ABSTRACT

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ENCAPSULATION USING TAPIOCA STARCH OR MALTODEXTRIN ON RAMBUTAN-PEEL ETHANOLIC EXTRACT IN PERFORATED POUCHES, AND APPLIED TO SUGAR-PALM NEERA TO DELAY FERMENTATION FOR ALCOHOL PRODUCTION
(xv + 100 pages: 17 figures, 15 tables, 6 appendices)

Recent findings showed that rambutan peel had a great potential to be a natural fermentation inhibitor in several food products such as cider, cassava tapai, coconut neera, and sugar palm neera. This research was aimed to observe the encapsulation of ethanolic extract of rambutan peel using tapioca starch or maltodextrin placed in perforated pouches immersed in sugar palm neera to delay fermentation for alcohol production. Physicochemical characteristics of treated neera were determined including pH, total titratable acidity, total dissolved solid, total sugar, reducing sugar, alcohol content, and microbial enumeration. After the immersion of pouch containing ethanolic extract encapsulated with tapioca starch or maltodextrin to the sugar palm neera and followed by fermentation (7d), several treatments exhibited a partial inhibition whereas others showed a complete inhibition indicated by no alcohol detected, which showed the ability of encapsulated rambutan peel extract to delay/inhibit the alcoholic fermentation. Other physicochemical characteristics of treated neera also differed from control. Interestingly, the fermentation resumed when the pouch was withdrawn a day prior to alcohol content either reached its peak or started to reach its peak. For the bioethanol obtained from sugar palm neera treated with ethanolic extract encapsulated with tapioca starch, the alcohol yield obtained was 20.27±0.11-23.56±0.84% with alcohol content of 53.90±0.76-60.63±0.77%, whereas using maltodextrin, the alcohol yield was 18.90±0.51-20.03±0.97% with alcohol content of 46.82±0.16-56.73±0.61%. Both treatments showed higher alcohol yield compared to control which was 18.07±0.27-18.71±0.74%. Taken all together, the application of ethanolic extract of rambutan peel encapsulated with tapioca starch or maltodextrin in sugar palm neera was able to delay alcoholic fermentation for production of bioethanol more effectively than control that would be useful for neera farmers.

Keywords: bioethanol, encapsulation, maltodextrin, rambutan peel, sugar palm neera, tapioca starch

References: (1938-2015)