

PRODUCTION AND QUALITY EVALUATION OF STAR FRUIT (*Averrhoa carambola*) BASED VINEGAR

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Artificial vinegar consumption is associated with health concerns such as allergic reactions, digestive disturbances, and impaired blood sugar regulation. Developing fruit-based vinegar offers a safer and more health-conscious alternative. This research aimed to develop a production process for star fruit-based vinegar while evaluating its physicochemical properties, sensory attributes, and shelf life. Two treatments of star fruit juice were prepared, the first treatment was supplemented with sugar, whereas the second treatment was not. Both underwent 28 days of alcoholic fermentation using *Saccharomyces cerevisiae* to convert sugar into ethanol. Subsequently, three concentrations (30% (v/v), 40% (v/v), and 50% (v/v)) of *Acetobacter spp.* were applied to convert ethanol into acetic acid. After 168 hours of acetic fermentation, the treatments having the highest acetic acid contents (4.11% and 3.83%) were selected for sensory evaluation. The highest acetic acid content was given by 50% (v/v) *Acetobacter spp.* concentration. Sensory evaluation was conducted with thirty untrained panelists, who were served a vinegar-added pickle mixture. The sugar-added star fruit vinegar was selected as the most preferred treatment. The titratable acidity, pH, total soluble solids (TSS), ethanol, specific gravity, methanol and total phenol content of selected vinegar were 3.83%, 3.37, 7.47%, 8.53%, 1.02 g cm⁻³, 191.82 mg L⁻¹, and 0.05 mg L⁻¹ respectively. Shelf-life evaluation included physicochemical and microbial analyses over 28 days. Results showed no significant difference ($p > 0.05$) in TSS (7.37±0.06), pH value (3.37±0.18), and titratable acidity (3.80±0.01) during the storage period. Microbial analysis (yeast and mold counts) confirmed the product's safety for consumption up to 28 days. In conclusion, star fruit-based vinegar with acceptable acidity, organoleptic properties and 28-days shelf life can successfully be developed presenting a promising alternative to artificial vinegar.

Keywords: Alcoholic fermentation, Organoleptic properties, Physicochemical properties, Sensory evaluation