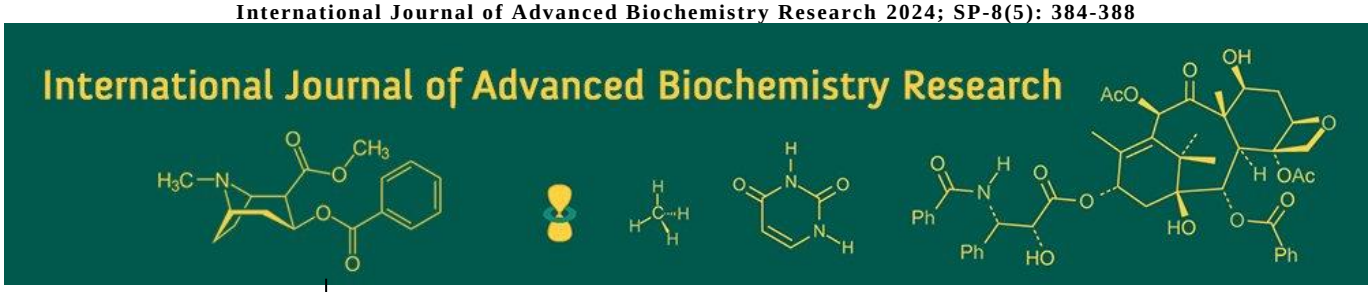

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Evaluation of physico-chemical and organoleptic properties of ginger lemonade syrup value added with mint, lemon grass and basil

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Abstract
The present study was carried in Post-Harvest Laboratory of Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India. The experiment was carried out to develop the ginger lemonade syrup value added with mint, lemon grass and basil using different sweetener like sugar, honey and jaggery with the objective to assess the physico-chemical and organoleptic properties. The experiment was conducted in Completely Randomized Design (CRD), with nine treatments and three replications. Based on the results of assessment, it has been observed that, T_8 (Ginger Juice 25% + Lime Juice 25% + Lemon grass 5% + Honey 5%) performed best in terms of physico-chemical properties *viz*. pH, total soluble solids (oBrix), acidity (%), vitamin C (mg/100g), reducing sugar (%) and total sugar (%). On the basis of sensory evaluation, T_7 (Ginger Juice 25% + Lime Juice 25% + Mint 5% + Honey 5%) was found most acceptable with regard to organoleptic properties *viz*. colour, taste, flavour, aroma and overall acceptability. The highest benefit-cost ratio was recorded in T_9 (Ginger Juice 25% + Lime Juice 25% + Basil 5% + Honey 5%).

Keywords: Ginger, lime, organoleptic properties, physico-chemical properties, syrup

Introduction
A beverage is a liquid intended for human consumption, in addition to their basic function of satisfying thirst, beverages play an important role in human culture. Beverages are of two types- unfermented (non-alcoholic) and fermented (alcoholic). Blended beverages with using different fruits, vegetables, herbs & spices extract and plants of medicinal values as new food products definitely attract the consumers in the interpretation of sensory and nutritional characteristics. The demands of natural beverages rich in nutrients and having therapeutic as well as medicinal values, are increasing because of changing life style, health consciousness and increasing purchasing capacity of the consumers (Harendra and Deen, 2022) [8].

Syrup is defined as a concentrated sugar solution with or without the addition of permitted food additives. In general, syrup has a sweet taste and a slightly sour taste with fruit flavors that give the drink a fresh taste. Fresh fruit commonly used in making syrup are fruit that has an attractive color, strong aroma and delicious taste typical. Syrup must be diluted before consumption because the sugar content is quite high and it is viscous (Badan Standardisasi Nasional, 2013) [14]. Syrup is a type of fruit beverage contains at least 25% fruit juice or pulp and 65% TSS. It also contains 1.2-1.5% acid and is diluted before serving.

Ginger is an ancient medicinal as well as spicy plant belonging to Zingiberaceae family and botanically known as *Zingiber officinale* Rosc. It is indigenous to South-Eastern-Asia. Since a very long time ginger is known for its medicinal values as a digestive aid, spiritual beverage, aphrodisiac, antiemetic, anticancer, anti-oxidant, anti-inflammatory and immune stimulating properties (Malhotra and Singh, 2003) [12]. Ginger is valued as a spice for ages and is also known for its medicinal properties such as to treat in rheumatoid arthritis, ulcer, preventing heart attack and stroke.

Lime (*Citrus aurantifolia*) belongs to the family of Rutaceae and is grown almost in every home garden. Lime juice is rich in vitamin C, responsible for a series of health benefits. Lime juice reduces the body heat and increases the appetite. Drinking lime juice with salt reduces the stomach pain. It helps in digestion of foods (Thamilselvi *et al.*, 2015) [18].

The fruit is very sour because of high quantity of acid; hence fresh fruits are not consumed whereas, fresh juice mixed with water and sugar makes a delicious drink during summer season. Lime juice reduces the body heat and increases the appetite. Drinking lime juice with salt reduces the stomach pain. It helps in digestion of foods. They are refreshing and delicious to eat (Harendra and Deen, 2022) [8]. Lemon is a rich source of nutrients and phytochemicals, including flavonoids, citric acid, vitamin C and minerals (González-Molina *et al.*, 2008) [5], which have numerous health-promoting properties (González-Molina *et al.*, 2010; Mulero *et al.*, 2012) [6, 13]. For this reason, lemon juice is an interesting food matrix for developing new beverages and a suitable source for value-added products (Gironés-Vilaplana *et al.*, 2012) [3].

Mint has been reported to have pharmacological effect such as antimicrobial, anti- inflammatory, antispasmodic, antituesive, anticancer and analgesic. It contains minerals like calcium, potassium, sodium, magnesium, phosphorus and iron, as well as Vitamin A, C, K, folic acid, thiamine, riboflavin and niacin (Raghavan, 2006) [15]. Lemongrass is well-known for its antioxidant, anti-microbial, anti-inflammatory, anti-hypertensive, anti-diabetic, anti-mutagenicity, anxiolytic properties, and for its hypoglycemic and hypolipidemic activities. Therefore, it is widely used in pharmaceuticals, food, feed, and the cosmetics industry. Lemongrass powder and essential oils are used to modulate the gut ecosystem by generating anti-microbial, anti-inflammatory, and antioxidant responses, increasing the optimum nutrient absorption in the gut system. This review will further explore lemongrass's phytochemical, pharmacological, and therapeutic potential (Kiani *et al.*, 2022) [10]. Basil has been found to show effectiveness against many fungal, viral, bacterial and protozoal infections. Current studies suggest that basil is helpful in inhibiting the growth of carcinogenic cells and in HIV. Basil leaves are used specifically to treat many fevers and coughs, flu, asthma, influenza, bronchitis, colds, chicken pox and diarrhoea, and they can lower the cholesterol level in blood and act as anti-stress agents. Basil juice is an effective medicine for inflamed eyes and night blindness, which is often caused by vitamin A deficiency (Grieve and Marshall, 1982; Boggia *et al*., 2015; Hosseini-Parvar *et al*., 2015) [7, 1, 9].

The growing interest in new value-added foods and beverages with health-promoting properties has prompted the development of new beverages based on different types of water, juices and non-alcoholic drinks that are enriched in fruits, as natural sources of nutrients, colors, and bioactive phytochemicals, and the evaluation of their bioactivity is being necessary (Gironés-Vilaplana *et al.*, 2015) [4].

With the increasing preference of consumers for natural and natural-like ingredients in various food products, the technology of blending various juices to obtain desired combination of nutrients and quality characteristics offers great promise for the fruit juice industry. Using this technology, a juice deficient in a particular nutrient can be enriched by blending with another natural juice, extract, etc., without compromising the basic nutrient composition and consumer acceptability of the original juice (Sharma *et al.*, 2014) [16].

Homemade ginger lemonade with a spicy kick from fresh ginger, perfectly sweet, and a hint of salt, poured over ice cubes makes a refreshing summer drink. Ready in under 2 minutes, this ginger lemonade drink is perfect to beat the summer heat. Both lemon and ginger have antioxidants and help boost overall immunity and digestive health. Ginger is a natural antibacterial and antiviral that helps fight infections in the body. Lemon is a good source of vitamin C and other nutrients. Sugar in this recipe is reduced or substituted with honey and jaggery for a healthier ginger lemonade. The development of ginger lemonade syrup value added with mint, lemon grass and basil would provide the opportunities for best use of these perishable raw materials and simultaneously availability of palatable drinks of medicinal values to the consumers. Moreover, this product presents an opportunity to diversify agricultural products and add value to farmer's harvests. By cultivating ginger and lemon for syrup production, farmers can access new markets and increase their income, contributing to economic stability in farming communities. Ultimately, this research initiative not only meets consumer demand for innovative beverages but also promotes sustainability and economic growth within agricultural sectors. By taking into consideration of above facts in view, the present investigation was carried out to develop a ginger lemonade syrup evaluating its physico-chemical and organoleptic properties.

Materials and Methods

The experiment was conducted in the Post-harvest Technology Laboratory, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during the year 2022-2024. The experiment was laid out in Completely Randomized Design (CRD) with 09 treatments and 03 replications. The treatments were T_0 (Control), T_1 (Ginger Juice 25% + Lime Juice 25% + Mint 5% + Sugar 15%), T_2 (Ginger Juice 25% + Lime Juice 25% + Lemon grass 5% + Sugar 15%), T_3 (Ginger Juice 25% + Lime Juice 25% + Basil 5% + Sugar 15%), T_4 (Ginger Juice 25% + Lime Juice 25% + Mint 5% + Jaggery 10%), T_5 (Ginger Juice 25% + Lime Juice 25% + Lemon grass 5% + Jaggery 10%), T_6 (Ginger Juice 25% + Lime Juice 25% + Basil 5% + Jaggery 10%), T_7 (Ginger Juice 25% + Lime Juice 25% + Mint 5% + Honey 5%), T_8 (Ginger Juice 25% + Lime Juice 25% + Lemon grass 5% + Honey 5%), T_9 (Ginger Juice 25% + Lime Juice 25% + Basil 5% + Honey 5%).

Preparation and storage of ginger lemonade syrup

The fresh ginger was chopped into small pieces followed by the juice extraction by a juicer. Fully matured fresh lime were cleaned and cut into halves and juice was extracted using stainless steel squeezer. Mint, basil, lemon grass were washed properly and blended in a blender. Then the extract was filtered through sterile muslin cloth to obtain the juice. In a separate container, ginger lemonade syrup was prepared by mixing required quantity of ginger juice, lime juice and water. Then the syrup was added with sweetener at required proportions so as to provide adequate textural property to the syrup. For flavoring, the syrup was value added with juice of mint, lemon grass and basil respectively. The ginger lemonade syrup was filled in sterilized plastic bottles and stored at ambient room temperature.

Evaluation of physico-chemical properties of ginger lemonade syrup: The ginger lemonade syrups were evaluated for various physico-chemical properties *viz.* pH,

TSS, acidity, vitamin C, reducing sugar and total sugar. The pH content was analyzed by digital pH meter. The TSS content was analyzed by hand refractometer. The acidity content was analyzed by titration method. The vitamin C content was analyzed by 2, 6- dicholorophenol-inndophenol visual titration method. The reducing sugar and total sugar content was analyzed by lane and eynon method. The recorded data of all samples for different parameters were tabulated and statistically analyzed to find out the most suitable treatment combination in terms of physico-chemical properties.

Evaluation of organoleptic properties of ginger lemonade syrup

The ginger lemonade syrups were evaluated for various organoleptic properties *viz.* colour, taste, flavour, aroma and overall acceptability. The samples were analyzed using the 9-point hedonic scale rating method by a panel of five judges. Each sample was assessed and given a score by the panelists on a scale of 1-9 for each parameter. The mean scores of all samples from all five panelists were tabulated and statistically analyzed to find out which treatment combination is the most acceptable in terms of organoleptic properties.

Results and Discussion

Physico-chemical properties of ginger lemonade syrup

The nutritional value of ginger lemonade syrup was evaluated by analyzing its physico- chemical properties *viz.* pH, TSS, acidity, vitamin C, reducing sugar and total sugar. The data recorded on effect of different treatments on physico-chemical properties of ginger lemonade syrup have been presented in Table 1.

Effect of different treatments on pH of Ginger Lemonade Syrup

Statistical analysis revealed that pH content differed significantly across all treatments. The mean values of pH ranged from 4.30 to 5.31. The maximum pH 5.31 was recorded in T_8 (Ginger Juice 25% + Lime Juice 25% + Lemon grass 5% + Honey 5%), while the minimum pH 4.30 was recorded in T_3 (Ginger Juice 25% + Lime Juice 25% + Basil 5% + Sugar 15%). Similar results were reported by Susanti *et al.* (2023) [17] in ginger leaf extract syrup.

Effect of different treatments on Total Soluble Solids of Ginger Lemonade Syrup Statistical analysis revealed that TSS content differed significantly across all treatments. The mean values of TSS content ranged from 60.73 to 65.10 oBrix. The maximum TSS content 65.10 oBrix was recorded in T_8 (Ginger Juice 25% + Lime Juice 25% + Lemon grass 5% + Honey 5%), while the minimum TSS content 60.73 oBrix was recorded in T_0 (Control). Similar results were reported by Korade *et al.* (2014) [11] in kokum syrup.

Effect of different treatments on Acidity of Ginger Lemonade Syrup

Statistical analysis revealed that acidity content differed significantly across all treatments. The mean values of acidity content ranged from 0.99 to 1.48%. The maximum acidity content 1.48% was recorded in T_8 (Ginger Juice 25% + Lime Juice 25% + Lemon grass 5% + Honey 5%), while the minimum acidity content 0.99% was recorded in T_1 (Ginger Juice 25% + Lime Juice 25% + Mint 5% + Sugar 15%). Similar results were reported by Harendra and Deen (2022) [8] in mango, citrus, aloe vera, ginger blended syrup.

Effect of different treatments on Vitamin C of Ginger Lemonade Syrup

Statistical analysis revealed that vitamin C content differed significantly across all treatments. The mean values of vitamin C content ranged from 18.81 to 23.93 mg/100g. The maximum vitamin C content 23.93 mg/100g was recorded in T_8 (Ginger Juice 25% + Lime Juice 25% + Lemon grass 5% + Honey 5%), while the minimum vitamin C content 18.81 mg/100g was recorded in T_0 (Control). Similar results were reported by Harendra and Deen (2022) [8] in mango, citrus, aloe vera, ginger blended syrup.

Effect of different treatments on Reducing Sugar of Ginger Lemonade Syrup

Statistical analysis revealed that reducing sugar content differed significantly across all treatments. The mean values of reducing sugar content ranged from 2.00 to 10.18%. The maximum reducing sugar content 10.18% was recorded in T_9 (Ginger Juice 25% + Lime Juice 25% + Basil 5% + Honey 5%), while the minimum reducing sugar content 2.00% was recorded in T_0 (Control). Similar results were reported by Chaudhary *et al.* (2017) [2] in mango and aloe vera gel blend syrup.

Effect of different treatments on Total sugar of Ginger Lemonade Syrup

Statistical analysis revealed that total sugar content differed significantly across all treatments. The mean values of total sugar content ranged from 3.86 to 68.88%. The maximum total sugar content 68.88% was recorded in T_8 (Ginger Juice 25% + Lime Juice 25% + Lemon grass 5% + Honey 5%), while the minimum total sugar content 3.86% was recorded in T_0 (Control). Similar results were reported by Chaudhary *et al.* (2017) [2] in mango and aloe vera gel blend syrup.

Organoleptic properties of ginger lemonade syrup

The sensory acceptability of ginger lemonade syrup was evaluated by analyzing its organoleptic properties *viz.* colour, taste, flavour, aroma and overall acceptability. The data recorded on effect of different treatments on organoleptic properties of ginger lemonade syrup have been presented in Table 2.

Effect of different treatments on Colour of Ginger Lemonade Syrup

Statistical analysis revealed that organoleptic score for colour differed significantly across all treatments. The mean values of organoleptic score for colour ranged from 4.7 to 8.0. The maximum organoleptic score for colour 8.0 was recorded in T_7 (Ginger Juice 25% + Lime Juice 25% + Mint 5% + Honey 5%), while the minimum organoleptic score for colour 4.7 was recorded in T_0 (Control).

Effect of different treatments on Taste of Ginger Lemonade Syrup

Statistical analysis revealed that organoleptic score for taste differed significantly across all treatments. The mean values of organoleptic score for taste ranged from 3.0 to 8.3.

The maximum organoleptic score for taste 8.3 was recorded in T_7 (Ginger Juice 25% + Lime Juice 25% + Mint 5% +

Honey 5%), while the minimum organoleptic score for taste 3.0 was recorded in T_0 (Control).

Effect of different treatments on Flavour of Ginger Lemonade Syrup

Statistical analysis revealed that organoleptic score for flavour differed significantly across all treatments. The mean values of organoleptic score for flavour ranged from 3.3 to 8.3. The maximum organoleptic score for flavour 8.3 was recorded in T_7 (Ginger Juice 25% + Lime Juice 25% + Mint 5% + Honey 5%), while the minimum organoleptic score for flavour 3.3 was recorded in T_0 (Control).

Effect of different treatments on Aroma of Ginger Lemonade Syrup

Statistical analysis revealed that organoleptic score for aroma differed significantly across all treatments. The mean values of organoleptic score for aroma ranged from 3.7 to 8.3. The maximum organoleptic score for aroma 8.3 was recorded in T_7 (Ginger Juice 25% + Lime Juice 25% + Mint 5% + Honey 5%), while the minimum organoleptic score for aroma 3.3 was recorded in T_0 (Control).

Effect of different treatments on overall acceptability of ginger lemonade syrup

Statistical analysis revealed that organoleptic score for overall acceptability differed significantly across all treatments. The mean values of organoleptic score for overall acceptability ranged from 4.3 to 8.7. The maximum organoleptic score for overall acceptability 8.7 was recorded in T_7 (Ginger Juice 25% + Lime Juice 25% + Mint 5% + Honey 5%), while the minimum organoleptic score for overall acceptability 4.3 was recorded in T_0 (Control).

Table 1: Effect of different treatments on Physico-chemical properties of Ginger Lemonade Syrup

Treatment	pH	TSS (*Brix)	Acidity (%)	Vitamin C (mg/100g)	Reducing Sugar (%)	Total Sugar (%)
T_0	4.38	60.73	1.02	18.81	2.00	3.86
T_1	4.58	63.47	0.99	20.09	8.75	66.01
T_2	4.44	62.53	1.34	20.77	8.81	61.86
T_3	4.30	63.50	1.19	20.21	9.32	62.77
T_4	4.32	62.60	1.26	20.26	9.29	63.14
T_5	4.67	64.77	1.07	21.21	9.35	63.17
T_6	4.57	62.60	1.22	22.26	9.91	63.05
T_7	5.25	64.93	1.37	22.63	10.02	68.20
T_8	5.31	65.10	1.48	23.93	9.99	68.88
T_9	5.21	64.83	1.39	23.57	10.18	67.36
F-test	S	S	S	S	S	S
SE(d)	0.047	0.479	0.150	0.798	0.475	0.788
CV	1.225	0.924	14.935	4.572	6.634	1.640
CD at 5%	0.098	0.999	0.314	1.665	0.990	1.643

Table 2: Effect of different treatments on organoleptic properties of Ginger Lemonade Syrup

Treatment	Colour	Taste	Flavour	Aroma	Overall acceptability
T_0	4.7	3.0	3.3	3.7	4.3
T_1	5.7	5.7	7.0	6.3	6.3
T_2	6.7	6.3	6.7	7.0	6.7
T_3	5.7	6.3	6.7	6.7	6.3
T_4	6.3	7.0	7.0	7.3	7.0
T_5	6.7	7.0	7.3	7.0	6.7
T_6	6.3	6.7	7.7	7.3	7.3
T_7	8.0	8.3	8.3	8.3	8.7
T_8	7.7	8.0	8.0	8.0	8.3
T_9	7.3	7.7	7.7	7.7	8.0
F-test	S	S	S	S	S
SE(d)	0.447	0.516	0.650	0.699	0.494
CV	8.427	9.583	11.423	12.351	8.692
CD at 5%	0.933	1.077	1.355	1.459	1.031

Conclusion

Based on the results of assessment, it has been concluded that, T_8 (Ginger Juice 25% + Lime Juice 25% + Lemon grass 5% + Honey 5%) performed best in terms of physico-chemical properties *viz.* pH (5.31), Total Soluble Solids (65.10oBrix), Acidity (1.48%), Vitamin C (23.93 mg/100g), Reducing Sugar (9.99%) and Total Sugar (68.88%). On the basis of sensory evaluation, T_7 (Ginger Juice 25% + Lime Juice 25% + Mint 5% + Honey 5%) was found most acceptable in terms of organoleptic properties *viz.* Colour (8.0), Taste (8.3), Flavour (8.3), Aroma (8.3) and Overall acceptability (8.7). The highest Benefit Cost Ratio (1.64) was recorded in T_9 (Ginger Juice 25% + Lime Juice 25% + Basil 5% + Honey 5%).

References

1. Boggia R, Zunin P, Hysenaj V, Bottino A, Comite A. Dehydration of basil leaves and impact of processing composition. In: Preedy V, editor. Processing and Impact on Active Components in Food. Academic Press; 2015. p. 645–653.
2. Chaudhary M, Deen B, Mishra KK, Singh JP. Studies on development of syrup from mango (*Mangifera indica* L.) pulp and aloe vera (*Aloe barbadensis* Miller.)

gel blend. Int. J Curr Microbiol App Sci. 2017;6(7):2247-2254.
3. Gironés-Vilaplana A, Valentão P, Andrade PB, Ferreres F, Moreno DA, García-Viguera C. Beverages of lemon juice and exotic noni and papaya with potential for anticholinergic effects. Food Chemistry. 2015;170:16-21.
4. Gironés-Vilaplana A, Valentão P, Andrade PB, Ferreres F, Moreno DA, García-Viguera C. Phytochemical profile of a blend of black chokeberry and lemon juice with cholinesterase inhibitory effect and antioxidant potential. Food Chemistry. 2012;134(4):2090-2096.
5. González-Molina E, Domínguez-Perles R, Moreno DA, García-Viguera C. Natural bioactive compounds of citrus lemon for food and health. J Pharm Biomed Anal. 2010;51(2):327-345.
6. González-Molina E, Moreno DA, Garcia-Viguera C. Genotype and harvest time influence the phytochemical quality of fino lemon juice (*Citrus lemon* L. Burm. f.) for industrial use. J Agric Food Chem. 2008;56(5):1669-1675.
7. Grieve M, Marshall M. A modern herbal: the medicinal, culinary, cosmetic and economic properties, cultivation and folklore of herbs, grasses, fungi, shrubs, and trees with all their modern scientific uses. Dover; 1982.
8. Harendra, Deen B. Studies on syrup preparation from mango (*Mangifera indica* L.), citrus (Citrus aurantifolia Swingle.), *Aloe vera* (*Aloe barbadensis* Miller.) and ginger (*Zingiber officinale* Rosc.) blends. Int. J Plant Soil Sci. 2022;34(6):70-82.
9. Hosseini-Parvar SH, Matia-Merino L, Golding M. Effect of basil seed gum (BSG) on textural, rheological and microstructural properties of model processed cheese. Food Hydrocolloids. 2015;44:557-567.
10. Kiani HS, Ali A, Zahra S, Hassan ZU, Kubra KT, Azam M, Zahid HF. Phytochemical composition and pharmacological potential of lemongrass (Cymbopogon) and impact on gut microbiota. Appl. Chem. 2022;2:229-246.
11. Korade SG, Relekar PP, Pujari KH. Studies on preparation of kokum (*Garcinia indica* Choisy) syrup from kokum rind juice. Asian J Hortic. 2014;9(1):198-201.
12. Malhotra S, Singh PS. Medicinal properties of ginger (*Zingiber officinale*), Natural product, Radiance. 2003;2(6).
13. Mulero J, Bernabé J, Cerdá B, García-Viguera C, Moreno DA, Albaladejo MD, *et al*. Variations on cardiovascular risk factors in metabolic syndrome after consume of a citrus-based juice. Clin Nutr. 2012;31(3):372-377.
14. Nasional BS. Sirup. Standar Nasional Indonesia. 2013;3544:2013.
15. Raghavan S. Handbook of spices, seasonings and flavorings. 2nd ed. CRC Press; 2006. p. 133.
16. Sharma SK, Yadav VK, Rao VK, Dixit AK. Enhancement of health-promoting properties while substituting exogenous citric acid by seabuckthorn (*Hippophae salicifolia*) pulp in preparation of sweet orange (*Citrus sinensis*) ready-to-serve beverage. J Food Process Preserv. 2014;38(4):1427-1438.
17. Susanti S, Kumoro AC, Suzery M, Oku H. The effect of various sweeteners on the physical, chemical, and organoleptic characteristics of ginger leaf extract syrup. Food Res. 2023;7(2):164-169.
18. Thamilselvi C, Krishnakumar T, Amutha S. Preparation and quality evaluation of lime based herbal blended RTS beverage. Asian J Dairy Food Res. 2015;34(1):54-58.