Stability Analysis of Dwarf Sorghum Varieties for Grain Yield in Northern Nigeria Using GGE Biplot Analysis

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The cultivation of sorghum for food and feed to livestock in Nigeria is threatened due to current security challenges. As an important staple, it is necessary to introduce new, suitable sorghum varieties to help meet their household requirements. The study was conducted to i) determine the interaction between the genotype and environment for grain yield and plant height and ii) identify stable and adaptable high yielding varieties for target environments using GGE biplot analysis. Fourteen (14) dwarf sorghum varieties were evaluated in a randomized complete block design across nine locations in Northern Nigeria in 2020 and 2021. The combined analysis of variance indicated that the genotype x environment interaction (GEI) was significant ($P < 0.01$) for grain yield and plant height. Grain yield of the varieties ranged from 3367kg ha−1 for 12KNICSV-252 to 1683 kg ha−1 for 12KNICSV-107 with an average of 2388kg ha−1. The total variation in grain yield was 83.65%, composed of PC1 and PC2 values at 73.81% and 9.84%, respectively. The GGE biplot analysis of the grain yield at each location indicated that 12KNICSV-260 was the ideal variety, with a high yield potential and the most stability at multi-locations, followed by 12KNICSV- 297 and 12KNICSV-252. The varieties 12KNICSV-260, 12KNICSV-252 and 12KNICSV-297 were adapted and performed better at Dadin Kowa, Gambawa, Minjibir, Samaru, Birnin kudu and BUK. Farmers prefer early maturing and high grain yielding varieties. The area prone to banditry is placing a premium on dwarf sorghum varieties to keep up areas of sorghum production. The identified high yielding and stable varieties are recommended for promotion for greater adoption and commercialization to contribute to food insecurity in Nigeria.

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