

# Influence of male sterility inducing cytoplasm on hybrid heterosis for bioenergy traits in sweet sorghum [*Sorghum bicolor* (L.) Moench]

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## SUMMARY

Influence of male sterility inducing cytoplasm on heterosis with respect to ethanol yield and its attributing traits in sweet sorghum was studied in 48 hybrids developed by crossing six A- lines viz., ICSA 631, ICSA 731, ICSA 324, ICSA 500, ICSA 38 and ICSA 84 and their corresponding B- lines with four R- lines viz., SEREDO, ICSV 700, ICSV 111 and E 36-1 in a line × tester mating design. The 16 parents and their 48 hybrids were grown separately in contiguous blocks in single row of 3m length with 0.15 m × 0.60 m spacing in simple lattice design with two replications at the experimental plots of Gandhi Krishi Vignana Kendra (GKVK), University of Agricultural Sciences (UAS), Bangalore. Presence of an average level of heterosis for all the traits studied were evident as exemplified by significant mean squares due to parents vs. hybrids. While cytoplasmic influence was apparent for midparent heterosis under individual nuclear genetic background for all the traits, no definite trend favoring any particular cytoplasm was observed.

**Key Words :** Cytoplasmic influence, Heterosis, Male sterility inducing cytoplasm, Sweet sorghum

**How to cite this article :** Dinesh, H.B., Rao, M.R.Gururaja, Ramesh, S., Rao, A. Mohan, Naik, S.J. Satheesh and Talekar, Sidramappa (2013). Influence of male sterility inducing cytoplasm on hybrid heterosis for bioenergy traits in sweet sorghum [*Sorghum bicolor* (L.) Moench]. *Internat. J. Plant Sci.*, 8 (1) : 169-172.

**Article chronicle :** Received : 06.07.2012; Revised : 22.11.2012; Accepted : 29.11.2012

Hybrid cultivar development in sorghum has been possible due to the discovery of workable cytoplasmic nuclear male-sterility (CMS) designated as A<sub>1</sub> (milo) (Stephens and Holland, 1954). A large number of milo CMS-based sorghum hybrids have been developed and released/ marketed in India and in several other countries. Devastation of 'Texas' CMS-based maize hybrids due to southern corn leaf blight (*Bipolaris maydis*) epidemic in 1970 triggered research on assessing the response of CMS-based hybrids

identical in nuclear genetic background but differing in their maternal cytoplasm for biotic stresses and productivity traits in several crops such as grain sorghum (Ramesh *et al.* 2006), rice, (Katayama, 1978 and Viraktamath, 1987), and cotton (Gill *et al.*, 2007). There is no reported literature on the effects of male sterility inducing cytoplasm on heterosis of hybrids on bioenergy traits in sweet sorghum. In the present study, the performances of male sterile cytoplasm based hybrids were compared to those based on male sterile cytoplasm for ethanol yield and its attributing characters in sweet sorghum.

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## MATERIALS AND METHODS

The material consists of six CMS (A) lines viz., ICSA 631, ICSA 731, ICSA 324, ICSA 500, ICSA 38 and ICSA 84, their corresponding maintainer (B) lines and four restorer (R) lines viz., SEREDO, ICSV 700, ICSV 111 and E 36-1 procured from International Crops Research Institute for Semi Arid Tropics