

Influence of Carrier Agents Concentrations and Inlet Temperature on the Physical Quality of Tomato Powder Produced by Spray Drying

ABSTRACT

The study aims to obtain spray-dried tomato powders with a high and effective product yield and enhanced powder quality. The experiment for this investigation entailed the use of several carrier agents, which were maltodextrin (MD) of 4-7 dextrose equivalents (DE), MD of 10-12 DE, and gum Arabic (GA), each in varied concentrations of 5% and 10% with spray drying inlet temperatures of 140°C, 150°C, and 160°C. Powder yield, bulk density, hygroscopicity, moisture content, water solubility, water absorption, color properties, particle size, and powder morphology were all evaluated in spray-dried tomato powders. The results revealed that the stability of the tomato powder is considerably better at high temperatures and concentrations (at 10%, 160°C), with MD 4-7 DE being the best carrier agent among the three tested carrier agents. According to the powder analysis, the product has a moisture content of $3.17 \pm 0.29\%$, the highest yield percentage of 32.1%, a low bulk density of $0.2943 \pm 0.01 \text{ g/cm}^3$, the lowest hygroscopicity at $5.67 \pm 0.58 \%$, a high water solubility index (WSI) at $89.98 \pm 1.25\%$, a low water absorption index (WAI) at $6.22 \pm 0.22\%$, an intermediate particle size of $24.73 \mu\text{m}$, and color L^* , a^* , b^* values at 31.59 ± 0.03 , 11.62 ± 0.08 and 13.32 ± 0.12 . The result showed that at higher temperatures and higher concentrations, the powder characteristics are more likely to have a higher yield, WSI, and larger particle size, as well as lower bulk density, hygroscopicity, moisture content, WAI, and color index.