Seed Research Vol. 33(1) 114-116, 2005

Short Communication

Flowering and Fruit Setting Behaviour in Chilli (*Capsicum annuum* L.) Genotypes as Influenced by Environments

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Chilli is an important spice as well as vegetable crop grown throughout the country. It also has a tremendous export potential. But the crop is highly specific to the climatic requirements. Like any other vegetable crops, chilli is affected by a number of climatic factors like photo period, temperature and relative humidity [1-3]. The major effect of these meteorological factors is on fruit and seed setting which ultimately influence seed productivity. High magnitudes of genetic variability for yield and its components have also been reported by many workers in chillies [4-5]. The comprehensive information on the response of different genotypes to environmental fluctuations needs to be generated. The information on chilli genotypes for seed production under different environments at Ludhiana (Punjab) is already published [6]. In the present communication information on days to flower and fruit set with respect to different environmental conditions is given.

Fifteen diverse genotypes of chilli were evaluated for flowering and fruit set performance under three planting seasons i.e. winter, spring and summer during 1999-2000 at Punjab Agricultural University, Ludhiana. The nursery for winter, spring and summer season was sown in mid October, mid November of 1999 and end of February 2000 and was transplanted during mid November of 1999 and last week of February and April of 2000 respectively. The experiment was laid out in RBD. The crop was planted at the spacing of 60 cm x 45 cm. The observations were recorded on days to 50% flowering, fruit set percent and number of seeds per fruit. Number of days taken after transplanting were recorded when 50% plants in the plot had flowered. For fruit set, 20 flowers from each of five plants were tagged in each cultivar in the peak flowering month i.e. three months after transplanting in each season. The data was recorded during the month of March for winter, during May for spring and during July for summer. Percent fruit set was calculated as proportion of flowers converted into fruits to the total number of flowers tagged and multiplied by 100.

The computation of Anova (Table 1) revealed significant difference among planting seasons as well as genotypes in respect of days to flowering and percent fruit set. The interaction between seasons and genotypes was also significant for the days to 50% flowering and percent fruit set.

Table 1. Analysis of variance for days to flower and percent fruit set

Source	D.f.	Mean squares	
		Days of flowering	Percent fruit set
Seasons	2	98286.90*	2567.90*
Genotypes	14	200.65*	449.33*
S x G	28	67.00*	61.76*
Error	84	7.90	103.60

*Significant at 5% level of significance

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Received Sept., 2003 Revised Jan., 2005 Accepted May, 2005

Table 2. Influence of planting season and cultivar on days taken to 50 % flowering and percent fruit set

Genotype	Days to flowering				Fruit set (%)			
	Winter	Spring	Summer	Mean	Winter	Spring	Summer	Mean
Pb. Guchhedar	108.3	62.7	53.0	74.7	55.2	66.0	47.5	56.3
Pb. Lal	92.0	46.7	39.7	59.4	59.5	69.3	51.9	60.3
Pb. Surkh	91.0	45.0	39.7	58.6	58.3	63.4	47.0	36.3
Ludhiana Local	99.7	52.3	40.0	64.0	48.9	63.0	42.7	51.5
Selection (LLS)								
S 2529	90.3	45.7	43.0	64.6	49.4	69.4	51.3	59.7
S 2530	90.0	45.3	39.7	58.3	42.2	62.3	52.4	52.3
S 20-1	100.0	61.3	40.7	67.3	48.0	60.9	48.9	52.6
LT-2	95.3	56.7	41.0	64.3	52.4	62.0	56.7	57.0
Tiwari	97.7	53.0	40.3	63.7	58.5	64.0	49.8	57.4
Pusa Jwala	97.0	54.3	42.3	64.6	61.3	67.4	49.9	59.5
Pusa Sadabahar	109.7	55.0	49.7	71.4	52.9	58.7	50.1	53.9
H-28	90.3	45.7	44.0	60.0	58.8	62.5	58.2	59.8
K-1	94.7	50.7	42.7	62.7	48.4	63.4	42.4	51.4
K-2	94.0	53.3	54.2	63.1	58.0	64.0	54.0	58.6
RHCH UP	109.7	59.7	52.0	73.8	56.0	61.3	55.6	57.6
Mean	97.3	52.5	44.1		53.9	63.8	50.6	
CD (P = 0.05)	Planting seasons	0.43			4.34			
	Genotypes	0.95			3.70			
	Interaction	1.65			2.06			

Number of days taken to 50% flowering (Table 2) were maximum (97.3) in winter and decreased gradually from winter to spring and summer. Flowering occurred earliest in summer (44.1 days) while in winter took more number of days (97.3) followed by spring (52.5 days). Baker [7] has also reported delayed flowering by low temperature in sweet pepper. The maximum number of days might be due to prevalence of low temperature (5-12°C) in months of December to March while earliest flowering in crop planted in April might be due to prevalence of favourable temperature (Table 3). More number of flowers induced by high temperature has also been reported by Bakker [7] in sweet pepper. Olarewaju (2) also reported that high temperature induced flowering in chilli.

The genotypes have also showed significant differences. S-2530 (58.3 days) was found to flower about 16 days earlier than Punjab Gucchedar, which took maximum days (74.7 days) for 50% flowering. Similar intervarietal difference for days to 50% flowering has also been reported by Pawade *et al* [8]. The genotype S 2530 was found to be statistically at par with Punjab Surkh which was recorded to be the earliest variety w.r.t. 50% flowering by Kumar *et al* [4].

The fruit setting percentage has significantly been affected by the environmental factors. It was observed that fruit set percentage was significantly more (63.8) in the crop planted in spring as compared to the other planting seasons. The higher fruit set percentage in spring season may be due to favourable environmental conditions. The lower fruit setting percentage in summer season crop may be due to high temperature (33.2 to 39.4°C) and high rainfall during the month of July (189.4 mm) where style elongation may occur prior to dehiscence [9] with subsequent reduction in fruit set and yield. In winter planted crop, the fruit setting and its development may be influenced by pollen infertility or deformation of ovary by low temperature conditions.

Increased assimilate demand due to increased flowering by high temperature may also cause

Table 3. Meteorological data during the cropping season

Month	Air tempeature (°C)			Relative humidity (%)	Rainfall (mm)
	Max.	Min.	Mean		
Oct. 1999	33.1	17.5	25.3	64	0.0
Nov. 1999	27.8	11.6	19.7	60	0.0
Dec. 1999	21.6	5.7	13.6	74	0.0
Jan. 2000	17.2	7.2	12.2	81	49.7
Feb. 2000	19.7	7.0	13.3	74	36.6
Mar. 2000	26.9	11.1	19.0	63	20.6
Apr. 2000	37.3	17.7	27.5	45	1.4
May 2000	39.4	25.9	32.7	44	0.0
June 2000	36.1	27.1	31.6	62	88.2
July 2000	33.2	26.8	30.0	79	120.8
Aug. 2000	34.1	26.0	30.0	79	120.8
Sept. 2000	34.0	22.7	28.3	73	139.2
Oct. 2000	33.8	18.5	26.2	62	0.0
Nov. 2000	27.3	12.2	19.8	64	0.0
Dec. 2000	22.4	6.2	14.3	69	19.4

abortion of newly formed fruits and this may also be a factor for reduced fruit set at high temperature. Significant genotypic variation was observed in fruit set being maximum in Punjab Lal (60.3) followed by H-28 (59.8), Pusa Jawala (59.5), S 2529 (59.7). All were statistically at par with each other. The minimum fruit set was observed in K–I (51.4). The interaction of planting seasons and genotypes for percent fruit set was found to be significant.

REFERENCES

1. KHAH, E.M. & H.C. PASSAM (1992). Flowering, fruit set and development of the fruit and seed of sweet pepper (*Capsicum annuum* L.) cultivated under conditions of high ambient temperature. *J. Hort. Sci.* **67** : 251-58.
2. OLAREWAJU, J.D. (1989). Effects of night temperature on fruit set and development in sweet pepper (*Capsicum annuum* L.). *Haryana J. Hort. Sci.* **18** : 285-88.
3. RYLSKI, I., B. ALONI, L. KAONI & Z. ZAIDMAH (1994). Flowering, fruit set and fruit development and fruit quality under different environmental conditions in tomato and pepper crops. *Acta. Hort.* **366** : 45-55.
4. KUMAR, K., K.S. BASAWANA & P.S. PARTAP (1999). Evaluation of different genotypes of chilli (*Capsicum annum* L.). *Haryana J. Hort. Sci.* **28** : 207-10.
5. MOHANTY, S.K. (2000). Evaluation of brinjal (*Solanum melongena* L) cultivars for seed production potential under different environments. M.Sc. Thesis, Punjab Agricultural University, Ludhiana, India.
6. KANWAR J.S. & G. BHUVANESHWARI (2004). Evaluation of Chilli (*Capsicum annuum* L.) genotypes for seed production under different environments. *Seed Research* **32**: 47-51.
7. BAKER, J.C. (1989). The effects of temperature on flowering, fruit set and fruit development of glasshouse sweet pepper (*Capsicum annuum* L.). *J. Hort. Sci.* **64** : 313-20.
8. PAWADE, S.B., M.B. SONTAKKE & N.N. SHINDE (1993). Variability and heretability in local chilli (*Capsicum annuum* L.) type from Nagpur District. *PKV Res. J.* **17** : 163-67.
9. COCHRAN, H.L. (1938). A morphological study of flower and seed development in pepper. *J. Agri. Res.* **56** : 365-419.