

# ARTICLE ON THE SOUTH AMERICAN RAINFOREST

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## Introduction

The excitement of discovery is forever growing and the jungle of South America is one area where that thrilling adventure is capturing the imagination of the media and scientists alike. Books are starting to appear with titles like "Rainforest Remedies <sup>1</sup>", "Sastun - my apprenticeship with a Maya healer <sup>2</sup>" and the "Ethnobotany of the Waimiri Atroari Indians of Brazil <sup>3</sup>", which are testimony to the avid market for this wealth of untapped knowledge.

The quest for new information and the opportunity to acquire new exciting materials is to be applauded, but only if those materials can be provided at a cost that is not at the expense of the environment or of the people that produce them. Happily, this can be achieved by the careful choice of your supplier.

This article will look at some of the new South American materials that will add benefit to skin care and toiletry products, while at the same time provide intriguing and novel story lines to their pack copy.

## Guarana (*Paullinia cupana*)

A plant so valuable to the local Indians, that it was used as a form of currency. Locally, it had the name "secret eyes", because the red pods split to reveal chestnut-brown seeds with a round white middle. It was as if you were being looked at by a tree full of peering eyes <sup>4</sup>.

It contains caffeine (3-5%) though other sources report that caffeine can be up to 7%, alkaloids theophylline, theobromine and also contains xanthine derivatives, it is high in tannins about 12% (primarily catechutannic acid, d-catechin, and catechol). It also contains trace amounts of saponin (known as timbonine.) and includes starch, fats, choline, pigments. Guarana contains very high concentrations of caffeine and related alkaloids and its pharmacologic effects are similar to those of coffee or tea <sup>5,6</sup>.

Though guarana is probably best known for its energy giving properties, it is also a valuable astringent and skin tonic, which has been used successfully in products designed for cellulite. The xanthine derivatives have vasodilating properties that are ideally suited to this role.

## Pau d'Arco (*Tabebuia avellandae*)

The bark of the Pau d'Arco tree has been the subject of much debate and first came to the attention of the media as a cure for cancer (used both internally and externally). There are three main varieties of Pau d'Arco, namely *Tecoma fabrisi* Meyer, *Tabebuia*

*avellanadae* Lorentz [Syn. *Tabebuia impetiginosa*] or lapacho rosado and *Tabebuia ipé* Mart. [Syn. *Tabebuia heptaphylla*] or lapacho morado. There are other species such as *Tabebuia roseo-alba* and *Tabebuia rosea* or roble colorada, which also show useful activity on the skin.



These varieties have numerous uses, from the treatment of cancer (anecdotal evidence) to circulation problems, diabetes, stubborn gum diseases, cataracts and other diseases. The topical uses include the treatment of acne, pimples, psoriasis and rashes, with success reported for the treatment of sunburn and wound healing (e.g. burns, haemorrhoids and cuts) <sup>7</sup>.

The name *Tabebuia impetiginosa* is taken for the success of the plant against impetigo, a *Staphylococcus* or *Streptococcus* infection.

Folk lore have included the treatment of boils, chlorosis, syphilis and external wounds. Extracts of the plant have recently been used topically for the management of

*Candida albicans* infections.

Chemical analysis of taheebo has led to the isolation of numerous quinone constituents and a variety of minor compounds from the inner bark and heartwood. These include the naphthaquinones lapachol and  $\beta$ -lapachone, and the anthraquinone tabebuin. Lapachol is present at a level from 2% to 7% <sup>8</sup>.

The inner bark of *Tecoma curialis* Soldanha da Gamma is also sometimes marketed as Páu d'Arco <sup>9</sup>.

Pau d'Arco has anti-viral activity, which is attributed to the lapachol,  $\beta$ -lapachone, hydroxynaphthaquinones, and the bioflavonoid quercetin. Lapachol has proved very effective against herpes simplex virus types I and II (amongst others), and quercetin, apart from its general anti-viral activity, is also active against herpes. According to Brazilian research, lapacho and isolated constituents of lapacho are active against several tropical parasites. Lapachol, as well as  $\alpha$ - and  $\beta$ -lapachone and quercetin, were shown to have an anti-parasitic action. The quinones (naphthoquinones), especially xyloidone, are very effective against *Candida albicans* <sup>10</sup>.

### **Yerba Mate (*Ilex paraguariensis*)**

*Ilex paraguariensis* or *Ilex paraguayensis* (Aquifoliaceae) is known by the names of Yerba Mate or Mate and locally as Mate, Paraguay Cayi, Paraguay Tea, South American Holly, Jesuit's Brazil tea; St. Bartholomew's Tea <sup>11</sup>.

It is a tonic, stimulant, diuretic, immunomodulator and alterative.

Maté is stated to possess CNS stimulant, thymoleptic, diuretic, antirheumatic, and mild analgesic properties. Traditionally it has been used for psychogenic headache

and fatigue, nervous depression, rheumatic pains, and specifically for headache associated with fatigue<sup>12</sup>.

The phytochemicals present include: 2,5-xyleneol, 4-oxolauric-acid, 5-*o*-caffeoylquinic-acid,  $\beta$ -amyrin, butyric-acid, caffeine, chlorogenic-acid, chlorophyll, choline, essential oil, fibre, inositol, isobutyric-acid, isocaproic-acid, isovaleric-acid, neochlorogenic- acid, nicotinic acid, pantothenic acid, protein, pyridoxine, resin, resinic acid, riboflavin, rutin, stearic acid, tannin, theobromine, theophylline, trigonelline, ursolic-acid and vanillin<sup>13</sup>.

*In vivo* hypotensive activity in rats has been reported for an aqueous extract of *Ilex pubescens* (commonly referred to in Chinese as Mao Dong Qing or MDQ), it was concluded that intravenous administration of MDQ releases histamine. The xanthine constituents, in particular caffeine, are the active principles in maté. The pharmacological actions of caffeine are well documented and include stimulation of the CNS, respiration, and skeletal muscle, in addition to cardiac stimulation, coronary dilation, smooth muscle relaxation and diuresis<sup>12</sup>.

The xanthine constituents would warrant examination of this plant as a treatment in skin firming and cellulitis products.

### **Marapuama (*Ptychopetalum olacoides*)**

This is (literally) one of the sexiest ingredients that one could incorporate into a toiletry product.

Confusion exists in the literature as to the botanic origin of Muira Puama or Potency Wood. It has been said to derive from *Liriosma ovata* Miers or *Acanthea virilis*, but it is now believed to consist of the wood, stem bark, and root of two Brazilian shrubs of the family Oleaceae, *Ptychopetalum olacoides* Bentham and *Ptychopetalum uncinatum* Anselmino. The drug has a long history of use in Brazilian folk medicine as a remedy for impotence.

Muira puama or Marapuama is recommended as an aphrodisiac and nerve tonic, indicating that the resin it contains has a strong stimulating effect on the central nervous system. An aqueous decoction or alcoholic extract is administered internally, but the effect is also obtained (reputedly) by bathing the genitals with a concentrated extract of the drug. The root bark is considered especially active.

Chemical studies have identified lupeol in the bark, but not in the wood, of *P. olacoides*, campesterol and  $\beta$ -sitosterol have also been identified. The bark also contains lipophilic esters, behenic acid<sup>9</sup>, there are also phytosterols present<sup>6</sup>.

Stomach ache is cured by drinking an infusion of the bark. An aphrodisiac drug is prepared from the roots of the young plants. Marapuama constitutes one of the ingredients of a medicine used by the caboclos of the lower Amazon to treat rheumatism. A decoction of the roots is also said to prevent baldness and paralysis. A decoction of the bark is used by the Wayapi Indians of French Guiana as a fortifying bath for children<sup>3</sup>.

Watson <sup>14</sup> refers to the tree as potentwood, and it is a South American aphrodisiac used in the Amazon and Orinoco basins for centuries to stimulate sensuality, as a sexual enhancer, and as a treatment for impotence and frigidity. Brazilian natives make a strong decoction of the bark and wood that they rub into their genitals, and they also drink a fluid extracted from the plant.

### **Catuaba (*Trichillia catigua*)**

Catuaba is a medium-sized vigorous growing tree in the northern part of Brazil, the Amazon, Para, Pernambuco, Bahia, Maranhao, and Alagoas. It produces yellow and orange flowers, and small, oval, dark yellow inedible fruit. Catuaba is known by two botanical names in Brazil, *Juniperus brasiliensis* and *Erythroxylum catuaba*.

Locally it is known by the names catuaba, chuchuhuasha, tatuaba, pau de reposta, caramuru or piratancara. It is the bark that is used in infusion, and 2-3 cups are drunk over a period of time. This causes erotic dreams, and then increased sexual desire.

Catuaba, of the family *Erythroxylaceae*, is undoubtedly the most famous of all Brazilian aphrodisiac plants, and has been appreciated by the local populations for generations. This valued herb from the Brazilian rainforest is praised by the Tupi Indians of Brazil as being an excellent nervous system fortifier and male libido enhancer.



The Tupi Indians first discovered the qualities of the plant and composed many songs praising it. The bark of Catuaba functions as a stimulant of the nervous system, and as innocent aphrodisiac, used without any ill side effects at all.

Historical uses include its use as a male aphrodisiac, and also a tonic to the male organs. It is also used to treat male impotency. It is a strong tonic and fortifier of the nervous system, it helps to eliminate restless sleep and insomnia from hypertension, and has been known to help failing memories.

In European herbal medicine, catuaba is also considered to be an aphrodisiac, and a brain and nerve stimulant with a bark tea used for sexual weakness, impotency, nervous debility and exhaustion. Herbalists and health practitioners in the U.S. use Catuaba in much the same way; as a tonic for the genitals as well as a central nervous system stimulant, for sexual impotence, general exhaustion and fatigue, for insomnia related to hypertension, agitation, and poor memory.

The constituents found in Catuaba include a bitter substance, alkaloids, tannins, aromatic oils and fatty resins, phytosterols and cyclolignans. Clinical studies on catuaba have found that it has antibacterial and antiviral properties. A clinical study conducted in 1992 indicated that an extract of catuaba was effective in protecting mice from lethal infections of *Escherichia coli* and *Staphylococcus aureus* <sup>15</sup>.

### **Bitter melon (*Momordica charantia*)**

It is a member of the Cucurbitaceae family and is known by a number of common names: Sorosi, A'Jayib Al Maasi, Assorossie, Balsam Apple, Balsampear, Chin Li Chih, Ejinrin Gule Khandan, K'U Kua Kurela, Lai P'U T'Ao, Melao De Sao Caetano, Nd, Salsamino, Sorci, Sorossi, Sorossie, Sorossies, Pare, Peria laut, Peria, Periok

The plant the fruit and the seeds are all used.

It contains 5- $\alpha$ -stigmasta-7, 25-dien-3- $\beta$ -ol, 5-hydroxytryptamine, alkaloids,  $\alpha$ -elaeostearic acid, ascorbigen,  $\beta$ -sitosterol-d-glucoside, charantin, citrulline, cryptoxanthin, elasterol, flavochrome, galacturonic acid, lanosterol, lutein, lycopene, momordicin, various momordicosides, oxalic acid, pipercolic acid, rubixanthin, stigmasta-5, 25-dien-3-beta-ol, sugars, zeaxanthin and zeinoxanthin



Researchers have discovered two proteins in the seeds of the bitter melon (*Momordica charantia*) which were shown to exert an immunosuppressive effect, but were non cytotoxic. The proteins (alpha and beta momorcharin) appeared to modulate the activity of both T and B lymphocytes and significantly suppressed the macrophage activity<sup>17</sup>.

Bitter melon has had much traditional use in the Orient as a foodstuff and "tonic". Several other principles have been isolated from the plant, including a blood sugar lowering fraction, an anti-tumor fraction and an antifertility fraction (a lectin). The plant could be of benefit in rheumatoid arthritis and lupus.

It has numerous reported benefits for boils, burns, skin eruptions, itching skin, piles, psoriasis, rheumatism, sores, wound healing. In Africa, the plant is recommended for wounds, cuts and sores. *Momordica charantia* or African Cucumber (as it is known there), is used by pounding the fruit and using the oily pulp as a dressing<sup>16</sup>. The leaf decoction is used by the Cuna for measles. It is also reported to have styptic and astringent properties.

*Momordica charantia*, is also a plant found in China, where it is (not surprisingly) known as Chinese Bitter Melon. It has been used in traditional Chinese medicine as an appetite stimulant, a treatment for gastrointestinal infection, and to lower blood sugar in diabetics. Recently, it has also been used in the treatment of certain types of cancer and viral infections.

### **Suma (*Pfaffia paniculata*)**

Suma is a large, scrambling, shrubby ground vine, which has a complex root system that burrows deep into the ground. It is indigenous to the Amazon basin area and other tropical parts of Brazil, Ecuador, Panama, Paraguay Peru and Venezuela. It has been

referred to by a number of botanical names including *Pfaffia paniculata*, *Hebanthe paniculata* and *Gomphrena paniculata*.

Suma also known as Brazilian Ginseng, *Pfaffia*, Para Toda, or Corango-acu is native to the Atlantic rain forest region of Brazil. This wild perennial, belonging to the family *Amaranthaceae* is an adaptogenic herb, similar to Chinese ginseng. It is normally the roots that are used.

The active substances are reported as saponins, pfaffosides A,B,C,D,E,F, and pffafic acid. It is normally standardised against  $\beta$ -ecdysterone (a phytosterol or phytosteroid hormone). It also contains ecdysonsone, which has shown analgesic and anti-diabetic activities in human studies. Other trace elements have been found, including germanium, allantoin, minerals, and amino acids.

The root of *Pfaffia paniculata* has been used by the native Brazilians for three centuries as a tonic, aphrodisiac, and as a remedy for general wound healing. Adaptogens such as Suma and Ginseng help the body achieve balance, resulting in improved resistance to infections and increased resistance to stress. It has also been shown to have anti-inflammatory properties<sup>19</sup>. It is also reported to accelerated wound and fracture healing.

Suma has been used as a tonic, an aphrodisiac, a calming agent and to treat ulcers for at least 300 years, and is an important herbal remedy in the folk medicine of several indigenous Indian tribes today.

### ***Acerola (Malpighia glabra)***

*Malpighia glabra* is small tree or shrub that is native to the West Indies and also found in northern South America, Central America and Jamaica. It grows up to 5 meters high in the dry deciduous forest and can be found growing wild and under



cultivation on the sandy soils throughout Northeast Brazil. It An acerola is the fruit of the tree, and is bright red, 1 to 2 cm in diameter, with several small seeds and has an appearance similar to the European Cherry. The acerola is also known as "Antilles Cherry" or "Barbados Cherry." Known in the tropics as the "health tree"<sup>20</sup>. The mature fruits are juicy and soft with a pleasant tart flavour and they contains about 80% juice and a large amount of vitamin C as well as iron, calcium and phosphorous.

The vitamin C content of acerola varies depending on ripeness, seasons, climate and region, but is at its highest while the fruit is still green. The fruit loses a great deal of vitamin C as it ripens, and so is usually harvested when it is green.

Acerola is one of the richest known source of vitamin C, oranges provide 500 to 4,000 parts per million Vitamin C or ascorbic acid, while Acerola has assayed in a range of 16,000 to 172,000 parts per million ascorbic acid. Acerola can be up to 4.5% Vitamin C compared to 0.05% in a peeled orange<sup>21</sup>. Compared to oranges, Acerola provides twice as much magnesium, pantothenic-acid, and potassium. Other vitamins present include Vitamin A (4,300-12,500 IU/100g compared to approx 11,000 IU for raw carrots), thiamine, riboflavin and niacin in concentrations comparable to those in other fruits.

It's western use is mostly associated with its high content of vitamin C, which has come under a great deal of recent attention as a free radical scavenger due to its antioxidant properties. *Malpighia glabra* has also shown active anti-fungal properties.<sup>22</sup> It can now be found in many over-the counter supplements in America as a natural form of Vitamin C in multi-vitamins. Recent research in cosmetology indicates that vitamin C is a powerful antioxidant and free radical scavenger for the skin as well. For this reason Acerola extracts are now appearing in skin care products which fight cellular aging. In addition to its vitamin content, Acerola contains mineral salts which has shown to aid in the remineralization of tired and stressed skin, while the mucilage and proteins have skin hydrating properties and promote capillary conditioning.

Controversy has focussed on whether vitamin C derived from "natural" sources is more physiologic than that produced synthetically or semi-synthetically (as ascorbic acid). To date, there is no clear evidence that naturally-derived vitamin C is superior in its clinical effectiveness than synthetic ascorbic acid. A potential advantage of using acerola as a source of vitamin C is that one derives not only ascorbic acid, but also several other useful vitamins and minerals from the fruit<sup>23</sup>.

### **Stevia (*Stevia rebaudiana*) Bertoni**

It is also known by the attractive name of Sweet Leaf of Paraguay.

Stevia is a plant native to Paraguay. Stevia is a perennial shrub of the Compositae family, it is now been grown commercially in Brazil, Paraguay, Uruguay, Central America, the United States, Israel, Thailand, England, Russia and China.

It has been used by the Guarani Indians since ancient times, long before Columbus arrived in the New World. They call it *Kaa jheé* and have used it to sweeten their Yerba Mate tea for centuries. They have also used it to sweeten other medicinal teas and foods as well as use it medicinally as a cardiogenic, for obesity, hypertension, heartburn, and to help lower uric acid levels.

As a sugar substitute, it is available as a concentrated liquid, crushed leaf or concentrated white powder. The liquid and leaf forms have a slight herbal overtone, which reminds some of anise (licorice). Europeans first learned of stevia when the Spanish Conquistadors of the Sixteenth Century sent word to Spain that the natives of South America had used the plant to sweeten herbal tea for generations.

The greenish-black concentrated liquid is 70 times as sweet as sugar. The crushed leaf form is about 30 times as sweet as sugar. In regard to its sweetening power, it is estimated that 30 ml (1 oz) of Stevia extract is equivalent to 3 Kg (6.6 lbs) of sucrose.

The leaves contain several chemicals called glycosides, which taste sweet, but do not provide calories. The major glycoside is called stevioside, and is one of the major sweeteners in use in Japan and Korea.

Research also suggests that stevia may help fight bacteria, though literature to substantiate this is not available at the time of writing.

## **Conclusions**

The Rainforest provides a real opportunity for the formulating chemist and for the marketing team looking for a really fresh and exciting look to their new product range. As with all plants, the real benefits can only be realised by the use of meaningful levels in their products.

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