BEST: International Journal of Humanities, Arts, Medicine and Sciences (BEST: IJHAMS)
ISSN (P): 2348-0521, ISSN (E): 2454-4728
Vol. 5, Issue 12, Dec 2017, 151-156
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OPTIMIZATION OF SPRAY DRYING PARAMETERS FOR BEETROOT JUICE POWDER ON HIGROSCOPICITY AND POWDER YIELD USING RESPONSE SURFACE METHODOLOGY (RSM)-CENTRAL COMPOSITE DESIGN

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ABSTRACT

The optimization of beetroot juice powder was devised using response surface methodology to optimize the spray drying parameters of inlet air temperature (IAT) (160–180 C), maltodextrin (MD) addition rate (5–15%) and feed flow rate (FFR) (400–600 ml/h). The experimental results were ($p < 0.05$) fitted into the second-order polynomial model to describe and predict the response in terms of the powder yield, hygroscopicity. The powder yield significantly ($p < 0.01$) increased with increasing inlet temperature, whereas the redness value, BR, and RSA decreased. With the increasing rate of MD addition, redness value, BR, and RSA increased. The hygroscopicity values decreased with increasing feed flow rate. The effect of feed flow rate on the rest of responses was found non significant at a level of $p > 0.05$ except hygroscopicity. The optimum conditions were found as 170 degree C inlet air temperature and 400 ml/h feed flow rate and a maltodextrin concentration of 10% with using desirability function. The properties of dried powder were investigated in terms of powder yield and hygroscopicity. The experimental run and enhancement work were planned utilizing Central composit outline of Response Surface Approach. The ideal operation conditions for most elevated powder yield and least hygroscopicity were acquired at gulf drying temperature of 160 °C; bolster stream rate of 10.5 ml/min and suction apparatus rate of 98.33 %. The ideal properties of shower dried powder got from this examination were 41.33% of powder yield and 14.46% of hygroscopicity.

KEYWORDS: Betalains, Powder, Drying & Optimized