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GENOTYPE-BY-ENVIRONMENT INTERACTION OF ELITE VARIETIES OF COWPEA DERIVED THROUGH MUTAGENESIS

Grain yield of cowpea (Vigna unguiculata L.) is considerably low in the northern communal areas of Namibia where the crop is predominantly cultivated. This is attributed to: i) the lack of improved and well-adapted cultivars,ii) limited water availability, as well as iii) the effects of genotype by environment (G x E) interaction on the crop productivity. The objectives of this study were to determine G x E interaction and yield stability of elite cowpea genotypes developed through mutagenesis and to identify promising genotypes and to establish the most representative field-test methods and identify the best production environments. The study was conducted in Namibia at three selected sites (Bagani, Mannheim and Omahenene) during two cropping seasons (2014/2015 and 2015/2016) in six different environments. The experiments were laid out using a randomised complete block design with three replications. Thirty-four elite genotypes and three check lines were evaluated. Data were analysed using the Additive Main Effects and Multiplicative Interaction (AMMI) and the Genotype plus Genotype by Environment (GGE) bi-plot methods. The following four promising mutant genotypes: G9 (ShL3P74), G10 (ShR3P4), G12 (ShR9P5) and G4 (ShL2P4) were identified with better grain yields of 2.83, 2.06, 1.99 and 1.95, t/ha-1, in that order. The parental lines designated as G14 (Shindimba), G26 (Nakare) and G37 (Bira) provided mean grain yields of 1.87, 1.48 and 1.30 t/ha-1, respectively. The best environments in discriminating the test genotypes were Bagani during 2014/15 and Omahenene during 2014/15. The AMMI model explained 77.49 % of the total variation in the present study. The GGE bi-plot showed that 63.57% of the total variation was explained by the first principal component (PC1), while the second principal component (PC2) explained 12% of the variation.

Country or International Organization

Namibia

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