

Yerba Mate



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Overview

- History of Yerba Mate
- Inputs – Harvest & Cultivation
- Process – Grinding & Milling
- Outputs – Mate for the People



INPUTS: Yerba Mate Tree



- Yerba Mate is a tree not a plant.
- In the Holly (Ilex) genus. *Ilex paraguariensis* (binomial name)
- Native to subtropical regions in Northern Argentina, Paraguay, Uruguay, Southern Brazil and Bolivia in South America.
- First cultivated by the Guaraní people.
- Jesuits missionaries first to domesticate yerba mate.
- The tree contains small red berries and whitish-green flowers.
- Can grow wild in the rainforest, today it's grown in plantations.



INPUTS: Fertilizer & Soil



- Nitrate fertilizers are used in cultivation.
- Yerba mate is able to grow in the shade, does not require direct sunlight for growth.
- Fertilizers and the soil have a major impact in the mineral composition of the leaves for the production of higher nutritional value.
- The fertile soil where it grows varies from region to region.
- Different regions soils provide the tree leaves with their own unique flavors.
- Prefer a well draining sandy/clay soil rich in phosphoric potassium and iron.
- Seed germinate is between 2-3 months.
- Ideal climate conditions are 16-25 °C with moderate to high humidity.

INPUTS: Cultivation

- Mate leaves and branches are cut down using machetes.
- Harvested leaves are tied up with sticks and placed on a rough sack formed into a bundle (~130 lbs).
- Bundles are taken to the drying facility.



Process

Three Main Steps

- Blanching, drying, and aging stage.



Step #1: Blanching (Stability)

- Leaves and stems flash heated for 10 seconds to 3 min over open flame.

***Goal:** To break epidermis and stomata to halt oxidation and deactivate leaf enzymes for a **STABLE** product.

Enzyme: Polyphenol oxidase

*Processors can vary time and temperature of blanching.



Step #2: “Sapeco”



*Sapeco meaning → **DRYING**

- Blanched leaves put into rotating cylinders heated by burning wood
- * Reduces moisture
- Dried very **SLOWLY**

• Options: Could use wood smoke /not smoked, filtered or unfiltered, and heated ~400-750 degrees Celsius for a low humidity.

• Could be 8-24 hours

• **ORGANIC** yerba mate must be smoked.

Step #3: Aging/Grinding

*Dried product place in special bags, cement or aging chambers.

*Aging helps develop flavor.

Longer: softer, less bitter

Color changes: Deep green → Pale green

- Then leaves are ready to be grinded!
- Called a “Canchada cut”, meaning rough cut.
- Large stems removed, small stems left for sweet flavor.



Nutrition



*Polyphenols are found in Yerba Mate

*The degree of milling, variety of Mate, and blending determines concentration of polyphenols extracted in an infusion.

*Avg amt of polyphenols extracted from Mate : 92 mg equivalents of chlorogenic acid per gram of dry leaves

*This correlates to a higher antioxidant capacity for Mate

Antioxidant intake have beneficial effects for overall human health.

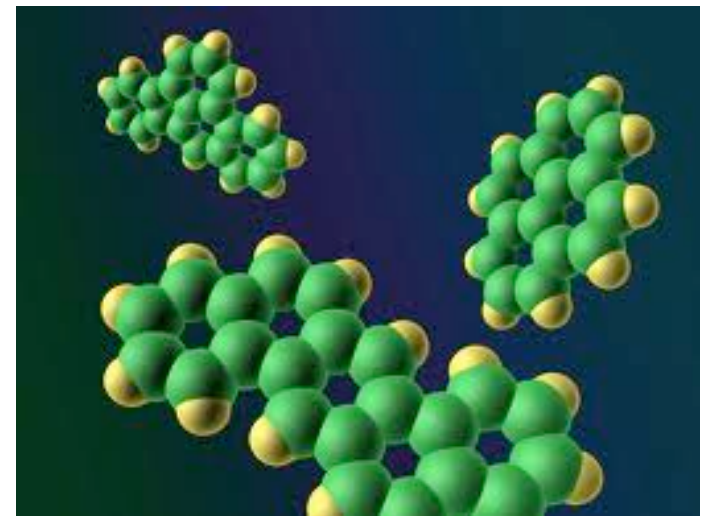
Safety

*Polycyclic Aromatic hydrocarbons in mate due to degradation of mate compounds during the “sapeco” (drying process).

*High toxicity of these compounds (carcinogens)

Study looked at PAH levels through out processing stages of prod.

Results→processing method currently used in mate production may lead to increase in PAHs levels in final product.



Cost

*Value of Mate production around the world ~\$1 billion in 2004.

*Argentina largest producer. Brazil and Paraguay 2nd and 3rd.



*Production of 874, 678 tons of Mate

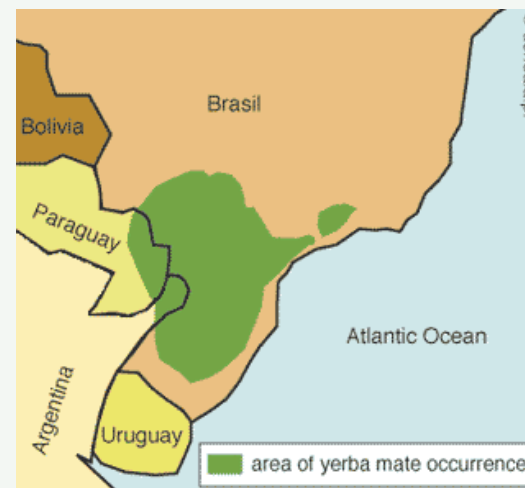
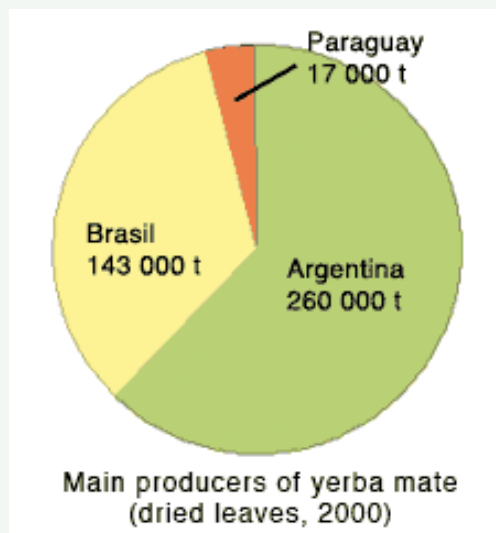
Outputs



Regulations, Costs,
Nutrition, Convenience,
Delight/culture



Outputs Where?



- Yerba Maté grown in Southern Brazil, North Eastern Paraguay, Northern Argentina. Most consumers live in same area as production.
- Some exports to Lebanon, and Syria, Chile, Bolivia and Uruguay

USA Regulations GRAS

FDA Regulation on Maté

*Labeling in English.

FDA Import refusal



*Ingredients without specific known
Antioxidants

Diaspora Tea & Herb Co., LLC

**“II. Unauthorized Nutrient Content Claims...
Yerba Maté Shade Grown, Organic Yerba Maté”**

• “Yerba Maté is...rich in... antioxidants.”



Nutrition



- *According to <http://worldofteas.info/yerba-mate> vitamins B1, B2, C, A and E, as well as B complex and B5. When it comes to minerals, the herb contains zinc, magnesium, selenium, calcium, iron, phosphorus and manganese. Some other additives are flavonols, trace minerals, carotene, 15 amino acids and fatty acids.

- “[Yerba mate has]...more active compounds than green tea, 52 to be exact. Yerba mate boasts an impressive 196 active compounds as compared to the 144 found in green tea. In fact, yerba mate has higher polyphenol and antioxidant counts than both green and black teas”





Nutrition

Supplement Facts		
Serving size: 1 vegetable capsule		
	Amount Per Serving	% Daily Value
Yerba Mate Powder (Ilex paraguariensis) (aerial/leaf)	500 mg	*

* Daily value not established
Other Ingredients: vegetable capsule. Contains no fillers, excipients or artificial substances.

	Normal	HFD	HFD+Mate 0.5	HFD+Mate 1.0	HFD+Mate 2.0
Liver	3.54±0.04 ^a	2.37±0.09 ^d	2.56±0.05 ^c	2.77±0.06 ^b	2.84±0.05 ^b
Spleen	0.21±0.02 ^a	0.15±0.00 ^c	0.18±0.01 ^{abc}	0.19±0.01 ^{ab}	0.16±0.00 ^{bc}
Heart	0.44±0.01 ^a	0.34±0.02 ^b	0.41±0.02 ^a	0.39±0.01 ^{ab}	0.97±0.03 ^a
Kidneys	1.04±0.03 ^a	0.80±0.03 ^c	0.91±0.02 ^b	0.95±0.02 ^b	0.97±0.03 ^{ab}
Testes	0.72±0.02 ^a	0.53±0.02 ^b	0.63±0.03 ^a	0.66±0.04 ^a	0.63±0.02 ^a
Epididymal Fat	1.54±0.08 ^d	5.50±0.36 ^a	4.07±0.24 ^b	3.13±0.31 ^c	2.82±0.44 ^c
Retroperitoneal Fat	0.36±0.03 ^d	1.75±0.08 ^a	1.31±0.09 ^b	10.7±0.12 ^b	0.70±0.12 ^c
Peri-renal Fat	0.23±0.02 ^c	0.81±0.07 ^a	0.45±0.03 ^b	0.33±0.04 ^c	0.28±0.04 ^c

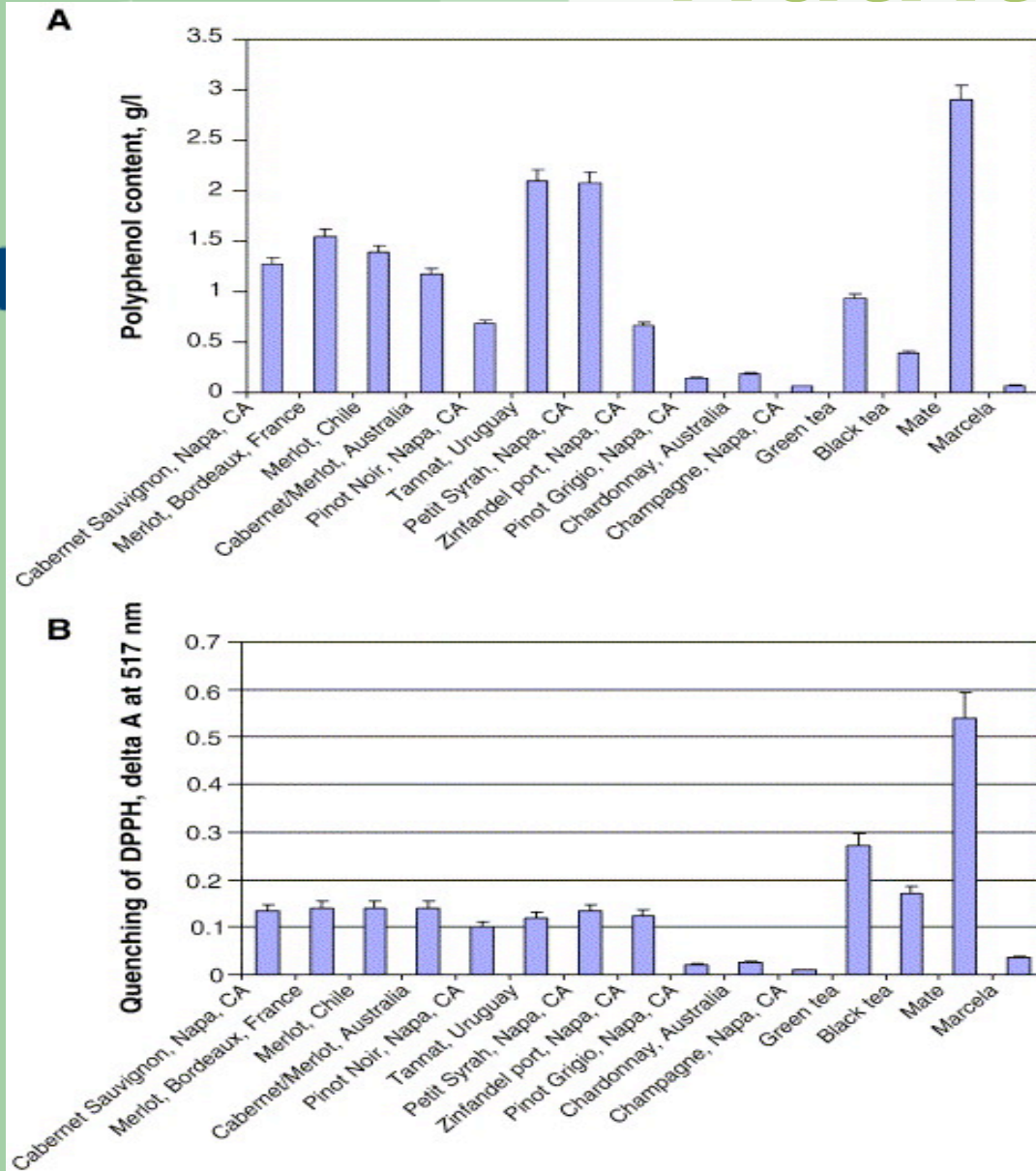
Effects of Yerba Mate on percent change in organ weight relative to body weight in an obesity model induced by a high-fat diet

a, b, c, dValues in the row with different superscript letters are significantly different, P<0.05. Data are shown as mean±SE (n=10).

* “The data presented in this study suggest that Yerba Mate extract may act synergistically to suppress body weight gain and visceral fat accumulation and to decrease the serum levels of cholesterol, triglycerides, and glucose.”

* Saponin? Antioxidants? Leptin?

Nutrition



- “The polyphenol content in the preparations used in these studies are depicted in Fig. 1A. **Ilex paraguariensis** extracts as they are usually brewed and drunk in South America **have the highest concentration of polyphenols, followed by red wines and green tea.**”

Costs



(40)Tea
Bags(Brazil) in U.S.
\$6.95



Loose Leaf(1lb)
U.S.\$ 12.00



Tea bags
Argentine
(50 tea bags)
U.S.\$7.95



Argentine
(2.2lb)Loose
Leaf U.S.
\$12.79

[Click to enlarge](#)

Plus cost of Additives. Suagar.
Milk, Etc.



Maté Cultura



Maté en el Viaje (Convenience)



Thank you for your time!!



References

Cebador. "San Mateo Mate". Online video clip. *Youtube*. 13 Oct. 2008. Web. 24 Feb. 2013.

Heck CI, de Meija EG. "Yerba Mate Tea (*Ilex paraguariensis*): a comprehensive review on chemistry, health implications, and technological considerations". *Journal of Food Science*. 2007 Nov; 72(9): R138-R151. Web.

"How Yerba Mate is Processed". *YerbaMate.us*. 2013. Itapua Trading LLC. Web. 24 Feb. 2013.

<http://www.yerbamate.us/Yerba-Mate-Processing-s/161.htm>

Vieira MA, Maraschin M, Rovaris AA, Amboni RD, Pagliosa CM, Xavier JJ, Amante ER. "Occurrence of polycyclic aromatic hydrocarbons throughout the processing stages of erva-mate (*Ilex paraguariensis*)". *Food Additives & Contaminants: Part A*. 2010 Jun; 27(6): 776-782. Web.

Markowicz Bastos, D. et al. (2007). Yerba mate: Pharmacological Properties, Research and Biotechnology. Medicinal and Aromatic Plants Science and Biotechnology 1 (1), 37-46, 2007 Global Science Books

References (continued)

[http://www.accessdata.fda.gov/scripts/importrefusals/ir_detail.cfm?
EntryId=WDN-5250464-5&DocId=10&LineId=1&SfxId=](http://www.accessdata.fda.gov/scripts/importrefusals/ir_detail.cfm?EntryId=WDN-5250464-5&DocId=10&LineId=1&SfxId=)

<http://www.fda.gov/ICECI/EnforcementActions/WarningLetters/2011/ucm252215.htm>

[http://guayaki.com/mate/191/Yerba-Mate-vs.-Green-Tea-.html \)](http://guayaki.com/mate/191/Yerba-Mate-vs.-Green-Tea-.html)

<http://www.matefactor.com/the-yerba-mate-plant.html>

<http://www.sciencedirect.com/science/article/pii/S0024320505001505>

[http://www.webmd.com/vitamins-supplements/ingredientmono-828-MATE.aspx?
activeIngredientId=828&activeIngredientName=MATE](http://www.webmd.com/vitamins-supplements/ingredientmono-828-MATE.aspx?activeIngredientId=828&activeIngredientName=MATE)