

Methanol, Ethanol, and Acetone Result in Non Different Concentration of Total Phenolic Content in Mangosteen (*Gacinia mangostana* L.) Peel

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Received: September 23, 2014 Accepted: December 5, 2014 Online Published: January 15, 2015

doi:10.5539/jas.v7n2p131

URL: <http://dx.doi.org/10.5539/jas.v7n2p131>

Abstract

Peel extract of Mangosteen (*Gacinia mangostana* L.) can controll *Aspergillus flavus*, and *Colletotrichum gloeosporioide* since the peel contains high total phenolic content. However, different solvents might result in a different extraction yield of total phenolics. This research studied the effect of 4 solvents, acetone, ethanol, methanol, and water on total phenolic content in the fresh and dry peel of mangosteen. Folin-Ciocalteu method was used for total phenolic content analysis. The result demonstrated that mangosteen peel extracted with methanol, ethanol, and acetone contained non significant difference of total phenolic contents in dry mangosteen peel. Extraction of the peel with water resulted in less total phenolic content than other solvents in both fresh and dry magosteen peel. In conclusion, to obtain high total phenolic content, methanol, ethanol, and acetone, should be used for the extraction of total phenolic content from mangosteen peel.

Keywords: mangosteen, *Gacinia mangostana* L., peel, ethanol, methanol, acetone, water

1. Introduction

Mangosteen (*Gacinia mangostana* L.) is an important fruit of Thailand. Its peel contains antioxidants particularly phenolic compounds such as xanthone, condensed tannins and anthocyanins. Phenolic represents a striking example of metabolic plasticity enabling plants to adapt to changing biotic and provide to plant products colour, taste, technological properties and putative health promoting benefits (Boudet, 2007). Many studies revealed the phenolic can inhibit microorganism growth (Pothitirat et al., 2009). Study of Yenjit et al. (2003) demonstrated that mangosteen's peel controlled *Aspergillus flavus*, and *Colletotrichum gloeosporioide*, fungi-pathogen in mango. Mangosteen peel extract inhibited *Aspergillus* spp. which caused seed rot in mungbean (*Vigna radiata*) (Kittipat et al., 2008). It also inhibited *Ralstonia solanacearum*, pathogenic bacteria, which caused wilt disease in tomato (Sasitorn & Supot, 2005).

Extraction of phenolic from plant material with solvent gives reasonable recovery. However, extraction of mangosteen peel with different solvents might result in a different concentration of total phenolic contents. This research investigated the effect of solvents on total phenolic content in mangosteen peel. We hypothesized that extraction of the peel with methanol would result in high total phenolic content than other solvents in both fresh and dry mangosteen peel.

2. Method

The mangosteen fruit were obtained from local market. They were soaked in 1% NaClO₂ for 30 mins. The mangosteen fruit was then peeled and washed with distilled water. They were dried in a hot air oven at 40 °C for 24 hrs. Then the samples were extracted with 4 solvents, acetone, ethanol, methanol, and water, at 1:7 ratio by weight, for 1 hr. The solution was filtered with a muslin cloth before centrifuging at 10,000 rpm/min for 20 mins at 4 °C and then filtering with filter paper no. 1. The solution was then taken for total phenolic analysis following Folin-Ciocalteu method which was optimized from Singleton et al. (1999). The solution was measured with spectrophotometer at 765 nm. The reading values of gallic standard at 50, 100, 300, 500, 700 and 1,500

ppm were plotted in a graph. Analysis of variance and LSD (Least Significant Difference) at 95% were used to compare difference among treatments.

3. Results

The results demonstrated that total phenolic content in fresh mangosteen peel extracted with methanol, ethanol, acetone, and water was 27,138, 19,392, 19,016 and 7,504 mgGAE/100 gDW respectively (Figure 1). The peel extracted with methanol, ethanol, and acetone contained non significant difference of total phenolic content in dry mangosteen peel (Figure 1).

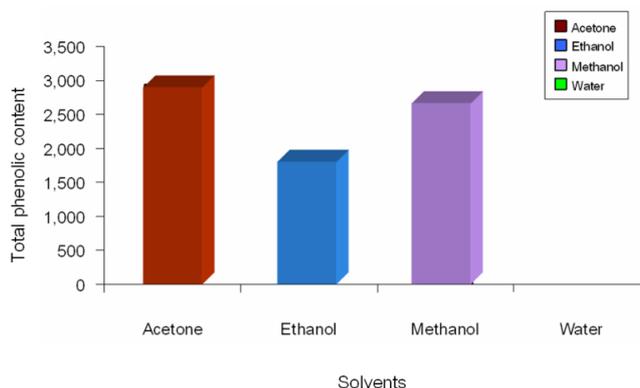


Figure 1. Effect of differencnt solvents on total phenolic content in fresh mangosteen peel (mgGAE/100 gDW)

4. Discussion

Methanol, ethanol, and acetone result in non different concentration of total phenolic content in mangosteen peel. The result of this study was in contrast with the study of Mohsen and Animar (2009) which demonstrated that corn tasse extracted with ethanol and methanol had a higher concentration of total phenolic content than that extracted with acetone, methanol, hexene, chloropform, buthanol, phetholeme, and water. Methanol, ethanol, and acetone are the good solvents on the extraction of mangosteen peel as they are polar solvents. Extracting the peel with water resulted in less total phenolic content than other solvents.

Study of Urusa & Mingmuang revealed that the total phenolic content in dry mangosteen peel extracted with acetone by Folin-Ciocalteu method contained total phenolic 2,930.43 mgGAE/100 gDW. Zadernowski et al. (2009) explored total phenolic analysed with Gas chromatography-mass spectrometry (GC-MS) and revealed that mangosteen peel contained total phenolic $5,027.7 \pm 188.0$ mg/kgDW. Ponstron et al. (2008) demonstrated that total phenolic in freeze dry mangosteen peel was 215.1 ± 25.1 mgGAE/100 gDW. Khonkarn et al. (2010) demonstrated that young peel of mangosteen contained higher phenolic content than the mature peel. Study of Dangcham et al. (2008) revealed that red-brown and red-purple mangosteen peel contained total phenolic 10,000.73 mg/kgFW and 11,000.32 g/kgFW respectively when they were extracted with 65% ethanol and 0.5% sodium metabisulfite. This indicates the variation in the degree of maturity harvest, cultivation, preharvest environmental conditions, and postharvest handling, might have an affect on total phenolic in mangosteen peel.

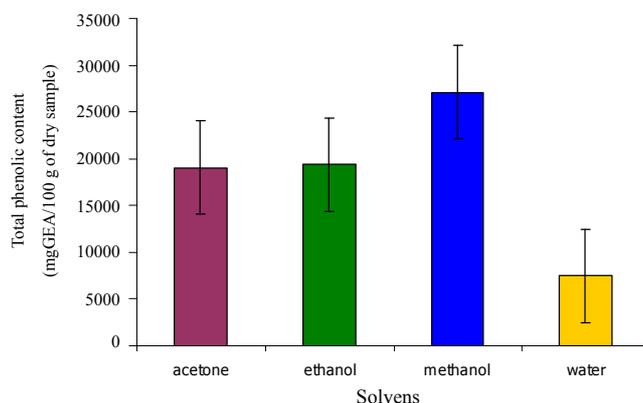


Figure 2. Effect of different solvents on total phenolic content in dry mangosteen peel (mgGAE/100 gDW). Different letters indicating significant differences by LSD (Least significant range test) (LSD = 9.121) ($P \leq 0.05$).

Acknowledgements

We would like to thank the National Research Council of Thailand and Mahasarakham University, Thailand for financial and instrument support.

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