

Investigation of the Physicochemical Properties of Tomato Powder Prepared by Spray Drying Technology

ABSTRACT

The aim of this study was to investigate the effects of additives as well as operational parameters on the physicochemical quality of tomato powder produced through the spray-drying method. This experiment utilised maltodextrin (MD) and gum Arabic (GA) as carrier agents at concentrations of 10%, 20%, 30%, 40%, and 50%, with spray drying inlet temperatures ranging from 140 to 180°C. Powder yield, moisture content, colour characteristics, particle size, and morphology of spray-dried tomato powders were all assessed. The results showed that the stability of tomato powder is significantly enhanced at high intake temperatures and lower concentrations (at 10%, 180°C) with a composition of 50:50 MD and GA. According to the powder analysis, the product has between 5.82 and 6.25% moisture content. The maximum yield achieved was 35.10%, and the colour L*, a*, and b* values range between 85.47 to 92.64, 3.28 to 6.18, and 10.50 to 26.13, respectively. The highest antioxidant activity measured by the IC₅₀ value was 15.35, while the lowest was zero. The result showed that at a higher temperature and greater concentration of a single additive combination, powder characteristics are more likely to exhibit a higher yield and lower moisture content. For colour index, however, higher temperatures and a lesser quantity of additives are desirable. This also compensates for the antioxidant action at low doses, while high temperatures boost the activity overall. The investigation revealed that carrier agents considerably enhanced powder properties such as moisture content and process yield.