

Effects of Spray-drying Temperatures on Powder Properties and Antioxidant Activities of Encapsulated Anthocyanins from Black Glutinous Rice Bran

Nattapong Kanha¹ and Thunnop Laokuldilok^{1,2*}

¹Faculty of Agro-Industry, Chiang Mai University, Chiang Mai 50100, Thailand

²Lanna Rice Research Center, Chiang Mai University, Chiang Mai 50200, Thailand

*Corresponding author. E-mail: thunnop.l@cmu.ac.th

ABSTRACT

The objective of this study was to determine the effects of spray drying temperature on the powder properties and antioxidant activities of encapsulated black glutinous rice (BGR) bran anthocyanins. The anthocyanins in BGR bran was extracted using acidified ethanol. The extract was encapsulated with maltodextrin (DE10) using spray drying at various inlet air temperatures (IAT; 140, 160 and 180°C). The results revealed that increasing IAT enhanced productivity with lower energy consumption, encapsulation efficiency, solubility, dispersibility, wettability, flowability and surface smoothness of the microcapsules. In contrast, total anthocyanin content (TAC), bulk density and color values (a^ , C^* and h° , respectively) of the microcapsules were decreased by increasing the IAT. Reducing power and DPPH radical scavenging activity of anthocyanin powders were not significantly different. In addition, anthocyanin powder produced using 180°C IAT showed the greatest encapsulation efficiency ($96.72 \pm 0.61\%$), solubility ($87.42 \pm 1.26\%$), dispersibility ($86.45 \pm 0.93\%$) and repose angle (23.50 ± 0.61 degree).*

Keywords: Encapsulation, Anthocyanins, Black glutinous rice bran, Spray drying, Inlet air temperature

INTRODUCTION

Anthocyanins are the biggest group of water-soluble pigments that are widely distributed in fruits, vegetables and cereals (Mazza and Miniati, 1993). Their bright colors, which vary from orange-red to blue, are used as natural food colorants, replacing synthetic colorants due to their color varieties and safety (Mercadante and Bobbio, 2008). Moreover, properties of anthocyanins are related to human health, including antioxidant, anti-inflammatory and anti-cancer activity (Wang and Stoner, 2008). Specifically, cyanidin-3-glucoside has been reported to inhibit the growth of Lewis lung carcinoma cells in vivo (Chen et al., 2005).

Black glutinous rice (BGR), which is a traditional rice commonly cultivated in Thailand, is a rich source of anthocyanins pigments. The major portion of