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Shelf-life estimation of probiotic fruit juice by using physicochemical change during storage

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Recently, probiotic fruit juices have known as a functional food and nutraceutical with health beneficial effect. Since fermented fruit juices are known as a novel probiotic product, shelf-life evaluation is important to ensure a quality product during the storage period. With the aim to develop a predictive model to estimate the shelf-life of a probiotic fruit drink product, the mixed fruit juice (Pineapple: Mango: Banana) with ratio of 50:25:25 was fermented by the mixed starter of *L. casei*-01: *L. plantarum* 299V: *B. lactis* Bb-12 (1:1:1) at 37°C for 16 hours. Then, the fermented juices were stored at different temperature, including 5°C, 15°C, 25°C and 35°C until their ending pH reached 3.4 which cannot be accepted in term of sensory. The initial pH value (3.9) dropped to around 3.4 after 45 days in the case of 5°C, 18 days for 15°C, 7 days for 25°C and 3.5 days for 35°C. The microbial population of juices remained over 9 log CFU/mL after the storage period. Accelerated shelf-life testing was conducted to estimate the product's shelf life based on the rate law and Arrhenius equation. Based on the coefficient of determination (R^2), the third order model with the highest R^2 value (> 0.8) was in accordance with the pH kinetic. Arrhenius prediction shelf-life model were was obtained: $\ln(k) = -7317.2 \cdot 1/T + 17.881$ with $R^2 = 0.99$. The root mean square error (RMSE) was calculated with 0.1272. The findings of this research highlighted the feasibility this technique to determine the shelf-life and to improve the quality management of the probiotic fruit drink products.