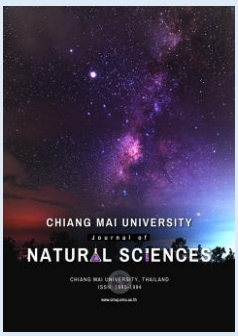

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Corresponding author:
Wichien Sriwichai,
E-mail:
Wichien.s@agro.kmutnb.ac.th

Research article

Evaluation of The Physicochemical, Sensorial and Antioxidant Properties of Functional Ale Beer Brewed with Rice and Fruit by-Products

Wichien Sriwichai[1,*], Pakkawat Detchewa[2], and Patcharee Prasajak[2]

1 Department of Innovation and Product Development Technology, Faculty of Agro-Industry, King Mongkut's University of Technology North Bangkok, Prachinburi 25230, Thailand
2 Department of Agro-Industry Technology and Management, Faculty of Agro-Industry, King Mongkut's University of Technology North Bangkok, Prachinburi 25230, Thailand

Abstract Functional beer brewed with a high bioactive compound ingredients is beneficial to prevent many diseases. Rice and fruit by-products are rich in bioactive compounds and have a potential for functional beer production. The aim of the present work was to assess the physicochemical, nutritional and sensorial properties of the beer brewed with rice and fruit by-products. The five formulas of beer investigated were the dried malt extract, Phitsanulok paddy rice powder, riceberry powder, banana peel and coffee pulp. The ratio of the dried malt extract and the other alternative ingredients was 80:20. The contents in reducing sugar, total phenolic compounds, flavonoid, chlorogenic acid, caffeine and dietary fiber were evaluated. The correlations between the physicochemical, sensorial, antioxidant properties and acceptability of beers were assessed by the Principal Component Analysis. The results showed that beers were differed in color density and have a low alcohol content. Among beer formula, beers brewed with coffee pulp was the richest in total phenolic and beers brewed with banana peel was the richest in flavonoid content (278.82 mg gallic acid equivalent/ L beer and 69.18 mg catechin equivalent/ L respectively). The antioxidant capacity was the highest in banana peel beer formula (76.64%). The Principal Component Analysis revealed that beers brewed with the two varieties of rice powder formula were in the same group of beer control (dried malt extract formula). These beers were characterized by a high note of appreciation from consumer. Whereas, a high correlation between the antioxidant capacity and total polyphenolic, flavonoid content was observed in beer fruit by-products formulas. The incorporation of two varieties of rice powder or fruit by-products was feasible in brewing process to produce a functional ale beer appreciated by customer and having a noticeable antioxidant capacity.

Keywords: Antioxidant capacity, Fruit by-products, Functional ale beer, Physicochemical properties, Rice

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