Application of Co-Crystallization Technique in Instant Chocolate Beverage: Effect of Gum Arabic Concentration on Solubility Profile and Sensory Acceptability

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ABSTRACT

Instant powdered beverages are processed products characterized by high solubility, low moisture content, powder form, and convenience in preparation. This study aimed to determine the effect of gum arabic concentration on the physical, chemical, and sensory characteristics of instant soy chocolate powder produced using the co-crystallization method and to identify the best formulation with the highest product quality. The experiment employed a Completely Randomized Design (CRD) with a single factor, namely gum arabic concentration at four levels: 0%, 0.15%, 0.20%, and 0.25%. The observed parameters included solubility, viscosity, moisture content, ash content, protein content, and sensory attributes (color, aroma, taste, and texture). Data were analyzed using Analysis of Variance (ANOVA) followed by Duncan's Multiple Range Test (DMRT), while the best treatment was determined using the Multiple Attribute Decision Making (MADM) Zeleny method. The results showed that the addition of gum arabic increased the solubility, viscosity, and texture characteristics of the instant soy chocolate powder. Solubility increased with increasing gum arabic concentration, while viscosity also increased due to the formation of a more stable dispersion system. The moisture, ash, and protein contents ranged from 6.65–7.96%, 2.20–2.80%, and 10.77–11.85%, respectively. Sensory evaluation indicated that gum arabic had no significant effect on panelists' preference for color and taste but significantly affected aroma and texture while enhancing the intensity of chocolate color and product thickness. Based on the Multiple Attribute Decision Making (MADM) Zeleny method, the best treatment was B2 (0.20% gum arabic), which provided the optimum balance of physical, chemical, and sensory characteristics, with 78.65% solubility, 10.35 cP viscosity, 6.65% moisture content, 2.80% ash content, 10.77% protein content, and acceptable sensory attributes as evaluated by the panelists.

Keywords: chocolate, gum arabic, soybean, co-crystallization, instant beverage