5.07

Characterization of pre-harvest stress cracks in corn seed by visual, X-ray and LTSEM analysis: effect on seed quality

M.L.M. Carvalho[1,2], A.C. van Aelst[3], J.W. van Eck[4] and F.A. Hoekstra[2]
[1]Department of Agriculture, Universidade Federal de Lavras, P.O.Box 37, 37200-000 Lavras, MG, Brazil
[2]Laboratories of Plant Physiology and [3]Plant Cytology, Wageningen Agricultural University, Arboretumlaan 4, 6703 BD Wageningen, The Netherlands
[4]DLO-Centre for Plant Breeding and Reproduction Research, PO Box 16, 6700 AA Wageningen -NL

Internal cracks that are caused by high temperature or excessive moisture during corn seed development were characterized, and their effects on seed quality were assessed. Pre-harvest stress cracks are often located along the embryo axis, but they are also detected in other positions, irrespective of the shape of the kernel. X-ray analysis enables visualization of stress cracks that are invisible to the human eye and, therefore, gives a better estimate of the percentage of cracks. However, low temperature scanning electron microscopy of the surface of milled kernels reveals small cracks that are unnoticeable by visual or X-ray inspection.. Cracks were frequent in the endosperm tissue and in the scutellum, but rare in the embryo axis. Endosperm cracks followed the boundary of the starch granules, but did not extend into the pericarp tissue. In contrast to external cracks caused by mechanical impact, pre-harvest internal stress cracks generally are not detrimental to germination and vigour. If the crack is located inside or perpendicular to the embryo axis, it may affect the quality of the seed, probably by impeding nutrient translocation to the embryo.

5.08

Lettuce seed germination at high temperature: endo-β-mannanase activity and ethylene production in response to seed vigor.

W. M. Nascimento*, D. J. Cantliffe, and D. J. Huber
University of Florida, IFAS, Horticultural Sciences Department Gainesville, FL 32611-0690, USA

The lettuce endosperm delays or prevents germination, acting as a physical barrier to radicle protrusion, especially under high temperature conditions. Weakening of the endosperm layer of lettuce seeds is a pre-requisite to radicle protrusion at high temperatures. Cell wall-associated endo-β-mannanase (EBM) is expressed in lettuce seed endosperm prior to radicle protrusion. The involvement of EBM during germination of lettuce seeds at high temperature (35°C) was investigated by a gel-diffusion assay. A high-vigor seed lot of lettuce 'Everglades' was aged by placing seeds at 41°C and 100% humidity for 0, 24, 72 and 120 hours, thus generating four separate seed lots varying in vigor. At 20°C, seeds germinated 100%, independently of seed vigor. At 35°C, germination was lowest in the lowest vigor seeds. Low vigor seeds also produced very low ethylene levels, whereas high vigor seeds produced high ethylene at this temperature. Higher EBM activity was observed in high vigor seeds. The results suggest that high seed vigor is an important factor to be considered in overcoming thermoinhibition, and that ethylene might be involved in EBM activity.

EMBRAPA/CNPHortaliças