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HETEROSIS AND VEGETATIVE PROPAGATION STUDIES IN INTERSPECIFIC FODDER SORGHUM HYBRID

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The F_1 hybrids between CO - 27 (2n=20) and *Sorghum halepense* (2n=40) were evaluated for fodder attributes and their ability for vegetative multiplication. The heterosis study indicated that the hybrids was superior than CO-27 for fodder attributes. The vegetative propagation study indicated that the F_1 hybrids can be multiplied by stem cuttings and rooted slips.

Keywords: Fodder; Hybrid; Vegetative propagation.

Introduction

Keeping in view the importance of sorghum as a fodder crop in India, breeders have started to develop high yielding, multicut forage sorghum hybrids. In this context, wide hybridization plays a major role in the production of high yielding hybrids. Moreover, allotriploid hybrids are more vigorous than the diploid hybrids as in the case of Cumbu-Napier hybrid. So this present stydy was taken up to explore the possibilities of obtaining sterile triploid hybrids amenable for vegetative multiplication by heterosis and regeneration ability studies.

Materials and Methods

The experimental material of this sudy consisted of a fodder sorghum variety namely Co-27 (2n=20) as a female parent and *Sorghum halepense* (2n=40) as a male parent. Crossing was effected by hand emasculation technique[1]. F_1's were raised along with the parents and a check namely SSG-59-3. The biometrical observations were recorded for nine fodder attributing characters. The three kinds of heterosis were estimated and their significance was worked out as suggested by Snedecor and Cochran[2]. Two noded stem cuttings and rooted slips were taken from both the parents and the F_1 hybrids after flowering, and were planted vertically on beds. The survival percentage was worked out on 15th day after planting for showing its amenability for vegetative multiplication.

Results and Discussion

A study on the magnitude of heterosis in the F_1 hybrids is a basic requisite to assess the extent of exploitable heterosis. In this study, relative heterosis (di), heterobeltiosis (dii) and standard heterosis (diii) were considered as the criteria for the purpose of discussion (Table 2).

For days to 50 per cent flowering, the F_1 hybrid showed negative values for all the 3 types of heterosis indicating earliness of the hybrid. The hybrids recorded significant and positive relative heterosis for plant height. Similar observations were made in the interspecific fodder sorghum hybrid[3].

Regarding the number of tillers, the F_1 hybrids showed superiority over the female parent (Co-27) based on the mean performance (Table 1.) For biomass yield, the F_1 hybrids recorded significant positive relative heterosis and significant negative heterobeltiosis and standard heterosis. Heterosis for biomass yield in sorghum interspecific hybrids was reported[4].

The heterosis study of days to flowering, plant height and biomass yield indicated the possibilities of obtaining superior fodder types, even though negative heterosis for tillering and leaf L/b ratio was observed.

Table 1. Mean performance of parents and hybrid.

Character	Co-27	*S. halepense*	SSG 59-3 (check)	F_1
Days to 50 % flowering	57.9	64.3	77	60
Plant height (cm)	175	129.5	192	180.3
Number of tillers	3.9	20.9	10	8.4
Number of nodes	4.4	4.4	5.4	5.5
Number of leaves	4.8	4.2	6.5	6.1
Leaf L/B ratio	12.5	19.7	15.7	13.6
Earhead L/B ratio	2.9	1.7	1.9	3.4
Stem girth (cm)	2.8	1.8	3.1	3.5
Biomass yield (g)	260	780	693	662.3

Table 2. Mean Performance and heterosis in the F_1 hybrids.

Character	Range	Mean	heterosis (%)		
			di	dii	diii
Days to 50 % flowering	53-68	60	-1.8	3.6	-22.0**
Plant height (cm)	110.9-215	180.3	18.2**	3.0	-0.1**
Number of tillers	4-15	8.4	-32.3**	-0.6**	-0.2
Number of nodes	4-7	5.5	25.0**	25.0*	1.9
Number of leaves	5-7	6.1	35.6**	27.1*	-0.1
Leaf L/B ratio	10.5-19.3	13.6	-15.5**	-18.3**	-13.4*
Earhead L/B ratio	2.1-4.2	3.4	47.8**	15.6*	78.9*
Stem girth (cm)	2.7-4.2	3.5	52.2**	94.4	12.9
Biomass yield (g)	250-1250	662.5	27.4**	-151.1**	-4.4**

* Significant at 5% level; ** Significant at 1% level; di Relative heterosis; dii Heterobeltiosis; diii Standard heterosis

Table 3. Evaluation of F_1 hybrid for vegetative propagation

Genotype	Stem cuttings			Rooted slips		
	Planted	Regenerated	%	Planted	Regenerated	%
Co - 27	50	15	30	20	2	10
S. halepense	50	46	92	20	20	100
F_1	125	65	52	20	7	35

Table 4. Standardisation of maturity of stem for vegetative multiplication

Portion of the stem	Cuttings planted	Regenerated	% of regeneration
Lower	60	28	46
Middle	60	36	60
Upper	5	1	20

Similar heterosis for tillering was reported in the interspecific hybrids of sorghum[5].

The F_1's showed an average of 27 per cent pollen fertility and poor seed set. So it was tested for its amenability for vegetative multiplication. Vegetative propagation as a method of multiplication enables us to maintain the genetic uniformity. Vegetative propagation studies showed that the F_1's were superior than Co-27 and they were found to be inferior than *S. halepense* (Table 3) through stem cuttings (52 per cent) and rooted slips (35 per cent). Further the cuttings from the middle portion of the stem were found to be superior than the cuttings from the upper and lower portions of the stem (Table 4) for vegetative multiplication.

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