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COMPARATIVE STUDY OF STARCHES FROM FIVE DIFFERENT SOURCES ON THE RHEOLOGICAL PROPERTIES OF GLUTEN AND GLUTEN-FREE MODEL DOUGH'S

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Starch, as a major component of dough's, can significant affect the rheological properties. Understanding effects of different botanical starches on the rheological properties of dough can help us to enhance the technological properties of dough's and the products' quality. In this study, starch-gluten and starch-hydroxy propyl methyl cellulose (HPMC) model dough's were prepared, and effects of wheat starch (WS), corn starch (CS), tapioca starch (TS), sweet potato starch (SS) and potato starch (PS) on the rheological properties and moisture distribution of dough's were investigated. For gluten doughy, WS showed greatest linear viscoelasticity region (0.190%), lowest frequency dependence (0.128) and greatest recovery capacity (67.39%), while PS showed smallest linear viscoelasticity region (0.126%), greatest frequency dependence (0.195) and lowest recovery capacity (54.97%). Furthermore, WS–gluten dough showed highest disulfide bonds content (3.47μmol/g), lowest intensity of extracted glutenin bands and highest bond water content (23.20%). This suggested that WS–gluten dough formed stronger starch–gluten interactions compared with the other four starch–gluten dough's. For gluten-free dough's, WS showed greatest linear viscoelasticity region (0.104%), frequency dependence (0.236) and recovery capacity (31.79%), while PS showed lowest viscoelasticity region (0.077%), frequency dependence (0.160) and recovery capacity (19.33%). Furthermore, PS-HPMC dough showed higher free water content (85.05%) than the other four starch-HPMC dough's. This suggested that more water distributed between hydration sites of HPMC and PS surface, leading to more hydrogen bonds and the formation of stable PS-HPMC network. In conclusion, the rheological properties of model dough's are largely due to the variation in structural and physicochemical properties of different starches, and the varying interactions between different starches and gluten/HPMC.

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