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Impact of Natural Stabilizers on Physicochemical, Microbiological, and Sensory Properties of Frozen Yoghurt

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Background: Frozen yoghurt is produced by bacterial milk fermentation followed by air incorporation to improve the texture. Stabilizers help in the maintenance of the texture over time. Natural stabilizers are preferred over synthetics due to health concerns.

Objective: To assess natural stabilizers' effects on frozen yoghurt's physicochemical, sensory, and microbiological properties.

Methods: Frozen yoghurt samples were prepared with chia seeds (*Salvia hispanica* L., 3%), carrot pulp (*Daucus carota* L., 4%), potato starch (*Solanum tuberosum*, 1%), and beet pulp (*Beta vulgaris* L., 1%) and compared to a control containing 0.7% gelatin. Samples were evaluated over 14 days for quality. Physicochemical differences were analyzed using one-way ANOVA at 95% confidence in R Studio, while sensory properties from the same 30 panelists were analyzed using the Friedman test in SPSS ($p < 0.05$).

Results: Frozen yoghurt with beetroot imparted the highest protein ($4.00 \pm 0.02\%$), whereas chia seeds significantly increased fat ($5.21 \pm 0.11\%$). Moisture varied distinctly among treatments, with the lowest (77.04%) by potato enrichment. Total solids were 16–20% in all treatments except beet and carrot. Beet incorporation caused the lowest viscosity over time, while potato starch showed a higher pH (5.51 ± 0.03) throughout the storage. Colour declined in all treatments over time, where beet incorporation showed a notable reduction in L^* values, while the potato starch recorded the lowest a^* and b^* values at the end of the storage. Potato also had the highest total phenolic content (76.46 ± 4.23 mg GAE/100 g). Yeast and mould counts remained within acceptable limits in all treatments. Sensory results showed beet as the most preferred for colour, and chia seeds for aroma. Overall sensory acceptability ranked potato highest, followed by beet, control, carrot, and chia.

Conclusion: All stabilizers were effective, with potato starch-frozen yoghurt showing superior sensory scores, highest phenolics and solids, stable pH, and best overall acceptability during storage.

Keywords: Fermented Dairy Products, Quality Parameters, Total Phenolic Content