THE INFLUENCE OF SEED MOISTURE CONTENT AND MECHANICAL DAMAGE ON GERMINATION, IMBIBITIONAL CHILLING INJURY AND LEAKAGE

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Mechanical damage in large seeded legumes can be artificially induced at any time during harvesting, handling, conditioning and sowing operations (2). Snap bean seeds are susceptible to this damage which results in decreased germination and increased seedling abnormalities. The purpose of this report is to present preliminary data on the influence of seed moisture content and mechanical damage on germination, imbibitional chilling injury and leakage.

Nontreated seeds of Bush Blue Lake 47 (Asgrow Seed Co.) were used in this study. The moisture content of seed samples were adjusted to 8 or 12 percent (wet weight basis) and kept in plastic zip lock bags for subsequent studies (3). Mechanical damage was experimentally induced by dropping seeds onto a steel plate from a height of 2.0 m.(1) Seeds with 8% moisture were dropped only 4 times compared to 4 and 8 times for high moisture content seeds. The percent germination of each sample was determined according to the Association of Official Seed Analysts 'Rules for Seed Testing' (3). Imbibitional chilling stress was induced by placing seeds in 5°C sand moistened to 22% (dry weight basis) for 24 hours. Seeds were then transferred to standard germination test conditions (3). The electrical conductivity of seed leakage was determined with an ASAC-1000 Seed Analyzer (Neogen Inc.). Data is expressed as micro amperes (μA) with a 0.25 V reference.

An interaction was observed between the influence of mechanical damage and moisture content on warm and chilled germination (Fig. 1). At 12% moisture content, increasing the number of impactions decreased both the warm and chilled germination.

Fig. 1. The Influence of Mechanical Damage of 8 or 12% Moisture Content Seeds on Warm or Chilled Germination
However, little difference was observed between warm and chilled germinations at any particular damage level. Low moisture content seeds were more susceptible to mechanical damage than high moisture content seeds. Chilling had its most pronounced effect on 8% moisture seeds when no mechanical damage was induced. Leakage measured after 24 hours increased as the level of damage increased at both moisture levels (Fig. 2). Greater leakage was measured from 8 than 12% moisture level seeds.

Fig 2. The Influence of Mechanical Damage of 8 or 12% Moisture Content Seeds on Electrolyte Leakage

These results are consistent with earlier work on this topic. High moisture content seeds are less susceptible to both mechanical damage (2,4) and chilling injury (3) than low moisture seeds. The 12% moisture seeds are more chilling tolerant (3) and the decrease in germination is attributed to increased mechanical damage. Leakage has also been shown to be greater from seeds of low moisture than from high moisture content seeds of the same seedlot (3). Mechanical damage further increases leakage from both low and high moisture seeds, however, the total leakage increase is greater from the low moisture seeds.

References


