

## Optimum Condition of Beta-Cyanin Colorant Production from Red Dragon Fruit (*Hylocercus polyrhizus*) Peels using Response Surface Methodology

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### ABSTRACT

*The extraction and drying processes used to produce red colorant from red dragon fruit peels were optimized to yield the highest beta-cyanin content. The types of solvents (deionized water and 80% ethanol), pH, extraction time and temperature were the independent variables in the extraction process. The amount of binding medium (acetylated oxidized starch and maltodextrin) and extract, inlet temperature and feed rate were the independent variables in the spray-drying process. Based on response surface methodology, Box-Behnken and full factorial designs were used for the experiment, while beta-cyanin was determined as the response. Antioxidant activity of the colorant powder was also tested. The optimum extraction condition giving the highest beta-cyanin content was a pH of 5.5 at 40°C for 20 min extracted by deionized water. The optimum drying condition for the production of red colorant powder was 6% binding medium at a feed rate of 6 ml/min and an inlet temperature of 140 and 160°C for acetylated oxidized starch and maltodextrin, respectively. The experimental results following the response surface methodology corresponded well to the predicted values. The optimum drying conditions yielded a red colorant powder with antioxidant properties that could be used in food products.*

**Keywords:** Beta-cyanin, Spray drying, Extraction, Red dragon fruit, Optimum condition

### INTRODUCTION

Peels from red flesh dragon fruit (*Hylocereus polyrhizus*), a byproduct of consumption, are potentially useful to the food colorant industry because of an abundance of betalains, with their red shades of color. Betalains are composed of beta-cyanins and betaxanthins compounds, which have red and yellow color, respectively. The beta-cyanins are more abundant than the betaxanthins in betalains (Harivaindaran et al., 2008). Betalains are an antioxidant, like anthocyanins, that can dissolve in water, but are very sensitive to pH and heat (Wybraniec and Mizrahi, 2002; Wu et al., 2006). Thus, the extraction process of betalains is important to maintaining the stability of sensitive pigments, such as beta-cyanins.