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Combing Ability Analysis and Gene Action for Seed Cotton Yield and Fibre Characters in Upland Cotton (*Gossypium hirsutum* L)

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ABSTRACT

A study was conducted with forty five intra-hirsutum hybrids along with their parents for combining ability for seed cotton yield and its component traits. The analysis of variance for combining ability revealed that, the variance due to SCA variances were higher than GCA variances for all the characters except for days to 50 % flowering and 2.5% span length indicating the predominance of non-additive gene action. The estimates of GCA effects revealed that the parents NDLH 1938 and RAH 1004 were found to be best general combiners for yield and fibre quality traits in desired direction. The crosses, NDLH 1938 × RAH 1004, L 770 × G COT 16 and NA 1325 × MCU 5 recorded high *per se* performance (241.2, 185.5 and 172.73 g) and significant positive SCA effects (60.99, 49.79 and 30.48) for seed cotton yield plant^{-1} respectively. These hybrids were also recorded high *per se* performance and significant positive SCA effects for number of bolls plant^{-1}, boll weight, lint yield plant^{-1}.

Key words: *Combining ability, Fibre quality, Gene action, Seed cotton yield.*

Cotton is an important commercial crop of India. In India, cotton is being grown over an area of 126.55 lakh ha with an annual production of 400 lakh bales (1 bale=170 kgs of lint) with a productivity of 537 kg/ha (AICCIP Annual Report, 2014-15). Hybridisation is the most potent technique for breaking yield barriers and evolving genotypes with higher yield potential. The first step in a successful breeding programme is to select appropriate parents. As combining ability forms the basis for selection of parents for hybridization, therefore, the present study was undertaken to estimate combining ability for yield and other characters, with a view to identify good combiners. Diallel analysis is useful procedure for preliminary evaluation of genotypes for use in hybridization programme.

MATERIAL AND METHODS

The present investigation was carried out by crossing the ten parents *viz.,* NDLH 1938, L 788, L 770, NA 1325, L604, SURABHI, RAH 1004, HYPS 152, MCU 5 and G COT 16 in diallel fashion without reciprocals and forty five intra-specific cross combinations were generated and the evaluation of hybrids along with parents was done at Agricultural Research Station, Jangamaheswarapuram, Guntur district, Andhra Pradesh during *kharif*, 2013-14. Each entry was represented by following 120 x 60 cm spacing with 3 rows for each entry with a row length of 6m. Recommended doses of fertilizers 120 N, 60 P_2O_5 and 40 K_2O kg/ha were applied in split doses. Observations were recorded on five randomly selected plants from each genotype per replication for the characters *viz*., plant height (cm), number of monopodia plant^{-1}, number of sympodia plant^{-1}, number of bolls plant^{-1}, boll weight (g), chlorophyll content (mg g^{-1} fresh weight), seed index (g), lint index (g), seed cotton yield plant^{-1} (g) and lint yield plant^{-1} (g). The data on days to 50% flowering, ginning out turn (%), 2.5% span length (mm), micronaire value (10^{-6}g/inch), bundle strength (g/tex), uniformity ratio and elongation (%) were recorded on plot basis. The fibre quality parameters were studied at Central Institute for Research on Cotton Technology (CIRCOT), RARS, Lam, Guntur, Andhra Pradesh by using HVT Expert 1201 high volume fibre tester instrument. The data was statistically analysedby following method 2 and model II of Griffing (1956).

RESULTS AND DISCUSSION

The analysis of variance for combining ability recorded significant differences for most of the characters (Table 1). The differences among

Table 1. Analysis of variance of combining ability for different characters in cotton.

Source of variation	d f	Days to 50% flowering	Plant height (cm)	No. of mono podia plant^{-1}	No. of sym podia plant^{-1}	No. of bolls plant^{-1}	Boll weight (g)	Chlorophyll content (mg g^{-1} fresh weight)	Seed index (g)	Lint index (g)	Ginning out turn (%)	2.5% span length (mm)	Micronaire value (10^{-6} g/inch)	Budnle strength (g/tex)	Uni formity ratio	Elon gation (%)	Seed cotton yield plant^{-1} (g)	Lint yield plant^{-1} (g)
Replications	2	2.85	36.39	0.05	2.75	16.95	0.08	0.02	0.10	0.00	0.27	3.89	0.03	1.52	2.86	0.02	159.18	21.65
Treatments	54	27.05**	151.98**	0.04**	5.77**	64.91**	0.86**	0.02**	10.97**	1.58**	25.02**	17.55**	0.87**	6.93**	14.29**	0.05**	2401.00**	343.78**
Parents	9	40.67**	147.50*	0.02	2.11*	35.63**	1.18**	0.01	9.72**	0.96**	27.86**	29.54**	0.41**	8.97**	22.14**	0.10**	1644.71**	248.60***
Hybrids	44	19.73**	155.96**	0.05**	6.19**	72.36**	0.71**	0.02**	11.46**	1.74**	24.88**	15.02**	0.98**	6.34**	11.86**	0.04**	2372.70**	351.99**
Parent Vs.Hybrids	1	226.40**	17.47	0.01	20.34**	0.90	4.84**	0.08**	0.52	0.31**	5.73*	20.64**	0.02	14.12**	50.40**	0.10**	10452.58**	838.86**
Error	108	0.98	63.37	0.02	0.97	6.99	0.07	0.01	0.17	0.01	0.88	2.25	0.02	0.62	1.86	0.01	278.28	29.52
Total	164	9.58	92.21	0.03	2.57	26.18	0.33	0.01	3.72	0.52	8.82	7.30	0.29	2.70	5.96	0.023	975.77	132.89
GCA	9	41.41**	63.74**	0.014	5.16**	51.32**	0.50**	0.01**	8.70**	0.95**	24.96**	26.06**	0.54**	7.88**	11.37**	0.023**	2033.93**	249.34**
SCA	45	2.53**	48.04**	0.015*	1.27**	15.70**	0.24**	0.005**	2.64**	0.44**	5.01**	1.80**	0.24**	1.19**	3.44**	0.016**	553.61**	87.64**
Error	108	0.32	21.12	0.008	0.32	2.33	0.02	0.003	0.05	0.003	0.29	0.74	0.005	0.20	0.61	0.003	92.75	9.83

**Significant at 1% level * Significant at 5% level

Table 2. General combining ability effects of ten parents for yield and yield components in cotton.

Parent	Days to 50% flowering	Plant height (cm)	No. of mono podia plant^{-1}	No. of sym podia plant^{-1}	No. of bolls plant^{-1}	Boll weight (g)	Chlorophyll content (mg g^{-1} fresh weight)	Seed index (g)	Lint index (g)	Ginning out turn (%)	2.5% span length (mm)	Micronaire value (10^{-6} g/inch)	Budnle strength (g/tex)	Uni formity ratio	Elon gation (%)	Seed cotton yield plant^{-1} (g)	Lint yield plant^{-1} (g)
NDLH 1938	-0.06	3.24*	-0.02	1.17**	4.10**	0.45**	-0.04**	1.37**	0.31**	-1.54**	-1.35**	0.44**	-0.35**	0.87**	0.03*	31.60**	8.88**
L 788	0.75**	0.78	-0.05	0.32*	-0.81	0.08	-0.03*	1.41**	0.33**	-1.92**	-0.93**	0.10**	-0.37**	0.36	-0.06**	0.24	-2.96**
L 770	-2.06**	-2.06	-0.05*	-0.03	-1.06*	0.04	0.01	-0.23**	0.05**	1.54**	-0.12	-0.19**	-0.09	-1.15**	0	-2.16	1.28
NA 1325	-2.36**	-1.95	-0.02	-0.48**	-2.74**	0.17**	-0.03	0.17**	0.28**	0.73**	-1.78**	0	-1.18**	0.81**	-0.05**	-4.87	-0.77
L 604	-1.92**	0.5	0.03	-0.23	-2.04**	-0.20**	0.01	-0.40**	-0.39**	-0.98**	0.63**	-0.05**	0.24	-0.54*	-0.03*	-18.28**	-7.03**
SURABHI	-1.08**	2.25	0.03	0.45**	-1.23**	-0.13**	0	-0.78**	-0.44**	-0.13	1.46**	-0.26**	0.96**	-0.4	0.04**	-8.50**	-3.81**
RAH 1004	0.47**	0.84	0.01	0.69**	2.18**	-0.18**	-0.01	-0.51**	0.17**	1.78**	-2.21**	0.26**	-1.28**	1.90**	0.06**	3.39	4.36**
HYPS 152	0.81**	-0.04	0.03	-0.99**	1.37**	-0.03	0.04**	-0.88**	-0.16**	1.62**	1.47**	-0.03	0.37**	-0.97**	-0.01	4.49	3.02**
MCU 5	3.00**	1.08	0.04	-0.33*	0.35	0.03	0.02	0.54**	-0.01	-1.64**	1.28**	-0.12**	0.72**	-0.84**	-0.03*	1.67	-2.08*
GCOT 16	2.44**	-4.64**	-0.01	-0.60**	-0.11	-0.22**	0.04**	-0.70**	-0.15**	0.52**	1.56**	-0.13**	1.00**	-0.05	0.05**	-7.59**	-0.89
SE (gi)	0.156	1.258	0.024	0.156	0.418	0.042	0.014	0.065	0.014	0.148	0.237	0.020	0.124	0.215	0.014	2.637	0.859

**Significant at 1% level * Significant at 5% level

Table 3. Specific combining ability effects of 45 hybrids of cotton for for yield and fibre quality components in cotton.

HYBRIDS	Days to 50 % flowering	Plant height (cm)	No. of mono podia plant^{-1}	No. of sym podia plant^{-1}	No. of bolls plant^{-1}	Boll weight (g)	Chlorophyll content (mg g^{-1} fresh weight)	Seed index (g)	Lint index (g)	Ginning out turn (%)	2.5% span length (mm)	Micronaire value (10^{-6} g/inch)	Budnle strength (g/tex)	Uni formity ratio	Elon gation (%)	Seed cotton yield plant^{-1} (g)	Lint yield plant^{-1} (g)
NDLH 1938 × L 788	0.12	15.25**	0.03	0.95	1.55	0.44**	0.03	-0.17	0.88**	4.34**	-0.45	0.36**	0.62	-3.20**	0.03	24.82**	13.89**
NDLH 1938 × L 770	-1.07*	0.75	0.02	-0.44	1.47	-0.33*	-0.03	0.35	0.06	-1.32*	0.37	0.27**	0.37	-3.01**	0.11*	-4.26	-4.56
NDLH 1938 × NA 1325	-1.10*	-2.79	-0.03	1.21*	0.81	-0.24	-0.04	-0.37	-0.21**	-0.03	0.2	0.19**	-0.2	-0.21	0.02	-3.58	-2.3
NDLH 1938 × L 604	-1.88**	-9.67*	0.06	-0.04	-1.95	0.34*	-0.03	1.44**	0.66**	0.07	0.96	-0.27**	0.27	1.83*	-0.15**	7.22	0.51
NDLH 1938 × SURABHI	-2.38**	-10.43*	-0.07	-0.78	3.51*	0.17	0.02	0.54*	-0.16**	-2.21**	-0.79	0.44**	-0.13	0.53	0.01	22.66*	2.4
NDLH 1938 × RAH 1004	0.73	-9.95*	-0.15	0.38	13.62**	0.02	-0.15**	-0.24	0.06	0.81	-0.5	0.30**	-0.26	1.36	0.07	60.97**	20.40**
NDLH 1938 × HYPS 152	-0.6	-2.14	-0.08	-0.08	-3.29*	0.33*	0.08	-0.76**	-0.44**	-0.82	0.99	-0.32**	0.65	-2.13**	-0.06	-0.12	-1.89
NDLH 1938 × MCU 5	-0.46	1.54	0.15	1.26*	-3.74*	-0.52**	-0.04	0.28	-0.35**	-1.53**	1.23	0.28**	-0.16	-0.09	-0.03	-31.33**	-13.31**
NDLH 1938 × G COT 16	-0.57	1.33	0.04	-1.20*	-3.41*	-0.15	-0.06	2.65**	0.56**	-2.39**	0.81	-0.56**	1.51**	-1.76*	-0.05	-18.84*	-11.66**
L 788 × L 770	-1.88**	-1.76	-0.04	-0.72	-0.83	0.22	0.02	3.57**	0.41**	-5.00**	-0.01	0.65**	1.24**	1.54*	0.08	2.97	-5.96*
L 788 × NA 1325	-1.57**	-2.4	-0.07	0.73	-4.62**	-0.02	-0.01	0.94**	-0.09	-1.69**	1.29	-0.35**	-0.6	-2.18**	-0.07	-21.37*	-8.61**
L 788 × L 604	-1.68**	-7.18	0.08	-0.05	1.02	0.19	-0.03	1.97**	1.70**	3.53**	-0.25	0.31**	0.95*	-0.34	0.20**	13.71	8.78**
L 788 × SURABHI	-1.52**	-5.33	-0.15	1.33*	1.95	-0.98**	0	-0.77**	-0.28**	0.45	-0.6	-0.57**	-0.54	-0.15	-0.12*	-26.59**	-7.02*
L 788 × RAH 1004	0.6	6.31	0.04	0.3	0.93	0.26	-0.07	-0.02	-0.27**	-0.77	1.35	0.73**	0.57	-1.31	-0.06	11.51	1.67
L 788 × HYPS 152	0.6	-10.34*	0.04	-1.16*	4.41**	0.25	0	-1.00**	-0.46**	0	-1.52	-0.41**	-1.10*	-1.48*	0.05	26.64**	9.23**
L 788 × MCU 5	0.07	-4.36	-0.13	-0.62	-1.96	0.39*	-0.08	-1.10**	-0.77**	-0.56	-0.11	-0.56**	-0.57	-1.54*	-0.02	4.37	0.67
L 788 × G COT 16	0.62	-0.88	0.07	-0.22	-6.71**	-0.07	0.05	-2.91**	-1.46**	0.14	0.45	-1.14**	0.91*	2.23**	-0.08	-28.79**	-9.98**
L 770 × NA 1325	-0.1	4.04	0	1.35*	-1.57	-0.12	-0.02	-1.72**	-0.24**	3.08**	0.05	-0.45**	0.6	1.82*	0.06	-11.29	-0.84
L 770 × L 604	0.79	3.36	0.12	1.03	8.14**	-0.18	0.1	-2.28**	-1.44**	-1.76**	1.66*	-0.36**	0.68	-0.62	-0.08	27.82**	14.28**
L 770 × SURABHI	-0.04	7.47	-0.05	0.68	-2.4	-0.27	0.02	-1.84**	-0.28**	3.39**	-1.23	-0.21**	-2.28**	0.82	-0.34**	-18.16*	-2.44
L 770 × RAH 1004	0.07	-8.45	-0.02	-2.28**	-4.42**	-0.13	0.12*	-2.31**	-0.80**	2.86**	0.65	-0.83**	0.36	-2.81**	-0.15**	-22.25*	-6.09*
L 770 × HYPS 152	-1.93**	-9.41*	0.03	-0.48	-3.27*	0.39*	0.01	-0.25	0.50**	2.44**	0.73	0.53**	0.46	2.32**	0.05	-1.4	3.11

**Significant at 1% level *Significant at 5% level

Table 3. cont...

Days to 50% flowering	Plant height (cm)	No. of mono podia plant^{-1}	No. of sympodia plant^{-1}	No. of bolls plant^{-1}	Boll weight (g)	Chlorophyll content (mg g^{-1} fresh weight)	Seed index (g)	Lint index (g)	Ginning out turn (%)	2.5% span length (mm)	Micronaire value (10^{-6} g/inch)	Budnle strength (g/tex)	Uni formity ratio	Elon gation (%)	Seed cotton yield plant^{-1} (g)	Lint yield plant^{-1} (g)
-1.46**	-0.59	--0.05	-0.54	0.49	-0.17	0	-1.33**	-0.59**	-0.17	2.00*	-0.19**	-1.31**	0.16	0.13*	-3.34	-1.4
-0.24	-3.11	0.06	-1.20*	2.47	1.13**	0.07	1.73**	1.08**	0.46	-1.38	-0.19**	-0.57	0.56	-0.15**	49.79**	16.82**
0.43	1.82	0.09	-1.92**	2.17	-0.09	0.06	-0.69**	-0.35**	0.23	-1.47	0.44**	-0.90*	-1.65*	0.01	9.26	2.53
0.26	-11.17*	-0.08	-2.13**	2.54	-0.66**	0.11*	-0.31	-0.48**	-1.63**	-0.26	-0.04	1.04*	2.68**	0.06	-12.22	-5.6
-1.63**	-3.43	-0.03	-1.63**	-2.88*	0.28	-0.05	3.59**	1.00**	-3.08**	1.91*	0.12	0.81	0.84	-0.11*	-3.71	-6.66*
-1.29*	9.35*	-0.02	0.44	4.01**	0.27	0.10*	2.64**	1.11**	-1.25*	0.4	0.1	0.79	-0.45	0.06	26.98**	7.89**
-0.15	7.6	-0.09	0.65	0.03	0.94**	-0.02	0.46*	0.25**	0.67	-0.2	-0.17*	-1.54**	-1.24	-0.15**	30.48**	10.88**
0.07	8.25	0.1	-0.55	1.82	0.58**	0.04	0.52*	-0.04	-0.8	0.8	0.15*	0.59	-0.98	0.05	26.38**	6.34*
-0.18	13.65**	-0.13	-1.38*	1.58	-0.27	-0.06	0.94**	0.72**	1.15*	0.86	0.23**	1.94**	2.52**	0.18**	1.28	1.76
-1.07*	3.93	0.02	0.65	-2.24	0.40**	0.08	0.38	0.11*	-0.02	0.02	0.02	-0.07	-0.3	0.08	7.51	0.64
0.26	10.01*	-0.20*	-0.48	0.44	-0.31*	-0.01	0.4	-0.56**	-4.50**	-0.21	0.16*	-0.64	-0.4	0.11*	-4.99	-7.30*
-0.27	-5.65	-0.02	-0.2	-7.60**	0.49**	0.05	-0.77**	-0.24**	0.84	-0.18	-0.09	-0.05	0.87	-0.05	-12.01	-2.84
-0.38	-0.26	0.01	0.33	-4.61**	-0.34*	0.03	-1.19**	-0.83**	-1.12*	1.97*	-0.03	0.7	-1.79*	0.10*	-21.55*	-9.76**
-0.57	1.77	0.01	1.44**	-4.31**	-0.40**	0.12*	0.01	0.25**	1.64**	3.11***	-0.52**	1.82**	-1.57*	0.11*	-29.71**	-9.29**
0.1	8.05	0.57**	0.31	-3.36*	0.96**	-0.03	0.26	0.27**	0.53	0.68	-0.23**	1.78**	-2.10**	-0.06	16.03	7.20*
0.57	-1.4	0	-1.55**	2.52	0.15	0.07	0.84**	-0.31**	-3.43**	-0.2	-0.01	-1.53**	-0.6	-0.16**	15.15	0.52
0.46	-5.95	-0.09	-0.48	-0.35	0.16	-0.08	-0.43	-0.44**	-0.91	0.16	0.16*	0.3	-2.01**	0.01	3.38	-0.75
-2.13**	-0.3	0.16	0.35	2.22	0.23	-0.04	0.29	-0.43**	-2.65**	-2.20**	1.08**	-0.46	3.10**	0.14**	16.42	1.4
-0.65	7.61	-0.05	-0.45	0.71	0.56**	0.07	-1.34**	-0.01	4.14**	-2.61**	-0.03	-0.69	-1.72*	-0.11*	23.11*	13.52**
-0.43	2.46	0	1.22*	4.36**	0.12	0.03	-3.16**	-0.04	2.07**	-3.21**	1.02**	-2.05**	1.51*	-0.14**	17.97*	23.43**
-0.65	3.59	-0.07	-0.44	-0.28	-0.30*	0.08	-0.05	-0.15**	-0.57	1.49	0	1.06*	1.50*	0.04	-10.6	-3.88
-1.43**	-6.36	-0.19*	-1.70**	-0.82	-0.27	0	0.58*	0.45**	1.20*	0.34	-0.30**	-1.45**	-1.66*	-0.19**	-11.77	-3.67
-1.29*	-1.74	0.01	0.63	3.40*	0.18	-0.06	1.79**	0.74**	0.21	-0.5	0.06	0.66	-0.62	0.02	20.29*	5.77
0.527	4.233	0.083	0.524	1.406	0.144	0.049		0.049	0.499	0.797	0.067	0.419	0.724	0.047	8.871	2.889

**Significant at 1% level *Significant at 5% level

Table 4. Estimates of GCA and SCA variances for yield and yield components in cotton.

Source	Location	Days to 50 % flowering	Plant height (cm)	No. of monopodia plant^{-1}	No. of sympodia plant^{-1}	No. of bolls plant^{-1}	Boll weight (g)	Chlorophyll content (mg g^{-1} fresh weight)	Seed index (g)
σ^2 GCA	ARS, J M Puram	3.42	3.55	0.00	0.40	4.08	0.04	0.00	0.72
σ^2 SCA	ARS, J M Puram	2.21	26.92	0.01	0.95	13.37	0.22	0.00	2.59
σ^2 GCA/ σ^2SCA	ARS, J M Puram	1.55	0.13	0.06	0.42	0.31	0.18	0.23	0.28

Table 4. cont.....

Lint index (g)	Ginning out turn (%)	2.5% span length (mm)	Micronaire value (10^{-6} g/inch)	Budnle strength (g/tex)	Uniformity ratio	Elongation (%)	Seed cotton yield plant^{-1} (g)	Lint yield plant^{-1} (g)
0.08	2.06	2.11	0.04	0.64	0.90	0.00	161.76	19.96
0.44	4.72	1.06	0.23	0.99	2.82	0.01	460.85	77.80
0.18	0.44	2.00	0.19	0.65	0.32	0.12	0.35	0.26

the parents and hybrids were significant for all the characters except for number of monopodia plant^{-1} and chlorophyll content for parents. Where as the differences among the parents vs hybrids were significant for all the characters except plant height, number of monopodia plant^{-1}, number of bolls plant^{-1}, seed index and micronaire value. The analysis of variance for combining ability revealed that, the variance due to SCA variances were higher than GCA variances for all the characters except for days to 50 % flowering and 2.5% span length indicating the predominance of non-additive gene action for all characters and additive gene action for days to 50 % flowering and 2.5% span length. The results regarding significant GCA and SCA effects are in conformity with those of Ahuja and Dhayal (2007).

General combining ability effects of parents and specific combining ability effects of crosses were estimated and presented in Tables 2 to 3 respectively. The estimates of GCA and SCA variances were presented in Table 4.

The GCA effects from the analysis revealed that none of the parent recorded significant GCA effects for all the characters studied. Among the parents NDLH 1938 showed significant positive GCA effects for plant height, number of sympodia plant^{-1}, number of bolls plant^{-1}, boll weight, seed index, lint index, micronaire value, uniformity ratio, elongation, seed cotton yield plant^{-1} and lint yield plant^{-1}. It can be extensively used as parent in the breeding programme. The parent RAH 1004 showed significant positive GCA effects for days to 50% flowering, number of sympodia plant^{-1}, number of bolls plant^{-1}, ginning out turn, micronaire value, uniformity ratio, elongation and lint yield plant^{-1}. The results regarding significant GCA effects are in confirmity with those of Tuteja and Manju Banga (2013) and Deosarkar et al. (2014).

The hybrids shown the highest significant positive SCA effects for various characters were L 770 × L 604 (0.79) for days to 50 % flowering, NDLH 1938 × L 788 (15.25) for plant height, SURABHI × HYPS 152 (0.57) for number of monopodia plant^{-1}, SURABHI × RAH 1004 (1.44) for number of sympodia plant^{-1}, NDLH 1938 × RAH 1004 (13.62) for number of bolls plant^{-1}, L 770 × G COT 16 (1.13) for boll weight, HYPS 152 × G COT 16 (0.04) for chlorophyll contenet NA 1325 × RAH 1004 (3.59) for seed index, L 788 × L 604 (1.70) for lint index, NDLH 1938 × L 788 (4.34) for ginning out turn, SURABHI × RAH 1004 (3.11) for 2.5 % span length, RAH 1004 × HYPS 152 (1.08) for micronaire value, L 604 × SURABHI (1.94) for bundle strength, RAH 1004 × HYPS 152 (3.10) for uniformity ratio, L 788 × L 604 (0.20) for

elongation, NDLH 1938 × RAH 1004 (60.99) for seed cotton yield plant^{-1} and RAH 1004 × G COT 16 (23.43) lint yield plant^{-1}. The crosses between high × low or low × high general combiners resulted in superior cross combinations due to complementary gene action which has arisen out of both additive and non-additive gene action. These crosses may likely throw superior trangressive segregants. These components may be exploited by adopting breeding procedures like cyclic hybridization, biparental mating and diallel selective mating system.

The cross, NDLH 1938 × RAH 1004 recorded the highest SCA effect for seed cotton yield plant^{-1}(60.99), followed by L 770 × G COT 16 (49.79) and NA 1325 × MCU 5 (30.48).

The hybrid NDLH 1938 × RAH 1004 also showed significant SCA effects for number of bolls plant^{-1} (13.62), micronaire value (0.30) and lint yield plant^{-1} (20.40) in the desired direction. This hybrid recorded the highest seed cotton yield plant^{-1} (241.42 g). The high seed cotton yield combination (high x high) might be attributed due to interaction between positive alleles in the good combiners. The cross L 770 × G COT 16 showed significant positive SCA effects also for boll weight (1.13), Seed index (1.73), lint index (1.08) and lint yield plant^{-1} (16.82) with seed cotton yield plant^{-1} (185.5 g). The hybrid NA 1325 × MCU 5 also showed significant SCA effects for boll weight (0.94), Seed index (0.46), lint index (0.25) and lint yield plant^{-1} (10.88) with seed cotton yield plant^{-1} (172.73 g). Similar results were earlier reported by Senthil Kumar *et al* (2013) and Rajamani *et al*. (2014).

The cross combinations involving high × high general combiners produce crosses with significant SCA effect indicating the role of additive and additive × additive genetic component of variance which could be easily improved through simple selection procedures.

It can be concluded that the choice of the parents for crossing programme should be based not only on the *per se* performance and GCA effects but also on SCA effects of the cross combinations. Parents with good individual performance and good GCA effects may not nick well, on the other hand parents with poor GCA effect may nick well in combination due to complementary gene action.

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