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Sorghum Hybrids - A Contribution to Future Agricultural Productivity and Food Security in West Africa

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Abstract

The long-term sorghum [*Sorghum bicolor* (L.) Moench] grain yield is around one ton per ha in West Africa (WA), despite the varieties released by research. Sorghum production faces many biotic and abiotic stresses, and farmers are accustomed to use their own photoperiodic, stable and tall landrace seeds from the previous season. The International Crop Research Institute for Semi-Arid Tropics (ICRISAT)-Mali and its partners developed several experimental photoperiodic guinea-race sorghum hybrids to assess their yield and quality potential and their adoption rate by farmers. With multi-location on-farm yield trials, those tall and short hybrids were demonstrated to have respectively up to 37 and 17% of best average yield superiority over a well-adapted, farmer-preferred landrace, with taller hybrids having larger relative superiorities (up to 47%) over the local check in low-input environments. Experimental hybrids also showed little risk for farmers to recover their investment in purchased seed. Farmers' adoption of those experimental hybrids is increasing yearly (25 to 50% of farmers in villages where the seeds were produced in 2014), and farmers associations are trained to produce their own preferred hybrid seeds. A long-term hybrid-breeding programme is needed to provide WA smallholder farmers with new high-yielding hybrids that meet their low-input farming conditions and quality preferences. Presently, ICRISAT-Mali, University of Hohenheim, and partners are working on the basis of such a long-term sorghum hybrid-breeding program. This work includes, among others, mapping and validation of fertility restoration QTL for the A1 cytoplasmic male sterility system and development of new plant material for Malian and Nigerian sorghum hybrid breeding programs. This contribution aims (1) to present an overview of the work done so far and more specifically (2) to present the results of a recent study assessing combining abilities of 14 and 89 new A and R lines and corresponding hybrid performance in two-year (2015–2016) multi-location trials, conducted under two different soil phosphorus (P) levels. The outputs of this study will underline the tremendous potential of sorghum hybrids to contribute to food security in WA, and will provide sorghum breeders in WA with selection strategies for hybrid breeding targeting smallholder farmers' low input conditions.

Keywords: Hybrids, low input conditions, smallholder farmers, *Sorghum bicolor*, West Africa