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Impact of low temperature stress on pollen behaviour in rabi sorghum

P. Sanjana Reddy, Phani Krishna and J. V. Patil
Directorate of Sorghum Research, India

Sorghum (*Sorghum bicolor* (L.) Moench) is fifth most important cereal crop in the world with multiples uses for food, feed, fodder, fibre and fuel and is rightly considered as king of millets. One of the reasons for the low productivity levels of post rainy (*rabi*) season sorghum (*Sorghum bicolor*) in India (700 kg ha⁻¹) is non-availability of hybrids unlike rainy (*kharij*) season sorghum (1000kg ha⁻¹) where 90% of the area is covered with hybrids. Hybrids have not been successful in post rainy season as they exhibit poor seed set when the plants experience low temperatures (5 to 15°C) during night at anthesis. Systematic studies are lacking for cold stress tolerance during anthesis in rabi sorghum. Hence, a field experiment was conducted during the 2011-12 rabi season at Directorate of Sorghum Research in a three-replicated split-plot design considering dates of sowing (two dates) as main plot and genotypes (21) as subplot with an objective to determine the effect of low temperatures on the quality of pollen and seed set. The low night temperature recorded below 15oC during anthesis in the entire observation period. The 21 sorghum genotypes that included a diverse group of breeding material i.e., 8 varieties, 7 maintainer lines, 5 restorer lines and a hybrid were screened. Data were recorded for pollen viability and germinability apart from other agronomic traits and analysed using Genstat ver. 12.

Date of sowing significantly influenced pollen germinability while it interacted significantly with the genotype in influencing days to 50% flowering, open panicle grain yield and open panicle harvest index. As against pollen germinability, pollen viability is not influenced by sowing date or G×E denoting that this trait has less phenotypic plasticity and highly heritable. The maintainer lines showed comparatively poor germinability and lower grain yields than varieties and restorers. However, the loss in grain yield was about 5.7g/panicle which is comparative to the varieties though the panicle harvest index is reduced by 10%. The hybrid CSH 15R showed lower pollen germinability and viability than the other groups. Though the hybrid showed good open panicle grain yield of 82.7g/panicle, the loss in grain yield was about 22.9g. The result points towards realizing the higher grain yields in the hybrid with improvement in the pollen quality. Among the maintainer lines AKR306 recorded high germinability (94.9%) and high grain yield per selfed panicle (59.1g), B35 recorded low germinability (64.8%) and low grain yield (20.4g) while AKMS 14B showed high germinability (91.9%) and low grain yield (29.8g). These values point towards independent inheritance of these traits.

Biography

P. Sanjana Reddy has done her M.Sc. in Plant Breeding and Ph.D. in Genetics. She is a Senior Scientist in the Directorate of Sorghum Research which is affiliated to Indian Council of Agricultural Research. Earlier to this she served International Crops Research Institute for the Semi Arid Tropics for 9 years. She has more than 36 research papers and 10 book chapters to her credit.

sanjana@sorghum.res.in