THE POTENTIAL OF PSYLLIUM HUSK IN RE-SHAPING DOUGH RHEOLOGY OF WHOLEGRAIN SPELT WHEAT FLOUR

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Introduction

Since spelt wheat (Triticum aestivum subsp. spelta) is characterized with poor breadmaking properties, strategies to improve its rheological performance would contribute to satisfying the increasing demand for spelt flour based products and facilitate their large-scale production. It was shown that psyllium husk can improve workability of gluten-free dough while acting as structure forming agent. On the contrary, addition of psyllium husk to wheat flour results in bread with deteriorated quality due to gluten dilution effect. Considering that, unlike common wheat, rheological properties of spelt gluten are predominated by gliadins, responsible for formation of weak, soft and sticky dough, difficult to handle, the aim of this study was to investigate the effect of psyllium husk addition on the rheological properties of spelt flour dough during mixing and heating.

Methods

Psyllium husk was added to wholegrain spelt flour at 0, 5 and 10% replacement level and evaluated for dough Mixolab® parameters using Chopin+ protocol: Mixing speed 80 rpm, Dough weight 75 g, Temperature 1st step 30 °C, Duration 1st step 8 min, 1st temperature gradient 15min – 4 °C/min, Temperature 2nd step 90 °C, Duration 2nd step 7 min, 2nd temperature gradient 10min – 4 °C/min, Temperature 3rd step 50 °C, Duration 3rd step 5 min.

Results and discussion

Incorporation of psyllium husk led to significantly increased water absorption, dough elasticity and stability to mechanical and thermal constraints of wholegrain spelt flour dough. Upon heating, there was a decrease in maximum starch paste consistency as well as final baked dough consistency, due to lower starch retrogradation rate in psyllium husk substituted dough.

Table. Mixolab parameters of wholegrain spelt flour substituted with 0, 5 and 10% of psyllium husk

Mixolab parameter	Wholegrain spelt flour	Wholegrain spelt flour with 5% psyllium husk	Wholegrain spelt flour with 10% psyllium husk
Water absorption (%)	62.6	86.0	110.0
Dough development time (min)	6.33	5.75	6.33
Dough stability (min)	6.53	6.30	9.20
Dough elasticity (Nm)	0.05	0.08	0.09
Resistance to thermo-mechanical stress, C1-C2 torque (Nm)	0.680	0.487	0.290
Maximum consistency, C3 (Nm)	1.663	1.482	1.323
Hot paste stability, C3-C4 (Nm)	-0.117	0.208	0.254
Retrogradation rate, C5-C4 (Nm)	0.800	0.467	0.143

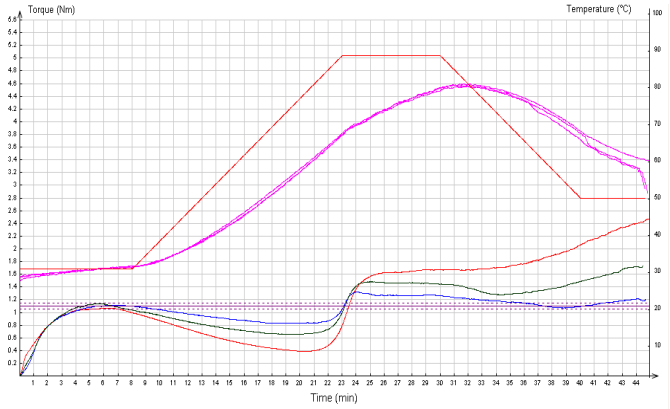

Figure. Mixolab profile of wholegrain spelt flour substituted with 0 (———), 5 (———) and 10% (———) of psyllium husk

Conclusions

According to obtained results it can be concluded that psyllium husk can be successfully employed to modify rheological properties of wholegrain spelt wheat flour towards production of spelt bread with better handling and shelf-life properties, while preserving product health-related composition.

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