

EVALUATING DESICCATION SENSITIVITY OF NORTHERN RED OAK ACORNS USING X-RAY IMAGE ANALYSIS

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Desiccation of northern red oak (*Quercus rubra* L.) acorns can have a major influence on seed viability. Recalcitrant behavior of northern red oak acorns was studied to examine the effects of moisture content (MC) on germination and early growth. Because it is rapid and non-destructive, X-ray image analysis was chosen to assess cotyledon damage in acorns subjected to varying amounts of desiccation.

Half-sib acorns collected from five sources were desiccated to one of four target MC levels (30, 25, 20, or 15%) or maintained as non-desiccated controls (35 to 38%). Each acorn was X-rayed before and after drying to respective MC treatments and sown into individual containers in a greenhouse. Germinated seedlings were evaluated for number of days needed to reach the developmental stages of radicle emergence, epicotyl emergence, and full emergence of the first leaf flush. Height and root-collar diameter were measured and number of leaf flushes was recorded 80 days after sowing. X-ray images were scored qualitatively for each acorn according to the degree of cotyledon-cotyledon and cotyledon-pericarp separation.

Family and MC had a significant influence on all variables. The percent of each sample to reach each stage, height, and root collar diameter declined with decreasing MC and dropped most notably between 20 and 15 percent MC. X-ray image separation scores for both cotyledon-cotyledon and cotyledon-pericarp were more closely correlated to the percent of each sample to reach each of the three developmental stages than MC level. These findings demonstrate the potential of X-ray image analysis to provide a rapid and nondestructive means for successfully predicting acorn viability.