RELATIONSHIP OF DIFFERENT SEED MEASUREMENTS FOR ESTIMATING SEED SURFACE AREA AND CERTAIN YIELD COMPONENTS

Frank E. Groves
University of Arkansas Cooperative Ext
Monticello, AR
Fred Bourland
University of Arkansas - Northeast Research and Extension Center
Keiser, AR

Abstract

The estimation of seed surface area is a critical component of several selection indices, but estimates may vary based upon estimation method and delinting practice. Traditionally, breeders have utilized either the Hodson method or used seed weight as a substitute for seed surface area. Recently, digital scanners and WinSeedle software have been used. In an effort to verify or improve the current methods of estimating cottonseed surface area the relationships of seed weight, volumetric displacement and seed surface area estimation were evaluated. A study was conducted at two locations in Arkansas including eight diverse genotypes arranged in a randomized complete block design with four replications. Within each plot, a 50-boll sample was collected by hand-harvesting all bolls from consecutive plants. After ginning, 100- fuzzy seed samples from a total of 10 replicates of field plots (2 locations) were randomly selected. Samples were flame-delinted, weighed and seed surface area was estimated by volumetric displacement followed by digital analysis. The same seeds were then acid-delinted, weighed and surface area recalculated in the same manner. Both seed weight and displacement values were affected by delinting method. The flame-delinting method proved inconsistent in removing linters and destructive to the seed coat; therefore, acid-delinting was preferred. Across genotypes the relationship between seed weight and volumetric displacement of acid delinted had an R^2 value of 0.68. However, the relationship was stronger for heavier seeded genotypes. Surface area estimation based upon WinSeedle analysis (R^2=0.48) was a better predictor of volumetric displacement than the Hodson method (R^2=0.38). Increased variability with the Hodson method was likely due to extrapolation between values in the table. The regression of seed weight on surface area estimation was stronger with the WinSeedle method (R^2=0.57) than was with the Hodson method (R^2=0.41). The relationship of seed weight and surface area estimation was at least equal to that of displacement and surface area estimation. Thus, seed weight was as good as displacement for estimating seed surface area.