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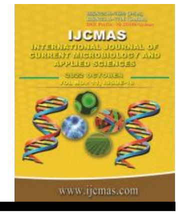

Original Research Article

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Stability Analysis in Chilli under Konkan Region of Maharashtra (*Capsicum annuum* L.)

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ABSTRACT

Keywords

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In present investigation thirty hybrids were evaluated at three locations in Konkan region of Maharashtra. Out of that five stable hybrids *viz*, AVPP0711S × BC-28, AVPP0709S × BC-28, AVPP0517S × DPLC-1, AVPP0711S × Pusajwala and AVPP0709S × DPLC-1 had high net plot yield of fresh fruits and high stability for some characters *viz*, days to 50 per cent flowering, fresh weight per fruit, fruit length, 1000 seed weight, dry weight per fruit and net plot yield of fresh fruits. Stability of these hybrids might have resulted due to stability for various component traits. Out of these five hybrids AVPP0709S × BC-28 was found to be most adaptable while other two hybrids were responsive to favorable environments. Hence, it would be advantages to exploit high yield and stable hybrid AVPP0709S × BC-28 in practical plant breeding.

Introduction

Chilli (*Capsicum annuum* L.) vegetable-cum-spice is one of the most important commercial crop of India, valued for its industrial (oleoresin extraction) purposes. Chilli has its unique place in Asian diet as a spice as well as vegetable. It is also high valued crop grown commercially in almost all parts of the world. It is a valuable foreign exchange earner. It is rich in Vitamins A, C and E. Chillies can act as a heart stimulant, which regulates blood flow and strengthens the arteries, possibly reducing heart attacks. Medicinally, capsaicin is being used to alleviate pain. It is the most recommended tropical medication for arthritis. Chilli pungency is desirable attribute in many foods. Medicinal use of *capsicum* is to treat asthma, coughs, sore throats and to relieve toothaches.

Keeping in mind all these things, it is necessary to screen and develop stable genotypes, which perform more or less uniform under varying environmental conditions. Thus knowledge of genotype into environment interaction helps the breeder for selection of high yielding and most adaptable varieties or hybrids.

Materials and Methods

The five CMS lines viz. AVPP0711S, AVPP0517S, AVPP0709S, AVPP0309S and AVPP0310Sreceived from Asian Vegetable Research and development centre Taiwan were crossed with six genotypes of chilliviz. Pusa jwala, ACSS-9818, DPLC-1, DPLC-2, DPLC-5 and BC-28 from Department of Agril. Botany, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri (M.S.).Thirty hybrids along with eleven parents and standard check (Sitara) were evaluated in randomized block design with two replications at Research Farm Dept. of Agril. Botany, COA, Dapoli, Dist.Ratnagiri (M.S.), Regional Agricultural Research Station, Karjat. Dist. Raigad.(M.S.) and College of Horticulture, Mulde.Dist. Sindhudurg.(M.S.).The mean values of five plants were used in statistical analysis. Observations were recorded on thirteen yield and yield contributing characters viz.Days to 50 per cent flowering, Days to first fruit ripening, Plant height (cm), Number of fruits per plant, Fresh weight per fruit (g), Fruit length (cm), 1000 seed weight (g), Number of seeds per fruit, Dry weight per fruit (g), Dry weight of fruits per plant (g), Fresh weight of fruits per plant (g), Net plot yield of fresh fruits (g), Capsaicin content (%).This statistical analysis for genotype x environment interactions and stability parameters were worked out according to Eberhart and Russell model (1966) for all the characters under study.

Results and Discussion

The analysis of variance for phenotypic stability indicated that the variation due to genotypes as well as environments were significant for all the characters. The variance due to genotype × environment interaction were significant for days to 50 per cent flowering, days to first fruit ripening, plant height, fruit length, 1000 seed weight, number of seeds per fruit, dry weight of fruits per plant and capsaicin content, interacted differently in different environment. The significance of G×E (linear) and pooled deviation for various traits suggested the importance of both linear and non linear components in building up total G×E interaction. The non linear components were accounted for major portion of total G×E interaction in respect of majority of traits. Similar results were also reported by Zewdiel and Poulos (1996); Saxena and Hundal (2008); Datta and Dey (2009); Samnotra *et al.*, (2011) and Srividhya and Ponnuswami (2011). Three stability parameters viz., mean (X), regression coefficient (bi) and mean square deviation from regression line (S^2di) were estimated for all the traits and the result are presented.

For Days to 50 per cent flowering non linear component (S^2di) was not significant indicating the less contribution of linear regression toward G×E interaction. The AVPP0309B female and DPLC-1 male were the earliest in flowering and exhibited bi value less than one indicated adaptability over unfavorable environments. Out of 30 hybrids, most of the hybrids were early in flowering and exhibited regression coefficient nearby one and non significant deviation from regression thus were considered as stable. Among the stable hybrids best three were AVPP0309S × Jwala, AVPP0310S × DPLC-1 and AVPP0309S × BC-28. These hybrids have below average response and high stability in overall environment due to unit regression coefficient with low non significant deviation from regression. AVPP0309S × ACSS9818 had better adaptability as evident from their linear regression (bi= 1.531) and non significant deviation with low mean.

The character days to first fruit ripening all the parents and hybrids exhibited non significant non linear components. The female AVPP0309B and male BC-28 showed early flowering and exhibited bi values less than one indicated adaptability over unfavourable environments. Most of the hybrids were early in flowering and exhibited regression coefficient nearby one or more than one and non significant deviation from regression thus were considered as stable. Among the hybrids AVPP0310S × BC-28 and AVPP0310S × DPLC-2, AVPP0310S × ACSS9818 and AVPP0711S × BC-28 had regression coefficient less than one suitable for poor environment where as hybrid AVPP0711S × DPLC-1 had bi value near to unity was identified as stable for this trait. Nine hybrids were highly responsive to favourable environments as evident from bi value greater than one and non significant deviation from regression along with low mean.

For Plant height none of the females had above average mean indicated that they were poorly adopted genotype for the character plant height. Among the male (Jwala, DPLC-4, BC-28, DPLC-1 and DPLC-2) had above average mean along with low regression coefficient and non significant deviations from regression thus they were considered as stable and suitable for poor environment due to less than one bi value. Hybrids AVPP0711S × DPLC-1, AVPP0711S × BC-28, AVPP0711S ×DPLC-4, AVPP0709S × DPLC-2, AVPP0711S × Jwala and AVPP0517S × Jwala found to be stable across the favourable environment due to above average mean along with regression coefficient more than one and non significant non linear component.

For number of fruits per plant the data indicated that significant deviation from regression were manifested by 4 genotypes, there by revealing major role of non liner components towards G×E interaction. Two females and one male exhibited non significant non linear components.

Among females VI060632B and VI060630B showed high mean with more than one regression coefficient and less deviation from linear regression adapted to favourable environments. Male parent BC-28 suitable for poor environments due to less than one bi value and DPLC-1 suitable for rich environment as bi is greater than one. Hybrids AVPP0310S × DPLC-4 had above average number of fruits along with regression coefficient near to unity and non significant deviation from mean square thus identified as stable for this trait. Fifteen hybrids were highly responsive to favourable environments as evident from bi value greater than one and non significant deviation from regression along with high mean.

Three genotypes were exhibited the significant non linear components, for fresh weight per fruit (g) revealing large contribution of non linear component toward G×E interaction. Among five females AVPP0309B had higher mean than average with bi value greater than one and non significant deviation from regression suitable for favourable environment. Among males DPLC-2 had bi value less than one performing better in average or poor environment. Among the hybrid two hybrids had significant non linear component suggesting that its performance could not be predicted over environment. Hybrid AVPP0517S × DPLC-2 had high mean value, bi value near to unity and non significant deviation from regression identified as stable genotype. Three hybrids had bi value less than one, high mean value and non significant deviation from regression suitable for poor environment. Remaining six hybrids suitable for favourable environment having bi value greater than one and high mean value.

In case of fruit length (cm) the significant non linear component exhibited by five genotypes, thereby indicating major contribution of non linear components towards G×E interaction. Among the females three females showed higher fruit length than the average mean, bi value less than one and non significant linear contribution hence suitable for unfavourable environment. All the six males showed lower mean value than overall mean. Maximum length recorded by DPLC-1 suitable for favourable environment. Four hybrids was unpredictable over environment due to significant deviation of mean square. Two hybrids had higher mean along with nearby unity regression coefficient and non significant deviation from regression coefficient which indicated stability over environments. Six hybrids were highly responsive to better conditions owing to their high mean, regression coefficient more than one and non significant deviation from regression. Two hybrids were highly responsive to poor environment and performance of five hybrids could not be predicted due to significant deviation mean square. All the male and female genotypes showed non significant deviation from regression for the character 1000 seed weight (g). Among females VI060629B, VI060632B and VI060630B recorded higher mean, less than one regression coefficient and lower S^2di value suitable for average environments. Whereas in males BC-28 had bi value greater than one suitable for favourable environment and DPLC-2 for average environment. Hybrid AVPP0709S × Jwala and AVPP0517S × DPLC-2 had higher mean bi value near to unity and lower S^2di values which indicated its stability over environments. Performance of hybrid AVPP0517S × BC-28 could not be predicted due to significant deviation of mean square. Eleven crosses were highly responsive to poor environment as evident from their high mean, low regression coefficient and non significant deviation from regression.

For number of seeds per fruit all the genotypes showed non significant deviation mean squares. VI060629B and VI060630B females were found to be stable due to high mean, non significant deviation mean square and regression coefficient nearer to unity. Male parents ACSS9818 and BC-28 had higher mean values, bi value more than one and non significant deviation mean square suitable for favourable environments. DPLC-1 had bi value less than one recommended for average environment.

Among the hybrids AVPP0309S × DPLC-4, AVPP0310S × DPLC-1, AVPP0310S × DPLC-2 and AVPP0517S × ACSS9818 exhibited high mean, regression coefficient nearer to unity and non significant and deviation from regression and therefore were classified as stable hybrids. Four hybrids had bi value greater than one suitable for favourable environments whereas two were responsive to unfavourable environment.

Fresh weight of fruits per plant (g) significant non linear components were exhibited by two genotypes, indicating major contribution of non linear component towards G×E interaction. Among females VI060629B and VI060630B had higher mean values, regression coefficient more than one and non significant deviation from regression therefore, they were highly adaptable to favourable environment. Male parents BC-28 had bi value less than one suitable for poor environment and DPLC-1 had bi value greater than one suitable for favourable environment. None of hybrid found to be stable for fresh weight of fruits per plant. Hybrid AVPP0517S × Jwala and AVPP0711S × BC-28 showed significant non linear component, hence their performance was unpredictable. Ten hybrids were highly responsive to better conditions owning to their high mean, regression coefficient greater than one and non significant deviation.

Significant non linear components were exhibited by 8 genotypes for dry weight of fruits per plant (g), there by indicating major contribution of non linear component towards G×E interaction. Among five females only AVPP0309B had high mean, regression coefficient greater than one and non significant deviation from regression, suitable for favourable environment. Female VI060632B had lower mean and among males ACSS9818, DPLC-1 and DPLC-2 had higher mean values but they showed significant non linear component, hence, their performance was unpredictable. Performance of four hybrids were unpredictable because significant non linear component. AVPP0711S × DPLC-4 had high mean value along with regression coefficient near to one and non significant deviation from regression coefficient which indicated their stability over environments. Six hybrids were highly responsive to better conditions owing to their high mean, regression coefficient greater than one and non significant deviation. While two hybrids were suitable for average environment with bi value less than one.

For dry weight per fruit (g) data indicated that significant deviation of mean square was manifested by ten genotypes, revealing large contribution of non linear components towards G×E interaction. Among the five females AVPP0309B had greater mean value bi greater than one and no significant deviation from regression suitable for favourable condition. VI060627B showed less dry weight per fruit than overall mean but most stable due to regression coefficient near to unity and non significant S^2di values.

Table.1 List of CMS lines

Sr. No.	CMS line		Origin	Source
1.	AVPP0711S	'A' line	Indonesia	**AVRDC, Taiwan**
	VI060630, C05671	'B' line		
2.	AVPP0517S	'A' line	Sri Lanka	**AVRDC, Taiwan**
	VI060632, C05661	'B' line		
3.	AVPP0709S	'A' line	Korea	**AVRDC, Taiwan**
	VI060627, C05606	'B' line		
4.	AVPP0309S	'A' line	Indonesia	**AVRDC, Taiwan**
	AVPP0309	'B' line		
5.	AVPP0310S	'A' line	Indonesia	**AVRDC, Taiwan**
	VI060629, C05601	**'B' line**		

Table.2 List of male pollinator (Genotype)

Sr. No.	Name of Genotypes	Origin / Source	Salient Features
1.	PusaJwala	IARI, New Delhi	**Fruits are long, thin and pungent, National check**
2.	DPLC-1	Central Experiment Station, Wakawali, Dr..BSKKV, Dapoli	**Ligth green, medium sized.**
3.	DPLC-2	Central Experiment Station, Wakawali, Dr..BSKKV, Dapoli	**Fruits are short, bold, point up word and straight**
4.	DPLC-5	Central Experiment Station, Wakawali, Dr..BSKKV, Dapoli	**Fruits are short, bold, point up word and pendent**
5.	ACSS 9818	AnandAgril. University, Gujarat	**Yellowish green, Medium to long sized chilli.**
6.	**BC-28**	**Orissa University of Agril. & Technology, Bhubaneshwar (Odisha)**	**Green fruits with pungency**

Table.3 Pooled Analysis of Variance (mean square) for Phenotypic Stability for Different Characters in Chilli

	D.F.	Day to 50 % Flowering	Days to 1st Fruit Ripening	Plant Height	Number of Fruits per Plant	Fresh Weight per Fruit	Fruit Length (cm)	1000 Seed Weight	Number of Seeds per Fruit	Dry weight per fruit	Dry Weight of Fruits per Plant	Fresh Weight of Fruits per Plant	Net Plot Yield of Fresh Fruits	Capsaicin Content
Genotypes (G)	41	19.89**	16.87**	452.82**	5645.61**	1.84**	6.78**	13.30**	453.67**	0.19**	635.84**	38707.63**	17391.584**	**0.01494****
Environment (E)	2	219.45**	177.70**	279.91**	6080.07**	0.49**	19.45**	34.75**	969.62**	0.64**	521.97**	10698.88*	6054.101**	**0.01516****
G × E.	82	3.53**	4.44**	18.13**	158.60	0.15	1.01*	1.17**	5.13**	0.01	31.96*	2245.29	283.424	**0.00011****
Environment (Lin.)	1	438.89**	355.39**	559.82**	12160.14**	0.98*	38.91**	69.50**	1939.24**	1.28**	1043.95**	21397.76**	12108.202**	**0.032****
G × E.(Linear)	41	6.71**	6.95**	32.73**	159.35	0.14	1.45**	2.08**	8.27**	0.01	43.93**	2234.46	280.914	**0.00023****
Pooled Deviation	42	0.34	1.88	3.45	154.09**	0.15**	0.56**	0.25	1.94	0.01**	19.52**	2202.40**	279.126	**0.0001**
Pooled Error	**123**	**1.62**	**2.95**	**29.05**	**65.78**	**0.02**	**0.22**	**0.48**	**6.14**	**0.00**	**2.92**	**711.26**	**277.544**	**0.00095**

*, ** Significant at 5 and 1 per cent probability levels, respectively

Table.4 Stability Parameters for Yield and Related Traits in Chilli across Three Locations

Genotypes	Days to 50 % flowering			Days to first fruit ripening			Plant height (cm)			Number of fruits per plant			Fresh weight per fruit(g)			Fruit Length (cm)			1000 seed weight (g)		
Hybrids	**Mean**	**S^2di**	**bi**	**Mean**	**S^2Di**	**bi**	**Mean**	**S^2Di**	**bi**	**Mean**	**S^2Di**	**bi**	**Mean**	**S^2Di**	**bi**	**Mean**	**S^2Di**	**Bi**	**Mean**	**S^2Di**	**bi**
AVPP0309S X PusaJwala	77.75	-1.49	1.03	77.75	-1.49	1.03	48.15	-28.75	-0.37	129.36	-58.42	1.24	2.00	-0.01	-2.12	6.15	-0.13	0.68	4.61	-0.47	0.49
AVPP0309S X ACSS 9818	79.00	-1.60	1.51	79.00	-1.60	1.51	48.55	-28.78	0.44	176.88	-58.56	1.63	2.08	-0.02	0.53	6.30	0.16	1.46	4.88	-0.47	0.00
AVPP0309S X DPLC-4	82.16	-1.04	2.29	82.16	-1.04	2.29	42.38	-8.86	-2.19	137.45	-58.21	1.30	2.05	-0.01	0.95	5.60	0.06	0.16	6.42	-0.40	1.23
AVPP0309S X BC-28	81.83	-0.87	1.52	81.83	-0.87	1.52	60.30	-15.10	4.41	106.91	4.75	-0.32	1.96	-0.02	1.32	7.37	1.60**	1.40	6.26	-0.44	0.44
AVPP0309S X DPLC-1	81.15	-1.39	2.90	81.15	-1.39	2.90	53.21	-28.83	-0.22	130.05	181.54	1.55	2.08	-0.01	1.17	5.60	-0.05	0.39	4.85	-0.47	0.36
AVPP0309S X DPLC-2	81.91	-1.38	1.15	81.91	-1.38	1.15	53.00	-28.87	0.14	48.90	-64.17	0.68	2.90	-0.01	-4.07	5.44	0.13	-1.00	7.12	-0.33	3.37
AVPP0310S X PusaJwala	81.75	-1.50	-0.81	81.75	-1.50	-0.81	52.80	-28.97	-0.36	60.68	-64.33	0.49	2.75	-0.01	-0.00	6.21	-0.21	1.26	4.95	-0.39	0.71
AVPP0310S X ACSS 9818	82.08	-1.57	-0.87	82.08	-1.57	-0.87	58.58	-28.97	-0.34	128.46	-63.05	1.13	2.08	-0.01	2.53	6.03	-0.15	1.34	5.51	-0.32	-0.34
AVPP0310S X DPLC-4	83.75	-1.47	2.46	83.75	-1.47	2.46	67.85	-28.66	2.88	127.75	-64.24	1.05	2.51	0.08	3.68	4.50	-0.21	-0.48	6.26	-0.40	3.42
AVPP0310S X BC-28	81.16	-1.57	0.11	81.16	-1.57	0.11	59.73	-28.95	2.26	84.45	-64.75	0.94	2.10	0.09	-1.63	4.75	-0.05	0.12	5.89	-0.45	0.46
AVPP0310S X DPLC-1	78.50	-1.53	0.82	78.50	-1.53	0.82	58.68	-28.97	-0.01	113.35	-63.05	1.08	2.02	-0.02	-0.30	5.18	-0.21	-1.41	4.99	-0.36	1.52
AVPP0310S X DPLC-2	82.08	-1.59	-0.49	82.08	-1.59	-0.49	63.51	-28.80	1.45	172.48	-64.43	1.44	1.98	-0.01	0.94	5.90	-0.19	0.37	3.23	-0.34	0.35
AVPP0517S X PusaJwala	80.50	-1.60	1.53	80.50	-1.60	1.53	71.35	-27.41	3.74	55.33	-64.85	0.51	2.02	-0.01	1.39	6.16	-0.21	1.29	7.86	-0.38	2.44
AVPP0517S X ACSS 9818	80.58	-1.61	2.35	80.58	-1.61	2.35	66.00	-28.29	2.54	145.11	-58.08	1.74	2.05	-0.01	0.92	4.98	-0.05	1.14	6.02	-0.42	1.46
AVPP0517S	85.	-1.58	1.09	85.41	-1.58	1.0	60.94	-18.33	-1.74	69.28	-64.88	0.66	2.84	-	2.76	5.90	-0.07	0.2	13.35	-0.44	2.23

X DPLC-4	41					9								0.002				8			
AVPP0517S X BC-28	81.66	3.50	0.54	81.66	3.50	0.54	65.35	-27.76	3.93	47.15	-64.85	0.53	1.58	0.04	-0.55	6.75	0.88**	0.93	9.18	3.61**	1.45
AVPP0517S X DPLC-1	80.91	-1.59	1.03	80.91	-1.59	1.03	61.83	-28.97	-0.44	181.36	-13.02	1.49	2.13	-0.02	0.70	6.38	-0.16	0.89	9.47	0.62	2.54
AVPP0517S X DPLC-2	81.83	-1.55	0.98	81.83	-1.55	0.98	57.28	-28.06	1.65	85.91	-63.17	0.83	2.86	-0.02	0.98	7.35	-0.11	1.22	6.58	-0.47	0.97
AVPP0709S X PusaJwala	84.26	-1.60	1.31	84.26	-1.60	1.31	67.41	-27.42	2.35	127.90	-45.34	1.45	2.27	-0.01	0.90	5.21	2.46**	2.35	9.06	0.20	0.91
AVPP0709S X ACSS 9818	82.90	-1.60	0.71	82.90	-1.60	0.71	42.81	34.54	-3.07	103.63	-52.77	0.95	2.11	0.00	0.09	6.28	-0.21	1.39	7.69	-0.00	1.66
AVPP0709S X DPLC-4	89.50	-0.21	1.53	89.50	-0.21	1.53	52.03	-28.95	0.67	115.35	484.34**	1.17	1.81	-0.02	0.44	5.70	6.70**	3.89	9.36	-0.47	1.29
AVPP0709S X BC-28	78.58	-1.46	0.98	78.58	-1.46	0.98	68.91	-28.86	1.16	133.63	-64.79	1.24	2.70	-0.01	3.10	7.56	-0.15	1.45	10.63	-0.36	5.46
AVPP0709S X DPLC-1	83.50	-1.53	1.04	83.50	-1.53	1.04	57.00	-28.82	0.82	175.98	162.15	2.86	2.46	-0.01	3.20	7.33	0.59	3.10	5.71	-0.43	0.65
AVPP0709S X DPLC-2	81.18	0.18	1.64	81.18	0.18	1.64	79.01	-28.68	2.56	150.13	-64.05	1.66	2.67	0.04	-0.07	6.38	-0.14	0.40	5.35	0.92	1.34
AVPP0711S X PusaJwala	79.66	-1.58	1.86	79.66	-1.58	1.86	73.08	-28.38	2.20	149.90	-64.88	1.60	2.76	0.01	2.46	7.16	0.07	0.20	7.19	-0.47	0.31
AVPP0711S X ACSS 9818	80.41	-1.40	1.91	80.41	-1.40	1.91	50.11	-28.94	0.87	140.29	-57.92	1.45	2.09	0.02	1.47	6.61	-0.18	1.16	2.17	-0.31	-0.01
AVPP0711S X DPLC-4	86.50	-1.61	1.09	86.50	-1.61	1.09	80.56	-28.94	2.15	89.31	-57.79	1.14	3.54	0.05	4.53	8.17	-0.20	2.96	6.96	-0.43	0.64
AVPP0711S X BC-28	82.16	-1.57	0.54	82.16	-1.57	0.54	86.31	-28.78	3.10	85.15	-62.70	0.89	5.70	0.02	9.62	9.59	3.44**	5.40	5.48	-0.46	0.43
AVPP0711S X DPLC-1	83.03	-1.60	0.87	83.03	-1.60	0.87	102.56	-18.46	3.17	49.65	-61.71	0.84	2.93	0.02	2.08	8.20	0.27	1.37	6.70	-0.47	0.21
AVPP0711S X DPLC-2	83.65	-1.60	1.25	83.65	-1.60	1.25	56.06	-28.96	0.38	119.35	-64.12	1.20	2.32	-0.02	0.67	8.53	0.15	0.82	6.13	-0.04	0.57
Female																					
AVPP0309B	80.68	-1.59	0.76	110.50	-2.71	0.96	42.717	-26.44	1.49	82.60	473.16**	-1.69	2.43	-0.01	1.37	6.40	0.002	0.71	2.58	-0.42	0.54
VI060629B	86.50	-1.61	0.65	116.00	-2.71	0.96	49.133	-28.86	0.48	149.85	4242.63**	0.42	2.09	-0.02	1.90	7.10	-0.15	0.25	7.47	-0.46	0.57
VI060632B	85.08	-1.55	0.87	115.16	-2.87	0.85	53.800	-28.97	0.67	142.31	-62.05	1.24	1.60	-0.02	1.91	6.43	-0.19	0.26	8.49	-0.38	0.85
VI060627B	83.73	-1.61	1.20	115.41	2.33	0.18	52.217	-28.96	0.38	66.78	-64.76	0.74	2.56	5.43**	-7.27	5.85	-0.16	0.39	6.03	-0.46	0.38
VI060630B	84.31	-1.59	1.14	113.83	-2.06	1.55	53.062	-28.83	0.55	247.92	-44.50	1.92	1.68	-0.01	0.67	7.35	0.09	0.88	7.65	-0.47	0.54

Males																					
PusaJwala	83.36	0.79	1.41	115.00	-2.72	0.39	64.34	-27.99	0.55	96.50	-61.48	0.93	1.06	-0.02	0.08	4.70	-0.21	-0.38	3.67	-0.21	-0.14
ACSS 9818	85.08	-1.60	0.38	115.16	-2.91	0.37	41.35	-28.70	0.26	108.93	-61.48	0.99	1.36	-0.01	-0.25	5.15	-0.20	0.10	4.72	-0.47	0.05
DPLC-4	83.08	-1.60	0.38	113.25	-2.88	0.31	63.33	-28.97	0.76	97.33	-64.66	1.08	1.46	-0.01	1.45	1.45	-0.21	-0.19	6.37	-0.46	0.53
BC-28	82.65	-1.55	0.32	112.16	-2.90	0.61	62.21	-18.75	0.55	151.55	-59.43	0.93	2.08	-0.02	0.36	4.10	-0.09	0.42	7.15	-0.29	1.27
DPLC-1	81.00	-1.61	0.65	113.28	1.41	1.62	61.41	-26.34	0.66	141.98	-63.39	1.35	2.23	-0.02	0.23	5.70	0.05	1.03	6.13	-0.47	0.25
DPLC-2	84.25	-1.51	0.16	114.83	1.60	0.13	62.77	-28.10	0.70	69.72	292.32*	-1.05	2.26	-0.02	0.46	5.48	0.53	1.07	6.62	-0.20	-0.02
Check																					
Sitara	89.58	-1.34	0.05	116.3	37.291	0.59	72.61	-28.97	0.70	60.9	64.68	0.595	4.35	-0.009	3.29	10.33	1.02	2.79	5.34	-0.470	0.490
Mean	**82.58**		**1.00**	**112.7**		**1.09**	**60.58**		**1.00**	**115.7**		**8.8**	**2.34**		**1.00**	**6.27**		**1.00**	**6.48**		**1.00**
SE	**0.41**		**0.179**	**1.0**		**0.5**	**1.31**		**0.508**	**1.97**		**0.7**	**0.27**		**2.52**	**0.52**		**0.77**	**0.35**		**0.3881**

Table 2cont….

Genotypes	Number of seeds per fruit			Dry weight per Fruit (g)			Dry weight of fruits per Plant (g)			Fresh weight of fruits per plant(g)			Net plot yield of fresh fruits (kg)			Capsaicin content (%)		
Hybrids	**Mean**	**S²di**	**bi**	**Mean**	**S²di**	**bi**	**Mean**	**S²Di**	**bi**	**Mean**	**S²Di**	**bi**	**Mean**	**S²Di**	**bi**	**Mean**	**S²Di**	**Bi**
AVPP0309S X PusaJwala	49.15	-6.20	1.37	0.50	-0.00	0.75	25.53	-2.61	1.41	273.76	-636.56	1.70	5.47	-279311.29	1.46	0.300	-0.0094	0.912
AVPP0309S X ACSS 9818	34.83	-6.22	0.73	0.90	0.01*	1.20	49.00	-1.96	1.26	382.48	-280.64	2.45	7.63	-273866.59	2.19	0.372	-0.0095	0.912
AVPP0309S X DPLC-4	44.13	-5.80	0.91	0.96	0.00	0.90	22.76	-2.80	1.20	298.81	-663.14	2.07	5.97	-267216.70	1.74	0.302	-0.0092	0.912
AVPP0309S X BC-28	13.16	-6.29	0.39	1.18	0.07**	1.56	21.16	472.88**	-0.67	203.13	-565.34	1.72	4.06	-280207.62	1.51	0.331	-0.0097	-0.456
AVPP0309S X DPLC-1	56.23	-4.56	1.88	1.31	0.04**	2.40	14.41	-2.84	0.65	310.70	-546.83	1.43	6.19	-279419.32	1.29	0.341	-0.0091	1.352
AVPP0309S X DPLC-2	41.60	-0.00	0.55	0.66	-0.00	0.84	3.01	-2.93	0.13	88.28	-702.42	1.06	1.76	-274060.96	0.88	0.336	-0.0093	0.760
AVPP0310S X PusaJwala	35.71	-6.05	1.05	0.60	-0.00	1.07	15.33	-2.91	0.71	149.02	-673.32	1.15	2.97	-280001.28	0.98	0.242	-0.0098	0.897
AVPP0310S X ACSS 9818	47.50	-2.02	1.72	1.03	0.01	1.43	34.97	69.58**	3.62	270.22	-654.68	1.68	5.40	-277330.53	1.44	0.324	-0.0096	1.079
AVPP0310S X DPLC-4	56.78	-2.62	1.53	0.65	0.00	1.13	17.38	-2.91	0.93	270.10	-680.43	1.24	5.40	-278510.66	1.06	0.317	-0.0097	1.048
AVPP0310S X BC-28	23.88	-0.46	0.63	0.61	0.00	0.39	1.71	-2.93	0.07	169.64	-675.56	0.91	3.39	-280856.20	0.79	0.357	-0.0092	1.048
AVPP0310S X DPLC-1	40.08	-5.59	0.92	1.15	0.01*	1.89	14.75	3.96	1.45	220.32	-649.30	1.37	4.43	-277589.07	1.18	0.258	-0.0099	0.790
AVPP0310S X DPLC-2	44.90	5.78	0.96	0.63	-0.00	0.61	4.85	-2.39	0.24	382.02	-450.70	1.35	7.64	-258788.64	1.25	0.294	-0.0095	3.465
AVPP0517S X PusaJwala	31.16	-4.85	0.70	0.73	-0.00	0.99	14.00	-2.34	0.59	224.76	32127.75**	-6.17	2.46	-280762.37	0.64	0.249	-0.0094	1.155
AVPP0517S X ACSS 9818	57.41	-6.08	1.09	0.90	0.00	1.13	50.00	-2.89	1.86	339.08	-646.67	1.70	6.85	-223569.96	1.91	0.459	-0.0092	1.231
AVPP0517S X DPLC-4	29.16	7.37	2.17	1.13	0.00	1.05	20.66	-2.90	0.49	192.58	-660.57	0.88	3.85	-280138.69	0.79	0.311	-0.0094	1.352
AVPP0517S	15.8	-	0.46	0.61	0.01*	0.70	14.25	-2.92	0.6	116.6	-641.26	1.02	2.33	-279654.23	0.9	0.350	-	1.459

X BC-28	8	6.22			*				5	2					1		0.0098	
AVPP0517S X DPLC-1	33.61	-6.25	0.89	1.08	0.00	1.37	31.23	-2.04	1.26	474.76	-511.13	1.45	9.49	-271904.06	1.31	0.278	-0.0097	1.292
AVPP0517S X DPLC-2	43.76	-6.07	1.24	0.76	-0.00	1.15	18.66	-2.77	0.77	247.94	-665.69	1.56	4.95	-277159.56	1.33	0.343	-0.0096	1.368
AVPP0709S X PusaJwala	23.88	-5.79	0.85	0.60	-0.00	0.31	32.08	23.87**	-0.37	322.67	-577.25	1.49	6.45	-278662.03	1.32	0.450	-0.0099	1.064
AVPP0709S X ACSS 9818	26.45	-5.96	0.62	0.71	0.00	0.77	21.25	-2.89	4.85	195.57	-678.51	1.57	3.91	-274052.16	1.33	0.278	-0.0095	1.102
AVPP0709S X DPLC-4	28.45	-5.34	0.96	0.68	-0.00	0.92	5.96	-2.89	0.28	205.51	-666.89	1.27	4.11	-280162.47	1.09	0.331	-0.0093	0.843
AVPP0709S X BC-28	22.31	13.95	2.17	0.76	0.00	0.39	61.60	-2.92	1.87	488.55	-587.96	1.18	9.77	-275792.13	1.07	0.323	-0.0099	1.056
AVPP0709S X DPLC-1	49.28	-6.19	1.26	0.65	0.02**	0.55	54.58	-1.88	1.83	454.29	-692.67	2.12	9.08	-249559.58	1.76	0.277	-0.0091	1.048
AVPP0709S X DPLC-2	20.50	-4.90	0.70	1.16	-0.00	1.15	11.16	60.38**	4.34	314.36	152.94	-4.23	6.28	862347.01**	-3.15	0.371	-0.0092	1.223
AVPP0711S X PusaJwala	40.48	-6.16	1.21	0.46	-0.00	1.15	18.31	-2.93	0.74	468.85	-649.59	1.38	9.37	-280579.74	1.19	0.326	-0.0093	0.714
AVPP0711S X ACSS 9818	42.40	-6.19	0.46	0.68	-0.00	0.92	36.81	-2.49	0.56	260.40	-699.90	0.81	5.20	-279071.38	0.69	0.315	-0.0097	0.821
AVPP0711S X DPLC-4	55.48	-5.02	0.71	1.45	0.00	1.51	23.66	-2.93	1.00	403.12	-234.38	-1.95	8.72	-280387.97	1.40	0.329	-0.0095	1.413
AVPP0711S X BC-28	33.93	-6.24	0.94	0.98	-0.00	0.92	12.75	5.24	1.88	505.05	50723.11**	6.33	12.14	-279892.89	2.12	0.547	-0.0098	1.398
AVPP0711S X DPLC-1	28.23	-5.99	0.88	0.80	0.03**	1.96	24.61	12.02	-1.04	189.18	-688.46	1.06	3.78	-279159.01	0.90	0.376	-0.0094	-0.395
AVPP0711S X DPLC-2	31.61	-6.15	0.87	0.91	0.00	0.77	55.60	-2.77	1.78	317.54	1856.38	0.65	6.01	-273223.63	1.17	0.284	-0.0093	1.079
Female																		
AVPP0309B	25.91	-5.843	1.06	1.16	-0.00	1.15	39.66	-2.71	1.23	160.15	-685.69	1.08	3.20	-279415.78	0.92	0.352	-0.0094	0.015
VI060629B	50.5	-	0.93	0.75	-0.00	0.75	17.78	3.95	2.1	333.4	-689.16	1.69	6.66	-267161.42	1.4	0.342	-	0.760

	3	5.780							5	5					1		0.0096	
VI060632B	11.15	-6.287	0.44	0.56	-0.00	1.22	7.31	32.92**	3.13	260.83	-474.80	-0.45	5.68	-249513.57	0.66	0.493	-0.00197	0.821
VI060627B	25.11	-6.232	0.75	0.58	-0.00	0.92	18.66	-2.84	0.57	177.46	-345.98	1.06	3.48	-274682.42	1.07	0.558	-0.0092	0.912
VI060630B	38.58	-6.226	1.05	0.45	0.00	0.62	20.93	-1.72	0.82	460.89	-646.57	1.38	8.15	6550174.39**	1.67	0.330	-0.0090	1.109
Males																		
PusaJwala	22.00	-6.283	0.78	0.43	0.01*	0.47	9.73	-2.81	0.42	105.16	-671.08	0.90	2.10	-280764.23	0.79	0.337	-0.0094	0.638
ACSS 9818	47.21	-5.898	1.14	0.76	0.00	0.77	24.33	23.59**	-1.36	106.07	-679.29	-4.63	2.24	3046554.08**	-2.88	0.333	-0.0093	0.836
DPLC-4	31.33	-6.244	0.94	0.83	-0.00	0.92	15.30	-1.22	1.33	158.95	-642.98	1.25	3.17	-280818.32	1.09	0.256	-0.0097	0.912
BC-28	53.83	-4.179	1.50	0.86	0.00	0.77	12.00	-1.19	0.10	351.66	-679.37	0.79	7.20	-108884.24	0.62	0.351	-0.0098	0.836
DPLC-1	38.26	-6.298	0.78	0.55	0.00	0.62	30.53	30.70**	-1.64	319.71	-655.21	1.21	6.39	-280841.25	1.06	0.282	-0.0095	1.048
DPLC-2	29.70	-5.763	0.70	1.00	0.06**	0.11	25.38	33.56**	-0.62	208.97	498.54	1.90	4.52	-280668.83	0.64	0.357	-0.0094	1.033
Check																		
Sitara	38.45	-5.87	0.943	1.20	0.02**	1.58	13.68	-2.07	1.39	325.9	-642.15	5.42	5.77	-278291.47	1.23	0.298	-0.0092	1.14
Mean	**36.05**		**1.00**	**0.821**		**1.00**	**23.03**		**1.00**	**278.8**		**1.00**	5.56		**1.00**	**0.339**		**1.00**
SE	**0.985**		**0.20**	**0.074**		**0.607**	**3.12**		**0.88**	**33.2**		**2.1**	**0.37**		**1.00**	**0.0001**		**0.0039**

Among the males DPLC-4 was most adaptable over environments due to unit regression coefficient and non significant deviation from regression. The parent Jwala and DPLC-2 had significant non linear component indicated that their performance was unpredictable. BC-28 had bi value less than one and very low S^2di suitable for average environment. HybridAVPP0309S × DPLC-4, AVPP0517S × DPLC-4 and AVPP0711 × BC-28 had high dry weight per fruit along with bi value nearer to unity and non significant non linear component thereby, considered as most stable in overall environments. Eight hybrids had significant non linear component indicated that their performance was unpredictable. Three hybrids had bi value greater than one suitable for favourable environment and hybrid AVPP0711S × DPLC-2 had higher mean value, very low S^2d^i and bi value less than one show stability to average environment.

Net plot yield of fresh fruits (g)data indicated that significant deviation of mean square were manifested by three genotypes, revealing large contribution of non linear components towards G×E interaction. Among the females VI060630B had high mean and male ACSS9818 had low mean value but their performance was unpredictable over environments due to significant deviation of mean square. Female VI060629B was stable for favourable environment and VI060632B for poor environment. Male BC-28 recorded maximum net plot yield with regression coefficient less than one and non significant deviation from mean square, hence it was suitable for poor environment. DPLC-1 was identified as stable genotype due to mean value higher than average mean, bi value near to unity and non significant non linear component. Hybrid AVPP0709S × BC-28 had highest net plot yield along with unit regression coefficient value and non significant non linear component thereby, considered as most stable hybrid over environment followed by AVPP0711S × DPLC-2 and AVPP0711S × Jwala. Hybrid AVPP0709S × DPLC-2 had unpredictable performance over environments due to significant deviation of mean square. Eleven hybrids had high mean, regression coefficient greater than one and non significant non linear components, indicated that these hybrids were adaptable over favourable environments.

For the character capsaicin content (%) the stability analysis showed that all the genotype had non significant deviation of mean square indicating less contribution of non linear components towards G×E interaction. Among the females VI060627B recorded high mean, bi value near to unity hence stable over environments, while AVPP0309B, VI060629B and VI060632B had high mean but was adaptable over poor environment due to bi value less than one. Among male parents, BC-28 had high mean, bi values less than one suitable for poor environment while DPLC-2 had high mean, regression coefficient near to unity considered to be stable. Hybrids AVPP0309S × ACSS9818, AVPP0310S × BC-28, AVPP0709S × Jwala had high mean for this trait coupled with unit regression coefficient and non significant non linear components and therefore were considered as stable. Five hybrids better adapted to favourable environment as evident from their high mean, regression coefficient higher than one and non significant deviation from regression.

Comparative study of five stable hybrids *viz*, AVPP0711S × BC-28, AVPP0709S × BC-28, AVPP0517S × DPLC-1, AVPP0711S × Pusajwala and AVPP0709S × DPLC-1 had high net plot yield of fresh fruits and high stability for some characters *viz*, days to 50 per cent flowering, fresh weight per fruit, fruit length, 1000 seed weight, dry weight per fruit and net plot yield of fresh fruits. Stability of these hybrids might have resulted due to stability for various component traits. Thirteen hybrids had higher than average yield, significant deviation mean squares (S^2di) with high, low or unit regression values therefore, categorized then as stable, better for good environment and poor environment. The stability of genotypes revealed that none of the parents and hybrids were found to be ideal for better as well as poor management condition for all the characters. In general the hybrids found stable for net plot yield of fresh fruits also depicted stability in respect of its one or more yield component traits like number of fruits per plant, plant height, fruit length, fresh weight per fruit and fresh weight of fruits per plant. This indicated that the stability of various component traits might be responsible for the observed stability of different hybrids for net plot yield of fresh fruits. The chances for selection of stable hybrids could be strengthen by selection in favor of stability in individual component. Similar trends for adaptability of genotypes were also observed by Roy *et al.,* (1998); Chowdhury *et al.,* (2001); Senapati and Sarkar (2002); Nehru *et al.,* (2003); Saxena and Hundal (2005); Srividhya and Ponnaswami (2011); Gurung *et al.,* (2012); Tembhurne and Rao (2012) and Syukur *et al.,* (2014).

Among females VI060632B, VI060629B and VI060630B and among males DPLC-1 and BC-28 were found to be stable for net plot yield of fresh fruits. Females VI060629B and VI060630B were stable for number of fruits per plant, fruit length, fresh weight of fruits per plant and net plot yield of fresh fruits. The male parent DPLC-1 and BC-28 was found to be stable for plant height, number of fruits per plant, fresh weight of fruits per plant, dry weight per fruit, number of seeds per fruit and net plot yield of fresh fruits.

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