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EVALUATION OF SOME COTTON GENOTYPES ON THE BASIS OF COMBINING ABILITY IN A DIALLEL CROSS

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ABSTRACT

Combining ability analysis in a 13 x 13 diallel cross involving nine tall and four dwarf cotton genotypes revealed that additive genetic variance played an important role in controlling yield and quality. Four tall parents, PH-93, NH-210, suman and LRA-5166 were good general combiners for seed cotton yield, boll number, boll size and seed index. Among the dwarf genotypes, NH-262(a) and 081 were good general combiners for halo length and ginning out turn respectively. Six crosses involving tall x dwarf parents, four of tall x tall and one of dwarf x dwarf had high sca effects worthy of further exploitation.

Combining ability analysis was attempted in a 13 x 13 diallel cross involving some tall and dwarf genotypes with a view to identify better cross combinations for improving yield and quality characters and develop early maturing highly productive dwarf genotypes of **G. hirsutum.**

MATERIALS AND METHODS

Thirteen genotypes viz., PH-44, NH-352, suman, Purnima, NH-210, LRA-5166, PH-93, Athens-1 MCU-5 (Tall parents) and Cul-1412, 081, NH-262(a), NH-262(b) (dwarf, compact genotypes) were crossed in a diallel fashion excluding reciprocals. Thirteen parents and 78 F1 were sown in a randomised block design with two replications at Cotton Research Station farm during 1986-87 kharif season. Each genotype was represented by a single row consisting of 15 dibbles spaced at 60 cm in rows 60 cm apart. Recommended agronomic practices were adopted for maintaining good crop growth. Field observations were recorded on 5 plants in each plot. Boll weight was recorded on the basis of 20 bolls randomly picked from each plot. Post harvest observations viz., seed index, ginning outturn, halo length were estimated using procedures outlined by Santhanam, (1967). Combining ability analysis was made according to model-1, method-2 of Griffing (1956).

RESULTS AND DISCUSSION

Analysis of variance for combining ability (Table-1) revealed significance of both general and specific combining ability effects in expression of all the characters

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studied. However, gca variance was predominant as revealed by high gca: sca variance ratio for all the traits. This indicated that additive genetic variance played an important role in controlling yield and quality traits in cotton, particularly in the material under study. Importance of additive gene action in control of the economic characters was also emphasised by Patil and Chopde, (1983). The study indicated that significant improvement in yield and quality can be effected by following simple selection procedures like mass and pedigree selection in this material. Also, intermating among desirable segregates in early generation of potential crosses may help to mop up residual variability and breaking of undesirable linkages as found in yield and halo length, halo length and ginning outturn, boll number and boll size etc.

Estimates of general combining ability effects (Table-2) indicated that four tall parents viz., PH-93, NH-210, Suman and LRA-5166 were found to be best general combiners for seed cotton yield and its component characters viz. boll number per plant, boll size and seed index. None of the dwarf parents were found as good general combiners for yield and yield components. PH-44, NH-352, PH-93 and Purnima among tall parents exhibited good gca effects for ginning outtrun whereas among dwarfs PKV-081 combined well for ginning outturn. MCU-5, Suman and LRA-5166 showed significant gca effects for halo length. NH-262(a) among dwarf parents, was the only good general combiner for halo length. None of the strains depicted significant gca effects for both ginning outturn as well as halo length.

Per se performance of the parents in general gave good index of their general combining ability for seed cotton yield, boll size, seed index and halo length. Further, the study revealed that high and significant gca effects for seed cotton yield resulted from combined effects of yield components viz., boll number, boll size and seed index which indicated that these three components were important in determining the seed cotton yield and selection may be made on the basis of these characters.

Thirty four crosses out of 78 studied showed positive sca effects for yield. Perusal of sca effects (Table-3) revealed that most of the crosses involving tall and dwarf parents indicated high sca effects for yield. Notable among them were PH-44 x Cul-1412, PH-93 x 081, PH-93 x 262(b), NH-210 x 081, NH-210 X NH262(a), Suman x Cul-1412, these crosses recorded positive sca effects for either one, two or three of the yield components viz., boll number, boll size and seed index.

Among tall x tall crosses, NH-352 x LRA-5166, NH-210 x Purnima, Purnima x NH-258 and LRA-5166 x MCU-5 were found to be better specific combiners for yield. The cross, cul-1412 x NH-262(a) involving dwarf x dwarf parents recorded better sca effects. However, from the point of exploiting the crosses for isolating high yielding genotypes with desirable plant type (semi dwarf, compact, open) only few crosses viz., PH-93 x 081, PH-93 x NH-262(b), NH-210 x 081, NH-210 x NH-262(a) and Suman x Cul-1412 which involved one of their parents having better general combining ability. The crosses NH-210 x Purnima, Purnima x NH-258, and PH-93 x 081 could be exploited for simultaneous improvement of yield and ginning outturn whereas NH-352 x LRA-5166, LRA-5166 x MCU-5, Suman x Cul-1412 for improvement in yield and halo length. High sca effects in dwarf x dwarf cross, Cul-1412 x NH-262(a) might have resulted from favorable interaction (epistatic effects) of genes and high heterosis exhibited by this cross having dwarf, compact plant type could be exploited with proper agronomic manipulation.

Table 1: Analysis of variance for combining ability for yield and its components.

Source	d.f.	Seed cotton Yield/plant	Boll number	Boll weight	Seed Index	Ginning Outturn	Halo length
Gca	12	836.34**	26.01**	0.78**	5.73**	11.23**	4.26**
Sca	78	94.98**	8.62**	0.19**	0.56**	0.73**	0.69**
Error	90	3.47	3.97	0.05	0.20	0.26	0.42
Gca/Sca		8.80	3.02	4.10	10.23	15.38	10.16

Table 2: Estimates of general combining ability effects of parents in a 13x13 diallel cross.

Parent	gca effects					
	Seed cotton yield/ plant (g)	Boll number /plant	Weight/ boll (g)	Seed Index	Ginning outturn (%)	Halo length (mm)
Ph-44	-4.98* (21.56)	-0.63 (14.9)	-0.06 (2.50)	-0.33** (7.75)	0.67** (35.5)	0.16 (27.8)
NH-352	-5.51** (32.62)	-1.18* (8.1)	-0.31** (2.60)	-0.16 (6.30)	0.83** (35.5)	-0.55** (26.6)
PH-23	5.52** (36.85)	0.43 (14.1)	0.134* (3.35)	0.14 (8.00)	0.96** (36.75)	0.18 (28.1)
NH-210	5.97** (41.5)	1.07* (11.0)	0.275** (3.40)	0.96** (8.7)	-0.22 (32.8)	-0.20 (26.2)
Suman	17.81** (75.3)	3.12** (19.2)	4.69** (3.85)	0.79** (8.75)	0.16 (35.3)	0.74** (28.3)
081	-5.04** (18.4)	-0.95 (9.0)	0.006 (2.90)	-0.55** (6.2)	0.45** (35.1)	0.27 (26.6)
Pumima	-4.39* (21.5)	-0.66 (11.6)	-0.073 (2.65)	-0.15 (6.65)	0.64** (35.5)	-0.39* (25.5)
NH-262(b)	-7.47** (19.7)	-0.67 (9.6)	-0.29** (2.70)	-0.94** (5.95)	-0.21 (34.8)	-0.28 (26.3)
LRA-5166	9.00** (32.7)	1.38** (9.2)	0.198** (3.41)	0.48** (7.3)	-0.20 (33.5)	0.49** (27.3)
MCU-5	-4.95* (27.1)	-1.64**(10.1)	0.127* (3.20)	0.38** (8.35)	-021 (32.8)	1.07** (30.2)
Cul-1412	-2.93 (22.6)	-0.27 (8.6)	-0.07 (2.50)	-0.24* (7.05)	0.23 (36.6)	-0.46** (25.5)
Athens-1	0.872 (41.0)	-0.74 (11.5)	0.156** (3.85)	0.59** (8.55)	-0.22** (34.0)	0.03 (26.1)
NH-262(s)	-3.878* (18.5)	0.77 (11.8)	-0.394** (2.10)	-0.95** (5.10)	0.22 (35.5)	0.73** (25.7)
SE+	1.67	0.49	0.06	0.1106	0.1264	0.167

(Figures in parentheses indicate *per se* value)

Table 3: Estimates of specific combining ability effects for different characters

Cross	Seed cotton yield	Boll Number	Boll Weight	Seed Index	Ginning Out turn	Halo Length
1	2	3	4	5	6	7
PH-44 x NH-352	9.37	2.23	0.98	0.61	-1.25	0.04
PH-44 x Suman	7.71	-1.97	0.19	0.36	0.42	1.09
PH-44 x NH-239	5.49	-1.38	-0.27	-0.75	-0.70	-0.63
PH-44 x Cul-1412	10.59	-0.18	0.28	-0.36	-0.14	0.05
PH-44 x NH-210	3.89	3.38	0.39	-0.41	0.96	-0.01
PH-44 x LRA-5166	2.36	2.57	-0.28	0.22	0.83	0.69
NH-352 x Suman	3.64	4.28	0.14	0.10	1.01	-0.47
NH-352 x Pumima	4.29	-1.04	-0.41	1.18	-0.21	0.66

NII-352 x LRA-5166	14.91	0.41	0.41	0.02	0.28	0.28
NII-352 x Cul-1412	5.97	3.07	0.28	0.58	0.74	-0.37
PII-93 x 081	17.24	2.34	0.11	0.39	1.10	0.17
PII-93 x Pumima	2.3	0.05	-0.07	0.43	-0.59	0.73
PII-93 x NII-262 (b)	10.57	3.26	0.13	-0.23	0.79	-0.78
PII-93 x LRA-5166	2.47	-0.90	-0.14	0.36	-0.61	0.15
PII-93 x NH-258	1.72	-1.57	1.20	0.26	0.38	-0.38
NII-210 x 081	21.82	4.00	-0.03	0.50	0.37	1.25
NH-210 x Pumima	11.91	2.01	0.64	0.66	-1.1	0.41
NH-210 x NH-262(b)	3.07	2.02	-0.49	0.80	-0.79	0.29
NH-210 x LRA-5166	4.44	-0.44	-0.03	-0.47	-0.24	0.47
NII-210 x NH-262(a)	17.94	8.07	-0.54	0.22	0.16	-0.25
Suman x Pumima	4.31	-0.34	-0.13	-0.17	0.51	1.05
Suman x NH-262(b)	8.6	1.37	0.57	-0.28	-0.12	0.44
Suman x Cul-1412	13.23	4.97	0.10	-0.57	0.61	-0.68
Suman x NH-258	3.64	0.84	0.40	0.10	-0.07	0.92
081 x LRA-5166	15.4	2.99	0.10	0.90	0.15	-0.06
Pumima x LRA-5166	6.10	3.50	0.72	0.34	-0.29	0.12
Pumima x NH-258	11.14	-0.07	0.06	1.29	0.95	0.19
NH-262(b) x MCU-5	7.23	2.03	0.61	-0.22	-0.03	0.03
NH-262(b) x Cul-1412	2.74	0.46	-0.09	0.40	0.41	0.47
NII-262(b) x NII-258	2.56	1.84	-0.37	0.28	-0.62	0.78
LRA-5166 x MCU-5	15.75	-0.42	0.27	2.16	-0.23	0.25
LRA-5166 x NH-262(b)	7.59	4.26	-0.31	0.30	0.73	-0.34
MCU-5 x NH-258	5.82	1.5	-0.14	0.46	0.26	0.82
Cul-1412 x NH-262(a)	17.8	3.42	-0.72	0.47	1.16	0.81
SE+	0.49	0.4511	0.05	0.12	0.13	0.17

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SVPR.1 - A NEW HIGH YIELDING WHITE SEEDED SESAME (SESAMUM INDICUM L)

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ABSTRACT

A high yielding short duration (75-80 days) white seeded sesame variety SVPR.1 has been released for general cultivation in southern districts of Tamil Nadu. This is an unit selection from the western ghat type and superior to TMV.3 and TMV.4 in yield and

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