

## **COMPARISON OF STONE-MILLED AND RECOMBINED WHOLE-GRAIN FLOURS FOR THEIR RHEOLOGICAL PROPERTIES AND BIOACTIVE COMPOUND CONTENT**

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Whole-grain food market is growing in the last years, and the selection of the milling process is a key point in the production of whole-grain flours. The aim of the present work was to study the effects of milling process on the content of antioxidant compounds, rheological properties and bread-making performance of two different whole-grain flours. Starting from red-, yellow- and blue-grained wheat varieties (*cvs* Aubusson, Bona Vita and Skorpion), the following flours were produced: i) a whole-grain flour obtained by means of a single-stream stone milling process and ii) a recombined whole-grain flour obtained by means of a multiple-stream roller milling process. Straight dough method was used for preparing bread loaves. The rheological properties of the flours were evaluated by GlutoPeak, Farinograph, and Rheofermentometer tests and related to bread quality (i.e. specific volume). The content of antioxidant compounds was investigated in both flours and corresponding breads.

A key difference between the whole-grain flours was the particle size distribution: the stone-milled flours showed a more uniform particle size distribution than the recombined ones. The latter exhibited on average a higher concentration of both cell wall-bound phenolic acids (CWBPA; +10%) and soluble phenolic acids (SPAs; +11%) than stone-milled flours. As far as the lutein content was concerned, the two whole-grain flours obtained from the yellow-grained variety presented no significant difference.

As regards the rheological properties, results showed gluten weakening for stone-milled samples. In fact, although the milling system did not affect either dough stability or leavening properties, bread samples from stone milling showed a structural collapse compared to the products from recombined whole-grain flours.

Bread samples made from the two types of whole-grain flour did not differ significantly for their antioxidant capacity. However, the effect of bread-making on the content of antioxidant compounds was more detectable in the sample from stone-milled flours, compared to the recombined ones.

In conclusion, the milling process used for obtaining whole-grain flour seems to mainly affect the particle size distribution of whole-grain flours and the textural characteristics of the resulting bread samples.

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### **Keywords**

Whole-grain flour, Stone milling, Antioxidant compounds, Bread