Market Surveys & Brief for Two Botanical Natural Products: Camu camu (*Myrciaria dubia*) and Sacha inchi (*Plukenetia volubilis*)

June 30, 2005

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Prepared for the Biotrade Programme - PROMPEX

i. Executive Summary

Camu camu and sacha inchi are two botanicals that have not yet reached their potential on the Californian or U.S. natural product markets. The market channels for which these botanicals have potential include the U.S. dietary supplement, functional food, cosmetic/ body care, and "sustainability markets."

Through interviews with manufacturers and distributors in the U.S. a key message that was pointed out was that both botanicals have supply issues that are needed to be overcome before they are able to reach significant demand in the U.S. market. Especially the large players on the market, such as Jamba Juice or Shacklee, will not have interest in these plants until supply issues are developed further. Supply concerns include lack of significant supply (especially of sustainable source), lack of consistency, and lack of trustworthy trade relationships in either plants. Also, as camu camu will be competing with other natural sources of vitamin C, it will need to be price competitive with, for example, acerola. Because sacha inchi may be competing with other essential oil products, it may also run into problems because the prices of competing oils (such as DHA from fish or algae, or flaxseed oil) is relatively low. Instability of the Peruvian government was also indicated as a concern for large players in assessing the potential for strategic partnerships with Peruvian companies and investments in process technologies in Peru.

Camu camu may have product development potential in many areas of the natural products market, by far the most popular being as a source for natural vitamin C. In this respect camu camu is seen as promising for dietary supplements, in which it is already present on the market. Another area of promise lies in functional foods, although there are is a significant concern of whether it may considered GRAS (Generally Recognized as Safe). Without a clear answer to this question, none of the large companies in the functional food or food industry will use this botanical in products. Another area for which it has promise, and some current application, is in cosmetics and body care products, such as lotions and creams. Again, the interest for these formulations is mostly as a new source of vitamin C. One exciting application that was pointed out by a leading industry innovator is the potential for the development of the leaf for its vitamin C content—perhaps as an herbal tea. Again, the question exists whether there is enough toxicological data to support this application.

Sacha inchi is virtually unknown on the U.S. market, although there are currently several interests in research and development, as can be seen in the patents being applied for in the U.S. Patent and Trademark database. Its main application for which is holds potential is as a source of beneficial fatty acids (oil) content. As it has a high amount of omega-3 fatty acids, there is potential to capitalize in the rising demand for such oils on the U.S. market

due to the recent granting of a health claim by the U.S. FDA. Sacha inchi also has many hurdles to its development, including quantity and consistency of supply and lack of long term toxicological data.

Both plants seem to have their immediate potential with the smaller and medium sized companies in the natural products industry, who are more likely to develop products with such innovative and perhaps risky raw materials. However, as more research is conducted into application technology, supply consistency and agricultural cultivation, and clinical and toxicological reports, the demand is sure to rise in the future, as there are many market channels for which development may open a demand.

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iii. Introduction and Methodology

Camu camu and sacha inchi are two botanicals that produce natural products that are of interest for foreign trade with the Californian and larger national United States market. They are also of interest for supply development in response to a significant demand, potentially providing sustainable incomes to local and rural farmers and wild-harvesters, as well as commercial enterprises of Peru.

Camu camu is known for its identity of being the fruit with the highest amount of Vitamin C content. Although it has been on the dietary supplement market for many years in the U.S., it has yet to see its potential, and is unknown to many manufacturers. Although many have heard of it (and some of these companies even claim to carry it), most are not familiar with its potential applications or where to source it. It is a low-growing shrub found throughout the rainforest, mainly in swampy or flooded areas. As it is the highest in vitamin C content it is of interest to the natural product industry for applications calling for a natural source of vitamin C. It is also rich in iron, niacin, riboflavin, phosphorus, as well as other interesting volatile aromatics and phytochemicals.

Sacha inchi is for the most part unknown on the U.S. market. The Chancas Indians of Peru have traditionally used sacha inchi as a food crop. In Peru the oil is promoted for its edible oil extraction. Sacha inchi grows in highland

tropical rain forests of the Andean region of South America, and is mainly produced in West Africa and Central and South America. The seeds are valued for their high oil (49%) and protein (33%) content, yet they are not commonly known in the U.S. market. If GRAS status can be affirmed through traditional use, and the technology for extraction developed, there is good potential of this crop as an alternative protein powder for functional foods and dietary supplement use. Westmoreland et al. (2001) identified the water soluble (albumin) storage protein called IPA as the first plant protein to date that contains all the essential amino acids required by humans. It also has an unusually high content of tryptophan (44 mg/g) with a low content of phenylalanine. The oil is yellow to orange in color, and viscous. Approximately 35-60% of the seed is the oil content, which is 70% unsaturated.

This market survey and breif was mostly developed through desk research, with a major focus on business to business opportunities and information. Information was gathered through interviews with buyers, consumers, market experts and other relevant actors in the Californian and larger national market.

In order to perform the market surveys, initially companies were contacted from industry supplier listings for the two plants. As the information gathered from these source was still lacking, a more specific list of companies who are

direct personal contacts to EthnoPharm (the Preparer of this report) were contacted for interviews. Through both sources of interviews sufficient information was gathered to analyze the potential market and demand of both plants. The reasoning that the industry listed suppliers initially did not provide sufficient information is because many suppliers were unwilling to give competitive information to this project, and also because many of the listed suppliers were not suppliers of these two plants at all (as they had signed up to the list saying they carried the plants when in fact, they did not)! The specific questions that were asked in the company interviews were as follows:

- How much of X plant do you currently buy/sell?
- For which applications do you buy or sell it for?
- Where do you obtain your raw material?
- What kinds of specifications do you require and what kind of special manufacturing or proprietary process do you use?
- Would you be interested in getting in touch with Peruvian suppliers of these plants, or forming partnerships, and being listed for them to follow up with?

As an additional source of information for the preparation of this report, one trade show was attended in the given time period—the Northern California Institute for Food Technologists (NC-IFT) Exhibition in Oakland, CA in May of

2005. This show was mainly attended by food ingredient companies and also dietary supplement companies that sell botanicals into the food market.

As an additional source of information to provide insight into the type of applications and clinical support of camu camu and sacha inchi, two detailed research reports were prepared from the subscription only database, NERAC (see www.nerac.com). This is an important step, because the potential for development of these two plants into the natural products markets depends largely on the amount of clinical toxicological research that has been performed. Additionally, an idea of the type of applications of interest was researched through scanning the patents which have been applied for or granted for the two botanicals using NERAC and the United States Patent and Trademark Database (see www.uspto.gov).

1 Species Description and Product Definition

1.1 Camu camu (Myrciaria dubia)

1.1.1 Other Common Names: Rumberry

1.1.2 Trade Names & HS Codes: Camu camu is the most common trade name. There is no HS Code assigned to camu camu because it is not considered a commodity item.

1.1.3 Family: Myrtaceae

1.1.4 Synonyms: *Eugenia divaricata, E. grandiglandulosa, Marliera macedoi, Myrciaria caurenisis, M. divarticata, M. lanceolata, M. obscura, M. paraensis, M. phillyraeoides, M. riedeliana, M. spruceana, Psidium dubium*

Chart 1. The Camu Camu Fruit Split Open

Photo taken without permission from:

http://www.essentiallivingfoods.com/products-functional-food-camu-camu.html

1.1.5 Origin & Description:

Camu camu grows in black river waters of the Amazon, especially those courses that are abandoned called "cochas." The fruits are the common product of trade, and they are approximately 2 centimeters in diameter with a purplish skin and a yellow pulp. The fruit is astringent with various purported health benefits.

1.1.6 Chemistry:

Camu camu is becoming famous for its content of more vitamin C than any other known plant in the world. Camu camu has 30-60 times the amount of vitamin C than oranges. Camu camu also contains the amino acids serine, valine, and leucine, and important levels of beta carotene, calcium, iron, niacin, phosphorus, riboflavin, and thiamin.

1.1.7 Uses:

1.1.7.1 Traditional-

According to one database (produced by the commercial company called Rain-Tree), camu camu has never been documented for use as traditional medicine by the indigenous in the Amazon. As the fruits are sour, the indigenous people purportedly never cared for them much as food, either. In more recent years, however, camu camu has become popular in both Peru and Brasil as a juice, and also made into popsicles, ice creams and drinks.

1.1.7.2 Dietary Supplement/Functional Food/Cosmetic-

Camu camu is thought to have astringent, antioxidan, anti-inflammatory, emollient and nutritional properties. It has a great antioxidant power, as measured by its DPPH (1,1-dipehnil-2-picrilhydrazil) radical inhibiting activity which is said to surpass pure vitamin C and also trolox.

According to a well known nutritional personality in the U.S. (with a radio show on the East Coast), Gary Null, Ph.D., camu camu is useful for depression. He lists it as just #2 in effectiveness compared to all the botanicals on the market. (see: http://www.essentiallivingfoods.com/products-functional-food-camu-camu.html)

Another area for which camu camu may have potential in these markets is as a whitening agent for skin. Several patents have been issued for this application (see **Section 9.0**).

1.1.7.3 Industrial-

Non known.

1.1.8 Traded Products:

The product of commerce is the berry, or extracts and concentrates of the berry.

Common forms of commerce are

- 100% dehydrated powders standardized to 12-16% vitamin C
- atomized powder (with a 15% maltodextrin carrier) with 8% vitamin C

1.2 Sacha inchi (Plukenetia volubilis)

1.2.1 Other Common Names: Inca Peanut, N'gart

1.2.2 Trade Names & HS Codes: It is difficult to know whether sacha inchi or Inca Peanut are the trade names that dominate. There is no HS Code assigned to camu camu because it is not considered a commodity item.

1.2.3 Family: Euphorbiaceae

1.2.4 Synonym: Tetracapidium conophorum

Chart 2. The Sacha Inchi Fruit Split Open

(taken without permission from: https://ssl.kundenserver.de/shop.sunshine-seeds.de/index.html?d_11075_Plukenetia_volubilis34574.htm)

1.2.5 Origin & Description:

Sacha inchi grows in highland tropical rain forests of the Andean region of South America, and is mainly produced in West Africa and Central and South America. It is a legume that grows as a vine and has branched nitrogen fixing root nodules. It produces white pea-like flowers. After pollination the flowers develop into 4 pods each, and 4 seeds. Each seed has a nut-like coat.

Each seed (weighing 6.6 g) is a flattened and spherical in shape—about the size of a penny. Approximately 63% of the seed weight is kernal. The seeds are very bitter unless roasted or processed by heat. (FAO Pub; Westmoreland et al., 2001)

Sacha inchi is very closely related to the African oilseed Cumbaza (FAO).

1.2.5.1 Agricultural Production and Yields:

Sacha inchi is produced at the approximate yields of 2 tones of seed/Ha, and is hand harvested (FAO).

1.2.6 Chemistry:

The oil is yellow to orange in color, and viscous. Approximately 35-60% of the seed is the oil content, which is 70% unsaturated. The fatty acid composition of sacha inchi can be seen in the **Table 1** below. (FAO)

Table 1. MAJOR FATTY ACID COMPOSITION OF OIL(FAO)

Palmitic acid	4.4%
Stearic acid	3.2%
Oleic acid	9.6%
Linoleic acid	36.8%
Linolenic acid	45.1%

A new water soluble protein was isolated, purified and characterized in recent research. The interesting aspect to this protein is that its tryptophan content is unusually high (44mg/g), with a low phenylalanine content (9 mg/g). It is also highly digestible in vitro. It accounted for approximately 25% (w/w) of the defatted seed flour weight, and represented 31% of the total seed protein. This protein was called IPA (Inca peanut albumin), and was characterized as a 3S storage protein that is composed of two glycosylated polypeptides, with estimated molecular weights of 32,800 Da and 34,800 Da. It has a sugar content of approximately 4.8%. It is a basic protein with a pI of approx. 9.4 that contains adequate amounts of all the essential amino acids (as designated by FAO/WHO for the human adult) (Sathe et al., 2002). A sensitive immunoassay (ELISA) was developed in order to identify trace amounts of this protein in plants (Westmoreland et al., 2001).

A heat labile substance makes the seeds very bitter if they are not roasted or heat processed (FAO Pub).

1.2.7 Uses:

1.2.7.1 Traditional-

The Chancas Indians of Peru have traditionally used sacha inchi as a food crop. In Peru the oil is promoted for its edible oil extraction. (FAO)

1.2.7.2 Dietary Supplement/Functional Food/Cosmetic-

The seeds are valued for their high oil (49%) and protein (33%) content, yet they are not commonly known in the U.S. market. If GRAS status can be affirmed through traditional use, there is good potential of this crop as an alternative protein powder for functional foods and dietary supplement use. Westmoreland et al. (2001) identified the water soluble (albumin) storage protein called IPA as the first plant protein to date that contains all the essential amino acids required by humans. It also has an unusually high content of tryptophan (44 mg/g) with a low content of phenylalanine.

1.2.7.3 Industrial- Due to the drying properties of the oil, it has been considered to have potential for the manufacture of paints, varnishes and linoleum (FAO, Mensier).

1.2.7.4 Other- The cake after oil extraction has a good protein content, and may have potential for animal feeds (FAO).

1.2.8 Traded Products:

Expressed Oil

2 Market Characteristics of the product X derived from species Y: Imports and Exports

2.1 Dietary supplements

2.1.1 Definition and Regulatory Bodies that affect this segment

In the United States, dietary supplements or "herbs" are governed and defined by the Dietary Supplement Health and Education Act of 1994 (DSHEA).

2.1.1.1 New Dietary Ingredients-

One of the important considerations with the marketing of Sacha Inchi is that it is not listed in the Herbs of Commerce, AHPA (see: http://www.ahpa.org/bookstore_descriptions.htm). This means that it may have to be regulated as a New Dietary Ingredient in the United States. According to DSHEA, any product that was sold on the U.S. market before 1994 was essentially grandfathered into the regulations, and is allowed to be regulated as a dietary supplement. This means that those ingredients that have prior use in the U.S. are officially dietary supplements and their governance lies under the DSHEA. The easiest way to find this out for any particular herb is to look in a book that has officially been designated by the FDA, called *The Herbs of Commerce*, published by the American Herbal Products Association.

To this date, Sacha Inchis (or Plukenetia volubilis) is not listed in the *Herbs of Commerce*, and therefore is not automatically considered a dietary supplement in the U.S. This means that in order to be marketed in dietary

supplement formulations it needs to either be registered as a New Dietary Ingredient, or if there is proof that there were sales in the US before 1994 this would also suffice. In order to meet the requirements of the New Dietary Ingredient premarket notification (required 75 days before marketing the product), the company needs to provide the FDA with evidence that the ingredient will "reasonably expected to be safe."

For more information on the New Dietary Ingredient premarket notifications see:

http://www.cfsan.fda.gov/~lrd/fr041020.html

2.1.2 Overall Size and Growth of Supplement Industry

Natural product sales in the year 2002 have topped $34 Billion. In the 1990's in the U.S. many segments of the natural products industry were growing at double-digit figures, sometimes as much as 30%. The market in the U.S. has matured, and many companies have been feeling the crunch, but the retail market still remains a solid growth market at 8.3% for 2001. This is excellent when compared to the performance of the top 10 supermarket chains in the second half of 2001, as it was almost flat in growth at only 0.1%. The growth of natural and organic product sales in the food/drug/mass merchandisers increased 5.5%, and for the natural and organic product sales in retail and non-retail outlets increased 6.7%. In the year 2001, the top growth areas for supplement sales were for sports

supplements (at 13.7%), and Specialty Supplements (at 12.5%), including Ayervedic, hormones, and essential fatty acids).

According to another survey, the "Sports Nutrition & Weight Loss Market Overview" published by Nutrition Business Journal (www.nutritionbusiness.com), sports supplements totaled $1.74 billion in sales, with $120 million coming in from "hardcore" beverages, $1.52 billion in sports powders and $100 million from sports pills. Weight-loss pill sales came to $1.88 billion, and weight-loss supplement sales totaled $2.02 billion. All in all, the weight-loss supplement market figures came to $3.9 billion. This $9.9 billion sports nutrition and weight loss (SNWL) market represents 28 percent of the combined U.S. supplement and FF markets. (see: http://www.fitnessbusiness-pro.com/mag/fitness_pills_powders_bars/).

2.2 Functional Foods and Food Ingredients

2.2.1 Definition and Regulatory Bodies that affect this segment

In the U.S. "Functional Foods" do not fit into a legally defined separate area, and are therefore regulated as foods. This means they must be GRAS, or have a very strong traditional food/beverage use.

According to the "Sports Nutrition & Weight Loss Market Overview" published by Nutrition Business Journal (www.nutritionbusiness.com), the U.S. Nutrition industry produced $50 billion in sales in 2001. The functional foods

category (nutrition bars, sports and energy drinks, etc.) had 34 percent of these sales. Additionally, within this category, nutrition bars took in $1.38 billion (a growth increase of 21 percent over 2000) and drinks, $2.92 billion, for a total of $4.3 billion. (see: http://www.fitnessbusiness-pro.com/mag/fitness_pills_powders_bars/)

In the year 2001, the top areas of growth for organic foods were, Food service- 37%, Nutrition Bars- 35%, Snack Foods- 29%, Nondairy Beverages- 26%, and *Packaged Grocery- 23%.*

2.3 Cosmetics/ Personal Care

2.3 1 Definition and Regulatory Bodies that affect this segment

The definition of cosmetic under the law varies slightly between countries, but in general terms "cosmetic" means any article intended to be used by means of rubbing, sprinkling or by similar application to the human body for cleaning, beautifying, and for maintaining health of the skin and hair, provided that the action of the article on the human body is mild. The regulatory agency for cosmetics in the US is the Food and Drug Administration (FDA). The FDA does not require pre-market approval for cosmetics. The cosmetic product name and details of its ingredients are voluntarily reported to the FDA within 60 days of marketing. With the exception of color ingredients that require authorization for use, the FDA does not approve the use of any cosmetic ingredient, unless a safety problem

arises after it has been put on the market, in which case the FDA can take action. The FDA's budget for cosmetic safety surveillance is less than 1%.

Esseential oils (EOs) are the volatile, odorous oils that occur in certain plants. EOs are widely known for their scents and flavors, making the food flavor and fragrance (F&F) and aromatherapy industries among the biggest users.

In the year 2001 the top growth areas in natural personal care were Personal Care (including aromatherapy)-22%, Organic Personal Care-42%, Housewares-22% and Organic Housewares-66%.

2.4 Other Handicrafts made from these species

There have been no known handicrafts found on the U.S. market for either species.

3 Consumption Patterns and Trends

3.1 Camu camu

Although camu camu is not new to the U.S. market, it still has not reached its full market potential in the U.S. Many of the manufacturers that I talked with (including many of those that claimed they carried it in industry listings) had no knowledge of camu camu, but said they would carry it if there was

interest. Most had never even heard of camu camu, and had no idea what it was used for, or what kinds of applications to use it in. By far, its seemed that among those who did know of camu camu, it was known only for its vitamin C content, and for the claim of it being the highest natural fruit source of vitamin C. The main applications it is currently in use for are natural vitamin C dietary supplements. Although there is tremendous potential for its use in functional foods, they are much further behind in camu camu use because the food market is much more mainstream. There is much potential—but as yet very little use—for camu camu in beverages (especially functional beverages), and in other functional foods looking for a natural vitamin C or antioxidant label claim. As antioxidant fruit blends are currently popular in the US market, this also holds potential for camu camu. For more information on the potential markets, see **section 6.0** Market Access.

Additionally, there was simultaneously both interest and reservation that was expressed having to do with the natural sour flavor of camu camu. Traditionally this is a drawback to the use of natural fruits as a flavor on the U.S. market. Traditionally only lemon and lime have been the sour flavors on the U.S. market, and they have only been used in formulations with much sugar added to compensate. However, there have recently been two exciting new trends that have appeared on the U.S. market that show promise for camu camu as a flavor. First, although Americans have been extremely slow

in the past to accept new foods or flavors, this has been changing. The first fruit to show this change in American's attitudes was the introduction of the kiwi on the U.S. market. Since that time there has been a relative explosion of new foods and fruits on the market. Two recent examples are acaí and pomegranate. Although pomegranate has been sold in grocery stores for a long time, is has never been a popular fruit or flavor. Recently—along with the interest in antioxidants—pomegranate has become a new and exciting flavor and fruit juice in the U.S. Much of this has to do with strong marketing and promotion of the antioxidant research on pomegranates, along with the other phytochemicals in pomegranate that have shown health benefits on the U.S. market. Acaí is a Brazilian fruit that is just beginning to become known on the U.S. market. Again, much of its acceptance has to do with the antioxidant potential of the fruit, along with a good story of its other nutritional aspects—even though there has been little clinical proof to confirm these claims. Acaí also has a good flavor, and some of the companies that have been promoting it have also claimed for its sale to have social benefits to rural poor people. If such programs were designed properly for camu camu, it has an equal potential.

The other new trend on the U.S. market that shows potential for the use of camu camu is the recent introductions of other sour flavors on the U.S. market, such as key lime and tamarind. In the past three years, these flavors have become the "new hot" trends in flavors, and show the potential for

acceptance of new sour flavors in the U.S. market. Likewise, if camu camu was championed by one or two food companies, it may also break into the U.S. acceptance of a new sour flavor.

3.2 Sacha inchi

Currently, sacha inchi is virtually unknown on the market, and thus to my knowledge there is no consumption patterns or trends evident in California or the rest of the U.S. However, in my research and discussions with companies there is tremendous interest in the potential use of this plant in several markets. The main applications I have seen a potential use for are: as a source for new essential fatty acid/ dietary oils, tryptophan containing supplements, and protein powders and meat alternatives. For the cosmetics/body care markets there is also a potential for its use as a cosmetic ingredient, carrier oil or massage oil. For more information on the potential markets, see **section 6.0** Market Access.

Several companies have requested sample so that they may research its use in different applications and to be able to characterize the oil further. Until this is done, the true potential for applications will not be known.

4 Production

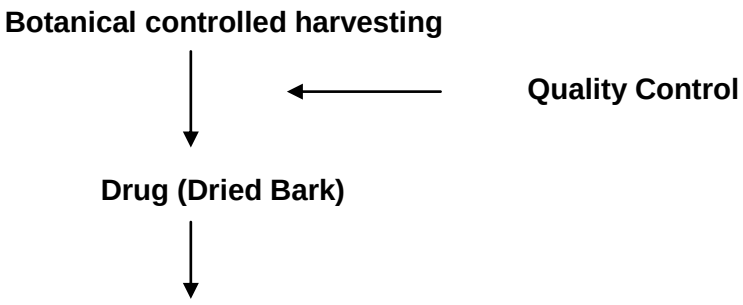
4.1 Camu camu

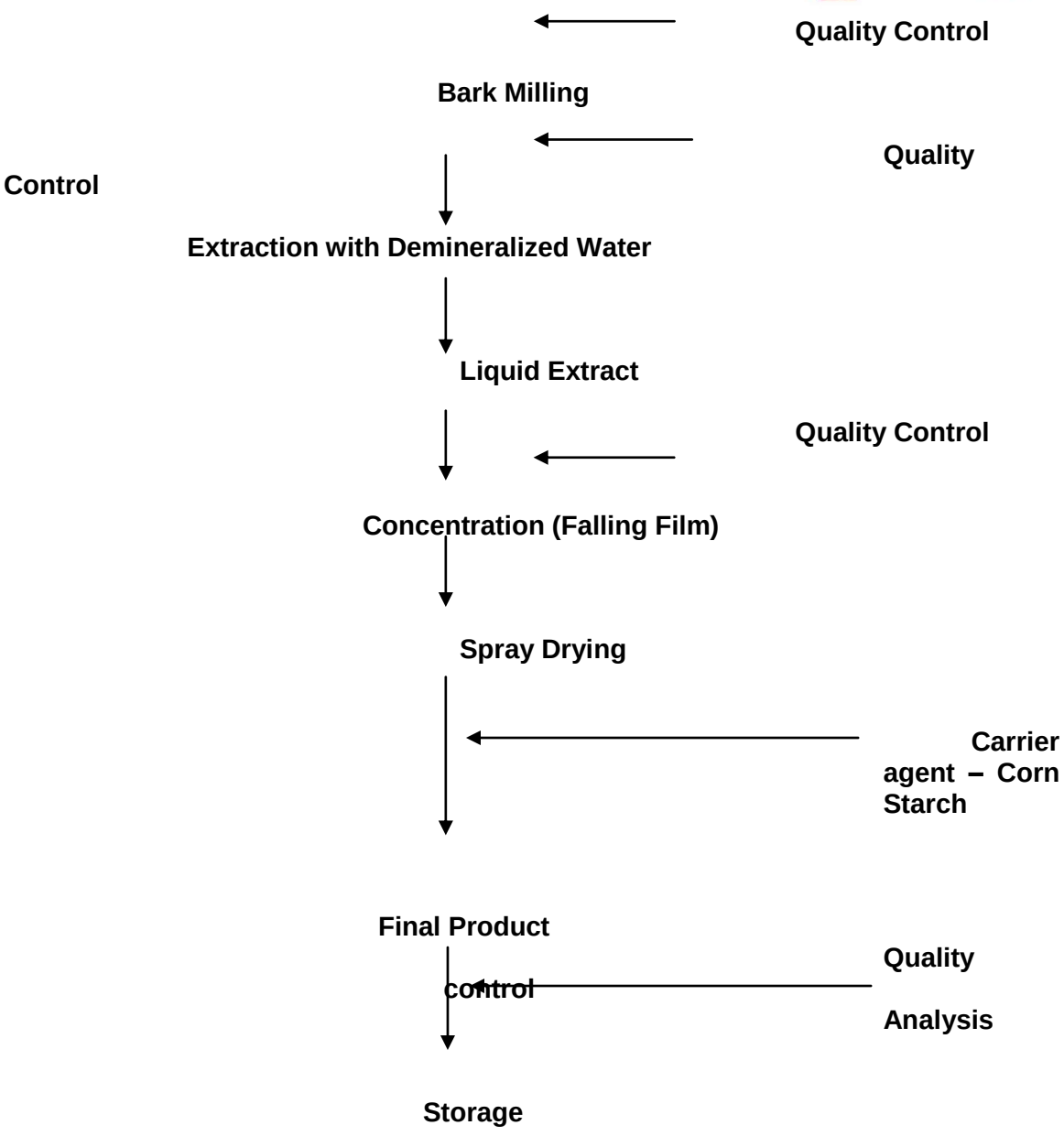
The typical production process of companies producing a camu camu extract that is standardized to vitamin C content is that the fruit is harvested, and then pulped. As the fruit goes bad quickly, it is essential to store the fruit pulp frozen, and it is usually kept in large drums where it is shipped to Lima, Peru, for further processing. From this point, the slurry is then put through a spray drying process and then concentrated to approximately 13:1 or 8:1. This is according to Christopher Daugherty of Essential Living Foods. He also says this is not the way they produce their product for the U.S. market. They sell primarily a juice concentrate, which is processed in a proprietary manner in Peru.

4.2 Sacha inchi

The typical production process for sacha inchi is for the fruit to be harvested and packaged. Afterwards, it is sent to a hydrolic press, and the oil is pressed. A bean cake is produced from this production process, and it is unclear what processing might be used for readying this for market, as no direct applications of this were found.

Chart 2. Extract Manufacturing Flow Chart




Quality Control
Bark Milling
Quality
Control
Extraction with Demineralized Water
Liquid Extract
Quality Control
Concentration (Falling Film)
Spray Drying
Carrier agent – Corn Starch
Final Product
Quality
control
Analysis
Storage

5 Trade Structure

5.1 The Possible Supplychain for Botanical Medicines, Including Camu Camu and Sacha Inchi

Chart 3. Sample Supply Chain

Cultivation or Wildcrafting of plants

Raw material may come from either cultivated or wild harvested sources. In this step, the raw material is harvested and then cleaned, and usually dried.

⇓

Exporters/importers/wholesalers/brokers/traders

A number of "middle men" may be involved in the trade of a botanical before it reaches processing or consumer sale. A number of local traders, village cooperatives or district traders may be involved. Brokers and agents act in behalf of purchasing companies. Wholesalers, importers and exporters may sell as commodities to a number of companies.

⇓

Bulk ingredient suppliers and processing companies

Some bulk ingredient suppliers may be vertically integrated and have both their own farm production, as well as their own processing facilities, though this is not very common. More commonly, some number of traders will sell to a large bulk ingredient supplier who has processing capacity or who will outsource the processing (such as by toll processing). Processing may occur in the form of extraction or pressing (for oil).

⇓

Manufacturers of finished products

Manufacturers of finished products may also be vertically integrated and control sourcing of the raw material, but more commonly they buy from qualified vendors. They manufacture, label and package the product for retail sales. Some manufacturers will sell directly to the retail market, while others restrict themselves to the health care professional market, or may sell directly to multi-level companies or mail order.

⇓

Distributors

Some manufacturers (the smaller ones) may also use brokers or distributors to help supply their products to the market.

⇓

Retail/Consumer Sales

Some products are sold through direct markets, such as multi-level markets, but the majority are sold through the various retail outlets, especially the mass market (eg chain pharmacies, supermarkets, grocery stores). Another area where are large amount of botanicals are sold are in specialty stores (eg health food stores, pharmacies).

6 Market Access

In order for both camu camu and sacha inchi to break into the natural products markets, there should be strategies developed that target specific health categories and market channels.

6.1 Camu camu

6.1.1 Markets

6.1.1.1 Dietary Supplement Market:

6.1.1.1.1 Natural Vitamin C Formulations-

Although in the past several years there have been downward spirals for the prices of vitamins due to Chinese competition, there is still a separate opportunity for natural sourced vitamins, such as vitamin C from camu camu. Vitamins A, C and E are still the leading vitamins in the market, accounting for more than 65% of the total sales in 2002. However, with the ever-lower moving prices in the synthetic vitamins, this will make it difficult for natural source vitamins to compete, as price will continue to be an issue for consumers. (see: http://www.bccresearch.com/editors/RGA-096N.html).

6.1.1.1.2 Antioxidants-

According to a recent article in Nutraceuticals World, the market in antioxidants is predicted to have slow but steady growth. According to Nutrition Business Journal (NBJ), San Diego, CA, the antioxidant market it tracks, which includes vitamins A, C and E, selenium, green tea extract, grape seed extract, pine bark, CoQ10, bilberry, soy isoflavones, lutein,

lycopene, rosemary and olive leaf extract, grew only 1.5% in 2002, totaling approximately $2.5 billion in sales. Part of the reason for the slow down in growth is due to the overall slow down in the dietary supplement industry, and the negative media on the safety and efficacy on dietary supplements in the U.S. However, there is a lot of clinical research that is beginning to reach the consumer about antioxidants, and they are slowly becoming part of the common dialogue concerning health maintenance and promotion. (see: http://www.nutraceuticalsworld.com/March041.htm). However, since there are so many antioxidants on the market, it may be hard for camu camu to compete in this category.

6.1.1.2 Functional Food/ Food Ingredients Market:

6.1.1.2.1 Beverages-

As mentioned above, the beverage section of the functional foods market continue to be a fast growing segment of the market. If camu camu is considered GRAS in the US, it will be well positioned to enter this market.

6.1.1.2.2 New Fruit Flavors/Tropical Fruits-

As discussed above, the increasing acceptance of new fruit flavors—including new sours—indicate that there may be an opportunity for camu camu in the U.S. for these markets. As Californians tend to be the trend-setters for new trends in foods, as well as wellness, camu camu shows promise for this application.

6.1.1.2.3 Natural Vitamin C Ingredient-

As long as camu camu is considered GRAS in the U.S., it may be well suited for food applications as a natural source of vitamin C. Also, because specific amounts of vitamins A,C, and E allow for antioxidant claims on food products, camu camu may be promoted for this as well.

6.1.1.2.4 Antioxidants-

As above, as long as camu camu is considered GRAS in the U.S., it may be well suited for food applications as a natural vitamin C source, and thus antioxidant source. Additionally, if there are further tests, such as ORAC, that can confirm the antioxidant potential—especially of its bioflavonoid components—then this may help in the marketing of camu camu as an antioxidant for functional foods.

6.1.1.3 Cosmetics/Body Care Market:

6.1.1.3.1 Natural Vitamin C Ingredient-

Due to its content of natural vitamin C, camu camu may be well suited as an "inner and outer" beauty product for the cosmetic and body care market. See section below on sacha inchi for more details.

6.1.1.3.2 Fruit Acids-

Fruit acids, such as alpha hydroxy acids, are a popular addition to creams that are intended to act as "skin peels" that slough off the upper layers of skin to reveal more youthful skin that is less wrinkled and aged in appearance. If camu camu has the potential to fit this application, it may make a new addition to the number of fruit acid products on the market.

6.1.1.3.3 "Inner & Outer" Beauty Products-

One area of cosmetics that is on the rise is the quest for "Inner and Outer" beauty products. This includes such ingredients that are suitable for taking both internally, as well as topically, and which increase the health and complexion of the skin by making the body more healthy. It is an area in which both dietary supplements and topical cosmetic or "cosmeceutical" ingredients meet to bring health and thus beauty to the individual. Sacha inchi has this potential as it contains essential fatty acids and amino acids that may be taken internally, as well as potentially applied topically, and these have been shown to improve skin health and beauty. If there are studies specifically on sacha inchi for this market and the potential for it in these applications, it may be well suited for this market.

6.1.1.4 Sustainability Markets:

According to the Datamonitor analysis, the U.S. organic market is projected to reach US$ 30.7 billion by year 2007, with a five year compound annual growth of 21.4 % until then. The global market for organic food and drink

has reached $23 billion in 2002, and North America has overtaken Europe as the largest market for these products. Organically certified camu camu may be sought after in the US market, as I have already had requests for such a product (for more statistics on the organic market see: http://www.ota.com/organic/mt/business.html).

6.1.1.4.1 Fair Trade/ "Fair Deal" or Community Supporting-

Another rapidly growing sustainability market are for those products that are Fair Trade certified or those that have other less-defined social benefits, such as community supporting benefits. In the year 2003, Fair Trade products had record growth, with 34 million in sales. Although this product is not yet eligible for such a certification program, the desire of consumers to support socially responsible products, or those that impart a direct benefit to suppliers is mounting. (see: http://www.transfairusa.org/content/about/pr_040329.php)

6.1.2 Health Categories

As Americans have grown skeptical of new herbal supplements that are claimed to be "cure-all's," there should be a effort to focus the marketing and promotion of camu camu for a limited number of health categories, each with some clinical support or scientific theory about how it will work for supporting that health aspect.

6.1.2.1 Aging-

A natural health category for the use of camu camu is for the support of healthy aging, especially for the aging baby boomer population in the US. The baby boomers represent nearly 30% of the US population, and they are a large driving force for the natural product industries because they are generally committed to supporting more natural alternatives, and also in bettering their own life, health and happiness. Baby boomers are aged 41 to 59 (in year 2005), are well educated, and earn a yearly average income in between US$50-60,000. As camu camu is not only a source of vitamin C, but a source of antioxidants, it will be well suited for protection against free radicals that contribute to the effects of aging.

6.1.2.2 Colds & Flus-

A well-known "self-care" treatment in the U.S. is to take vitamin C at the first sign of a cold or flu. Many people—even in the mainstream—know that vitamin C helps the body to fight off colds & flus, and will take it for this reason. As many people are also interested in natural alternatives (especially organic) for their common supplements or foods, camu camu has a good potential in this regard. Additionally, if there is any data showing that camu camu might provide a more absorbable or "bioavailable" form of vitamin C, this would provide a good advantage on the marketplace.

6.1.2.3 Immune Support-

New research confirms that vitamin C can strengthen the immune system, and that in turn helps us to fight off other viruses and infections. Scientists in Texas found that in patients taking daily vitamin C (two doses daily for two weeks) their white blood cells were more active. As immune support can provide benefit to a number of other health conditions, the inclusion of camu camu for its vitamin C content might be an advantage in many dietary supplement formulations. One caution should be noted, that much of the research that camu camu relies on is that of vitamin C. There are some who will argue that unless there are direct clinical studies of camu camu for specific conditions, that it should not be promoted for health benefits.

6.1.2.4 Skin Health-

Another area for which camu camu may have benefit is for skin health, and this is due to its vitamin C content and antioxidant benefits. Vitamin C has been termed to be "among the most important dermatologic discoveries." It is able to reduce damage from free radicals, and as these are byproducts of pollution, sunlight, and smoke, they may help protect our skin. As camu camu also contains bioflavonoids, it may they may add to its potential as an antioxidant. Vitamin C is also known to have beneficial effects on promoting collagen growth and protecting it from free radical damage. Most of the research on collagen, however, is on the L-ascorbic acid form of vitamin C, so unless camu camu can provide this, its claims may be limited in this regard. (see: http://my.webmd.com/content/Article/102/106925.htm).

6.2 Sacha inchi

6.2.1 Markets

6.2.1.1 Dietary Supplement Market:

Without further application development, and only reviewing the existing scientific literature on sacha inchi, it seems that sacha inchi has the highest potential to be manufactured into dietary supplements that are designed to be a source of essential and other beneficial fatty acids, protein powders, and mood support or tryptophan-containing supplements.

6.2.1.2 Essential Fatty Acid Supplements-

The market for essential fatty acids in the US—in particular omega-3 fatty acids—has increased 20% annually, and this is expected to continue to rise. Since the FDA recently approved a health claim for the use of omega-3 fatty acids for reducing the risk of cardiovascular disease, there has been an increase in consumer demand.

6.2.1.3 Protein Powders & Sports Supplements-

As sacha inchi is a good source of amino acids (containing all the essential ones for humans), and due to the content of the essential fatty acids and tryptophan, it may be well suited for positioning as a sports supplement, and certainly as a protein powder.

Sports supplements are on the rise, with approximately 1.52 billion in sales in 2001, and $120 million coming in from "hardcore" beverages, $1.52 billion in sports powders and $100 million from sports pills. These numbers are according to the "Sports Nutrition & Weight Loss Market Overview" published by Nutrition Business Journal (www.nutritionbusiness.com).

6.2.1.4 Tryptophan Containing Supplements-

In 1991 there was a warning that was broadcasted for all 5-HTP (5-Hyrdroxy-L-tryptophan) supplements due to impurities that were similar to "peak X" which was also found in L-tryptophan supplements in the 1989 epidemic of eosinophilia-myalgia syndrome (EMS). The FDA and Mayo Clinic had both confirmed the impurities, and it is uncertain whether any illnesses resulted in the most recent 5-HTP incidence. The presence of the "peak X" impurities is due to manufacturing processes, and it will be very important that the use of sacha inchi as a dietary supplement should be investigated for the potential of producing such impurities. (see: http://vm.cfsan.fda.gov/~lrd/tp5htp.html).

As tryptophan is a limiting metabolic precursor in the production of serotonin, supplements containing it are often touted for their mood-supporting benefits, and may be used by people as aids for insomnia, depression,

obesity, and in children with attention deficit disorder. A recent report said that the percent of adults using antidepressants has nearly tripled to 10% of women and 4% of men. Additionally, as the prevalence of obesity in people aged 20 to 74 increased from 47 percent in 1976-80 to 65 percent in 1999-2002, weight loss will continue to be what some have termed 'the Holy Grail' for the dietary supplement industry.

(see: http://www.wtnh.com/Global/story.asp?S=2641561).

6.2.1.2 Functional Food/ Food Ingredients Market:

6.2.1.2.1 Meat Alternatives-

The vegetarian market—including meat replacement products—has grown rapidly over the past several years. As there have been growing concerns about mad cow disease, along with greater understanding of the health-benefits of the meat-reduced diet, and the greater selection of vegetarian products, more people are choosing these products in both traditional and non-traditional sales channels. Even though the number of strict vegetarians continues to be small, the number of Americans who are reducing their meat intake is growing. (see: http://www.mindbranch.com/listing/product/R560-0179.html).

6.2.1.2.2 Essential Fatty Acids-

As essential fatty acids can be supplied in either food or dietary supplement form, they are suited for either markets. However, if sacha inchi is not considered GRAS, then it will not be appropriate for functional food markets in the US.

6.2.1.2.3 Low Carb Diet Foods-

Although low-carb foods have been a recent trend in the US in the past few years, this year the growth has declined. However, experts agree that low-carb or high protein supplements will continue to occupy a segment of the market, especially due to the increasing awareness and education of the role of nutrition in controlling blood sugar and pre-diabetes conditions. Another name for foods that are focused on blood sugar control is those with a "low glycemic index."

6.2.1.2.4 Milk Alternatives-

The market for various milk replacements is another market for which sacha inchi may be suited. The most popular milk replacement products on the market are soy and rice milks. One of the driving forces for this market is the desire for dairy free foods, whose market has increased by 125% according to a Mintel Survey. As there is also a growing number of food allergies and intolerances, in particular to soy foods, there is opportunity for new milk alternative products. (see:

http://www.worldveganday.org/html/modules.php?name=News&file=article&sid=34).

6.2.1.3 Cosmetics/Body Care Market:

6.2.1.3.1 Massage Oils-

Although most American consumers would opt for professional spa treatments, such as massages, over at-home pampering, most American consumers never make appointments for professional massages or treatments due to financial concerns. According to industry experts, however, these same people are compromising by buying personal care items that offer something beyond simple cleansing. One such area is the diversity of massage oils on the market, especially those of natural origin and which impart an added benefit to the skin or body. As sacha inchi is being promoted as a new oil, it is possible it may be suited for such applications.

6.2.1.3.2 "Inner and Outer" Beauty Products-

see above for more information.

6.2.1.4 Sustainability Markets:

6.2.1.4.1 Organic-

According to the Datamonitor analysis, the U.S. organic market is projected to reach US$ 30.7 billion by year 2007, with a five year compound annual growth of 21.4 % until then. The global market for organic food and drink

has reached $23 billion in 2002, and North America has overtaken Europe as the largest market for these products. (for more statistics on the organic market see: http://www.ota.com/organic/mt/business.html).

6.2.1.4.2 Fair Trade/ "Fair Deal" or Community Supporting-

Another rapidly growing sustainability market are for those products that are Fair Trade certified or those that have other less-defined social benefits, such as community supporting benefits. In the year 2003, Fair Trade products had record growth, with 34 million in sales. Although this product is not yet eligible for such a certification program, the desire of consumers to support socially responsible products, or those that impart a direct benefit to suppliers is mounting. (see: http://www.transfairusa.org/content/about/pr_040329.php)

6.2.2 Health Categories

6.2.2.1 Skin Health; PMS & Women's Health; Cardiovascular Health; Joint Support-

There are a number of health categories that may be targeted due to fatty acid research, and the inclusion of a beneficial mixture of essential fatty acids in sacha inchi. Essential fatty acid research has confirmed many benefits, especially for the omega-3 fatty acids, such as alpha-linolenic acid, and the American public is somewhat familiar with this news. Research will continue to build, and confirm not only the benefits of the omega-3 fatty acids as a

group, but also the benefits of specific fatty acids, such as DHA and EPA (as a FDA recently approved a qualified health claim for these in foods).

6.2.2.2 Mood Support-

As tryptophan is a limiting metabolic precursor for the manufacture of serotonin in the body, dietary supplements and foods that are sources are also touted as able to support the mood, implying effects on mild depression. As mentioned above, this could be of benefit for the marketing of sacha inchi, as it is an unusually high source of tryptophan, but it may also be a drawback as there have been problems with impurities with supplements containing this in the past.

6.2.2.3 Weight loss-

Sacha inchi may have benefits for weight loss, not only due to its content of fatty acids, which have some clinical support for their use in weight loss, but also due to its use as a protein supplement, and for the existing trend in the U.S. for low carb and high protein foods and supplements. If there were clinical studies for the use of sacha inchi specifically for weight loss, this would be a tremendous boost to the market potential for this herb.

7 Prices

7.1 Camu camu

The approximate price of the most commonly traded product on the market is US$52-58/kilo, for the standardized extract. The common standardization that is sought after is to 27% vitamin C content. Reliable sources say this is impossible, and that to get this high of standardization the product is adulterated and spiked. Essential Living Foods, at the time of this report, offered a pure unstandardized concentrated juice powder for approximately $60/kilo.

Table 2. Table of Camu Camu Trade Products by Company

Company Name	**Form:** **(W) whole/cut Powder** **(E) Extract/Concentrate** **(C) Certified Organic**
A.S.I. International Inc. _____	**E**
A.S.I. International Inc. - CA	**E**
Active Ingredients Group Inc.	**W, E, C**
Advanced Nutra LLC	**W, E**
Alfa Chem	**W, E**
Amax NutraSource Inc.	
Amazon Forest Botanicals Inc.	**E**
American Botanicals	**W, C**
American Sanjiang Bio-Fountain Inc.	**W**
Arnhem Inc.	**W, E**

BDS Natural Products	**E**
Bianca International Organic Inc.	**W, E, C**
Blue California	**W, E**
Blue Diamond Enterprises Inc.	**W**
Buckton Scott Nutrition Inc.	**E**
Chart Corp. Inc.	**W, E, C**
Complant Ningbo I/E Ltd.	**W, E**
CPB International Inc.	**E**
E.M. Sergeant Pulp & Chemical Co. Inc.	**W, E**
Ecuadorian Rainforest LLC	**W, E**
Essential Fine Ingredients Inc.	**W, E**
Essential Wholesale	**W, E**
Gaia Herbs Inc.	**E**
GCI Nutrients	**E**
Geni Herbs	**W, E**
GreeNeem K. Sivaram Bros.	**W, E, C**
H. Bilal & Co.	**W**
Hawk Biopharma	**W, E**
Hebei Sanxin Industry Group	**W, E**
Inca Health S.A.	**W, E**
Internaturales LLC	**W, E, C**
IRMA Corp.	**W, E**
Maypro Industries Inc.	**W, E**
Modern Natural	**W, E, C**

Products	
Mueggenburg North America	**W, E, C**
Nat-Trop	**E**
Nature's Thyme LLC	**W, E, C**
Naturex Inc.	**E**
NHK Laboratories Inc.	**W, E, C**
NutriScience Innovations LLC	**E**
Omana Group LLC	**E**
Pacific Rainbow International Inc.	**W, E**
Paul Schueller International Inc.	**E**
Phytoline Inc.	**E**
Premier Research Labs	**E**
Rainforest Botanicals LLC	**W, E**
Raw Deal Inc.	**W, E, C**
RFI Ingredients	**W, E**
RIA International LLC	**W, E**
Ricera American Corp.	**W, E**
Scandinavian Formulas Inc.	**W, E, C**
Stauber Performance Ingredients Inc.	**E**
Suan Farma Inc.	**E**
Synergy Production Labs	**E**
Watson Industries Inc.	**E**

Source: Natural Products Insider

7.2 Sacha inchi

The approximate market price for the oil of sacha inchi is $18/kilo. When compared to the price of DHA ($3.50/kilo), a leading omega-3 essential fatty acid on the market, it is not very competitive in the market. There is not much trade known in this plant. Essential Living Foods has given out small sample batches for R&D but never sold it.

8 Marketing Strategies/Prospects and Sales Promotion

In order to better understand the various strategies and hurdles that exist for capturing each market channel, below are SWOT (strength, weakness, opportunity, and threat) analyses for each product by market channel. By analyzing each of the strengths and opportunities, and potential for each market may be understood. However, each product has specific weaknesses and threats to be overcome in the strategy for entering that market.

8.1 Camu camu

8.1.1 Dietary Supplement SWOT Analysis:

STRENGTHS • A natural source of vitamin C • Highest C content of all fruits • Some supply network established • Regulated in the U.S. as a dietary supplement	WEAKNESSES • not a very good story with the traditional use (not much traditional use known) • not much research published • lack of consistent supply or quality
OPPORTUNITIES • there is opportunity to develop supply further and capture market demand	THREATS • clear lack of long term toxicological or safety data • much adulteration on the market • the market expects a product that can not be produced without adulteration or spiking • cheap price of competitive

	essential fatty acids

8.1.2 Functional Food SWOT Analysis:

STRENGTHS • A natural source of vitamin C • Highest C content of all fruits • Some supply network established • Some established food use by humans	WEAKNESSES • not a very good story with the traditional use (not much traditional use known) • not much research published • unclear if GRAS • lack of consistent supply or quality • too expensive for food market currently • little application data available
OPPORTUNITIES • If one company or a group were to take time to get GRAS certification, then the whole food market would open up • Maybe used as a new sour flavor • Opportunity for organic foods and good story with community supporting agriculture or production • Companies may develop applications more fully and capture the market first	THREATS • unclear if GRAS • clear lack of long term toxicological or safety data • much adulteration on the market • may not be able to be produced for the price needed by food market (usually well below 5 cents per serving) • cheap price of competitive essential fatty acids

8.1.3 Cosmetic SWOT Analysis:

STRENGTHS • A natural source of vitamin C • Highest C content of all fruits • Some supply network established	WEAKNESSES • not a very good story with the traditional use (not much traditional use known) • not much research published • lack of consistent supply or quality • patents exist on the whitening agent use
OPPORTUNITIES • Opportunity for organic products and good story with community supporting agriculture or production	THREATS • clear lack of long term toxicological or safety data • much adulteration on the market • cheap price of competitive

• Companies may develop applications more fully and capture the market first • Use as a whitening agent for skin	essential fatty acids

8.1.4 Sustainability Markets SWOT Analysis:

STRENGTHS • pesticides and many chemicals not needed in processing	WEAKNESSES • not a very good story with the traditional use (not much traditional use known) • not much research published • lack of consistent supply or quality
OPPORTUNITIES • due to adulteration and lack of consistent supply there is opportunity for higher quality story using organics or fair trade-like practices	THREATS • clear lack of long term toxicological or safety data • much adulteration on the market

8.2 Sacha inchi

8.2.1 Dietary Supplement SWOT Analysis:

STRENGTHS • Some interesting science to back up traditional uses. • Many companies doing R&D from scan of patent database	WEAKNESSES • Allowed in the U.S. as a dietary supplement? • Not much clinical data • Lack of consistency in supply
OPPORTUNITIES • Some exciting target markets and potential applications • Not much known on processing and feasibility of production for different applications	THREATS • If developed without benefit/share relationship it could be controversial. • Many patents recently that might interfere with new development potential • Clear lack of long term toxicological data

8.2.2 Functional Food SWOT Analysis:

STRENGTHS • Some interesting science to back	WEAKNESSES • Not much clinical data

up traditional uses. • Many companies doing R&D from scan of patent database	• Lack of consistency in supply
OPPORTUNITIES • Some exciting target markets and potential applications • Not much known on processing and feasibility of production for different applications	THREATS • If developed without benefit/share relationship it could be controversial. • Many patents recently that might interfere with new development potential • Clear lack of long term toxicological data

8.2.3 Cosmetic SWOT Analysis:

STRENGTHS • Some interesting science to back up traditional uses. • Many companies doing R&D from scan of patent database	WEAKNESSES • Not much clinical data • Lack of consistency in supply • Lack of consumer awareness
OPPORTUNITIES • Some exciting target markets and potential applications • Not much known on processing and feasibility of production for different applications	THREATS • If developed without benefit/share relationship it could be controversial. • Many patents recently that might interfere with new development potential • Clear lack of long term toxicological data

8.2.4 Sustainability Markets SWOT Analysis:

STRENGTHS • Some interesting science to back up traditional uses. • Many companies doing R&D from scan of patent database	WEAKNESSES • Not much clinical data • Lack of consistency in supply • Lack of agricultural technology
OPPORTUNITIES • Some exciting target markets and potential applications • Not much known on processing and feasibility of production for different applications • Because it is a rainforest plant it could have a good story, and be connected to the livelihoods (and	THREATS • If developed without benefit/share relationship it could be controversial. • Many patents recently that might interfere with new development potential • Clear lack of long term toxicological data

story) of rural and indigenous people	

9.0 References

Axtell, B.L. and Fairman, R.M. 1992. Minor Oil Crops. FAO Agricultural Services Bulletin. No. 94. Rome. ISBN: 92-5-103128-2

MENSIER. P.H., " Dictionaire des Huiles Vegetales". Editions Paul Lechevalier, Paris.

Sathe SK, Hamaker BR, Sze-Tao KW, Venkatachalam M.Isolation, purification, and biochemical characterization of a novel water soluble protein from Inca peanut (Plukenetia volubilis L.). J Agric Food Chem. 2002 Aug 14;50(17):4906-8.

T. WESTMORELAND1, M. Venkatachalam1, K. H. Roux2, and S. K. Sathe1. Enzyme linked immunosorbent assay (ELISA) for Inca peanut (Plukenetia volubilis L.) albumin. Symposium presentation at the 2001 IFT Annual Meeting: New Orleans, Louisiana: http://ift.confex.com/ift/2001/techprogram/paper_8366.htm

9.1 Other Key References

HAMAKER, B. R.; VALLES, C.; GILMAN, R.; HARDMEIER, R. M.; CLARK, D.; GARCIA, H. H.; GONZALES, A. E.; KOHLSTAD, I.; CASTRO, M.; ET, AL. **Amino acid and fatty acid profiles of the Inca peanut (Plukenetia volubilis)** CEREAL CHEMISTRY 1992 . VOL.69, NO.4, P.461-463

Guillen, M. D.; Ruiz, A.; Cabo, N.; Chirinos, R.; Pascual, G. **Characterization of sacha inchi (Plukenetia volubilis L.) oil by FTIR spectroscopy and 1H NMR. Comparison with linseed oil.** 2003. Journal of the American Oil Chemists' Society 80(8): 755-762

Hamaker, B. R.; Sathe, S. K. **A high quality low phenylalanine water-soluble protein of the Plukenetia volubilis oilseed.** 1996 IFT annual meeting: book of abstracts, 1996 pp. 119-120 ISSN 1082-1236

Amazonian small fruits with commercial potential.
Clement, C. R.; Silva Filho, D. F. da
JOURNAL NAME- Fruit Varieties Journal
VOLUME 48
NO 3

1994
PP 152-158
30 REFERENCES
DOCUMENT TYPE- Conference paper; Journal article
ISSN- 0091-3642
AUTHOR AFFILIATION- Coordenacao de Pesquisas em Ciencias Agronomicas, Instituto Nacional de Pesquisas da Amazonia - INPA, Cx. Postal 478, 69011 Manaus, AM, Brazil.
CONFERENCE TITLE- Workshop on tropical small fruits, Honolulu, Hawaii, USA, 6 August 1992.
ORGANISM DESCRIPTOR- Psidium cattleyanum; Malpighia glabra; Solanum quitoense; Eugenia; Psidium; Myrciaria; Solanum; Borojoa
LANGUAGE- English NDN- 191-0540-3296-3

Although most native Amazonian fruit species are trees, a few are woody or herbaceous shrubs. The family Myrtaceae is especially rich in small fruit species. The araca-boi (Eugenia stipitata) was domesticated in western Amazonia for its deliciously flavoured sour pulp. The araca-pera (Psidium acutangulum) was managed in swidden second-growth and around village sites for its pleasantly flavoured sour fruits, frequently similar in flavour to the strawberry guava (P. cattleianum [P. cattleyanum]). The cacari or camu-camu (Myrciaria dubia) is a wild species that occurs in monospecific stands in flood-plains. It is an extremely sour though pleasantly flavoured fruit, with up to 4 g of ascorbic acid per 100 g of edible pulp, making it richer in this vitamin than the acerola (Malpighia glabra). The Solanaceae offers the cubiu or cocona (Solanum sessiliflorum), domesticated in western Amazonia and similar in appearance to the naranjilla (S. quitoense). Its potential yields are enormous and its pleasantly flavoured fruits are used for juices or preserves. The Rubiaceae contains the purui (Borojoa sorbilis) and several relatives. Another sour fruit with a pleasant flavour, the purui appears to have been at least semi-domesticated in western Amazonia also. These species offer the potential for development as processed juices or other products, as they are all too sour for out-of-hand consumption. This paper describes each species, presents available composition and yield data, and suggests the research necessary to develop them as small fruit crops.

Characterization of sacha inchi (Plukenetia volubilis L.) oil by FTIR spectroscopy and 1H NMR. Comparison with linseed oil.
Guillen, M. D.; Ruiz, A.; Cabo, N.; Chirinos, R.; Pascual, G.
JOURNAL NAME- Journal of the American Oil Chemists' Society
VOLUME 80
NO 8
2003
PP 755-762
32 REFERENCES
DOCUMENT TYPE- Journal article

ISSN- 0003-021X
AUTHOR AFFILIATION- Tecnologia de Alimentos, Facultad de Farmacia, Universidad del Pais Vasco, Paseo de la Universidad 7, 01006 Vitoria, Spain.

PUBLISHER- AOCS Press
PUBLICATION PLACE- Champaign
PUBLICATION COUNTRY- USA
LANGUAGE- English NDN- 191-0694-4124-1
Three oil samples obtained from sacha inchi (Plukenetia volubilis L.) seeds were studied by means of FTIR and 1H NMR. Frequency data of the most significant bands of the IR spectrum of this oil are given. These data show that sacha inchi oil has a high degree of unsaturation. The same fact is deduced from the ratio between the absorbance of the bands due to the stretching vibrations of the cis olefinic CH double bonds at 3010.5 cm-1 and to the methylene symmetrical stretching vibrations at 2855.1 cm-1. The proportions of monounsaturated, polyunsaturated, and saturated acyl groups were predicted from the frequency of some IR bands, and these were in satisfactory agreement with the values obtained through FAME generation and their quantification by GC. Likewise, simple observation of the 1H NMR spectra provided a great deal of information about sacha inchi oil, with regard not only to the relative proportions of the different acyl groups but also to their nature. Thus, the presence of gamma -linolenic acyl groups was discounted. Furthermore, the area of some 1H NMR signals was used to determine the proportion of saturated and mono-, di-, and triunsaturated acyl groups, which also were in satisfactory agreement with the values obtained by classical methods. IR and 1H NMR determinations take very little time in comparison with classical methods and do not require chemical manipulation or transformation of the sample. A comparison was also made between the compositions of sacha inchi and linseed oil. Both oils are important sources of the healthful n-3 linolenic acyl groups, and sacha inchi also contains high proportions of the n-6 linoleic acyl groups.

High quality low phenylalanine water-soluble protein of the Plukenetia volubilis oilseed

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SPONSORING AGENCY- Institute of Food Technology
CONFERENCE DATE- 22-26 Jun 1996
CONFERENCE TITLE- Annual Meeting and Exposition of the Institute of Food Technologists
CONFERENCE LOCATION- New Orleans, LA (USA)
ISSUE OF ORIGINATION- V24N06
LANGUAGE- ENGLISH NDN- 107-0273-4391-5
NO-ABSTRACT

Tropical fruit flavors: a flavorist.s perspective.
Bauer, K.
JOURNAL NAME- Cereal Foods World
VOLUME 45
NO 5
2000
204-207 PAGES
DOCUMENT TYPE- Journal Article
ISSN- 0146-6283
PUBLISHER- .Flavour Div., Dragoco Inc., Totowa, NJ, USA.
LANGUAGE- English NDN- 178-0120-7727-1
Sensory properties of tropical fruits are described with emphasis on flavour. General flavour notes and flavour compounds present in many tropical fruits are discussed followed by individual sections covering sensory properties of: abacate avocado; abiu (egg fruit); acai; acerola (West Indian or Barbados cherry); araca (Brazilian or wild guava); araca boi; bacuri (bacury); cactus pear (prickly pear); caju (common cashew); camu-camu; carambola (starfruit); cupuacu; durian (civet durian); goiaba (common guava); granadilla; graviola; guarana; jabuticaba; jaca (jackfruit or nangka); jambu rosa (rose apple or plum rose); jenipape; kaki (date plum or Japanese and Chinese persimmon); kiwi; lychee; mamao (papaya); mamey; mangaba; mango; melastomtacie (melastome); monkey gourd; murici; passion fruit; pitanga (Brazilian or Surinam cherry); pomelo (Chinese grapefruit); pomegranate; sala fruit (snake skin fruit); sapote (Mexican apple); sapodilla; sapotira; starapple; tamarind; tapereba (yellow mombin); umbu; and uva (grape).

Juice up.
Curtis, L.
JOURNAL NAME- Food Product Design
7 (4) 37-38, 41-42, 45-46, 48, 50, 53-55, 57-59
1997
DOCUMENT TYPE- Article
ISSN- 1065-772X
LANGUAGE- English NDN- 178-0114-7305-9
Development of fruit and vegetable juices, as well as juice-based beverages, and possibilities for their fortification are discussed. Aspects considered include: history of the fruit juice industry; characteristics of fruit juices; processes involved in juice production (mechanical extraction, enzyme addition, formation of juice concentrates); production of pulps and purees from apricots, passion fruit, papayas and guavas for manufacture of juice; essential oil as a by-product of the juice industry; chemical constituents of a fruit juice; regulation of nomenclature regarding use of terms such as 'fruit juice' or 'nectar' and consequent methods of calculating fruit juice percentage; techniques employed to extend shelf life of juices (pasteurization, addition of preservatives); packaging of juice beverages; use

of additives to improve flavour and appearance of juices; development of New Age beverages such as citrus punches; use of Amazonian tropical fruits in juice beverages (maracuja, goiaba, acerola, acai, arace-boi, cupacu and camu camu); development of vegetable juices (tomato, beets, parsley, watercress, spinach, celery, romaine, lettuce, cucumber, cauliflower and carrot); fortification of juices with vitamins, minerals, herbs or phytochemicals; application of ginseng, guarana and yohimbe in New Age beverages; flavouring of fortified juice-based beverages; and development of fruit teas.

9.2 Key Camu Camu Patents

COMPOUND, PROCESS FOR PRODUCING THE SAME AND USE THEREOF
INVENTOR- NAGAMINE,Kenichi; HAYASHI,Miki; YAMASAKI,Kaori
DATE FILED- 2003-12-24
PUBLICATION NUMBER- 2004074304/WO-A1
DOCUMENT TYPE- A1
PUBLICATION DATE- 2004-09-02
189-0003 1-52-14 Tokyo; 189-0003 1-52-14 Tokyo; 189-0003 1-52-14 Tokyo
FIRM- (SAKAI,Hajime); 102-0083 Tokyo; JP
INTERNATIONAL PATENT CLASS- C07H015203; *C07H; *A61K00700; *A61K00748; *A61K0317032; *A61P01700; *A23L00130
PCT APPLICATION NUMBER- 03016544/JP
PATENT APPLICATION PRIORITY- 2003-42486
PRIORITY COUNTRY CODE- JP
PRIORITY DATE- 2003-02-20
APPLICANT- (NICHIREI CORPORATION)
PUBLICATION COUNTRY- WO
104-8402 Tokyo
JP
JP; JP; JP
FILING LANGUAGE- JAP
A component represented by the following formula (1) which originates in a natural material (CAMU CAMU;;) and has a potent antioxidant activity and a stable whitening effect. An antioxidant agent, a whitening agent, a skin preparation for external use, a cosmetic and a food characterized by containing the compound represented by the formula (1).; L'invention concerne un compose represente par la formule (1), ce compose etant issu d'une substance naturelle (CAMU CAMU ;;) et possedant une puissante activite antioxydante et un effet blanchissant stable. L'invention concerne egalement un agent antioxydant, un agent blanchissant, une preparation pour la peau a usage externe, un produit cosmetique et un produit

alimentaire caracterises en ce qu'ils contiennent le compose represente par la formule (1).

BLEACHING AGENT, ANTIOXIDANT, COLLAGENASE INHIBITOR, HYALURONIDASE INHIBITOR, AGE RESISTER, SKIN LOTION, COSMETIC AND FOOD
INVENTOR- NAGAMINE, KENICHI; HAYASHI, MIKI; YAMAZAKI, KAORI
PATENT APPLICATION NUMBER- 2002362507
DATE FILED- 2002-12-13
PUBLICATION NUMBER- 04189698 JP
DOCUMENT TYPE- A
PUBLICATION DATE- 2004-07-08
INTERNATIONAL PATENT CLASS- A61K00748; A23L00130; A61K00700; A61K03578; A61P01700; A61P04300; C09K01534; C12N00999
APPLICANT- NICHIREI CORP
PUBLICATION COUNTRY- Japan NDN- 043-0328-3489-7
PROBLEM TO BE SOLVED: To provide a bleaching agent having excellent safety and exhibiting bleaching action usable as cosmetics, etc., an antioxidant exhibiting stable antioxidation action, a collagenase inhibitor, a hyaluronidase inhibitor, an age resister, a skin lotion or cosmetic compounded with the bleaching agent, etc., and a food compounded with the antioxidant and enabling effective utilization of hitherto discarded seed of Camu Camu (Myrciaria dubia). SOLUTION: The bleaching agent, antioxidant, collagenase inhibitor, hyaluronidase inhibitor or age resister contains the extract of Camu Camu seed as an active component. The skin lotion or the cosmetic contains the bleaching agent, etc., and the food contains the antioxidant. COPYRIGHT: (C)2004,JPO&NCIPI

SKIN PREPARATION FOR EXTERNAL USE
INVENTOR- HATA, TOMONORI; HOSHINO, HIROSHI; UEHARA, SHIZUKA
PATENT APPLICATION NUMBER- 11139141
DATE FILED- 1999-05-19
PUBLICATION NUMBER- 00327553 JP
DOCUMENT TYPE- A
PUBLICATION DATE- 2000-11-28
INTERNATIONAL PATENT CLASS- A61K00748; A61K00700; A61K007027; A61K00750
APPLICANT- KOSE CORP
PUBLICATION COUNTRY- Japan NDN- 043-0195-0142-8
PROBLEM TO BE SOLVED: To obtain a skin preparation for external use capable of improving the elasticity, etc., of skin, eliminating the skin roughening, etc., and imparting a transparent feeling to the skin by including an extract of CAMU CAMU (botanical name: Myrciaria dubia), an ascorbic acid (derivative) and/or a placental extract and a polyhyric alcohol. SOLUTION: This skin preparation for external use is obtained by including (A) an extract of CAMU CAMU in an amount of 0.0001-5 wt.% expressed in terms of a dry

solid, (B) (i) ascorbic acid (derivative) (e.g. L-ascorbic acid phosphate magnesium) and/or (ii) a placental extract and (C) 0.001-80 wt.% of a polyhydric alcohol (e.g. trehalose). The content of the ingredient B is preferably 0.0001-10 wt.% in the case of the ingredient (i) and 0.0001-5 wt.% expressed in terms of a dry solid in the case of the ingredient (ii). The ingredient A is prepared by extraction thereof from a fruit of CAMU CAMU which is a fruit tree of the family Myrtaceae under conditions of a low temperature or heating. COPYRIGHT: (C)2000,JPO

COSMETIC COMPRISING EXTRACT OF CAMU CAMU
INVENTOR- NAGAMINE, KENICHI; HAYASHI, MIKI; KITO, TAKASHI
PATENT APPLICATION NUMBER- 11135670
DATE FILED- 1999-05-17
PUBLICATION NUMBER- 00327549 JP
DOCUMENT TYPE- A
PUBLICATION DATE- 2000-11-28
INTERNATIONAL PATENT CLASS- A61K00748; A61K00700; A61P01716
APPLICANT- NICHIREI CORP
PUBLICATION COUNTRY- Japan NDN- 043-0195-0138-6
PROBLEM TO BE SOLVED: To obtain a cosmetic excellent in stability and humectant properties by using a plant extract abundantly containing L-ascorbic acid by including a fruit extract of CAMU CAMU (botanical name: Myrciaria dubia). SOLUTION: This cosmetic is obtained by including a fruit extract of CAMU CAMU which is a fruit tree of the genus Myrciaria. A juice prepared by carrying out a pressing treatment of the juice from the fruit, a liquid part separated from a pulverized material, a ground material or a crushed material of the fruit by filtration or decantation, an extract of the fruit (the pulverized, ground or crushed material) with water and/or an organic solvent, a precise filtrate by ultrafiltation or the like, a treated-material (a concentated or a diluted material) and the like are cited as the fruit extract of the CAMU CAMU. The resultant juice, liquid part, extract, precise filtrate, treated material and the like, as necessary, can suitably be combined. When carrying out the ultrafltration treatment, a polymeric component having (greater than)30,000, preferably 10,000 molecular weight is preferably removed. COPYRIGHT: (C)2000,JPO

MELANOGENESIS SUPPRESSING AGENT
INVENTOR- OTAWA, TOSHIHIKO; FUJIWARA, YASUNORI; HOSOKAWA, MAKOTO
PATENT APPLICATION NUMBER- 08026709
DATE FILED- 1996-02-14
PUBLICATION NUMBER- 09221429 JP
DOCUMENT TYPE- A
PUBLICATION DATE- 1997-08-26

INTERNATIONAL PATENT CLASS- A61K03578; A61K00700; A61K00748
APPLICANT- T HASEGAWA CO LTD
PUBLICATION COUNTRY- Japan NDN- 043-0081-9076-1
PROBLEM TO BE SOLVED: To obtain the subject agent having high safety and stability and excellent melanin suppressing effect by using an extract of a fruit of a specific shrub having high contents of vitamin C, minerals, etc., and used as a food and drink. SOLUTION: An extract of camocamo (Myrciaria dubia) is used as an active component of the agent. Camocamo is fruit of an edible shrub plant belonging to the family Myrtaceae and growing on the river bank or the water-flowing bank of lakes of the Amazon basin extending from the eastern part of Peru to the western north part of Brazil. Raw, semi-dried or dried fruit can be used as the extraction raw material and the raw material is preferably used in pulverized state. The camocamo extract is easily produced by extracting the raw material with water, a hydrophilic organic solvent or their mixture. The melanin suppressing agent is topically applied to the diseased part such as the spot, freckle, pigmented part caused by sunburn, etc. The amount of the agent to be applied to 1cm(sup)2(end sup) of the skin is about 0.5-10mg for a creamy or ointment preparation and about 1-15mg for a liquid preparation. COPYRIGHT: (C)1997,JPO

WHITENING AGENT, SKIN PREPARATION FOR EXTERNAL USE AND COSMETIC
INVENTOR- NAGAMINE,Kenichi; HAYASHI,Miki; YAMASAKI,Kaori
DATE FILED- 2003-12-08
PUBLICATION NUMBER- 2004054520/WO-A1
DOCUMENT TYPE- A1
PUBLICATION DATE- 2004-07-01
189-0003 1-52-14 Tokyo; 189-0003 1-52-14 Tokyo; 189-0003 1-52-14 Tokyo
FIRM- (SAKAI,Hajime); 102-0083 Tokyo; JP
INTERNATIONAL PATENT CLASS- A61K00700; *A61K; *A61K00748; *A61K03578; *A61P01700; *A61P04300
PCT APPLICATION NUMBER- 03015656/JP
PATENT APPLICATION PRIORITY- 2002-362507
PRIORITY COUNTRY CODE- JP
PRIORITY DATE- 2002-12-13
APPLICANT- (NICHIREI CORPORATION)
PUBLICATION COUNTRY- WO
104-8402 Tokyo
JP
JP; JP; JP
FILING LANGUAGE- JAP
It is intended to provide a whitening agent having a whitening effect and a high safety and being usable in cosmetics, etc. wherein camucamu seeds having been disposed so far can be efficaciously utilized, and a skin preparation for external use or a cosmetic containing the whitening agent,

etc. This whitening agent contains a camucamu seed extract as the active ingredient and the skin preparation for external use or the cosmetic as described above contains this whitening agent, etc.; La presente invention se rapporte a un agent de blanchiment qui possede un effet de blanchiment, qui est sans danger et qui peut etre utilise en cosmetique, etc., dans lequel on utilise de maniere efficace les graines de camucamu connues jusqu'a present, et a une preparation de soin cutane a usage externe ou a un produit cosmetique contenant ledit agent de blanchiment, etc. L'agent de blanchiment de l'invention contient un extrait de graines de camucamu comme principe actif et la preparation de soin cutane a usage externe precitee ou le produit cosmetique precite contiennent l'agent de blanchiment de l'invention, etc.

9.3 Key Sacha Inchi Patents

United States Patent Application
20030195168
Kind Code
A1
Aylward, James Harrison ; et al.
October 16, 2003
Therapeutic agents - III
Abstract
The present invention relates generally to chemical agents useful in the treatment and prophylaxis of protein kinase C (PKC) related conditions in mammals, including humans and primates, non-mammalian animals and avian species. More particularly, the present invention provides a chemical agent of the macrocyclic diterpene family obtainable from a member of the Euphorbiaceae family of plants or botanical or horticultural relatives thereof or derivatives or chermical analogues or chemically synthetic forms of the agents for use in the treatment or prophylaxis of PKC-related conditions in mammalian, animal and avian subjects. The subject chemical agents are also useful for modulating expression of genetic sequences including promotion and other regulatory sequences. The present invention further contemplates a method for the prophylaxis and/or treatment in mammalian, animal or avian subjects with PKC-related conditions by the topical or systemic administration of a macrocyclic diterpene obtainable from a member of the Euphorbiaceac family of plants or their botanical or horticultural derivatives or a derivative, chemical analogue or chemically synthetic form of the agent. The chemical agent of the present invention may be in the form of a purified compound, mixture of compounds, a precursor form of one or more of the compounds capable of chemical transformation into a therapeutically and/or genetically active agent or in the form of a chemical fraction, sub-fraction, preparation or extract of the plant.

United States Patent Application
20030171337
Kind Code
A1
Aylward, James Harrison ; et al.
September 11, 2003
Therapeutic agents - II
Abstract
The present invention relates generally to chemical agents useful in the treatment and prophylaxis of inflammatory conditions or in the amelioration of symptoms resulting from or facilitated by an inflammatory condition in a mammalian animal including human and primate, non-mammalian animal and avian species. More particularly, the present invention provides a chemical agent of the macrocyclic diterpene family obtaining from a member of the Euphorbiaceae family of plants or botanical or horticultural relatives thereof or derivatives or chemical analogues or chemically synthetic forms of the agents for use in the treatment or prophylaxis of an inflammatory condition or in the amelioration of symptoms resulting from or facilitated by an inflammatory condition in a mammal, animal or avian species. The present invention further contemplates a method for the prophylaxis or treatment of mammalian, animal or avian subjects for inflammatory conditions including chronic or transitory inflammatory conditions or for ameliorating the symptoms of an inflammatory condition by the topical or systemic administration of a macrocyclic diterpene obtainable from a member of the Euphorbiaceae family or botanical or horticultural relatives thereof or a derivative, chemical analogue or chemically synthetic form of the agent. The chemical agent of the present invention may be in the form of a purified compound, mixture of compounds, a precursor form of one or more of the compounds capable of chemical transformation into a therapeutically active agent or be in the form of a chemical fraction, sub-fraction or preparation or extract of the plant.

United States Patent Application
20030166613
Kind Code
A1
Aylward, James Harrison ; et al.
September 4, 2003
Therapeutic agents - I
Abstract
The present invention relates generally to chemical agents useful in the treatment and prophylaxis of infection by pathogenic or potentially pathogenic entities, or entities capable of opportunistic infection in mammals, including humans and primates, non-mammalian animals and avian species. More particularly, the present invention provides a chemical agent of the macrocyclic diterpene family obtainable from a member of the Euphorbiaceae

family of plants or botanical or horticultural relatives thereof or derivatives or chemical analogues or chemically synthetic forms of the agents for use in the treatment or prophylaxis of infection by pathogenic entities in mammalian, animal and avian subjects. The present invention further contemplates a method for the prophylaxis and/or treatment in mammalian, animal or avian subjects of infection or potential infection by pathogenic entities by the topical or systemic administration of a macrocyclic diterpene obtainable from a member of the Euphorbiaceae family of plants or their botanical or horticultural derivatives or a derivative, chemical analogue or chemically synthetic form of the agent. The chemical agent of the present invention may be in the form of a purified compound, mixture of compounds, a precursor form of one or more of the compounds capable of chemical transformation into a therapeutically active agent or in the form of a chemical fraction, sub-fraction, preparation or extract of the plant.

United States Patent Application
20030171334
Kind Code
A1
Aylward, James Harrison ; et al.
September 11, 2003
Treatment of prostate cancer
Abstract
A chemical agent of the diterpene family obtained from a member of the Euphorbiaceae family of plants for use in the treatment of prophylaxis of prostate cancer or a related cancer or condition.

United States Patent Application
20020107309
Kind Code
A1
Malanga, Joseph ; et al.
August 8, 2002
Water-based intaglio printing ink
Abstract
The invention relates to a water-based intaglio printing ink especially suited for the intaglio printing of security documents, such as postage stamps, stock certificates and the like, wherein the water-based intaglio printing ink having a) an epoxy resin ester reacted with an unsaturated monobasic acid and a reactive monomer, b) a glycol and/or glycol ether c) a pigment, d) a monoalkanolamine, e) a drier and f) water.

10.0 Appendicies

Appendix A- Companies Contacted & Follow-Up List

Company	Products they Buy or Specialize in?	Interest/ Comments	Follow Up?
Ray Cooper, Ph.D. VP of Botanical Research **Herbalife** rcooperphd@aol.com (650) 248-6127	This is an MLM company—they have an extensive line covering all aspects of health. Botanicals-oriented.		Yes, wants to talk more about products.
Larry Brucia Focus Sales & Marketing San Anselmo, CA Consultant to **Whole Foods**, and many companies. Creator of many products including Trail Mix Cel- (415) 269-2548	Larry is an innovator in the industry, and helps with product launches and innovations.	Had been involved in a project years ago (abandoned in 2001) that brought him to Peru about 6 times. Got very interested in Camu Camu, but didn't work with the company from Peru because he felt they were untrustworthy. He thought there is a very good application that nobody is aware of using the leaves as a tea (with Vitamin C content).	Can help us find the research on the leaves (the lab analysis)—thinks this is very exciting.
Diana Fort Head Buyer NuSkin/Pharmanex South San Francisco dfort@pharmanex.com	This is a very large MLM company with extensive line of products, covering all aspects of health.	She has forwarded email to the R&D team and they are looking it over.	She said she would get back to me if interest.
Nitesh Khakhar President of Health Aid, USA Foster City, CA niteshkhakhar@yahoo.com	A line of single herbal extracts—mostly European and standardized. They have largest selling Eleuthro on market	He sent email to R&D group in UK (Health Aid UK is parent company) to see if they are interested.	He said he would let me know if they are interested—I have not heard any more
Nan Fuchs, Ph.D **Editor, Women's Health Letter**	This newsletter goes out to a targeted group of	Said she would be interested if we had something that was	Once products have more technical story,

PO Box 1365 Sebastopol, CA 95473 http://www.womenshealthletter.com	baby-boomer aged women. She features new innovative products and companies for this category.	well-researched (had clinical studies) and is fairly new/innovative.	can follow up.
Dr. Zakir Ramazanov Pharmline (845) 469-6143 medicine@frontiernet.net	Distributor and Manufacturer of botanicals. Does research on cutting edge botanicals. Created Rhodiola for this market.		Yes, follow up.
Tony Evans & Steve Hill US-Nutra/ Valensa Florida	Manufacturer. Biggest CO2 extraction facility in US. Interested in new product development	They are not currently sourcing, but if there is an opportunity to do new product development, maybe	Yes.
Dr. Isaac Eliaz President IELIAZ@prodigy.net (also Emma Mann, Marketing Director, and John Guardino, R&D Director) EcoNugenics & Better Health Publishing Santa Rosa, CA www.econugenics.com www.dreliaz.com	Line of herbal products and proprietary formulas. Does much of own clinical research.	Does not carry Camu Camu or Sacha Inchi. But very interested if we have fairtrade or community-supporting angle to products.	Yes, follow up if there is something innovative with clinical research or if there is a community supporting (social responsibility angle. Not interested in regular extract—only if sustainability or traditional medicine story
John Harrison EcoTrend San Rafael, CA also B.C., Canada 604-876-9876 ext 201.	Distributor of many herbal products. Mainly in Canada, but increasing in U.S.	Very interested in this opportunity for new products. However, he has developed a new branding model for his company, and they will only carry products that have a sustainable and/or sociobenefits (like	Very interested only if the products are from verifiable sustainable sources—especially those with community supporting angle.

		fairtrade) for people	
Barb Apps President Diamond Lotus EO Mount Shasta, CA appsbarb@usa.net	A line of very high quality EOs grown in CA. Targeted at high-end Spas	Does not carry these products, but maybe interested in oil for massage applications?	Yes. Only would be interested in Sacha inchi oil if for body care application
Joseph Brinkman jbrinckmann@tradmed.com VP of R&D Traditional Medicinals Sebastopol, CA	High quality medicinal tea company. They are very particular on quality and don't just shop on price alone.	Does not see immediate interest for either products at TM right now. However, if pitched correctly might be a fit. (how about leaves/ tea application?)	Yes
Steven King, Ph.D. VP of Ethnobotany and Product Development Napo Pharmaceuticals sking@pspharma.com	They are now a pharmaceutical company focused on developing pharmaceutical drugs from natural sources. They also have one dietary supplement product.	They do not use either products, and does not see it as a fit for their current direction.	No.
Michael Tempesta, Ph.D. Phenolics, Inc. South San Francisco, CA natprod@aol.com	Line of high quality, high phenolic extracts—mostly fruits	Very interested in any high phenolic potential products. Wants a high (like 40%?) % total phenols for camu camu as determined by folin-C.	Wants me to call later in month.
Roy Upton Herbalist & Formulator Planetary Formulations/Threshold Ent. American Herbal Pharmacopoeia (AHP) Scotts Valley, CA herbal@got.net	Large line of botanicals and formulas	They are looking at using an organic camu camu extract for a new formulation (herbal C product)—I have asked for specs but he didn't send. He said they are using one from Essential Living Foods.	Yes
Thierry Jones Pres. US Division Diana Vegetal USA (parent company is French)	Large supplier of specialty fruit and vegetable extracts. Some colors. Mostly for	Forwarded email to French R&D team to see if there is interest.	Yes.

New York tjones@dianavegetalusa.com	food industry		
Barbara Bruckner Mattison Foster City, CA barbara@foodcom.com	Well known marketing and product development consulting house.	Will talk to me soon—interested.	Has not yet contacted me again, but said she is looking them over.
Tom Bohager (President of both companies) Kalyna Hanover (Director of Marketing) Enzymedica & Theramedix tombohager@usa.net	Lines of high quality enzymes. Enzymedica is a retail line and Theramedix is only a professional line. They use some herbs in formulations.	Does not see immediate fit.	Yes.
Rosa P. Ubillas, Ph.D. Group Manager - Analytical Research Shaklee Corporation 1992 Alpine Way, Hayward CA 94545 phone: 510-780-5898 fax: 510-887-8583 rubillas@shaklee.com	An MLM company with long history and wide variety of products.	Rosa is Peruvian and is interested in working with any suppliers and manufactuers from Peru.	Yes!
Brian Keating Sage Group Seattle, WA Sagebk@aol.com	Herbal tea retail and formulations. Also publishes the annual tea report.	Is very interested and wants to call me later—esp. interested in Inca peanut.	Yes. Wants samples
Lin Visser Simply H Los Angeles, CA Also, Arruba Lin@Simplyh.com	Children and Infant formulas	No immediate interest.	No.
Dennis McKenna, PhD Product Development Consultant St. Croix, MN djmckenna@earthlink.ne	Product developer and consultant. Professor at U of Minnesota	Formulating children's line—no immediate need.	No
Alex Moffett	Full line of	Yes, wants to talk to	No, he used to

Renaissance Herbs Carlsbad, CA renherbs@adsl.loxinfo.com	ayervedic herbs and some Asian herbs	me further. He is located in Bangkok, so will call me.—he called and has no immediate interest in Peru	work in S. America and is only interested now in Indian and Asian
Martin Almao Starbucks martin.almao@cox.net	High quality coffee and some supplements	I talked to him and he is now with Starbucks. He does not get involved with sourcing.	No—not unless there is a good fit.
Qun Yi President and CEO Pureworld Botanicals (201) 440-7411 fax (201) 342-8000	Full line of botanicals and extracts—large raw material supplier of industry.	He is interested in any new discoveries and products.	Yes.
Chris Daugherty Essential Living Foods Miami, Florida (805) 528-4176	Line of botanicals, fruits and spices. Esp. interested in organics and sustainability.	Suppliers of camu camu fruit concentrate, and sacha inchi oil. Interested in only good relationships with people doing things truly sustainable. Leaders in these products.	Yes
A.S.I. International Inc. - CA *18455 Burbank Blvd., Ste. 203* *Tarzana, CA 91356* Phone: (818)734-0072 (908) 753-4448 Fax: (818)734-0082 Email: carmen@info-asi.net Web: www.info-asi.net			Need to call NJ office for more info.
Advanced Nutra LLC *8759 Airport Road, Ste. C* *Redding, CA 96002* Toll Free: (800)409-6353		Maria Barajas They get some Inquiries, but only sell about 100 k at a time, not their main product 1000 k/year	Yes interested in follow-up

Phone: (530)223-1676 Fax: (530)223-2771 Email: Louis@advancednutra.com ; maria@advancednutra.com Web: www.advancednutra.com		estimate Buying from Peru (Interhealth) 10:1 4:1 food apps and dietary supps extract	
Contact: Kava American Sanjiang Bio-Fountain Inc. *378 S. Lemon Ave. Walnut, CA 91789* Phone: (909)595-3080 Fax: (909)595-3089 Email: sales@americansanjiangbio.com Web: www.americansanjiangbio.com	They list themselves as suppliers of camu camu but they are not. They are mostlly suppliers from China	Will check (Kava)—do not carry	Not so much..
Contact: Sauna BDS Natural Products *1904 1/2 E. Dominguez St. Carson, CA 90810* Phone: (310)518-2227 Fax: (310)518-2577 Email: swalker@bdsnatural.com Web: www.bdsnatural.com	Large line of botanicals—supplier of raw materials for industry	Only purchased once several years ago Extract—dietary supplement	Interested in followup—maybe for sources in future
Blue California *30111 Tomas Rancho Santa Margarita, CA 92688* Phone: (949)635-		Produce own material, not a strong product, does not have info on volumes	

1990 Fax: (949)635-1984 Email: sales@bluecal-ingredients.com Web: www.bluecal-ingredients.com			
Contact: Rick Merriam GCI Nutrients *1501 Adrian Road* *Burlingame, CA 94010* Phone: (650)697-4700 Fax: (650)697-6300 Email: walter@gcinutrients.com Web: www.gcinutrients.com	Supplier of extensive raw materials for industry		Still trying to get a hold of them
Paulo Altaffer President Nat-Trop *P.O. Box 410297* *San Francisco, CA 94141-0297* Phone: (415)334-7199 Fax: (415)334-7395 Email: paulo@nattrop.com Web: www.nattrop.com	Supplier of extensive raw materials for industry— They have been bought by RFI but still retain their name. They used to be an early supplier of camu camu.	Had a lot of inquiries for camu camu, most of what is sold out there is adulterated. Probably better quality if there was better agricultural sources, not wild. (narrow season, not stable or reliable source) In contrast, acerola is well cultivated and they know a lot about production that isn't known about camu camu. He generally steers people away from it when	Would be interested in follow up.—strategic relationships

		people ask. The price to product (standardized in vit. C) compared to acerola it doesn't make sense. Although the fruit itself does have higher C than acerola. Needs someone like Jamba juice or Odwalla to get interested in it to get it big (or Oprah, like Acai). Most were to a Canadian co called Jamieson, were doing a tablet (contract manufacturing). Were buying ingredients from another supplier that was adulterated, and they went to Paulo looking for fruit to make label claim. A few hundred k yearly. They still offer it and have inquiries. But no regular demand. If they were able to demonstrate stable supply and capacity, then they would get companies like Nutralight and Pharmanex Might be	

		interesting to do a juice concentrate. Jamba had asked in the past about it, but he didn't know of anyone that could supply year round in a HACCIP facility. Ask association of oil extractors about Inca Peanut.	
Kevin Mabry Hawk Biopharma *1400 N. Harbor Blvd., Ste. 640* *Fullerton, CA 92835* Phone: (714)879-9172 Fax: (714)879-9186 Email: hawklosangeles@sbcglobal.net Web: www.hawkglobal.com	They are listed as suppliers of camu camu, but they are not yet.	Interested in follow up—does not carry either product now but will source if he has customers… would be interested in potential sources—mostly interested in extracts	Yes
NHK Laboratories Inc. *12230 E. Florence Ave.* *Santa Fe Springs, CA 90670-3806* Toll Free: (866)NHKLABS Phone: (562)944-5400 Fax: (562)944-0266 Email: sharmin@nhklabs.com Web: www.nhklabs.com	They are listed as suppliers of camu camu		No response yet.
Ramon Fabela—Pacific Rainbow International Inc.		Havent sold any in the last two years. Would have to	Yes

19905 Harrison Ave. City of Industry, CA 91789 Toll Free: (888)821-8336 Phone: (909)468-4618 Fax: (909)468-4628 Web: www.prinutrition.com		source it if they got any inquiries.	
Omana Group LLC *11562 Knott Ave., Ste. 5* *Garden Grove, CA 92841* Phone: (714)891-9488 Fax: (714)891-9478 Email: info@eOmana.com Web: www.eomana.com	They are listed as suppliers of camu, but they are not		Not so much
Stauber Performance Ingredients Inc. *4120 N. Palm St. Fullerton, CA 92835-1026* Phone: (714)441-3900 Fax: (714)441-3909 Email: customerservice@stauberusa.com Web: www.stauberusa.com			No response yet
Meng Wang Watson Industries Inc. *895 S. Azusa Ave. City of Industry, CA 91748* Phone: (626)964-			No response yet

1835 Fax: (626)964-3615 Email: watsonii@earthlink.net Web: watsonii.com			
Frontier Natural Brands www.frontiercoop.com customercare@frontiercoop.com 800-669-3275	suppliers of raw materials for industry		No response yet
Nature's Sunshine 506 Ivy Lake Road Morrison, TN 37357 www.healthy-sunshine.com businesssop@healthy-sunshine.com 931-728-4965 or 888-523-1727 fax: 503-218-7355	Well known line of botanical supplements		No response yet
Ashaninka Imports P.O. Box 770065 Miami, FL 33177 www.ashaninka.com info@ashaninka.com 305-971-3008 fax: 305-971-3224			No response yet
Leslie Taylor Raintree Nutrition, Inc. P.O. Box 369 Carson City, NV 89702 www.rain-tree.com info@rain-tree.com (775) 841-4142 (9 am to 6 pm PST) Fax: (775) 841-4022			No response yet
Greg Pennyroyal Consultant and Product	Does a lot of interesting work	Would be interested in something with a	Yes

Developer- gpennyroyal@earthlink.net	promoting products from different regions of the world.	good story—perhaps the sacha inchi	
Barbara Bruckner Mattison barbara@foodcom.com	A marketing and advertisement consultant. Sometimes can suggest products to companies	She is interested and said she would contact me.	Still waiting to hear interest.
Shawn Talbott Consultant and Product Developer doctalbott@yahoo.com	Works with a number of companies in the natural products industries.	He is very interested if in fact camu camu is high in bioflavonoids	yes, please contact he is in need of material for product development!
Anthony L. Almada, BSc, MSc Founder, President, and Chief Scientific Officer IMAGINutrition®, Inc. and MetaResponse Sciences®19 Stoney Pointe Laguna Niguel, CA 92677 T: 949.363.5858 F: 949.363.1758 www.imaginutrition.com	Product developers and licensers	No interest currently in products, but said he would call if he did.	no
Michael W. Moers New U.S. mailing address: Ritz Tower 465 Park Ave. Apt. 14A New York, NY 10022 (US) Cel.917-940-2113 (INT) Cel.+41796115043 Until October 2005: 443 North Sea Mecox Rd. Southhampton, NY	Involved mostly now in Asia in marketing and distributing botanicals	No interest right now, but will think about them.	no

11968 631-283-5045			

Appendix B- List of Companies Who Claim to Carry Camu Camu in The Natural Products Industry Insider (Industry Listing):

Active Ingredients Group Inc.

Active Ingredient Floor 4, No. 316
Yuanda First Road
Changsha, China
Phone: +86-13-875-993264
Email: Anthony@aigi-herb.com

Alfa Chem

2 Harbor Way
Kings Point, NY 11024
Toll Free: (800)375-6869
Phone: (516)504-0059
Fax: (516)504-0039
Email: alfachem1@aol.com
Web: www.alfachem1.com

Amax NutraSource Inc.

1770 Prairie Road
Eugene, OR 97402
Toll Free: (800)893-5306
Phone: (541)688-4944
Fax: (541)688-4866
Email: lm@amaxnutrasource.com
Web: www.amaxnutrasource.com

Amazon Forest Botanicals Inc.

210 Kings Hwy., Bldg. B, Ste. 8
Landing, NJ 07850
Phone: (973)770-3590
Fax: (973)770-3596
Email: amazonfb@optonline.net
Web: www.amazonforest.net

American Botanicals

P.O. Box 158
24750 Hwy. FF

Eolia, MO 63344
Phone: (573)485-2300
Fax: (573)485-3801
Email: ambotncls@aol.com
Web: www.americanbotanicals.com

Arnhem Inc.

25 Commerce Drive
Cranford, NJ 07016
Toll Free: (800)851-1052
Phone: (908)709-4045
Fax: (908)709-9221
Email: info@arnhemgroup.com
Web: www.arnhemgroup.com

Bianca International Organic Inc.

7174 Marquette, Ste. 1
Montreal, QC H2E 2C8 Canada
Phone: (514)376-7711
Fax: (514)729-2100
Email: biologique@videotron.ca
Web: www.biorganic.ca

Blue Diamond Enterprises Inc.

720 McMath Mill Road Ext.
Americus, GA 31719
Phone: (229)928-0097
Fax: (229)928-0092

Buckton Scott Nutrition Inc.

24 Stewart Place
Fairfield, NJ 07004-1642
Toll Free: (866)BUCKTON
Phone: (973)882-0322
Fax: (973)882-0323
Email: cnoltebsn@earthlink.net
Web: www.buckton.com

Chart Corp. Inc.

787 E. 27th St.
Paterson, NJ 07504
Phone: (973)345-5554
Fax: (973)345-2139
Email: chartcorp@aol.com
Web: www.chartcorp.com

Complant Ningbo I/E Ltd.

12/F, Zhongshan Mansion
93 E. Zhongshan Rd.
Ningbo, ZJ 315000 China
Phone: +86-57-481-188463
Fax: +86-57-487-260917
Email: nbpharm@yahoo.com.cn
Web: www.nbpharmchem.com

CPB International Inc.

3 Golden Slipper Road
Bartonsville, PA 18321
Toll Free: (888)539-9781
Phone: (570)629-0700
Fax: (570)629-2100
Email: slukas@cpbweb.com
Web: www.cpbweb.com

E.M. Sergeant Pulp & Chemical Co. Inc.

6 Chelsea Road
Clifton, NJ 07012
Phone: (973)472-9111
Fax: (973)472-5686
Email: dchristman@sergeantchem.com
Web: www.sergeantchem.com

Ecuadorian Rainforest LLC

1265 McBride Ave.
W. Paterson, NJ 07424
Phone: (973)237-9833
Fax: (973)237-9838
Email: ecuadorian.rainforest@verizon.net

Web: www.intotherainforest.com

Essential Fine Ingredients Inc.

P.O. Box 468
One Channel Drive
Port Washington, NY 11050
Phone: (516)944-8700
Fax: (516)944-8788
Email: JJKroez@aol.com
Web: www.essentialfineingredients.com

Essential Wholesale

8850 S.E. Herbert Court
Clackamas, OR 97015
Toll Free: (866)252-9639
Phone: (503)722-7557
Fax: (503)296-5631
Email: sales@essentialwholesale.com
Web: www.essentialwholesale.com

Gaia Herbs Inc.

108 Island Ford Road
Brevard, NC 28712
Toll Free: (800)831-7780
Phone: (828)884-4242
Fax: (883)883-5966
Email: ACC@GaiaHerbs.com
Web: www.gaiaherbs.com

Geni Herbs

1250 E. Conner St.
Noblesville, IN 46060
Toll Free: (888)656-GENI
Phone: (317)776-3600
Fax: (317)776-3650
Email: debra@geniherbs.com
Web: www.geniherbs.com

GreeNeem K. Sivaram Bros.

108-3-A Ramamoorthy Road

Virudhunagar, TN 626001 India
Phone: +91-45-622-80885
Fax: +91-45-622-81448
Email: ksivarambros@yahoo.com
Web: www.greeneem.com

H. Bilal & Co.

71/35 Mohamed Sadalipuram
Tuticorin, TN 628002 India
Phone: +91-46-123-22425
Fax: +91-46-123-23886
Email: asixa@vsnl.net
Web: www.hbilal.com

Hebei Sanxin Industry Group

5/F Fullhope Plaza Area B
12 HongKong Middle Road, Qingdao
Tangshan, HE 063301 China
Phone: +86-53-250-26592
Fax: +86-53-250-26593
Email: shijiechem-qd@public.qd.sd.cn
Web: www.sanxingroup.com

Inca Health S.A.

Paul Harris 270, #304
Lima, BR 04 Peru
Phone: +51-12-475-918
Fax: +51-12-472-613
Email: info@incahealth.com
Web: www.incahealth.com

Internaturales LLC

P.O. Box 19-1597
Miami Beach, FL 33119
Phone: (305)726-8420
Fax: (305)847-2656
Email: jrossel@internaturales.com
Web: www.internaturales.com

IRMA Corp.

216 Tingley Lane

Edison, NJ 10113
Phone: (212)353-0330
Fax: (908)769-7170
Email: mthomey@irmacorp.com
Web: www.irmaexpress.com

Maypro Industries Inc.

2700 Westchester Ave.
Purchase, NY 10577
Phone: (914)251-0701
Fax: (914)251-0746
Email: tktac123@aol.com
Web: www.maypro.com

Modern Natural Products

109-A Mittal Chambers
Nariman Point
Mumbai, MA 400021 India
Phone: +91-22-228-73604
Fax: +91-22-228-10509
Email: mnpindia@vsnl.net
Web: www.modernnatural.biz

Mueggenburg North America

1179 Atlantic Blvd.
Atlantic Beach, FL 32233
Phone: (904)249-8074
Fax: (512)853-6851
Email: pb@muepr.com
Web: www.paulmueggenburg.com

Nature's Thyme LLC

8 E. Frederick Place, Ste. 104
Cedar Knolls, NJ 07927
Toll Free: (866)528-1100
Phone: (973)267-0700
Fax: (973)267-1303
Email: info@naturesthyme.com
Web: www.naturesthyme.com

Naturex Inc.

300 Waverly Ave.
Mamaroneck, NY 10543
Phone: (914)381-5995
Fax: (914)381-5985
Email: naturex.usa@naturex.com
Web: www.naturex.com

NutriScience Innovations LLC

2226 Black Rock Turnpike, Ste. 206
Fairfield, CT 06825
Phone: (203)334-3535
Fax: (203)366-1850
Email: sales@nutriscienceusa.com
Web: www.l-theanine.com; www.nutriscienceusa.com

Paul Schueller International Inc.

6 Oak Lane
Scarsdale, NY 10583-1622
Phone: (914)722-9200
Fax: (914)722-9202
Email: schueller@att.net

Phytoline Inc.

C-606, Chuanye Bldg.
16 Gaoxin Road, No. 1 Xi'an Hi-Tech Development Zone
Xi'an, SH 710075 China
Phone: +86-29-883-22516
Fax: +86-29-883-14471
Email: stevelee@pub.xaonline.com

Premier Research Labs

2000 N. Mays St., Ste. 120
Round Rock, TX 78664
Toll Free: (800)325-7734
Phone: (512)238-7047
Fax: (512)244-2073
Email: info@prlabs.com
Web: www.prlabs.com

Rainforest Botanicals LLC

P.O. Box 771686
Miami, FL 33177
Phone: (305)235-9880
Fax: (702)973-8749
Email: info@rainforesbotanicals.com
Web: www.rainforestbotanicals.com

Raw Deal Inc.

300 Valentine St., Ste. G
Hachettstown, NJ 07840
Phone: (908)979-0775
Fax: (908)9790771
Email: bsteinlight@aol.com
Web: www.raw-deal.net

RFI Ingredients

300 Corporate Drive, Ste. 14
Blauvelt, NY 10913
Toll Free: (800)962-7663
Phone: (845)358-8600
Fax: (845)358-9003
Email: stevenl@rfiingredients.com
Web: www.rfiingredients.com

RIA International LLC

9 Whippany Road, Ste. C-3
Whippany, NJ 07981
Toll Free: (888)301-2011
Phone: (973)581-1282
Fax: (973)581-1283
Email: kj@riausa.com
Web: www.riausa.com

Ricera American Corp.

3651 42nd Ave. S., Ste. C-104
St. Petersburg, FL 33711
Phone: (727)865-6768
Fax: (727)865-1101
Email: sales@ricera.com

Web: www.ricera.com

Scandinavian Formulas Inc.

140 E. Church St.
Sellersville, PA 18960
Toll Free: (800)688-2276
Phone: (215)453-2507
Fax: (215)257-9781
Email: cpeklak@scandinavianformulas.com
Web: www.scandinavianformulas.com

Suan Farma Inc.

12 Route 17 N.
Paramus, NJ 07652
Phone: (201)556-1800
Fax: (201)556-1808
Email: gonzalomarin@suanfarma.com
Web: www.suanfarma.com

Synergy Production Labs

2279 S. Resource Blvd.
Moab, UT 84532
Phone: (435)259-4787
Fax: (435)259-2328
Email: spl@synergyproduction.com
Web: www.synergyproduction.com

Appendix C. Sample Specification Sheets
NAT-TROP SPECIFICATION SHEET

Name: Camu-Camu Dry Extract **Botanical Name: *Myrciaria dubia*** **NTP #: N1510**
Part Used: Fruit **Shelf Life: 2 years** **Packaging: Double poly bag in**
Revision: 1.0 Revision Date: 10/6/98 fiber drum w/desiccant

Description	Claim/ Target	Limits 1 min	Limits 1 max	Limits 2 min	Limits 2 max	Units	Method
Botanical Identity	Myrciaria dubia Fruit						Vissual
Physical Characteristics	Fine Hygroscopic Powder						Visual
Mesh Size		100				%	Thru USSS 40 Mesh
Color	Purplish Red to Pink						Visual
Odor/Taste	Sweet, acid, characteristic						
Vitamin C Content		*5*				%	
Solvents Used	none						
Ratio	*5*:1						
pH		3	3.5				
Loss on Drying		*5*				%	PROCYON PHN-4(Sol.10%)
Solubility	Soluble in water					%	2g/105C/2h
Aerobic Plate Count			10,000			cfu/g	
Mould & Yeast		100				cfu/g	
Gram Negative		Negative					
Escherichia coli		Negative					
Staphylococcus aureus		Negative					
Pseudomonas aeruginosa			Negative				

Salmonella sp		Negative
Heavy Metals		10
ppm	Atomic Absorption	
Clorate Organics		0.01
ppm	Gas Chromatography	
Phosphate organics		0.1
ppm	Gas Chromatography	

Ingredients: Malpighia glabra fruit, malto dextrn
Production Method: concentration, spray-drying

This information is presented in the belief that it is accurate and reliable; however, no warranty, either expressed or implied and no freedom from liability from patents, trademarks, or other limitations should be inferred. Any data listed are averages only and are not to be considered as guarantees expressed or implied, nor as a condition of sale.