Heterosis and Combining Abilities for Yield and Quality Traits in Forage Sorghum [*Sorghum bicolor* (L.) Moench]

[1]Mohammed I. Ahmed, [2]Awadalla A. Abdelmula,
[3]Maarouf I. Mohammed and [2]Seif Eldin M. Gasim

[1]Department of Crop Science. Faculty of Agriculture and Natural Resources. University of Bakht El Ruda. Ed-Duiem. Sudan.
[2]Department of Agronomy. Faculty of Agriculture University of Khartoum. Khartoum North. Sudan. Postal code:13314-Shambat, Sudan
[3]Shambat Research Station. Agricultural research Corporation (ARC) P.O. Box 30. Khartoum North. Sudan.

Abstract: This study was conducted to estimate the magnitude of heterosis and combining abilities (general and specific) for forage yield and quality characters of forage sorghum [*Sorghum bicolor* (L.) Moench]. Five exotic cytoplasmic male sterile lines of forage sorghum were crossed with eleven fertile local inbred lines, as testers, to produce 55 F_1-hybrids. Both parental lines and their F_1-hybrids were field-evaluated for yield and quality traits at four environments. These environments were: Shambat summer 2007, Shambat winter 2007, Ed-Duiem summer 2008 and Ed-Duiem winter 2008. The magnitudes of mid-parent (MPH%), better-parent (BPH%) and standard (STH%) heterosis were estimated. Also, Line × tester analysis was performed to estimate general (GCA) and specific (SCA) combining abilities, among parental lines as well as F_1-hybrids. The results revealed that high estimates of heterosis were determined for forage fresh and dry yields. The predominance of additive gene effect was high for forage fresh and dry yields, whereas there was predominance of non-additive gene effect for most of the quality traits. For forage fresh and dry yields, the testers exhibited higher contribution to the GCA variance than the lines. The best general combiners for forage yields were Aklamoi and Kambal among testers, and Atlas and E.Sumac among lines. Lines E.Sumac and Blue Ribbon and testers Wad Ahmed and S.42ANK were the best general combiners for forage quality traits. The highest SCA effect for Forage yield was given by the hybrid E.Sumac x Aklamoi. Therefore, based on the GCA results, it could be concluded that the most suitable parental lines for improving forage yield could be Aklamoi and Kambal among testers and E.Sumac and Atlas among lines. However, Wad Ahmed and S.42ANK from testers and E.Sumac and Blue Ribbon from lines could be the most appropriate ones for improving forage quality.