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Consumer perceptions, attitudes and acceptance of new and traditional mate tea products

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ABSTRACT

Consumption of teas has been increasing around the world. In Brazil, mate tea, prepared from yerba mate (*Ilex paraguariensis*), is the most popular tea and its popularity is increasing due to the development of new mate-based products and the increasing health consciousness of the Brazilian population. Further development of the mate market in Brazil requires accurate consumer profiling, focusing on tea drinking behavior, preferences and perceptions. We applied a questionnaire to mate tea consumers to assess their beliefs, consumption behavior, and taste preferences. We also explored the acceptability of tea made from yerba mate processed in different ways: immediately after harvest and after eight months of storage, varying the percentage of leaves and sticks. One hundred consumers evaluated six experimental samples and two commercial mate teas. Results indicated that mate was most consumed in tea bag form, followed by ice teas. The preferred flavors were natural and lemon. Most of the consumers (61%) consumed mate with sugar, drinking it at home before bedtime. Product quality, brand and price were the most important aspects taken into account when purchasing mate. The majority of consumers were not satisfied with the products currently offered in the market, and the main criticism was poor quality and packaging. Consumers accepted all tasted samples, except the tea prepared with 100% sticks. Commercial teas were less preferred than the experimental teas, indicating that there are opportunities for further development of commercially viable mate products.

1. Introduction

Infusions of the leaves of aromatic plants in hot water (tea) are drunk throughout the world. In recent years the global popularity of tea has risen dramatically, with sales increasing by over 500% in ten years in some countries (New Products Trends, 2004). This startling rise in consumption has probably been driven by various factors, including the perception of tea as a natural and healthy product, an increasing diversity of teas on the market and, more generally, globalization, affordability, trends and availability. Indeed, it has been predicted that this growth in tea products will continue into the future, especially for those products that are perceived to have specific health-related functions (Koch, Muller, De Beer, Naes, & Joubert, 2012; Miller, 2005). Besides the investigation on such functions, sensory properties are also important issue to take into account, either to describe products (Koch, Muller, Joubert, & Naes, 2012) or to study how a specific tea is perceived/liked by consumers (Lee & Liao, 2009; Lee et al., 2010).

Brazil is typical of this global trend of increasing tea consumption. Tea drinking has increased considerably in recent years, becoming an almost obligatory and year-round item in the diet of Brazilian consumers as in other countries (Lee & Liao, 2009). The main causes of this growth in popularity have been identified as the increased range of new flavors on the market and the general rise of health consciousness of Brazilians (Paula, 2010).

Although a broad range of teas are drunk in Brazil, mate tea is the most consumed (IBGE, 2008). This beverage is prepared using leaves of the plant known locally as yerba mate (*Ilex paraguariensis*) that has phenolic compounds with antioxidant effects (Lanzetti et al., 2012). There have been claims that ingesting mate tea can be used to treat chronic diseases such as cancer, arteriosclerosis, and diabetes (Bastos, Fornari, Queiroz, & Torres, 2006). Mate tea has recently been highly advertised for its supposed health benefits, such as its hypocholesterolemic and hepatoprotective functions (Filip & Ferraro, 2003), its stimulatory influences on the central nervous system and its diuretic properties (Dellacasa & Bandoni, 2001; Gonzalez, Ferreira, Vazquez, Moyna, & Paz, 1993).

Although traditionally drunk in the south of the country, mate tea is now used all over Brazil. Moreover, it is being increasingly drunk in

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other parts of the world, especially the United States and European countries that have experienced immigration from South America. The geographic expansion of mate tea indicates its potential for diversification into new products (Heck & Mejia, 2007). Effective exploitation of the high commercial potential of mate tea requires carefully designed consumer profiling, focusing on tea drinking behavior, preferences and perceptions. Such profiling allows the development of more effective marketing and production strategies that match consumer needs. To our knowledge, there are currently no published studies on mate tea drinking habits, although there are studies specifically focused on black tea and green tea (Lee et al., 2010). Anecdotal and observational evidence suggests that Brazilians consume mate tea in a qualitatively different way to other teas, their behavior possibly being influenced by factors such as local temperature, cultural habits, and income.

Despite the apparent health benefits of mate tea, there are relatively few commercial brands of this product available in Brazil (Paula, 2010). Moreover, these products vary considerably in flavor, composition, color and storage time, depending on the quality of the raw material and differences in processing.

The quantity of sticks in the final product may be especially important in this respect. Ultimately, the characteristics of each brand are determined by the processing criteria adopted by each agribusiness unit. In general, only branches with a diameter smaller than 10 mm are processed, to avoid advanced stages of lignification. Producers believe that these branches have lower content of phenolic compounds, which could harmfully alter the flavor of the product with negative impact on consumer liking (Tamasi, Filip, Ferraro, & Calvino, 2007). Thus, variations in leaf characteristics and processing need to be investigated since it is clearly counterproductive to market a product that is disliked by consumers, even if it has excellent chemical, physical or microbiological properties (Moskowitz, 2007).

This study aimed at investigating the effect of compositional differences of mate tea raw materials on consumer acceptability of beverages taking into account the consumer profile of mate tea drinking in Brazil.

2. Material and methods

2.1. Consumer

We conducted an exploratory research with 100 consumers in which socio-demographic characteristics and ways of tea consumption were collected. Participants were recruited from the Federal University of Paraná including students and workers used to drink mate tea. Participants were mostly women (84%), aged from 36 to 55 years (X% of 18–25 years; Y% of 26–35 years; Z% of 36–45 years; W% 46–55 years; and T% older than 56 years), with a roughly equal distribution in terms of education level, i.e., primary and secondary (32%), university (30%) and post-graduation degree (38%). Although the high participation of females in the study can be attributes to their higher willingness to take part in the study, it is also worth commenting that women are now responsible for purchasing decisions of most Brazilian homes (Anonymous, 2012), and they drink more tea than men (IBGE, 2011). They also answered a semi-structured questionnaire to get information on consumer's perception for tea. They were asked to indicate their agreement with eight statements using a 7-point scale anchored at the edges and middle (1: totally disagree; 4: neither disagree, nor agree; 7: totally agree). The attitude statements were: tea is diuretic, tea is good for health, tea helps to lose weight, tea helps digestion, tea prevents aging, tea lowers cholesterol, tea is rich in vitamins, and tea is rich in minerals. Principal Component Analysis (PCA) was applied to investigate the main patterns in attribute perceptions of mate tea by consumers. In order to identify consumer segments with different beliefs and thoughts on mate tea, hierarchical Cluster analysis was carried out on data. This statistical analysis was performed considering Manhattan distances and average linkage.

2.2. Yerba mate processing

Samples of mate tea used were processed according to the following steps and description (Isolabella et al., 2010):

Harvesting: green leaves and stems of *I. paraguariensis* were cut (25 to 30 cm).
Roasting: this process is also known as “sapeco”. The green yerba mate leaves were exposed to direct fire at temperatures between 600 and 800 °C in a rotary dryer for 2 min. The inactivation of enzymes, which occurs in this stage can preserve the color, flavor and aroma of the leaves.
Pre-drying: as above, the only difference was the temperature (280 °C/3 min).
Drying: the leaves were exposed to a hot air flow until a 5% of moisture was reached following the process normally used by the company, which takes about 5 h.
Milling: the dried yerba mate leaves were grounded in a miller (Felix) to make easier the manipulation and transport.
Classification: the yerba mate was classified using a 12 mesh sieve.
Aging: some samples were stored for eight months in order to acquire characteristic flavor, color and aroma.
Toasting: the crushed yerba mate was toasted at 120 °C/15 min.

2.3. Tea samples and preparation

It is important to investigate the effect of different percentages of sticks/leaves and freshness on consumer liking for mate. This information may help mate tea producers to offer in the market mates that meet consumer's expectation. Similarly, it is relevant to bring to the study commercial mate teas in order to compare how the experimental samples compare to the commercial ones.

Mate teas were prepared by varying the percentage of sticks/leaves (100% sticks, 50:50% leaves and sticks, and 100% leaves) and the freshness of them (fresh: immediately after harvest, and stored: after eight months of storage) yielding six experimental tea samples. Two commercial mate teas (Com1 and Com2) were purchased in local supermarket and included in the study. Com1 is the most important tea in the Brazilian market, and Com2 the cheapest tea. Both of them have sticks and leaves in different proportions. A total of eight teas were evaluated in this study, all of them loose tea leaf packed samples. The description of all experimental samples is shown in Table 1.

For the preparation of the experimental samples, 16 g of mate was added to one liter of boiling water, which was then boiled for 3 min. The tea was filtered into a thermal bottle and kept until the beginning of the sensory test, which was carried out immediately. Commercial teas were prepared following the package directions. Beverages were kept up to 20 min in the bottles, and they were thrown away after that.

2.4. Consumer acceptance

One hundred Brazilian tea consumers participated in the acceptance test. Each consumer evaluated four samples, waited for 30 min and

Table 1
Description of the experimental samples used in this study.

		% of stick/leave		
		100% sticks	50:50	100% leaves
Storage time	Fresh (F)	100%stick_F	50:50_F	100%leave_F
	Stored (S) (8 months)	100%stick_S	50:50_S	100%leave_S