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## Evaluation of Promising Lines of Chillies under High Rainfall Conditions

M. Farooq, A.K. Mansab, Hidayatullah and K.M. Khokhar  
National Agricultural Research Center, Islamabad-45500, Pakistan

**Abstract:** Seven exotic chilli (*Capsicum frutescens*) cultivars, NARC-4, 9656-06, 9656-15, PBC-386, PBC-534, PBC-581 and Korean were evaluated for different yield parameters including number of fruits per plant, fruit weight per plant, single fruit weight, fruit size and yield per hectare. A potential line PBC-386 was found the highest yielding with 14.5 t ha<sup>-1</sup> of fresh fruit. It was followed by PBC-534 and 9656-15 yielding 11.9 and 10.1 t ha<sup>-1</sup>, respectively while Korean seemed to be the poorest yielder with only 4.2 t ha<sup>-1</sup> of fresh fruit.

**Key words:** Promising lines, high rainfall conditions, chillies (*Capsicum frutescens*)

### INTRODUCTION

Chilli (*Capsicum frutescens*) is one of the major condiments widely used in every household round the year. Hot pepper is usually used for pickles, relish salads and seasoning in the form of dry powder. It has high medicinal value. Pepper is a rich source of vitamin C and minerals like potassium, phosphorous and calcium<sup>[1]</sup>. Among vegetable crops, it occupies the largest area in Pakistan after potato and onion<sup>[2]</sup>. Chilli is annually grown over an area of 48.7 thousand hectares with a production of 93.3 thousands tones in Pakistan. Major producing areas prevail in Sindh with share of 79.3%, Punjab (16.2%), Balochistan (3.9%) and NWFP (0.6%). Average per hectare yield of chilli in the country is 1.9 tones which is quite low as compared to the horticulturally advanced countries of the world. It may be due to low yield potential of the existing cultivars being grown in Pakistan. Various researchers have evaluated a number of chilli cultivars under different growing conditions. Chilli cultivars were evaluated and it was observed that 'Numex R Naky' was long fruited with a length of 17.5 cm<sup>[3]</sup>. It gave the highest fresh fruit yield of 34.67 t ha<sup>-1</sup>. Four chilli cultivars were evaluated and variety Sindhur was reported to be the most promising bearing 282.49 fruits per plant as compared to other cultivars which produced 148.65 to 238.0 fruits per plant<sup>[4]</sup>. Seven Chilli cultivars were tested and highest yield of 12.67 t ha<sup>-1</sup> was recorded in BR-Red<sup>[5]</sup>. It was further reported that BR-Red and NP-46A had the longest fruits (104.9 and 101.4 mm, respectively) while CA 960 and BR-Red produced the heaviest fruits weighing 3.06 and 2.48 g, respectively. Fifteen chilli cultivars were tested for yield and quality and it was reported that college 64 L, Hungarian yellow wax and

Anaheim TMR-23 produced good quality fruit and highest yield ranging from 18 to 23 t ha<sup>-1</sup>, whereas, Early-Jalapeno yielded 14.9 t ha<sup>-1</sup><sup>[6]</sup>. PSP II, was reported to be a promising line of chilli having erect and compact growth habit bearing in clusters<sup>[7]</sup>. Ten hot pepper cultivars were evaluated for yield and yield components and Elpaso was found to be the promising, yielding 12.3 t ha<sup>-1</sup> of fresh fruit<sup>[1]</sup>. NARC-V had the maximum fruit length while 'long pepper' was on top (1.37 cm) in case of fruit width. The performance of four exotic chilli cultivars was studied and 'Peshawar selection' was found to be late maturing, bearing maximum (268.0) number of fruits per plant<sup>[8]</sup>. It gave the highest yield of 44.3 t ha<sup>-1</sup> followed by TMR 23 yielding 34.03 t ha<sup>-1</sup> of fresh fruit. The present study was therefore, conducted to select high yielding chilli cultivars for fresh yield under high rainfall conditions of Islamabad.

### MATERIALS AND METHODS

A study was conducted to evaluate the performance of promising lines of chilli at National Agricultural Research Center, Islamabad during spring, 2002. The site is located at 34.4° North and 73° East at 518 m above sea level. A set of seven promising lines received from Asian Vegetable Research and Development Center Taiwan, was planted in a Randomized Complete Block Design with three replications. Nursery of seven chilli lines; NARC-4, 9656-06, 9656-15, PBC-386, PBC-534, PBC-581 and Korean was raised in a mixture of soil, sand and well rotted farm yard manure in equal proportion under controlled conditions to protect from frost during January, 2002. Uniform seedlings at five leaf stage were transplanted in the field by the mid of March, 2002. The inter and intra

row distances were kept at 75 and 50 cm, respectively. Chemical fertilizer NPK were broadcast @ 15: 20: 15 g<sup>-2</sup> at the time of seedbed preparation. Weeds were controlled manually and through mechanical means. Attack of fruit borer was controlled by applying Karate (Lembda Cyhalothrin) @ 2 mL per L of water. Crop harvesting started in June and continued till September, 2002. Observations were recorded on number of fruits per plant, fruit weight per plant, fruit size (length and diameter), single fruit weight and fruit yield kg ha<sup>-1</sup>. Data were analyzed with the help of MSTAT Statistical Procedures, using analysis of variance (ANOVA) technique<sup>[9]</sup>. Difference among chilli lines was computed using the Least Significant Difference (LSD) method at the 0.05 probability level.

**RESULTS AND DISCUSSION**

Normal (1961-90) and year 2001 climatic data (Table 1) indicate that temperature remains below normal during March, April, May and July was above normal while it was slightly below normal in June, August and September. Contrary to that relative humidity remains below normal (8.0 to 10.9%) in March, April, May and July while it was above normal (3.3 to 8.8%) in June, August and September. Rainfall was extremely below normal ranging from 48.4, 51.3, 36.1 and 202.5 mm during March, April, May and July, respectively. It was above normal 68.2 mm in June, 98.0 mm in August and 27.5 mm September<sup>[2,11]</sup>.

Data on yield parameters clearly indicated considerable variations among cultivars.

Almost all promising lines exhibited significant difference among each other for different parameters (Table 2). PBC-534 produced significantly higher number of fruits (278.0 plant<sup>-1</sup>) and showed best environmental reaction and revealed good performance of fruit yield while 9656-06 produced significantly lower number of fruits (136.7) and showed poor response to environment in respect to yield. The lines; NARC-4, 9656-15 and PBC-386 were statistically at par with PBC-534 in case of number of fruit per plant while PBC-581 and Korean were at par with 9656-06. Fruits per plant in 'Jawahar-Mirch 218' has been recorded to be in the range of 138-154 while 148.7 to 282.5 fruits plant<sup>-1</sup> in different cultivars has also been reported<sup>[4,12]</sup>.

Variation in yield and yield contributing parameters of the varieties/lines used in the study may be attributed to their variable genetic make up and response to environmental conditions. Similarly, variation has also been reported among chilli cultivars for number of fruits

**Table 1: Normal (1961-90) and actual climate data at Islamabad during, 2002**  
Latitude: 34.4° North Longitude: 730 East Above sea level: 518 m

Months	Temperature (°C)			Relative humidity (%)			Rainfall (mm)		
	Normal	Mean	Deviation	Normal	Mean	Deviation	Normal	Total	Deviation
March	17.0	18.2	1.2	67.0	56.1	-10.9	89.8	41.4	-48.4
April	22.2	23.9	1.7	51.0	42.5	-8.5	61.8	10.5	-51.3
May	27.9	29.8	1.9	41.0	33.0	-8.0	39.2	3.1	-36.1
June	32.1	30.8	-1.3	38.0	46.8	8.8	62.2	130.4	68.2
July	30.2	30.8	0.6	63.0	52.2	-10.9	267.0	64.8	-202.5
August	28.5	28.1	-0.4	75.0	78.3	3.3	309.9	407.9	98.0
September	27.7	24.7	-3.1	66.0	69.3	3.3	98.2	125.7	27.5

Source: Pakistan Meteorological Department, Karachi Institute of Natural Resources and Environmental Sciences, National Agricultural Research Center, Islamabad

**Table 2: Chillies lines yield and yield components comparison during, 2002**

Name of lines	No. of fruits plant <sup>-1</sup>	Fruit weight plant <sup>-1</sup> (g)	Fruit size (g)		Single fruit weight (g)	Fruit yield ha <sup>-1</sup>
			Length	Diameter		
NARC-4	244.0ab	186.33d	3.40d	0.98cd	0.74d	4.97d
9656-06	136.7c	273.33cd	7.43a	1.24a	2.00b	7.29cd
9656-15	242.7ab	379.33bc	6.53b	0.92d	1.57c	10.11bc
PBC-386	217.7ab	545.00a	7.00a	1.23a	2.49a	14.53a
PBC-534	278.0a	447.00ab	5.23c	1.00c	1.61c	11.92ab
PBC-581	195.0bc	343.00bc	6.53b	1.11b	1.77bc	9.15bc
Korean	189.3bc	158.33d	3.40d	1.01c	0.87d	4.22d

Means with the same letter(s) are not significantly different at 0.05 probability level

per plant<sup>[1,8]</sup>. A significant difference was observed among the cultivars in respect of fruit size. Maximum fruit length of 7.4 cm was recorded in 9656-06, elucidating best environmental response in respect of fruit size. It was followed by PBC-386 having fruit length of 7.0 cm. The cultivars NARC-4 and Korean had lowest fruit length of 3.4 cm. The chilli lines 9656-06 and PBC-386 had diameter of 1.3 and 1.2 cm, respectively, while minimum fruit diameter of 0.92 cm was recorded in 9656-15<sup>[5,8,12,13]</sup>. These differences might be due to genetic and climatic variation.

Fruit weight per plant produced by PBC-386 was the highest (545.0 g) among all lines and was followed by PBC-534 (447.0 g). The lowest fruit weight (158.3 and 186.3 g, respectively) per plant was recorded in Korean and NARC-4. The three remaining lines gave fruit weight ranging from 273.3 to 379.3 g per plant. Yield variation has been reported from 31.9 to 475.3 g per plant<sup>[1]</sup>. Similarly, plant yield ranging from 257.0 to 1037.3 g in different chilli cultivars has also been reported<sup>[8]</sup>. Single fruit weight also varied significantly among the cultivars/lines ranging from 0.74 to 2.49 g. Number of fruits per plant and fruit size are important parameters contributing towards yield. PBC-386, PBC534 and 9656-15 were the top yielding cultivars producing 14.5, 11.9 and 10.1 t ha<sup>-1</sup> of green peppers, while NARC-4 and Korean were in the lower range yielding 4.9 and 4.2 t h<sup>-1</sup>, respectively. There exists distinct variation in yield potential among different chilli genotypes<sup>[1,5,8,13,14]</sup>. Chilli lines PBC-386, PBC-534 and

965615 showed promising results under high rainfall conditions, therefore, their good characteristics can be utilized for the improvement of local chilli cultivars.

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