firm established operations in Paraguay in 2008, and by 2012 exported dried, pressed leaves to its plant in China. The firm announced plans to construct and extraction plant with a capacity of 500T in Paraguay in 2013.
Granja Virginia		This operation was awarded funds under the technology transfer component of the project and was focused on improving varieties, propagation and management of stevia during cultivation.
Stevia Guaraní S.A.		
Asisteco S.A.		This firm received funding through the technology transfer component of the project. The firm offers a comprehensive service including seedlings, technical assistance and introductions to buyers directly to producer groups.
Fed. de Cooperativas de Produccion de Paraguay (FECOPROD)	SUB-CONTRACTED AGENCY (ORGANIZATION OF PRODUCERS)	This organization was responsible for working with producer groups to strengthen collaboration and coordination among smallholders. They did not work with all producers included in the program. In some cases, the organization also helped to recruit new stevia producers for the project.
MIF – IDB	CO-FUNDER	The project began in 2009. It was supervised by Carlos Ortiz, MIF Specialist in Asuncion, Paraguay. MIF financed the technical assistance and technology transfer components of the project.
REDIEX/Stevia Board Exports and Investment Network	PROMOTIONAL ORGANIZATION	This board was established by the government to promote exports of and investment in the production and industrialization of stevia in Paraguay. The organization facilitates contacts between general buyers requests and firms in the sector.

DESCRIPTION OF THE VALUE CHAIN

Stevia Value Chain - Summary Project Intervention



Source: Authors.

Competitiveness of stevia production: Stevia cultivation has traditionally been done by smallholders due to labor intensity. However, smallholder yields remain both unpredictable and insufficient to meet growing global demand because of high input costs, lack of irrigation, poor disease control and limited expertise in the cultivation of specific improved varieties. The project specifically addressed three of these factors – reducing input costs (providing seedlings at minimal cost), developing expertise through extensive provision of technical assistance, and training in disease management. The lack of irrigation remains a concern for increasing productivity. Cultivation in Paraguay has also been successfully expanded to cultivated areas as large as 22 ha as mechanization has been introduced. These producers have

seen yields up to 30% higher than those of small producers. As mechanization techniques improve, exporters may be more inclined to work with larger producers in order to lower transaction costs and improve competitiveness compared to other producing countries with cheaper labor costs and better-suited climates. Countries along the Equator with more consistent daylight hours have seen yields of up to 3 times higher than that in Paraguay.

While anticipated demand in the medium to long term is considerable, short term demand growth is still comparatively slow. This is due to lobbying by artificial sweetener producers, and to some degree is due to the fact that in 2011, the lion's share (over 95%) of stevia was produced in China. Safety concerns for food products 'made in China', has thus led industry participants to seek alternative potential locations to grow and process stevia, opening an important opportunity for new countries to enter the market. Paraguay's competitiveness is derived largely from its being the "birthplace" of stevia, which gives it important advantages over other competing countries: it has the second largest extension of stevia cultivation in the world; this means it will likely be the first country to achieve scale of production necessary for industrialization of stevia outside of China. This provides it with an important first mover advantage to become a regional processing center for Latin America. In addition, this also gives Paraguay a unique advantage to brand stevia as a Paraguayan product.

"Paraguay's competitive advantage in the production of stevia lies in its heritage as the "birthplace" of the plant. This creates an important branding opportunity of the country."



↘ MODEL FOR VALUE CHAIN INCLUSION

Small- and medium-sized producers are often excluded from the value chain because they face resource, skills and market knowledge constraints. As noted above, four major constraints found to affect the success of agro-food inclusive business projects are access to finance, access to training, access to markets and coordination and collaboration amongst producers and other value chain actors. Below we discuss how each of these constraints was addressed in this project.

Assessment of the Four Value Chain Inclusion Pillars in this Project

Access to Finance

- ▶ **Access to finance was a strong component**
- ▶ Inputs provided by purchasing firms: seedlings at minimal cost and on credit; TA and training were provided at no cost; producers also taught to produce non-chemical, fertilize with on-farm inputs.
- ▶ Contracts (4-5 years) included guaranteed minimum purchase price, with cash on delivery. Costs of inputs deducted from payment, with 1-2 year grace period.
- ▶ Outside the context of the project, there is no access to credit for the production of stevia. Credito Agricola (a government credit facility) finances other crops.
- ▶ No credit was available for the installation of irrigation systems, as the income level generated by stevia would not be sufficient to repay these loans over 5 years.
- ▶ Stevia can be harvested 3-4 times a year, at time when producers have no other income, providing important income-smoothing effect & alleviating credit constraints.

Collaboration and Coordination Building (horizontal and vertical)

- ▶ **The strength of this component varied by firm and geographic location.**
- ▶ Some producers were organized, either by the producers themselves, or organized into groups by FECOPROD, in other cases, they were not organized and participated individually, particularly where there was reluctance amongst producers to work together in stevia.
- ▶ In certain areas, FECOPROD provided training in group formation and strengthening, including legal support.
- ▶ Best practices included: Recruitment of new producers by organized groups and not individually.
- ▶ Contracts signed with each producer, but the producer group received a bonus for each kg delivered if target amount was reached, incentivizing collective action.
- ▶ In other cases, firms worked with individual producers, many of whom were a fair distance from each other. Isolation made collective action difficult and significantly increased transaction costs for the firm.
- ▶ CAPASTE encouraged firm collaboration, however, a lack of trust and high levels of competitiveness undermined potential to share information and leaning across firms.



Access to Training

- ▶ **Training was an important component although it varied by firm.**
- ▶ Most training took the form of one-on-one Technical Assistance, although several firms offered initial induction training for their producers at the firm's nursery where both theoretical and practical classes were held.
- ▶ Where producer group formation was stronger, one firm provided training to all members of the committee, including those who did not produce stevia as part of their recruitment strategy.
- ▶ Most training focused on technical cultivation and harvest aspects of the production. Little focus on entrepreneurial skills such as cost management and planning.
- ▶ Wives and children were encouraged to attend both the training sessions and the technical assistance visits.

Access to Market

- ▶ **This was a strongly developed aspect of the project.**
- ▶ Firms committed to guaranteed purchase of 100% of "cleaned" stevia with a minimum starting price and premiums for quality. Essential to success due to a history of false starts in small producer stevia cultivation.
- ▶ Producers who reneged on their contracts selling to other buyers were excluded from the outgrower programs in future seasons. Lack of ongoing market access led some of these producers to exit the cultivation of stevia.
- ▶ The establishment of three processing plants in the country and the growing demand, makes it likely that lead exporter firms will also buy from producers who are not part of their outgrower programs.
- ▶ Leading exporter firms have well developed and growing client bases and have seen strong interest for increased sales to these and other clients. These firms export over 95% of production.
- ▶ There is still limited production capacity in the country, leading firms to expand production in other countries in the region to supply their future extraction plants.
- ▶ One firm supported producers to obtain organic certification, however, organic certification is not yet widespread in the industry.



➤ PROJECT RESULTS

RESULTS	IMPACTS
<ul style="list-style-type: none"> ▶ 2,500 new producers began to cultivate stevia commercially.² ▶ Number of hectares under production increased from 800 ha to 1,300 ha.³ ▶ 1 manual on good agricultural practices was created. ▶ 9 producer groups established.⁴ 	<ul style="list-style-type: none"> ▶ Consolidation and formalization of the relationship between producers and export firms. ▶ Multiplier effect seen as firms begin to offer the same services for all outgrowers, not only those in the project. ▶ Increased family income. ▶ Extended education for children.



2 It is difficult to ascertain an exact number of producers that have been included in stevia production as direct beneficiaries in the program, due to the very fluid nature of the production, with new producers joining and other producers leaving production for a variety of reasons. Together, 4 of the 7 firms interviewed engaged 3,800 small and medium sized producers in January 2012. Considering the base line provided in IDB-MIF Reporte de Estado Del Proyecto (No. PR-M1013) July – December 2011, there were 1,700 producers at the beginning of the program. A reasonable estimate would thus suggest that a minimum of 2,100 new producers have been engaged altogether.

3 This figure does not include the loss of production as a result of the drought. The technical assistance teams highlighted that this problem has led producers to question whether or not they will continue in the project.

4 Based on IDB-MIF Reporte de Estado del Proyecto (No. PR-M1013) July – December 2011.

➤ SUSTAINABLE VALUE CHAIN INCLUSION OF SMALL PRODUCERS: AN ASSESSMENT

The project has successfully included small producers into the stevia value chain, however, results were more limited than initially proposed. First, the scope of the project was to increase production to 4,000 ha. The project reached just 2,300 ha by mid-2012. Below, we discuss several factors that facilitated the expansion of production, and those that limited it from reaching its target goals. A comprehensive assessment is provided in the table below.

- All four key pillars of inclusion were included in the program design.
- Access to finance, training and market were provided through comprehensive, structured outgrower programs. However, the lack of adequate finance for irrigation systems led to vulnerability to unpredictable climate and a loss of between 10-15% of plants due to drought in 2011/12. Consistent irrigation accounts for up to 30% higher yields.
- Network development, however, was the weakest component. Although the project incorporated the organization and consolidation of producer groups, these were not directly aligned with the producer groups included under the first component of the program. Some new producers who were brought on were occasionally geographically isolated from other producers, limiting possibilities for support and collaboration between producer groups and increasing transaction costs for firms involved.
- A manual for good agricultural practices in Stevia developed for the project set the bar too high for small producers to access (US\$2,000/producer) and thus no small producers were able to implement this. Different firms continued to operate with their own standards for quality.

Positive elements that facilitated the project included:

- ▶ High global and domestic demand for stevia.
- ▶ Good climate for the production of stevia
- ▶ Income smoothing effect of multiple end-of-year harvests encouraged participating producers to expand production.
- ▶ Long shelf life of dried stevia leaves helped overcome challenges with transportation infrastructure.

Some challenges limited the success of the project:

- ▶ Unsuccessful engagement of the small producers in stevia production in the past, led to skepticism and a reluctance of small producers to join the outgrower projects.
- ▶ The approval of Reb-A, at 95% by the FDA and the EU meant that the variety being cultivated by the majority of producers in the project was not efficient due to its low concentrations of the component. "Improved varieties" were thus required.

- Increased uncertainty regarding project. Improved varieties required different production techniques and an increased amount of labor. Certain firms did not follow market demand and continued to grow “criolla”- a variety of stevia endemic to Paraguay.
- Although research and development on new varieties was not complete, some firms provided these to their outgrowers. In certain cases, these varieties did not respond well to the conditions and realities of the small producer and died in the field. This required a significant investment in seedling replacement.
- ▶ Weak collaboration amongst firms prevented information sharing on lessons learned.




↘ PROJECT BUDGET

The initial budget for the project was US\$ 2,633,870 (MIF’s grant contribution was US\$1,269,500 for technical assistance and CAPASTE’s counterpart was US\$1,364,470).



▼ TABLE SUSTAINABLE VALUE CHAIN INCLUSION OF SMALL PRODUCERS IN THE STEVIA CHAIN: AN ASSESSMENT

	CRITERIA	KEY POINTS	ASSESSMENT
SELECTED VALUE CHAIN	Target Product	<p>Stevia is a premium product, with higher returns than most other crops cultivated by the small producer. However, it has high input costs associated due to the required propagation methods and the need to produce new varieties and small producers must rely on resource-provision outgrower contracts. Emerging mechanization of stevia production and harvesting, however, will lead to larger producers entering the segment. Increased coordination of smallholders could help them remain competitive producers vis-à-vis large scale production.</p> <p>Commercial Viability: There is a very strong and growing demand for stevia at a global level. However, it is a relatively new product, and there are important marketing costs still involved. Stevia lasts up to 5 years in Paraguay, compared to countries, including China, with harsh winters which must replant annually. Countries along the Equator, however, have higher yields than Paraguay due to ideal light hour conditions.</p>	●
	Beneficiaries	Beneficiaries varied considerably across the project. Many producers began with ¼ to ½ ha of stevia under production with the goal to increase to 1ha. Producers generally have large families with +5 children, basic education and 5-10 ha of land.	◐
INCLUSIVENESS	Inclusion four pillars	The project design was based on providing all four pillars, however with various degrees of success: Access to finance was facilitated by the exporter through the provision of the most expensive inputs – seedlings – on credit with a 1-2 year repayment grace period; Access to market was guaranteed by contracts; Access to training was also provided by the exporter, with some producers receiving technical assistance up to two times a week; linkages were created between producer and the exporter for both inputs and sale, while the work of FECOPROD was designed to foster and strengthen producer organizations.	◐

	CRITERIA	KEY POINTS	ASSESSMENT
INCLUSIVENESS	Competitiveness	<p>Producers still need to improve their competitiveness, especially increasing productivity and product quality. Lack of access to irrigation and mechanization makes small producers less competitive than producers with more resources. Productivity is up to 30% higher for mechanized and large-scale producers.</p> <p>Risks: Weather, disease and pests: While not susceptible to a large number of diseases or pests, the varieties being produced do not withstand drought or dry conditions well and lack of irrigation can lead to the death of the plants.</p> <p>Moral Hazard: Scarcity of supply and growing global demands results in moderate risk of contracted producers selling their harvests to other buyers. Infant industry: The industry is still young, and marketing and consumer awareness must be carried out globally. This leads to uncertainty in the market.</p>	
	Upgrade-ability/ Potential to add value	<p>Product upgrading: Considerable advances can still be made in the plant variety grown. Results from the innovation component to improve varieties yielded positive early results.</p> <p>Process upgrading: Producers mainly prepared their land and harvested by hand, or using oxen. Several exporters indicated they would soon offer mechanized services to the producers for these alternatives. In addition, low cost innovations were being made to minimize producer dependency on the climate for harvesting.</p> <p>Functional upgrading: In Paraguay, there is one extraction plant already operating and two other plants under development. To achieve the scale of production required to support these plants, larger producers will need to be incorporated into the production segment. These were not considered in the project's design.</p>	
	Economic sustainability	<p>Access to finance for irrigation systems is important to reduce risk and increase productivity for small producers; larger producers must be incorporated into outgrower projects to increase total yields to sustain extraction plants; the development of appropriate varieties is important due to large investment costs in seedlings.</p>	

	CRITERIA	KEY POINTS	ASSESSMENT
INCLUSIVENESS	Social sustainability	Several exporters work with producers, their wives and their children, encouraging children to view the cultivation of stevia as an important opportunity, helping to alleviate migration out of rural areas to urban zones. The nurseries and collection centers have become important hubs for employment in different parts of the country. Increased income levels have seen improvements in homes, transport, etc.	●
	Environmental sustainability	The growth of stevia by small producers involves minimal use of agrochemicals, while dedicated attention from the technical assistants has improved producer knowledge of agricultural techniques such as rotation, fertilizer, etc.	●
IMPACT	Spillovers/impact	Relationship between producers and export firms was formalized. All producers supplying the chain are now incorporated in contract farming schemes reducing uncertainty and vulnerability.	●
	Potential for replication	The “outgrower” model used in this project, in which the buyers provide financing and training for new producers while at the same time guaranteeing them access to market and helping them to organize into producer groups has strong potential for replication. However, the financial capital required to do so was significant and continued success would require the buyer to have access to sufficient long-term financing.	◐

Weak ○ Medium ◐ Strong ●

