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Analysis and elaboration of lemon balms teas (*melissa officinali l.*) in São Gabriel da Cachoeira-AM

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***Keywords*— Lemon Balm, Medicinal Tea, São Gabriel da Cachoeira, Sensory Analysis.**

***Abstract*—** *The diversity of plants in the Alto Rio Negro region and the traditional knowledge of indigenous peoples on the consumption of medicinal plants for the cure of diseases are factors that justify the need to expand knowledge about these practices, especially about forms of consumption. The IFAM CSGC carried out the research on sensory analysis with the Institution's workers and students, evaluating the Lemon Balm species (Melissa Officinalis L.), aiming to prepare and evaluate the Lemon Balm tea by the academic community of the IFAM Campus São Gabriel da Cachoeira, Amazonas. Tea is the most consumed food for the treatment of various illnesses in the region, mainly as a natural tranquilizer. To prepare the tea, three techniques were used: infusion, decoction, and maceration. For the sensorial analysis, the hedonic scale was used, according to the methodology of Monteiro (1984). The research on Lemon Balm tea resulted in high levels of sensory acceptability, highlighting the infusion technique by workers, and the decoction technique among students, in which the "age" factor may have influenced the results, as adult individuals tend to show loss of some organoleptic characteristics such as aroma and flavor, and young individuals do not yet have these characteristics fully developed.*

I. INTRODUCTION

São Gabriel da Cachoeira, located on the border with Colombia and Venezuela, in the extreme northwest of Brazil, is a city in the state of Amazonas. Considered the most indigenous city in Brazil, it comprises 23 indigenous peoples (Gomes, 2013). Inside this multicultural city is located the Federal Institute of Amazonas Campus (Instituto Federal do Amazonas IFAM/CSGC) where this study was conceived and carried out. The IFAM/CSGC has the mission of integrating indigenous and non-indigenous people, bringing education to all ethnic groups in the Alto Rio Negro region, as a right guaranteed in the Federal Constitution of 1988. It has been carrying out teaching, research, and extension activities since 1994, the year of its foundation, promoting educational policies for differentiated education that meets the demands of local society (IFAM CSGC, 2021).

With Alto Rio Negro's region biodiversity and the traditional knowledge of indigenous people on the consumption of medicinal plants for the cure of diseases, there is the need to expand knowledge, mainly for forms of consumption such as teas, baths, bottles, syrups, among others.

According to Barbosa and Cazal (2018), tea is the second most consumed food in the world, second only to water, which has the first place. Its consumption has

historical records since antiquity, when people already used the plants to heal disorders, dysfunctions, and diseases. In accordance with the Institute of Food Technologists (IFT, 1981), sensory analysis is a discipline of science that measures, analyzes, and interprets properties of materials or foods through the human body's senses, such as taste, smell, touch, hearing, and vision. According to Nascimento (2014), although some organoleptic properties are realized by the same sense of the human body, its definitions may not have the same meaning as the “taste” and “flavor”. For example, the taste is a characteristic perceived only by the palate, while the flavor requires a sensory analysis carried out by the olfactory receptor cells, taste buds, tactile and thermal elements of the tongue, in addition to the oral cavity. The "aroma" is characterized by the perception of volatile substances by smell, retronasally (Nascimento, 2014). When sensory analysis evaluates two or more properties, it is called “flavour” (Esteves, 2009).

Melissa (Melissa officinalis L.), known as melissa, a true lemon balm that belongs to the Lamiaceae family, is of Asian and European origin (Meira et al., 2012). This plant is composed of hydroxycinnamic acid and essential oils, especially terpenoids such as citral, citronellal, geraniol, and nerol, in addition, it consists of flavonoids and tannins (Silva et al., 2018). It has simple, opposite leaves, with a serrated edge; pinkish-violet inflorescences gathered in an axial chapter of a short and variable axis. The fruits are globose drupes (Vieira et al., 2016, p.103). The plant gives off a lemon-like odor that gets more intense after the plant dries. Popularly used to treat nervous breakdowns, tachycardia, melancholy, hysterics, and anxiety. The essential oil of this plant is in the leaves and flowers (Meira et al., 2012).

This study aimed to prepare and evaluate, through sensorial analysis, the lemon balm tea by the academic community of IFAM São Gabriel da Cachoeira campus, Amazonas state, Brazil.

II. METHOD

Acquisition of Raw Materials

The Lemon Balm species (Melissa officinali L) was cultivated and extracted on the Medicinal Plants Nursery of IFAM - São Gabriel da Cachoeira campus. The taxonomic identification of the seedlings was performed with the help of the biology technician according to the cataloguing of the Herbarium Control System (Sistema de Controle de Herbário - SICOHE) and the Amazonas Research Institute (Instituto de Pesquisa do Amazonas INPA).

The tea preparation (methodologies, and techniques)

The tea preparation was made by three different techniques after sanitizing the plant material with water and soap, and selection of the healthiest leaves of the plant species that were used. For the infusion technique, 50g of lemon balm leaves were previously separated, cut in little pieces and put into a metallic container where there was 500ml of boiled water at 100º C. The recipient was closed and left to rest for about 10 to 15 minutes. For the Decoction technique, 50 g of the plant material was cut and put into a metal container where there was 500 ml of water in regular temperature. After that, the recipient was brought to the fire until the boiling temperature of the water reached. After boiling the water, the system was left on the fire for 8 minutes and then putted to rest until it reached the regular temperature again. For the Macerated technique, 50 g of plant material was cut, crushed and placed in 500 ml of water at room temperature for 24 hours. By the end of this process, the products were filtered in a paper strainer and transferred to properly identified thermal bottles.

Sensory Analysis

Sensory acceptability tests were performed based on the analysis of sensory attributes: appearance, smell, colour, taste, texture and global acceptance, through a structured hedonic scale of nine extreme points (1- I really disliked it) and (9- I liked it a lot), according to Monteiro's methods (1984). It also verified the frequency of consumption with extremes by (1- I would only eat this if I was forced to) and (9 - I would eat this whenever I had the opportunity), with the IFAM-CSGC students and public servers. The sensory analysis of tasting was made by the Organic Chemistry Laboratory (IFAM-CSGC).

110 tasters untrained of both sexes with different ages students or servers participated in this study (TAE and teachers) from IFAM-CSGC.

The samples were presented to the evaluators in disposable plastic cups, coded with random numbers without the identification of the product. The collaborators agreed to participate in the research voluntarily and they were instructed to sign the Informed Consent Form (Termo de Consentimento Livre Esclarecido TCLE).

The data from sensory analysis were submitted to descriptive statistics through ®Microsoft Excel Version 2010.

III. DISCUSSION AND RESULTS

The consumption of medicinal and aromatic plants is generally through the ingestion of drinks like teas, for example. Characteristics such as great smell and taste

contributed to the popularization of this drink, but due to its medicinal properties is that it spread across different cultures (Braibante et al., 2014). The active ingredients of the tea are absorbed through the digestive tract, going through the hepatic circulation, according to its physical and physicochemical properties until it is metabolized by the liver and transformed into an easily eliminated substance. Despite the herbal benefits, Cardoso (2012) says that tea consumption must be encouraged, not only because of the therapeutic need, but because of sensory experiences that drinking it can bring to its users.

From the results of this research, it was possible to verify the potential of Lemon balm tea ingestion by IFAM-São Gabriel da Cachoeira campus students and servers. The Table 1 shows sensory analysis, consumption frequency, purchase intention and purchase acceptance index by the institution's servers. Sensory analysis demonstrated that the consumption frequency was much

higher when the tea was prepared in the infusion.form (82,38%). Regarding the purchase intention, the highest averages were also verified for manipulation through infusion, classifying the tea in the category "I would probably buy it" in the evaluation of the servers. In a study conducted by Nascimento (2014), 'black tea' was prepared in different ways and the infusion technique was more preferred than the others by the panel of evaluators.

Table. 1: Sensory analysis rate (± standard deviation), consumption frequency, and purchase intention of the 'lemon balm' tea by the IFAM servers

		Servers Samples		
		Infusion	Decoction	Maceration
Characteristics	Pontuation	Lemon Balm	Lemon Balm	Lemon Balm
Appearance	(1-9)	7.61 ± 1.18	7.26 ± 1.37	7.41 ± 1.67
Smell	(1-9)	7.87 ± 1.39	7.13 ± 1.59	7.43 ± 1.39
Colour	(1-9)	7.12 ± 1.59	7.13 ± 1.36	7.12 ± 1.58
Taste	(1-9)	7. 15 ± 1.69	6.38 ± 1.89	6.92 ± 1.86
Texture	(1-9)	7.25 ± 1.71	6.62 ± 1.98	7.34 ± 1.59
Global Acceptance	(1-9)	7.46 ± 1.66	6.36 ± 2.15	7.21 ± 1.83
Consumption Frequency	(1-9)	6.64 ± 1.78	5.74 ± 1.89	6.50 ± 2,00
Purchase Intent	(1-5)	4.33 ± 0.86	3.68 ± 1.19	4.20 ± 1.50
Acceptance index	(%)	82.38	75.68	80.48

Source: Search Results.

Regarding the acceptability for the sensory attributes' appearance, smell, colour, taste, texture, and global acceptance (Figure 1), it was found that all characteristics had an acceptability index higher than (70%).

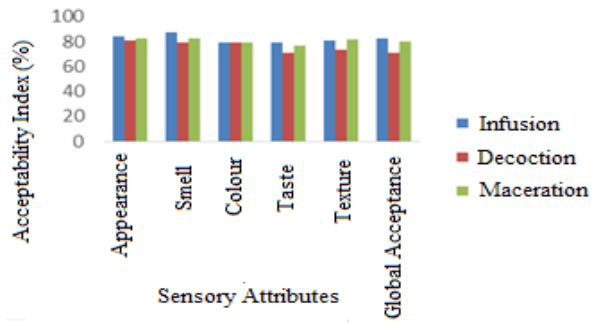

Fig. 1: Acceptability index by sensory attributes of 'lemon grass' tea, by servers
Source: Search results

In Castro's et al. (2007) evaluation, for a product to be accepted by the consumer public, its sensory evaluation must be at least 70%. Therefore, regardless the technique employed, lemon balm tea was accepted by the evaluators and that means the product classification in categories "I liked it slightly" and "I liked it moderately". In the sensory evaluation of ginger inflorescence tea, Lucio et al. (2010), it was found an acceptability index higher than (80%), and it was considered, thar the ginger inflorescence may be yet another alternative of nutritious food available on the market for consumers.

In the sensory evaluation performed by the students (Table 2) the lemon balm tea was better manipulated by the decoction technique. About the acceptability index it was (70,97%). The Consumption Frequency was classified at the "I would eat it if it was affordable, but I would not strive" category. This perception by the students may be related to the fact that the tea was served without the

addition of sweeteners, which contributed to the intensification of sensory attributes. Regarding the purchase intention, the students informed that they 'would have doubts whether they would buy' the tea, if it was being marketed.

In Steinle's et al. (2005) research it was not possible to find any significant differences in sensory acceptance of mate tea sweetened with sucrose, aspartame, and stevia before and after physical exercise. Barboza and Cazal (2018) evaluated the influence of sensory factors and nutritional knowledge on the acceptance of mate tea. They stated that the non-addition of sweeteners in this beverage influenced the sensory evaluation, because most of the consumers prefer tea with sugar.

Table. 2: Sensory analysis rate (± standard deviation), consumption frequency, and purchase intention of the 'lemon balm' tea by the IFAM students.

		Students Samples		
		Infusion	Decoction	Maceration
Characteristics	Pontuation	Lemon Balm	Lemon Balm	Lemon Balm
Appearance	(1-9)	6.58 ± 1.91	6.56 ± 1.79	6.66 ± 1.82
Smell	(1-9)	5.25 ± 2.45	6.17 ± 2.29	5.87 ± 2.50
Colour	(1-9)	6.52 ± 1.72	6.68 ± 1,70	6.22 ± 1.89
Taste	(1-9)	5.35 ± 2.61	6.04 ± 2.28	5.76 ± 2.47
Texture	(1-9)	5.76 ± 2.43	6.32 ± 1.87	5.90 ± 2.05
Global Acceptance	(1-9)	6.29 ± 2.12	6.55 ± 2.10	5.95 ± 2.39
Consumption Frequency	(1-9)	5.35 ± 2.23	5.73 ± 2.25	5.67 ± 2.26
Purchase Intent	(1-5)	3.68 ± 1.25	3.57 ± 1.17	3.60 ± 1.30
Acceptance index	(%)	66.25	70.97	67.37

Source: Search Results

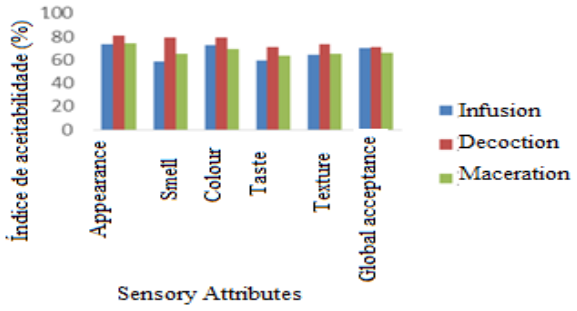

Fig. 2: Acceptability index by sensory attributes of 'lemon grass' tea, by students
Fonte: Search Results.

The sensory acceptability index of the attributes (appearance, smell, colour, taste, texture and global acceptance) is higher than (50%) regardless of the technique used (Figure 2). It is noticeable that in the decoction technique the attributes had the highest indices with numbers higher than (70%). Carvalho et al. (2006), states that sensory analysis is an important technique for knowing the consumer's opinion and purchase intent in relation to a particular product. Santos et al. (2016) added inulin in green tea cake and reached acceptability rates of more than 70%.

IV. CONCLUSION

The Lemon Balm tea showed a huge potential for consumption by IFAM-Campus São Gabriel da Cachoeira - AM servers and students. On this research, the different methods had high levels of sensory acceptability. The servers considered the infusion technique the best for the tea preparation, while the students thought that the decoction is the best technique. It is really likely that the age was a factor that influenced on the results. The adults tend to present organoleptic loss (smell and taste), while young people do not have these fully developed characteristics.

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REFERENCES

[1] Barboza, H. C. & Cazal, M. M. (2018) Avaliação da influência de características sensoriais e do conhecimento nutricional na aceitação do chá-mate. Braz. J. Food Technol, Campinas, vol. 21, e2017075.

[2] Braibante, M. E. F.; Silva, D.; Braibante, H. T. S.; Pazinato, M. S. (2014) A química dos chás. Química Nova Escola, São Paulo - SP, vol. 36, No.3, pp. 168-175.

[3] Cardoso, L. M. T. F. (2012) Avaliação sensorial em infusões de plantas aromáticas e medicinais- influência dos fatores de pós-colheita e processo de preparação. Faculdade de Ciências da Universidade do Porto.

[4] Carvalho, E. A.; Neto, B. A. M.; Aguiar, J. C.; Caldas, M. C.; Cavalcanti, M. T.; Miyaji, M. (2006) Desenvolvimento e Análise Sensorial de Sorvete de Massa Sabor Café. I Jornada Nacional Da Agroindústria. Anais.

[5] Castro, L. I.; Vila Real, C. M.; Pires, I. S.; Pires, C. V.; Pinto, N. A.; Miranda, L. S.; Rosa, B. C.; Dias, P. A. (2007) Quinoa (*chenopodium quinoa* willd): digestibilidade *in vitro*, desenvolvimento e análise sensorial de preparações destinadas a pacientes celíacos. Revista Alimentos e Nutrição, vol.18, No.4, pp. 413-419.

[6] Esteves, E. (2009) Análise Sensorial: Curso de Engenharia Alimentar. Portugal: Instituto Superior de Engenharia da Universidade do Algarve.

[7] Gomes, R. C. M. (2013) Território e línguas indígenas em São Gabriel da Cachoeira-AM. 2013. 127 f. Dissertação (Mestrado em Geografia) - Universidade Federal do Amazonas, Manaus.

[8] Instituto Federal do Amazonas. Instituto Federal do Amazonas Campus São Gabriel da Cachoeira. A Instituição. Retrieved from: http://www2.ifam.edu.br/campus/sao_gabriel_da_cachoeira/instituicao/instituicao 24th april 2021.

[9] Institute of food technologists. (1981) Sensory evaluation guide for testing food and beverage products. Sensory Evaluation Divison, Institute of Food Technologists. Food Technology, 35, pp. 50-59.

[10] Lucio, I. B.; Freitas, R. J. S.; Waszczynskyj, N. (2010) Composição físico-química e aceitação sensorial da inflorescência de gengibre orgânico (*Zingiber officinale Roscoe*). Ciência e Tecnologia de Alimentos, Campinas, vol. 30, No. 3, pp. 652-656.

[11] Meira, M.R., & Martins, E.R.; Manganotti, S.A. (2012) Crescimento, produção de fitomassa e teor de óleo essencial de melissa (*Melissa officinalis L.*) sob diferentes níveis de sombreamento. Revista Brasileira de Plantas Medicinais, Botucatu, vol.14, No.2, pp.352-357.

[12] Monteiro, C. L. B. (2002) Técnicas de avaliação sensorial. 2. Ed. Curitiba: CEPPA, 1984. 101 p. mussatto, s. i.; roberto, i. c. Produção biotecnológica de xilitol a partir da palha de arroz. Biotecnologia Ciência & Desenvolvimento, No. 28, pp. 34-39.

[13] Nascimento, M. L. (2014) Doseamento de cafeína e análise sensorial de chá preto (*Camellia sinensis*) preparado com diferentes condições de extração. 2014. Dissertação (Mestrado em Ciências Gastronômicas) -Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa.

[14] Santos, M. D.; Santos, J. K.; Ribas, A. P. J.; Meotti, N.; Santos, E. F.; Novello, D. (2016) Adição de inulina em bolo de chá verde: análise físico-química e aceitabilidade sensorial entre crianças. Revista da Universidade Vale do Rio Verde, Três Corações, vol. 14, No. 2, pp. 93-105.

[15] Silva, T. G. L. Juvino, E. O. R. S., Marcelino, E. M., Silva, M. A. S., Mariz, S. R. (2018) Propriedades terapêuticas da melissa officinalis: uma revisão integrativa. Anais III CONBRACIS. Campina Grande: Realize Editora. Retrieved from: https://www.editorarealize.com.br/index.php/artigo/visualizar/41341. 19th September 2021.

[16] Soares, C. A. (2012) Aprenda tudo sobre chás medicinais. Premius Editora.

[17] Steinle, S. R.; Guerreiro, N. F.; Toledo, F. O.; Shiguemoto, G. E.; Bolini, H. M. A. (2005) Avaliação da aceitação de chá-mate adoçado com aspartame, extrato de estévia (*Stevia reabaudiana* (Bert.) *Bertoni*) e sacarose, antes e após o exercício físico. B. CEPPA, Curitiba, vol. 23, No. 1, pp. 85-94.

[18] Vieira. A. C. M., Andrade, S. R. Seixas, I. M. V., Medeiros, T. K. C., Carneiro, L. S. M. (2016) Manual sobre uso racional de plantas medicinais. Extensão Universitária sobre Farmacobotânica. 1st ed. – Dados eletrônicos. – Rio de Janeiro: Cerceau.