Variation in cassava germplasm for tolerance to post-harvest physiological deterioration

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ABSTRACT. Tolerant varieties can effectively control post-harvest physiological deterioration (PPD) of cassava, although knowledge on the genetic variability and inheritance of this trait is needed. The objective of this study was to estimate genetic parameters and identify sources of tolerance to PPD and their stability in cassava accessions. Roots from 418 cassava accessions, grown in four independent experiments, were evaluated for PPD tolerance 0, 2, 5, and 10 days post-harvest. Data were transformed into area under the PPD-progress curve (AUP-PPD) to quantify tolerance. Genetic parameters, stability (Si), adaptability (Ai), and the joint analysis of stability and adaptability (Zi) were obtained via residual maximum likelihood (REML) and best linear unbiased prediction (BLUP) methods. Variance in the genotype (G) x environment (E) interaction and genotypic variance were important for PPD tolerance. Individual broad-sense heritability (h^2_g = 0.38 ± 0.04) and average heritability in accessions (h^2_{mg}= 0.52) showed high genetic control of PPD tolerance. Genotypic correlation of AUP-PPD in different experiments was of medium magnitude ($\hat{r}_{gA}$ = 0.42), indicating significant G x E interaction. The predicted genotypic values of G x E free of interaction ($\hat{\mu}+\hat{g}_i$) showed high variation. Of the 30 accessions with high Zi, 19 were common to $\hat{\mu}+\hat{g}_i$, Si, and Ai parameters. The genetic gain with selection of these 19 cassava accessions was -55.94, -466.86, -397.72, and -444.03% for $\hat{\mu}+\hat{g}_i$, Si, Ai, and Zi, respectively, compared with the overall mean for each parameter. These results demonstrate the variability and potential of cassava germplasm to introduce PPD tolerance in commercial varieties.

Key words: REML/BLUP; *Manihot esculenta* Crantz; Abiotic stress; Breeding; Post-harvest losses

