

RHEOLOGICAL BEHAVIOUR OF ANCIENT WHEAT FLOURS



Miroslav Hadnađev^{1*}, Jelena Tomić¹, Dubravka Škrobot¹, Tamara Dapčević-Hadnađev¹
¹University of Novi Sad, Institute of Food Technology, Bul. cara Lazara 1, 21000 Novi Sad, Serbia

*Corresponding author:

E-mail address: miroslav.hadnadjev@fins.uns.ac.rs



Background

The need to preserve genetic diversity, the request for high adaptability to low agronomic input, along with the increasing demand for traditional products with better nutritional composition are recognized as a major driving forces behind the renewed consumers', manufacturers' and farmers' attention toward ancient wheat grains.



Aims and scopes

In order to convert ancient grains into food products with acceptable techno-functional properties, dough's rheological behaviour has to be considered. In this study a comparative evaluation of the rheological properties of ancient wheat species (emmer, spelt and khorasan) was conducted.



Material and methods

The wholegrain flours of these varieties were prepared and evaluated for chemical composition, wet gluten quantity and quality and rheological properties in terms of gluten aggregation and disruption kinetics (GlutoPeak), dough proofing (Rheofermentometer), as well as mixing and thermal behaviour (Mixolab).



Results

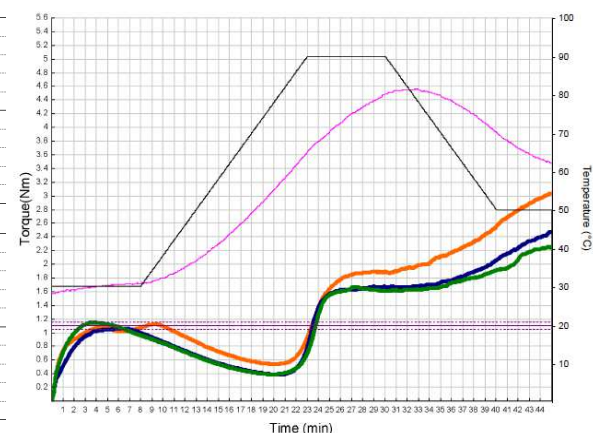
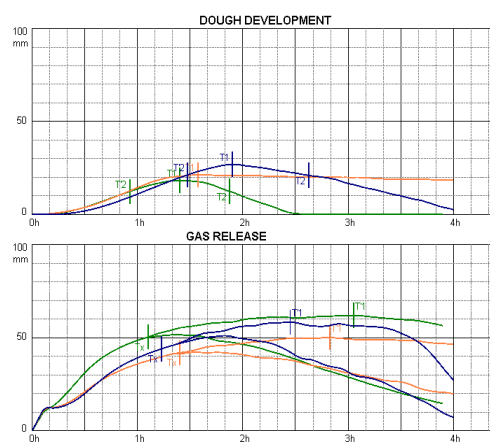
Although emmer and spelt flours had higher protein and wet gluten content, they were characterized with lower gluten indexes (GI) in comparison to khorasan flour (GI were 64, 50 and 11% for khorasan, spelt and emmer, respectively). This influenced significant differences in dough rheology of investigated ancient wheat flours.

Samples	Moisture (%)	Ash (%)	Starch (%)	Protein (%)	Wet gluten (%)	Gluten index (%)	Glutopeak maximum torque (BU)	Glutopeak peak maximum time (s)
Spelt	10.80	1.98	59.07	14.16	39.0	49.5	44	120
Khorasan	10.70	1.50	65.75	10.26	17.5	64.0	28	174
Emmer	11.31	1.87	66.30	14.18	29.5	11.0	16	83

Emmer flour - high wet gluten content, however, very low gluten index value affected dough development process, resulting in the lowest maximum dough height and pronounced loss in dough height during fermentation and the lowest percentage of gas retained in the dough relative to the total gas production compared to other wheat species.

Spelt flour - high wet gluten content, strong gluten network (high maximum torque as measured by GlutoPeak) with the highest Mixolab water absorption (62.6%) and maximum dough height (Hm at Rheofermentometer curve) in comparison to other varieties.

Khorasan flour - low wet gluten content, the highest dough stability both during mixing (Mixolab test) and fermentation (Rheofermentometer dough development curve) due to high gluten index value.



— Spelt — Khorasan — Emmer flour



Conclusions

The results obtained in this study can be used to better understand the techno-functionality and target application in cereal based products of different ancient wheat species.

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