

Modelling and optimization of Eurycoma longifolia water extract production

Abstract

Eurycoma longifolia or Tongkat Ali water extract is a valued product in the phytochemical industry. This work features the modelling and optimization of a Tongkat Ali water extract production using SuperPro Designer (R) a commercial batch process simulator. The objective of this work is to design an economically viable production scheme for a locally developed Tongkat Ali extract production process. The current pilot scale production scheme with an annual production rate of 390 kg of Tongkat Ali extract was used to simulate the base case process. Four alternative production schemes were further developed with several debottlenecking and optimization strategies. The final alternative scheme was reported to achieve a product yield of 3.00%, with an annual production of 1137.72 kg of Tongkat Ali extract. The minimum batch cycle time was reduced from 24.44 h in the base case to 8.32 h. Economic analysis determined that the proposed alternative production scheme has an annual revenue of \$6.32M, with a 86% gross margin and a 55% return on investment (ROI). The payback period of this scheme was estimated to be less than two years.