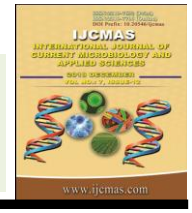
EXCELLENT PUBLISHERS

Int.J.Curr.Microbiol.App.Sci (2018) *7*(12): 567-577

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 7 Number 12 (2018)**
Journal homepage: http://www.ijcmas.com



Original Research Article https://doi.org/10.20546/ijcmas.2018.712.071

Combining Ability in Ridge Gourd [*Luffa acutangula*]

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ABSTRACT

Keywords

Combining ability, Variance, General combinig ability, Specific combining abiliy

Article Info

Accepted:
07 November 2018
Available Online:
10 December 2018

Line x Tester analysis was carried out for ten diversified parents at the Department of Vegetable Science Kittur Rani Channamma College of Horticulture, Arabhavi, to study the combining ability for various characters in ridge gourd. Lines DWD local, ERG-2, ERG-1 and DMRG-1 were identified as good general combiners for yield appear to be worthy of exploitation in future hybrid development. It is suggested that population involving these lines may be developed through multiple crossing isolating high yielding varieties. The variance due to general combining ability (GCA), specific combining ability (SCA) and GCA to SCA ratio for various characters indicate that the presence of both additive and non-additive gene actions. The cross DWD local x CO-1, ERG-1 x Deepthi, IC-92637 x Deepthi, HSN local x CO-1 and DMRG-25 x Deepthi were identified as good specific combiners for total fruit yield per hectare in order of merit. These cross combinations can be utilized for further breeding programme for crop improvement in ridge gourd.

Introduction

Ridge or ribbed gourd (*Luffa acutangula* Roxb., 2n = 2x = 26) is a popular cucurbitaceous vegetable grown as spring and summer season crop. The fruits have 10 prominent longitudinal ridges; thus the plant is also described as “angular loofah”, “Chinese okra,” ridged gourd,” or “fluted loofah.” Ridge gourd is one of the least expensive vegetables to produce. It is cultivated on commercial scale and in kitchen garden.

Combining ability analysis has greater importance in crop improvement to identification of best combiners and utilize them in hybridization programme to produce superior hybrids, either to exploit for heterosis or to combine favourable genes (Meena *et al.*, 2015). This technique was developed by Kempthorne in 1957. In addition, the information on nature of gene action will be helpful to develop efficient crop improvement programme. General combining ability is due to additive and additive × additive gene action and is fixable in nature while specific combining ability is due to non-additive gene action which may be due to dominance or epistasis or both and is non-fixable. The presence of non-additive genetic variance is the primary justification for initiating the hybrid breeding programme (Pali and Mehta, 2014). Keeping these points in view, the present investigation was undertaken to determine general combining ability and specific combining ability in ridge gourd.

Materials and Methods

The parental materials developed at the Department of Vegetable Science, Kittur Rani Channamma College of Horticulture, Arabhavi were utilized for the study. The lines used in the present investigation were collected from local areas of Arabhavi region, Hassan region, Chikkamagaluru region and Dharwad region. Subsequently these lines were selected based on their *per se* performance for yield and quality attributes. Testers used were CO-1, Deepthi and Pusa Nutan, selected on basis of their earliness and high yielding character.

The experimental plot was ploughed repeatedly and land was brought to a fine tilth. About 20 tonnes of FYM per hectare and the recommended basal dose of fertilizers (25:50:50 kg NPK) were incorporated into the soil just before sowing. The remaining 25 kg of nitrogen was applied as a top dress at 45 days after sowing. Ridges and furrows were opened at a distance of 1.20m apart. Two seeds of each genotype per hill were dibbled at a distance of 0.90m in a row. Irrigation, weed control and other cultural practices were followed as per the package of practices of UHS, Bagalkot (Anon., 2014a).

Results and Discussion

Highly significant gca effects was reported for vine length at 45 DAS in both positive and negative direction. Significant positive gca effects was found in HSN local (46.67) followed by IC-92637 (23.00) among lines. Two lines also showed significant positive gca effects. PSN showed highly significant positive gca effects (5.12) among testers where other two showed negative gca effects. Among crosses sca effect was recorded in both negative and positive direction, where eight crosses showed highly significant positive sca effects for vine length at 45 DAS. Among 30 crosses highest sca effects was found in ERG-1 x Deepthi (81.39) followed by DMRG-3 x PSN (75.73). For vine length at 90 DAS, six lines showed highly significant positive gca effects, among which IC-92637 showed highest gca effects (31.44) followed by ERG-1 (27.77). Only three lines showed negative gca effects. Among testers only Deepthi showed highly significant positive gca effects and other (17.93) two testers were significant in negative direction. Among crosses, 10 crosses were reported to be highly significant in positive direction and cross DMRG-3 x PSN showed highest positive sca effects (41.21) followed by CKM local x PSN (32.88).Highly significant gca effects was reported for number of leaves at 45 DAS in both positive and negative direction. Highly significant positive gca effects was found in DWD local (13.09) followed by DMRG-1 (8.32) among lines. One line also showed significant positive gca effects among 10 lines. CO-1 showed highly significant positive gca effects (4.09) among testers where other two did not show significant gca effects. Among crosses sca effects was recorded in both negative and positive direction, where only a cross DWD local x CO-1 was reported to have highly significant positive sca effects (12.51) for number of leaves at 45 DAS followed by DMRG-1 x CO-1 (9.38).

For number of leaves at 90 DAS, IC-92637 showed highest gca effects (6.31) followed by DMRG-3 (6.25). None of the testers showed significant gca effects. Among crosses, ERG-1 x Deepthi showed highest positive sca effects (5.54) followed by DWD local x PSN (4.92).Highly significant gca effects was reported for number of branches at 45 DAS in both positive and negative direction. Highly significant positive gca effects was found in only DWD local (1.18) among 10 lines. None of the testers showed significant positive gca effects. Among crosses only DWD local x PSN was reported to have highly significant positive sca effects (1.09) for number of branches at 45 DAS. For number of branches at 90 DAS, DMRG-3 (1.16) showed highest gca effects followed by IC-92637 (0.96). Among testers PSN showed significant positive gca effects (0.26). Among crosses, ERG-2 x PSN showed highest positive sca effects (0.97) followed by DMRG-1 x Deepthi (0.90).

For days to first male flowering only DMRG-25 (-2.18) showed highest significant negative gca effects as gca effects in negative direction is considered to be desirable for earliness parameters. None of the testers showed significant negative gca effects. Among 30 crosses, only cross DWD local x PSN showed highly significant sca effects (-6.55) in negative direction followed by the cross ERG-4 x PSN (-4.23).For node to first male flowering only DMRG-25 (-0.42) showed highest significant negative gca effects as gca effects in negative direction is considered to be desirable for earliness parameters. None of the testers showed significant negative gca effects. Among 30 crosses, maximum and significant sca effects in negative direction was reported in cross ERG-4 x CO-1 (-1.08) followed by ERG-4 x Deepthi (-0.89) and DWD local x PSN (-0.56).For days to first female flowering none of the lines and testers showed significant negative gca effects. Among 30 crosses, only cross DMRG-1 x Deepthi showed highly significant sca effects (-7.05) in negative direction. Only two crosses showed significant sca effects in positive direction. For node to first female flowering only HSN local (-1.56) showed highest significant negative gca effects as gca effects in negative direction. Whereas, DWD local showed highest significant positive gca effects. Only CO-1 (-0.94) showed significant negative gca effects among testers. Among 30 crosses, maximum and significant sca effects in negative direction were reported in cross DWD local x CO-1 (-3.26). None of the other crosses showed significant negative sca effects.

For days to first harvest, among 10 lines, CKM local was reported to have highest significant negative gca effects (-7.65) followed by IC-92637 (-4.80). None of testers showed significant negative gca effects. Among the crosses, DWD local x CO-1 (-9.71) followed by ERG-4 x Deepthi (-9.70), DMRG-1 x CO-1 (-8.81) exhibited highest significant negative sca effects for days to first harvest. Among 10 lines, IC-92637 was reported to have highest significant negative gca effects (-3.83) for days to last harvest. None other lines showed significant negative gca effects. None of tester showed significant negative gca effects. None of the crosses exhibited significant negative sca effects for days to last harvest. For sex ratio, ERG-2 showed highly significant negative gca effects (-2.26). None of tester showed significant negative gca effects. Out of 30 crosses, none of the crosses showed significant negative sca effects for sex ratio.

For fruit length, DMRG-25 (4.61) showed highest significant positive gca effects followed by DMRG-3 (3.25). Two other lines also reported highest significant positive gca effects among 10 lines. None of the tester showed significant positive gca effects. Among 30 crosses, ERG-1 x PSN (5.26) followed by DMRG-25 x CO-1 (5.08) exhibited highest positive sca effects for fruit length. Two other crosses also showed highest positive sca effects for fruit length. For fruit diameter, CKM local (0.59) showed highest significant positive gca effects followed by

DWD local (0.48) and IC-92637 (0.43) among 10 lines. Two of the 10 lines showed significant negative gca effects. Only CO-1 showed significant positive gca effects (0.29) among testers. Among 30 crosses, HSN local x CO-1 (1.16) followed by ERG-4 x Deepthi (0.89) exhibited highest positive sca effects for fruit diameter. Two other crosses also showed highest positive sca effects.

For percent fruit set, none of the lines showed significant positive gca effects. None other lines showed significant positive gca effects. Among testers CO-1 (3.52) followed by PSN (3.24) showed highly significant positive gca effects. Out of 30 crosses, only DMRG-3 x Deepthi (15.26) showed significant positive sca effects followed by ERG-1 x CO-1 (12.25).

Highly significant gca effects was reported for average fruit weight in both positive and negative direction. Highly significant positive gca effects was found in DWD local (29.65) followed by DMRG-25 (14.33) among lines. Deepthi (8.91) showed highly significant positive gca effects among testers where other two did not show significant positive gca effects. Among crosses sca effects was recorded in both negative and positive direction, where only a cross ERG-4 x CO-1 was reported to have highly significant positive sca effects (46.88) followed by ERG-2 x Deepthi (42.19) and DWD local x CO-1 (23.23) for averege fruit weight.

For number of fruits per vine, ERG-2 (1.80) showed significant positive gca effects followed by DWD local (1.37) among 10 lines. None of tester showed significant positive gca effects. Out of 30 crosses, ERG-4 x Deepthi showed significant positive sca effects (2.04) followed by DMRG-3 x Deepthi (1.80) for number of fruits per vine. Highly significant gca effects was reported for fruit yield per vine in both positive and negative direction. Highly significant positive gca effects was found in ERG-2 (0.39) followed by DWD local (0.34) among lines. Two lines also showed significant negative gca effects among 10 lines. Deepthi (0.07) showed highly significant positive gca effects among testers and other two did not show significant positive gca effects. Among crosses sca effects was recorded in both negative and positive direction and the cross DWD local x CO-1 was reported to have highly significant positive sca effects (0.88) followed by ERG-2 x Deepthi (0.65).

Highly significant gca effects was reported for fruit yield per plot in both positive and negative direction. Highly significant positive gca effects was found in ERG-2 (3.53) followed by DWD local (2.62) and ERG-1 (2.35) among lines. None of the testers showed positive gca effects. Among crosses sca effects was recorded in both negative and positive direction, where only a cross DWD local x CO-1 was reported to have highly significant positive sca effects (3.92) followed by ERG-1 x Deepthi (2.22), IC-92637 x Deepthi (2.09) and HSN local x CO-1 (1.95) for fruit yield per plot.

Highly significant gca effects was reported for yield per hectare in both positive and negative direction. High significant positive gca effects was found in ERG-2 (32.72) followed by DWD local (24.23) and ERG-1 (21.76) among lines. Deepthi (7.5) showed highly significant positive gca effects among testers where PSN (-8.44) showed significant negative gca effects. Among crosses sca effects was recorded in both negative and positive direction, where only a cross DWD local x CO-1 was reported to have highly significant positive sca effects (36.28) followed by ERG-1 x Deepthi (20.56) and IC-92637 x Deepthi (19.32). Two other crosses also exhibited significant positive sca effects for fruit yield per hectare.

None of the lines showed significant positive gca effects for rind thickness, but CO-1 showed significant positive gca effects (0.37) among three testers. Out of 30 crosses, only the cross CKM local x Deepthi showed highly significant sca effects (1.55) in positive direction for rind thickness.For flesh thickness, ERG-1 showed significant positive gca effects (0.78) followed by HSN local (0.61). Deepthi showed significant positive gca effects (0.46) among three testers. Out of 30 crosses, only the cross ERG-4 x PSN showed highly significant sca effects (1.5) in positive direction. None other crosses showed significant positive sca effects for flesh thickness (Table 1–3).

Variance for all 23 characters revealed that non additive gene action was predominant for days to last harvest and days to first female flowering these traits can be improved by recurrent selection of breeding method where as non additive component was more than additive component for vine length at 45 DAS and 90 DAS, number of branches at 45 and 90 DAS, number of leaves at 45 and 90 DAS, days to first male flowering, node to first male flowering, days to first harvest, days to last harvest, sex ratio, fruit length, fruit diameter, number of fruits per vine, fruit yield per vine, fruit yield per plot, fruit yield per hectare, per cent fruit set, flesh thickness and rind thickness. These traits can be improved by recurrent selection. But for average fruit weight and node to first female flowering additive components of genetic variance were predominant and thus can be improved by simple selection or direct selection.

Table.1 Details of ridge gourd entries with their sources

Sl. No.	Entry	Pedigree/Name	Source
Lines			
1.	L- 1	IC-92637	KRCCH, Arabhavi
2	L- 2	DMRG-3	KRCCH, Arabhavi
3.	L- 3	DMRG-25	KRCCH, Arabhavi
4.	L- 4	Chikkamagaluru local	Chikkkamagaluru
5.	L- 5	ERG-4	KRCCH, Arabhavi
6.	L- 6	Hassan local	Belur, Hassan
7.	L- 7	DMRG-1	KRCCH, Arabhavi
8.	L- 8	ERG-1	KRCCH, Arabhavi
9.	L- 9	Dharwad local	Dharwad
10.	L- 10	ERG-2	KRCCH, Arabhavi
Testers			
1.	Deepthi		KAU, Kerala
2.	PSN	Pusa Nutan	IARI, New delhi
3.	CO-1		TNAU, Coimbotore
Commercial check			
1.	Naga	F_1 hybrid	East-West company

Table.2 General combining ability effects for growth, earliness, yield and quality parameters in ridge gourd

Sl. No.	Parents	Vine length		Number of leaves		Number of branches		Days to first male flowering	Node to first male flowering	Days to first female flowering	Node to first female flowering	Days to first harvest	Days to last harvest	Sex ratio
		45 DAS	90 DAS	45 DAS	90 DAS	45 DAS	90 DAS							
Lines														
1	IC-92637	23.00**	31.44**	-4.51	6.31**	0.03	0.96**	0.69	-0.09	2.69	-0.5	-4.80**	-3.83*	-0.02
2	DMRG-3	16.67**	16.92**	-4.84	6.25**	-0.34	1.16**	0.13	-0.06	-1.58	-1.1	4.10**	-2.83	2.58**
3	DMRG-25	0.87	21.64**	-7.94**	-1.35	-0.21	-1.04**	-2.18 *	-0.42*	-1.11	-0.73	4.26**	0.33	-0.49
4	CKM local	14.50**	22.04**	-5.38 *	-1.19	-0.08	-0.21	0.09	-0.32*	1.54	0.4	-7.65**	0.33	0.03
5	ERG-4	-33.33**	-40.93**	-9.34**	-3.62*	-0.58*	-1.11**	-1.84	0.81**	-2.06	-1.13	-2.62*	2.33	-0.56
6	HSN local	46.67**	-58.68**	-0.64	1.65	-0.38	0.39*	0.19	-0.29	1.92	-1.56*	4.73**	2.67	0.28
7	DMRG-1	-10.33**	12.50**	8.32**	-3.22*	-0.14	-0.14	-1.31	-0.19	-0.66	-0.4	-0.44	2.67	0.52
8	ERG-1	-20.13**	27.77**	4.26	-1.75	0.26	0.49**	0.09	0.31	0.42	-0.4	0.73	3.67*	0.85
9	DWD local	-17.46**	-2.53	13.09**	-4.09**	1.18**	-0.24	3.07**	0.04	-1.34	4.27**	-1.34	-2	-0.93
10	ERG-2	-20.48**	-30.16**	6.99*	1.01	0.26	-0.24	1.06	0.21	0.17	1.14	2.13	-3.33	-2.26 **
	SE.m±	1.75	1.19	1.81	0.96	0.16	0.11	0.74	0.11	0.93	0.41	0.82	1.23	0.53
	CD at 5 %	5.07	4.46	5.24	2.79	0.45	0.34	2.14	0.32	2.8	1.2	2.37	3.5	1.54
	CD at 1%	6.83	6.01	7.06	3.75	0.61	0.45	2.88	0.44	3.72	1.62	3.2	4.68	2.07
	Testers													
1	Deepthi	-3.97**	17.93**	-1.92	-0.21	-0.38**	-0.37**	1.04	-0.14	-0.34	0.39	-1.03	0.28	0.35
2	PSN	5.12**	-13.31**	-2.17	-0.85	0.24	0.26**	-0.97	0.30**	-0.66	0.55	1.09	0.28	-0.4
3	CO-1	-1.16**	-4.61**	4.09**	1.06	0.13	0.11	-0.07	-0.15	1	-0.94**	-0.05	-0.57	0.06
	SE.m±	0.96	0.84	0.99	0.53	0.09	0.06	0.4	0.6	0.51	0.23	0.45	0.67	0.29
	CD at 5 %	2.77	2.44	2.87	1.53	0.25	0.18	1.17	0.18	1.54	0.66	1.3	1.92	0.84
	CD at 1%	3.74	3.3	3.87	2.06	0.33	0.25	1.58	0.24	2.04	0.88	1.75	2.56	1.14
								1.04	-0.14	-0.34	0.39	-1.03	0.28	0.35

*and **indicate significance of values at p=0.05 and p=0.01, respectively.
DAS: Days after sowing

Table.2 contd…

Sl. No.	Parents	Fruit length	Fruit diameter	Per cent fruit set	Averege fruit weight	Number of fruits per vine	Fruit yield per vine	Fruit yield per plot	Fruit yield per hectare
Lines									
1	IC-92637	2.34 **	0.43 *	-4.72	2.34 **	0.43 *	-4.72	-1.11 *	-10.34 *
2	DMRG-3	3.25**	0.29	-11.23**	3.25**	0.29	-11.23**	-1.13 *	-10.50 *
3	DMRG-25	4.61 **	-0.08	2.11	4.61 **	-0.08	2.11	-1.12 *	-10.34*
4	CKM local	-1.21	0.59**	7.30	-1.21	0.59**	7.30	-0.95	-8.8
5	ERG-4	-2.30 **	-0.21	-9.57	-2.30 **	-0.21	-9.57	-0.68	-6.33
6	HSN local	2.90**	-0.96 **	5.83	2.90**	-0.96 **	5.83	-2.02**	-18.67**
7	DMRG-1	-3.08**	-0.15	8.78	-3.08**	-0.15	8.78	-1.48**	-13.73 **
8	ERG-1	-2.60**	-0.55 **	-4.34	-2.60**	-0.55 **	-4.34	2.35**	21.76**
9	DWD local	-2.95**	0.48 **	8.31	-2.95**	0.48 **	8.31	2.62**	24.23**
10	ERG-2	-0.97	0.17	-2.45	-0.97	0.17	-2.45	3.53**	32.72**
	SE.m±	0.50	0.11	1.94	0.50	0.11	1.94	0.33	3.04
	CD at 5 %	1.43	0.33	5.82	1.43	0.33	5.82	0.95	8.81
	CD at 1%	1.93	0.44	7.76	1.93	0.44	7.76	1.28	11.87
	Testers								
1	Deepthi	0.20	-0.17	-6.76**	0.20	-0.17	-6.76**	0.07	7.5 **
2	PSN	0.08	-0.12	3.24*	0.08	-0.12	3.24*	-0.11	-8.44**
3	CO-1	-0.28	0.29**	3.52*	-0.28	0.29**	3.52*	0.04	0.91
	SE.m±	0.27	0.06	1.06	0.27	0.06	1.06	0.18	1.67
	CD at 5 %	0.79	0.18	3.19	0.79	0.18	3.19	0.52	4.82
	CD at 1%	1.10	0.24	4.25	1.10	0.24	4.25	0.70	6.49
		2.34 **	0.43 *	-4.72	2.34 **	0.43 *	-4.72	-1.11 *	-10.34 *

*and **indicate significance of values at p=0.05 and p=0.01, respectively.

Table.3 Specific combining ability for growth, earliness, yeild and quality parameters in ridge gourd

Sl. No.	Hybrids	Vine length		Number of leaves		Number of branches		Days to first male flowering	Node to first male flowering	Days to first female flowering	Node to first female flowering	Days to first harvest	Days to last harvest
		45 DAS	90 DAS	45 DAS	90 DAS	45 DAS	90 DAS						
1	IC-92637 x Deepthi	-2.53	-2.94	0.52	2.68	0.01	0.20	-1.28	-0.09	2.81	0.58	-3.77	-1.12
2	IC-92637 x PSN	-0.29	-6.12	4.17	-4.08	0.29	-0.13	0.94	-0.23	-0.77	0.52	-4.89*	0.88
3	IC-92637 x CO-1	2.81	9.06*	-4.69	1.41	-0.3	-0.08	0.34	0.32	-2.04	-1.09	8.65**	0.23
4	DMRG-3 x Deepthi	-25.26**	-3.20	2.05	1.94	0.28	0.00	-0.51	0.18	3.37	-1.82	3.23	1.38
5	DMRG-3 x PSN	75.73**	41.21**	5.20	2.08	0.06	0.67 *	1.71	-0.36	-2.90	0.72	-4.29*	-0.12
6	DMRG-3 x CO-1	-50.47**	-38.01**	-7.26	-4.03	-0.33	-0.68 *	-1.20	0.19	-0.47	1.11	1.05	-1.27
7	DMRG-25 x Deepthi	-41.73**	-4.80	2.15	-0.76	0.04	0.30	-0.71	0.04	-0.05	-0.49	-0.43	-2.28
8	DMRG-25 x PSN	10.01*	-6.99	1.10	0.28	-0.38	-0.53	-2.10	-0.30	0.38	0.45	-1.75	-0.28
9	DMRG-25 x CO-1	31.71**	11.79**	-3.26	0.47	0.33	0.22	2.81	0.25	-0.34	0.04	2.19	2.57
10	CKM local x Deepthi	-14.13**	-31.04**	2.39	-3.32	0.51	0.27	-2.18	0.24	0.26	1.08	-0.92	0.22
11	CKM local x PSN	5.11	32.88**	2.54	0.82	-0.21	-0.56	1.14	0.20	0.23	-1.28	-0.39	-0.78
12	CKM local x CO-1	9.01*	-1.85	-4.92	2.51	-0.30	0.29	1.04	-0.45	-0.49	0.21	1.30	0.57
13	ERG-4 x Deepthi	-18.16**	4.80	-2.25	-3.59	0.01	0.37	1.86	-0.89**	0.61	0.71	9.35**	-0.28
14	ERG-4 x PSN	31.28**	-27.79**	0.80	1.25	-0.51	-1.16**	-4.23 *	1.97 **	0.28	-0.75	-5.82**	-1.28
15	ERG-4 x CO-1	-13.12**	22.99**	1.44	2.34	0.5	0.79 **	2.37	-1.08**	-0.89	0.04	-3.53	1.57
16	HSN local x Deepthi	-24.41**	18.80**	5.75	-1.16	0.31	-0.83 **	-0.88	-0.09	-2.13	-0.56	2.50	2.88
17	HSN local x PSN	26.78**	-28.29**	0.10	-0.72	-0.31	0.54	1.94	-0.23	-4.30	0.48	-1.72	-1.12
18	HSN local x CO-1	-2.37	9.49*	-5.86	1.87	0.00	0.29	-1.06	0.32	6.43 *	0.07	-0.78	-1.77
19	DMRG-1 x Deepthi	-14.59**	6.80	-11.01 *	3.61	0.28	0.90**	-0.88	0.31	-7.05**	-1.02	2.97	-1.62
20	DMRG-1 x PSN	-5.35	-0.79	1.64	-6.45 *	-0.04	-0.73 *	1.14	-0.03	5.18*	0.02	5.85**	0.38
21	DMRG-1 x CO-1	19.95**	-6.01	9.38*	2.84	-0.23	-0.18	-0.26	-0.28	1.87	1.01	-8.81**	1.23
22	ERG-1 x Deepthi	81.39**	13.60**	4.95	5.54*	-0.62	-0.03	-0.68	0.01	-1.53	-0.62	-6.90**	3.38
23	ERG-1 x PSN	-81.12**	-38.89**	-5.1	0.58	0.56	0.54	2.24	-0.13	1.20	-0.58	1.28	0.38
24	ERG-1 x CO-1	-0.27	25.29**	0.14	-6.13*	0.07	-0.51	-1.56	0.12	0.33	1.21	5.62**	-3.77
25	DWD local x Deepthi	-8.16	18.03**	3.42	-4.52	-0.79 *	-0.50	6.09 **	0.48	2.44	1.71	3.67	-0.95
26	DWD local x PSN	-32.38**	15.85**	-15.93**	4.92*	1.09**	0.37	-6.55 **	-0.56*	1.76	1.55	6.05**	-0.45
27	DWD local x CO-1	44.48**	-33.88**	12.51 **	-0.39	-0.3	0.12	0.46	0.09	-4.20	-3.26**	-9.71**	1.40
28	ERG-2 x Deepthi	67.57**	-20.05**	-7.98	-0.42	-0.02	-0.70 *	-0.84	-0.19	1.27	0.44	-9.70**	-1.62

Table.3 contd…

Sl. No.	Hybrids	Vine length		Number of leaves		Number of branches		Days to first male flowering	Node to first male flowering	Days to first female flowering	Node to first female flowering	Days to first harvest	Days to last harvest
		45 DAS	90 DAS	45 DAS	90 DAS	45 DAS	90 DAS						
29	ERG-2 x PSN	-25.84**	18.91**	5.47	1.32	-0.54	0.97**	3.77 *	-0.33	-1.05	-1.12	5.68**	2.38
30	ERG-2 x CO-1	-41.74**	1.14	2.51	-0.89	0.57	-0.27	-2.93	0.52	-0.22	0.67	4.02	-0.77
	SE.m±	3.03	2.67	3.14	1.67	0.27	0.20	1.28	0.19	1.62	0.72	1.42	2.12
	CD at 5%	8.78	7.73	9.07	4.82	0.78	0.58	3.70	0.56	4.88	2.08	4.11	6.06
	CD at 1%	11.82	10.41	12.23	6.50	1.05	0.78	4.99	0.76	6.50	2.80	5.54	8.10

*and **indicate significance of values at p=0.05 and p=0.01, respectively.
DAS: Days after sowing

Table.3

Sl. No.	Hybrids	Sex ratio	Fruit length	Fruit diameter	Per cent fruit set	Average fruit weight	Number of fruits per vine	Fruit yield per vine	Fruit yield per plot	Fruit yield per hectare	Rind thickness	Flesh thickness
1	IC-92637 x Deepthi	1.02	-1.31	0.02	-0.40	15.67	0.91	-0.01	2.09 *	19.32 *	-0.39	0.77
2	IC-92637 x PSN	-1.59	-0.43	0.35	8.10	1.28	-0.18	0.02	-1.0	-9.15	-0.11	-0.14
3	IC-92637 x CO-1	0.57	1.74	-0.37	-7.69	-16.95	-0.72	-0.00	-1.10	-10.17	0.49	-0.63
4	DMRG-3 x Deepthi	2.71*	-0.43	-0.39	15.26**	-10.40	1.80*	-0.03	-0.70	-6.45	-0.39	-0.96
5	DMRG-3 x PSN	-1.15	2.01	0.25	-10.90*	1.46	-1.12	0.17	0.33	3.04	0.19	0.43
6	DMRG-3 x CO-1	-1.56	-1.58	0.14	-4.36	8.93	-0.66	-0.14	0.37	3.41	0.19	0.54
7	DMRG-25 x Deepthi	1.17	-1.88	0.27	-1.07	-9.08	0.51	-0.00	1.79 *	16.54 *	-0.09	0.27
8	DMRG-25 x PSN	0.81	-3.20 *	0.06	6.60	10.53	0.02	0.06	0.21	1.96	-0.01	-0.04
9	DMRG-25 x CO-1	-1.98	5.08**	-0.33	-5.53	-1.45	-0.52	-0.06	-2.00 *	-18.50 *	0.09	-0.23
10	CKM local x Deepthi	-0.60	1.73	0.59*	12.24*	0.85	-0.73	-0.10	0.62	5.74	1.55**	0.70
11	CKM local x PSN	1.26	1.52	-0.01	-13.11*	-11.46	-0.12	0.09	-1.06	-9.77	-0.57	-1.01
12	CKM local x CO-1	-0.67	-3.25*	-0.58 *	0.87	10.61	0.84	0.01	0.44	4.03	-0.97*	0.30
13	ERG-4 x Deepthi	0.33	1.51	0.89 **	10.27*	-31.75 **	2.04 *	-0.05	-2.05 *	-18.95 *	-0.02	-1.40**
14	ERG-4 x PSN	0.98	-1.29	0.43	-2.59	-15.14	-0.85	0.10	0.73	6.74	0.06	1.5 **
15	ERG-4 x CO-1	-1.32	-0.21	-1.32**	-7.68	46.88**	-1.19	-0.05	1.32	12.21	-0.04	-0.10
16	HSN local x Deepthi	-1.18	4.69**	-0.61 *	-8.46	6.17	-0.13	0.01	-2.41 **	-22.35 **	-0.02	0.87
17	HSN local x PSN	0.25	-5.04**	-0.55	5.37	16.68	0.68	0.02	0.46	4.27	0.06	-0.74
18	HSN local x CO-1	0.93	0.35	1.16**	3.09	-22.85 *	-0.56	-0.02	1.95*	18.07 *	-0.04	-0.13
19	DMRG-1 x Deepthi	1.51	-4.30**	-0.15	-13.58**	6.39	-0.93	-0.04	0.45	4.20	0.11	0.07
20	DMRG-1 x PSN	0.55	1.142	-0.55	7.44	12.25	-0.72	0.05	0.28	2.58	-0.41	0.26
21	DMRG-1 x CO-1	-2.06	3.16 *	0.70 *	6.14	-18.63	1.64	-0.02	-0.73	-6.78	0.29	-0.33
22	ERG-1 x Deepthi	-1.37	-2.93 *	-0.37	-2.80	8.67	-0.83	0.13	2.22**	20.56 **	-0.55	-0.20
23	ERG-1 x PSN	0.36	5.26**	0.04	-9.46	-13.72	0.28	-0.01	-0.36	-3.29	0.33	-0.31
24	ERG-1 x CO-1	1.02	-2.33	0.33	12.25*	5.05	0.54	-0.12	-1.87 *	-17.27 *	0.23	0.50
25	DWD local x Deepthi	-1.34	1.62	0.04	-11.61*	-28.70 *	-2.30**	-0.60**	-3.60**	-33.30**	0.31	0.20
26	DWD local x PSN	0.04	-0.57	-0.27	6.90	5.46	1.12	-0.33**	-0.32	-2.98	0.09	0.49
27	DWD local x CO-1	1.29	-1.06	0.23	4.71	23.23 *	1.18	0.88**	3.92**	36.28**	-0.41	-0.70
28	ERG-2 x Deepthi	-2.26	1.29	-0.28	0.15	42.19**	-0.33	0.65**	1.59	14.69	-0.52	-0.33
29	ERG-2 x PSN	-1.51	0.60	0.24	1.65	-7.35	0.88	-0.18	0.71	6.59	0.36	-0.44
30	ERG-2 x CO-1	3.77 **	-1.89	0.04	-1.80	-34.83**	-0.56	-0.47**	-2.29 **	-21.28 **	0.16	0.77
	SE.m±	0.92	0.86	0.2	3.36	8.00	0.57	0.07	0.57	5.30	0.28	0.36
	CD at 5%	2.67	2.48	0.57	10.08	21.96	1.66	0.21	1.65	15.25	0.82	1.04
	CD at 1%	3.59	3.35	0.76	13.44	29.60	2.24	0.28	2.22	20.55	1.11	1.40

Similar reports were obtained by Dubey and Maurya (2007) and Suganthi (2008) in bottle gourd, Sarkar and Sirohi (2010) in cucumber, Podder (2010) in snake gourd, Vegad *et al.*, (2011) in bottle gourd, Alli Rani (2013) in ridge gourd, Singh *et al.*, (2013)

The lines DWD local, ERG-2, ERG-1 and DMRG-1 were identified as good general combiners for total fruit yield per hectare in order of merit.The cross DWD local x CO-1, ERG-1 x Deepthi, IC-92637 x Deepthi, HSN local x CO-1 and DMRG-25 x Deepthi were identified as good specific combiners for total fruit yield per hectare in order of merit. Therefore these hybrids can be used commercially by further assessing for its yield stability.

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How to cite this article:

Divya S. Kamble, Shivaji Duradundi V.D. Gasti, Shashikanth Evoor, Dileep Kumar A. Masuthi and Sumangala Koulagi. 2018. Combining Ability in Ridge Gourd [*Luffa acutangula*]. *Int.J.Curr.Microbiol.App.Sci.* 7(12): 567-577. doi: https://doi.org/10.20546/ijcmas.2018.712.071