



PROMISING PARENTS FOR GRAIN YIELD AND EARLY MATURITY IN POST RAINY SORGHUM

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Abstract

Three lines and eighteen testers were crossed in line \times tester fashion and the resultant 54 hybrids were evaluated along with the check for days to 50% flowering, days to maturity and grain yield per plant for combining ability analysis. The general combining ability study revealed that among the lines, the line AKRMS-80-1A and among the testers, the tester ICS-93-2-1 were found to be the good general combiners for grain yield along with earliness. This one line and one tester need to be extensively used in crossing programme for development of high yielding and early maturing *rabi* sorghum hybrids.

Key words : Sorghum, *gca*, combining ability analysis, line \times tester, randomized block design (RBD).

Introduction

Post rainy sorghum is the sorghum grown in the *rabi* sorghum. It is mostly grown on the conserved soil moisture that too receding soil moisture. The *rabi* sorghum is mostly exposed to the terminal moisture stress in which the crop at flowering and post flowering stage suffers from the soil moisture deficit. This moisture stress during flowering and grain filling stage results in drastic reduction in the productivity level of the *rabi* sorghum. There is need to develop the high yielding and early maturing hybrid in *rabi* sorghum. For this identification of the suitable parental lines having potential for earliness and high grain yield needs to be identified. In the present investigation, the promising parental lines for high grain yield and earliness were sorted out based on their general combining ability effects.

Materials and Methods

Three male sterile lines *viz.*, AKRMS-80-1 A, AKRMS-68-1 A, AKRMS-66-2 A were crossed with eighteen testers *viz.*, Rb-413-1, AKSV-178 R, (13R \times 104B \times 36074-30-3-1), Rb-304-4-1, ICS-93-2-1, Rb local-5, G-45-3-1-1, Rb-400, Rb local 6-3, AKSV-257 R, Rb local 6-4 (AKR-73 \times SPV-504), AKRb-325, *Rabi* local 5-6, AKSV-219R, (275 \times 104 \times 1204 \times Ringnix 18551 \times 89022-36-2-1-1), Rb local 3 and Rb-369-1. These twenty-one genotypes were crossed in line \times tester fashion.

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Twenty-one parents and their resulting 54 hybrids along with one standard check CSH-19R were sown at Sorghum Research Unit, Dr. P.D.K.V., Akola (M.S.), India, during *rabi* 2013-14 in randomized block design with three replications. The observations were recorded on five randomly selected plants per plot per replication for grain yield per plant (g). For days to 50% flowering and days to maturity, observations were recorded on plot basis. The data on all the above characters was subjected to combining ability analysis by following Kempthorne (1957) method.

Results and Discussion

Analysis of variance for combining ability is presented in table 1. The total variance due to hybrids was partitioned into portions attributable to lines (females), testers (males), their interaction (lines \times testers) and error sources. The components of variances attributable to lines and testers were used as a measure of general combining ability. The lines (females) recorded significant variation for day's to 50% flowering and day's to maturity. The testers (males) showed significant variation for only the character days to 50% flowering.

The estimates of general combining ability effects of the lines and testers are presented in tables 2 and 3, respectively. In sorghum, positive *gca* effects is desirable for grain yield per plant while for days to 50% flowering and days to maturity negative *gca* effects are desirable.

Table 1 : Analysis of variance for combining ability for various characters.

Source of variation	d.f.	Mean Sum of Squares		
		Days to 50% flowering	Days to maturity	Grain yield/Plant (g)
		1	2	10
Replications	2	11.58	30.82	19.68
Crosses	53	26.58	30.77	722.13**
Lines	2	180.64**	198.56**	1380.49
Testers	17	34.20*	26.54	754.80
Line × Tester	34	13.71	23.01	667.07**
Error	106	18.54	22.93	28.58

* - significant at 5% level of significance, ** - significant at 1% level of significance.

Table 2 : Estimates of general combining ability effects of lines.

Parents	Days to 50% flowering	Days to maturity	Grain yield/plant (g)
Lines (Females)			
AKRMS-80-1A	-1.90**	-1.95**	2.21*
AKRMS-68-1A	0.15	0.06	-5.78**
AKRMS-66-2A	1.74*	1.88*	3.56*
SE (gi) ±	0.58	0.65	0.72
CD at 5%	1.16	1.29	1.44
CD at 1%	1.53	1.70	1.90

* - significant at 5% level of significance, ** - significant at 1% level of significance.

Among the three lines, the line AKRMS-80-1A recorded significant and desirable *gca* effects for grain yield per plant (2.21*) as well as for days to 50% flowering (-1.90**) and days to maturity (-1.95**). Thus, the line AKRMS-80-1A was found to be suitable for developing high yielding and early maturing hybrids in *rabi* sorghum due to its positive significant *gca* effects for grain yield along with negative significant *gca* effects for days to 50% flowering and days to maturity. It is very well known that in *rabi* sorghum the crop is often exposed to the terminal moisture stress, which badly affects the yield of *rabi* sorghum. The early maturing hybrids escape this terminal drought so this line need to be extensively used in *rabi* hybridization programme for developing high yielding and early maturing hybrids.

Premalatha *et al.* (2006) also reported that negative *gca* effects for days to 50% flowering might be useful in breeding programme for earliness. Prabhakar *et al.* (2013) also identified one line SL-39B with positive significant

Table 3 : Estimates of general combining ability effects of testers.

Parents	Days to 50% flowering	Days to maturity	Grain yield/plant (g)
Testers			
Rb-413-1	3.37	2.16	-9.40**
AKSV-178R	-3.17**	-1.72**	9.46
(13R × 104B × 36074-30-3-1)	2.82	1.49	13.32*
Rb-304-4-1	0.26	0.16	-9.20**
ICS-93-2-1	-0.40**	0.38	20.73*
Rb local-5	-0.62**	-2.28**	-12.08**
G-45-3-1-1	0.82	0.60	2.52
Rb-400	-1.95**	-1.95**	-3.31**
Rb local 6-3	3.48	3.49	-8.69**
AKSV-257R	-0.51**	-0.39**	-9.78**
Rb local 6-4	-0.62**	-0.39**	2.65
(AKR-73 × SPV -504)	-2.17**	-0.84**	0.73
AKRb-325	1.37	1.04	4.74
Rabi local 5-6	-0.84**	-0.84**	8.91
AKSV-219R	-0.06**	-0.28**	1.64
(275 × 104 × 1201 × Ringini × 18551 × 89022-36-2-1-1)	-2.40**	-2.95**	-10.29**
Rb local 3	-1.06**	-0.28**	-0.49**
Rb-369-1	1.71	2.605	-1.47**
SE (gi) ±	1.43	1.59	1.78
CD at 5%	2.84	3.16	3.53
CD at 1%	3.76	4.18	4.67

* - significant at 5% level of significance, ** - significant at 1% level of significance.

gca for grain yield and negative significant *gca* for days to flowering and reported the use of this line in developing high yielding early maturing hybrids in *rabi* sorghum.

Among the testers, the tester ICS-93-2-1 exhibited positive significant *gca* effects for grain yield per plant (20.73*) along with negative *gca* effects for days to 50% flowering (-0.40**). This tester appeared to be promising for development of early maturing and high yielding *rabi* sorghum hybrids. Prabhakar *et al.* (2013) also reported the tester SLR-66 with significant desirable *gca* effects for grain yield per plant along with days to 50% flowering and reported the usefulness of this tester in developing high yielding and early maturing hybrids in *rabi* sorghum.

Thus, it was concluded from the present study that there is need to extensively use the line AKRMS 80-1A and the tester ICS-93-2-1 in the hybridization programme to develop high yielding and early maturing post rainy sorghum hybrids.

References

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