

## Abstract

Recently, kombucha has gained recognition for its innovative development into instant powder through spray drying technology, which stabilizes alcohol content, extends shelf life, and produces a fine, easily soluble powder. However, the process may cause bioactive compound degradation due to elevated inlet temperatures, potentially impacting the overall bioactive profile. The proposed research aims was to develop a stable spray-dried kombucha powder by improving the spray-drying method to preserve its functional and physicochemical qualities effectively. This study used spray drying technology with different maltodextrin concentrations, which were 5%, 10%, and 15% of maltodextrin concentration. The final powder product of the spray dry kombucha was assessed by the physical (moisture content, water activity, color, and total soluble solid), chemical (pH and titratable acidity) and antioxidant properties (DPPH assay). These analysis results showed that maltodextrin gave a gradient impact towards the kombucha spray-dried powder moisture content (3.24 - 3.66), water activity (0.27 - 0.35), color ( $L^*$ : 83.91 - 86.69,  $a^*$ : 3.25 - 4.09,  $b^*$ : 13.38 - 15.62,  $\Delta E$ : 1.84 - 3.72), total soluble solids (9.45 - 9.73), pH (3.73 - 3.78), titratable acidity (0.51 - 0.96), and antioxidant activity (55.08% - 64.13%). The results showed different maltodextrin concentration showed significant difference except total soluble solid. Nevertheless, the 5% of maltodextrin concentration had higher results for better options in preserving the antioxidant properties (64.13%), pH (3.73), and titratable acidity (0.96 g/L). Regardless, the moisture content (3.66), water activity (0.35), and the color ( $L^*$ : 83.91,  $a^*$ : 4.09,  $b^*$ : 15.62) of 5% of maltodextrin concentration enhances overall stability, visual quality, and microbial safety. These findings showed the maltodextrin concentration may be lowered to 5% to achieve balance in visual appeal, microbiological safety, and antioxidant activity.

**Keywords:** *Antioxidant activity, kombucha powder, maltodextrin, physicochemical properties, spray drying*