Rheological properties of triticale (*Triticosecale Wittmack*)

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INTRODUCTION

Triticale (*Triticosecale Wittmack*) is a man-made cereal formed by crossing wheat with rye. It possesses the genomes of the genus *Triticum* and *Secale* ssp., and thus the advantageous properties of wheat grain with the features of rye, such as resistance to abiotic and biotic stresses (Ukalska and Kociuba, 2013). The ability of triticale to perform under stress and its versatility of usage underscore its importance as a feed/food cereal. Currently, triticale has limited utilisation, primarily as an animal feedstuff, but it can also be used in baking by supplementing with wheat due to its low gluten content (McGoverin et al., 2011). The farinograph is a dynamic physical dough testing instrument involving the measurement of torque. The results of farinograph are analysed primarily in the aspect of the dynamics of changes in the consistency of dough during mixing (Sabovics and Straumite, 2012).

The aim of research was to evaluate the rheological properties of triticale grown in conventional and biological condition using Brabender Farinograph.

MATERIALS AND METHODS

Plant materials

Winter triticale (*Triticosecale Wittmack*) 3 varieties (‘Inarta’, ‘Dinaro’, ‘Ruja’) and 2 breeding line (9405-23 and 0314-29) from breeding program in Priekuli Plant Breeding Institute (Latvia) cultivated in 2014 under conventional and organic farming conditions were used in the current research.

Determination of moisture content

Moisture content of grain flour was determined using heating oven Memmert (GmbH) Memmert, Germany) – 5.00±0.03 g sample for 1 hour was dried at 110 ± 1 °C temperature (LVS EN ISO 712:2010A). All analyses were performed in duplicate and averaged.

Determination of rheological properties using Brabender Farinograph

For analysis of rheological properties there was used Brabender ICC BIPEA 300 method. The farinograph test measures and records the resistance of dough during the mixing time using paddles. For all samples there were determined the following parameters: water absorption (WA) of grains, development time of dough (DDT), stability of dough (S) and farinograph quality number (FQN).

All samples were weighed and placed into the corresponding farinograph mixing bowl (model 827505, Brabender Farinograph-AT, GmbH & Co. KG, Germany). Water was added automatically from the farinograph water container to flour and mixed to form dough. Farinograph was connected to a circulating water pump and a thermostat which operated at 27±2 °C. The mixing speed of the farinograph was 63 rpm; experiment run for 20 min. All analyses were performed in triplicate and averaged.

Statistical analysis

The results (mean, standard deviation, *P* value) were processed by mathematical and statistical methods. Significance was defined at $P < 0.05$.

RESULTS AND DISSCUSIONS

Moisture content

The optimum moisture content of wheat flour is 14.0%, in case if moisture content is higher it is difficult to maintain quality during storage, on the other hand, if moisture content is very low, during dough formation it would not bind sufficient amount of water.

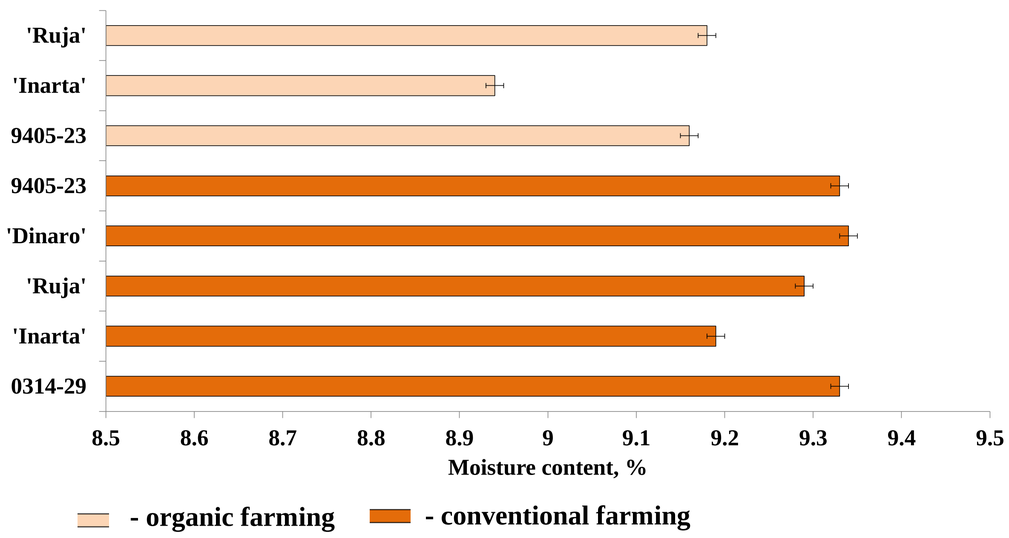

Figure 1. Moisture content of anlysed samples.

Moisture content in the studied triticale grain samples was from 8.94±0.04% (‘Inarta’, organic farming) to 9.34±0.02% (Figure 1).

Rheological properties of triticale

The farinograph is a dynamic physical dough testing instrument involving the measurement of torque. The results of farinograph tests are analysed primarily in the aspect of the dynamics of changes in the consistency of dough during its mixing

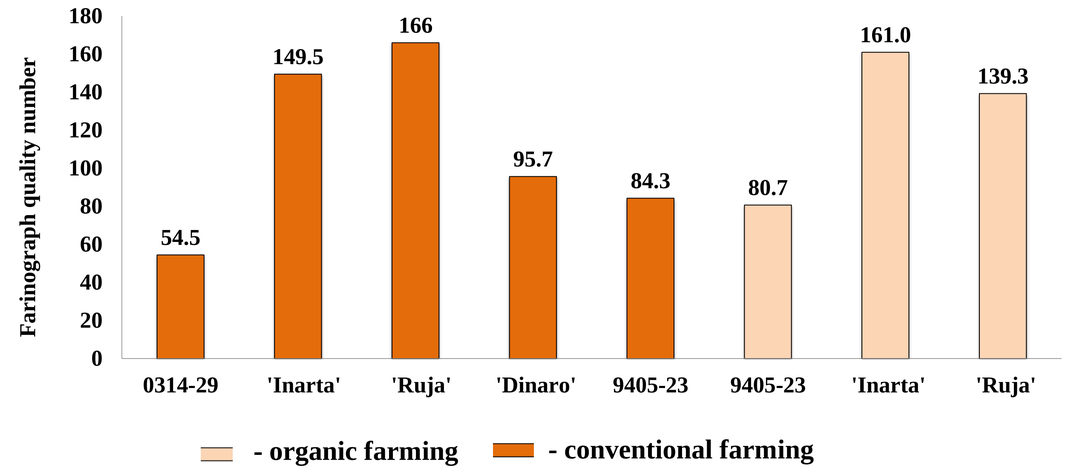

Figure 2. Farinograph quality number of anlysed triticale samples.

The farinograph quality number represents the quality of flour in a single value. Farinograph quality number (Figure 2) of analysed triticale grain samples was in the range from 54.5 (breeding line 0314-29 – conventional farming) to 166.0. (variety ‘Ruja’ – conventional farming).

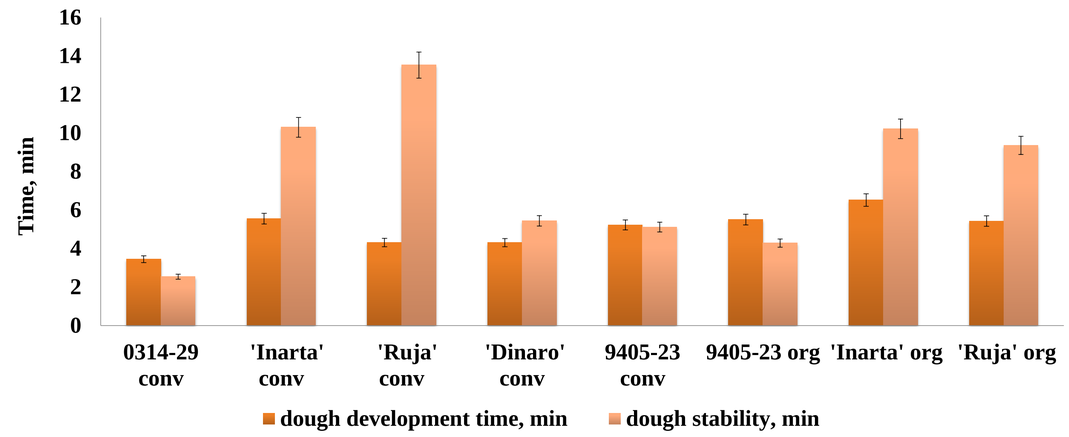

Figure 3. Triticale dough development and dough stability time.

Dough development time (DDT) is the time required for water absorption in the flour until the dough mixing reaches the point of the greatest torque (500 FU). Dough development time and stability of triticale grain samples are shown in Figure 3. Dough development time for the samples was from 3.45±0.11 min (breeding line 0314-29) to 6.56±0.02 min (variety ‘Inarta’). The triticale varieties ‘Inarta’ and ‘Ruja’ gave the highest dough stability value 10.30–12.29±0.16 min.

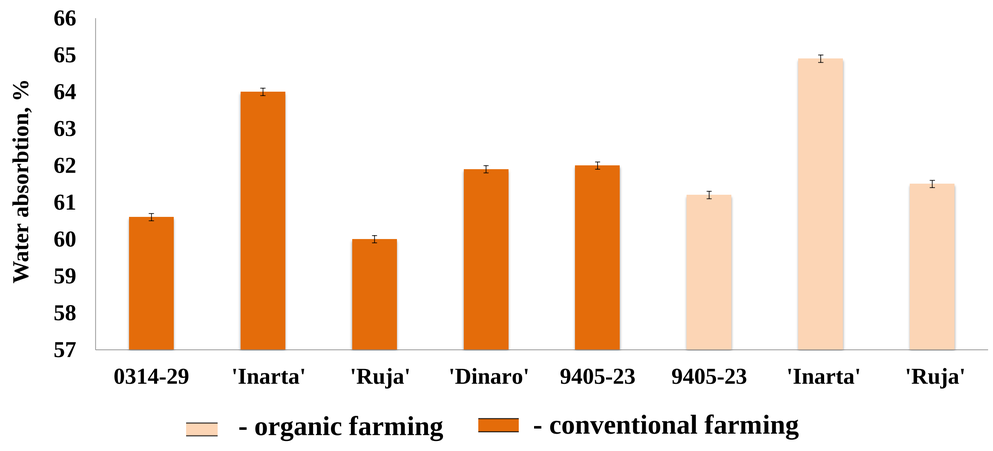

Figure 4. Water absorbtion of analysed triticale samples.

Water absorption of analysed triticale grain samples was in the range from 60.0±0.1% to 64.9±0.7%, and the growing condition have not influence ($p > 0.05$) on grains water absorbtion.

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CONCLUSIONS

Growing condition of triticale does not influence ($p > 0.05$) the moisture content, development time, dough stability and farinograph quality number.

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