

Effect of inulin and xanthan gum on the properties of 3D printed Tartary buckwheat paste

ABSTRACT

This work aimed to investigate the effect of inulin and XG on the 3D printability of Tartary buckwheat paste. A 2 × 3 factor design comprising three levels of inulin (6%, 10%, and 14%) and three levels of xanthan gum (XG) (0.4%, 0.8%, and 1.2%) was used. The effect of inulin and XG on the rheological properties (yield stress, flow behaviour, viscoelasticity, and creep-recovery property), 3D printed structure, and microstructure properties of Tartary buckwheat paste were investigated. Compared with the control sample, a high amount of XG (0.4% and 1.2%) shifted the ink to a more solid-like form and improved the consistency (K), mechanical strength (yield stress, storage modulus (G')), resistance to deformation, and recoverability, while a high amount of inulin (14%) weakened these properties. Scanning electron microscopy (SEM) revealed that adding XG (0.4% and 1.2%) in the ink with 6% and 10% of inulin reinforced the ink structure. This study also identified the best combination of XG and inulin to facilitate the printing of Tartary buckwheat paste and produce a final product with an exquisite appearance. This study provided more insights for developing 3D printing of Tartary buckwheat foods rich in inulin.