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ARTICLE 1

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PINEAPPLE AND MINT-FLAVORED WATER KEFIR: FUNCTIONAL PROPERTIES, NUTRITIONAL POTENTIAL, AND CONTRIBUTION TO THE INTEGRAL USE OF FOOD

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ABSTRACT: Water kefir has stood out as a functional, non-dairy alternative capable of meeting the nutritional demands of consumers with dietary restrictions and those seeking natural and sustainable products. The incorporation of ingredients such as pineapple and mint, in addition to enriching the sensory profile of the drink, contributes to the full use of food and the reduction of waste, a practice in line with sustainable development guidelines. This study presents an analytical review of the literature with the aim of understanding the relevance of water kefir consumption and evaluating the nutritional and functional potential of adding pineapple and mint in the flavoring process. Scientific databases between 2015 and 2025 were consulted, selecting studies that addressed microbiological, nutritional, technological, and sustainable aspects related to the topic. The analysis revealed that water kefir contains microorganisms capable of promoting health benefits, such as modulation of the intestinal microbiota, antioxidant action, immune improvement, and preventive potential against chronic diseases. It was also observed that the use of unconventional parts of pineapple and mint leaves enables the nutritional enrichment of the beverage and is in line with food waste minimization strategies. The results demonstrate that flavoring water kefir with pineapple and mint is a promising alternative for the development of functional, healthy, and sustainable products.

KEYWORDS: water kefir; fermented beverage; *Ananas comosus*; *Mentha spicata*; full use of food.

1 INTRODUCTION

Functional foods are defined as those that, in addition to providing essential nutrients to the body, offer additional health benefits, contributing to the reduction of the risk of chronic noncommunicable diseases. Among the main components of this group are prebiotics, substances consisting of dietary fibers that promote the selective growth of beneficial microorganisms in the intestine, and probiotics, which contain live microorganisms capable of assisting in the maintenance and balance of the intestinal microbiota (Ghedini *et al.,* 2020).

In addition to milk kefir, there is water kefir, which can be cultivated in aqueous solutions containing brown sugar or fruit juices. The microbial composition of both types of kefir, as well as the fermentation processes, are similar, although they have visual differences: grains cultivated in water tend to acquire a brown or ocher color, while those cultivated in milk take on a yellowish hue (Ghedini *et al.,* 2020; Azizi *et al.,* 2021).

The drink resulting from the fermentation of kefir grains has high nutritional value, whether fermented in milk or in aqueous solutions with sugar. Water kefir, as it does not contain dairy ingredients, is a viable alternative for individuals with lactose intolerance, as well as for those who follow plant-based diets, such as veganism. In addition, its ability to ferment different substrates has sparked the interest of researchers in developing innovative functional beverages with high nutritional value and functional potential (Jaime; Ramos; Sancho, 2022; Lima, 2022).

Among the most commonly used substrates in this fermentation process is sugar, an essential source of carbohydrates for the metabolism of the microorganisms present in kefir. Sugar is composed of mono- and disaccharides, with sucrose, obtained from sugarcane juice (Saccharum officinarum L.), being the main representative. Brown sugar, in turn, has gained prominence because it undergoes minimal processing, which allows the preservation of its natural nutrients, such as calcium, iron, potassium, and vitamins. In addition to having a reduced energy content, its structure favors the absorption of these compounds by the body, making it a healthier alternative to refined sugar (Brazil, 2022; Nascimento; Lima, 2019; Pontes; Pupo; Felicio, 2024).

In the quest to improve the nutritional and sensory value of beverages fermented with water kefir, natural ingredients such as fruits and herbs have been incorporated into the formulations. Pineapple *(Ananas comosus),* widely consumed in Brazil and used by the food industry, stands out not only for its characteristic flavor but also for its energy value and mineral richness. In addition, residues such as peels, seeds, and pulp, which are normally discarded, have been reused in sustainable preparations, contributing to waste reduction and the full use of the food (Frutuozo *et al.,* 2024).

Another promising addition in this context is mint *(Mentha spicta L.)*, an aromatic herb of the Lamiaceae family, native to Africa, temperate Asia, and Europe. It is a herbaceous, rhizomatous, and perennial plant with leaves that can be used fresh in teas, sauces, candies, and beverages, imparting aroma and freshness. Species of the Mentha genus stand out not only for their nutritional properties but also for their

pharmacological potential (Oliveira, 2021). Given this context, this study focuses on the development of fermented beverages based on water kefir, flavored with pineapple and mint, aiming to expand consumption options for specific audiences.

2 METHODOLOGY

This study consists of an analytical review, based on a clear and well-defined research question, as guided by Franco, Ganga, and Santa-Eulalia (2017). The review aimed to answer the following guiding question: what is the relevance of consuming water kefir, including the addition of pineapple and mint as a way of flavoring and making full use of food? The search for studies was conducted from May to November 2025, using widely recognized scientific databases, including the CAPES Journal Portal, the Brazilian Digital Library of Theses and Dissertations (BDTD), the Scientific Electronic Library Online (SciELO), and the Latin American and Caribbean Health Sciences Literature (LILACS). The following keywords and combinations thereof were used to identify the studies: fermented beverage, water kefir, full use of food, pineapple, and mint.

Studies that directly addressed water kefir, its nutritional or functional properties, as well as research related to the full use of food, especially the use of pineapple and mint, were included in the review. Only studies published in Portuguese or English, available free of charge in full text, and included in the time interval from 2015 to 2025, covering a ten-year period, were considered. Studies that did not fit the proposed theme, those that were not available in full or had restricted access, and those duplicated in the databases consulted were excluded.

The selection of materials took place in three stages: initially, the titles and keywords were read, followed by an analysis of the abstracts and, finally, a full reading of the preselected texts. After this screening, the studies considered eligible were analyzed qualitatively, covering aspects such as the nutritional composition and functional properties of water kefir, the nutritional and technological potential of pineapple and mint, possibilities for flavoring the fermented beverage, and contributions related to the full use of food. The interfaces of the theme with sustainable practices and Sustainable Development Goal 3, which deals with the promotion of health and well-being, were also observed.

The results were summarized descriptively, allowing for the integration of the evidence found and discussion of the main trends, gaps, and contributions observed in the literature on the topic.

3 LITERATURE REVIEW

3.1 KEFIR: CONCEPTS AND HISTORY

The term kefir is of Turkish origin and means "well-being" or "feeling good," which reflects the benefits traditionally attributed to its consumption. It is believed that its origin dates back to the Caucasus region around 2000 BC, where it was discovered empirically through the spontaneous fermentation of milk stored in leather bags. This process gave rise to a whitish, slightly effervescent drink with gelatinous grains 1 to 2 cm in diameter, whose appearance resembles cauliflower (Ghedini *et al.,* 2020).

Kefir is obtained through fermentation carried out by a complex symbiotic community of microorganisms, predominantly lactic acid bacteria and yeasts, organized into grains. It is estimated that this microbiota includes about 35 different species, notably *Lactobacillus casei, Bifidobacterium sp., Streptococcus salivarius subsp. thermophilus, Leuconostoc, Lactococcus, and Acetobacter. In addition, the grains contain yeasts such as Kluyveromyces marxianus* (lactose fermenter) and *Saccharomyces exiguus* (non-fermenter), all immersed in a matrix composed of polysaccharides, proteins, and lipids, whose composition may vary depending on the length of use and the origin of the grains (Santos, 2015; Ghedini *et al.,* 2020).

Although *Saccharomyces cerevisiae* yeast is widely used in industry as a fermenting agent, water kefir grains have also established themselves as a viable alternative for the production of fermented beverages, especially because they have an acidic taste, moderate alcohol content, and low residual sugar content. Its artisanal preparation, combined with the fact that the grains are usually obtained through donation, makes water kefir accessible to the population and attractive from a nutritional and sensory point of view (Santos; Ramos; Pistile, 2022). Despite its growing popularity, Brazilian legislation is still in its infancy when it comes to regulating water kefir. MAPA Normative Instruction No. 46, dated October 23, 2007, only covers kefir in the context of fermented milks, defining it as a product resulting from the fermentation of milk by kefir grains. Thus, water kefir still needs specific regulation, hindering its standardization and industrial insertion.

At the same time, there is growing interest in water kefir among consumers with dietary restrictions (such as those who are lactose intolerant, allergic to milk protein, and followers of vegan diets), since it does not contain ingredients of animal origin. In addition, scientific evidence has strengthened its recognition as a functional beverage, which justifies the need to establish specific quality parameters, especially for flavored versions produced on an industrial scale.

3.2 NUTRITIONAL COMPOSITION AND FUNCTIONAL PROPERTIES OF WATER KEFIR

The growing acceptance of water kefir is directly related to its nutritional composition and the functional effects conferred by fermentation. It is a non-dairy beverage produced by grains composed of lactic acid bacteria and yeasts, cultivated in solutions containing sugars or fruit juices. The final composition of the product varies according to the substrate, environmental conditions, and fermentation time, resulting in a beverage with low- , low alcohol content, and reduced residual sugars (Figueiredo; Castro; Mascarenhas, 2023).

From a nutritional point of view, water kefir contains bioactive compounds such as organic acids (lactic, acetic, and glucuronic), B vitamins (B1, B2, B12), and minerals such as calcium, magnesium, phosphorus, and zinc. Fermentation also generates secondary metabolites with antioxidant and antimicrobial properties, which increases its potential as a functional food (Santos, 2015).

Among the main benefits associated with regular consumption of the drink are: modulation of the intestinal microbiota,

strengthening of the immune system, anti-inflammatory action, improved digestibility, and potential for the prevention of metabolic diseases such as obesity, type 2 diabetes, and dyslipidemia (Santos, 2015; Santos; Ramos; Pistile, 2022). Furthermore, as it does not contain ingredients of animal origin, water kefir represents a versatile and inclusive food solution, aligned with the demands of audiences with dietary restrictions and sustainability concerns.

3.3 INTEGRAL USE OF FOOD

The growing amount of food waste and the residues generated from these losses have attracted worldwide attention due to their socioeconomic and environmental impacts. This global scenario results in the depletion of non-renewable sources and resources, the loss of biodiversity, and the intensification of climate change. However, it is possible to reverse this trend by significantly reducing waste on a global scale (Rodrigues *et al.,* 2021; Santos *et al.,* 2020).

In this scenario, the full use of food emerges as an effective and viable strategy to mitigate these impacts. This practice, by incorporating parts traditionally discarded in culinary preparations (such as peels, stalks, and leaves), not only reduces waste generation but also enriches food nutritionally, promoting more varied, healthy, and low-cost meals (Luiz; Santos; Azeredo, 2019).

Fruits and vegetables, rich in fiber, water-soluble vitamins, and minerals, are essential to human nutrition. Their full use, in addition to preventing waste, can directly contribute to the prevention of chronic noncommunicable diseases such as diabetes, cancer, and cardiovascular diseases (Rodrigues et al., 2021). Thus, adopting sustainable and h y practices in the food chain becomes a relevant response to current demands for health, economy, and environmental responsibility (Linhares *et al.,* 2019).

3.4 NUTRITIONAL PROPERTIES AND BENEFITS OF USING PINEAPPLE AND MINT

Pineapple *(Ananas comosus)*, typical of tropical and subtropical regions, is widely accepted worldwide, both fresh and in industrialized versions. Its characteristic appearance, flavor, and aroma make it a highly appreciated fruit, consumed fresh, canned, frozen, in syrup, crystallized, dried, pickled, and as an ingredient in sweets, ice cream, creams, candies, and cakes. The consumption of pineapple generally results in the generation of waste such as the crown, peel, ends, and central cylinder of the fruit (Bazzi *et al.,* 2020).

Pineapple waste has high levels of carbohydrates, such as cellulose, hemicellulose, and small amounts of pectin, which can be hydrolyzed into mono- and disaccharides, such as glucose, fructose, and sucrose. These compounds enable their use in fermentation processes, favoring the creation of new products and adding value to the fruit production chain (Menezes, 2018).

Thus, pineapple fruit is rich in minerals such as potassium, nitrogen, calcium, magnesium, sulfur, and phosphorus, in addition to containing smaller amounts of manganese, iron, zinc, boron, and copper. It also has nutritional value because it contains beta-carotene and vitamins A, B1, C, and D. In addition to being a source of bromelain, an enzyme that aids in the digestion of proteins and fibers, it acts as a germicide and antioxidant and contributes to the prevention of dehydration (Pereira, 2019; NEPA, 2011).

Spearmint *(Mentha spicata L.)*, in turn, is an herb widely used in food and in the essential oils industry, notable for its aroma and medicinal properties. Studies indicate that its leaves are rich in phenolic compounds, especially flavonoids, which act as natural antioxidants and have anti-inflammatory, antimicrobial, and anticarcinogenic properties (Liberato; Aguiar, 2023; Carvalho, 2019; Quaresma *et al.,* 2021).

Given its functional importance and versatility, mint cultivation has expanded in commercial and domestic gardens, being propagated mainly by cuttings. Its incorporation into food formulations, such as fermented beverages, can not only add nutritional value , but also sensorially enrich the final products (Quaresma *et al.,* 2021).

3.5 THE IMPORTANCE OF SUSTAINABLE DEVELOPMENT GOAL 3 (GOOD HEALTH AND WELL-BEING)

The development of the 2030 Agenda for Sustainable Development began in 2013 as a direct result of the deliberations of the Rio+20 Conference. This process resulted in the formulation of the Sustainable Development Goals (SDGs), which began to strategically guide national public policies and international cooperation actions planned until 2030. The SDGs were designed to integrate the three essential dimensions of sustainable development: economic, social, and environmental. In total, there are 17 goals accompanied by 175 targets, adjusted to the Brazilian reality with the aim of being achieved by 2030. Among these goals, SDG 3 stands out, emphasizing one of the fundamental pillars for global transformation: "ensuring healthy lives and promoting well-being for all at all ages" (Matinei; Stefani; Carraro, 2023; Nobre *et al.,* 2023).

SDG 3 plays a decisive role in the Brazilian scenario, especially in view of the multiple challenges faced by the country. Among these, the increase in chronic diseases associated with unhealthy lifestyles stands out. In this context, SDG 3 is a strategic axis, guiding public policies and actions that promote greater equity in the health system, reinforce preventive practices, expand universal access to qualified services, and encourage healthier lifestyles. In this way, it contributes significantly to the advancement of sustainable development in Brazil (Nobre *et al.,* 2023).

3.6 FLAVORING KEFIR WATER

Kefir water, obtained from the cultivation of water kefir strains, can be flavored to make the fermented drink more sensorially and nutritionally enriched. This process involves the addition of fruits or vegetables and can result in the formation of carbon dioxide, a typical characteristic of fermentation carried out by the microorganisms present in the grains. In this study, pineapple pulp and peel, as well as mint leaves, were used as flavoring agents.

According to Pereira (2019) and NEPA (2011), pineapple has a varied mineral composition, being a source of potassium, nitrogen, calcium, magnesium, sulfur, and phosphorus, in addition to containing, in smaller quantities, manganese, iron, zinc, boron, and copper. The fruit also has significant nutritional value due to its beta-carotene and vitamins A, B1, C, and D. According to Liberato; Aguiar (2023), Carvalho (2019), and Quaresma *et al.* (2021), mint leaves are notable for their high content of phenolic compounds, especially flavonoids, which have antioxidant, anti-inflammatory, antimicrobial, and potential anticancer properties.

The methodology based on adding pineapple pulp and peel, combined with mint leaves, is suitable for flavoring kefir water, with the aim of improving the sensory characteristics and nutritional content of the final product.

FINAL CONSIDERATIONS

The review showed that water kefir is an important non-dairy fermented beverage option with significant functional and nutritional potential. Its diverse microbial composition, combined with the presence of bioactive metabolites, favors the modulation of the intestinal microbiota, contributing to digestive, immune, and metabolic health.

The use of pineapple and mint in the flavoring process proved to be particularly relevant, both for its ability to enrich the sensory properties of the beverage and for adding bioactive compounds from these ingredients, such as flavonoids, vitamins, and minerals. In addition to increasing the nutritional value of the product, the use of the peel and unconventional parts of the pineapple demonstrates that the preparation of the beverage can be integrated with sustainable practices of full food utilization, contributing to waste reduction and aligning with the goals of Sustainable Development Goal 3, which aims to promote health and well-being.

Thus, the incorporation of natural ingredients into kefir water represents an effective strategy for the development of new functional products aimed at specific audiences, such as individuals with lactose intolerance, vegans, and consumers interested in healthier and more environmentally responsible food alternatives. Therefore, experimental studies that further explore sensory, microbiological, technological, and functional parameters are encouraged in order to consolidate the standardization and industrial vi tion of the beverage.

REFERENCES

AZIZI, N. F; KUMAR, M. R; YEAP, S. K; ABDULLAH, J. O; KHALID, M; OMAR, A. R; OSMAN, M. A; MORTADZA, S. A. S; ALITHEEN, N. B. Kefir and Its Biological Activities. Foods, v. 10, n. 6, p. 1210, 27/maio 2021. Disponível em:https://www.mdpi.com/2304-8158/10/6/1210. Acesso em: 4 de jul. 2025.

BAZZI, J; LEMES, K; SPEROTTO, L; GRIGOL, M; VARELA, V. Aproveitamento integral do abacaxi. 2020. 32 f. Revisão Bibliográfica - Instituto Federal de Santa Catarina, Santa Catarina, 2020. Disponivel em:

https://repositorio.ifsc.edu.br/bitstream/handle/123456789/2249/joana_da_silva_bazzi_2020.pdf?sequence=1&isAllowed=y. Acesso em: 17 jun. 2025.

BRASIL. Agência Nacional de Vigilância Sanitária. Instrução Normativa – IN nº 161, de 1º de julho de 2022. Estabelece os padrões microbiológicos dos alimentos. Diário Oficial da União: seção 1, Brasília, DF, n. 126, p. 235-238, 6 jul. 2022. Disponível em: https://pesquisa.in.gov.br/imprensa/jsp/visualiza/index.jsp?-data=06/07/2022&jornal=515&pag ina=235. Acesso em: 13 de ago. 2022.

CARVALHO, R. S. C. Potencial antioxidante e teor de compostos fenólicos dos chás de hortelã (Mentha spicata) camomila (Matricaria chamomilla) e capim- cidreira (Cymbopogon citratus). 2019. 44 f. Monografia (Bacharelado em Biotecnologia) - Universidade Federal de Uberlândia, Minas Gerais, 2019. Disponível em: https://repositorio.ufu.br/bitstream/123456789/25959/4/PotencialAntioxidanteTeor.pdf. Acesso em: 17 jun. 2025.

FIGUEIREDO, V. B; CASTRO, T. L. A; MASCARENHAS, M. S. A produção de Kefir no Brasil entre 2017 a 2022 e os microrganismos presentes na sua microbiota: um estudo Cienciometrico .Revista Scientific Electronic Archives, v.16, 2017-2022. Disponível em: https://scientificelectronicarchives.org/index.php/SEA/article/view/1666/1719 . Acesso em: 17 jun. 2025.

FRUTUOZO, F. A. B; SALLES, B. C. C; SOUZA, C. S. H; MARTIN, R. L; TERRA, R. A; SOUTO, F. S. N; OLIVEIRA, R. B. S; MIRANDA, L. P. A; SILVA, D. B. S. Perfil químico e atividade antioxidante de kombucha derivada de chá com propriedades energéticas. Revista Científica da Unifenas, Minas Gerais, v. 6, n. 1, jan/mar. 2024. Disponível em: https://revistas.unifenas.br/index.php/revistaunifenas/article/view/918 . Acesso em: 02 de jul. 2025.

GHEDINI, T. G. M; BENTO, L. V; MIOTO, L. S; OLIVEIRA, L. C; AMBROSIO, M. A. L. V; MARTINS, C. H. G; CARRIJO, M. G. M. S. Qualidade microbiológica do kefir. Revista Brazilian Journal of Development, v. 6, n. 1, p. 4336–4349, jan. 2020. Disponível em: https://ojs.brazilianjournals.com.br/ojs/index.php/BRJD/article/view/6419/5674 . Acesso em: 16 jun. 2025.

JAIME, C. E. F; RAMOS, G. G; SANCHO, R. A. S. Propriedades do fermentado kefir de água em diferentes substratos alimentares. Revista Perspectiva, v. 46, n. 6, p. 69–83, 16 fev. 2023.Disponível em: https://doi.org/10.31512/persp.v.46.n.6.2022.274.p.69-83 . Acesso em: 2 de jul. 2025.

LIMA, A. L. B. C. Influência de diferentes substratos na fermentação do kefir de água. Mestre em Engenharia Química—Viçosa - MG: Universidade Federal de Viçosa, 14 dez. 2022. Disponivel em: https://locus.ufv.br/items/c52986b0-1cba-426a-b16e-3494427623a1 . Acesso em: 2 de jul. 2025.

LIBERATO, M. C. C; AGUIAR, G. C. Propriedades da planta da hortelã e de seus compostos principais. Pesquisas bibliográficas realizadas por alunos das disciplinas de Bioquímica e Química dos Alimentos – Volume 4. 1. ed. Belo Horizonte: Poisson, 2023. p. 24-30. Disponível em: http://www.poisson.com.br . Acesso em: 17 jun. 2025.

LINHARES, P. S. D; SANTOS, S. O; NUNES, G. L; TRINDADE, D. B; PAIVA, C. C. S. Aproveitamento integral de alimentos: da sustentabilidade à promoção da saúde. Revista Referências em Saúde da Faculdade Estácio de Sá de Goiás, v. 2, n. 3, p. 65-68, ago./dez. 2019. Disponível em: https://estacio.periodicoscientificos.com.br/index.php/rrsfesgo/article/view/228/221 . Acesso em: 16 jun. 2025.

MATINEI, S; STEFANI, S. R; CARRARO, E. Tecnologia da informação e comunicação

e seu uso na saúde pública:| Contribuições aos objetivos do desenvolvimento sustentável- ODS 3. Revista Gestão em Análise, v. 12, n. 1, p. 49-62, jan./abr. 2023. Disponível em: https://periodicos.unichristus.edu.br/gestao/article/view/4521/1705. Acesso em: 18 nov. 2025.

MENEZES, J. L. Bebidas fermentadas por kefir de água a partir de sucos de resíduos de abacaxi. 2019. 84 f. Dissertação (Mestrado em Ciência de Alimentos) - Universidade Estadual de Londrina, Paraná, 2018. Disponível em: https://repositorio.uel.br/items/78a4178e-f14a-4b35-8e1c-fc93d7acb4c8 . Acesso em: 17 jun. 2025.

NASCIMENTO, L. C; LIMA, M. Influência de diferentes fontes de açúcar sobre as propriedades físicas do kombucha. In: XIII Congresso Brasileiro de Engenharia Química em Iniciação Científica. Blucher Chemical Engineering Proceedings. Uberlândia: Editora Blucher, ago. 2019. Disponível em: http://www.proceedings.blucher.com.br/article-details/31041 . Acesso em: 2 de jul. 2025.

Núcleo de Estudos e Pesquisas em Alimentação-NEPA. Tabela Brasileira de Composição de Alimentos – TACO. 4. ed., Universidade Estadual de Campinas. Campinas: NEPA/UNICAMP, 2011. 161 p. Disponível em: https://cfn.org.br/wp-content/uploads/2017/03/taco_4_edicao_ampliada_e_revisada.pdf. Acesso em: 22. fev. 2025.

NOBRE, A. K. C; TOLEDO, A. L. L; MORAIS, D. S. V. D; PIMENTA, H. C. D; MEDEIROS, J. A. N; MELO, R. P; LUCENA, S. V. Bem-estar e desenvolvimento sustentável: um estudo sobre o ODS 3. Revista Observatorio de la Economía Latinoamericana, v.23, n.11, p. 01-20. 2025. Disponível em: https://ojs.observatoriolatinoamericano.com/ojs/index.php/olel/article/view/12106/7554. Acesso em: 18 nov. 2025.

OLIVEIRA, P. P. Obtenção e caracterização de hortelã em pó em spray dryer. 2021. 88 f. Dissertação (Mestrado em Engenharia de Alimentos) - Universidade Federal de Uberlândia, Minas Gerais, 2021. Disponível em: https://repositorio.ufu.br/bitstream/123456789/32550/4/Obten%c3%a7%c3%a3ocaracteriza%c3%a7%c3%a3ohortel%c3%a3.pdf. Acesso em: 2 jul. 2025.

PEREIRA, J. S. Análise da aceitabilidade de suco de abacaxi produzido da casca da fruta. 2019. 21 f. Dissertação (Mestrado em Produção e Tecnologia Agroindustrial) - Universidade Federal de Campinas Grande, Paraíba, 2019. Disponível em: https://dspace.sti.ufcg.edu.br/bitstream/riufcg/17083/3/J%c3%89SSICA%20DE%20SOUSA%20PEREIRA%20-%20ARTIGO%20PPGSA%20PROFISSIONAL%202019.pdf .Acesso em: 16 jun. 2025.

PONTES, K. A. P; PUPO, P. H. B; FELICIO, R. S. Produção de açúcar mascavo a partir de caldo de cana. 2024. 17 f. Trabalho de Conclusão de Curso (Técnico em Química) - Centro Paula Souza, São Paulo, 2024. Disponível em: https://ric.cps.sp.gov.br/bitstream/123456789/27312/1/tecnico_quimica_2024_2_kevyn_augusto_de_pupo_pontes_producao_do_acucar_mascavo_a_partir_do_caldo_de_cana.pdf . Acesso em : 2 de jul. 2025.

QUARESMA, E. V. W; OTTO, R. P. A; SANTOS, C. C; SILVERIO, J. M; LOLI, G. H. S; VIEIRA. M. C. Níveis de sombreamento influenciam a produção de mudas de mentha x villosa huds. (Hortelã). Revista Brasileira de Engenharia de Biossistemas, v. 15, n. 1, p. 127-141, 2021. Disponível em: https://seer.tupa.unesp.br/index.php/BIOENG/article/view/988/497 . Acesso em: 17 jun. 2025.

RODRIGUES, J. H; SAMPAIO, R. S. G; SOUZA, L. D. Z. S; FERRARI, T; FELIPE, D. F. Contribuição do aproveitamento integral dos alimentos para saúde e meio ambiente. Revista Ibero Americana de Ciências Ambientais, v.12, n.7, p.314-327, 2021. Disponível em: https://sustenere.inf.br/index.php/rica/article/view/5912/3064 . Acesso em: 17 jun. 2025.

SANTOS, F. L. KEFIR: propriedades funcionais e gastronômicas. Bahia-BA: UFRB, 2015. 124p.

SANTO, G. E; RAMOS, S. P; PISTILE, K. L. M. Estudo da viabilidade de produção de vinho de beterraba a partir de kefir de água. Revista Processando o Saber, v. 14, p. 45-60, 2022. Disponível em:https://www.fatecpg.edu.br/revista/index.php/ps/article/view/244/157 . Acesso em: 2 jun. 2025.

SANTOS, K. L. PANIZZON, J; CENCI, M.M; GRABOWSKI, G; JAHNO, V. D. Perdas e desperdícios de alimentos: reflexões sobre o atual cenário brasileiro. Revista Brazilian Journal of Food Technology, v. 23, 2020. Disponível em: https://www.scielo.br/j/bjft/a/yhXZXHzvzPTqRWJpLcVt9Bx/?format=pdf&lang=pt . Acesso em: 17 jun. 2025.