

A-01

Relating temperature and relative humidity in commercial warehouses to decline in vigor of soybean seed stored for late plantings in Arkansas

*John Rupe\**, Department of Plant Pathology, University of Arkansas, Arkansas, USA

*Jung Ae Lee*, Department of Plant Pathology, University of Arkansas, Arkansas, USA

*Aaron Palmer*, Arkansas Plant Board, Arkansas, USA

*Robert Holland*, Department of Plant Pathology, University of Arkansas, Arkansas, USA

Summer storage for late soybean plantings in Arkansas can expose seed to prolonged periods of high temperature and relative humidity (RH). To determine if this exposure reduces seed germination and vigor, soybean seed was stored in 23 kg paper seed bags at three sites within three commercial warehouses over three years. The sites within each warehouse represented good, bad, and on-farm seed storage environments. Seed was also stored at the Arkansas Plant Board under controlled environmental conditions (20°C at 60% RH). From April through August, seed was sampled every two weeks and the standard germination (SG) and seed vigor (accelerated aging, AA) determined. Temperature and RH were measured within the bags at each site. Average temperatures at all sites in the warehouses rose to over 30°C during the season. RH reached approximately 70, 60, and 50% for the on-farm, good, and bad sites, respectively. In the warehouses, there was little change in SG during the season, however, AA declined dramatically at the on-farm sites, followed by the good sites, with the least change at the bad sites. Traditional analysis of variance is poor at relating temperature and RH to declines in seed quality. Instead, a survival modeling approach was used with a Kaplan-Meier curve, a Cox proportional hazard model, and a 60% AA threshold. No change in AA occurred for the first 70 days and then the decline in AA was associated with high RH, not temperature. Seed lots exposed to extended periods of temperatures between 27 and 33°C and RH above 57% had the greatest decline in AA. Few seed lots fell below 60% when temperatures were above 30°C, but RH was below 57% or if temperatures were 20°C. These results show significant declines in vigor of seed for late plantings when both temperature and RH were high.