

## RESEARCH PAPER

# Investigations on *Per se* Performance of Chilli Hybrids for Yield and Yield Contributing Traits

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### ABSTRACT

The development of chilli hybrids which can offer the great yields and fruit quality is the current research in chilli breeding. Based on mean performance, the evaluated hybrids varied significantly for all the studied traits. On the basis of analysis of variance, significant differences were recorded for all the studied traits. The results from the present investigation on the *per se* performance of twelve genotypes of chilli revealed that the cross Tejaswini × VNR-145 was found superior in terms of number of fruits per plant and fruit yield per plant followed by Tejaswini × VNR-305 which expressed superior performance for fruit width and fruit yield per plant.

### HIGHLIGHTS

- Chilli hybrid Tejaswini × VNR-145 recorded the highest number of fruits per plant and fruit yield.
- Chilli hybrid Tejaswini × VNR-305 exhibited the maximum performance for fruit width and yield.

**Keywords:** *Capsicum annuum* L., *Per se* performance, Chilli, L×T design, Fruit yield

Chilli (*Capsicum annuum* L.,  $2n = 2x = 24$ ) is one of the most important commercial crops of India belongs to the solanaceae family which represents a diverse plant group. Chillies are cultivated mainly in tropical and subtropical countries. The majority of the globe uses chilli, which is renowned for its spiciness and flavour. The pungency in chillies is mainly due to a crystalline volatile alkaloid called 'capsaicin' which has a very good export potential. The red colour of chillies is due to the presence of a pigment known as 'capsanthin'. This crop has a very vast genetic divergence. India is a major producer, consumer and exporter of chillies in the world. For its green fruits and dry forms, the chilli stands out as one of the most important, economically advantageous, and widely used produced vegetables and spices. Chilli peppers have a significant part as a spice in many of the world's cuisines, as well as being utilized in numerous processing industries for various products such as pepper sauce, ground pepper

and dried pepper, and pickled pepper (Bosland and Votava, 2010; Komala *et al.* 2023). Chilli is used in the food and beverage sectors in the oleoresin form, which allows for greater flavour and colour distribution. 2.9 grams of protein, as well as Ca, Mg, P, K, Cu, and S, are all found in green chilli. Vitamin A content in green chilli is 280–290 Iu/100 g of fresh chilli, and vitamin C content is 120–130 Mg/100 g of fresh chilli. Rutin, which has medicinal applications, is abundant in green chillies. a novel application of chilli in self-defence sprays. Hot chillies stimulate the heart, which makes the body sweat and lowers blood cholesterol while decreasing the risk of a heart attack. With the increase in population and consumer demand of chilli, the chilly cultivars are constantly looking for way to

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increase the quantity of their products. In recent times, plant breeders employ breeding procedure as an additional instrument as these approaches become more perfect and well known, plant breeder can gradually add them to their arsenal to achieve the common goal of crop improvement (Pathare *et al.* 2023; Suhasini *et al.* 2023; Hulagannavar *et al.* 2024). Therefore, the present study was undertaken to evaluate the per se performance of chilli hybrids for their fruit yield and yield contributing traits in Line  $\times$  Tester (L $\times$ T) design.

## MATERIALS AND METHODS

The field experiments were conducted to evaluate the mean performance of chilli genotypes. The chilli genotypes were evaluated in a randomized block design (RBD) with two replications in L  $\times$  T analysis was performed as suggested by Kempthorne (1957). The study was under taken on 12 genotypes of chilli using inter and intra row spacing of 60 cm  $\times$  50 cm. All the important yield and yield contributing traits observations were recorded on five randomly selected plants in each plot. The means for all the observed parameters were worked out and further subjected to Analysis of Variance from the replicated data worked out using the AGRISTAT software (Manivannan, 2014; Nadarajan, and Manivannan, 2024).

## RESULTS AND DISCUSSION

### Analysis of variance for chilli yield and yield contributing traits

The presence of considerable genetic variation with respect to various traits in yield contributing traits and significant differences for the plant height, number of fruits per plant and fruit yield per plant. However, fruit length and fruit weight were not showed substantial significant variation in all the sources (Table 1). The sources viz., crosses, testers and lines vs. testers were varied significantly for plant height, number of fruits per plant and fruit yield per plant.

### Per se performance for chilli yield and yield contributing traits

The Promising chilli hybrids exhibited significant differences in the plant height, number of fruits per plant and fruit yield per plant (Table 2; Fig. 1). The

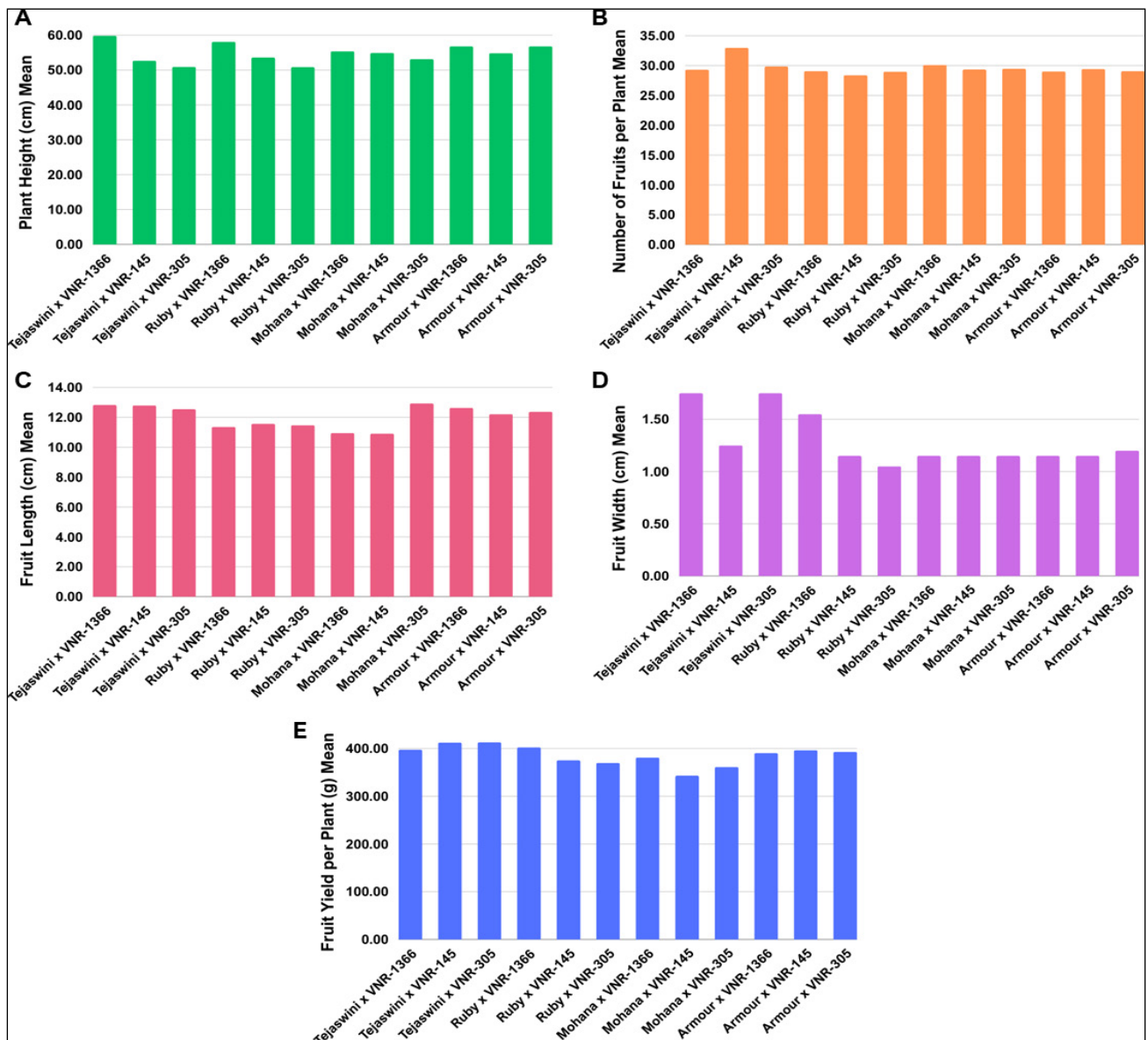
results showed that the hybrids Ruby  $\times$  VNR-305 recorded minimum (50.84) and maximum (59.85) mean performance values for the plant height. Overall, two hybrids were significant over mean values. The difference observed in the plant height of the different genotypes at different stages of crop growth could be attributed to their genotype characteristics. This may be due to difference in the genotype genetic makeup, environment and soil. These results are in accordance with the finding of Chattopadhyay *et al.* (2011), Syeda Farwah *et al.* (2020) and Aimol *et al.* (2023). Number of fruits per plant was ranged from 28.40 (Ruby  $\times$  VNR-145) to 32.97 (Tejaswini  $\times$  VNR-145) (Table 2). Which were on par with each other and the variation is due to the inherent traits and genetic makeup of the hybrids, higher uptake of nutrient and environmental conditions. Only one hybrid expressed significant over mean values. The results are conformity with finding of Janaki and Naidu (2015), Kumari and Jat (2021) and Meenakshi *et al.* (2022).

**Table 1:** Analysis of variance for yield and yield contributing traits of chilli

Source of variation	d.f.	Mean squares				
		PH	NFP	FL	FW	FYP
Replication	1	2.98	0.0	0.16	0.01	679.26
Crosses	11	15.30**	2.80*	1.13	0.12	883.26**
Lines (L)	3	4.87	4.08	2.24	0.24	2244.64**
Testers (T)	2	46.32*	1.18	0.48	0.10	264.97**
L $\times$ T	6	10.17**	2.40	0.79	0.07	408.67**
Error	11	4.72	0.55	0.53	0.03	387.48

\* and \*\*Significant at  $P \leq 0.05$  and  $P \leq 0.01$ , respectively. d.f.: Degrees of freedom, PH: Plant height (cm), NFP: Number of fruits per plant, FL: Fruit length (cm), FW: Fruit width (cm), FYP: Fruit yield per plant (g), and L  $\times$  T: Lines  $\times$  Testers.

The maximum fruit length (12.94 cm) was reported in the hybrid Mohana  $\times$  VNR-305 followed by Tejaswini  $\times$  VNR-145 (12.80 cm), Tejaswini  $\times$  VNR-1366 (12.83 cm) and the minimum fruit length (10.91 cm) was recorded in the hybrid Mohana  $\times$  VNR-145 (Table 2). Three hybrids showed significant over mean values. The variation in fruit length might have been due to the internodal length, sex ratio, fruit set percentage, genetic nature and their response to varying environment condition and higher uptake nutrient. Similar results have been found in chilli by various workers Pandiyaraj *et*



**Fig. 1:** Mean performance of twelve chilli hybrids: (A) Plant height (cm), (B) Number of fruits per plant, (C) Fruit length (cm), (D) Fruit width (cm) and (E) Fruit yield per plant (g)

*al.* (2017), Vidyashree *et al.* (2018) and Aimol *et al.* (2023).

Fruit width was ranged from 1.75 cm (Tejaswini x VNR-305) to 1.05 cm (Ruby x VNR-305) (Table 2; Fig. 1). Three hybrids expressed significant than overall mean value. The variation in diameter of fruits may be due to its hybrid vigour and adoptability to local area agro-climatic condition. These results were in agreement with the finding of Zehra *et al.* (2014), and Yatagiri *et al.* (2017).

Fruit yield per plant was maximum (412.64 g) expressed in the hybrid of Tejaswini x VNR-145 and minimum (343.31 g) in Mohana x VNR-145 (Table 2; Fig. 1). Two hybrids revealed significant

than over all mean value. Increasing of number of fruits per plant is mostly influenced by genetic factor, environmental factor, hormonal factor vigour. Number of fruits per plant is one of the major factors for deciding the yield of the crop. The variation in fruit yield per plant was also reported by Jogdhande *et al.* (2017) and Aimol *et al.* (2023). Since no genotypes could be identified to have superior performance for all the traits, the genotype with maximum good characteristics could be used in a well-planned hybridization programme to select superior performing lines in the successive segregating lines.

**Table 2:** Mean performance of twelve chilli hybrids for yield and yield contributing traits

Chilli Hybrids	PH	NFP	FL	FW	FYP
Tejaswini × VNR-1366	59.85*	29.34	12.83*	1.65*	397.68*
Tejaswini × VNR-145	52.70	32.97*	12.80*	1.25	412.64
Tejaswini × VNR-305	50.93	29.86	12.54	1.75*	410.13*
Ruby × VNR-1366	58.10*	29.08	11.36	1.55*	402.50
Ruby × VNR-145	53.61	28.40	11.57	1.15	375.54
Ruby × VNR-305	50.84	28.99	11.47	1.05	369.84
Mohana × VNR-1366	55.39	30.12	10.95	1.11	381.00
Mohana × VNR-145	54.93	29.36	10.91	1.12	343.31
Mohana × VNR-305	53.17	29.47	12.94*	1.10	361.35
Armour × VNR-1366	56.83	29.03	12.63	1.15	390.54
Armour × VNR-145	54.84	29.43	12.21	1.15	396.46
Armour × VNR-305	56.83	29.09	12.37	1.20	393.13
Mean	54.83	29.59	12.05	1.29	386.17
SEd	2.17	0.74	0.73	0.16	19.68
CD (P=0.5)	4.78	1.63	1.6	0.35	43.3
CD (P=0.1)	6.75	2.3	2.26	0.5	61.22
CV (%)	3.96	2.51	6.04	12.49	5.09

\* and \*\*Significant at  $P \leq 0.05$  and  $P \leq 0.01$ , respectively. PH: Plant height (cm), NFP: Number of fruits per plant, FL: Fruit length (cm), FW: Fruit width (cm), FYP: Fruit yield per plant (g).

## CONCLUSION

In the present study the evaluated chilli hybrids expressed a wide range of variability in per se performance for yield and yield contributing traits. Based on the results, we found that Tejaswini × VNR-145 chilli hybrid was superior in terms of number of fruits per plant and fruit yield per plant followed by Tejaswini × VNR-305 expressed superior performance for fruit width and fruit yield per plant.

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