Effect of Whole Buckwheat Flour and Transglutaminase on the Textural Properties of Sourdough Breads
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It was aimed within the current study to research texture profile features (TPA) of bread such as volume, hardness, adhesiveness, cohesiveness, chewiness, resilience and springiness regarding bread which was produced through adding transglutaminase (0, 50,100 ppm) (TG) and buckwheat (BWF) (0, %10,20,30) in various proportions and sourdough.

As control samples had the highest volume (520.67 cm3), addition of 50 ppm TG caused no significant change in volume. However, when enzyme addition level was increased to 100 ppm, %6.53 increase was experienced. Samples that had BWF experienced respectively %15.34, %31.41, %40.91 decrease in volume. It was identified that according to BWF amount, it caused a decrease in volume and the lowest level of volume (288.33 cm3) was identified in bread samples that had %30 BWF and 100 ppm addition. According to TPA, hardness also increased in relation to BWF amount (%0, 10, 20 and 30) (means were respectively 1178.30, 1797.10, 3456.90, 3346.80 g). However, no significant difference was found in hardness of bread samples that had %20 and %30 BWF. Addition of 50 ppm TG decreased the hardness in bread samples with %10 BWF but no change was recorded in samples with %30 BWF. Adhesiveness also increased in direct proportion to increasing of BWF (0.39, 4.56, 8.71, 16.64 g.s). Addition of TG did not cause any meaningful statistical difference regarding this value. The highest springiness was identified in samples that contained 100 ppm TG and in the ones which were TG free with %30 BWF. As the addition of %10 BWF did not change springiness, %20 and %30 additions reduced this value respectively to %6.12 and %10.20. TG addition had no influence on springiness. As bread samples (0.81 g.s) that were produced by using bread wheat flour with 50 ppm TG addition, %10, %20 and %30 BWF addition decreased the cohesiveness respectively %7.8, %11.7 and %27.27. The lowest gumminess (720.47 g.s) was identified in samples with 50 ppm TG addition. The highest value (2836.0 g.s) was recorded in ones with %20 BWF but with no enzyme. The highest chewiness was identified in samples with %20 BWF and the lowest value was in the ones with 100 ppm but with no BWF. TG addition to the samples with %10 and %30 BWF did not change the chewiness. Addition of %30 BWF decreased the springiness considerably (respectively; 0.42, 0.37, 0.31, 0.24). Addition of enzyme and its amount made no significant change in springiness. As the addition of 50 ppm TG had no effect on bread volume in the course of bread production with sourdough, addition of 100 ppm TG decreased the bread volume in a considerable amount. In relation to increase of BWF addition, volume decreased considerably. When TPA results and features of bread volume were taken into
consideration, as TG enzyme addition was found to have no positive

effect on bread, TG was considered as unnecessary in the production of bread with
sourdough. Nutritional values of BWF and buckwheat are thought to increase the
nutritional values within bread. However, they also decreased the bread value
considerably.

**Keywords:**

Sourdough, bread, texture, transglutaminase, buckwheat