Evaluation of the Potentiality of Sweet Potato (Ipomoea batatas) and Kiri Ala (Colocasia Esculenta) Starches for the Commercial Production of Boba Pearls and Assessment of their Physicochemical Properties

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Traditional tapioca pearls which are made from cassava starch face limitations due to their high cyanide content, perishability, and elevated glycemic index. This study was aimed to address these limitations by assessing the potentiality of utilizing underutilized starches available in Sri Lanka for the commercial boba production by considering abundance, starch yield, and improved nutritional qualities. Sweet potato (*Ipomoea batatas*) and Kiri ala (*Colocasia esculenta*) starches were primarily explored due to their exceptional ability to fulfill the desired characteristics considered above. The study utilized five formulations: T (control – 100% tapioca), TS (35% tapioca + 65% sweet potato), TK (35% tapioca + 65% Kiri ala), TSK (35% tapioca + 35% sweet potato + 30% Kiri ala), and SK (55% sweet potato + 45% Kiri ala). Native starches and starch mixtures were evaluated for amylose content, color, pH, morphology, and functional properties. The pearls were assessed for cooking performance, sensory attributes, and texture profile analysis. Among the formulations, boba pearls produced from the TS treatment emerged as the most promising, exhibiting consumer acceptance similar to the control sample, with no significant difference in assessed attributes (color, aroma, taste, texture and overall acceptance) ($P>0.05$) while demonstrating a lesser cooking time (1.37 min), lower cooking loss (3.56%), and higher water absorption percentage (53.99%). Additionally, they exhibited improved textural properties, notably reduced chewiness. Incorporating various starches significantly enhanced the cooking, textural, and sensory properties of the boba pearls. In the assessment functional properties, the TS starch mixture exhibited moderate Water Holding Capacity (WHC), solubility, and swelling power compared to others, with values reported as 1.61 ± 0.12 g H_2O g^{-1} starch, $0.71 \pm 0.35\%$, and 2.12 ± 0.10 g/g, respectively. In conclusion, this study underscores sweet potato starch as a valuable ingredient for improving the quality of boba pearls, resulting in better cooking performance and organoleptic properties.

Keywords: Boba Pearls, Tapioca Starch, Sweet Potato Starch, Taro Starch, Sensory Attributes, Cooking Performance