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Modified GlutoPeak Method for Additives

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Abstract:

The GlutoPeak has been recently introduced as a sensitive and rapid way of testing wheat gluten quality. However, the flour is usually mixed with various additives like ascorbic acid, enzymes etc. to improve its performance suited for various product applications. The current study was designed to modify the standard GlutoPeak method to better differentiate the flours treated with different concentrations of ascorbic acid. Center composite design was employed to assess the influence of two independent variables – ascorbic acid (A, 29.5-170.5 ppm) and RPM (R, 877-1723) on GlutoPeak - torque and Peak Maximum Time (PMT). Response surface regression analysis revealed that PMT was only impacted by RPM while both the linear terms ascorbic acid concentration and RPM significantly affected the torque ($p \leq 0.05$). However, interaction of both the variables was insignificant ($p > 0.05$) for any of the responses. In the next step, prior to each experiment, flours with different concentrations of ascorbic acid were mixed with solvent (0.5M CaCl₂) for 1 min at 150 rpm and then rested for 2 min. Subsequently, all the experiments were run again following the same center composite design. Analysis of Variance revealed that kinetics of gluten network formation represented by PMT was impacted most by RPM and also significantly affected by concentration of ascorbic acid. Also, the interaction between the two variables was significantly positive ($p \leq 0.05$). Ascorbic acid and RPM acted synergistically to govern the gluten aggregation time.

Higher concentrations of ascorbic acid in flour at higher RPMs led to faster gluten aggregation. Current study suggests that modified GlutoPeak method can be advantageously used to better discriminate among the flours treated with different additives. Further results will be discussed for flours modified with different enzymes.

Keywords: GlutoPeak, additives, gluten aggregation time, center composite design.

