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Abstract

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Evaluation of Degree of Elasticity and Other Mechanical Properties of Wheat Kernels

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Three samples were selected representing bread, soft, and durum wheat. Uniaxial compression and stress relaxation tests were performed on wheat kernels. Force-deformation curves from intact wheat grain typically exhibited at least two points of inflection (PI) at ≈ 0.1 and 0.2 mm displacement. The first PI is related to the mechanical properties of all the bran layers. The second PI (0.2 mm) seems to be the endosperm boundary near the aleurone layer. These structures had higher degree of elasticity (DE) compared to the inner endosperm (0.5 - 0.6 mm). Besides wheat class and specific structures of the caryopsis, moisture content is a prominent factor affecting the mechanical strength of kernels. Stress relaxation tests show that bread wheat kernels with 69.2% DE at 13% moisture decreased to 31.6% DE with additional 6% moisture content. Soft wheat kernels DE of 61.0% at 13% moisture decreased to 22.7% at 19.7% moisture. Stress relaxation revealed pronounced time-dependence. However, the differences of stress values at 120 - 180 sec were not significant in all wheat classes and moisture contents evaluated. The stress values after 120 sec might be attributed to the elastic deformation of the kernels.

Cited by

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