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Effect of Jaggery and basil seed on ready-to-serve (RTS) yoghurt smoothie

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Abstract

Currently, there is a significant emphasis on promoting nutrition and raising health awareness. Consumers are progressively in pursuit of top-notch functional items that possess agreeable sensory qualities. This study aimed to scrutinize the impact of varying concentrations of jaggery (5%, 10%, 15%) and basil seeds (1.5%, 2%, and 2.5%) on the sensory attributes of a ready-to-serve (RTS) yogurt smoothie. The data collected underwent thorough statistical analysis, leading to the enhancement of the RTS yogurt smoothie, which was accomplished by utilizing 10% jaggery and 2% basil seeds, as determined through the analysis.

Keywords: basil seed, yoghurt, jaggery

Introduction

Short shelf life of fruits and veggies addressed by transforming them into Ready-to-Serve (RTS) beverages-non-fermented drinks with added sugar, water, and additives. Blending counters astringency or bitterness, enhancing flavor, nutrients, and shelf life. Natural RTS beverages valued for nutrition, refreshment, taste, and potential health benefits (Rathinasamy *et al.*, 2021) [9]. "Functional food" term coined in 1984 in Japan, describing fortified products with health benefits. Goals: improve health, prevent diseases, treat illnesses. Italy's functional food market led by "health yoghurt" (Bigliardi *et al.*, 2013) [11]. Yoghurt and soft cheese, both of which are high in calcium, protein, prebiotics, and probiotics, enhance the health of the bones. Yoghurt promotes the metabolism and absorption of calcium. Regular consumption increases bone mass, promotes equilibrium, and lessens loss brought on by hormonal shortages. Fermented milk products are a good choice for strong bones because of their effect on the gut bacteria. (Rizzoli *et al.*, 2017) [10]. Yoghurt, a creamy fermented milk, combines high milk solids with *Streptococcus thermophilus* and *Lactobacillus delbrueckii ssp. bulgaricus* (Vedamuthu, 1991) [12]. Nutrient-rich, yoghurt offers bio-available calcium and high-quality proteins with essential amino acids. Reported benefits include improved lactose tolerance, enhanced immunity, and gastrointestinal health. Rising demand due to recognized health advantages (Weerathilake *et al.*, 2014) [13]. Smoothies, semi-liquid with blended fruits like pineapple, watermelon, mango, and banana, offer varied nutrients due to fruit diversity. Blending enhances sensory properties (Teleszko *et al.*, 2014) [11]. Jaggery, a natural Indian sweetener, is unrefined cane sugar made by concentrating sugarcane juice with molasses. Organic jaggery is chemical-free. Its golden to dark brown hues are popular, especially light golden types. Globally used, it's a key sweetener and ingredient in Indian dishes. Nutrient-rich, jaggery's micronutrients combat toxins, with calcium, phosphorus, and zinc for overall health. It purifies blood, prevents ailments, and may aid jaundice treatment (Kumar *et al.*, 2018; Dutta *et al.*, 2015) [5, 3]. Basil (*Ocimum basilicum* L.), from tropical regions, belongs to *Ocimum* genus with 50-150 species (Munir *et al.*, 2019) [7]. In Iranian Sherbat and Faloodah, basil seeds are used. Extracting basil seed gum (BSG) involves gum from *Ocimum basilicum* L. seeds (Ghasempour *et al.*, 2020) [4]. Beyond customs, functional foods like basil seeds, which are nutrient- and health-promoting-rich, are available (Mezeyova *et al.*, 2020) [6].

Materials and Methods

The research was conducted at the Post Graduate Laboratory of Dairy Technology, Dairy Chemistry, and Dairy Microbiology Department situated in Dairy Science College, Regional Campus of Karnataka Veterinary, Animal and Fisheries Sciences University, Bengaluru.

The production of RTS functional red banana yoghurt smoothie utilized KMF "Nandini" brand cow milk with 3.5% fat and 8.5% SNF. *Streptococcus thermophilus* and *Lactobacillus delbrueckii ssp. bulgaricus* were included in the mixed culture used to make the yoghurt, which was purchased from Christian Hansen. Plastic cups with lids made of polypropylene (PP) were used to package the yoghurt smoothie. The optimization process for creating the Ready-To-Serve functional yoghurt smoothie involved Jaggery and Basil seeds, as illustrated in Figure 1.

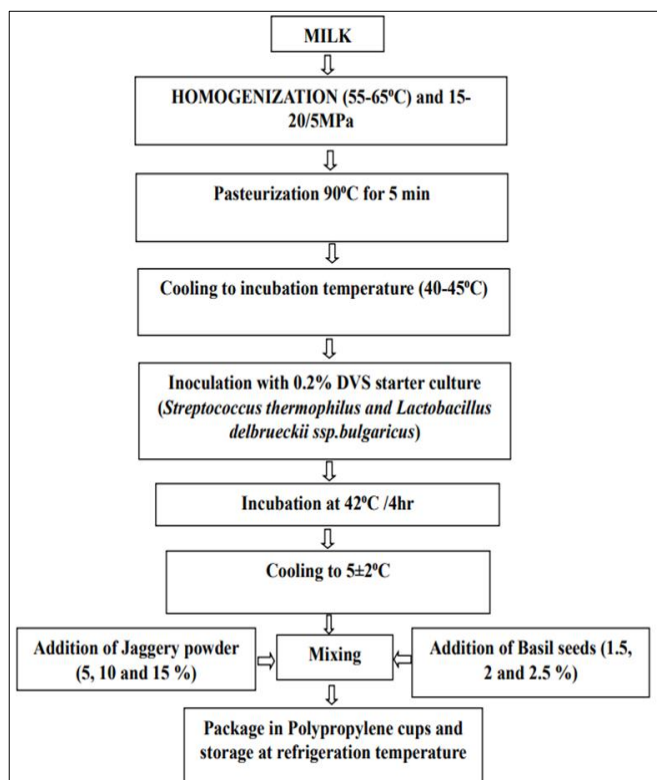


Fig 1: Flowchart for the RTS yoghurt smoothie preparation.



Sensory Evaluation

A group of five evaluators received samples for assessment. Each evaluator received a standard scoring card that employed a 9-Point Hedonic Scale to rate attributes such as color and visual appeal, consistency and texture, taste, and

overall desirability. Subsequently, the scores assigned by the evaluators were subjected to statistical analysis. To prevent any identification or prejudice, the samples were assigned code numbers (Pimentel *et al.*, 2016).

Statistical analysis

The data collected in this research study was analyzed using one-way ANOVA through the utilization of IBM SPSS software (version 29.0.1.0). SPSS is a statistical computing tool used for calculating means and critical differences to determine the significance or non-significance of the parameters investigated in the current study.

Results and Discussion

Effect of Jaggery on sensory attributes of RTS functional yoghurt smoothie

The yoghurt fortified with Jaggery in different concentrations such as 5%, 10% and 15%. The product was given for sensory evaluation to choose the optimized level of Jaggery to prepare RTS functional yoghurt smoothie. The mean sensory scores for colour and appearance are 7.58, 8.08 and 6.80 for yoghurt smoothie enriched with jaggery at 5, 10 and 15 percent respectively. The body and texture score of 5, 10 and 15 percent jaggery added yoghurt smoothie are 7.41, 8.08 and 6.72. The flavour and sweetness scores are 7.83, 8.26, 6.58 and 7.70, 8.00, 6.33 respectively and are significantly different. And the overall acceptability of the yoghurt smoothie of different concentration of jaggery (5,10 and 15%) obtained as 7.58,8.08 and 6.42 respectively as shown in the table 1 and figure 2 and Shrivastav *et al.*, (2016) highlighted the distinction between sugar and jaggery, particularly in terms of colour. They noted that sugar is characterized by its bright white colour, while jaggery exhibits a colour spectrum that can range from golden yellow to golden brown or even dark brown. This is in accordance with this result as higher amount of jaggery resulted in a much darker colour making it unappealing.

Effect of basil seeds in development of RTS functional yoghurt smoothie.

The yoghurt smoothie with best optimized level of Jaggery (10%), was used for further studies with incorporation of basil seeds (1.5%, 2% and 2.5%). The prepared product was given for sensory evaluation to select the optimum level of basil seeds for RTS functional yoghurt smoothie and obtained results where depicted in the table 2 and figure 3. When basil seeds were added at 1.5 percentage level in treatment sample it showed colour and appearance, body and texture, flavour, sweetness and overall acceptability scores of 7.75, 7.91, 7.91, 8.00 and 7.75 respectively. The mean sensory scores for colour and appearance are 7.75, 7.66 and 6.98 for yoghurt smoothie enriched with basil seeds at 1.5, 2 and 2.5 percent respectively. The body and texture score of 1.5,2 and 2.5 percent basil seeds added yoghurt smoothie are 7.91, 8.00 and 6.87. The flavour and sweetness scores are 7.91, 8.00 and 6.57 and 8.00, 8.09 and 6.92 respectively and overall acceptability scores are 7.75, 8.16 and 6.90 respectively. This decrease in sensory score with increase in percentage addition may be due to seeds will have swollen in water and had amounts of water between them. In a report by Hajmohammadi *et al.*, (2016), there will be a reduction in desirability of texture with increase in seed ratio.

Table 1: Effect of Jaggery on sensory attributes of RTS functional yoghurt smoothie

Level of Jaggery (%)	Colour and Appearance	Body and Texture	Flavour	Sweetness	Overall Acceptability
Control	7.33 ^a	7.35 ^a	7.66 ^a	7.58 ^a	7.33 ^a
5%	7.58 ^a	7.41 ^{ab}	7.83 ^a	7.70 ^a	7.58 ^a
10%	8.08 ^b	8.08 ^b	8.26 ^b	8.00 ^b	8.08 ^b
15%	6.80 ^c	6.72 ^c	6.58 ^c	6.33 ^c	6.42 ^c
CD($p \leq 0.05$)	0.78	0.70	0.42	0.31	0.48

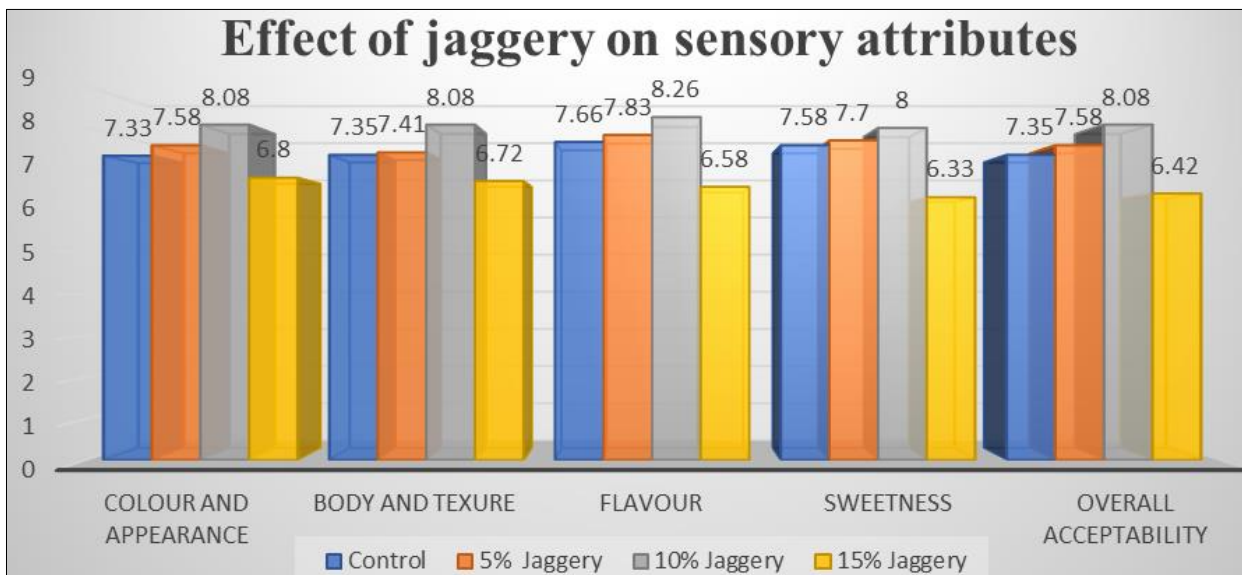


Fig 2: Effect of Jaggery on sensory attributes of RTS functional yoghurt smoothie

Table 2: Effect of Basil Seeds on sensory attributes of RTS functional yoghurt smoothie

Level of Basil Seed (%)	Colour and Appearance	Body and Texture	Flavour	Sweetness	Overall Acceptability
Control	7.50 ^a	7.33 ^a	7.41 ^a	7.50 ^a	7.56 ^a
1.5%	7.75 ^a	7.91 ^b	7.91 ^{ab}	8.00 ^{ab}	7.75 ^{ab}
2%	7.66 ^a	8.00 ^b	8.00 ^b	8.09 ^b	8.16 ^b
2.5%	6.98 ^b	6.87 ^c	6.57 ^c	6.92 ^c	6.90 ^c
CD($p \leq 0.5$)	0.32	0.41	0.41	0.20	0.39

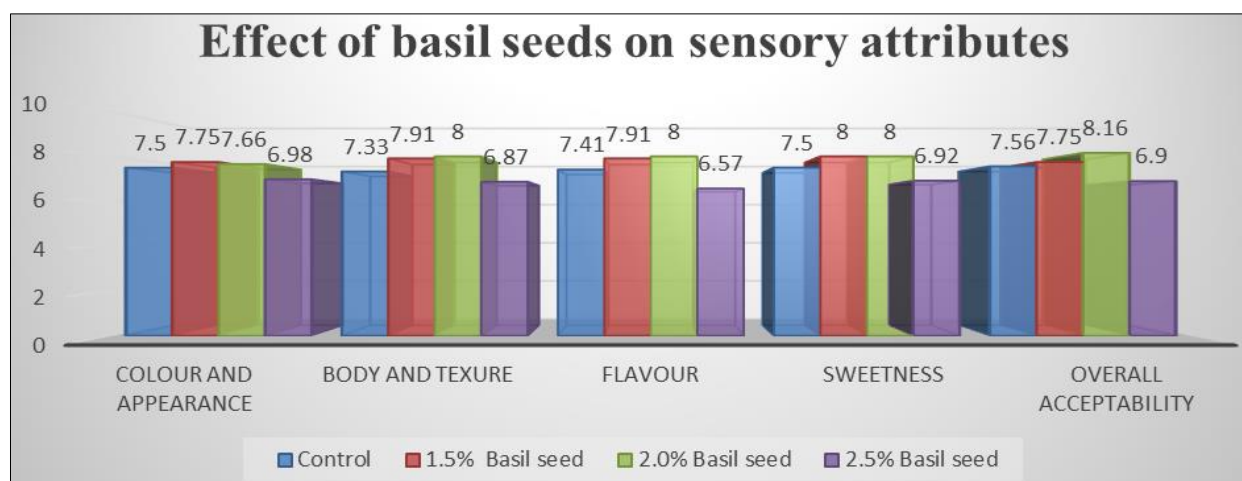


Fig 3: Effect of Basil Seeds on sensory attributes of RTS functional yoghurt smoothie

Conclusion

The research study explored the innovative ideology in developing RTS yoghurt smoothie by incorporating native functional ingredients such as jaggery and basil seeds. The developed product was subjected to sensory studies where the levels of functional ingredients were optimized. The final optimal formulation consists, 10% jaggery and 2% basil seeds. This combination received the highest scores.

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