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Studies on Processing and Storage of Tender Coconut Water

K. Anil Kumar[1], N.Harish[2], D. Srinivas[3], Ch.V.V. Satyanarayana[3]

[1,2,3]P.G. Student, College of Agricultural Engineering, Bapatla. (A.P., India
[4]College of Food Science & Technology, Bapatla. (A.P., India)
E-mails: [1]anilkumarcae002@gmail.com, [2]naitamharish@gmail.com,
[3]durgamsrinivas0024@gmail.com, [4]drchvv@yahoo.com

Abstract—*The study was conducted to develop process technology for bottling TCW using membrane filtration, pasteurization and chemical additive and suggest a suitable method. A continuous cross flow flat sheet membrane module was used in the study to process by MF and UF. Initially the permeate fluxes were established using pure water on 0.2µm pore size and 40 kDa and 500 Da molecular weight cut off (MWCO) membranes at various transmembrane pressures (TMPs). The experiments revealed that permeate flux increases with an increase in TMP and membrane pore size or MWCO. The steady state fluxes were relatively higher with MF in comparison to UF and NF at the given TMP. The permeate flux of microfiltered TCW declined from 189.98 L /m^2h and reached a steady flux at 88.51L/m^2h at a TMP of 5.06 kg/cm^2. The flux also declined from 107.54 to 82.07 L/m^2 h in UF. The flux decline during MF and UF is perhaps due to concentration polarization and consequent fouling. Five different treatments were investigated to develop process technology and extend shelf life during storage of TCW. In the first treatment, the coconut water was passed through a microfiltration membrane of 0.2 µm pore size at a pressure of 5.06 kg/cm^2 to remove microbes and suspended particles. In the second treatment, coconut water was passed through ultrafiltration membranes of 40 kDa MWCO at pressures about 5.06 kg/cm^2 to remove enzymes such as polyphenoloxidase (PPO) and peroxidase (POD). In the third treatment, the coconut water was bottled and pasteurized at 85 ^oC for 10 min. In the fourth and fifth treatments, the coconut water was filtered through a MF membrane and chemical preservative nisin was added in two concentrations of 5000 I.U. and 2500 I.U. The TCW filtered through muslin cloth was taken as control sample. The control as well as all the treated samples were bottled and stored at 4 °C. The samples were taken at four days interval and their physico-chemical, microbiological and sensory characteristics were determined upto 20 days of storage. The TSS of TCW generally decreased during storage except for pasteurized samples. Pasteurized TCW did not show any change in TSS compared to all other treatments. The pH generally decreased in all the treatments during storage up to 20 days. The percentage reducing sugars increased for all the samples during storage. However, pasteurized samples recorded lower increase in reducing sugars. The turbidity of the TCW increased during storage as indicated by decrease in the light transmittance values. Turbidity was observed to be relatively low for microfiltered and ultrafiltered TCW suggesting that membranes processes are useful for clarification of TCW. E.coli, Fungal and bacterial count were observed to be less in pasteurized samples. Overall based on different quality attributes, pasteurized treatment, MF and UF have been found to give a better quality bottled TCW in that order, the first treatment being the best. It can be concluded that membrane processing of TCW is one of the alternate methods along with thermal processing for producing quality product.*