Market perspectives

Development and potential

Use and international regulations

Stevia from Paraguay

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PARAGUAY VENDE
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Introduction

We are pleased to present the following study of the market opportunities for Stevia. The report is an analysis of existing information regarding the properties, uses and benefits of Stevia, the regulatory environment, the current market environment in Japan, a case study of a Brazilian production company, Steviafarma, and recommendations for marketing “Stevia from Paraguay” in the global market.

One of the main reasons for Paraguay Vende to complete this study was to help us better understand the wide ranging development of Stevia, and give shape to our current program of assistance to local companies, in addition to the many Paraguayan firms and associations that may benefit from the information in this study.

We look forward to expanding the original objective of this study, to propel “Stevia from Paraguay” into the global market, and increasing economic returns for Paraguayan families.

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Executive Summary

The most important market for Stevia is currently the food and beverage industry, where it is chiefly employed as a sweetener and flavoring agent. The health market takes second place in importance. In third place there are the byproducts made from the plant remains after removing the leaves destined for the tea industry or extractive industries. Seventy percent of the total worldwide production of Stevia is used to extract crystals known as "Steviosides" and "Rebaudioside-A," while the remaining 30 percentis destined for herbal uses.

Stevia was always subjected to a regulatory framework which determined its economic evolution. Its commercialization is somewhat more limited when it is regulated as a dietary supplement, and wider when it is defined as a food additive which includes, among other uses, food sweeteners. In most countries, the use of Stevia as a sweetener is not approved. It is noteworthy to add that the food and beverages industry is one of the most regulated industries worldwide. Therefore, it should not be a surprise to see barriers to the growth of Stevia, especially as a certified natural sweetener. Scientific studies supporting the use of Stevia are available in Japan, Brazil, Denmark, and other countries. Around 1,500 scientific studies come from Japan alone. The Japanese use a holistic method, trying to use the whole plant and not only the leaves through several applications pertaining not only health and human well-being, but also those of the animals, soil, and ecology.

The biggest producer of Stevia is China. The Shandong Huaxian Stevia is the biggest and oldest Stevia factory of China. It accounts for almost 50 percent of that country's total production. More than half ofthis factory's production is sold in China's internal market, while 40 percent is sold to Japan, and the rest is sold to Korea, Indonesia, and the United States.

Paraguay, the world's second producer, is focused into supplying the Stevia industry of Brazil. It also exports to Europe, Mexico, and other Latin American countries. The ideal markets to be considered by Paraguay and Brazil would be those of the United States and the European Union member countries,

which have a limited regulatory framework for Stevia.

Production of Stevia leaves and extracts has flourished in China thanks to the accessible regulations of Japan. Near 95 percent of the raw material used in Japan comes from four producers of China.

The Codex Alimentarius serves as a reference for the international trade of foods. Its main goals are to protect the health of the consumers, to ensure fair practices in food trade, and to promote the coordination of all food regulation studies undertaken by international organizations, as well as both governmental and nongovernmental ones. Since June 2004, the Joint FAO/WHO Expert Committee on Food Additives) sees Stevia as a safe product, which opens the door to a more lenient future regulation.

There are elements which give more competitive advantages to Asian markets. Probably, these markets are better positioned than those of Paraguay and Brazil to take advantage of the benefits of a deregulation. However, conditions might change, especially if action is taken to improve Stevia growth in Paraguay, with investments in its production and sale, and its preferred use is promoted among the consumers of the world.

The Paraguayan Central Government, together with several Departmental Governments and Municipalities and the majority of the international agencies operating in the country are aware that Stevia is an attractive crop for small farmers. Private companies have shown a growing interest in Stevia. In the 1980s, the James May company started operations, thus marking an important milestone in Paraguay's Stevia business. Later, in the 1990s, Paraguayan companies such as Telnet, KH Agrícola and the Ka'a He'e Poty Cooperative started to promote Stevia growth and to buy dried leaves in order to sell them to regional markets.

The efforts recommended by this study comprise the following points:

- Focus the efforts towards existing markets
- Improve Paraguay's Stevia competitiveness
- Inform consumers
- Work in partnership with government agencies and other agencies toward achieving a review of laws impacting on Stevia's sales

USAID's Paraguay Vende started to assist Stevia businesses, analyzing potential product demand, which in this case is ensured by regional companies willing to buy two times the current volume of grown leaves. Thus, Paraguay Vende focuses now into providing technical assistance to producers. In the short and medium term, this action will account for an increase in sales and jobs in the Northern corridor, where work currently is concentrated.

The existing markets require little effort in changing needed laws; rather, they ask for improved

competitiveness of Paraguay's Stevia in the world markets and to increase production in order to satisfy local demand.

In order to achieve Stevia's biggest potential, it is necessary that, in the long term, it be used as a food ingredient/sweetener. Stevia industry should continue to focus in that potential long-term market. However, it is imperative to keep using the current allowed market in order to change the regulations which in turn will open the doors to the potential market.

An industry review in the United States pointed out that China is, by far, the biggest Stevia provider in the market. Also, a review of the U.S. market shows that the American importer associates Stevia with China, and not with Paraguay. Therefore it is very important that Paraguay work to establish its reputation as a provider of a Stevia of superior quality. When American importers were asked about why they bought Stevia from China, they give a variety of answers such as quality, price, and lack of knowledge about Paraguayan providers.

If Paraguay is going to compete with China and with other Stevia producing countries, it will need to inform the consumers, seeking to internalize the notion that Stevia "is" from Paraguay, in the same way as the wine is from France, the cheese is from the Netherlands, the coffee is from Colombia, and the kiwi is from New Zealand.

China gives a steady offer of prices considerably lower for Stevia crystals, and it also has the image of being "the" Stevia provider. This study suggests that Paraguay should not focus on obtaining the best price, but to offer a competitive price instead, which, when added to other strengths, will lead to the notion that buying Stevia from Paraguay is "the right choice." Other strengths are quality and image. A remark made by James May about Stevia quality states that "Good quality Stevia leaves, whether whole, cut and sifted or in tea bags, are about 30 times sweeter than sugar and have no calories. The best quality leaves are imported from South America and Mexico, and are about 12 percent to 13 percent Stevioside. The poorest quality, but most ample supply, is currently coming from China, where the leaves contain only 5 percent to 6 percent Stevioside. A simple taste test quickly demonstrates the difference."

The Paraguayan Stevia image in the world market is one of an unknown product and quality. This could be easily changed to Paraguay's favor. If Paraguay could make a difference in the image by which consumers perceive the "original" Stevia of Paraguay vis-à-vis those of different origin, this could be an advantage. Stevia culture and track record in Paraguay have centuries of production and use. This historical foundation could be used as an advantage by producers and marketers of Stevia of Paraguay. For example, "Terra Soda" is a Stevia-sweetened soda, natural and low-calorie, introduced in the U.S. market by the Web under the formula of "ecomarketing" as a product coming from Peru, focused towards social consciousness and an image that promotes saving the forest through the purchase of their products.

Section 1

1. Uses, Applications and Regulations of Stevia

1.1 Introduction

When exploring the possibilities of turning Paraguay into an important world producer of Stevia it is fundamental to first understand the nature of Stevia. Stevia has a number of properties, which makes it more attractive than sugar and much more attractive than most of the synthetic products available. Some of the reasons for increasing interest in Stevia may be the decreasing popularity of these artificial sweeteners and the increased consumer interest in natural organic products (Mitchell, 2003).

The sections of this report are organized to present the uses, properties and qualities of Stevia, the international regulatory framework, and how it affects the willingness to supply Stevia.

Stevia is a leafy green herb, native to the Rio Monday Valley in the highlands of Paraguay, where it is well known by the name Ka'a–he'e and has been used as a sweetener by the Guaraní people long before the colonization of the Americas (Bertoni, 1905). In 1887, while studying the herbs used by natives in Paraguay, Moises Santiago Bertoni "discovered" Stevia. In 1905, in honor of the Paraguayan chemist Dr. Rebaudi, the plant was scientifically named Stevia rebaudiana (Bertoni).

Since its discovery, Stevia, as it is most commonly referred to, has been subjected to changing international regulations marking its economic evolution and use in the world market. Central to Stevia's international evolution, there is an important debate that could represent millions of dollars to the Stevia industry.

The Stevia Registration Debate

1921: US Trade Commissioner George Brady first presented Stevia to the US Department of Agriculture, calling it a "new sugar plant with great commercial possibilities." Brady took note of its non-toxicity and its ability to be used in its natural leaf state. He also claimed that it was "an ideal and safe sugar for diabetics."
1954: Japan, who is now today's largest user of Stevia in the world, began cultivating the plant.
1970: Food manufacturers began marketing Stevia in Japan.
1991: US Food and Drug Administration (FDA) banned the import of Stevia into the USA.
1995: US FDA modified its import guidelines to allow Stevia into the country as a dietary supplement, not a food additive.
2000: EU Commission refused to allow Stevia either as a novel food and/or a novel food ingredient, in the European market
2003: Paraguay sent documentation to the Codex Alimentarius Commission requesting a regulatory status of food additive.
2004: The 63rd JECFA meeting declared the ADI of Stevia extract to be 2mg/kg per day, a temporary decision that could influence the decisions in the next Codex Alimentarius Conference when re-evaluating the Stevia status, which will also be reviewed by the EU.

1.2 Many Types of Stevia Products

Seventy percent of all the world production is used for processing Stevioside crystals, while the remaining 30 percent of the world's production is designated for herbal uses. The leaf form includes all forms of the plant in its natural stage (fresh or dried), and the extracts from the leaves can be processed into either powders or liquids (see table next page). The best form of Stevia to use depends on the amount of sweetness required in a product and the degree to which the particular recipe or beverage will benefit from the licorice-like taste produced in less refined forms.

Stevia Leaves

Fresh leaves: have a mild licorice flavor. This is the simplest form of Stevia in its most natural and unrefined state. The leaves are used to prepare sauces but are best in herbal teas and for direct consumption. They do not dissolve. In various markets they may be purchased loose or in tea bags. They are 15 to 30 times sweeter than sugar.

Dried leaves: are 10 to 15 times sweeter than sugar. To dry them, one just removes all the water (the easiest way is to dry them with a dehydrator, but drying them in an oven on the lowest setting will also work), which allows them to have an extended storage period. They have the same uses as fresh leaves but are also for industrial purposes, to extract the Stevioside.

Powdered or ground leaves: can be found in bulk form and in tea bags. They have a greenish, leaf color and are used as a flavor enhancer or sweetener in teas, salads, fruit, and coffee, among others. Ground Stevia leaves do not dissolve.

Byproducts (plant remains): The remaining parts of the plant, including stems, seeds, flowers and even leaves that were not classified for industrialization, are collected and processed into animal feed or fertilizers.

The use of fresh or dried leaves (pieces or ground) is acceptable in domestic cooking but it leaves sediment and a greenish color in clear drinks (Midmore & Rank, 2002). Processed products were introduced as an alternative to avoid the side effects of the natural leaves. There are several forms of processed Stevia (see table next page) and one of the challenges in using these various forms of Stevia in cooking and beverages lies in finding the right amount to suit the recipe and consumer taste (Bonvie et al., 1997).

Stevia Extracts

STEVIA LIQUID EXTRACTS

Dark liquid extracts: “a concentrated syrup made from the dried leaves in a base of water and alcohol” (Kirkland, 2000). Used for the sweetening of beverages.

Clear Liquid Extracts: a solution of powdered Steviosides dissolved in water, alcohol or glycerin. Used for the sweetening of beverages.

STEVIA POWDERS

Powdered Stevia extracts with 40–50 percent Sweet glycosides: the Stevia leaves are processed through one of several extraction methods, usually water or ethyl alcohol based. The resulting powder, usually off-white, contains 40 to 50 percent sweet glycosides and is more than 100 times sweeter than sugar (Richard, 1999). Used for the sweetening of food and beverages.

Powdered Stevia extracts with 85–97 percent Sweet glycosides: the same as above, except with greater concentration, it is usually between 200-300 times sweeter than sugar. Stevia is primarily used as a sweetener in this form. Not all Stevia powders are the same. The taste, sweetness and cost of the various white Stevia powders will likely depend on their degree of refinement and the quality of the Stevia plant used (Bonvie, L. et l, 1997).

STEVIA GLYCOSIDES AND ITS COMBINATIONS

Stevia blends: combine pure Stevioside extract with a filler to make an easy-to-measure great tasting powder. Stevioside is the purified or most highly processed form of Stevia. It is the most powerful form of Stevia glycoside and is available in either a white powder or a liquid extract. Because of the great strength of Stevioside, manufacturers combine Stevioside with filler. These blends are the most versatile and easy-to-use form of Stevia. The Stevia to sugar ratio most commonly used is 4:1.

- According to Kirkland (2002), the types of fillers used in Stevia Blends are:
- Lactose: Derived from milk, it has a slightly sweet taste and dissolves instantly.
- Malt dextrin: It is a non-sweet complex carbohydrate with virtually no taste. It can be derived from corn, rice, tapioca or other starches and has a very low glycemic index.
- F.O.S.: This is the common term for fructo-oligosaccharides. It is a sugar found in a variety of common foods like bananas, garlic and wheat.
- Dextrose: It is a common processing agent derived from corn sugar.

Stevia packets: these normally contain the same ingredients as Stevia blends, except in convenient and pre-measured servings.

Stevia quick dissolving tablets: They normally contain Stevioside along with other ingredients and are mainly used to sweeten beverages.

1.3 Many Qualities of Stevia Products

As the table above shows, not all Stevia products are the same. The taste, the sweetness and cost of the various white Stevia powders will likely depend on their degree of refinement and the quality of the Stevia plant used. Stevia quality is determined by the levels of Steviosides and Rebaudiosides-A, and is also often detected by the sweetness of the product.

Kirkland (2000) declares that the quality of any Stevia product depends on the amount of Steviosides it contains, but even more important is the percentage of Rebaudiosides, which is the result of the cultivation and the extraction methods. He also suggests that the presence of these additives at any time during growing, harvesting or processing, are an important issue in determining the final quality of the product.

Midmore further expand the argument when he references the conclusions from six scientific studies. “Stevioside (St) traditionally makes up the majority of the sweetener (60 to 70 percent of the total) and is assessed as being 110 to 270 times sweeter than sugar. It is also responsible for the aftertaste sometimes reported (licorice taste). Rebaudioside A (R-A) is usually present as 30–40 percent of total sweetener and has the sweetest measure of sweetness quality, the more R-A the better. If R-A is present in equal quantities to St (or more), it appears that the aftertaste is eliminated. The minor glycosides are considered to be less sweet, 30 to 80 times sweeter than sugar.”

The differences in quality, taste and prices are important when researching Stevia and comparing products from a Chinese and a Brazilian plant.

1.4 Research and evelopment

Stevia has become a popular research topic in universities and laboratories the world over. Research objectives range from health studies, such as diabetes and cloning research to environmental impact assessments, and extraction patents. Some better known studies include “confirming the safety of Stevia for diabetic use, showing dental benefits in the form of plaque inhibition and cavity reduction, investigating carcinogenicity and mutagenicity (if any) in animal testing. The safety of animal consumption including, chickens and humans has also been confirmed by a wide range of studies.” (Midmore 2002) Some important studies in Paraguay are discussed in section 2.

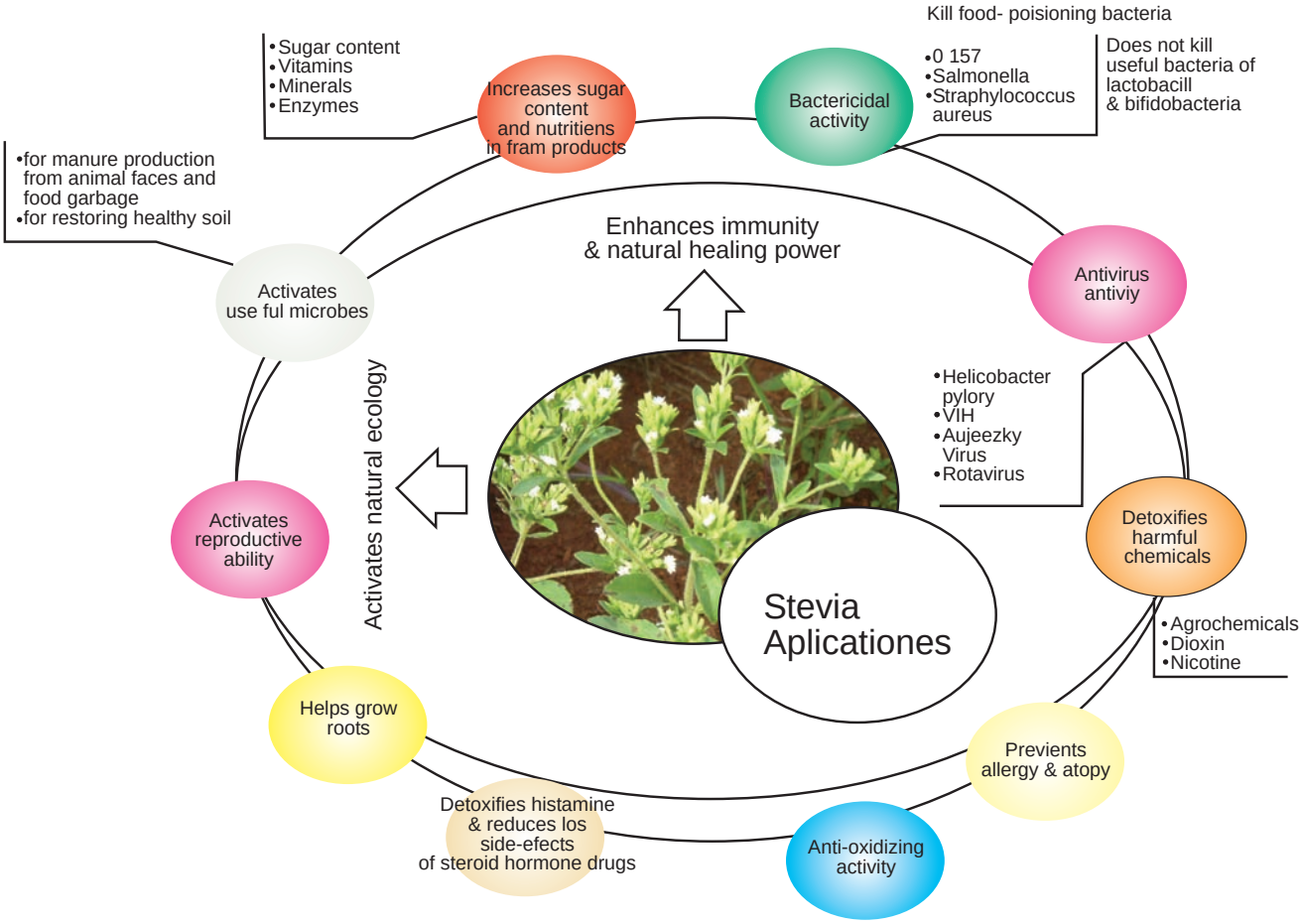
There are hundreds of patents for the Stevia extraction processes around the world; Europe, the United States, and Canada all have valuable patents on Stevia. Japan alone has around 150 patents (Angelucci, 1982; Bonvie et al., 1997a). Brazil has conducted considerable R&D regarding Stevia and continues to do so (see section 3). These studies are important because they will help the industry to discover the best production methods. Although most basic research has been done, this does not mean that the results are accessible and open to all. In 2003, Norina et al published the following chart categorizing the extraction processes. (see table next page from Food New Zealand 2003).

Methods of Extracting Stevia Glycosides

Method	Publication	Name
Based on solvent	Haga, T., R. Ise and T. Kobayashi (1976)	A method forpurifying Stevioside.
Ion exchange	Uneshi, H., R. Ise and T. Kobayashi (1977)	Purification of Stevia sweetening agent.
Absorption chromatography	Itagaki K., and Ito, T. (1979)	Purification of Stevioside
Solvent and decolorizing agents	T. Ogawa (1980)	Decolorization and purification of Stevia component.
Selective precipitation of individual glycosides	Matsushita, K. and T. Kitahara (1981)	Separation of Rebaudioside A by crystallization
Ultrafiltration	Tan, S. and H. Ueki (1994)	Method of extracting and separating sweet substances.

Scientific research studies on Stevia are available in Japan, Brazil and Denmark which are supporting the use of Stevia (Brandle, 1998). Around 1,500 scientific research works on Stevia have originated in Japan. The Japanese have an integrated approach, seeking to utilize the whole plant, not only the leaf, through various applications that not only affect the people's health and well-being, but also animals, ecology and the soil. (JBB Stevia Laboratory, 1988). The table next page summarizes some of the important anti-oxidizing effects of Stevia, beneficial to the health and environmental communities.

The Antioxidizing Power of Stevia



1.5 Uses of Stevia

The single most important market for Stevia is the food and beverage industry, mainly as a sweetener and flavor enhancer. The health market is second in order of importance. The third most important market is byproducts, which consists of the remainder of the plant, after the best leaves have been harvested for tea or for extraction. Many producers have difficulty in finding buyers for these by products, which reduces their return per hectare considerably. The byproduct market can be developed by promoting use of these products for fertilizer and as an additive in animal food products. All three markets require considerable promotion to overcome the acceptance barriers.

Applications in Accordance with the Stevia Markets

(1) Food and Beverages Market
Stevia sweeteners are heat stable to 200º C, are acid stable, non-discoloring and do not ferment. (Glycemic Research Institute, 2000; Midmore and Rank, 2002).
Enhances flavors and odors (Ikan, et al., 1993; Mowrey, 1992).
It has no calories and it is natural (Johnson, 1990)
It is a non-toxic and non-addictive sweetener (Alvarez, 1986; Kirkland, 2000)
It is potent, 250 to 300 times sweeter than sugar in its processed forms (Glycemic Research Institute, 2000)
It is a table top sweetener for tea, coffee, etc. (Midmore & Rank, 2002);
A source of antioxidants
Alcoholic beverage enhancer (aging agent and catalyst)
Potential products: Additive for soft drinks, cordials, fruit juices, ice creams, yoghurts, sherbets, cakes, biscuits, pastries, pies, baking, jams, sauces, pickles, jellies, desserts, chewing gum, candies, confectioneries, seafood, vegetables, weight loss diets, diabetic diets, flavor, color and odor enhancers
(2) Health Market
Hypoglycemic action
Diabetes treatment
Cardiovascular Action
Antimicrobial action
Digestive tonic action
Plaque retardant/ cavities prevention
Eczema and acne control, rapid healing agent for skin care
Zero calories
Treats hypertension and controls blood pressure
Calcium antagonist
Bactericidal agent
Potential products: mouthwash, weight loss programs, toothpaste, skin care agents, medical treatments

(3) Byproducts Market
Agriculture: green fertilizer, golf grasses, and garden grasses
Animal production: for balanced rations, farm animals, racing horses, fishes
Cosmetics: additives for creams, lotions, soaps and shampoos
Environment: to decontaminate dioxin and dangerous chemicals
Soil: disinfectant that kills bacteria, filamentous fungi and seaweed

1.6 Main Producers

The largest Stevia producing country is China. Stevia was introduced to China during the 1970s and has been produced commercially there since the 1980s. China is the main supplier to Japan, which is the major commercial producer and user of Steviosides. Within China, Stevia has been considered a major crop in the past (more than 2,000 tons per year), but there has been a reduction due to lower demand and price from Japan (Midmore & Rank, 2002).

According to Midmore, the Shandong Huaxian Stevia Company is the largest and oldest Stevia factory in China and produces about 50 percent of China's total production, with speculation that this figure might have changed with the new factories in the north. More than 50 percent of this company's production is sold within China, around 40 percent to Japan and the rest sold throughout Korea, Indonesia, and the United States. (op.cit).

In the late 1990s, Paraguay and Brazil started to produce and distribute Stevia products direct to consumers internationally via health food stores, herbal product outlets and by direct mail order sales. Paraguay – the world's second largest producer – currently has around 750 ha dedicated to Stevia (more than 500 tons per year; see Section 2). Other main Stevia producing countries are: Thailand, Korea, Russia, Indonesia, Australia, Spain, Brazil, Canada, Costa Rica, Colombia, Bolivia, and Peru.

The production of Stevia leaves and extracts in China has flourished because of Japanese regulations regarding these products, which allow greater access for Stevia producers than the regulations in the United States and Europe. Some 95 percent of the raw material used in Japan comes from four major producers in China (Midmore & Rank, 2002). The production of Paraguay and Brazil are focused on the Brazilian, Mexican and other Latin American markets. The ideal export markets for Brazil and Paraguay would be those of Europe and the United States. As latecomers, Brazil and Paraguay face competitive constraints when compared to China, for example, higher transport and transactional costs in the Japanese market.

1.7 Regulatory Constraints

The food and beverage industry is one the most regulated markets worldwide. Therefore it should be not surprising that Stevia is experiencing growth constraints, especially as a certified natural sweetener. Firms involved in the production of Stevia should take notice and keep track of regulatory developments.

1.7.1 Regulations in Japan

Today, Japan has the largest consumption of Stevia. In 1954, Japan, began cultivating the plant domestically. In 1970, food manufacturers began marketing Stevia in the country. Japan banned artificial

sweeteners in the 1960s, and has strict regulations regarding products that pose health concerns. In order to verify the safety of Stevia sweeteners, the Japanese authorities conducted several safety tests (carcinogenicity tests, teratogenecity and propagation tests, single administration test, repeated administration tests, and mutagenicity tests), concluding that Stevia is safe (Chan et al. 1998; Chan et al. 2000). Why then do other countries restrict Stevia from entering their markets as a sweetener, when the Japanese have found it to be safe?

The Situation of Stevia in Japan and Other Countries

JAPAN	OTHER COUNTRIES
Stevia holds 41 percent of the sweeteners market (Bonvie et al., 1997a)	Stevia is almost unknown and accepted only as a dietary supplement
Artificial sweeteners such as saccharin and aspartame were banned or strictly regulated in the 1960s due to safety concerns (H. Fujita, T. Edahiro, 1979)	Artificial sweeteners such as aspartame and saccharin are consumed and used in food preparation
Japanese food processors use Stevia and its products in a wide variety of applications (Richard,1999)	Stevia products can only be found in health shops as a dietary supplement
There are several Stevia manufacturers who have formed the Stevia Association of Japan (Richard,1999)	There are some Stevia manufacturers but there are no strong associations of Stevia producers

1.7.2 Regulations in the United States

In 1921, the U.S. Trade Commissioner George Brady presented Stevia to the Department of Agriculture, declaring it a “new sugar plant with great commercial possibilities.” Brady took note of its non-toxicity and its ability to be used in its natural leaf state. He claimed that it was “an ideal and safe sugar for diabetics.” There was little movement in the Stevia market in the United States between 1921 and 1991. In 1991, the US FDA banned the import of Stevia into the U.S., and in 1995 it modified these restrictions to allow Stevia into the country as a dietary supplement, but not as a food additive.

According to the Federal Food, Drug and Cosmetic Act of 1994 (revised April 2000), Chapter 402 (a) (2) (c), Chapter 409, 21 CFR 170 and 21 CFR 189-1, Stevia is a substance “Prohibited from use in human food.” Per 21 CFR 190, Stevia may be sold in the United States as a stand-alone "dietary supplement" or herb, but not as a sweetener. The US FDA authorities base their position on results of the study published in 1968 that claimed that certain tribes of Indians in Paraguay (the Matto Grosso) used Stevia tea as a contraceptive (Planas & Kuc, 1968). This position was unchanged even after other studies showed that Stevioside does not affect either growth or reproduction in animals (Yodyingyuad, & Bunyawong, (1991), Takanaka, Kawashima, Usami & Sakami, (1991), Bonvie et al., (1997)).

The impact of applying one or another of the terms “food additive” or “dietary supplement” in regard to Stevia regulations represents millions of dollars to the potential Stevia industry.

The statutory definition of “food additives” according to the FD&C Act Chapter 201(s) are any substances the intended use of which results or may reasonably be expected to result, directly or indirectly, in its becoming a component or otherwise affecting the characteristics of any food...” (Ditto, 2002).

In reference to dietary supplements, the Dietary Supplement Health and Education Act of 1994 (DSHEA), states that “(dietary supplements) are the following: vitamins; minerals; herbals and other botanicals; amino acids; dietary substances used to supplement the diet by increasing its total daily intake; and concentrates, metabolites, constituents, extracts, and combinations of these ingredients. In addition, these products must be intended for ingestion in pill, capsule, tablet, or liquid form; must not be represented as a food or sole item of a meal or diet; and must be labeled as a "supplement." (US FDA, 2001).

1.7.3 Regulations in the European Union

The European Union’s (EU) position, which is even more restrictive than the U.S. position on Stevia, is given in the Document 300DO196, 2000/196/EC, which says: “The Commission (Environment, Public Heath and Food Safety Committee of the European Union) Decision of February 22, 2000 denied permission to place Stevia rebaudiana (Bertoni): plants and dried leaves as a novel food or novel food ingredient, in the market, under Regulation (EC) No. 258/97 of the European Parliament and the Council (notified under document number C) (2000) (77) Official Journal L 061, 08/03/2000 p. 0014.” It appears that the commission will change this position and allow Stevia in the food market, once they believe there is sufficient research done to better understand the side effects, dietary properties, etc., of Stevia (see the following section).

In apparent contradiction to this EU position, some European countries grow and use Stevia, including: Germany, Belgium, Italy and the United Kingdom (Glycemic Research Institute, 2001, Bonvie et al., 1997a, Kirkland, 2000). Individuals in Europe are also conducting research on Stevia to determine the benefits, and safety of the products (op.cit.).

1.7.4 Codex Alimentarius Commision

The Codex Alimentarius Commission was created in 1963 by FAO and WHO to develop food standards, guidelines and codes of practice under the Joint FAO/WHO Food Standards Program, as a reference for international food trade. The main objectives of this program is to protect the health of the consumers, ensure fair trade practices in the food trade, and promote coordination of food standards studies undertaken by international governmental and non-governmental organizations.

The Joint FAO/WHO Expert Committee on Food Additives (JECFA) recently held its 27th Session in the International Conference Centre in Geneva (Switzerland) June 28-July 3 2004. Paraguay presented its position paper, supported by a series of documents, from medical to quality studies, proving Stevia as a safe product. Other countries including Japan and China also presented similar documents requesting a change in Stevia’s regulatory status.

This 63rd JECFA meeting updated the official opinion regarding Stevia. In a temporary decision, the committee declared that Stevia is innocuous and does not appear to be harmful in amounts of up to 2mg/kg of body weight per day. The Commission has requested additional studies to be completed and presented prior to 2007, to include experiments on humans. Although this does not open the commercialization in the European Union, this is an important step for the Commission and the European Union. The Stevia community anxiously awaits the outcome of the above mentioned studies.

1.7.5 Regulatory Environment in Mercosur

There are no regulations that prohibit the commercialization, processing or consumption of Stevia in Paraguay. The product can be found in its natural stage (whole leaves, powder, and teabags)

or in a processed form (crystals, liquid extracts, culinary uses). In 2000, the Paraguayan Congressdeclared Stevia of “national interest” and recommended to the executive branch, that the country strengthen its competitive development, train the growers, start market research, and promote investment. In 2001, a Presidential decree declared Stevia a “crop of interest” for the agricultural development of the country, and the Ministry of Agriculture, in a Resolution dated October 2003 declared Stevia of “institutional interest.”

Both at the MERCOSUR level, and within Paraguay, Stevia is not listed as a natural sweetener in the customs nomenclature code. The National Technical Committee of Customs Affairs and Nomenclature Codes (Sección Nacional del Comité Técnico de Asuntos Arancelarios y Nomenclatura) in Paraguay, states that Stevia is a relatively new export product and thus is not listed separately as a sweetener product. For this reason, Stevia products are listed in the miscellaneous category, as a product with general components, with no specific definition. However, this Commission is discussing the importance of listing Stevia as a separate item, apart from the miscellaneous category, to show consistency in the petitions Paraguay has presented to the Codex Alimentarius Commission.

In Brazil, the Ministry of Health, the National Secretary of Sanitary Monitoring, National Division of Sanitary Food Monitoring, Port N° 14, on September 10, 1986 decided to authorize the use of Stevioside as a natural sweetener (additive) in dietetic foods and drinks, with an acceptable ADI of 5.5 mg/kg of body weight per day.

In Argentina, the National Institution of Nutrition and the National Administration of Medicine, Nutrition and Medical Technology (Instituto Nacional de Alimentos y Administración Nacional de Medicamentos, Alimentos y Tecnología Medica INAL–ANMAT) informs that Article 1398.64.3 of the Argentine Food Code, classifies Stevioside as a “white crystalline powder, odorless, not fermentable, not hygroscopic, of a sweet taste even in water soluble and well diluted solutions.”

1.8 Changing the Regulations

To change these factors and laws in the consuming countries will require considerable resources. The benefits to a single country to change the regulatory norms in other countries are limited by a cost–benefit relationship just as they are for a single business. Paraguay could spend the time and money to help Stevia obtain approval as a sweetener and ingredient in the United States or Europe; however, due to a lack of monopoly controls on supply, Paraguay would not receive the complete reward for their efforts.

The competitive advantage can be measured in a number of areas, including:

- Lowest cost of production, processing and shipping
- Greatest ability to produce and meet the demands of the market for quality and supply.
- Product quality or product image advantage
- Logistical or location to market advantage – USAID is supporting or exploring Stevia production in Peru, Colombia and Eastern Europe.
- Available resources, and associated costs, to dedicate to the production and processing
- Processing technology
- Favorable or political advantage in country of consumption
- Cultural ties between exporter and consuming nation and businesses

This study evaluates the comparative advantage of the markets (see sections 2, 3 and 4). Considering these elements, some markets are most likely in a better position than Paraguay and Brazil, to benefit once the regulations are changed.

However, the conditions can change, and the Paraguayan market can benefit, especially if the recommended actions are followed, such as improving the cultivation, investing in the production and promoting the preference for Stevia from Paraguay with the international consumers.

Section 2

2. Development of Stevia from Paraguay

2.1 Introduction

The success of Stevia in Japan and China in the 1980s was followed by the development of Stevia in Paraguay and Brazil in recent years. During the late 1990s the Paraguayan government received some assistance from Japan, earmarked for Stevia, which generated many reports assessing the advantages of promoting its cultivation. In general, the assistance given to Stevia by the Paraguayan government was research oriented (see sub section 2.5), and in the case of the donor agencies, it was localized and based on pilot programs.

The central government and many local governments, as well as most international agencies in Paraguay have been aware that Stevia it is an attractive crop for small growers in Paraguay. Although presently the average yearly yield per hectare (ha) of Stevia in Paraguay is low, a crop should achieve yields of 3,000 kg, generating a gross income of $1,800 per ha. There are growers that produce well above these levels, achieving 5,000 kg per ha per year. The crop may be harvested two to four times per year. Once started, Stevia is a relatively simple crop to grow and store. Dried leaves can be produced and stored for up to three years in a “low tech” system (see sub sections 2.2 and 2.3).

Private firms have shown increasing interest in Stevia. In the 1980s when James May formed his company with the mission to make a business based on Stevia, this marked the beginning of what was hoped to be a blossoming export business for Paraguay to the United States (see section 5). In the 1990s, Paraguayan firms, such as Telnet, KH Agrícola and the Cooperativa Ka'a He'e Poty started to promote cultivation, and buying leaves for the regional market (see section 3). In 2002, the producers, traders and consultants formed a chamber of commerce and launched an ambitious plan of expanding Stevia cultivation. The Paraguayan

government placed Stevia high on its agenda during its official visit to the United States in 2003 in order to explore the possibilities of obtaining support for a plan to expand Stevia cultivation in Paraguay.

In 2004, the United States Agency for International Development (USAID), through its Paraguay Vende program, decided to analyze the possibilities of expanding Stevia from Paraguay. Paraguay Vende initiated assistance to Paraguayan companies dedicated to Stevia with two firms, Telnet/Steviafarma and a local branch of a U.S. firm Wisdom Natural Brands, the company founded by James May.

The Paraguay Vende approach consists of establishing links with new buyers and providing technical assistance to the firms, in order to improve their commercialization and production process. The expected results of the program are an increase in the volume of sales, employment and investments in Paraguay, thereby helping to reduce poverty. The program analyzes the potential demand for a product. In the case of Stevia, regional companies are willing to buy up to three times more than the present volume of Stevia leaves. Other donor agencies like the Japanese (JICA) and the Germans (GTZ) are also interested or planning to start projects promoting Stevia cultivation.

The main advantages of Stevia from Paraguay can be defined by the following: 1) it has more production per hectare, in other words, up to five crops can be harvested per year; and 2) the Stevioside and Rebaudioside A content per kilogram is slightly higher than other producing countries.

Unfortunately, production has expanded slowly and has not reached the minimum volume for meeting the demand of just one extraction factory. Although the market information available gives hope for developing the Stevia business in Paraguay, there are also cautionary signs. One aspect to be taken into account is the need for competitive positioning with the Chinese Stevia producers, who currently produce at a rate cheaper than the Paraguayan producers.

This section explores the potential of increasing the supply and commercialization of Stevia from Paraguay. Each section gives an overview of what accomplishments have been achieved regarding Stevia in Paraguay, assessing the quality issues and price development in different segments of the market.

2.2 Stevia from Paraguay

Since 1998, considerable efforts from private firms have been made to promote the cultivation of Stevia in Paraguay, teaching, guiding and helping the growers. Stevia is a labor-intensive crop, requiring more labor per ha than most crops. For this reason, the government and international donor agencies are providing technical assistance to small producers as a tool for combating poverty.

2.2.1 Production and Exportation

Subsequently, Paraguay has a designated area of cultivation of more than 750 ha for cultivating Stevia. This is not a large area dedicated to Stevia, but is a step in the right direction. In the coming years, more land should not only be dedicated to Stevia, but cultivated as well. One local company exports most of the Stevia leaves from Paraguay, 330 ton in 2003, which is 61 percent of the total leaves exported during the whole year, and 82 percent of the leaves were exported to Brazil. The second exporting company has 36 percent share of the Stevia leaf export market of Stevia leaves shipped to various countries: China 51 percent, Brazil 36 percent, Argentina 12 percent, and others (see table next page).

Production in 2004 is expected to be less than previous years, because a drought reduced production by about 50 percent. Paraguay sells almost its entire production (approximately 600 ton/year) as dried leaves. According to the table in next page, 85 percent of this production goes to Steviafarma, Maringá, Brazil. The remaining 15 percent is mainly distributed between France, United States and Germany.

Export of Stevia Leaves, 2003

(In Kg and by country of destination)

EXPORT COMPANY	Brasil	China	Argentina	EE.UU	Germ.	Mex.	Total
TELNET	326.668						326.668
KH AGRICOLA	70.600	100.300	24.200	100	307	204	195.711
FUNDECA			9.100				9.100
ARASY ORGANICA				665			665
LAS PALMAS					532		532
WISDOM NATURAL BRANDS				411			411
Total kilograms	397.268	100.300	33.300	1.176	839	204	533.088

Source: OCIT, Paraguay 2004

Some firms do not export Stevia directly but combine Stevia in an herbal blend with other natural products. Although the U.S. market is small, the role is very important when discussing the possibilities of transforming this market into a major importer of Stevia from Paraguay. The following businesses are the main suppliers of Stevia leaves and/or Stevia finished products in Paraguay:

The Main Firms Involved in Stevia in Paraguay

WISDOM NATURAL BRANDS: The US firm is market leader of Stevia in the United States (see section 5). The Paraguayan branch of Wisdom is exporting finished Stevia products, like soluble mate with Stevia, tea bags, and others to the US firm. They have a requirement of 25 ton of selected Stevia leaves per year, of which most are imported from Paraguay.

TELNET S.A.: Representatives of Steviafarma (Maringá, Brazil). TELNET sells dried leaves to the factory and distributes their “Stevita” finished products in Paraguay and South America (excluding Brazil).

KH AGRÍCOLA: Exports to the Steviafarma factory. In 2003, KH exported 300 ton of Stevia leaves to the Shandong Stevia Company (China).

NATURIT: Produces Stevia tea bags (Stevia, Stevia with Tea, and Stevia with other herbs).

INSTANT FOODS: Produces Stevia concentrates that are added to instant tea and coffee. They buy around 40tn of Stevia leaves per year.

LAS PALMAS: Exports Stevia green powder and Stevia stems to France and Germany (the latter being used for animal food).

SHIROSAWA: Exports selected Stevia leaves to Japan.

2.2.2 Geographical Expansion of Stevia

As mentioned on the previous page, one of the cautionary factors regarding the Stevia industry in Paraguay is the slow start, even after the push in the late 1990s when more private firms entered the market. The reasons for this slow start include the difficulties of introducing a new crop to small producers without any effective government or international support. The main Stevia cultivation area is located in the regions of San Pedro and Concepción where low income farmers and small producers dominate the rural economy. This however is not the region where Stevia is grown naturally. Stevia was discovered growing wild in the highland region of Paraguay and Brazil (see circle in the map).

One important reason for this shift of Stevia's cultivation area to the north is that the highlands have been dominated by the soybean cultivation, which is not compatible with Stevia cultivation. Stevia uses virtually no agrochemicals whereas there is an intensive use of agrochemicals in the cultivation of soybeans. There are no effective herbicides for Stevia. Stevia needs plenty of water in its first years, which makes it susceptible to weeds. These weeds can only be removed by hand, because there is no known mechanization system that can replace the manual labor. In contrast, soy cultivation is a highly mechanized process.

The highlands of Paraguay and Brazil have not been successful in introducing Stevia, whereas the San Pedro and Concepción region have shown some signs of progress. Both major trading companies of Stevia are operating in this region. These regions could increase their cultivation because most growers are planting sesame, which they could easily combine with Stevia. Sesame is compatible as it is also an agrochemical free crop.

2.2.3 Paraguay Vende's Assistance

Paraguay Vende is inaugurating their technical assistance in respect to Stevia in the northern region of the country. On one hand, the objective is to expand the cultivation by incorporating new families and new parcels of land, while on the other hand, the cultivation will be expanded by reincorporating old plots previously dedicated to Stevia. In the region of Concepción, there were areas dedicated to the cultivation of Stevia in the early 1990s, but shortly after these areas experienced a decrease in production. There are various breeding grounds for Stevia, but the commercial cultivation could never be solidified in the geographic area. There is an irrigation system in the area that is partially abandoned today, although there is a probability that GTZ will help provide technical assistance to reactivate the system. All of these characteristics helped Paraguay Vende decide to begin offering technical assistance to Stevia farmers in the north.

In May 2004, Paraguay Vende participated in the launch of a Stevia campaign in the Department of Concepción that brought together farmers, nurseries, representatives of the central government, the government of Concepción, a commercial company and the municipalities of Yby Yau and Horqueta. The government of Concepción provided Stevia starter plants, Paraguay Vende provided free technical

assistance, and the trading company offered to purchase the harvests at a specified quality and price. During the same month, Paraguay Vende also participated in the launch organized in the Department of Amambay, again bringing together farmers, representatives from the government of Amambay, private companies from Brazil and Paraguay, offering to purchase harvests at a specified quality and price, and this time a representative from the Brazilian company for Agricultural Research, EMBRAPA, was also present.

The project has planned to incorporate approximately 25 new hectares into the cultivation of Stevia, involving approximately 100 families in Yby Yau. Likewise, it plans to implement cultivation in the Colony of the Virgen of Caacupe, where a poll has shown that there are approximately 60 families interested in starting the production. At the same time, Paraguay Vende trained farmers in Stevia cultivation methods in the designated areas of San Vicente, Yrybu Cua, and December 25. A committee of the Stevia producers was formed with the assistance of the municipality of Yby Yau with 20 producers each cultivating a quarter hectare of Stevia. This initiative expanded to Amambay, where the Department is offering starter plants to 50 producers who are each preparing one quarter hectare for growing. Finally, there are another 60 additional hectares being prepared for the cultivation of Stevia in the extreme rural areas of the Department of Concepción.

2.3 Cultivation and Associated Costs

To begin to cultivate Stevia, it is necessary to prepare the land: analyze the soil, ensure the best conditions, plow the soil, till the soil and if needed, add some agriculture lime to it. It is calculated that 80,000 to 100,000 Stevia plant starts are needed for every hectare. Plowing, tilling, and cultivation costs depend on how many people are involved in these activities. If only family members work the land, no additional costs are involved, however, below are some calculations assuming everything is outsourced. The production costs do not include the implementation costs, shown separately in the tables below and on the next page.

Implementation Costs for a Stevia Crop Per 1 ha

Activities Description	Value US$
Cost of purchasing land	1.000,00
Soil Analysis	10,00
Plow and Trail	50,00
Agriculture lime	66,67
Stevia plantings (100.000)	500,00
Cultivation Costs	100,00
Fertilization	33,33
TOTAL COSTS	1.760,00

The following information includes all of the product costs except for the implementation costs listed in the table on the previous page.

Annual Production Costs for a Stevia Crop of 1 ha

Quantity	Description of Activities	Value (per Unit)	Totl Value US$
10	Soil preparation	25,00	250,00
3	Harvests	25,00	75,00
3	Drying/Packaging	25,00	75,00
100	Kg. Fertilizers (US$/kg)	0,33	33,33
1	Fungicide	16,67	16,67
1	Insecticide	16,67	16,67
	Organic fertilizer	33,33	33,33
	Total Production Costs		500,00

The trading firms follow strict quality standards. If the products do not reach this standard, they are rejected or purchased at a lower price. This situation is a direct result of the specifications demanded by the industries that processes the leaves. The price paid to growers for dried Stevia leaves is approximately $0.60 to $0.66 per kilogram. The price paid to the middle man (see next section) is approximately 10 percent above the amount paid to growers, because they perform screening and store purchased leaves. When a certain volume is reached, the middle man comes and collects the stock. However, the growers usually end up selling their first quality leaves directly to the trader, bypassing the middle man.

Taking into account that Stevia leaves are also sold to clients in Europe, the United States, China and other destinations, the regional industry may afford shortages of supply even if the cultivated area in Paraguay increases to a level of 1,500 ha.

Investment in Stevia cultivation is highly recommended because the level of returns cannot be met by most other crops. Even if the family labor is paid, and a linear depreciation rate of 20 percent is incorporated into the calculations, the rate of return on investment is high. The internal rate of return is 88 percent when considering the profit minus the operational and implementation costs (see following table).

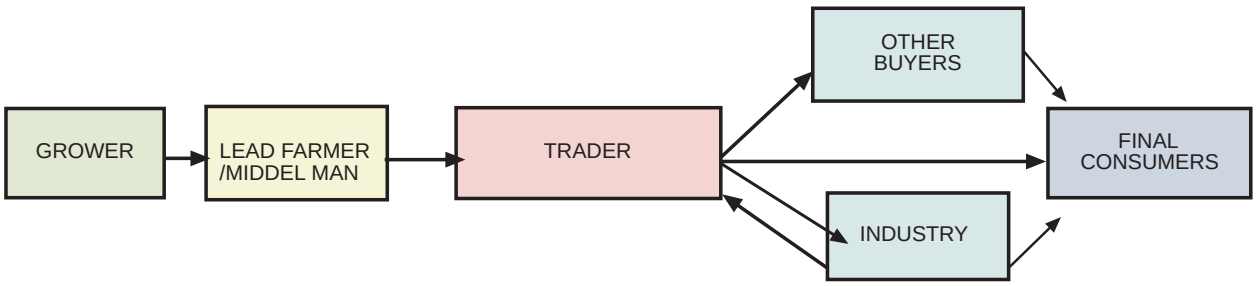
Net Returns on Investments per 1 ha of Stevia cultivated

Yield p/Year Kg	Gross Income $	Depreciat. $	Operating cost $	Net Returns $	Cash Flow $
1.500	900	352	500	48	-1360
3.000	1.800	352	500	948	1.300
3.000	1.800	352	500	948	1.300
3.000	1.800	352	500	948	1.300
3.000	1.800	352	500	948	1.300
13.500	8.100	1.760	2.500	3.840	3.840
				TIR	88%

2.4 Commercialization

The Paraguayan Stevia association recommended a commercialization system for Stevia leaves, whereby a middleman, usually as well a lead farmer, serves as the intermediary between the growers and the traders purchasing the leaves. The middleman or lead farmers purchase the production, and in some cases they provide starter plants and technical assistance to the growers. Usually there is no written contract between the parties, but rather a verbal agreement that governs the relationships. Unfortunately, disloyalties are very common between growers, middle men and traders. Once the middle man has accumulated a volume of Stevia for shipment to the firm, he or she will sell the production and receive payment for it.

The Commercialization System



In the recommended system, the trading firm deals directly with the middle man, who then in turn is responsible for many committees of growers, each with multiple growers. Each grower plants approximately 0.25 ha to 1 ha of Stevia. Although the growers should have some equipment, e.g., a tractor, plow, rake (harrow), or water tank, in reality most work the land by hand. Middleman's used to be as well lead farmers and should have at least 3 ha of Stevia planted with an irrigation system. This represents an approximate investment of $4,200. The payback period for this investment is estimated to be 15 to 18 months.

Additional details of the contracts between middle man and the growers include a requirement that the producers must sell green dried leaves, with a maximum of 12 percent of foreign materials (stems, flowers, earth and non Stevia leaves). The middle man must pay a pre-established price per kilogram to the producers. This price is adjusted and established according to the world price for Stevia. Payments to growers are made in cash on the farm. The buyer must provide technical assistance. The technical assistance may include distribution of starter plants, which is essential to new growers. In many cases, failure to provide some form of technical assistance may delay the entire cultivation and commercialization process, as it stunts the expansion of the cultivation area.

The prices are paid in accordance with the quality and the use of the leaves:

- First grade quality leaves receive approximately $1 to $1.50 per kg.
- Second grade quality leaves receive approximately $0.80 to $1.00 per kg.
- Standard grade quality for industrial uses receives an average of $0.66 per kg.
- An industrial plant in Brazil pays $1 to $1.1 per kg of dried Stevia leaves.
- Other countries that buy the first quality leaves, used especially for infusion blends, pay from $1.30 to $1.50 per kg.

In some cases, discussions arise either through price disagreements between growers, middle men and/or the traders, or because someone does not comply with other terms of the agreement. Despite the contracts or verbal agreements, traders no longer require the growers and middle mans to only sell products to them, a cause of many problems in the past. Growers have the freedom to choose to whom they will sell their Stevia leaves, but firms try to maintain a cordial relationship with the farmers in order to gain and maintain their loyalty.

When there is a shortage of leaves, additional problems related to the price arises. Businesses are willing to pay whatever it takes to purchase the leaves, even if a business has signed a contract with a buyer. In recent months, due to shortages, growers demanded higher prices, but did not provide the quality originally promised, losing the credibility of the middle man and traders. While this may seem like a fairly ordinary dispute between growers and traders, the outcome of these disputes can and have greatly impacted the supply of Stevia in Paraguay. It also has damaged the relationships between growers and traders resulting in growers ceasing production because they feel they are not receiving the fair market price for their crop. Additional commercialization problems are summarized in the table on following page.

Factors that Slow the Development of Stevia from Paraguay

The investment climate in Paraguay must improve before international firms will invest in Paraguay.
There is no governmental support for the cultivation of Stevia. It was named a Crop of National Interest in the parliament and the central government some years ago, but no resources were dedicated to help the cultivation of the crop.
The plant demands more humidity than others. However, considering the unstable weather conditions in Paraguay and the fact that small producers can not afford investments in irrigation, the lack of irrigation could be a major setback to the industry.
Prices have not been very stable from the point of view of low income farmers (the growers), and thus, they do not trust the buyers, and mix lower quality leaves with the first quality leaves. Stevia is a labor intensive crop, due to the fact that there are no herbicides that can effectively clear the weeds without killing the crop, and thus, the crop must be weeded manually, requiring the attention of at least four workers per hectare.
Profiting from an intense cultivation of Stevia requires changing some cultural practices. The Stevia crop as mentioned before is a labor intensive crop which needs a lot of care, and it must be harvested when mature, otherwise, a big part of the crop is lost.
There are some commercialization problems. Many growers who once cultivated Stevia are no longer in the business, because they do not know where to sell their products, how to take care of the crop, and what characteristics to consider.
There are growers interested in planting Stevia, but they do not have the starter's capital for cultivating the crop. It is difficult to obtain financial support to increase the cultivation of Stevia, since most of the governmental programs are designated to support traditional crops such as cotton. The firms involved have already lost some private capital, by financing Stevia seedlings to growers, or other kind of expenditures. Today all firms clearly state that they are not in the condition to finance the implementation costs of new growers.

Stevia producers are concerned about the lack of markets for byproducts that are not in current demand by the industries. Paraguay Vende has assisted in identifying a new market for these byproducts in order to utilize the whole plant and to avoid losses or waste, for example, incorporating them into animal foods.

Many products in Paraguay, especially liquid concentrates and powders, are marketed as Stevia products. However these products have a low percentage of Stevia and are combined with other sweeteners such as saccharin, aspartame and cyclamate. Prices for these products are much lower than pure Stevia products. Consumers buy the cheaper products ignoring the fact that it is not a pure Stevia concentrate.

Consumers in Paraguay and Brazil prefer the liquid concentrate in the smallest 40 cc size, a result of the fact that most still purchase their food on a daily basis. Consumers in Argentina, Uruguay, and Chile prefer the tablets, because it is the most common way that artificial sweeteners entered the market just as in the U.S. consumers like the little individual packets best.

In 2004, Paraguayan authorities are finally controlling the product labels, to make sure that the components are listed correctly. This was an important step for the pure Stevia finished products, since they were previously unfairly competing with other products that claimed to be Stevia, when they only had

a small percentage of Stevia in the finished product. In the local market Stevia-based sweeteners are sold in the supermarket chains, specialty stores (ice cream shops, pastry shops, among others) and pharmacies. The local market for Stevia leaves is almost nonexistent. At this moment the single biggest problem facing the Stevia business in the shortage of dried leaves in the MERCOSUR region. Demand should increase by 2005, according to industry estimations. This is important information for international firms interested in investing in an extraction factory in Paraguay.

2.5 Comparison of Sweetener Contents

The National Agronomic Institute (IAN), a Paraguayan governmental research unit, is currently working on a research project with the objectives of (1) Evaluating the content of Stevioside and Rebaudioside A in Stevia plants to determine how to most efficiently grow the purest plant in Paraguay, and (2) Identifying the purest form of the plant, and cloning it for mass production. The IAN picked plants before the flowering season and sorted them according to their phenotypes and agronomical characteristics. All plants belonged to commercial growers who were willing to help in the research. The analytical methodology used is the one suggested by Hashimoto-Morigasu (1978). The HPLC equipment used for the quantitative determination of the Stevioside and Rebaudioside-A is “Shimadzu,” equipped with an air compressor and an UV/VIS detector. The content of Stevioside and Rebaudioside, is presented through “chromatogram,” and the results are later expressed in percentages.

The results, summarized below, show that on average the content of Stevioside ranges from 5,1 percent to 21 percent of and of Rebaudioside-A from 0 percent to 12 percent A (see table).

Contents of Stevioside and Rebaudioside A in Stevia Leaves from Paraguay

	% of the Population	Range
Stevioside	61,4 %	5,1% - 10,0%
	32,0 %	10,1 - 21,0%
Rebaudioside “A”	61,0 %	3,1% - 9,0%
	100,0 %	0% - 12,0%

Source: IAN

These results are consistent with results of Chang-Shing & Cook (1983) and Kawatani (1983), from their studies of Paraguayan Stevia. These results prove that it is possible to select samples with a high content of Rebaudioside -A and use them to construct a clone line. According to the IAN, the analysis of the above result shows that there is a high variability of Stevioside and Rebaudioside-A contents in Stevia plants. It may be a result of crossed fertilization (alogama) of Stevia plants (CAPASTE 2000). Similarly, there can be observed a high diversity in glycosides content. The results indicated that genes of quantitative inheritance govern both characteristics. Conclusions may be made on influence of outside factors such as, harvesting time, temperature, humidity, photoperiod, or post-harvesting handling.

There is an obvious similarity between the results of the Midmore (2002) and IAN study when comparing the Stevioside content of the Stevia from Paraguay. The content ranges from 5.0 percent to 14.0 percent (Midmore 2002) and 5.1 percent to 21.0 percent (IAN). In comparison with the Midmore study regarding the Stevia from China, the range of Stevioside content is much less, with a 3.78 percent to 6.98 percent range.

However, there are fewer similarities between the two investigations in respect to the content of Rebaudioside-A in the Stevia from Paraguay. According to Midmore (2002), the range of Rebaudioside-A in the Stevia from Paraguay is between 2 percent and 4 percent while, according to IAN, the range is 3.1 percent to 12.0 percent. Midmore's (2002) study shows a range of Rebaudioside-A content of Stevia From China from 3.86 percent to 12.15 percent. In conclusion, when Midmore's results on Stevia from China are compared with the results of the IAN's study of Stevia from Paraguay, Stevia from both countries has a similar content of Rebaudioside A. However, according to Midmore's study, Stevia from Paraguay has a lower content of Rebaudioside A when compared to the Stevia from China.

Stevioside and Rebaudioside Analyses in China

Location Cultivars	Stevioside %	Rebaudioside A %	Rebaud. A/ Stevioside ratio	Total Sweetener
Paraguay – average	8-14	2-4	.4	10-15%
Paraguay – typical	5-10	2-4	0.4	9-15%
Paraguay – wild				10.2-13.5%
China – average	6.44	3.86	0.6	10.3%
China selection 508	5.73	12.03	2.1	17.9%
China selection J2/8	3.78	12.15	3.2	18.3%
China selection J"/23	6.98	10.47	1.5	19.57%

Source: Midmore, 2002

According to the Midmore study (2002), with China's ability to select for high yield, it is not surprising that Chinese growers have doubled the level of sweetness and have considerable increased the Rebaudioside-A content.

Section 3

3. Steviafarma of Brazil

This case study focused on Steviafarma of Brazil was chosen due to the firm's leadership in the South American market, and its relationship to the Paraguayan firm Telnet, which is associated with the Paraguay Vende program.

3.1 The History

The company was created in 1985 by a group of farmers located in southern Brazil on the eastern slopes of the Amambay Mountains, in the city of Maringá. The exportation of Stevia leaves was a growing business for these farmers. They decided that instead of just exporting the leaves, it would be more profitable to export the pure Stevia extracts. By hiring Japanese consultants and scientists from the University of Maringá, the company developed a unique proprietary process to extract the glycosides from the leaves of the Stevia plant and built a state-of-the-art factory to produce Stevia crystals. The factory repeatedly experienced financial problems, until the Meneguetti's, a well-known family operating in the Brazilian sugar industry, decided to take over the business.

There is no information about the existence of another Stevia plant operating in the southern hemisphere that can produce Stevia crystals on commercial scale, with a high concentration of glycosides. Most of the company's machinery was developed by the factory's own technical resources together with the technology from the University of Maringá. At the beginning of the venture the directors launched a Stevia cultivation program in the area. Originally there were approximately 300 ha of Stevia crops but most of the growers stopped their cultivation. The reasons

reflect recurrent problems associated with the cultivation of Stevia: the leaves were not bought at a consistent price, failures in the production process, and persistent difficulties inherent to growing the crop. Today some 50 ha of Stevia are cultivated in Brazil, but this is no where near the maximum capacity needed for the factory that could produce more than 100 ton of Stevia crystals per year. When the factory first started, the idea was to focus on food additives in the industrial market, but as time passed, they decided to focus on finished consumer products such as table top sweeteners.

3.2 Markets

3.2.1 The Products

The main categories are powder and liquid extracts, all of which are 97 percent pure Stevia. It is believed that the best quality extracts have a 50/50 ratio of Steviosides to Rebaudiosides–A. The company is trying to obtain the best of both properties in their products.

For the finished products, the company uses some filler to give volume to the products. The most common fillers are lactose and malt dextrin. In contrast to the artificial sweeteners in the market, Stevia crystals are heat resistant and, can be used in products that need ultra high temperature and high temperature short time, it is ph stable and it has 30 percent solubility in water.

The company sells 95 percent of its products to the Brazilian market. There are some companies in Brazil that are using Stevia crystals from Steviafarma as food ingredients. For example, they are selling it to a company that produces yogurt (Rio Grande) and another that produces chocolate (Curitiba). There are also other companies interested in including Stevia sweetener as an ingredient in their food products, for example: Garoto (famous Brazilian chocolate company), Kraft, Nestlé, and Coca Cola, but as the company cannot yet commit themselves (due to the lack of raw material), to provide the level of production these companies would demand so they are in a stand by situation.

“Stevita” Products

Products	Ingredients	Packs	Description	
Stevita Packets	(7%) Stevioside and (93%) lactose	1 g packets come in packages with 50, 150, and 100 packets.	Each packet has the sweetening power of 2 teaspoons of sugar.	
Spoonable Stevita in Bulk	(7%) Stevioside and (93%) lactose	120 g 220 g 540 g 2,000 g	1 g = 3.7 Kcal equivalent to 6 g = 24 Kcal	
Stevita Liquid	(12%) Stevioside, (2%) Xilitol, (0.18%) Sorbate, and water.	40 ml 100 ml	4 drops (0 Kcal) are equal to 1 tablespoon of sugar (12 Kcal)	
Spoonable Stevita in Bulk without Lactose	(7%) Stevioside, (1%) Anti-Humectant, (92%) Maltodextrin (natural product from corn)	160 g	For people who are lactose intolerant.	
Stevita for Culinary Use-Oven and Kitchen	(1%) Stevioside, (1%) Anti-Humectant, (93%) Malt dextrin	400 g 1, 200 g	Substitute for the same amount of sugar.	

Products	Ingredients	Packs	Description	
Stevita Instant Chocolate (50% less calories)	(2%) Stevioside, (98%) Cocoa Powder	120 g	60% less calories than conventional hot or cold chocolate products.	
Stevita Cocoa (60% less calories)	(1%) Stevioside, (30%) Pure Cocoa Powder, (68.32%) Maltodextrin, (1.68%) Calcium, (1%) Anti-Humectant	220 g	Dissolve on teaspoon (10 g) for each 200 ml of skim milk.	
Stevia Leaves Powder	Powdered Stevia leaves in capsules.	60 capsules	Can be used on salads, teas, etc.	
Stevita Magrins Shake	Wheat fiber, flour, oats, soy, rice, brewer's yeast, stevita, and natural papaya aroma.	500 g	Mix 2 tablespoons of Magrins with 150 ml of milk.	

3.2.2 Direct Distribution

The company distributes the products directly to the main supermarkets and retail outlets in Brazil, which receive the orders at their central stores and then distributes them through the entire country via their own transportation systems.

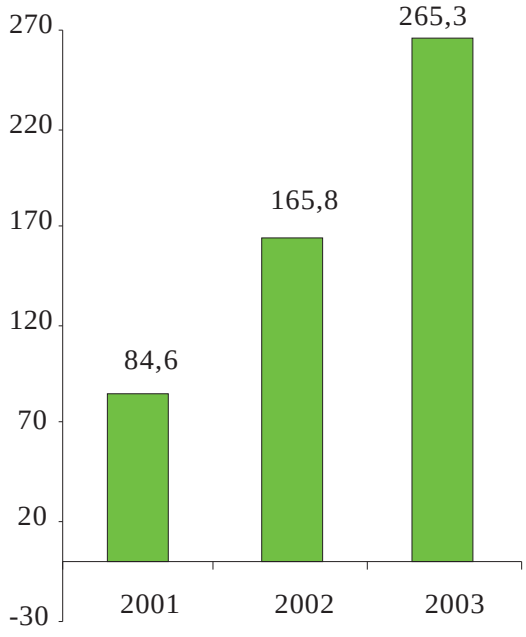
3.2.3 Indirect Distribution

The company contracted a well-known Sao Paulo firm to organize their distribution system to reach the small pharmacies, health stores, and small retail stores with their products. The company also sells a small amount to Argentina, Peru, and Mexico and since 1996 to the U.S. market, through a distributor in Arlington, Texas. Some products marketed in Brazil are not available in the U.S. market, and not all the products marketed in the United States are available in Brazil. The firm sells some products to Germany, France and Italy, even though the European market is still not officially open to Stevia.

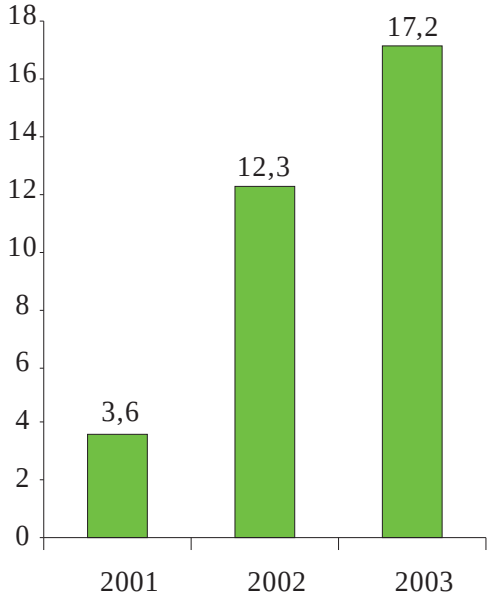
3.3 Production

The ideal conversion rate of raw material into Stevia crystals is approximately 10 percent (10 kg of dried leaves to 1 kg of Stevia crystals). With the currently available technology, the company's conversion rate is between 5 percent and 10 percent. However, with the new spray dryer being designed, the rate is expected to jump to 10 percent. Taking this conversion rate of 10 percent into account, the total capacity of leaves currently being processed in the factory is 1,000,000 ton/year resulting in 100 ton/year of pure Stevia crystals. The factory is now working at approximately 20 percent to 30 percent of its total capacity (see tables below), using only one 8 hour shift. The only reason the factory is not working with three shifts and utilizing 100 percent of its capacity is that it lacks sufficient raw materials, the Stevia leaves. Employment would increase considerably more than the 99 people currently working at the company, but most importantly the rural employment in Paraguay would rise significantly.

Stevia Leaves tn.



Steviosides tn.



The production process begins with the receipt of the dried leaves. Growers that bring a quality product receive a premium price. Those that bring a low quality product receive a lower price. The company's new policy regarding the leaves is that they only pay premium price for leaves with 12 percent or less impurities. Leaves that have more than 12 percent impurities are paid lower prices.

The first step of the production process is to test the Stevia leaves for their content of Steviosides and Rebaudiosides-A. Once they past the test, the leaves are processed into a paste, which goes through a filtration and extraction processes and finally the crystals are dried. Liquid products are processed in a different manner. The powder crystals are packaged as a final product for industrial uses, or mixed with the fillers and other ingredients, for finished consumer products.

With the incorporation of a spray dryer, the company will also produce a higher quality product with a better taste. The process will be faster, more efficient and as a result, they will produce a better product.

After a long period of studies, the company has decided to relaunch the liquid product. The factory worked together with the university to create a product with a better taste. All products will have new packaging. Formerly, they had two sizes of the liquid extract: 40 ml and 100 ml. They decided to discontinue these options and market a more attractive 75 ml bottle. The powder products will also undergo some changes, the packets for export will be made in the shape of a leaf. The objectives of the relaunch is to give a new image to the enterprise, increase sales, attract consumers attention and give them the opportunity to try a new, better product.

3.4 Relationship with Paraguay

The main problem that the company faces is the lack of supply of Stevia leaves. There is a strong working relationship between the company and Paraguay through its associated company Telnet. The Brazilian company buys almost its entire

requirement of dried leaves from Paraguay through Telnet. If the Brazilian company buys Paraguayan Stevia leaves that are not sent by Telnet, they pay a commission to Telnet for these "outside" leaves.

The management of the Brazilian firm believes that Paraguayan leaves are of good quality, however, they are concerned with the quality of the leaves that have recently been sent from Paraguay, as they have found more foreign material mixed in with the leaves. Because of this, they are more rigorous in the selection of leaves and no longer accept low quality leaves. The company's policy is to pay according to the quality of leaves. The better the quality of the leaf, the better the price the grower receives. This motivates the growers to produce and select the better quality leaves.

3.5 Quality

In the Brazilian market there are around eight different products that claim to contain Stevia. The company took samples of some of these products and analyzed them in the laboratory, concluding that many of them contained other artificial sweeteners with very little Stevioside and Rebaudioside-A, and some of them did not even contain any extracts.

The company is trying to convince Brazilian authorities to establish a standard label for sweeteners, since most of the marketed products highlight the fact that their sweetener is made of Stevia when in reality it is not only Stevia, or it contains very little. The same problem exists in Paraguay, and the food control authorities are now establishing standard labels for the products offered in the sweetener market.

According to the university studies in Maringá, the Brazilian Stevia extracts (using leaves from Paraguay) have 97 percent purity rate, which is considerable higher than those of Asia. (See section 4). Furthermore, the Brazilian producer claims that they never incorporate artificial sweeteners such as saccharin, aspartame, and/or cyclamate into their Stevia products. The Asian products have a low content of Stevia and the flavor is very strong and leaves a strong aftertaste. The company claims this is the reason why Asia can produce products at a much lower price.

The company does not have enough finished products to meet their current demand and therefore they sell everything at their established quality levels, at their established prices. Depending on the quantity the client requires, the price per kilo of Stevia crystals are $150 per 1 kg and $140 per 2 kg per kilo. According to the company's management, the prices are considerably higher than those of the competitors (see section 4), but the qualities are different too.

3.6 Prices

Stevia from Brazil and Paraguay is sold for $140 to $150 per kg, while Chinese Stevia sells for $14 to $33 per kg (see sub section 4.3). The company suggests that this is only possible because there is a high difference of quality, or purity. But the firm is as well aware that their price could be lowered if the production volume were to increase or the production process modernized. For instance, with the installation of the new spray dryer, the firm believes that they will be able to lower the price.

The firm claims that if the factory works full time the Stevia crystals price would drop down to around $60 per kg, which is less than half the price that they are offering it at today.

The Meneguetti family owns four sugar refineries in Brazil which are subsidizing their investments in the Stevia industry; Steviafarma is working thanks to the sugar business.

It is interesting to compare the cost structure of the plant when considering a scenario of producing 6 ton/year with another scenario of producing 32 ton/year of Stevia crystals (see table on the next page). The increaseof production is directly related to the increase of costs, not only of the variable costs, but also of fixed costs. The firm claims that the increase in the fixed costs is mainly because until now they do not assign the real expenses to those accounts. For example, the wages and salaries of the management and administration would increase significantly, due to the fact that the management has not been receiving any revenue, dividends, from the factory since it started, and therefore if production were to increase, there would be additional revenue that could be distributed among the members of the management.

The variation in the variable costs is understandable because, with the increase of production, there will be a direct increase in the costs involved (raw material, energy, wages and salaries). The total costs would increase enormously with an augmentation of production, but as can be observed, the cost per ton decreases to more than a half; which confirms the fact that the factory is utilizing its capacity insufficiently.

A study, analyzing the treatment of Type II diabetes with Stevia has recently been concluded, through a joint project with Aarhus University, Denmark and the National University, Paraguay. The scientist responsible for the study, Dr. Per Bendix Jeppesen has more than nine years of investigating Stevia, first with animals and later with humans. In the coming months, the study is expected to be published for the scientific community, demonstrating the important benefits of Stevia for one's health.

It is important to note that, for the development of this study, the researchers analyzed various crystals produced throughout the world and the Steviosides produced in Brazil were chosen for their purity and abilitiy to remaining completely homogeneous through the production process.

Fernando Meneguetti, Chairman of Steviafarma Ind. S.A. Brasil, www.stevita.com.br

and Juan Carlos Fischer, Chairman of Telnet S.A. Paraguay, www.steviaparaguaya.com.py

Comparing to Scenarios of Annual Cost Structure (in $)

	6 ton	32 ton
1- Fixed Costs	173.636,4	
1.1. Wages and Salaries	127.575,8	224.242,4
1.1.1. Directory	46.969,7	72.727,3
1.1.2. Administration	80.606,1	151.515,2
1.2. Depreciation	26.363,6	45.454,5
1.3. Area and Equipment Maintenance	19.697,0	29.393,9
2- Variable Costs	686.363,6	1.911.818,2
2.1. Raw Material	225.454,5	575.757,6
2.1.1 Stevia Leaves	170.909,1	454.545,5
2.1.2. Chemical Products	54.545,5	121.212,1
2.2. Salaries and Wages	106.060,6	142.424,2
2.3. Energy	13.333,3	17.878,8
2.4. Firewood	14.848,5	78.787,9
2.5. Financial Costs	48.484,8	96.969,7
2.6. Fuel and Lubricants	1.818,2	9.090,9
2.7. Travel Costs	21.818,2	36.363,6
2.8. Taxes	37.878,8	196.969,7
2.9. Packaging	216.666,7	757.575,8
3- Total Costs	860.000,0	2.210.909,1
Cost per Kg	143,3	69,1

It is iteresing to note that if packaging and tax cost are deducted from the cost structure (see scenario of 32 tons per year in the table above) a cost price of $ 39.30 per kg of extracts would result. Considering that the purity of Stevia from Paraguay produced in Brazil is of 97 percent, a competitive price could result after adding the prevailing profit margin to this cost price.

3.7 Research and Development

The company provided Paraguay Vende with a copy of eight volumes of R&D documents available to the public. The different documents include toxicological studies, chemical and physical studies, analytical

studies, botanical studies, and general studies. These studies were also given to the INTN (National Institute of Technology and Normalization) of Paraguay and were presented with Paraguay's position paper presented to the Codex Alimentarius Commission in 2003.

The company is constantly researching and analyzing issues related to Stevia. Presently, they are developing two different methods to improve the quality of their products, working together with the University of Maringá and EMBRAPA, the main Brazilian research institution for agribusiness, to improve all Stevia related matters. Most changes or new methods considered for production are evaluated and analyzed by an independent research institute (University of Maringá, University of Campinas, and EMBRAPA).

EMBRAPA is currently undertaking a research project regarding Stevia (varieties, growing issues) in two locations within Brazil. The company is also involved in organizing a joint project with the Brazilian Embassy in Paraguay, with the aim of strengthening the relationship between Paraguay and Brazil on all Stevia related issues.

The University of Maringá and the company have maintained a good relationship. The university has worked with Stevia for many years and has conducted studies and several International Seminars of Stevia rebaudiana (Bertoni). They worked together with the company in designing and building the extraction and processing machinery for the factory. Agronomist Osvaldo Hidalgo da Silva is the adviser of the Department of International Cooperation of the University of Maringá, and has expressed his interest in working together with any Paraguayan institution interested in further developing the research regarding Stevia.

Section 4

4. Stevia in Japon and China

4.1 Introduction

A discussion of Stevia from Paraguay cannot be complete without covering issues involving the Japanese market and Paraguay's competitor, China. Japan is a key global market with consumption in excess of 150 tons of finished Stevia products per year. Indications are that more than 95 percent of the Stevia imported into Japan is coming from four major suppliers in China.

Scientific data referencing Stevia is supported by more than 1,500 research projects with the bulk of these studies completed under their authority or directives of Japan. This research has opened many doors for the use of Stevia in the Japanese market, which are not available in other countries. For example, Stevia is an ingredient in the health drink Pocari Sweat (see Web site http://otsuka.com.jp/pocari_e/pocari1.htm) which is similar to Gatorade. Stevia has also been utilized as an ingredient in the Japanese staple, soy sauce.

Japan utilizes Stevia as a sweetener. They have found no negative health impacts from Stevia consumption. Given Japanese food standards and importation restrictions this is amazing. Many of the ingredients that are "standard" and without question in the United States are banned in Japan, including artificial sweeteners. Japan typically does not allow products into Japan that are of any questionable health concerns.

The conclusion is that the Japanese allow Stevia imports for the following reasons:

- The nearly 1,500 reports commissioned and undertaken in Japan show no ill health efforts to the use of Stevia

- Japan is promoting a cost efficient alternative to sugar
- Japanese companies have investments in Stevia use and production supported by their regulatory environment

The purpose of this section is not to argue the logic behind the Japanese laws but rather to understand the market potential that they allow and to develop a strategy for getting a market share in Japan for Stevia from Paraguay.

The fact that Japan has approved Stevia, while denying access to other products, supports the argument that Stevia is safe and should be approved in other markets – specifically the United States. This is a key argument where the business associations of Stevia in Paraguay should focus on when presenting their petitions to amend the regulations in the various markets. Japan has records, statistics and professionals that know about every aspect of Stevia processing and consumption. These documents and professionals should be utilized by Paraguay in their efforts to change the regulatory status of Stevia. The Japanese Stevia experts will see the value in working with Paraguay, if Paraguay can show that it is serious about its intention for leading the Stevia industry.

4.2 Opportunities for Stevia from Paraguay

Japan offers the single greatest market opportunity for Stevia from Paraguay. Nothing will happen in this market until the Stevia industry of Paraguay approaches the Japanese market, determines their needs, and defines how "Stevia from Paraguay" can meet these needs.

The nature of Japan's economy and agriculture has caused Japan to be the world's leader in outsourcing the products that their economy requires. The Japanese buyers are experts in finding the world's best sources for their product. The question the Stevia industry in Paraguay needs to answer while working with the Japanese is "why in the world would Japan buy Paraguay's product over everything else available in the world?".

Japan is currently purchasing products from China to fill their demand for Stevia products, most coming from the Shandong Province. According to the information from Paraguayan business representatives, the level of sophistication of the Chinese cultivation is low and harvested in small parcels of land, as in Paraguay. It would be a good investment for Paraguay to regularly send a representative, or a group of representatives, to Japan and China to review their industry.

Developing a dialogue with Japanese buyers and processors of Stevia is a simple process. The Stevia Association of Japan consists of 10 companies (see sub section 4.3). These companies include processors, pharmaceutical and food companies all involved in the processing and distribution of Stevia. These companies currently purchase Stevia products from China and "reprocess" the product to meet Japanese standards and to modify the product for specific uses. It is not unusual for Japanese companies to "reprocess" imported products to meet their needs, however, in the case of Stevia, the Japanese companies have more than 150 patented processes for which to process Stevia.

One question that has not been answered in this study is how the product from Paraguay compares and meets the quality requirements of the Japanese buyers. This needs to be determined through a dialogue with the Japanese companies. Inviting the 10 Japanese companies to visit Paraguay to review the state of the industry in Paraguay should be a top priority of Paraguay or a company planning to take the lead in Stevia exports from Paraguay. If a program is outlined to include plant visits, farm and field visits, technical discussions and presentations on Stevia from Paraguay, Japanese buyers will support their travel to Paraguay to participate in this program.

To capitalize upon the Japanese market, a dialogue needs to exist between the industry and companies in Paraguay and the Japanese buyers. The buyers have been identified (see sub section 4.3 on the next page) and therefore what needs to occur now is an open dialogue. The dialogue can be done directly

as most Japanese companies English-speaking representatives.

One company in Paraguay has exported leaves to China for processing into crystals (see section 2). This exportation was sold at a price of $1.00 per kg FOB versus the US$0.66 price sold in Paraguay. The fact that China can buy raw materials from Paraguay at a premium and still process the product competitively provides hope for the competitiveness of Stevia leaves and finished products from Paraguay.

If Paraguay is able to implement several of the suggestions in this report they will be able to sell their finished goods in Japan. The key steps to accomplish this include:

- Develop a dialogue with the Stevia Association in Japan
- Present Japan with the standards for processing Stevia leaves from Paraguay
- Educate the Japanese companies about the value of the "Stevia from Paraguay" seal
- Invite the Japanese to visit the farms, fields and operations in Paraguay
- Increase production and processing at the farm and factory level to allow for a decreased price and greater overall profits.

4.3 The Japanese Market

According to this section, the current volume of imported Stevia products in Japan has declined from 200 tons to 150 tons/year and it is expected to remain flat, with little to no growth. The price of Stevia in Japan has increased in recent months from US$14 to US$15 per kg to a price currently around US$33 per kg, which would result in an imported value of $4.95 million per year. The market for Stevia crystals has decreased in Japan over the past several years and according to Japanese Stevia companies, it is expected to remain flat. Stevia consumption in Japan is decreasing because many consumers associate Stevia with Genetically Modified Organisms (GMO).

The fact that Stevia is not a GMO product, but rather a natural herb with centuries of production in its natural condition – only in Paraguay – is not a point

understood by the Japanese consumers. Japanese consumers are unaware of the nature and history of Stevia in Paraguay. These misconceptions can only be overcome with access to the correct information. In this case, consumer education, if developed properly through a marketing campaign on the benefits of Stevia from Paraguay, could be deployed to the advantage of Paraguay and not the industry as a whole, thus returning rewards nearly exclusively to Paraguay. This can be accomplished via the media kit to be produced by the Stevia Association in Paraguay (see section 5).

In recent months there has been a leaf shortage in China. It has not been determined whether this shortage will be short-term or long-term and therefore it is difficult to make recommendations on the long-term trend of the Japanese market.

The main applications of Stevia in Japan are:

- Salty foods: pickles, sea foods boiled in sweetened soy sauce, soy sauce, miso, and fish paste
- Drinks: beverages (low calorie or no sugar drinks) and milk drinks
- Desserts: ice candies, ice cream, yogurt and jelly
- Canned and jarred fruits
- Confectioneries: gums and candies
- Table sweeteners
- Toothpaste

The Japan Stevia Industry Association (http://www.stevia.gr.jp/index_02.htm) is composed of the following 10 major Stevia processing and marketing companies.

Japanese Stevia Companies

Ikedatohka Industries Co., Ltd. (http:www.ikedatohka.co.jp)
TAMA Biochemical Co., Ltd. (http:www.tama-bc.co.jp)
DAINIPPON INK AND CHEMICALS, Inc.(http:www.dic.co.jp)
Toyo Sugar Co., Ltd. (http:www.toyosugar.co.jp)
Tokiwa Plant/Chemical Lab. Co., Ltd. (http:www.trade.or.jp/member/tokiwa/tokiwa.html)
Nichinouseiken Co., Ltd. (http:www.daily-yamazaki.co.jp/group_m.html)
NIPPON PAPER CHEMICALS Co., Ltd. (http:www.npchem.co.jp/e/product/stevia/index.html)
Fuji Kagakukogyou Co. Ltd. (http:www.waila.or.jp/kasei/fuji1.html)
Maruzen Pharmaceuticals Co., Ltd. (http:www.maruzenpcy.co.jp)
Morita Kagakukogyou Co., Ltd. (http:www.morita-Kagaku-kogyo.co.jp)

The association members' supply to the customers are very specific to each end product, which means the Stevia extract/enzyme-treated products (for instance alpha glycosiltransferase-treated Stevia) are marketed as original but refined extracts, but also can be combined with other ingredients such as dextrin to adjust and/or improve the sweetness and taste. Because of this larger number of diverse market segments, which add considerable values to the commodity imported form China, it should be concluded that the actual Stevia sweetener market is a multiplier of the imported value of $ 4.95 million mentioned on the previous page.

The price of refined/reprocessed Stevia extracts in Japan has a very wide range because in most cases they are not sold as the pure Stevia extracts (>80 or 90 percent of the two sweetness components) but rather at the blend that meets customer requirements or applications. Very roughly speaking, the market price of Stevia extracts is about 4,000 to 9,000 yen/kg ($36.9 to $83.20 p/kg) depending on the quality (Stevioside and Rebaudioside contents), and enzyme-treated extracts about 10,000 to 25,000 yen/kg ($92.50 to $231.20). The price range looks quite wide, of course, the higher the concentrate ratio (Rebaudioside–A/Stevioside) the higher the price, as the sensory evaluation regarding sweetness mentioned above is very critical.

Few soy sauce/brown sauce producers in Japan use Stevia products, and the volume of those special sauces are very limited. According to a couple of sauce producers, a blend of licorice and Stevia is more favorable than straight Stevia in terms of masking salty taste.

What are the prospects for the future? As per the discussion with several association members as well as with sweetener suppliers, the future market of Stevia and Stevia products in Japan as sweetener may stay flat. The reasons would be: 1) safety issue, many scientific research results show that it is safe, but the consumers are rather leery, simply because some consumers have associated Stevia with GMO; 2) competition from alternatives, sugar derivatives (enzyme-treated sugar by Nikken kasei, Sucralose by San–Ei Gen), licorice (by many suppliers), and SUNET (Acesulfame K by Takeda).

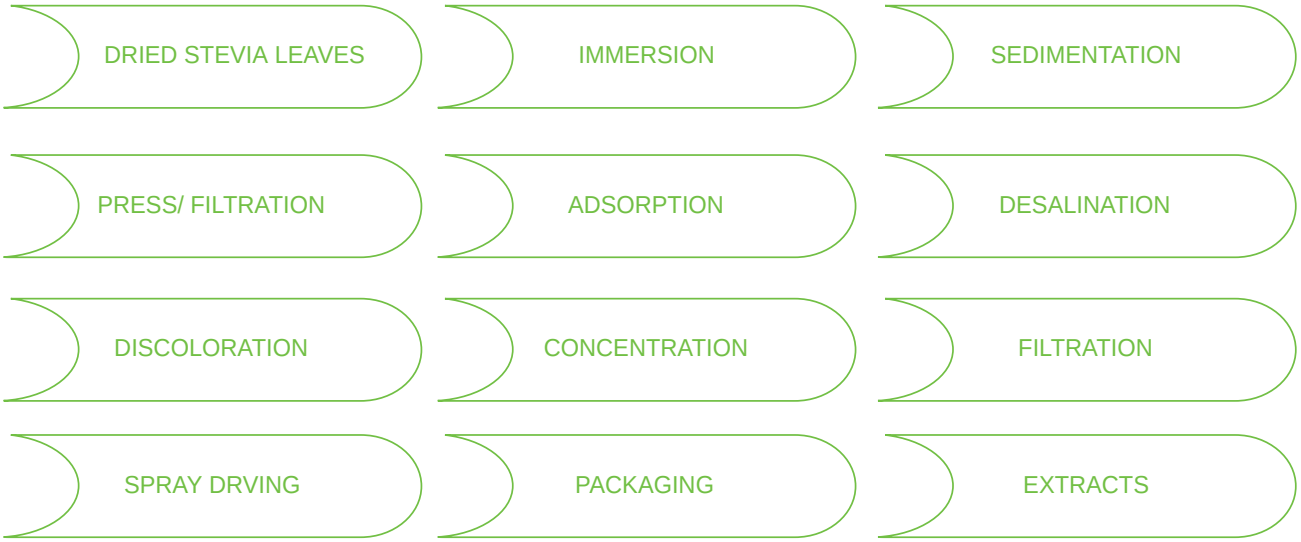
The association in Japan also applied to place Stevia into the JECFA agenda (Joint FAO/WHO Expert Committee on Food Additives) that met in Switzerland in June 2004. The fact that the JECFA Committee recognized Stevia as a safe product may help with consumer acceptance. As mentioned earlier, the import price of raw materials has not been consistent, which may cause some uncertainty for Japanese processors. They need a stable supply in volume, price and quality.

4.4 Production Processes

Since the first entry into Japan's market in the 1970s, extensive R&D has investigated its breeding, cultivation, processing/reprocessing methods, and its safety. The farming and processing has moved to China due to the lower associated production costs. Presently most Stevia marketed in Japan is imported from China as semi-processed Stevia extracts, but because of the quality requirements in Japan, e.g., purity or the content of sweetness components, foreign materials, moisture content and microbial contamination, almost all Stevia extracts imported from China are reprocessed to refine the extracts.

The members of the association have know-how for reprocessing imported Stevia extracts to meet Japanese quality standards. Two companies (Toyo Sugar Co., Ltd. and Nippon Paper Chemicals Co., Ltd.) reprocess the imported extracts by using a special enzyme treatment technique to produce Alpha glycosiltransferase-treated Stevia, which was patented by the Hayashibara Company. Others companies only reprocess and blend with other ingredients depending on the applications. The refining or reprocessing techniques of imported Stevia extracts are not separately disclosed but it is assumed to be very similar to the process mentioned below except membrane or ion exchange resin technique for sweetness and taste adjustment. The purpose of the enzyme treatment is to improve the taste of the finished products.

Chinese Extracting Process of Stevia



The following specifications for Stevia extracts and enzyme-treated Stevia were agreed to by the members of the Japanese Stevia Association and discussed at the JECFA meeting in Switzerland.

The Japanese Specifications for Stevia Extracts

For Stevia extract:
Sweetness of the four components: higher than 80 percent;
Dry matters: higher than 94 percent (1 g at 105° C for 2 hours);
Ash: less than 1 percent (1g);
Heavy metals: less than 10 micro g/g as Pb;
Arsenic: less than 2 micro g/g as As2O3;
Sweetness components are analyzed by HPLC.
For Enzyme–treated Stevia:
Sweetness of the four components: higher than 80 percent;
Dry matters: higher than 94 percent (1 g at 105° C for 2 hours);
Ash: less than 1 percent (1g);
Heavy metals: less than 10 micro g/g as Pb;
Arsenic: less than 2 micro g/g as As2O3;
Sweetness components are analyzed by GC.

4.5 Supply from China

Almost no leaves are currently imported into Japan, but the processors do not want to say that they are not presently trading leaves. In order for other Stevia supply countries to compete with the raw materials from China the price/quality is critical. Dried Stevia leaves belongs to tariff code 121299300 (tariff rate is 5 percent for standard and 3 percent for WTO countries), and Stevia extract belongs to 293890000 (tariff rate is 4.6 percent for standard and 3.9 percent for WTO countries). There is no import quota or import limitation for both products from Paraguay into Japan.

The price of imported Stevia extracts from China was about 14 to 15 US$/kg C/F until early 2003 but recently the price has gone up over $30, even $33. They expect the price will come down again to the mid $20's when the next crop becomes available. Currently association members are facing a difficult time caused by this very high price for raw materials because they cannot increase the price to the customers as it would allow for the competition to enter the market with lower prices, or other sweeteners.

The Two Main Suppliers of Stevia from China

Supplier #1 from Shandong Province

Supplied extracts to Association members
Supplied to Japan: 240 MT in last 3 years
Sweetness components 90% (5 components total=
Stevioside, Rebaudioside-A, Dulcoside-A,Rebaudioside-C and Steviolbioside)
Moisture content: 4 % max
Microbial: Total bacteria counts 100 cfu/g max
Yeast/Mold: 50 cfu/g max
Total Coli forms: negative
Total Coli: negative
Salmonella: negative
Appearance: White fine granule
Price: US$29.5/kg CIF or RMB260/kg FOB Qindao

Supplier #2 from Shandong Province

Supplied extracts to Japanese trading companies
The amount supplied to Japan
40 MT in 2001, 48 MT in 2002, and 56 MT in 2003
Specifications: There are 4 products. More than 90% sweetness products and more than 95% sweetness products
Moisture: less than 4 %
Foreign materials: less than 2/g
Microbial: bacteria less than 100/g
Particle size: 80 mesh pass
Price: RMB260 to 450 /kg depending on the specification
Zhuhai Stevia Science Development Co., Ltd.,
Following specification is obtained from Chinese Web site
TEL 0756-3226318
FAX 0756-3226319
E_mail:info@zhstevia.com
http://www.zhstevia.com

Section 5

5. Prospective Market Opportunities in the United States

5.1 Introduction

The U.S. market is probably the most dynamic and is in the process of transforming itself into the largest Stevia market in terms of sales volume. In this section, the specific recommendations to the Paraguayan companies for capturing this market can be grouped in the following points:

- Focus on existing markets
- Improve Paraguay's competitiveness
- Educate consumers
- Work with government agencies and organizations on the laws impacting Stevia sales

By working on these objectives we believe that Stevia production in Paraguay can rapidly increase and accomplish the objectives outlined.

5.2 Capturing the Market

The tendency in looking at a market is to look at the largest potential market and to determine how best to achieve sales in that market. In the case of Stevia the largest market is in consuming Stevia as an ingredient used to sweeten products ranging from soft drinks to ice cream and soy sauce. Though this is potentially the "greatest" market for Stevia, in most countries, it is not currently an available and open market.

Most countries prohibit Stevia as an ingredient or sweetener for other foods. However most major markets allow Stevia to be marketed and used as a dietary supplement. Due to this fact, Stevia can not be sold in bulk to industrial markets (sweetener), but rather is sold in specialty stores as a niche product. The U.S. market alone is greater than US$20 million.

In the long run, for Stevia to achieve its greatest potential, it needs to be legally used as an ingredient, as a sweetener. The Stevia industry must continue to focus on this long-term potential market, however, using the market currently available as a stepping stone to changing the laws may be the best means of opening this potential market.

Paraguay currently produces 500 tons of Stevia leaves. It was also determined through discussions with regional companies, that they alone have a current demand for more than 1,000 tons of Stevia leaves. With the support of these regional companies, the current production could nearly double without an increase in marketing effort or changing any domestic or international food laws.

Furthermore, a review of the U.S. industry determined that China is by far the largest supplier to the U.S. market. A review of the U.S. Stevia market illustrates that the U.S. importer associates Stevia with China, not with Paraguay. Therefore, it is important that Paraguay works to establish its reputation as a supplier of quality Stevia. When asked why various importers purchased from China, we received answers ranging from quality, to price, to ignorance of the suppliers in Paraguay.

Existing markets do not require efforts to change laws or extensive consumer education but rather focus on making Stevia from Paraguay competitive in the world market and increasing production to meet domestic demand.

A search on the Internet search engine Google for Stevia finds 295,000 hits. While adding the word “Paraguay” to the search hits are cut down to a mere 5,300. This is a drop out rate of 98 percent of the Web sites that have Stevia as their primary subject that are not associating Paraguay with Stevia in their site. When you add the word “China” to the Stevia search you get a return of 26,800 sites, nearly 10 percent of the Stevia sites associate China with Stevia while only 2 percent of the sites associate Paraguay with Stevia.

This clearly illustrates that there is significant interest in Stevia in the United States. As another illustration we learned that The King County Library (Seattle, Washington) has 15 books on Stevia and cooking with Stevia. When we checked availability we found that all of these books were checked out and there were waiting lists. Some of the lists had as many as five people waiting for the book – another testimony to the interest in Stevia.

When doing a search on the term “Stevia Sales,” Google returns over 10,000 hits. When adding the name “Paraguay,” this drops to only 587, which again reflects a very small percentage of consumers associates Stevia with Paraguay. When adding the name “China” the returns are 902, nearly double that of Paraguay and close to 10 percent of the total when simply searching for “Stevia Sales.”

If Paraguay is going to compete with China, and other countries, in Stevia production it will need to educate the consumers that Stevia “is” from Paraguay, just as wine is from France, cheese is from Holland, coffee is from Colombia and kiwi is from New Zealand.

There is no question that Stevia captures interest on a global basis. The key for Paraguay is to: a) determining a strategy to capture a reliable and loyal market share and b) pursue the defined strategy.

5.3 The U.S. Market

According to businessman Steve May: “We estimate the retail table top market for Stevia [in the United States] in 2003 was approximately $20 million to $22 million and growing at 40 percent per year.” This entire sales volume falls within the existing FDA regulations. These products are marketed as dietary supplements and come in the form of pills, powders, liquids and herbal teas. Wisdom Natural Brands (formerly Wisdom Herbs) has a 53 percent market

share while their nearest competitor is currently at 17 percent market share. Below the Wisdom of Natural Brands there are several brands with markets ranging from sales in natural food stores to mail order to Internet sales in virtual stores. For instance, there is an orange cream soda sweetened with Stevia, low-carb and natural, called Terra Soda. Another product is launched with a formula of ecomarketing, through a Web-based retailer and wholesaler with their product originating in Peru and utilizing the social conscience marketing program to provide an image of saving the rainforest through purchasing their products.

Some Stevia Suppliers in the United States

Wisdom Natural Brands 2546 W.Birchwood Ave, Suite 104 Mesa AZ 85202 United States	+1 (800) 899 9908 +1 (480) 9211373 Vea el sitio Web www.wisdomnaturalbrands.com
Stevia from China Empero`s Herbologist 301 East 45th Street Suite 12 A New York, NY 10017 United States	+1 (212) 9229066 +1 (212) 8084832 fax Vea el sitio Web www.emperorhebologist.com
Stevia from Australia Good Sugar Substitute	See the Website www.goodonu.com
Sellers of Stevia plants Herbal Advantage Route 3, Box 93 Rogersville, MO 65742 United States	+1 (800) 7539199 + 1(417) 7533999 herbal@dialnet.net www.herbaladvantage.com
NuNaturals 2220 West 2nd Avenue #1 Eugene, OR 97402 United States	+1 (800) 7534372 See the Website www.nunaturals.com
Stevia from Canada Stevia Canada	See the Website www.steviacanada.com
Stevia LLG – Brand Sweevia P.O. Box 80253 Valley Forge, PA 19484 United States	+1 (888) 8783842 See the Website www. sweevia.com
Amazon Herb Company	See the Website www.rainforestbio.com
Terra Soda Orange Cream	See the Website www.sodaking.com

Wisdom Natural Brands was founded by James May in 1982, and today it manufactures and markets more than 50 products through 10,000 natural foods retail outlets and grocery chains throughout the United States and Canada. In addition, Wisdom Natural Brands supplies raw materials to other manufacturers as well as private label product formulations. Essentially the firm introduced and marketed four unique herbs in multiple formulations: YerbaMate, Pau d'Arco (Lapacho), Stevia and a blend of herbs for cold and flu symptoms called Symfre. During the tenure of Jim May's son Steve May, the firm changed its name to Wisdom Natural Brands and developed new branded product lines, including SweetLeaf™ Stevia, which is the number one selling Stevia brand in North America.

Products of Wisdom of Natural Brands

Product	Ingredients	Packs	Description	
Sweet & Slender® Natural Sweetener	Frutafit® Inulin Fiber (FOS), Stevia Extract (standardized to a minimum of 90%).	2.82 oz shaker 1.75 oz packets	Promotes fat burning, low calorie, low glycemic, use in cooking and baking	
SteviaPlus® Fiber Packets and Shaker	Frutafit® Inulin Fiber (FOS), Stevia Extract (standardized to a minimum of 90%).	50g packets 4 oz shaker	#1 selling Stevia product in America, zero calories, zero glycemic, all natural	
SteviaClear™ Liquid Stevia	Purified Water, pure Stevia leaf extract standardized to a minimum of 90% Steviosides including 40% Rebaudioside A, Grapefruit Seed Extract	120 ml 60 ml 6 ml (travel)	No alcohol, no glycerine, concentrated liquid	
Stevia Extract Powder	100% pure Stevia leaf extract standardized to a minimum of 90% Steviosides including 40% Rebaudioside A	25 g 10 g	300 times sweeter than sugar, pure premium quality Stevia extract, use for baking and cooking, 25 g bottle = almost 17 lbs of sugar, zero calories, carbs, safe for diabetic.	

Product	Ingredients	Packs	Description	
SteviaTabs™ Stevia Extract	Stevia extract, sodium bicarbonate, citric acid, lactose, magnesium stearate	100 mg each	SteviaTabs™ Stevia extract will dissolve in hot or cold liquids, adding quality nutrition with an intensely sweet flavor without sugar or artificial sweeteners. It's calorie-free and safe for diabetics and hypoglycemics.	
Stevia Concentrate Dark Liquid	Premium Quality Stevia Leaves (Stevia Rebaudiana Bertoni) in Pure Water (4:1 concentrate)	60 ml 6 ml (travel)	This product is made by concentrating nutritious, whole Stevia leaves in pure water by a special cooking process. Contains no alcohol or chemicals.	
HoneyLeaf™ Stevia Leaf Powder	Premium Quality Stevia Leaves (Stevia Rebaudiana Bertoni)	1.8 oz	It contains no calories and may help suppress growth of some oral bacteria that cause dental cavities	

5.4 The Competitiveness of Stevia from Paraguay

For Paraguay to increase its economic returns on Stevia, it needs to be competitive with products available from other markets. In order to market a product effectively Paraguay needs to answer the question: "why in the world would we buy your product over every other opportunity we have in the world?" It is clear that the Stevia industry in Paraguay does not have an answer to this question. Paraguayan entrepreneurs need to change this so that they can effectively compete in the world market.

A product has an advantage when it can claim superiority in one of the following areas, a) price, b) quality, c) image, d) service, e) relationship and f) minimizing or eliminating risk for the buyer

Often the "comparative advantage" can be a combination of each of the above factors with no definite advantage in a single element but a solid performance in all areas of consideration. In the case of Stevia from Paraguay, this study believes that the combination of strengths is going to be the best way to achieve an overall advantage.

China consistently offers considerably lower prices on crystals and it has an image of being "the" source

for exporting Stevia. “Paraguayan companies do not effectively market their product” indicates that customer service is not in the favor of Paraguay. Relationships, the final element when considering an advantage is also to the advantage of China where they have existing business relationships and joint ventures with Japanese buyers and other major global buyers.

5.4.1 Improving the Price

Price is often the first, and occasionally the only, reason to purchase from one supplier over another. It is going to be difficult for Paraguay to obtain an absolute advantage on price given several factors:

- China’s economies of scale given their current level of production
- Stevia in some form or another can be produced in several geographic locations
- Logistics costs associated with obtaining Stevia shipped from Paraguay
- Inefficiencies in agricultural production in Paraguay
- Business environment discourages foreign investment in Paraguay

According to a statement of Steve May, “the price [of Chinese leaves] in large quantities would be $0.79/kg in "bad" harvest times (i.e. relative shortages) and $0.55/kg in good or normal harvests. This is FOB San Francisco, for tonnage quantities. We pay a little under $0.70 for Paraguayan leaf FOB Asunción. Shipping by sea would add about $0.30/kg.”

Given these factors, and others, we suggest that Paraguay not focus on obtaining the best price, but achieving a competitive price, that when coupled with strengths in other areas will make buying Stevia from Paraguay “the right choice.”

5.4.2 Quality of Stevia from Paraguay

To date it has been difficult to compare end products made from Stevia leaves cultivated in Paraguay with that of other countries because they are not sold on the industrial market, but rather as consumer products. However there have been studies comparing the glycosides content, thus the purity and quality, of Stevia concluding that the products made from Stevia leaves cultivated in Paraguayan are better (see section 2).

Furthermore, it is important to assess the quality of the leaves. According to May (2001) “Good quality Stevia leaves, whether whole, cut and sifted or in tea bags, are about 30 times sweeter than sugar and have no calories. The best quality leaves are imported from South America and Mexico, and are about 12 percent to 13 percent Stevioside. The poorest quality, but most ample supply, is currently coming from China, where the leaves contain only about 5 percent to 6 percent Stevioside. A simple taste test quickly demonstrates the difference.”

> Paraguay could overcome the current economic disadvantage by: (1) using currently available superior plant material already possessed by the Paraguayan government to grow better tasting and higher yielding raw material; (2) utilize new extraction technology already available for acquisition or develop new methods; (3) market a premium, branded finished product that would contain and communicate superior value to the consumer (i..e. “Equal” still commands a premium over generic aspartame in both table top and ingredient markets); (4) further exploiting the agricultural advantage that allows Paraguayans to use a single plant for approximately 15 harvests over 5 years versus a single harvest for Chinese or North American production; (5) initiating revisions to labor, tax and investment regulations that make doing business in Paraguay more favorable than competing nations.
>
> Steve May, Chief Operating Officer
> Wisdom Natural Brands®
> www.wisdomnaturalbrands.com

5.4.3 Image of Stevia from Paraguay

The image of Paraguayan Stevia in the world market is one of unknown quality. This image can be easily turned into the favor of Paraguay. In this case the discussion of "image" relates to more than the image of the product. It encompasses factors in the following areas:

- Image of the quality of the product
- Image of the company selling the product – their strength, integrity and experience
- Image of the individuals within the company selling the product – their knowledge, integrity and personality
- Image of the country from which the product is produced and sold and their business ethics and understanding of the business
- Product shipping, packaging and marketing image
- Image of outside factors ranging from risk, shipping lines and banking relationships

Image is the easiest influenced aspect of the decision points when considering if a buyer should purchase your product over any other available to him in the world. Image is also the most difficult to gain back once an image is tarnished by market actions that conflict with the existing image.

Advertising agencies are often used to improve images, however, they are not as essential as common sense in image improvement. For example, an image of poor marketability can be changed by an improved label, and the image of poor service and business understanding can be improved by providing immediate service and customer feedback.

The image of Stevia from Paraguay is discussed throughout this document as it is the first step in achieving a competitive advantage as discussed above. This can, and should, be done on an industry and company level in order to achieve the greatest results.

5.4.4 Developing a Service Advantage

Providing good service is closely tied with image as discussed above. Good service results from paying attention to business, knowing that the customer is always right and communicating honestly with the customer.

A service advantage is often an individual company factor, however, a bad service image of one company can impact the entire industry. Therefore, it is critical that all companies involved in the industry understand that their actions impact the image of all in the Stevia business in Paraguay.

5.4.5 Advantages of Developing Relationships

Buyers are people and they want to work with people that they enjoy working with and can trust. Therefore it is critical that a trusting personal relationship be established between the exporter and the importer. This can be done on a face to face basis; however, an actual meeting is not always essential. Many business contacts are maintained through the Internet. A strong business relationship is built upon honesty, therefore, maintaining an honest and open business relationship is essential.

A strong relationship between businesses is based upon trust, and as such it should be treated with the same high level of communication and commitment. It is always better to communicate "too much" than to not communicate with your customer. Building a strong relationship requires time since love at first sight is seldom the case in the business world; patience in this area is critical, however a competitive advantage in a relationship can be established, which will often overcome weaknesses in the other areas of the buying decision process.

5.4.6 Minimizing or Eliminating Risk for the Buyer

Buying a product from a new source is always a risk for buyers. It is a personal risk if they make the wrong decision because they lose their job and money. It is a business risk if a new supplier cannot perform, or the buyer's company cannot perform or meet customers' needs.

Therefore, it is essential that the buyer and his company have minimal risk in buying product. Though it is impossible to eliminate all risks when buying product, some can be minimized through having strength in each of the decision points listed at the introduction of this section.

It is critical to understand the risks the buyer faces. Paraguay can address these risks through communications with the customer and advise them how businesses can minimize their risks. For example, if quality control is a risk, provide customers with a diagram of the quality control system. Having Hazard Analysis and Critical Control Point (HACCP) or other internationally recognized quality control certification is another means of providing a level of comfort with for customers who know that HACCP helps minimize quality risks. Businesses address customer concerns by knowing risks associated with buying before closing the deal.

In the case of Stevia from Paraguay the risks to a new buyer include:

- New supplier presents unknown challenges
- Unrecognized quality raises quality concerns
- Inexperience of importers in dealing with Paraguay
- Shipping and logistics limitations – availability of container space
- Unknown customer acceptance toward product from Paraguay
- Other company specific challenges

If Paraguayan entrepreneurs can answer these questions, they stand a better chance of success

being prepared as opposed to being surprised when these questions arise.

5.5 The Media Kit

To achieve the greatest market potential for Paraguayan Stevia, it is essential that companies in Paraguay improve their production efficiencies and focus on marketing Stevia from Paraguay as a premium product on a global basis. This requires that the Paraguayan Stevia industry have a visual presence in the markets they are targeting. This presence can be an individual company presence or an industry presence. Although a single company could accomplish the same objectives, their rewards would be shared by others in the industry that did not support the efforts, potentially producing frustration by the company that invested the time and money in marketing "Stevia from Paraguay."

It is often difficult to get competing companies to participate in a trade association, however, if companies can see the individual benefit from cooperation they can justify their participation. It is highly recommended that the association include all processors, exporters, and growers in order to provide a forum for all to participate. The association can enforce membership by issuing a grade certificate supported by the industry, government and buyers. By providing a "grown at home – Paraguay" seal on product from Paraguay that meets the standards set by the association they can force others to join and support the association. If products that receive the "seal of quality" from the association receive a premium then others will be economically motivated to join in order to receive a premium for their production as well. The first objectives of the association of Stevia industry should be the following:

- Establish and adopt standards and grading for Stevia products from Paraguay. Include in this effort the grades and associated "quality seal." Compare these standards with those of other origins and publish a comparison document that clearly shows the advantages of working with "certified Stevia from Paraguay."

- Develop and disseminate a media kit that covers all aspects of Stevia. The contents of this media kit are to provide technical information, history, recipes, health data, technical specifications and other factual and historical information relating to Stevia produced in Paraguay. It should focus on the benefits of Stevia, but specifically focus on the benefits of Stevia from Paraguay. It should provide the reader with sufficient information to dig as deep as they would like to answer their questions on Stevia. The "target market" for this media kit are journalists who will write about Stevia and promote its use to a wider audience. This list should include all major newspapers, trade journals, gourmet magazines, health magazines, diet magazines, and fashion magazines in target markets.

- By providing this information, the hope is that these influencers of the diet in the target market will publish reports which stimulate interest. By stimulating interest the demand will increase and more retailers will be forced to carry Stevia products to meet the demands of their customers. The caution here is that unless done effectively the media kit will stimulate demand for "Stevia" not for "Stevia from Paraguay."

- This media kit should take the form of a CD Rom and a Web site. The traffic to the Web site can be generated by the CD, news articles and direct e-mails to targeted groups of customers, importers, and regulators.

- Develop a Paraguay Stevia Web site that provides full details on Paraguayan Stevia. This Web site should also provide a venue for Stevia leaf and Stevia production sales through a bulletin board or other trading type of marketing tools.

5.6 Creating a Marketable Difference

For Paraguay to compete businesses need to develop, and quantify, a difference between their production and that of other countries where labor, logistics or other resources are less expensive or other competitive advantages already exist.

A good example of an industry that has done this is the U.S. orange juice industry in Florida. While many origins of the world have lower costs in producing analytically identical orange juice to that of Florida, including a lower cost in production and shipping, the State of Florida has built an image over Florida orange juice that consumers prefer and are willing to pay a higher price. The producers of orange juice in Florida, as an industry, adopted a program which states if product is "100 percent Florida Oranges" or "meets Florida standards." They state that "when you see the Florida Sunshine Tree, you know what's inside is produced from oranges or grapefruit grown only within the state of Florida."

Does this mean that it is better than orange juice that is not 100 percent from Florida? Probably not, but to the consumers it does make a difference. If a consumer perceives a difference in products offered on the market, then the difference exists from a marketing standpoint. Product produced exclusively with Florida citrus has the Florida Sunshine Tree,

while product produced with Florida citrus blended with other oranges has the Florida Seal, signifying it meets Florida standards but not with 100 percent Florida citrus.

Another example of this type of perceived difference in the U.S. market is the "house" or private label business. In the United States there are now only a handful of canners of corn and fruit products.

These packing facilities often have their own brand which they market, however, work to fill their production capacity with other brands which they do not own or market. For example, Del Monte, the number #1 brand of canned vegetables in the United States, will also pack product under retailers' brands — thus increasing their production capacity without increasing their marketing or associated costs. Del Monte then spends millions of advertising to promote their brand as a premium brand over retailers' brands, though technically the product may be identical from the same plant and with the same specifications. Del Monte works to promote a premium for their brand through an image, not always supported by a quality difference.

If Paraguay can create such a difference in how consumers conceive the "original" of Stevia produced in Paraguay against that of other origins that would be to their advantage. To achieve such designation, standards would need to be set and monitored by the industry, or marketing companies inside of Paraguay. The efforts in creating a "difference" in Stevia from Paraguay versus that of other origins can be accomplished through the Stevia association or an individual company undertaking the actions discussed before.

5.7 Growth Potential of Stevia from Paraguay

The history of Stevia lends itself well to being a major crop produced and marketed from Paraguay. The history and culture of Stevia in Paraguay has centuries of production and use. This history can be used to the advantage of the growers and marketers of Stevia from Paraguay. These centuries of both cultivated and natural production of Stevia have helped ensure that the genetic varieties of Stevia available in Paraguay are suited for the local climate and soil conditions. The tradition of Stevia production and consumption provides for a cultural base from which to produce Stevia. Where Stevia cultivation and processing is new to other countries, it is well established in Paraguay. This history can be utilized as a competitive advantage if built upon effectively.

The current area dedicated to cultivating Stevia in Paraguay is 750 ha. From this total it is estimated that the San Pedro area has around 300 to 400 ha. With average family production of around .25 ha, this equates to roughly 1,600 rural families currently involved in Stevia cultivation. This number of families would represent only the 0.5 to 0.9 percent of the total number of families in the San Pedro area. Currently most of these families are involved with the cotton crop as their primary source of income. A study would need to be done to compare Stevia financial yields versus cotton yields in order to determine the feasibility of switching from cotton to Stevia, however, Stevia appears to be a viable option for these growers.

Considering the above mentioned situation, it can be assumed that there is a potential for growth, both to increase the economic activity (better income) and employment stability (more employm ent) through increased production of Stevia.

To be effective the increase of Stevia production needs to be driven by an increase in the demand for the product. Given current market conditions, regional companies will buy the additional production of Stevia leaves, until it reaches a total of 1,500 hectares of production. Currently the regional companies have a demand for finished products at this level and their plant could produce at this level without additional investment.

If Paraguay is successful in achieving this increased production of 1,400 ha with an average production of 2,500 kg/ha it would generate an increase of around US$2 million in rural income while providing an increase of employment efficiencies of around 5,600 rural families.

If the 1,500 ha is cultivated, enough to fill the capacity of the regional companies, the need for additional processing capacity would be required. At that time a Stevia processing factory in Paraguay could be economically justified, thus adding additional revenue and employment to Paraguay.

Paraguay Vende has not done a complete study on

the economics or efficiencies of production or processing of Stevia in Paraguay. The team has however talked with many in the industry who have expressed concerns about the production efficiencies in Paraguay and processing efficiencies in Brazil. Under most circumstances it is going to be difficult for Paraguay to compete with China on a commodity basis, in the target market of Japan as not only does China already possess economies of scale as a competitive advantage and produces a higher volume. However, China is known for not valuing labor when it comes to an export product. Therefore, it will be difficult for Paraguay to compete even when they are able to neutralize the economies of scale issue. The freight distance to the primary market of Japan and the cultural similarities and business ties between Japan and China also provide an advantage to China in the Japanese market (see section 4).

Paraguay Vende has determined that Stevia production on a hectare of land can generate a "net income" form $1,300 to $1,500 per year. With a land cost in the current areas of cultivation of $1,000 per hectare, it appears that, at the current market prices, Stevia production is a business venture that pays off the investment in land in a very short period of time (see section 2). Considering that most Paraguayan farmers already own their land this income is even more significant.

In comparing returns on farmland ownership in the United States, an Iowa State University study shows the period 1992-2002 had an average return of 12.2 percent of the value including a percentage change in land value average of 5.74 percent for a net return on the use of the land of about 6.5 percent. What this means is that in the U.S. farm returns pay off the land in about 10 years, while Stevia returns in Paraguay can pay off the land in 1 to 2 years.

Paraguay Vende has not completed a comparison of the returns on Stevia versus other crops in Paraguay. Given the return in 1 to 2 years, this far exceeds the return on agricultural lands in the United States where, without an increase in the value of land, the returns on farming require an average of 15 years to cover the cost of the land. This economic analysis would encourage investment in Stevia farming in Paraguay and further economic research and investment prospectus should be developed to pursue investment in this area. With this level of return and as foreign ownership of land in Paraguay is assured, U.S. investors and others could be attracted to Paraguay agriculture for implemented contract farming of Stevia.

Paraguay Vende also realizes that there are other factors which influence both the cost of land and the rate of paying off the land including interest rates, availability of cash and loans, stability of currency. However, the team believes that the above figures, coupled with the cost/benefit analysis prepared in the section 2 provide sufficient information to firmly state that Stevia production in Paraguay can be profitable and in fact the returns (sales price of leaves) could be reduced and Stevia production would still prove to be a good investment.

If additional land were to be placed into Stevia production, it would result in increasing supply and lowering the price of the Stevia leaves while providing reasonable returns to the grower. The resulting lower raw materials price (resulting from additional supply of leaves) would allow the processor to produce more products, increase efficiencies and lower their cost due to two factors – lower raw material costs and increased efficiencies.

With the current demand of 1,000 tons of production from regional companies it could mean that a doubling of hectares would not result in a significant lowering of prices. Simply stated, production could double without demand increasing and prices could remain stable due to current demand.

Paraguay Vende realizes that the numbers used in these calculations are theoretical and that being an agricultural crop there are several variables that come into play when theory changes to reality, however, given the calculations, additional land can be placed into Stevia production at a profitable level. If demand for Stevia products from Paraguay increases as a result of enhanced marketing or competitive market factors, this effort will prove even more beneficial to the expansion of hectares.

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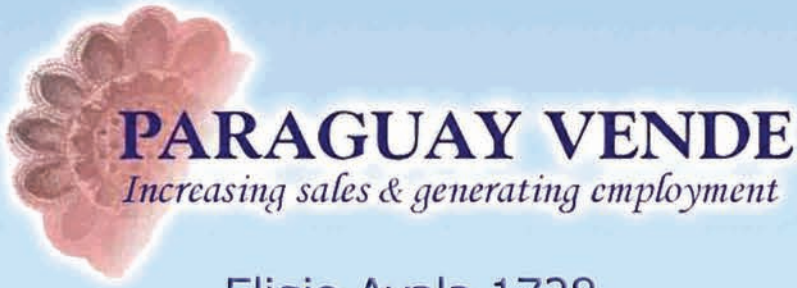

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