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COMBINING ABILITY STUDIES FOR DEVELOPMENT OF NEW HYBRIDS IN CHILLI OVER ENVIRONMENTS

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ABSTRACT
Combining ability study on chilli yield and its components from line x tester analysis over the locations of six lines and five testers revealed higher SCA variance than GCA variance for all the traits except plant spread, fruit length, fruit diameter, average dry fruit weight, dry fruit recovery and seed weight indicating the prevalence of non-additive gene action. The lines LCA 764 and LCA 704 and testers LCA 315 and LCA 703 were the good general combiners for yield and its majority of the traits. The hybrids LCA 764 x LCA 315, LCA 704 x LCA 315, LCA 625 x LCA 706, LCA 710 x LCA 706 and LCA 718 x G4 were identified as potential one for yield and desired traits based on *sca* effects.

KEYWORDS: Hybrid chilli, Line x Tester, Combining ability, Gene action

INTRODUCTION

Chilli (*Capsicum annuum* L.), the world's second most important solanaceous vegetable after tomato, is grown worldwide both as a spice or vegetable crop. It is a diploid (2n=24) species and genetically self-pollinated and chasmogamous crop whose flowers open only after pollination (Lemma, 1998). However, 2 to 96% out-crossing was observed under open pollination (AVRDC, 2000). The Line x Tester analysis helps to obtain information on the genetic systems governing the inheritance of attributes to be improved, and hence may help in predicting the performance in subsequent generations by assessing the potential of different crosses. Plant breeders use Line x Tester analysis as an aid in selection and to investigate genetic properties of parents and their crosses. Line x Tester analysis provides information on average performance of individual lines in crosses known as general combining ability (GCA). It also gives information about the performance of crosses relative to the average performance of parents involved in the cross known as specific combining ability (SCA). Significant GCA and SCA effects provide information to determine the efficacy of breeding for improvements in given traits and they can be used to identify the lines to be served as parents in a breeding program for improvement. In addition, this technique enables the breeder to combine desirable genes that are found in two or more genotypes. It provides to the breeders an insight in to nature and relative magnitude of fixable and non-fixable genetic variances. Therefore, the present investigation was carried out to estimate combining ability effects for yield and its components.

MATERIALS & METHODS

The material for the present study comprised 30 F_1s of chilli generated involving six lines (*viz*., LCA 625, LCA 764, LCA 704, LCA 710, LCA 718 and LCA 712) and five testers (viz., LCA 315, LCA 706, LCA 763, LCA 703 and G4) through Line x Tester design during kharif, 2012-13. The resultant 30 F1s and 11 parents were grown in randomized complete block design with three replications during kharif, 2013-14 at three different locations *viz*., Horticultural Research Station (HRS), Lam, Guntur, Horticultural Research Station (HRS), Darsi and Horticultural College and Research Institute (HC & RI), V.R.Gudem of Dr. YSR Horticultural University, Andhra Pradesh. Thirty five days old seedlings were transplanted with 75 x 30 cm spacing and each entry was planted in one row of 4 m length. All the recommended agronomic practices were followed. In each entry, five plants were selected randomly from each replication and biometrical observations were recorded for plant height, plant spread, number of primary branches, number of secondary branches, days to 50% flowering, per cent fruit set, days to first picking, no. of fruits per plant, fruit length, fruit diameter, average dry fruit weight, dry fruit yield per plant, dry fruit recovery, no. of seeds per fruit, seed weight. The mean data over the three locations were analyzed for combining ability following the standard method of Kempthorne (1957).

RESULTS &DISCUSSION

Pooled analysis of variance for experimental design revealed significant differences among locations for all the characters studied (Table 1a &1b). Significant differences for replications x locations were not recorded except for primary branches per plant. The differences among the

parents and hybrids were observed to be significant for all the characters studied. The differences among the parents vs. hybrids were recorded to be significant except for plant spread; percent fruit set and fruits per plant. Partitioning of genotypes into lines, testers and lines x testers revealed that the variance differences among lines and testers were observed to be significant for all the characters studied. The effects due to lines x testers were significant for all the traits studied except for days to 50 percent flowering, fruit diameter, fruit length, average dry fruit weight and number of seeds per fruit. Interaction effects of (parents vs. hybrids) x locations were significant for all the characters except fruit diameter.

Significant variances for parents x locations interaction were per cent fruit set, fruits per plant, dry fruit yield per plant and dry fruit recovery. The effects due to hybrids x locations were significant for all the characters except days to first picking and dry fruit recovery. Further partitioning of hybrids x locations indicated that the interaction of lines x locations was significant for per cent fruit set, no. of fruits per plant, dry fruit yield per plant and dry fruit recovery while that of testers x locations for per cent fruit set, fruits per plant and dry fruit recovery. Interaction effects of lines x testers x locations were significant for per cent fruit set, dry fruit yield and dry fruit recovery.

This indicates the existence of wide variability in the material studied and there is a good scope for identifying promising parents and hybrid combinations, and improving the yield through its components. These results are in conformity with the findings of Prasath and Ponnuswami (2008) and Payakhapaab *et al*. (2012). The comparative estimates of variances due to GCA and SCA revealed the importance of SCA variance. The SCA variances were higher than GCA variances for all the traits except plant spread, fruit length, fruit diameter, average dry fruit weight, dry fruit recovery and seed weight suggesting the significant role of non additive gene action predominance of non additive gene action for fruit yield and its components was also reported by other workers Hasanuzzaman and Faruq (2011), Hasanuzzaman *et al*. (2012), Chaudhary *et al*. (2013), Sharma *et al*. (2013) where as additive gene action reported by Prasath and Ponnuswami (2008), Pandey *et al*. (2012), Mendes *et al*. (2014) and Khalil and Hatem (2014).

The *gca* effects of the parents revealed that the lines LCA 764 and LCA 704 were good general combiners for most of the traits like dry fruit yield per plant, no. of primary and secondary branches per plant, plant spread, per cent fruit set, average dry fruit weight, no. of seeds per fruit, seed weight, no. of fruits per plant and days to first picking by exhibiting significant positive GCA effects (Table 2a & 2b). These lines also showed negative significant *gca* effect for the trait days to first picking indicating their usefulness in breeding for early maturing hybrids. The line LCA 625 was best general combiner for plant height, plant spread, dry fruit weight, dry fruit recovery and no. of seeds per fruit. The line LCA 712 contributed a large number of favorable alleles for days to 50% flowering indicated by their significant negative *gca* effects for these character (early maturing hybrid).

Among the testers, LCA 315 and LCA 703 was best general combiner for majority of the important yield components, *i.e*., dry fruit yield per plant, average dry fruit weight, no. of seeds per fruit, seed weight, no. of fruits per plant, fruit diameter, fruit length, days to first picking . It also exhibited high negative GCA effect in a desired direction for days to 50% flowering and days to first picking. Favourable genes for plant height were predominantly contributed by LCA706 and LCA 763 by recording significant positive GCA effects. The tester LCA 706 was a good combiner for dry fruit recovery.

Hence, among the lines LCA 764 and LCA 704 and among the testers LCA 315 and LCA 703 were proved to be good combiners for fruit yield and its most of the related characters and need to be exploited in future breeding programme (Table 3). The parents which are good general combiners for yield possessed *gca* effects in the desired direction for yield components was also reported earlier by Hasanuzzaman and Faruq (2011), Hasanuzzaman *et al*. (2012) and Sharma *et al*. (2013).

In case of SCA effects, none of the hybrid exhibited favourable SCA effect for all the characters (Table 2a & 2b). Significant SCA effects in favourable direction as observed in many crosses for plant height (4), plant spread (1), number of primary branches (4), number of secondary branches (3), ays to 50% flowering (8), per cent fruit set (8), days to first picking (10), no. of fruits per plant (5), fruit length (3), fruit diameter (3), dry fruit yield per plant (8), dry fruit recovery (1), no. of seeds per fruit (8) and seed weight (2). This results are getting support from the findings of Prasath and Ponnuswami (2008), Prajapati and Agalodia (2011) in chilli.

The magnitude of SCA effects having a vital importance in selecting the cross combinations with higher probability of obtaining desirable transgressive segregants. The range of SCA effects for dry fruit yield per plant varied from -37.82 (LCA 712 X LCA 315) to 52.14 (LCA764 X LCA 315). Twenty hybrids showed significant SCA effects of which eight hybrids attributed towards positive direction for dry fruit yield per plant. Out of thirty crosses, the best eight specific crosses were LCA 764 x LCA 315 (52.14), LCA 704 x LCA 315 (33.48), LCA 625 x LCA 706 (30.67), LCA 710 x LCA 706 (28.57), LCA 718 x G4 (26.02), LCA 712 x LCA 703(25.99), LCA 712 x LCA 763(18.26) and LCA 764 x LCA 763(13.21) for dry fruit yield per plant (Table 4).

TABLE 1a. Pooled analysis of variance for combining ability (L X T) for yield and yield components in chilli

	Df	Plant height (cm)	Plant spread (cm)	No. of primary branches per plant	No. of secondary branches per plant	Days to 50 % flowering	Fruit set (%)	Days to first picking	No. of fruits per plant
Replications	2.00	7.77	32.48	0.14	0.34	13.08*	36.41	57.23**	2174.63
Locations	2.00	13590.84**	37088.52**	10.82**	92.21**	90.89**	2150.57**	90.89**	1032572.63**
Rep x Locations	4.00	27.70	26.65	0.66*	1.24	0.91	22.23	0.96	983.47
Treatments	40.00	748.23**	1786.61**	1.69**	9.61**	56.22**	432.71**	412.02**	30040.14**
Parents	10.00	1007.98**	2448.06**	3.38**	20.71**	50.98**	316.90**	584.87**	26466.02**
Lines	5.00	697.41**	2183.29**	1.41**	19.50**	76.21**	278.96**	404.08**	24114.53**
Testers	4.00	1365.45**	3325.04**	2.43**	20.21**	28.59**	257.23**	363.72**	11663.24**
Line x Tester	1.00	1130.91**	263.99*	17.04**	28.72**	14.43	745.30**	2373.41**	97434.65**
Hybrids	29.00	172.40**	175.30**	0.76**	3.91**	57.89**	486.76**	365.24**	32177.40**
Parents vs hybrids	1.00	14849.72**	41900.44	11.41**	63.80**	60.18**	23.34	40.22*	3800.72
Parents x locations	20.00	4.13	4.18	0.07	0.72	2.28	127.63**	2.28	15160.42**
Lines x location	10.00	4.62	2.23	0.09	0.52	2.43	161.48**	2.43	21527.49**
Testers x locations	8.00	4.06	5.56	0.07	0.82	2.57	95.89**	2.57	10276.57**
(Lines x Testers) x locations	2.00	1.98	8.38	0.01	1.40	0.35	85.41*	0.35	2860.45
(Parents vs. hybrids) x locations	2.00	4755.30**	14053.77**	6.89**	26.37**	26.39**	1136.94**	26.39*	176706.48**
Hybrids x locations	58.00	122.14**	160.37**	0.74**	5.11**	9.46**	146.17**	9.46	10014.29**
Error	240.00	28.00	43.43	0.21	0.96	4.18	23.73	8.58	1210.79
σ^2gca		5.99	8.21	0.03	0.12	0.81	10.77	10.19	1281.91
σ^2sca		8.78	1.85	0.05	0.20	6.82	46.28	31.25	1660.28
σ^2gca/σ^2sca		0.68	4.44	0.60	0.60	0.19	0.23	0.33	0.77

*: Significant at 5% level and **: Significant at 1% level

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TABLE 1b Pooled analysis of variance for combining ability (L X T) for yield and yield components in chilli

	Df	Fruit length (cm)	Fruit diameter (cm)	Average dry fruit weight (g)	Dry fruit yield (g/plant)	Dry fruit recovery (%)	No. of seeds per fruit	Seed weight (g/1000 seed)
Replications	2.00	1.77**	0.022	0.034	120.99	17.85	92.12	0.774
Locations	2.00	9.53**	0.076**	0.432**	227979.58**	955.65**	5631.15**	119.334**
Rep x Locations	4.00	0.30	0.010	0.011	211.04	54.32*	16.66	0.312
Treatments	40.00	5.89**	0.054**	0.144**	13569.71**	108.69**	971.38**	3.689**
Parents	10.00	8.83**	0.069**	0.253**	18384.38**	268.82**	1400.48**	5.833**
Lines	5.00	1.39**	0.087**	0.166**	20034.45**	200.10**	2025.48**	6.536**
Testers	4.00	20.15**	0.063**	0.421**	11028.67**	146.24**	969.05**	5.090**
Line x Tester	1.00	0.80	0.001	0.020	39556.88**	1102.72**	1.15	5.288**
Hybrids	29.00	4.32**	0.043**	0.095**	12234.75**	43.77**	535.17**	2.644**
Parents vs hybrids	1.00	21.96**	0.237**	0.457**	4136.78**	390.21**	9330.63**	12.568**
Parents x locations	20.00	0.08	0.002	0.006	3097.61**	202.33**	4.22	0.063
Lines x location	10.00	0.03	0.002	0.005	4061.23**	223.71**	6.21	0.104
Testers x locations	8.00	0.11	0.002	0.008	211.30	175.67**	2.51	0.027
(Lines x Testers) x locations	2.00	0.19	0.003	0.000	9824.76**	202.14**	1.11	0.005
(Parents vs. hybrids) x locations	2.00	3.04**	0.019	0.285**	46100.83**	859.87**	2030.27**	3.311**
Hybrids x locations	58.00	0.87**	0.012*	0.023**	2694.33**	13.81	242.21**	1.085**
Error	240.00	0.33	0.008	0.011	333.49	20.92	49.47	0.464
σ^2gca		0.24	0.24	0.006	473.02	1.41	21.23	0.12
σ^2sca		0.12	0.12	0.001	669.13	0.96	25.11	0.07
σ^2gca/σ^2sca		2.00	2.00	6.00	0.71	1.47	0.85	1.71

*: Significant at 5% level and **: Significant at 1% level

TABLE 2a Estimates of general and specific combining ability effects for various traits in chilli

	Plant height (cm)	Plant spread (cm)	No. o primary branches per plant	No. of secondary branches per plant	Days to 50 % flowering	Fruit set (%)	Days to first picking	No. fruits per plant
Lines								
LCA 625	3.56**	3.30**	-0.18**	-0.04	0.17	-2.23**	0.74	-32.87**
LCA 764	0.20	1.90*	-0.05	0.55**	0.86**	6.23**	-5.69**	18.71**
LCA 704	-2.32**	2.29*	0.18**	0.36**	0.02	3.97**	-1.11**	79.46**
LCA 710	-2.77**	-2.32*	0.10*	0.01	-0.51	-0.99	-0.04	2.20
LCA 718	-0.69	-3.65**	0.07	-0.09	0.57	-1.74*	-0.60	-40.17**
LCA 712	2.01*	-1.52	-0.12*	-0.79**	-1.11**	-5.23**	6.69**	-27.33**
SEi	0.78	0.95	0.05	0.13	0.30	0.75	0.42	5.32
Testers								
LCA 315	-2.77**	-4.44**	-0.27**	-0.19	1.23**	0.34	-3.62**	12.05*
LCA 706	2.88**	3.18**	0.04	0.01	-0.60*	3.82**	-0.34	-7.01
LCA 763	2.55**	-0.07	0.25**	0.12	0.71**	-1.31	-0.10	-25.16**
LCA 703	-0.38	2.71**	-0.01	0.36**	-1.53**	-2.31**	2.92**	40.23**
G4	-2.29**	-1.38	0.00	-0.29**	0.19	-0.53	1.14**	-20.11**
SEj	0.72	0.87	0.05	0.12	0.27	0.68	0.38	4.86
Crosses								
LCA 625 x LCA 315	-2.34	-0.70	0.20	0.61*	-0.23	-3.03	-5.85**	-43.51**
LCA 625 x LCA 706	-2.50	0.56	0.06	0.41	-2.40**	-4.40**	5.87**	34.67**
LCA 625 x LCA 763	-1.04	0.63	-0.07	-0.78**	4.18**	-4.93**	-0.92	12.28
LCA 625 x LCA 703	1.79	0.73	-0.36**	0.12	-1.25	2.84	4.73**	-9.57
LCA 625 x G4	4.09*	-1.22	0.17	-0.36	-0.30	9.51**	-3.83**	6.12
LCA 764 x LCA 315	5.85**	-2.66	-0.32**	-0.58	-1.36*	-3.38*	0.69	99.14**
LCA 764 x LCA 706	2.97	2.91	-0.08	0.24	-2.31**	3.14	-0.15	11.96
LCA 764 x LCA 763	-2.24	4.97*	0.30**	0.26	4.38**	7.49**	-4.39**	6.28
LCA 764 x LCA 703	-2.64	-4.61*	0.20*	0.25	-0.38	0.60	-2.07*	-78.79**
LCA 764 x G4	-3.94*	-0.61	-0.10	-0.17	-0.33	-7.84**	5.93**	-38.59**
LCA 704 x LCA 315	-4.67**	-0.27	-0.01	-0.19	0.70	-1.56	-2.11*	35.22**
LCA 704 x LCA 706	5.00**	0.43	0.11	-0.18	-1.13	-7.15**	5.61**	-21.66
LCA 704 x LCA 763	-2.39	-2.41	-0.17	0.21	-0.56	8.42**	-0.19	-31.69**
LCA 704 x LCA 703	0.84	1.26	0.17	0.26	-2.31**	1.53	6.13**	60.93**
LCA 704 x G4	1.22	0.98	-0.10	-0.10	3.30**	-1.24	-9.43**	-42.80**
LCA 710 x LCA 315	-1.70	-0.23	-0.03	-0.37	-0.65	8.84**	-4.29**	-4.41
LCA 710 x LCA 706	-2.46	-3.50	-0.28	-0.09	0.29	7.58**	-7.68**	-9.10
LCA 710 x LCA 763	1.71	-0.37	0.04	0.94**	-2.47**	-8.29**	6.19**	-3.40
LCA 710 x LCA 703	-0.97	2.91	0.30**	-0.36	5.00**	-12.40**	-1.39	-3.65
LCA 710 x G4	3.43	1.19	-0.03	-0.12	-2.17**	4.27*	7.17**	20.57
LCA 718 x LCA 315	2.93	2.77	0.14	0.24	1.48*	1.37	6.37**	-35.64**
LCA 718 x LCA 706	-3.23	0.00	-0.28*	-0.27	2.98**	4.23*	1.10	-12.18
LCA 718 x LCA 763	-0.20	-2.20	0.14	0.47	-4.00**	1.58	-3.48**	7.59
LCA 718 x LCA 703	1.98	-2.31	-0.12	-0.60*	-1.09	-2.64	-5.16**	15.45
LCA 718 x G4	-1.48	1.74	0.11	0.16	0.63	-4.53**	1.17	24.78*
LCA 712 x LCA 315	-0.06	1.10	0.03	0.29	0.06	-2.25	5.20**	-50.81**
LCA 712 x LCA 706	0.22	-0.41	0.46**	-0.11	2.56**	-3.40*	-4.75**	-3.69
LCA 712 x LCA 763	4.16*	-0.62	-0.24*	-1.10**	-1.53*	-4.27*	2.79**	8.95
LCA 712 x LCA 703	-1.00	2.01	-0.19	0.34	0.04	10.07**	-2.23*	15.63
LCA 712 x G4	-3.32	-2.08	-0.06	0.59*	-1.13	-0.16	-1.01	29.92*
SEij	1.75	2.12	0.12	0.30	0.65	1.67	0.94	11.90

TABLE 2b Estimates of general and specific combining ability effects for various traits in chilli

	Fruit length (cm)	Fruit diameter (cm)	Average dry fruit weight (g)	Dry fruit yield (g/ plant)	Dry fruit recovery (%)	No. of seeds per fruit	Seed weight (g/1000 seed)
Lines							
LCA 625	0.20*	0.01	0.03*	-22.61**	2.21**	4.74**	0.18
LCA 764	-0.19*	0.02	0.05**	16.44**	-0.35	4.57**	0.36**
LCA 704	0.07	0.07**	0.08**	49.48**	-0.47	4.98**	0.55**
LCA 710	-0.21*	-0.08**	-0.11**	-4.48	1.69**	-6.71**	-0.49**
LCA 718	0.08	0.01	0.00	-30.79**	-1.44*	0.16	-0.46**
LCA 712	0.05	-0.04**	-0.05**	-8.04**	-1.64**	-7.74**	-0.14
SEi	0.08	0.01	0.01	2.62	0.58	0.90	0.10
Testers							
LCA 315	0.77**	0.04**	0.10**	6.49**	-0.67	5.76**	0.26**
LCA 706	-0.70**	-0.06**	-0.10**	-5.79*	1.60**	-1.81*	-0.39**
LCA 763	0.59**	0.04**	0.06**	-10.81**	-1.02	-2.79**	0.03
LCA 703	-0.51**	0.00	-0.03*	19.72**	0.11	-1.22	0.06
G4	-0.15	-0.02	-0.03*	-9.60**	-0.02	0.06	0.03
SEj	0.08	0.01	0.01	2.40	0.53	0.83	0.09
Crosses							
LCA 625 x LCA 315	0.17	0.03	-0.02	-15.54**	-0.44	4.81*	-0.31
LCA 625 x LCA 706	-0.03	-0.01	0.06	30.67**	2.07	-4.02*	0.14
LCA 625 x LCA 763	-0.44*	-0.01	-0.01	2.81	-1.40	2.41	-0.32
LCA 625 x LCA 703	0.01	0.01	-0.02	-1.64	-0.63	-4.19*	0.41
LCA 625 x G4	0.28	-0.02	-0.01	-16.29**	0.39	1.00	0.08
LCA 764 x LCA 315	0.19	0.03	0.03	52.14**	0.40	1.18	0.28
LCA 764 x LCA 706	0.03	0.03	-0.04	-17.31**	-0.04	-0.80	-0.19
LCA 764 x LCA 763	0.00	-0.02	0.00	13.21*	1.40	-1.85	0.30
LCA 764 x LCA 703	-0.09	-0.03	-0.03	-19.48**	-0.18	4.17*	-0.19
LCA 764 x G4	-0.13	0.00	0.04	-28.56**	-1.57	-2.70	-0.20
LCA 704 x LCA 315	0.95**	0.00	0.06	33.48**	-0.40	7.80**	0.41
LCA 704 x LCA 706	-0.03	-0.07**	-0.05	-22.35**	-2.75*	-1.48	-0.34
LCA 704 x LCA 763	-0.49*	0.05	0.01	-27.06**	2.00	1.81	0.12
LCA 704 x LCA 703	-0.21	-0.03	0.01	6.47	1.45	-9.11**	-0.49*
LCA 704 x G4	-0.22	0.05	-0.02	9.46	-0.29	0.98	0.30
LCA 710 x LCA 315	-0.46*	-0.01	0.02	-5.45	2.60*	-5.76**	0.23
LCA 710 x LCA 706	0.13	0.01	0.02	28.57**	1.63	8.57**	0.03
LCA 710 x LCA 763	0.35	-0.01	0.01	-18.04**	-0.68	1.23	-0.13
LCA 710 x LCA 703	-0.05	0.01	0.01	-15.76**	-2.28	0.25	-0.22
LCA 710 x G4	0.03	0.00	-0.06	10.69	-1.28	-4.30*	0.09
LCA 718 x LCA 315	-0.20	0.02	-0.04	-26.81**	-1.42	-0.31	-0.12
LCA 718 x LCA 706	0.25	0.04	-0.02	-14.46*	-0.69	-7.43**	-0.17
LCA 718 x LCA 763	0.07	-0.05*	0.02	10.82	-0.86	-2.05	-0.25
LCA 718 x LCA 703	-0.05	0.00	-0.01	4.42	0.84	4.71*	0.39
LCA 718 x G4	-0.08	-0.01	0.05	26.02**	2.13	5.07*	0.15
LCA 712 x LCA 315	-0.66**	-0.07**	-0.05	-37.82**	-0.75	-7.72**	-0.49*
LCA 712 x LCA 706	-0.35	0.01	0.03	-5.11	-0.21	5.16*	0.54*
LCA 712 x LCA 763	0.50**	0.04	-0.02	18.26**	-0.46	-1.54	0.28
LCA 712 x LCA 703	0.39*	0.03	0.04	25.99**	0.80	4.17*	0.09
LCA 712 x G4	0.12	-0.01	-0.01	-1.32	0.62	-0.06	-0.42
SEij	0.19	0.03	0.03	5.87	1.29	2.02	0.23

TABLE 3: Promising general combiners for yield and other traits in chilli

SI. No.	Parent	Characters
1	LCA 764	Dry fruit yield per plant, no. of secondary branches per plant, plant spread, per cent fruit set, average dry fruit weight, no. of seeds per fruit, seed weight, no. of fruits per plant, days to first picking and capsaicin.
2	LCA 704	Dry fruit yield per plant, no. of primary branches per plant, no. of secondary branches per plant, plant spread, per cent fruit set, average dry fruit weight, no. of seeds per fruit, seed weight, no. of fruits per plant, fruit diameter, days to first picking.
3	LCA 315	Dry fruit yield per plant, average dry fruit weight, no. of seeds per fruit, seed weight, no. of fruits per plant, fruit diameter, fruit length, days to first picking, vitamin C and capsaicin.
4	LCA 703	Dry fruit yield per plant, no. of secondary branches per plant, days to 50% flowering, plant spread, no. of fruits per plant and oleoresin.

TABLE 4: Promising specific combiners for yield and other traits in chilli

SI. No.	Hybrid	Characters
1	LCA 764 x LCA 315	Dry fruit yield per plant, days to 50% flowering, no. of fruits per plant and capsaicin
2	LCA 704 x LCA 315	Dry fruit yield per plant, number of seeds per fruit, no. of fruits per plant, fruit length, days to first picking and capsaicin.
3	LCA 625 x LCA 706	Dry fruit yield per plant, days to 50% flowering, no. of fruits per plant and capsaicin
4	LCA 710 x LCA 706	Dry fruit yield per plant, per cent fruit set, no. of seeds per fruit, days to first picking and total colour value.
5	LCA 718 x G4	Dry fruit yield per plant, no. of seeds per fruit, no. of fruits per plant and total colour value.
6	LCA 712 x LCA 703	Dry fruit yield per plant, per cent fruit set, no. of seeds per fruit, fruit length, days to first picking, oleoresin and capsaicin
7	LCA 712 x LCA 763	Dry fruit yield per plant, fruit length, capsaicin and total colour value
8	LCA 764 x LCA 763	Dry fruit yield per plant, no. of primary branches per plant, plant spread and per cent fruit set.

The best specific combination for dry fruit yield per plant *Viz*., LCA 764 x LCA 315 recorded the desirable significant SCA effects for traits of days to 50% flowering and no. of fruits per plant. The second best cross i.e., LCA 704 x LCA 315 had desirable significant SCA effects for number of seeds per fruit, no. of fruits per plant, fruit length and days to first picking. Whereas, the third best cross LCA 625 x LCA 706 had significant SCA effects for days to 50% flowering and no. of fruits per plant. The fourth best specific combination LCA 710 x LCA 706 had desirable significant SCA effects for per cent fruit set, no. of seeds per fruit and days to first picking. The fifth best specific combination LCA 718 x G4 had desirable significant SCA effects for average no. of seeds per fruit and no. of fruits per plant. The performance of these crosses needs to be critically evaluated over different seasons and locations to confirm their superiority and stability.

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Abbreviations: GCA- General combining ability; SCA- Specific combining ability; AVRDC- Asian vegetable research and development centre; V.R. Gudem- Venkataramannagudem.