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Short Communication

Genetic variation for yield and anthracnose resistance in chilli (*Capsicum annuum* L.)

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Chilli (*Capsicum annuum* L.) is an important spice cum vegetable crop, grown on a commercial scale in India. Productivity of the crop remains low mostly due to destructive diseases. One of the most dreaded diseases affecting chilli is anthracnose, which is also called dieback and fruit rot. The best way to tackle this disease is to grow resistant varieties. Hence it is essential to identify the sources of anthracnose resistance to develop high yielding anthracnose resistant varieties of chilli. The present investigation was undertaken to reveal the genetic variability for yield and anthracnose resistance in chilli.

Two parallel experiments using 76 genotypes of chilli were conducted during *rabi* 2002 to screen for anthracnose disease resistance and yield evaluation. Randomised block design with two replications, at a spacing of 45 × 45 cm and ten plants per treatment per replication was adopted. A high yielding chilli variety *viz.*, Jwalamukhi, released by Kerala Agricultural University was used as the check variety and it was found to be highly susceptible to anthracnose. Scoring for disease incidence was done following the standard procedures by Mayee and Datar [1] and Sulochana *et al.* [2] during three crop stages *viz.*, 30, 45 and 60 DAT (Days After Transplanting). From the experiment on yield evaluation, observations on days to first flowering, number of branches, number of fruits per plant, average green fruit weight (g), fruit weight per plant (g), fruit length (cm), fruit girth (cm), number of seeds per fruit, hundred seed weight (g), plant height (cm), duration of the crop, harvest index, capsaicin content and oleoresin content were recorded.

It was found that anthracnose disease intensity gradually increased from 30 DAT to 60 DAT. At 30 DAT, 45 DAT and 60 DAT, majority of the genotypes showed anthracnose disease incidence varying between 20 and 30 per cent. At 30 DAT, most of the genotypes were found to be slightly susceptible while a few were severely affected by the disease. But three genotypes *viz.*, T_{20} (Kidangoor Local-1), T_{42} (Ujwala) and T_{76} (Pant C 1) were found moderately resistant. The same trend continued during 45 DAT and 60 DAT with the number of slightly susceptible genotypes increasing as the number of days after transplanting increased. T_{20}, T_{42} and T_{76} remained moderately resistant throughout the crop period (Table 1).

Table 1. Anthracnose disease intensity for chilli at 30, 45 and 60 days after transplanting (DAT)

Treatment number	Anthracnose disease intensity					
	30 DAT		45 DAT		60 DAT	
	Mean	Trans-formed mean	Mean	Trans-formed mean	Mean	Trans-formed mean
T_{20}	4.52	3.14	7.69	2.77	4.27	2.07
T_{42}	6.08	2.91	4.39	2.09	4.51	2.12
T_{76}	2.75	2.91	4.45	2.10	4.48	212
SE		0.29		0.29		0.30

Among the 76 genotypes, T_{65} (48.0 days) was the earliest to flower. For number of fruits per plant, T_1 (138.4) ranked first and was on par with T_6 and T_2. T_{17} (7.8 g) was superior for average green fruit weight. T_1 (379.2 g) was the highest yielder and it was on par with T_{23} and T_2. The longest fruits were produced by T_{20} (10.7 cm). T_1 (0.9) recorded the highest value for harvest index. Capsaicin content was the highest for T_{20} (0.41 %) and T_{69} (0.41%) while oleoresin content was maximum for T_{42} (14.18 %).

High PCV and GCV (Table 2) were observed for most of the traits. Very high heritability was shown by fruit weight per plant, fruit length, hundred seed weight, number of seeds per fruit and capsaicin content. High genetic advance was observed for fruit weight per plant, per cent disease incidence, number of fruits per plant, disease intensity, average green fruit weight and number of seeds per fruit. High heritability coupled with high

Table 2. PCV, GCV, heritability and genetic advance in chilli

	Characters	PCV	GCV	H^2 (%)	GA (% of mean)
1.	Days to first flowering	16.12	15.21	89.01	29.56
2.	Number of branches	32.86	31.56	92.30	62.56
3.	Number of fruits per plant	39.15	38.10	94.70	76.39
4.	Average green fruit weight (g)	35.02	34.24	95.62	69.14
5.	Fruit weight per plant (g)	45.93	45.68	96.90	93.59
6.	Fruit length (cm)	32.76	32.21	96.68	65.19
7.	Fruit girth (cm)	25.04	24.30	94.21	48.38
8.	No. of seeds per fruit	27.79	26.30	96.40	72.43
9.	Hundred seed weight (g)	28.82	28.30	96.08	55.23
10.	Plant height (cm)	06.37	05.63	79.68	57.62
11.	Duration of the crop	16.41	15.22	86.12	10.46
12.	Harvest index (%)	41.48	38.41	85.75	29.11
13.	Capsaicin content (%)	32.47	31.88	96.39	64.48
14.	Oleoresin content (%)	13.63	13.31	95.26	26.75
15.	Per cent disease incidence	40.78	40.05	96.46	80.64
16.	Disease intensity (%)	41.48	38.41	85.75	72.63

H^2 = Heritability, GA = Genetic advance

genetic advance (as % of mean) was shown by all the characters studied except duration of the crop. Predominance of additive genetic effects for these characters is revealed suggesting selection to be rewarding.

Per cent disease incidence and disease intensity were negatively associated with capsaicin content and harvest index (Table 3).

Green fruit weight per plant (yield) exhibited positively significant association with number of branches per plant, number of fruits per plant, average green fruit weight, fruit length, fruit girth, hundred seed weight, duration of the crop, harvest index, capsaicin content, disease intensity and per cent disease incidence. Yield showed desirable negatively significant association with days to first flowering. Hence selection based on the above traits would lead to improvement in yield.

References

1. **Mayee C. D. and Datar V. V.** 1986. Phytopathometry. Technical Bulletin No. I (Special bulletin-3) Marathwada Agricultural University, Parbhani: 146.

2. **Sulochana K. K. Rajagopalan B. and Wilson K. I.** 1992. Fungicidal control of fruit rot of chilli caused by *Colletotrichum capsici* (Syd.) Butl. and Bisby. Agric. Res. J. Kerala, **30**: 65-67.

Table 3. Genotypic correlation in chilli

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16
X1	1.0000															
X2	−0.1109	1.0000														
X3	−0.2008	0.5309**	1.0000													
X4	−0.2850*	0.1162	0.2433*	1.0000												
X5	−0.2529*	0.3548**	0.7340**	0.4867**	1.0000											
X6	0.0683	0.2041	0.2068	0.1285	0.2790*	1.0000										
X7	−0.1043	0.0566	0.3269**	0.2205*	0.3861**	0.2017	1.0000									
X8	−0.0219	−0.2367*	−0.0257	−0.0678	−0.1957	−0.0114	−0.1023	1.0000								
X9	−0.1601	0.1020	0.2182	0.0309	0.2274*	0.2093	0.0841	0.1217	1.0000							
X10	−0.0680	−0.0571	0.0591	0.2275*	0.1520	0.3581**	−0.2005	0.1476	0.0471	1.0000						
X11	−0.0307	0.2277*	0.4506**	0.1869	0.4984**	0.0165	0.1558	−0.1182	0.1283	−0.0417	1.0000					
X12	−0.1570	0.2338*	0.3865**	0.4432**	0.6567**	0.0490	0.2795*	−0.1612	0.2147	0.1392	0.2270*	1.0000				
X13	0.0839	0.2562*	0.3908**	0.4231**	0.5411**	0.3188**	0.1497	0.4342**	0.0122	0.4021**	0.2527*	0.4184**	1.0000			
X14	−0.1416	−0.1213	0.2527*	−0.1867	−0.0592	−0.1497	−0.1052	0.1899	0.4142**	−0.0625	0.1568	−0.1891	−0.0529	1.0000		
X15	−0.3020	0.4588**	0.6883**	0.3649**	0.6677**	0.1891	0.4777**	−0.1162	0.1974	−0.1274	0.4446	0.2832*	−0.4297**	0.0071	1.0000	
X16	−0.2065	0.4105**	0.6416**	0.3967**	0.6617**	0.2867*	0.4465**	−0.0569	0.2390	−0.0195	0.4144	0.3426**	−0.3841**	0.0098	0.9140**	1.0000

*,**Significant at 5 and 1% level respectively. X1 = Days to first flowering, X2 = No. of branches, X3 = No. of fruits per plant, X4 = Average green fruit weight, X5 = Fruit weight per plant, X6 = Fruit length, X7 = Fruit girth, X8 = No. of seeds per fruit, X9 = Hundred seed weight, X10 = Plant height, X11 = Duration of the crop, X12 = Harvest index, X13 = Capsaicin content, X14 = Oleoresin content, X15 = Disease intensity and X16 = Percent disease incidence.