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Studies on fertility restoration on A_2 cytoplasm by derived restorer lines in sorghum

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SUMMARY

An experiment was conducted to study the fertility restoration by derived restore lines selected in F_3 generation. Each selected plant was crossed with two A_2 cytoplasmic male sterile lines *viz.*, ms 750 $_2$ and ms 840 A_2. Thus, 840 selections and hybrids were prepared and planted in a single row in *kharif* 2001. Out of 840 selections, 128 exhibited completely sterile reaction, 652 selections exhibited partial fertile reaction and 60 selections exhibited fully fertile reaction.

Key words : Fertility Restoration, Cytoplasmic male sterility, Sorghum.

Sorghum is an important cereal crop of the world increasing its important as a source of food, feed and industrial raw material. All the commercial hybrids of sorghum developed to date are based on milo cytoplasm. This situation can predispose the crop for unforeseen wide spread damage in future years to come. Restoration on milo (A_1) cytoplasm is quite easy as majority of the breeding lines act as restores on this cytoplasm. However, the restoration on non-milo cytoplasm is difficult and work in this sphere is quite limited.

Kishan and Borikar (1989) reported that majority of the breeding lines from Indian programme acts as restorer for milo cytoplasm and thus, identification of suitable restorer for milo (A_1) cytoplasm is quite easy. However, the A_2, A_3 and A_4 cytoplasm appear difficult for fertility restoration. Because of these limitations A_2, A_3, A_4 and other cytoplasmic male sterile lines have not been used for commercial exploitation. Few restores available for A_2 and other cytoplasmic sources are not agronomically acceptable (Jilani, 1997) and therefore there is urgent need to upgrade the restorers for diverse cytoplasmic male sterile lines.

MATERIALS AND METHODS

The material comprised of 42 F_1's, which were obtained from three restores form A_2, A_3 and A_4 cytoplasm *viz;* IS 3667, SP 14199 and SP 23292, respectively were used as female parents and 14 A_1 (milo) restore lines *viz*; CS 3541, AKR 73, AKR 150, ICSR 89058, RS 29, C-43, PSR 23, SPV 475, HR 90006, SPV 1333, SPV 775, RS 585, SPV 892 and ICSR 77014. The selfed F_1 seed of each cross was harvested to raise F_2 population. 42 F_2 population was planted with rows of each F_2 with 3 meter length having row to row spacing 45 cm in *kharif* 2000. The set of 42 F_2 was planted in two replications to have sufficient plant population. Each treatment in each replication was represented by two rows of three meters length and spacing was 45 cm between lines and 15 cm between plants, and seeds were hand dibbled during *kharif* 2000. The recommended package of practices and plant protection measures were undertaken at the appropriate time.

Ten individual plants were selected from two replications of each entry of F_2 generation on the basis of agronomically superior character. Total 420 individual plants were selected for the further investigation of fertility restoration.

In *rabi* 2000, 420 individual cob seeds were planted in a single row of three meter length. Two individual plants were selected from each row of F_3 generation. Each selected plant was crossed with two A_2 cytoplasmic male sterile lines *viz.*, 750A_2 and 840A_2. Thus, 840 selections and hybrids were prepared.

The non-replicated trial for evaluation of fertility restoration of 840 hybrids with their respective restorer lines was laid out in *kharif* 2001. Each treatment consists of three meter length of single row and spacing was 45 cm between rows and 15 cm between plant. The recommended package of practices and plant protection measures were undertaken at appropriate time.

Prior to flowering, earheads of ten plants in each treatment were covered with brown paper bags and these plants were used for recording of observation on seed setting percentage for estimating fertility restoration. The hybrids were categorized as completely sterile, partial fertile and completely fertile based on per cent seed set

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