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Susceptibility of naked oat cultivar seeds to mechanical damage

Research Article

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Abstract: Mechanical damage to seeds occurring during harvesting and threshing, especially in naked cultivars, is one of the main factors decreasing the size and quality of yield. The objective of this study was to assess the susceptibility of naked oat cultivars to mechanical damage, considering the biometric parameters of seeds determined on the basis of computer image analysis and weight tests. The testing was carried out on eight cultivars harvested between 2008 and 2010 at 15% moisture and threshed at either 1.6 or 2.4 $m \cdot s^{-1}$ threshing drum speed. A 50% increase in the threshing speed caused an average 19% increase in the frequency and a 29% increase in the area of microdamage to seeds. There was a corresponding 4.1 mm^2 change in the microdamage area when using the threshing speed of 1.6 $m \cdot s^{-1}$, and a 6.1 mm^2 change when using the threshing speed of 2.4 $m \cdot s^{-1}$ was 53% and 68%, respectively, determined by a decreasing seed shape coefficient indicating seed elongation. The greatest resistance to mechanical damage was found on the Bullion cultivar, which was also characterized by the largest total projected area of seeds (7.14 mm^2), as well as the greatest seed density (63.8 $kg \cdot hL^{-1}$) and thousand kernel weight (TKW) (28.2 g).

Keywords: *Hulles oat • Mechanical microdamage • Shape coefficient • Computer image analysis*

Abbreviations:

TKW - thousand kernel weight;
LTS - low threshing speed;
HTS - high threshing speed;
F_M - frequency of microdamage;
A_M - area of seed microdamage;
K_m - shape coefficient.

1. Introduction

The sowing material of new cultivars is considered to be a fundamental element of the continual biological progress. In the seed industry, the basic problems associated with the production of high quality cereal seed intended for sowing or consumption are susceptibility to mechanical damage [1] and preharvest sprouting [2,3]. Financial losses caused by these phenomena are difficult to assess since both are strongly modified by the use of agrotechniques and the environment. However, some estimates have put the losses for producers during unfavorable years as much as 10-50% due to sprouting [4] and 50-90% due to mechanical damage [5]. In 2003, a report was published indicating that preharvest sprouting can occur in traditional oat cultivars [6]. According to this report, the sprouting seeds of husked oat show increased susceptibility to mechanical damage occuring during the husking process. However, little is known about the susceptibility to sprouting and mechanical damage in naked oat cultivars, which have lately been more and more commonly grown. The multi-flowered inflorescence, which is specific for naked oat, as well as long pedicels and weaker lignification of lemma and palea [7], all these factors may lead to varied susceptibility of seeds to mechanical damage and sprouting if the maturation process takes place under changing weather conditions. The more delicate structure of naked oat seeds, compared to traditional

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