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Process Optimisation for Enzymatic Clarification of Indigenous Wild Watermelon (*Citrullus lanatus*) Juice

Maureen Mamabolo[1], Frederick Tabit[2], Yvonne Maila[1], Samuel Mphosi[1]

[1]University of Limpopo, Polokwane, South Africa. [2]University of South Africa, Pretoria, South Africa

Abstract

A fundamental step in improving the quality and consumer acceptability of wild watermelon (*Citrullus lanatus*) is the process of juice clarification. The aim of this research was to investigate the physicochemical properties of crude C. lanatus juice and to optimise the processing conditions, incubation time, incubation temperature and enzyme concentration for the enzymatic clarification of the crude juice. Crude C. lanatus juice samples were treated with pectinase enzyme in different concentrations (0.05-0.15 w/w%), at different incubation temperatures (30-50oC) and for different incubation durations (60-180 min). The effects of the different treatments on turbidity, clarity, viscosity, lightness, and brix were determined. The response models adequately predicted turbidity, clarity, and viscosity at $R2 > 0.5$, but not lightness considering that $R2 < 0.5$. The model was statistically significant in predicting turbidity ($R2 = 0.86$), clarity ($R2 = 0.81$), viscosity ($R2 = 0.97$) and brix ($R2 = 0.94$) - but not lightness ($R2 = 0.24$) at $p < 0.05$. The enzyme concentration did not significantly affect turbidity, clarity, and lightness, but it did significantly affect brix positively ($p < 0.05$). Response surface methodology software was used to determine optimal clarification conditions. In conclusion, the optimum conditions for crude watermelon juice clarification were 0.15 w/w% enzyme concentration, 60 min incubation time and 60 oC incubation temperature. The optimum output parameters were 14.18 NTU for turbidity, 0.04 Abs for clarity, 52.30 L* value for lightness, 1.96 cps for viscosity and 3.08% for brix.