Landrace sorghum lines- potential sources for male sterility maintainers in hybrid parent development

Angarawai, I. Ignatius*., Willmar, Leiser., Baloua, Nebie, Yeye, Y. Mary., Aba, A. Daniel, Lawali Abubakar and Jonah Jerome.

*Contact Author: I.Angarawai@cgiar.org

Introduction

The potential of hybrid sorghum to provide yield advantages under drought stressed conditions in semi-arid areas was shown several authors (Haussmann, et al., 1998, 2000, Rattunde et al., 2013). Higher yield advantages were shown with Nigerian germplasm in preliminary on-station testing (Andrews, 1975), though the parental materials have since been lost. The objective of this work is to identify suitable seed parents towards developing hybrid sorghum for the Nigerian environment, constrained most particularly by non-appropriate indigenous sources of stable male-sterility maintenance on the female parents, within the diverse sorghum landraces.

Materials & Methods

Total of 288 West African sorghums landraces collected from various sources by ICRISAT Nigeria, were screened using 20 SSR markers at the University of Hohenheim Germany. The Euclidean dissimilarity matrix was employed to cluster the 288 genotypes, using the UPGMA algorithm to develop the dendrogram. 388 testcrosses generated using 40 randomly selected landraces on 2 male sterile lines (ICS38A and ICS24005A) were evaluated for sterility maintainer at Bagauda Kano Nigeria during 2016 cropping season.

Results & Discussion

Result of the 20 SSR markers revealed wide genetic diversity among the sorghum genotypes studied. The resulting dendrogram revealed 5 major distinct clusters at 0.2 Euclidian distances (Figure 1). Based on sources of germplasm, 2014 collections were assigned blue, 2015 collections were assigned red while materials from Mali were assigned black colours. Germplasm collection of 2014 and 2015 were distributed across 5 cluster. Parental lines of the 23 progenies identified with sterile heads during screening for male sterility maintainer were mapped to clusters as follows; 3 to cluster 1, 13 to cluster 2, 4 to cluster 3 and 1 to cluster 5 (Figure 2), most of which were traced to be materials collected from drier Northern Nigeria axis of Sokoto, Katsina and Zamfara states. Materials from these regions considering their distribution across cluster showed high variability, indicative they have the potential for sterility maintainers and can be explored for hybrid parent development.

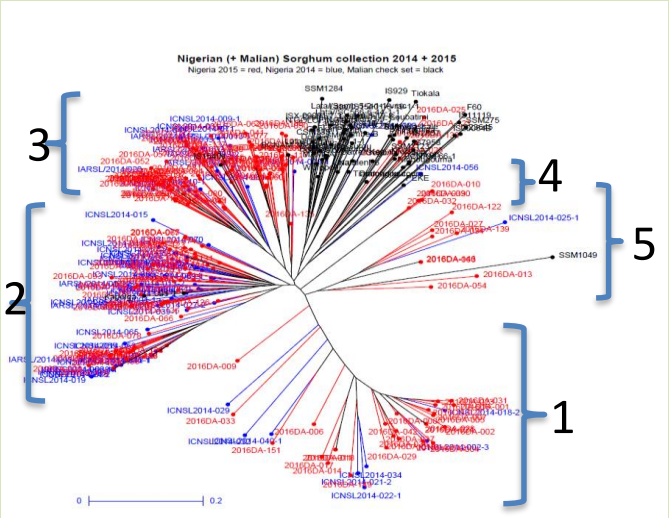

Figure1. dendrogram revealed 5 major distinct clusters

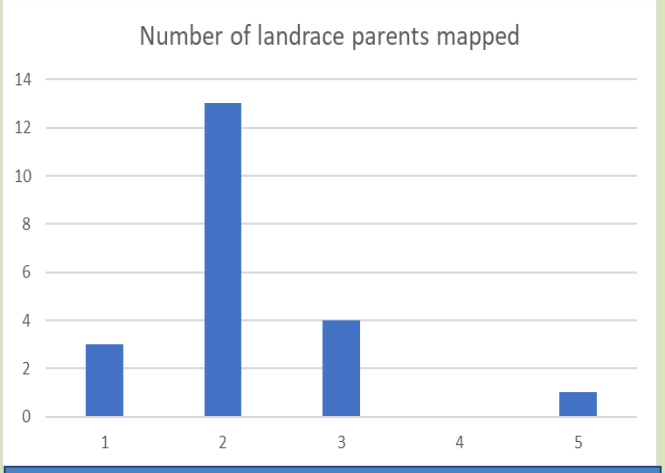

Figure2. Number of landrace parents mapped to cluster /heterotic groups

Conclusion and Recommendations

Result from this study revealed wide genetic diversity with high potential of genetic male sterility maintainers. Given that the collection areas are diverse with heterogeneous agro-ecologies, the landraces observed can be explored as potential lines with high genetic diversity and serve as important sources of novel alleles for developing hybrid parents. Furthermore, phenotypic evaluations are needed to identify possible QTLs and select suitable agronomic traits associated with the genetic markers for breeding strategies.

Suggested Readings

Andrews, D.J. 1975. Sorghum grain hybrids in Nigeria. Experimental Agriculture 11: 119–127.

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