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Varietal trails of chilli (*Capsicum* spp.) varieties on the basis of growth and yield in Prayagraj Agroclimatic condition

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Abstract

A field experiment was carried out to evaluate the performance chilli varieties for growth and yield in Prayagraj Agroclimatic condition which was conducted at the Horticulture Research Farm, Department of Horticulture, Sam Higginbottom University of Agriculture, Sciences and Technology, Allahabad (U.P.). The experiment consisted of seven chilli varieties i.e., V₁ (Surajmukhi F1 Hybrid), V₂ (Pusa Sadabahar), V₃ (Shanya Hybrid), V₄ (Pusa Jwala), V₅ (F1 Alpine Hybrid), V₆ (Naga Chilli) and V₇ (VNR-305 F1 Hybrid) in a randomized block design with three replications. Result revealed that growth and yield characters such as plant height, numbers of branches per plant, days to first flower initiation, number of fruits per plant, weight of fruit, fruit yield per plant and fruit yield (t ha⁻¹) were influenced by varieties. Among the varieties, V₁ (Surajmukhi F1 Hybrid) recorded significantly higher plant height, number of branches per plant and days to first flower initiation. However maximum number of fruits per plant, fruit yield per plant and fruit yield (t ha⁻¹) were recorded with variety V₃ (Shanya Hybrid).

Keywords: Growth, yield and varieties

Introduction

Chilli or pepper (*Capsicum annum* L.) belongs to family Solanaceae, which is emerging as one of the commercial vegetable crops at the global level, and is probably most important vegetable after Tomato. Its fruits are rich in vitamins, calcium, potassium and other mineral matters. The main functional properties of chilli are pungency, antioxidant activity, vitamin C and natural pigments. Green chillies are rich in source of Vitamin A and Vitamin E. It is also a good source of chilli oleoresin, which is the total flavour extract of dried and ground chillies. The quality of dried chilli is assessed by a number of different parameters such as colour, hotness, ascorbic acid content and volatile flavour compounds (Ruth *et al.*, 2003). India is a major producer, exporter and consumer of chilli. In India, it is grown throughout the country. Andhra Pradesh, Maharashtra, Karnataka and Tamil Nadu constitute 75% of the total area of its cultivation and production. In Uttar Pradesh chillies are mostly grown in eastern districts viz., Ballia, Azamgarh, Mirzapur, Basti, & Faizabad Katheek *et al.*, (2018) [6]. Chilli production and productivity is seriously affected by the use of low yielding local varieties, optimal plant density, heavy attack of insect pests, diseases and weeds etc. Higher production of this crop is possible by the cultivation of varieties which show remarkable enhanced returns, compared to other cultivars grown at same climatic conditions and inputs applied. However, productivity could be improved through careful evaluation and selection of proper chilli varieties based on location and environmental condition Sha & Madhavan (2016) [13]. The protected cultivation could solve the problem of low productivity during extreme weather conditions. Therefore, in the present scenario of perpetual demand for vegetables and drastically shrinking land holdings, protected cultivation of vegetable crops suitable for domestic as well as export purposes is the best alternative for using land and other resources more efficiently. Considering these points, the present investigation was undertaken to find out the growth and yield performance of chilli varieties.

Materials and Methods

The field experiment was carried out at the Horticulture Research Farm, Department of Horticulture, Sam Higginbottom University of Agriculture, Sciences and Technology, Allahabad (U.P.).

It is situated at an elevation of 78 meters above sea level at 25.87°N latitude and 81.15°E longitude. This region has a sub-tropical climate, moderate rainfall, very hot summer prevailing and cold winter. The experiment consisted of seven chilli varieties i.e., V₁ (Surajmukhi F1 Hybrid), V₂ (Pusa Sadabahar), V₃ (Shanya Hybrid), V₄ (Pusa Jwala), V₅ (F1 Alpine Hybrid), V₆ (Naga Chilli) and V₇ (VNR-305 F1 Hybrid) in a randomized block design in three replications. Urea (46% N), DAP (46% P₂O₅) and muriate of potash (60% K₂O) were used as a sources of NPK. The RDF (recommended dose of fertilizer) was 100:60:60 kg NPK ha⁻¹. As a basal dose, half dose of nitrogen was applied at time of transplanting along with full dose of phosphorus and potassium. The remaining nitrogen was applied in three splits at 25, 50 and 70 DAT. Other cultural practices were followed according to the crops requirement. After 75 days of transplanting, the fruit was harvested. The first two pickings given green chillies, followed by red mature fruits.

Results and Discussion

Growth parameters

Plant height (cm)

The data pertaining to plant height influenced due to varieties are presented in Table 01. The results showed that all the varieties exert significant effect on plant height at all growth stages during the experimentation. The value (V₃) was found at par at 30, 60, 90 and 120 DAT, when the CD value was subtracted from the maximum value i.e. V₁ and the rest are significantly superior over the minimum values viz., V₂, V₄, V₅, V₇ and V₆ (lowest). Similar growth trend was observed during the experiment in the varietal trial of chilli. Proper recommended dose of NPK might have helped the plant to have a good plant growth and might be due to existing environmental conditions. So, ultimately it resulted in good vegetative flush. High variation in height of the chilli plants on its final performance was found by Chaudhary (2004) [3], Chopra *et al.*, (2005) and Kerketta *et al.*, (2018) [7].

Number of branches per plant

Data related to number of branches per plant are presented in Table 01. The results showed that all the varieties tried in this experiment significantly influenced the number of branches per plant at all growth stages of chilli plant. The value (V₃) was found at par at 30, 60, 90 and 120 DAT, when the CD value was subtracted from the maximum value i.e. V₁ and the rest are significantly superior over the minimum values viz., V₂, V₄, V₅, V₇ and V₆ (lowest). Similar growth trend was observed during the experiment in the varietal performance of chilli. Proper recommended dose of NPK might have helped the plant to have a good vegetative growth of plant and might be due to existing environmental conditions. So, ultimately it resulted in good vegetative flush. High variation in branches of the chilli plants on its final performance was founded by Sirshat *et al.*, (2006) [15], Krishna *et al.*, (2007) [10] and Munshi *et al.*, (2010) [11].

Days to first flower initiation

It is clear from Table 02 that significant differences were observed in days to first flower initiation of chilli varieties. Variety V₁ recorded significantly more days to attained first flower initiation than viz. V₂, V₄, V₅, V₇ and V₆ (lowest) and it was found statistically at par with V₃ at 30, 60, 90 and 120 DAT. Proper dose of phosphorus is the element most associated with flower growth and production, nitrogen and potassium, along with the secondary nutrients and

micronutrients, are might have helped for the flower initiation and development. Similar findings were also reported by Khokhar *et al.*, (2001) [8], Anu *et al.*, (2002) [1], Bharadwaj *et al.*, (2007) [2] and Sha and Madhavan *et al.*, (2016) [14].

Number of fruits per plant

Data on number of fruits per plant presented in Table 02 revealed that number of fruits per plant influenced significantly due to varieties. The maximum value (V₃) was found significantly superior over all the treatments, followed up by V₂, V₄, V₅, V₇ and V₆ (lowest). This was the growth trend observed during the experimentation. Potassium and phosphorus are responsible for fruiting and strengthen of plant. This is might be due to application of proper dose of potassium and the associated fertilizer associated with growth and production, nitrogen along with the secondary nutrients and micronutrients and the environmental factors, are might have helped for growth and development fruit. Such variation in chilli varieties for number of fruits per plant was reported by Khokhar *et al.*, (2001) and Sirshat *et al.*, (2006) [9, 15].

Weight of fruit

Data presented in Table 02 showed significant variation in weight of fruit of chilli varieties. The maximum value (V₆) was found significantly superior over all the treatments, followed up by V₂, V₃, V₄, V₇ and V₅ (lowest). Application of proper dose of potassium and phosphorus are the element most associated with fruiting and nitrogen along with the secondary nutrients and micronutrients, are might have helped for growth and development fruit. The variation in chilli in weight of fruit was also reported by Anu *et al.*, (2002) [1], Sirshat *et al.*, (2006) [15], Sha and Madhavan *et al.*, (2016) [13] and Kerketta *et al.*, (2018) [7].

Fruit yield per plant

Data related to fruit yield per plant as influenced by varieties are presented in Table 02. The results showed that all the varieties tried in this experiment significantly influenced the fruit plant of chilli varieties. The maximum value (V₃) was found significantly superior over all the treatments, followed up by V₂, V₄, V₅, V₇ and V₆ (lowest). Proper recommended dose of NPK and along with micronutrient might have helped the plant to have a good plant growth and might be due to existing environmental conditions. So, ultimately it resulted in good seed development of fruit per plant. The variation in chilli for fruit yield per plant was also reported by Khokhar *et al.*, (2001) [8], Kameshwari *et al.*, (2006) [5], Karishna *et al.*, (2007), Datta and Jana (2012) [4] and Sha and Madhavan *et al.*, (2016) [14].

Fruit yield (t ha⁻¹): The data pertaining to fruit yield (t ha⁻¹) has been presented in Table 02. The perusal data clearly reveals that fruit yield (t ha⁻¹) was significantly influenced by varieties. The maximum value (V₃) was found significantly superior over all the treatments, followed up by V₂, V₄, V₅, V₇ and V₆ (lowest). Potassium and phosphorus are responsible for fruiting and strengthen of plant. This is might be due to application of proper dose of potassium and fertilizer associated with growth and production, nitrogen along with the secondary nutrients and micronutrients and the environmental factors, are might have helped for growth and development fruit. Variation in chilli for fruit yield among the varieties also found by Anu *et al.*, (2002) [1], Kameshwari *et al.*, (2006) [5], Sirshat *et al.*, (2006) [15], Datta and Jana (2012) [4] and Sha and Madhavan *et al.*, (2016) [14].

Table 1: Evaluation of chilli varieties (*Capsicum annuum*) for growth parameters

Varieties	Name of varieties	Plant height (cm)				Number of branches per plant				Days to first flower initiation
		30 DAT	60 DAT	90 DAT	120 DAT	30 DAT	60 DAT	90 DAT	120 DAT	
V ₁	Surajmukhi F1 Hybrid	27.18	58.93	77.3	107.74	4.54	6.85	9.16	15.11	29.8
V ₂	Pusa Sadabahar	23.54	56.88	67.47	91.45	3.78	5.82	8.33	13.62	35.87
V ₃	Shanya Hybrid	25.86	58.02	76.57	104.85	4.36	6.58	8.74	14.8	32.62
V ₄	Pusa Jwala	22.47	54.68	65.33	98.55	4.05	5.73	7.58	13.53	37.42
V ₅	F1 Alpine Hybrid	22.85	55.85	68.26	95.44	3.57	4.85	7.25	13.43	36.64
V ₆	Naga Chilli	19.16	48.92	60.44	80.99	2.45	4.52	5.48	11.05	39.15
V ₇	VNR-305 F1 Hybrid	24.79	56.78	75.88	104.16	4.21	6.24	8.26	14.43	34.77
	F-Test	S	S	S	S	S	S	S	S	S
	S. Ed. (+)	0.678	1.557	0.796	2.804	0.192	0.286	0.357	0.249	0.755
	C.D. at 0.5%	1.478	3.392	1.734	6.109	0.417	0.624	0.778	0.542	1.645

Table 2: Evaluation of chilli varieties (*Capsicum annuum*) for yield

Varieties	Name of varieties	Number of fruits per plant	Weight of fruit (g)	Fruit plant ⁻¹ (g)	Fruit yield (t ha ⁻¹)
V ₁	Surajmukhi F1 Hybrid	55.07	3.08	183.73	40.83
V ₂	Pusa Sadabahar	48.80	2.88	140.40	31.20
V ₃	Shanya Hybrid	52.37	2.62	137.50	30.55
V ₄	Pusa Jwala	51.45	2.56	136.89	30.42
V ₅	F1 Alpine Hybrid	49.18	2.41	118.27	26.28
V ₆	Naga Chilli	29.08	3.98	115.80	25.73
V ₇	VNR-305 F1 Hybrid	51.81	2.54	131.66	29.26
	F-Test	S	S	S	S
	S. Ed. (+)	1.155	0.289	16.33	3.629
	C.D. at 0.5%	2.516	0.631	35.58	7.907

Conclusion

On the basis of the result findings, it may be concluded that the variety V₁ (Surajmukhi F1 Hybrid) and V₃ (Shanya Hybrid) performed better in terms of growth and yield parameters respectively, in Prayagraj Agroclimatic condition over rest of the chilli varieties.

Future Scope: Based on one year research work, the experiment can be used as credible work for additional years to validate the current findings. Chilli varieties must be grown under different agroclimatic conditions to determine which variety perform best in various location.

Conflict of interest

None of the authors of this study have any financial or personal ties to persons or organization that may improperly influence or prejudice the paper's content. We assure you that the paper's content is never been released.

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