Using Ayurvedic Herbs Having Prebiotic Potential of Buckwheat-Based Gluten-Free Synbiotic Products Development, Sensory Evaluation and Characterization

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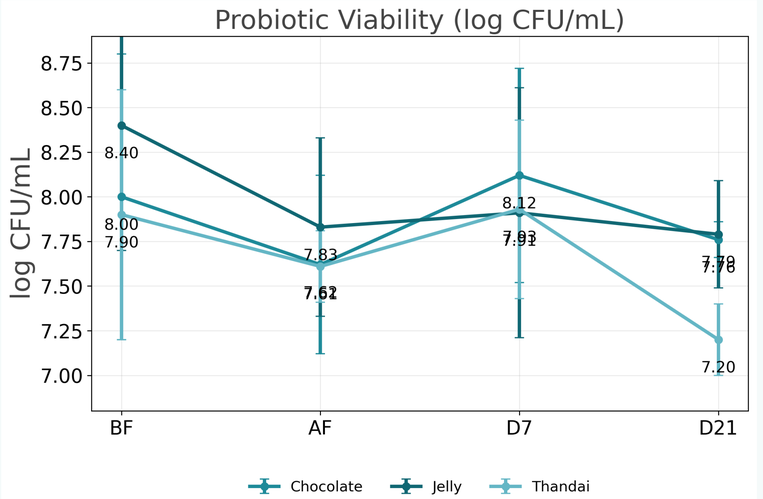
Abstract

Buckwheat-based non-dairy synbiotic matrices were developed using Lactobacillus plantarum (MTCC 13002), L. rhamnosus (MTCC 13028), and Streptococcus salivarius (MTCC 13009), combined with Ayurvedic prebiotic herbs — Punica granatum peel, Aegle marmelos, and Glycyrrhiza glabra. Fifteen semi-trained panelists evaluated six sensory attributes on a 9-point hedonic scale. AHP and TOPSIS were used for multi-criteria decision analysis. Optimized formulations showed high sensory acceptability (> 6/9), sustained probiotic viability (7.2–8.1 log CFU g■[1]), and balanced nutrient composition per 100 g.

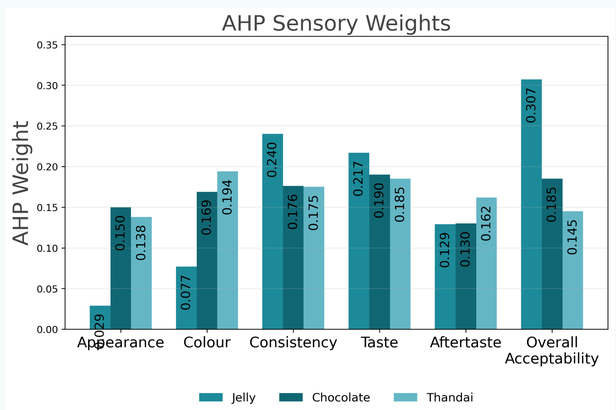
Methods

Buckwheat grains were germinated and processed to obtain buckwheat milk, inoculated with probiotic cultures, and fermented prior to forming three product series (Jelly 100, Chocolate 200, Thandai 300). Phenolic content was quantified by the Folin–Ciocalteu assay (mg GAE/100 g). Nutritional composition was determined by AOAC proximate analysis (protein, fat, carbohydrate, fibre, moisture, ash). Probiotic viability (log CFU g■[1]) was measured at BF, AF, day 7, and day 21. Sensory evaluation used a 9-point hedonic scale over six attributes with fifteen semi-trained panelists. Attribute weights were derived by Analytic Hierarchy Process (CR ≤ 0.10) and integrated with TOPSIS distances (Si■/Si■) to compute Pi for ranking. All assays were in triplicate; data are mean ± SD with ANOVA ($p < 0.05$) for significance.

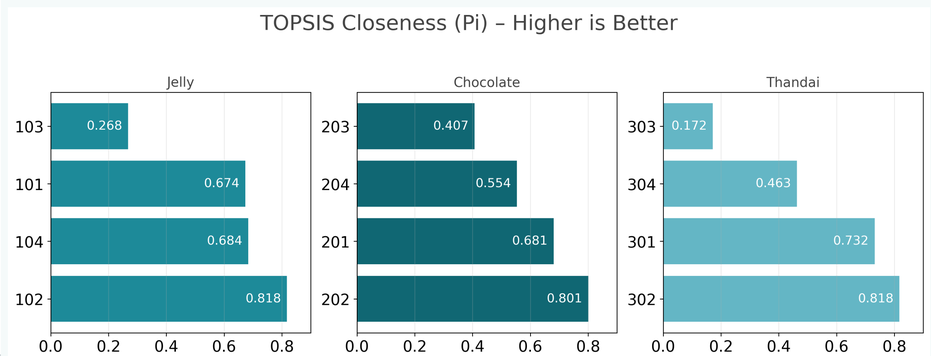
Probiotic Viability



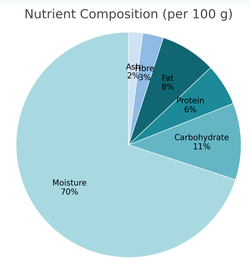
AHP Sensory Weights



TOPSIS Ranking (Pi)



Nutrition per 100 g



Total Phenolics: 182–480 mg GAE / 100 g

Conclusion

Buckwheat-based gluten-free synbiotic formulations fortified with Ayurvedic prebiotic herbs exhibited robust probiotic viability, favorable sensory acceptance, and balanced nutrient profiles. The AHP–TOPSIS framework identified Jelly 102, Chocolate 202, and Thandai 302 as optimal variants, combining sensory quality, phenolic richness, and microbial stability—supporting an Ayurceutical pathway for non-dairy functional foods.

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