



Studies on the Performance of Sweet Pepper (*Capsicum annuum* L.) Hybrids under Plastic Tunnel

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Abstract: A study was carried out at the Horticultural Research Institute, NARC, Islamabad during 2009-2010 to investigate the growth and yield of sweet pepper hybrids under plastic tunnel. The experiment comprises five hybrids viz., Orobelle, Figaro, Green Beauty, Mighty, Capistrano with control Yelowonder. The experiment was set up in a randomized complete block design with four replications. Data were chronicled on number of fruits per plant, fruit weight per plant (kg), length of fruits (cm), diameter of fruits (cm), pericarp thickness (mm), number of locules per plant and yield ($t\ ha^{-1}$). Orobella rank first regarding number of fruit/plant (43.47), fruit weight/plant (1.96 kg) and yield ($51\ t\ ha^{-1}$) followed by Figaro (32.84, 1.72 kg, $48.57\ t\ ha^{-1}$) and Capistrano (41.48, 1.76 kg, $45.90\ t\ ha^{-1}$), respectively. Mighty hybrid produced highest (5.98, 6.27 cm) value for fruit length and fruit diameter.

Key words: *Capsicum*, performance, hybrids, number of fruit, fruit weight, yield

INTRODUCTION

Pepper (*Capsicum annuum* L.) belongs to the family Solanaceae. It is a year round international vegetable crop used in variety of ways for home consumptions, catering and industries (Obidiebube *et al.*, 2012). It was originated in the Mexico and Central America region Chirstopher Columbus encountered it in 1493. Pepper is grown as an annual crop due to its sensitivity to frost; pepper is actually herbaceous perennial and will yield for several years in tropical climates. Bell peppers are rich in vitamins particularly vitamin A and vitamin C and hundred gram of peppers provides 4.3 g of carbohydrates, 1.3 g of protein and 24 kcal of energy.

The concept of protected cultivation of bell pepper has slowly been mingling with the changing trends in vegetable production due to the increasing demand in variety, taste and quantity. For successful cultivations of bell pepper poly houses, poly-tunnels and plastic mulching are most suitable solutions (Chandra *et al.*, 2000; Singh *et al.*, 2004). Growing of *Capsicum* under cover has been reported to give good quality produce with higher productivity in several countries. Kurubetta and Patil (2009) studied hybrids under different protected cultivation and recorded significant results among the tested hybrids under these structures. Present study was

designed to evaluate different *Capsicum* hybrids under plastic tunnel in agro-ecological conditions of Islamabad.

MATERIALS AND METHOD

Five sweet pepper hybrids were transplanted under high plastic tunnel along with Yelowonder as check, to study their relative performance. The study was conducted in the experimental are of vegetable research program, NARC, Islamabad during 2010-2011. The seedlings were raised during first week of September and transplanted in mid October. The experiment was laid out in randomized complete block design with four replications. Row to row and plant to plant distance was maintained at 75 and 50 cm, respectively. Crop was irrigated on need basis approximately at 10-12 days interval. The NPK was applied at the rate of 75:50:50 in the form of Urea, DAP and Sulphate of potash. Data were recorded on fruit characteristics and yield attributes viz, number of fruits/plant, fruit weight/plant, fruit length, fruit diameter, pericarp thickness, number of locules and yield ($t\ ha^{-1}$). The statistical analysis (ANOVA) for the above parameters was carried out by using Statistix software. The analysis of variance was compared at 0.05% following Least Significant Difference test (Steel *et al.*, 1997) (Table 1).

Table 1: Mean estimates of different parameters in sweet pepper

SOV characters	Replication	Genotypes	Error
No. Fruit/plant	3.45	154.35**	10.20
Fruit weight/plant (kg)	0.020	0.22114*	0.078
Fruit length (cm)	0.028	1.945**	0.11
Fruit diameter (cm)	0.027	0.978**	0.06
No. of locules	0.07	0.336 ^{NS}	0.36
Pericarp thickness	0.0024	0.009**	0.0004
Yield (t ha ⁻¹)	7.58	180.04**	11.76

**Highly significant, *Significant, NS: Non significant

RESULTS AND DISCUSSION

All the reproductive and quality parameters differed significantly due to the different hybrids tested under plastic tunnel as shown by the analysis of variance (Table 2). All parameters showed significant results except number of locules.

No. of fruits per plant: The maximum (43.47) mean value for number of fruits/plant was observed in hybrid Orobelle followed by Capistrano (41.48), Yelowonder (36.20) and Figaro (32.84), respectively. The lowest (27.82) mean value for number of fruits/plant was observed in hybrid Mighty. Kanwar *et al.* (2014) found higher number of fruits per plant in bell pepper under green house condition. Kurubetta and Patil (2009) recorded significantly higher number of flower and fruits (13.41 and 12.11), respectively in the Indra hybrid. This might be due to the favourable climatic conditions, sufficient accumulation of photosynthates in the polyhouse condition.

Fruit weight per plant (kg): Data regarding fruit weight showed significant results among tested hybrids (Table 2). For the fruit weight highest (1.96 kg) value was recorded in the hybrid Orobelle, while Capistrano (1.76) stands second followed by Figaro and Green beauty (1.72), which is statistically at par. Whereas, the hybrid Mighty had the lowest (1.32) mean value for fruit weight. Zedne (2008) recorded significantly higher fruit weight (147.74 g) and fruit yield (64.91 t ha⁻¹) under protected conditions. Yellavva (2008) also find similar results regarding fruit weight and yield in bell pepper.

Fruit length (cm): A significant difference was observed among sweet pepper hybrids for this character (Table 2). Fruit length was found maximum (5.98 cm) in hybrid Mighty followed by hybrid Figaro (5.50 cm) and Green beauty (5.45 cm), respectively. The hybrid Orobelle showed the minimum (4.01 cm) fruit length followed by

Yelowonder (4.70 cm). Khokhar *et al.* (2006) reported significant difference in fruit size (length and width) in different tomato hybrids under study. Similar results were also found by Kanwar and Sharma (2010).

Fruit diameter (cm): Fruit diameter varies significantly among the tested hybrids (Table 2). Hybrid Capistrano have significantly higher (6.28 cm) value of fruit diameter which is statistically at par with Mighty having 6.27 cm fruit diameter value. The check variety Yelowonder showed lowest (4.96 cm) fruit diameter as compared to other tested hybrids. Our results correlate with the studies of Chaudhry *et al.* (1999). Singh *et al.* (2011), who reported that hybrid Tanvi produced maximum fruit diameter, no. of fruits/plant, individual fruit weight and yield in protected cultivation. Sweet pepper hybrids US-181 and Indum 5 also produced similar pattern of result in plastic tunnel conditions.

No. of locules: Non significant result was recorded in case of number of locules at 0.05% level of significance (Table 2). This shows that the hybrids tested had similar performance regarding number of locules. Our results are contrary to the findings of Khokhar *et al.* (2006).

Pericarp thickness (cm): Data regarding pericarp thickness showed significant results among the hybrids (Table 2). The fruit of hybrid Orobelle had the thickest (0.47 cm) pericarp followed by hybrid Mighty, Yelowonder and Figaro having pericarp thickness of 0.42, 0.41 and 0.40 cm, respectively (Table 2). The hybrid Capistrano had the lowest (0.32 cm) value for pericarp thickness. Chaudhry *et al.* (2003) also reported variation in pericarp thickness in tomato studies.

Fruit Yield (t ha⁻¹): Significant variations among hybrids were observed regarding fruit yield (Table 2). Hybrid Orobelle proved higher (51.10 t ha⁻¹) yielder followed by Figaro (48.57 t ha⁻¹) and Capistrano (45.90 t ha⁻¹), respectively. The hybrid Mighty produced lowest yield (34.09 t ha⁻¹). The higher fruit yield, better economics and minimum disease and mortality was recorded under polyhouses, due to its protective ability against major abiotic stresses, which minimizes the effect of excessive rainfall and provide controlled environment (3-4°C higher temperature than open field condition) to the crop (Singh *et al.*, 2003, 2010). Brar *et al.* (2005) reported highest yield in *Capsicum* var. Bombay under polyhouse condition.

Table 2: Performance of *Capsicum* hybrids under plastic tunnel

Hybrids	No. of fruits/plant	Fruit weight/plant (kg)	Fruit length (cm)	Fruit diameter (cm)	No. of locules	Pericarp thickness (cm)	Yield (t ha ⁻¹)
Orobelle	43.47	1.96	4.01	6.09	3.25	0.47	51.10
Figaro	32.84	1.72	5.50	5.89	3.05	0.40	48.57
Green beauty	30.28	1.72	5.45	6.07	3.75	0.41	38.61
Yolowonder	36.20	1.43	4.70	4.96	3.00	0.41	38.26
Mighty	27.82	1.32	5.98	6.27	3.25	0.42	34.09
Capistrano	41.48	1.76	4.98	6.28	3.00	0.32	45.90
CV value	9.04	16.98	6.55	4.05	18.69	5.48	8.02
LSD value	4.81	0.42	0.50	0.36	0.90	0.03	5.16

REFERENCES

- Brar, G.S., R.N. Sabale, M.S. Jadhav, C.A. Nimbalkar and B.J. Gawade, 2005. Effect of trickle irrigation and light levels on growth and yield of *Capsicum* under polyhouse conditions. J. Maharashtra Agric. Univ., 30: 325-328.
- Chandra, P., P.S. Sirohi, T.K. Behera and A.K. Singh, 2000. Cultivating vegetable in polyhouse. Indian Horticult., 45: 17-32.
- Chaudhry, M.F., K.M. Khokhar, S.I. Hussain, T. Mahmood and S.M. Iqbal, 1999. Comparative performance of some local and exotic tomato cultivars during spring and autumn seasons. Pak. J. Arid Agric., 2: 7-10.
- Chaudhry, M.F., G. Jeelani, S. Riaz and M.H. Bhatti, 2003. Yield potential of some indeterminate hybrids and an open-pollinated variety of tomato during winter season under plastic tunnel at Islamabad. Pak. J. Arid Agric., 6: 5-7.
- Kanwar, M.S. and O.C. Sharma, 2010. Performance of *Capsicum* under protected cultivations in cold arid region. J. Hill Agric., 1: 88-89.
- Kanwar, M.S., M.S. Mir, K. Lamo and P.I. Akbar, 2014. Effect of protected structures on yield and horticultural traits of bell pepper (*Capsicum annuum* L.) in Indian cold arids. Afr. J. Agric. Res., 9: 874-880.
- Khokhar, M.A., K.M. Khokhar, G. Jeelani and T. Mehmood, 2006. Off season production and correlation studies of tomato hybrids under plastic tunnel. Sarhad J. Agricult., 22: 237-239.
- Kurubetta, Y. and A.A. Patil, 2009. Performance of coloured *Capsicum* hybrids under different protected structures. Karnataka J. Agric. Sci., 22: 1058-1061.
- Obidiebube, E.A., P.G. Eruotor, S.O. Akparobi, S.O. Emosaariue, U.A. Achebe and P.E. Kator, 2012. Response of four cultivars of pepper (*Capsicum frutescens* L.) to different levels of N. P. K. fertilizer in rainforest agroecological zone. Int. J. Agric. Sci., 2: 1143-1150.
- Singh, A.K., A.K. Singh, M.J. Gupta and R. Shrivastav, 2003. Study of spacing, training-pruning and varieties of *Capsicum* under polyhouse condition. Progressive Horticult., 7: 212-216.
- Singh, B., M. Kumar and N.P.S. Sirohi, 2004. Cultivating off-season summer squash. Indian Horticult., 49: 9-11.
- Singh, B., A.K. Singh and B.S. Tomar, 2010. In peri-urban areas... Protected cultivation technology to bring prosperity. Indian Horticult., 55: 31-33.
- Singh, A.K., B. Singh and R. Gupta, 2011. Performance of sweet pepper (*Capsicum annuum*) varieties and economics under protected and open field conditions in Uttarakhand. Indian J. Agric. Sci., 81: 973-975.
- Steel, R.G., J.H. Torrie and D.A. Dickey, 1997. Principles and Procedures of Statistics: A Biometrical Approach. 3rd Edn., McGraw-Hill, Singapore.
- Yellavva, K., 2008. Evaluation of *Capsicum* hybrids under different protected structures. M.Sc. Thesis, University of Agricultural Sciences, Dharwad.
- Zedne, U.M., 2008. Investigation on production techniques in *Capsicum* under protected cultivation. M.Sc. Thesis, University of Agricultural Sciences, Dharwad.