

FRUITION
botanicals



**Duas
Rodas**

Flavors & Botanicals

NATURAL VITAMIN C



DISCOVER VITAMIN C

Ascorbic acid is a six-carbon ketolactone, structurally related to glucose and other hexoses. It is reversibly oxidized in the organism in dehydroascorbic acid. The latter compound has the full activity of the Vitamin C. Humans and primates are the only living beings that cannot synthesize vitamin C from glucose, so they require the intake of this vitamin through food to prevent their deficiency.

WHERE IT CAN BE FOUND

Vitamin C or ascorbic acid is a water-soluble vitamin found in abundance in many fruits, but some commercially available fruits stand out for their high vitamin C content. Both Acerola and Camu-camu, two fruits fully adapted to the tropical climate, are known as those with the highest natural sources of Vitamin C, in addition to containing several other nutrients, such as phenolic components, which make them attractive and increasingly popular in the human diet.

APPLICABILITY

- Food Supplements
- Functional Beverages
- Dairy Products
- Cereal Bars
- Meat and Fish Products
- Bakery
- Cosmetics

MAIN BENEFITS OF VITAMIN C CONSUMPTION

Improves cicatrisation of wounds, ulcers and bone fracture healing.

Fights infections, improves iron absorption, and reduces triglyceride and cholesterol levels.

Prevents gastrointestinal diseases.

It has a modulating action of insulin, contributing to glycemic control.



Boosts the immune system.

It improves the vasomotor capacity of coronary arteries in patients with hypertension and ischemic heart diseases, decreases arterial hardening and platelet aggregation and reduces atherogenesis.

Promotes the regeneration of muscles, skin, teeth and bones, and collagen formation.

Antioxidant activity, fights free radicals.

Helps body cells to grow and remain healthy.



ACEROLA

Brazil is the largest global producer of acerola, a source of 30 times more Vitamin C than orange. In order to maintain the active natural components of fruits, Duas Rodas has a structure that handles the harvesting and processing within 24 hours. Due to the fragility and quick degradation

of the fruit, which can jeopardize the natural components, especially the Vitamin C content, the processed fruit is selected already in the harvest to preserve all its functional properties. Duas Rodas offers Dehydrated Acerola in powder standardized between 17% and 40% of natural vitamin C.

DUAS RODAS PRODUCTS

Acerola Extract and Dehydrated Acerola Powder
- Standardized from 17% to 40% of natural Vitamin C



GREATER BIOAVAILABILITY

Synthetic and natural Vitamins C are chemically identical; however, some studies suggest that the presence of other nutrients, such as minerals, fibers and phytochemicals, could influence their bioavailability. Several studies based on animal samples, attributed to flavonoids the function of increasing the bioavailability of Vitamin C¹.

Uchida et al., 2011, investigating the possibility of other food components interaction in the ascorbic acid absorption and excretion, compared the bioavailability of ascorbic acid administered alone with that naturally present in acerola juice. The results evidenced that acerola juice promoted better plasma absorption for ascorbic acid and minimized its excretion via the urine when compared to ascorbic acid alone.



¹CARR, A. C.; VISSERS, M. C. M. Synthetic or Food-Derived Vitamin C—Are They Equally Bioavailable? *Nutrients*, v. 5, p.4284 - 4304, 2013

UCHIDA, E.; KONDO, Y.; AMANO, A.; AIZAWA, S.; HANAMURA, T.; AOKI, H.; NAGAMINE, K.; KOIZUMI, T.; MARUYAMA, N.; ISHIGAMI, A. Absorption and Excretion of Ascorbic Acid Alone and in Acerola (*Malpighia emarginata*) Juice: Comparison in Healthy Japanese Subjects. *Biological and Pharmaceutical Bulletin*, v. 34, n.11, p.1744-1747, 2011



CAMU CAMU

The aromatic and astringent tasting fruit, considered native of the Amazon basin, is found in Brazil, Peru, Colombia, Ecuador and Bolivia. Harvested between the

months of November to May, it is recognized as one of the fruits with greater content of Vitamin C - the productivity and content of the vitamin can be influenced by region and climatic conditions.

DUAS RODAS PRODUCTS

Camu-camu Extract and Dehydrated Camu-camu
- Standardized up to 20% of vitamin C

NATURAL ANTIOXIDANT



MORE ABOUT THE ANTIOXIDANTS

Natural antioxidants are molecules present in food, in small quantities, that are capable of interrupting the formation of free radicals slowing down the aging of human bodies. Free radicals, or oxidants, are substances that the human body continuously produces as a result of normal metabolic processes, such as breathing and digestion, and which are also generated by the influence of external factors - such as pollution, smoking, alcohol and malnutrition.

WHERE IT CAN BE FOUND

Among all polyphenolic compounds, anthocyanins can be highlighted. Anthocyanins are a group of purple colored pigments found in various fruits such as açai, maqui, blueberries, and in flower - as hibiscus. On the subject of antioxidant activity, maqui and açai stand out from other fruits, according to Oxygen Radical Absorbance Capacity studies measuring in vitro antioxidant activity that were carried out at various universities and in credentialed laboratories - in order to compare antioxidant activity in fruits.

APPLICABILITY

- Food Supplements
- Functional and Mixed Beverages
- Soft Drinks
- Frozen Desserts
- Cereal Bars
- Chocolate
- Cosmetics
- Coloring Foodstuff

ANTIOXIDANT AND ANTI-FREE RADICAL ACTIVITIES





AÇAÍ

This Superfruit from Amazon is a great source of energy due to its calorific value and contains a high concentration of fibers, minerals, vitamin E that contributes to the proper functioning of the digestive system. The anthocyanins found naturally in the fruit are

powerful antioxidants that when added to food provide color and avoid self-oxidation; its pigment is an important alternative for gradually replacing synthetic coloring, which has great intensity of color together with the beneficial effects for human health.

DUAS RODAS PRODUCTS

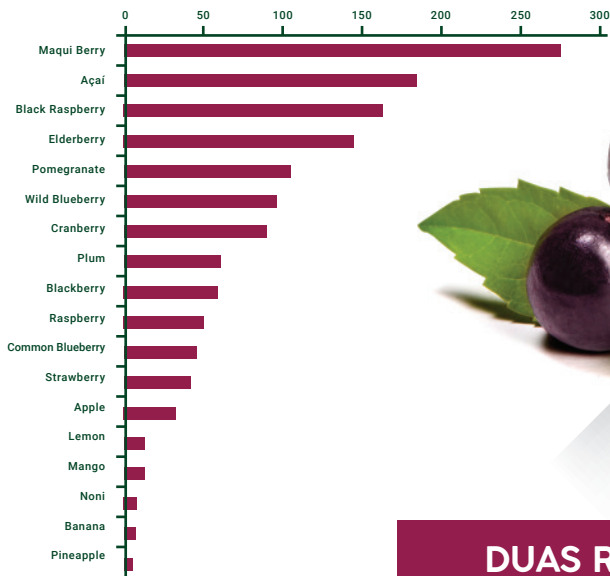
- Powder Açai Extracts
- Dried Açai Powder and Flakes

Standardized in total polyphenols or anthocyanins



NATURE'S ANTIOXIDANTS

Antioxidant activity in ORAC ($\mu\text{Mol TE/G}$) in fruit



MAQUI

Its consumption is millenarian: even before Spanish colonization in Chile, the maqui was known and consumed by the Mapuche Indians, who called it the "sacred tree". In their language, maqui means fruit, which can be found in the Chilean and Argentinean Andes and has propagation by seeds. Looking very similar to gooseberries, the maqui berry has the flavor described as a blend of blackberry, blueberry, watermelon and açai.

DUAS RODAS PRODUCTS

- Dehydrated Maqui Berry Powder - Standardized in anthocyanins



JABUTICABA

Jabuticaba is the fruit of the jabuticabeira, a native tree from Brazil. The fruit is small, with a purple skin and white pulp. This superfruit from the Atlantic Forest is an excellent source of nutrients such as carbohydrates, minerals, amino acids, lipids and vitamins. The fruit also contains polyphenols with high antioxidant capacity, such as anthocyanins. The anthocyanins found naturally in the fruit are powerful antioxidants that have beneficial effects on human health.

DUAS RODAS PRODUCTS

- Dehydrated Jabuticaba Powder - Standardized in polyphenols

NATURAL ENERGY



WHERE DOES ENERGY COMES FROM

The caffeine is a mild stimulant belonging to the class of methylxanthines. It is absorbed in the digestive tract and quickly distributed to tissues where it exerts its various effects. Worldwide caffeine daily consumption is approximately 50mg/person, mainly due to the coffee and green tea consumption.

WHERE IT CAN BE FOUND

Caffeine can be obtained through chemical synthesis, but it can also be sourced from plants: tea, coffee, cola, mate, cocoa and guarana. Caffeine, when combined with other natural components of the plant matrix, as tannins and other polyphenols, has its bioavailability prolonged.

APPLICABILITY

- Food Supplements
- Supplements for Weight Control
- Energy Drinks
- Mixed Beverages
- Frozen Desserts
- Refreshments and Soft Drinks
- Cereal Bars
- Chocolate
- Cosmetics



YERBA MATE

Yerba mate is native to the subtropical regions of South America with its beneficial properties discovered by the Guarani Indians. With a high concentration of polyphenolic compounds and antioxidant activity, the mate extract provides a distinctive flavor to food, beverages and contain components such as catechins and phenolic acids, which are natural compounds known for their ability to combat free radicals.

DUAS RODAS PRODUCTS

Green Yerba Mate and Roasted Yerba Mate Extracts - Standardized from 0.5 to 10% caffeine and up to 10% total polyphenols



MAIN BENEFITS OF MATE CONSUMPTION



Energy booster and stimulant: methylxanthines stimulate the central nervous system.

Weight control: Reduces appetite, increases calorie burning by accelerating metabolism.

Diuretic activity.

Antioxidant: It contains polyphenols which have antioxidant activity, fighting free radicals.



GUAYUSA

Originally grown in the Amazon Rainforest, *Ilex guayusa* is a traditionally cultivated tree mainly found in Ecuador. According to its nutritional and metabolic profile, Guayusa presents stimulating and antioxidant properties. Among the main bioactive compounds identified in the leaves of *I. guayusa* are

caffeine, theobromine, phenolic compounds and flavonoids, in addition to tannins, alkaloids and triterpenes. The plant also stands out for its rich composition of amino acids. Highly caffeinated herb, Guayusa has a smooth flavor, with no bitterness and is usually applied in RTD teas and energy drinks.

DUAS RODAS PRODUCTS

Guayusa Powder Extract - Standardized in total polyphenols (7%) and caffeine (3%)



GUARANA

Guarana is a native Brazilian fruit and Duas Rodas is one of the leading global producers of its extract. The Amazonian Maués Indians considered this plant as "sacred fruit" and used the seed during combats to increase strength and vitality. Guarana is rich in methylxanthines,

a group of natural compounds such as caffeine, theobromine and theophylline that is the main cause of guarana seeds' stimulating and energetic effects. The plant also has a complex matrix of other substances that results in the stimulating effect greatly appreciated in guarana extracts.

DUAS RODAS PRODUCTS

Guarana Extracts - Standardized from 1% to 30% of caffeine

MAIN BENEFITS OF GUARANA CONSUMPTION

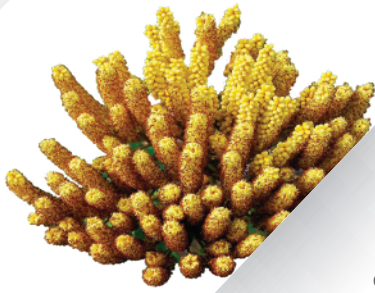


Provides general sensation of well-being.

Stimulates blood circulation.

Stimulates clear thinking.

Reduce fatigue.



QUERCETIN

The flavonol quercetin is one of the most abundant natural polyphenols in our foods; the substance has **antioxidant, anti-inflammatory, antiviral, immunoprotective and anticancer effects**. Used by the nutraceutical industry, it is mainly produced from Fava-d'anta (*Dimorphandra mollis*), a medicinal plant found in the Brazilian Savannah, and its harvest is a way of survival for many local communities. Preserving and expanding its production is essential for the recovery of desertified areas, carrying out soil nutrition and irrigation, favoring the harvest sustainability and preparing the soil for successor plants. Duas Rodas has **highly concentrated extracts of rutin and quercetin** in its portfolio.

**DUAS RODAS
PRODUCTS**

Quercetin Powder

UPCYCLED INGREDIENTS



COFFEE CHERRY

Produced by the coffee plant and known as Coffee Cherry in its mature state, it is a natural brain-stimulating supplement.

Coffee is a plant originally from the mountainous regions of Ethiopia and currently grown in regions with subtropical and tropical climate. Brazil is the world's largest coffee producer, followed by Colombia.

Coffee is a drink of great popularity, consumed worldwide, but the coffee fruit has until recently been considered a waste product and relegated to consumption in local communities only. The demand for differentiated ingredients which are at the same time sustainable has helped the coffee sector develop methods to reorganize the production processes and ensure the product is valued and used further in the value creation chain.

**DUAS RODAS
PRODUCTS**

Coffee Cherry Extract – Standardized in caffeine (0.5 - 5%) and total polyphenols (2% - 7%)



COCOA PULP POWDER



Usually when we think about cocoa, we imagine the dark brown powder obtained from grinding the fruit's grains. However, besides the cocoa beans, the cocoa fruit have another less known component, but just as tasty, called Cocoa Pulp.

Soft, sweet and white in color. Some of the pulp is used in the fermentation of the cocoa beans after they are harvested, but a significant proportion is usually removed, and the value is lost.

UNLOCKING THE PULP POTENTIAL

Obtaining the cocoa pulp through the pulping process (separation of the pulp from the grain) enables the use of this part of the fruit that is normally destined to become waste, highlighting its relevance in a sustainability standpoint.

PRODUCTS

SOURCE	FORMAT	HEALTH BENEFITS
AÇAÍ 	Extract Powder Flakes	   
ACEROLA 	Extract Powder	  
BLUEBERRY 	Powder	
CAMU CAMU 	Extract Powder	  
COFFEE CHERRY	Extract	   
CUPUAÇU	Powder	 
GINGER	Extract	   
GREEN COFFEE	Extract	    
GREEN YERBA MATE 	Extract	    
GUARANA 	Extract	   
GUAYUSA 	Extract	    
HIBISCUS	Extract	   
JABUTICABA	Powder	 
KOLA NUT	Extract	
LULO	Powder	
MAQUI 	Powder	   
NOPAL	Powder	 
PHYSALIS	Powder	
PITANGA	Powder	
QUERCETIN	Extract	 
RUTIN	Extract	  
SOURSOP	Powder	 
ROASTED COFFEE	Extract	   
ROASTED YERBA MATE	Extract	    
YACON	Flakes	  



**CARDIOVASCULAR
HEALTH**



**COGNITIVE
PERFORMANCE**



**ENERGY BOOSTER/
FATIGUE RELIEF**



**EYE
HEALTH**



**IMMUNITY
BOOSTER**



**GUT/
DIGESTIVE HEALTH**



SKIN HEALTH



**SPORT NUTRITION
& WEIGHT CONTROL**



**URINARY
HEALTH**



**WEIGHT
CONTROL**

CERTIFICATIONS*

Kosher | Halal | Organic Products
FSSC22000 | SMETA

* Please verify with your representative which Duas Rodas production units are certified.

We recognize the importance of regulatory compliance in all the markets we serve. As a result, ingredient claims and permissions may vary depending on country requirements. Consult applicable legislation.

One of the five most innovative Brazilian companies in its segment, Duas Rodas is reference in ingredients for the Food, Beverage & Nutraceutical industry. With more than 98 years of experience and headquarters in Brazil, Duas Rodas has presence in over 70 countries with six manufacturing units in Latin America, three in Brazil and units in Chile, Colombia and Mexico.

Its dotNat platform includes flavors, botanicals extracts, fruits and vegetables in powder and in flakes. The company has been committed to

bringing the best of flavor for people in different parts of the world, providing excellence and creativity to help its partners gain greater functional and sensorial quality, combining technology and nature.

Always attentive to the market trends and consumers' needs, Duas Rodas sought inspiration in nature to create Fruittion Botanicals, a dotNat product line focused on the natural actives of the typical fruits and plants of Latin America, delivering functionality to Food, Beverage & Nutraceuticals.

The logo for Fruittion Botanicals features the word "FRUITTION" in a green, uppercase, sans-serif font. Each letter is stylized with a small green leaf or branch extending from it. Below "FRUITTION" is the word "botanicals" in a smaller, lowercase, green, sans-serif font.

The logo for dotNat features the word "dot" in a small, lowercase, green, sans-serif font inside a green circle. To the right of "dot" is the word "nat" in a larger, lowercase, black, sans-serif font. Above the "n" in "nat" is a green stylized leaf or branch graphic.





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December, 2024

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