Preliminary analysis of selected tropical fruit seed extracts potential as natural coagulant in water

ABSTRACT

In this preliminary study, active coagulant extract from tropical fruit (jackfruit, durian, date, Malaysian Longan, tarap) seeds were explored as a potential natural coagulant for turbidity removal in water through multiple parameters (mass, dosage and settling time) by means of response surface methodology and adsorption isotherms. Extraction of active coagulant extracts from these tropical fruit seeds was conducted using sodium chloride solution and characterized using Fourier transform infrared spectrometer (FTIR). FTIR results have indicated the functional groups present in active coagulant extract solution from tropical fruit seeds are mainly proteins. Active coagulant extracts from tropical (jackfruit, durian, date, Malaysian longan, tarap) seeds have displayed total turbidity removal between 31.6 and 72%. Various models of Box-Behnken design for turbidity removal indicated that the linear model was the most suitable model for jackfruit, durian, Malaysian Longan and tarap fruit seeds, while the quadratic model was optimal for date fruit seed. In addition, active coagulant extract from date fruit seed was selected as the best active coagulant extract for turbidity removal in water using the highest R2 value (R2 = 0.984). Furthermore, results obtained from regression analysis and three-dimensional surface plots revealed that mass (3 g) and the settling time (90 min) were significant parameters for turbidity removal. Moreover, Langmuir adsorption model was observed to be the most suitable for the adsorption process by coagulant active extract from date fruit seeds with maximum adsorption capacity of 48.08 mg/g. This preliminary study has demonstrated active coagulant extracts from date seed as a promising natural coagulant which can be investigated further.

Keyword: Tropical fruit; Seed; Waste; Natural coagulant; Turbidity; Water