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Identification of Combining Ability Patterns for Pearl Millet Hybrid Breeding in West Africa

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Abstract

Pearl millet (*Pennisetum glaucum* (L) R. Br.) is cultivated in India and Sub-Saharan Africa as staple crop. Especially in West Africa (WA) it is important for the food security of smallholder farmers in rural areas. In contrast to India, breeding of hybrid varieties is still limited in WA. An extensive diversity was shown to be present in pearl millet in WA, its centre of origin. However, one major cause is the nonexistence of natural heterotic patterns as indicated by several diversity studies. The development of heterotic groups based on combining ability patterns will help to overcome this issue and make sustainable hybrid development feasible.

Population hybrids have greater population buffering capacity than single-cross hybrids, which makes them suitable to cope with harsh environmental conditions like variable inter-annual rainfall and their production requires less input and training. This increases the chance that smallholders in WA will adopt new hybrid varieties.

The objectives of this study were to evaluate combining ability, combining ability patterns and heterosis effects of WA pearl millet based on population hybrids, and to derive conclusions for developing future long-term hybrid breeding programs. Therefore, 17 populations were intercrossed in a diallel mating design. Those population hybrids were tested together with their parents at two locations each in Niger and in Senegal in two consecutive years. In addition, 21 microsatellite markers were used to evaluate genetic distances between the 17 parental populations. Results of the diallel design showed an average panmictic midparent heterosis (PMPH) of 24.2 %, ranging from 0.4 to 45.7 % for panicle yield. While preparing this abstract, data analysis for the diallel mating has been still underway. Results obtained so far indicate great potential for pearl millet hybrid breeding in WA. Our study represents a first step to identify combining ability patterns and initial heterotic pools for pearl millet hybrid breeding in WA.

Keywords: Heterotic pattern, panmictic midparent heterosis, pearl millet, population hybrids

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