

AMATEA™

**Organic Guayusa
Leaf Extract**

**A Naturally Derived
Ingredient for
Nootropic Energy**



AMATEA™

organic guayusa extract by *AFS*



MARCH 11, 2019
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Guayusa

Guayusa responds differently than other caffeine sources with a significant impact on nootropic benefits such as mood and cognitive focus.

Guayusa – *Ilex guayusa* – (pronounced “gwhy-you-sa”) is a caffeinated leaf of the holly species that grows only in the upper Amazon basin of Colombia, Ecuador, and Peru¹. Records suggest that guayusa has been used and traded as a medicinal plant in the greater Andes Amazon region since at least 500 C.E. Traditionally use by tribal societies, such as the Amazonia Kichwa, is to brew guayusa leaves like tea and consume as such. However, guayusa is not related to *camellia sinensis*, used to make green or black tea varieties. Instead, guayusa is a cousin plant to yerba mate (*Ilex paraguariensis*), a fellow rainforest holly leaf that grows further south in the Atlantic Rainforest region, primarily in Argentina and Brazil. Guayusa is also uniquely different than traditional tea or yerba mate in that it tastes sweet, not bitter, and has a distinctively different polyphenolic antioxidant makeup.

Guayusa is known as the ‘Night Watchman’ by Amazonian hunters because it is said that while guayusa sharpens their awareness and gives them energy to hunt at night, it also allows them to sit perfectly still without restlessness. These seemingly counterintuitive benefits of energy and ease are what makes guayusa so unique. Guayusa is



usually experienced as a bright and focused energy thanks to the healthy synergistic compounds that help balance the naturally occurring caffeine.

“In exploring guayusa, it quickly became clear to see how this ingredient receives such a positive reputation within the communities it serves. The nutritional compounds within guayusa offered some unique combinations of antioxidants and caffeine that became an attractive proposition for AFS when creating our AMATEA™ standardized organic guayusa extract,” explains Loretta Zapp, CEO of Applied Food Sciences (AFS). “In our most recent studies, guayusa has been shown to respond very differently than other caffeine sources. Most significantly guayusa impacts our brain’s neurotransmitters which can aid in nootropic function such as mood and focus.”

The Next Generation of Caffeine?

Energy ingredients and cognitive health are related in the eyes of the consumer as caffeine is one of the most common stimulants consumed worldwide. While the average US person will consume around 240 mg of caffeine per day, they might not realize is that not all caffeine sources are equal with regards to how it responds in the body and how it makes them feel. Caffeine can originate from both synthetic and plant-based sources such as coffee beans, tealeaves, guarana, cocoa beans, kola nuts, and other more novel sources like guayusa or yerba maté.

Caffeine will interact with neurotransmitters in the brain and has been shown to have both therapeutic and negative side-effects. One vindicating factor is due to an adrenal response that occurs when consuming traditional forms of caffeine, which will provoke an increase in epinephrine, the “fight or flight” hormone.² We might know what this feels like after we have had one too many cups of coffee and suddenly feel anxious or flighty.

According to the Mayo Clinic, the common side effects to having too much caffeine are migraine

headaches, nervousness, irritability or restlessness, amongst others.³

For some people, that are more sensitive to caffeine, just small amounts may prompt these unwanted effects. So while the end goal may be alertness or improved cognitive function, the fight or flight response provoked by caffeine can often times defeats its very purpose.

Fortunately, new innovation and discovery has driven more research in to guayusa and for cognitive health and energy, this is an exciting ingredient to follow.



Nutritional compounds

naturally present in the guayusa leaves contain both the chlorogenic acids, (CGA - the antioxidants similar to those found in coffee plants), and rutin (a flavonoid that is found in certain fruits and vegetables). Its unique antioxidant profile allows for delivery or rapid absorption of the water-soluble compounds, namely the chlorogenic acids for enhanced antioxidant activity in the plasma and cardiovascular system as well as more complex flavonoids that aid in digestive health.

Energy & Focus are the primary functional attributes of this plant.

Qualitative analytical research demonstrates that the pharmacokinetics of guayusa are very similar to that of green coffee beans. More specifically, there are two key compounds, caffeine and antioxidants, that are found in both botanicals and are metabolized in a very similar fashion⁴. AMATEA™ organic guayusa extract is designed to emphasize these compounds.

Clinical research utilizing [AMATEA™](#), a 30% wt/wt CGA, 20% wt/wt caffeine standardized organic guayusa extract, generated science to help understand the synergies with these naturally occurring compounds and how they impact physiological and hormonal biomarkers in the human body.

The most recent of two key studies evaluated the effect of AMATEA™ on cortical neurotransmitter levels in the median prefrontal cortex of rats looking at extracellular levels of:

- Dopamine (DA)
- Norepinephrine (NE)
- Serotonin (5-HT)
- Histamine (HA)
- Acetylcholine (ACh)

Administration of the AMATEA™ induced robust and significant elevation of several

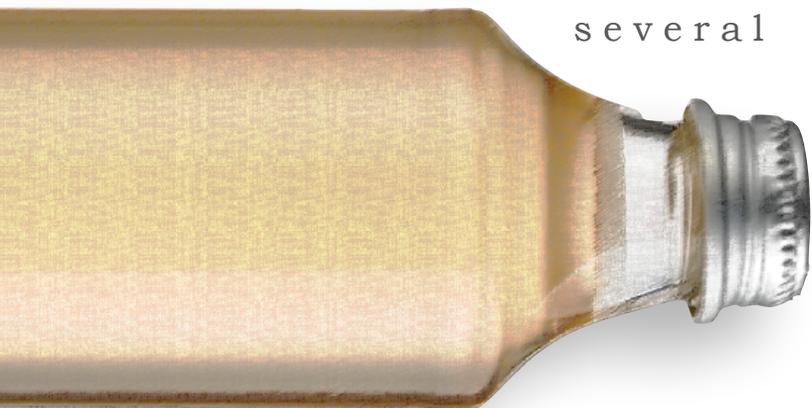
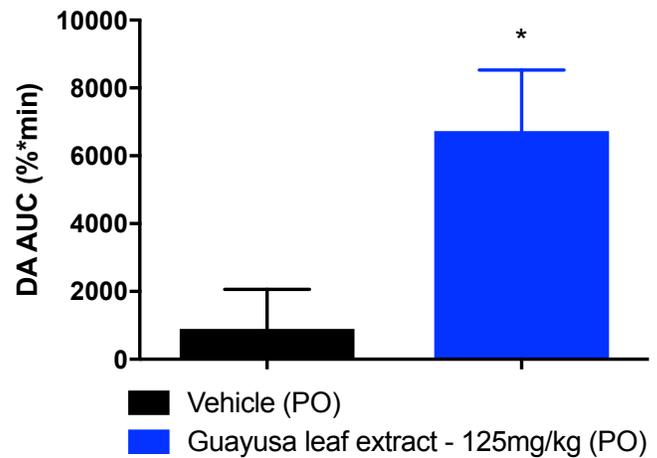


Figure 1: AMATEA's effect on dopamine released are pronounced as measured by AUC



neurotransmitters in the rat prefrontal cortex relative to the control.

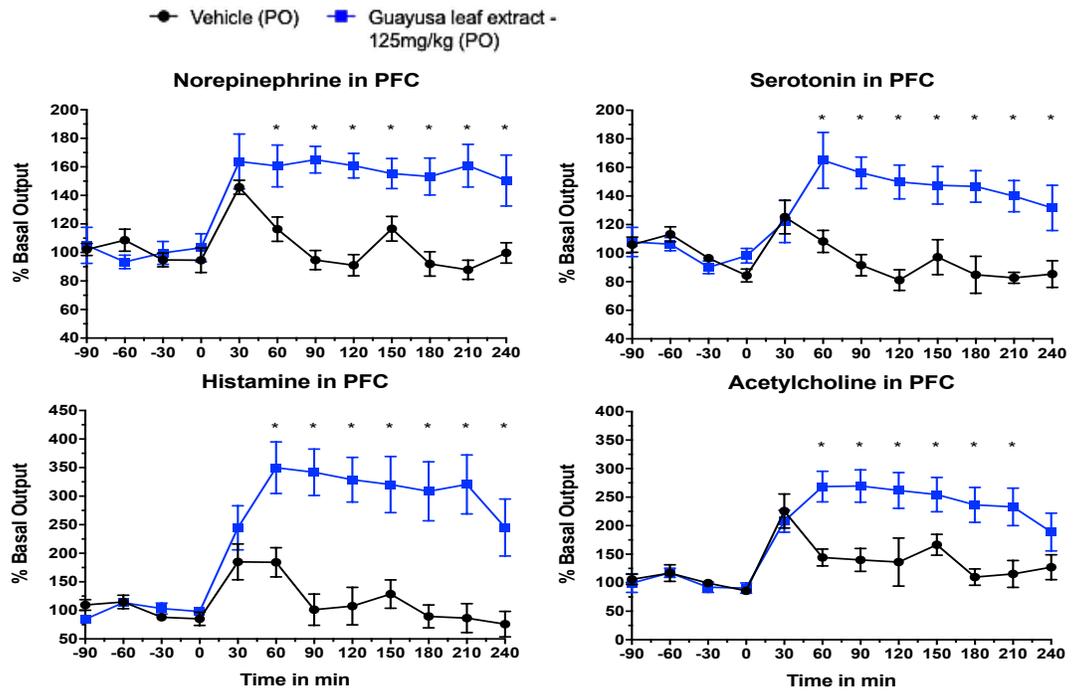
The prefrontal cortex (PFC) is important for the modulation of executive function tasks, including, learning / categorization, inhibitory control, cognitive flexibility, working memory, and behavioral flexibility.

Effective and enhanced release of our brain's neurotransmitters can aid in nootropic benefits such as:

- Enhance mood
- Decrease stress
- Increase motivation
- Cognitive performance

For example, histamine has been associated with states of wakefulness and also has been positively correlated with attention and learning benefits, whilst Acetylcholine has been associated with cognitive and arousal function. Serotonin is important for proper functioning of the cortex in relation to emotional, cognitive function, and overall perceptions of happiness and wellbeing. Dopamine and

Figure 2 (Right): The four graphs illustrate how guayusa increases the extracellular level of NE, 5-HT, HA, and ACh in the rat PFC cortex in a time-dependent manner. Neurotransmitter levels are expressed as a percentage of basal output. Six rats were used for each of the vehicle and AMATEA™ treatments. Microdialysis probes were placed 24 hours prior to sample collection and probe placement was verified histologically at the conclusion of the experiment. * = time points where NT levels were significantly different between treatments at P<0.05.



norepinephrine play major roles in working memory and attention in addition to many other central nervous system activities.

Results of this study demonstrate that extracellular levels of NE, 5-HT, HA, ACh, and DA in the rat PFC were significantly increased by the administration of AMATEA™ as compared to vehicle alone in a time-dependent manner (figure 2).

Further evaluation of the DA increase following guayusa treatment using area under the curve (AUC) analysis showed a very significant and pronounced response (figure 1 - page 4). This study aids in demonstrating how the nootropic benefits of AMATEA™ can be explained through its positive and pronounced impact the enhancement and release of important brain stimulating hormones.

Other nootropic implications

of guayusa were demonstrated in a 2016 study, Krieger et. al. in which AFS was able to demonstrate guayusa’s ability to help regulate epinephrine upon caffeine ingestion.

Epinephrine is released by the adrenal medulla and is a key part of the flight-or-fight hormones. Side-effects of caffeine resemble those same feelings of restlessness or anxiety that associated when the body is under stress.

In a double-blind crossover clinical trial with 200 mg of caffeine from a green coffee extract, a guayusa leaf extract, and a synthetic control, the results showed that the guayusa leaf extract stimulated a significantly lower increase in epinephrine compared with the control, while the green coffee extract provoked an increase in epinephrine similar to the control.



Large Brands Convert to Organic.*

What factors are driving purchases with millennials?

- Trust
- Transparency
- Environmental Impact
- Social and Economic Impact



Key Demographics:

- ✓ 18-35 y/o Millennial Males
- ✓ Hispanic Consumers (Mintel)

“A close examination of consumer needs reveals a mix of positive and negative forces creating demand for transparency in products,” says Eric Pierce from New Hope Natural Media’s NEXT Trend. “Consumers are willing to expend more effort and to pay more for products and brands which align with their values.”

Market forecasting for this Amazonian energy shows us that consumers are already primed for the emergence of guayusa thanks, in part, to the growth of natural and organic energy beverages. In the past decade, the U.S. energy drinks market grew 147% to \$13.8B and RTD tea sales grew 111% to \$11B⁵. Within that category, 30% of consumers are now using natural energy drinks or shots⁶. Sales of items where guayusa is the primary ingredient are up 18% cross channel in beverages⁷.



Natural energy is growing 16.2%. Conventional growth remains flat at around 1.8 percent (SPINS)

One of the major factors influencing this change is that the dominant consumer of energy drinks, millennials, are growing up and changing their purchasing habits. 67% of males and 47% of females between the age of 18-34, consume energy drinks, which is by far the largest consumer base⁸.



The "Organic" segment led all categories in growth within the energy drinks market in 2018 and is anticipated to maintain dominance by 2021.



Maria Grefa along with more than two-thousands other partnering families will more than triple their annual income within three years.

Meaningful Growing

[AMATEA™](#) guayusa extract is exclusively produced by independent farming families, not industrial plantations. Their farms are not mono crop systems, instead farmers plant guayusa in ancient forest gardens known as “chakras” by the Kichwa people. Chakras apply similar growing techniques to agroforestry and permaculture in which crops are grown among trees and other vegetation utilizing patterns observed in nature. Growing in this method reduces the need to degrade or cut down the forest and creates a more diverse, productive, profitable, healthy, ecologically sound, and sustainable land-use system⁹.

Guayusa is shade-grown, in these forest gardens, under a canopy of more than 50 different native hardwood trees. Guayusa shrubs typically reach an average of 10 m high and present a multitude of stems that measure 2 to 15 cm at breast height



before they are harvested. The olive-green leaves of *Ilex guayusa* are perennial and about 5cm long, with small white flowers.

Fresh guayusa leaves, used in part to make AMATEA™ guayusa extract, are regularly purchased from over 3000 Kichwa farming families. This type of meaningful growing is environmentally sustainable and socially responsible.

"When we started partnering with local farmers to help grow our guayusa to scale, it was amazing to see the positive impact it had on the community, and Maria Grefa is a great example," says Tyler Gage. "Maria Grefa's family used to make less than two dollars per day from logging and migrant labor. Instead by selling organic guayusa, her family and over two-thousand others have been able to raise their income by more than thirty-percent each. They will more than triple their annual income within three years."



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Applied Food Sciences, Inc. ([AFS](#)), an Austin-based company, is an international ingredient supplier that provides solutions to the industry for creating the healthiest organic products imaginable in beverage, food and nutritional supplements. With their newly opened Innovation Center at the University of Iowa's Bio-Ventures Campus, AFS develops novel natural and organic ingredients that are scientifically qualified, highly water soluble, sustainably and ethically sourced, Non-GMO and GRAS.

AMATEA™ organic guayusa extract is a highly water soluble ingredient for the application of nootropic energy intended in beverages or nutritional supplements. AMATEA™ has a unique fingerprint standardized at 20% caffeine, 30% chlorogenic acids (similar to green coffee), and also contains other beneficial compounds like rutin (a flavonoid that is found in certain fruits and vegetables). Because it is low in tannins, AMATEA™ is not bitter, dry, or chalky tasting like many other more astringent tea extracts. Instead AMATEA™ is naturally sweet to complement a variety of flavors. AMATEA™ is also Non-GMO, GRAS (Generally Recognized As Safe), and USDA organic.

Patent – U.S. Patent #9345707 – AFS owns this exclusive process patent for the production of enriched natural guayusa antioxidant mixture from a single source plant containing antioxidants, amino acids and caffeine.

GRAS - Even though guayusa has been used traditionally for hundreds of years in its indigenous regions with positive outcomes, an extensive safety review was completed. A comprehensive GRAS assessment was executed by AIBMR to carefully identify, evaluate and assess the compounds naturally found within the plant and ensure no negative toxicological effects were demonstrated.

Contact Applied Food Sciences for pricing, specification info, or to request a sample. Go to www.appliedfoods.com or call 1 800-345-9666

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