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“Bridging the gap between increasing knowledge and decreasing resources”

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

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### Abstract

This study was conducted to estimate the magnitude of combining abilities (general and specific) and heterosis 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 F1-hybrids. Both parental lines and their F1-hybrids were field-evaluated for yield and quality traits at four environments in the Sudan. These environments were: Shambat summer 2007, Shambat winter 2007, Ed-Duiem summer 2008 and Ed-Duiem winter 2008. Line  $\times$  tester analysis was performed to estimate general (GCA) and specific (SCA) combining abilities, among parental lines as well as F1-hybrids. Also, the magnitudes of mid-parents (MPH%), better-parent (BPH%) and standard (STH%) heterosis were estimated. The results revealed that the predominance of additive gene effect (GCA) was high for forage fresh and dry yields, whereas there was predominance of non-additive gene effect (SCA) 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*  $\times$  Aklamoi. High estimates of heterosis were determined for forage fresh and dry yields. Therefore, 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 the forage quality.

**Keywords:** Combining abilities, forage sorghum, heterosis, quality, traits, yield