J. Phytol. Res. **11**(2) :175-177, 1998

COMPARATIVE STUDY OF SELF AND OPEN POLLINATED F_2 POPULATIONS OF FODDER SORGHUM THROUGH VARIABILITY, HERITABILITY AND GENETIC ADVANCE

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Genetic variability, heritability and genetic advance were studied in open and self pollinated F_2 populations of interspecific cross in fodder sorghum between Co-27 and *S. halepense* (2n=40). Mean variability and heritability were higher in open pollinated populations than in the self pollinated populations regarding the fodder attributes. High genetic advance was recorded for biomass yield and HCN content.

Keywords : F_2 populations ; Fodder sorghum; Genetic advance; Heritability ; Variability.

The knowledge on the genetic parameters like mean, coefficient of variation, variability and genetic advance will be helpful in the selection of superior plants in the segregating populations. The potentiability of a cross is measured not only by mean but also by the extent of variability. When mean serves as a basis for eliminating undesirable crosses or families, variability helps to choose a potential cross or population. Additional information on genetic parameters like heritability and genetic advance will help the breeder in choosing the character which can be relied upon in selection. With this objective, 20 open pollinated and 10 self pollinated F_1 earheads of sorghum were raised as F_2 families and in that various genetic parameters were estimated to perpetuate the best progeny in the best family in the segregating population in fodder sorghum.

F_1 hybrids were synthesized between Co-27 (2n=30) and *S. halepense* (2n=40). The F_1 hybrids were evalulated along with the parents. In the F_1 generation, 20 ear heads were allowed for open pollination and 10 ear heads were allowed for self pollination. Collected seeds were raised as 30 F_2 families (10 plnats/family) along with the parents.Biometrical observations were reocorded at 50% flowering.

The statistics like mean. standard error, variance and c.v. percent were calculated for both the populations as per the standared methods of Goulden[1]. Heritability in F_2 was computed according to the method of Mahmud and Kramer[2]. Genetic advance for each character was computed according to the method of Johnson *et al*[3].

The results on the c.v. percent, heritability and genetic advance are furnished in Table 1. When mean value is considered as an index of selection in fodder attributes, the

Character	No. of Plants of open pollinated individuals showing increase over self pollinated individuals	% superiority of open pollinated population over self pollinated Population.
1. No. of tillers	43	20
2. Biomass yield	11	5
3. Decrease in HCN content	9	5
4. Ratooning ability	60	30
5. Increase in crude protein	42	20

Table 1 : Estimation of genetic parameters in F_2.

S.No. Character	Mean± SE	C.V. %	Heritability	%Genetic Advances
1. Days to flowering				
O.P.	62.9 ± 3.7	2.5	48.0	3.1
S.P.	64.3 ± 3.6	2.5	47.0	3.0
2. Number of tillers				
O.P.	3.4 ± 0.3	16.4	86.0	5.0
S.P.	2.9 ± 0.6	12.4	–	–
3. Number of nodes				
O.P.	8.07 ± 0.6	4.6	45.0	0.5
S.P.	9.39 ± 0.6	1.8	41.0	0.4
4. Number of leaves				
O.P.	9.11 ± 1.1	6.9	68.0	1.3
S.P.	10.2 ± 1.1	6.4	68.0	1.3
5. Leaf L/B ratio				
O.P.	15.4 ± 2.2	11.6	59.0	2.3
S.P.	14.7 ± 1.3	9.9	66.0	–
6. Plant height (cm)				
O.P.	269.7 ± 18.5	6.3	66.0	21.5
S.P.	244 ± 15.4	5.4	52.0	14.1
7. Earhead L/B ratio				
O.P.	2.7 ± 04	5.2	84.0	0.7
S.P.	3.0 ± 0.5	4.8	89.0	0.8
8. Stem girth (cm)				
O.P.	4.4 ± 0.4	6.1	77.0	0.6
S.P.	4.7 ± 0.5	10.4	79.0	0.6
9. Biomass yield (g)				
O.P.	558 ± 235.7	31.0	92.0	387.6
S.P.	554 ± 103.1	15.0	59.2	107.1
10. Crude protein (%)				
O.P.	8.8 ± 1.1	9.8	98.0	1.9
S.P.	9.2 ± 0.8	4.8	95.0	1.3
11. HCN content (ppm)				
O.P.	91.8 ± 31.2	24.7	99.0	54.4
S.P.	83.8 ± 22.2	21.5	99.0	38.7

O.P. = Open pollinated

S.P. = Self pollinated

open pollinated population registered disirable value of mean for earliness, number of tillers, leaf l/b ratio, plant height, stem girth and biomass yield than the self pollinated populations. The superiority of the open pollinated populations over the self pollinated populations is furnished (see table on page 175).

The variability in the segregating progenies was higher for biomass yield in the open pollinated populations. But it was medium for number of tillers and HCN content in both the populations.

The present study also indicated that all the characters showed high degree of heritability in both open and self pollinated populations except for number of tillers and leaf 1/b ratio which showed negative values in the self pollinated populations.

Considering these three parameters together as a criteria for selection for fodder attributes, the open pollinated population is

preferred because it registered desired mean with high variability and heritability for traits like number of tillers, plant height, biomass yield and crude protein content.

In addition when genetic advance is considered as a criteria for comparison, both the populations registered very low degree of genetic advance for all the characters except for biomass yield and HCN content. So selection in this F_2 population will not be effective for other fodder attributes. Hence, the selection can be postponed to later generations. The later generations can be raised by making intercrosses among the segregants or allowing them for open pollination. Similar desirable increase in fodder attributes in later generations was reported[4] in sorghum sudan grass progenies.

References

1. Goulden C H 1952 *Methods of Statistical Analysis*. John Wiley and Sons, Inc., New York.
2. Mahmud I and Kramer H H 1951, *Agron. J.* **43** 605
3. Johnson H W, Robinson H F and Comstock RE 1955, *Agron. J.* **47** 477
4. Baktleit B R 1990, *Assiut. J. Agric Sci.* **21** (1) 53