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Effect of truss retention and pruning of berry on seed yield and quality of cherry tomato (*Solanum lycopersicum* var *cerasiforme*) grown under different polyhouse structures

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ABSTRACT

Study was conducted to evaluate the effect of retention of truss per plant and pruning of berries per truss on seed yield and quality of cherry tomato (*Solanum tycopersicum* var *cerasiforme* L.) grown under three different polyhouse structures, viz. semi climate controlled polyhouse (P1), naturally ventilated polyhouse (P2) and insect proof nethouse (P3). Among the structures P1 gave higher berry weight (7.67 g), number of seeds/berry (60.66), 100 seed weight (0.1328 g), seed yield/berry (0.0912 g), germination (84.90%), vigour index-I (650.64), vigour index-II (1.47) and lower EC (0.0086 µS/g/cm), when compared to P2 and P3. The retention of 5 truss per plant (V1) recorded higher berry weight (7.37 g), number of seeds/berry (63.25), 100 seed weight (0.1319 g), seed yield/berry (0.0886 g), germination (84.68 %), vigour index-I (640.97), vigour index-II (1.43) and lower electrical conductivity (0.0083 µS/g/cm), as compared to V2 and V3. The thinning of berry, i.e 10 per truss (B1) has given significantly higher mean berry weight (8.21 g), number of seeds/berry (61.53), 100 seed weight (0.1323 g), 100 seed weight (0.1323 g), seed yield/berry (0.0913 g), germination (86.01%), vigour index-I (651.96), vigour-II (1.46) and lower EC (0.0080 µS/g/cm) in comparison to B2 and B3.

Key words: Cherry tomato, Electrical conductivity, Germination, Number of berry per truss, Retention of truss, Seed yield, Vigour index

Growing of cherry tomato (*Solanum lycopersicum* var. *cerasiforme* L.) is gaining momentum as it is an important component of salad around the world. This is a warm-season crop and required long growing periods to reap more harvests and is the most promising crop under protected structures. Total marketable yield, fruit quality, berry weight, and seed quality are affected by fruit number (Saglamand Yazgan 1995), but varies from variety to variety and from one environment to the other. In tomato, increase in number of truss per plant and fruits per truss, yield per plant will increase but decrease the size of fruits. In general, higher berry number increases yield but reduces average weight. Low fruit number per truss increases fruit size and quality, but reduces yield (Mangal and Jasmin 1987, Pimpini *et al.* 1987, Damyanovic *et al.* 1992, Saglam and Yazgan 1995). The distribution of assimilates among sinks is regulated by the sinks itself (Marcelis 1996), hence in fruit bearing crops, fruits themselves play a major role in allocation of biomass, as they are the main sinks in these crops (De Koning 1993). By increasing the number of fruits per plant the vegetative growth of the plant was abated whereas fruit growth was increased. at the expense of vegetative growth (De Koning and Deruiter 1991).

Demand for quality seed is increasing for cultivation under protected structures but the cost of the seed and uncertainty in supply affecting the cherry tomato cultivation. The development of cherry tomato cultivar Pusa Cherry Selection 1 at CPCT, IARI, New Delhi necessitated the need of development of seed production technology to ensure the production and supply of quality seed at affordable price. Thus, the present investigation was carried out to evaluate the growing conditions, retention of truss load per plant and thinning of berry for obtained higher seed yield in relation to seed yield and quality of cherry tomato.

MATERIALS AND METHODS

The investigation was carried out at CPCT, IARI, New Delhi falling under 28°35^N latitude and 77°12^E longitude with an altitude of 228.6 m above mean sea level. It has a semi-arid and sub-tropical climate characterized with hot summer (34.3°C) and cold winter (2°C). The soil of experimental site is sandy loam in texture with slight salinity and having an organic content of 0.25%. Seedlings of Pusa Cherry Selection 1, were raised inside the high-tech nursery by sowing in the multi-celled plastic plug trays having cell

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volume of 20 cubic centimeters by using soil less media consisting of cocopeat, vermiculite and perlite in the ratio of 3:1:1 (on volume basis). During 10th September 2011-12 and 12 September 2012-13 seedlings transplanted at two true-leaves stage (21 days), to three different environments, viz. P1 (Semi climate controlled polyhouse), P2 (Naturally ventilated polyhouse) and P3 (Insect proof nethouse) after hardening of them under direct sunlight for two days. Fertigation was done through a drip system with integrated droppers for every 30 cm^3. Plants were maintained with identical management practices (stacking, irrigation and plant protection measures) under all three environments.

The truss load treatment consists of 5 truss/plant (V1), 7 truss/plant (V2) and 9 truss/plant (V3) whereas, the berry pruning consists of 10 berry/truss (B1), 15 berry/truss (B2) and 20 berry/truss (B3). The number of berry retained/truss was done by removing the excess berries after fruit set.

The biometric observations, viz. berry weight (g), radial diameter (cm), polar diameter (cm), number of seeds per berry, seed weight per berry (g) were recorded on ten randomly tagged plants from four replications. The berries were harvested 30-40 days intervals and the seed was extracted by using natural fermentation method. The germination test was conducted on fresh dried seeds. Fifty seeds were kept in each of four petri-plates containing two layers of blotting paper saturated with 10 ml of double distilled water. The plates were then placed in germination chamber at 25°C with a 16/8 hr dark cycles. Percentage of normal seedlings was determined after 5 and 14 days of planting. Seedlings with a radicle and shoot greater than 2.0 and 1.5cm, respectively, were considered normal. Fresh and dry weight of seedlings was recorded using normal seedlings. Vigour indices were calculated as suggested by Abdul-Baki and Anderson (1973). EC of the seed leachates was studied as per procedure prescribed by Dadlani and Agarwal (1983).

The seed quality parameters, viz. 100 seed weight, germination, seedling length, dry weight of seedling, vigour indices and EC of seed leachates were recorded at Division of Seed Science and Technology, IARI, New Delhi. The experiment was laid out in a RBD and the data expressed in percentage were transformed using arcsine square root (Steel

Table 1 Effect of growing structures, truss load and berry retention on berry attributes of cherry tomato

Parameter	Berry weight (g)				Berry radial diameter (cm)				Berry polar diameter (cm)			
	2011-12	2012-13	Pooled		2011-12	2012-13	Pooled		2011-12	2012-13	Pooled	
Structure (P)												
P1	7.89	7.44	7.67		2.55	2.44	2.50		2.31	2.23	2.27	
P2	7.19	6.71	6.95		2.47	2.38	2.42		2.27	2.19	2.23	
P3	6.53	6.21	6.37		2.39	2.30	2.34		2.24	2.15	2.19	
CD (P=0.05)	0.037	0.043	0.035		0.019	0.018	0.018		0.014	0.013	0.014	
Truss load per vine (V)												
V1	7.65	7.09	7.37		2.50	2.40	2.45		2.30	2.22	2.26	
V2	7.42	7.04	7.23		2.49	2.39	2.44		2.27	2.19	2.23	
V3	6.54	6.23	6.39		2.41	2.32	2.37		2.25	2.15	2.20	
CD (P=0.05)	0.037	0.043	0.035		0.019	0.018	0.018		0.014	0.013	0.014	
Berry retention per truss (B)												
B1	8.45	7.97	8.21		2.56	2.45	2.50		2.34	2.25	2.30	
B2	7.11	6.69	6.90		2.43	2.35	2.39		2.29	2.21	2.25	
B3	6.05	5.70	5.88		2.41	2.32	2.37		2.19	2.11	2.15	
CD (P=0.05)	0.037	0.043	0.035		0.019	0.018	0.018		0.014	0.013	0.014	
Interactions (Pooled)	*B1*	*B2*	*B3*	*Mean*	*B1*	*B2*	*B3*	*Mean*	*B1*	*B2*	*B3*	*Mean*
P1V1	9.47	7.57	7.07	8.04	2.59	2.53	2.49	2.54	2.42	2.28	2.23	2.31
P1V2	9.29	7.31	6.46	7.69	2.54	2.49	2.45	2.49	2.37	2.25	2.23	2.28
P1V3	8.00	6.85	6.98	7.27	2.53	2.45	2.40	2.46	2.31	2.24	2.14	2.23
P2V1	8.90	7.04	6.20	7.38	2.58	2.41	2.41	2.46	2.32	2.28	2.23	2.28
P2V2	8.01	7.16	6.83	7.33	2.52	2.38	2.38	2.43	2.26	2.24	2.15	2.22
P2V3	7.33	6.63	4.47	6.14	2.46	2.31	2.34	2.37	2.25	2.24	2.09	2.19
P3V1	8.23	6.37	5.48	6.69	2.56	2.40	2.31	2.42	2.31	2.24	2.15	2.23
P3V2	7.84	7.02	5.14	6.66	2.49	2.29	2.27	2.35	2.26	2.23	2.09	2.19
P3V3	6.81	6.17	4.26	5.75	2.25	2.26	2.26	2.26	2.19	2.23	2.07	2.16
CD (P=0.05)												
P×V	0.061				0.031				0.024			
P×B	0.061				0.031				0.024			
V×B	0.061				0.031				0.024			
P×V×B	0.106				0.054				0.041			

et al. 1997). Data were analysed with the statistical analysis software (SAS 9.2).

RESULTS AND DISCUSSION

The observations under different structures on truss load/plant and retention of berry/truss in berry attributes, seed yield and quality have been analysed and discussed in this paper.

Analysis of variance showed significant differences for berry weight among the structures, truss load/plant and berry/truss (Table 1). Among the structures P1 recorded significantly highest values for berry weight (7.67 g), followed by P2 (6.95 g) and P3 (6.37 g). On the other hand, in truss removal, V1 showed significantly more berry weight (7.37g) while reduction trend in berry weight were recorded in V2 (7.23g) and V3 (6.39 g). Among the number of berry per truss, the treatment B1 recorded maximum weight (8.21 g) followed by B2 (6.90 g) and B3 (5.88 g). Significantly higher berry weight in P1, V1 and B1 were due to better growing environment and availability of more food assimilates due to restricted number of truss per plant and berry per truss as compared to P2, V2, B2, & P3, V3, B3 (Fig 1) Similar results were obtained by Franco *et al.* (2009), who noted that cherry tomato variety Salomee, showed larger quantity of fruit and greater output in terms of weight per unit surface area. Our findings were also in tune with the findings of Slack and Calvert (1977), who stated that more assimilates were distributed to neighbouring trusses and there was no significant loss of yield as a result of these treatments. Moreover regulation of fruit load by pruning trusses resulted in more uniform fruit load and final yield . The interaction P×V, P×B, V×B, P×V×B were significant for berry weight and interaction combination P1V1B1 (9.47 g) recorded significantly higher berry weight.

The analysis of variances showed significant differences in berry radial diameter among the structures, truss load/plant and berry retention/truss (Table 1). Among the structures, P1 showed higher berry radial and polar diameter (2.50 cm and 2.27 cm), followed by P2 (2.42 cm and 2.23 cm), and P3 (2.34 cm and 2.19 cm) respectively. The load of truss/plant was significantly higher in V1 (2.45 and 2.26 cm), followed by V2 (2.44 and 2.23 cm) and V3 (2.37 and 2.20 cm). The retention of berry per truss has also significant influence on berry radial and polar diameter with higher in B1 (2.50 and 2.30 cm), followed by B2 (2.39 and 2.25 cm) and B3 (2.37 and 2.15 cm). The significantly higher berry radial and polar diameter among P1, V1, and B1 could be due to the better growing environment and proportion of sources among the trusses per plant and berries per trussThe interaction among P×V, P×B, V×B, P×V×B were showed significant difference for berry radial diameter and polar diameter and interaction combinations P1V1B1 (2.59 and 2.42 cm) recorded for significantly higher value.

The condition P1 showed superior values for number of seeds per berry (60.66) as compared to P2 (56.69) followed by P3 (51.76). Among the treatments for truss load V1 recorded significantly higher value (63.25), followed by V2 (59.27) and V3 (46.58) for number of seeds/berry (Table 2). Significantly superior values were recorded for the treatment B1 (61.53), followed by B2 (56.03) and B3 (51.54) for number of seeds/berry.

Higher number of seeds per berry under P1 condition may be due to the availability of optimal temperature and relative humidity thereby more production of photosynthates and equal distribution of assimilates among the fruits might have led to the better development and maturation of ovules into seeds. Whereas, the lower number of seeds per fruit and seed weight per fruit was more conspicuous in the treatment V3 and B3, in which more number of truss (Franco *et al.* 2009) and more number of berry per truss (Steel *et al.* 1997) were maintained. It may be due to the competition between trusses of the plant as well as within the berries of the truss for photosynthates and similar results was reported by Kaul (1991). Lowest number of seeds per berry was recorded under P3 condition. This might be due to meagre swelling of fruits with less seeds. It was confirmed with the results of Verkerk (1955), concluded that presence of seeds is not essential for the continued swelling of fruits, since pollination with a relative of tomato, will cause fruit to swell to a size of control.

The interactions (P×V, P×B, V×B, P×V×B) have also showed significant differences (P=0.01) number of seeds per berry. Among the interactions, P1V1B1 recorded significantly higher berry weight (68.34) when compared to other interactions.

The 100 seed weight is higher in P1 (0.1328 g) followed by P2 (0.1286 g) and lower in P3 (0.1244 g). The higher mean values observed in V1 (0.1319 g) and V2 treatment

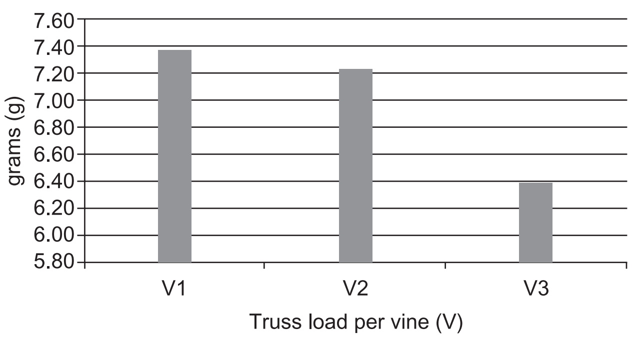

Fig 1 Effect of truss load per plant on berry weight (g)

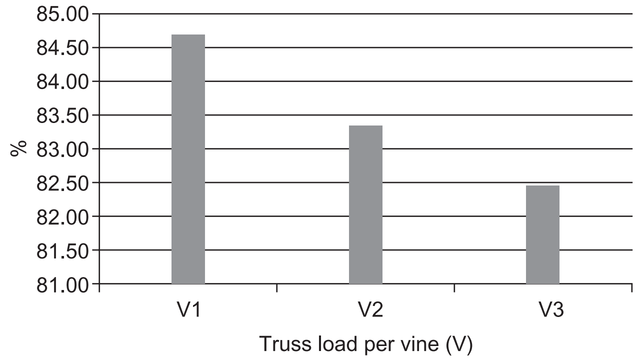

Fig 2 Effect of truss load per plant on germination (%)

Table 2 Effect of growing structures, truss load and berry retention on seed yield attributes of cherry tomato

Parameter	Number of seeds/berry			Seed yield/berry (g)			100 seed weight (g)		
	2011-12	2012-13	Pooled	2011-12	2012-13	Pooled	2011-12	2012-13	Pooled
Structure (P)									
P1	61.70	59.86	60.66	0.0910	0.0917	0.0912	0.1341	0.1317	0.1328
P2	57.22	55.90	56.69	0.0876	0.0853	0.0864	0.1297	0.1273	0.1286
P3	54.92	48.60	51.76	0.0854	0.0831	0.0841	0.1263	0.1237	0.1244
CD (P=0.05)	0.425	0.435	0.383	0.0000	0.0030	0.0020	0.0000	0.0000	0.0000
Truss load per vine (V)									
V1	64.33	62.17	63.25	0.0896	0.0891	0.0893	0.1332	0.1309	0.1319
V2	60.36	58.19	59.27	0.0893	0.0868	0.0880	0.1316	0.1292	0.1303
V3	49.16	44.01	46.58	0.0863	0.0842	0.0852	0.1253	0.1226	0.1236
CD (P=0.05)	0.425	0.435	0.383	0.0000	0.0030	0.0020	0.0000	0.0000	0.0000
Berry retention per truss (B)									
B1	64.14	58.92	61.53	0.0913	0.0918	0.0913	0.1336	0.1312	0.1323
B2	56.56	55.53	56.03	0.0874	0.0852	0.0863	0.1296	0.1270	0.1286
B3	53.14	49.91	51.54	0.0852	0.0831	0.0841	0.1270	0.1244	0.1249
CD (P=0.05)	0.425	0.435	0.383	0.0000	N.S.	N.S.	0.0000	0.0000	0.0000

Interactions (Pooled)	*B1*	*B2*	*B3*	*Mean*	*B1*	*B2*	*B3*	*Mean*	*B1*	*B2*	*B3*	*Mean*
P1V1	68.34	63.53	62.65	64.84	0.1030	0.0900	0.0900	0.0943	0.1410	0.1330	0.1310	0.1350
P1V2	65.43	57.36	60.88	61.22	0.0910	0.0900	0.0900	0.0903	0.1410	0.1310	0.1300	0.1340
P1V3	62.33	57.59	47.80	55.91	0.0910	0.0900	0.0860	0.0890	0.1310	0.1300	0.1270	0.1293
P2V1	63.64	62.76	62.19	62.86	0.0910	0.0850	0.0830	0.0863	0.1330	0.1310	0.1300	0.1313
P2V2	62.14	60.88	53.46	58.82	0.0910	0.0880	0.0850	0.0880	0.1310	0.1300	0.1290	0.1300
P2V3	61.88	48.19	35.06	48.38	0.0900	0.0830	0.0820	0.0850	0.1310	0.1220	0.1200	0.1243
P3V1	63.28	62.06	60.80	62.05	0.0910	0.0830	0.0810	0.0850	0.1310	0.1310	0.1260	0.1293
P3V2	62.03	60.30	50.99	57.77	0.0900	0.0870	0.0800	0.0857	0.1310	0.1300	0.1200	0.1270
P3V3	44.74	31.56	30.08	35.46	0.0840	0.0810	0.0800	0.0817	0.1210	0.1190	0.1110	0.1170
CD (P=0.05)												
P×V		0.664					0.003			0.000		
P×B		0.664					N.S.			0.000		
V×B		0.664					0.003			0.000		
P×V×B		1.150					N.S.			0.000		

(0.1303 g) followed by V3 (0.1236 g). The treatment B1 recorded higher seed weight (0.1323 g), followed by B2 (0.1286 g) and B3 (0.1249 g).

The higher 100 seed weight in P1 could be attributed to the enrichment of CO_2 which in turn improved the development of seed and seed maturation Our results were in tune with Hand and Postlethwaitej (1971).

The interaction among P×V, P×B, V×B, P×V×B were significant and interaction combinations P1V1B1 and P1V2B1 (0.1410 g) recorded significantly higher 100 seed weight.

The perusal of the data (Table 2) showed that structures and truss load per plant significantly affected on seed yield per berry. The structure P1 has given higher seed yield (0.0912 g), followed by P2 (0.0864 g) and P3 (0.0841), but P2 and P3 were at par on their performance. The retention of truss per plant, V1 recorded more seed yield (0.0886 g) to than V2 (0.0880 g) and V3 (0.0852 g), which were at par. Numerically, B1 has been recorded higher seed yield per berry (0.0913 g), followed by B2 and B3 (0.0863 & 0.084 g) but differences were non-significant.

The interaction combinations recorded non-significant values for seed yield per berry.

Significant difference for germination (%) among structures, truss load per plant and berry retention per truss were recorded (Table 3). The higher germination was recorded in P1 (84.90%) followed by P2 (83.24%) and low germination under P3 (82.35%). The maximum germination for truss load per plant was observed in V1 (84.68%) followed by V2 (83.35%) and V3 (82.46%) (Fig.12 & 16).

The interactions of P×V, P×B, V×B, P×V×B have shown significant differences among the treatments under study. The interaction P1V1B1 (90.13%) recorded significantly higher germination percentage among the treatments.

Vigour index-I & II significantly differed in all the factors P, V and B (Table 4). The vigour indices were significantly higher in P1 structure (650.64 and 1.47) followed by P2 (611.76 and 1.38) and lower values were noted from P3 (595.55 and 1.32) for vigour index- I & II, respectively. Among the treatments, truss load per plant (V1) noted significantly higher vigour index I & II (640.97

Table 3 Effect of growing structures, truss load and berry retention on seed quality traits of cherry tomato

Parameter	Germination %			Seedling shoot length (cm)			Seedling root length (cm)		
	2011-12	2012-13	Pooled	2011-12	2012-13	Pooled	2011-12	2012-13	Pooled
Structure (P)									
P1	86.00	83.81	84.90	6.89	6.75	6.82	7.36	7.21	7.29
P2	84.11	82.36	83.24	6.74	6.65	6.70	7.14	7.05	7.10
P3	83.22	81.47	82.35	6.56	6.47	6.51	6.91	6.88	6.90
CD (P=0.05)	0.44	0.45	0.44	0.05	0.05	0.05	0.04	0.04	0.04
Truss load per vine (V)									
V1	85.78	83.58	84.68	6.88	6.73	6.81	7.28	7.20	7.24
V2	84.22	82.47	83.35	6.79	6.70	6.75	7.21	7.18	7.20
V3	83.33	81.58	82.46	6.52	6.43	6.48	6.93	6.77	6.85
CD (P=0.05)	0.44	0.45	0.44	0.05	0.05	0.05	0.04	0.04	0.04
Berry retention per truss (B)									
B1	86.89	85.14	86.01	7.14	7.09	7.11	7.54	7.44	7.49
B2	83.89	82.14	83.01	6.80	6.61	6.71	7.22	7.13	7.18
B3	82.56	80.36	81.46	6.25	6.17	6.21	6.66	6.57	6.62
CD (P=0.05)	N.S.	N.S.	N.S.	0.05	0.05	0.05	0.04	0.04	0.04

Interactions (Pooled)	*B1*	*B2*	*B3*	*Mean*	*B1*	*B2*	*B3*	*Mean*	*B1*	*B2*	*B3*	*Mean*
P1V1	90.13	84.13	84.13	86.13	7.43	6.84	6.29	6.85	7.84	7.49	6.77	7.37
P1V2	89.13	84.13	81.13	84.79	7.31	6.89	6.27	6.82	7.83	7.43	6.76	7.34
P1V3	86.13	83.13	82.13	83.79	7.22	6.45	6.74	6.80	7.32	6.99	7.18	7.16
P2V1	87.13	84.13	82.13	84.46	7.27	6.96	6.23	6.82	7.68	7.35	6.59	7.21
P2V2	84.13	83.13	82.13	83.13	7.19	6.82	6.62	6.87	7.51	7.31	7.04	7.29
P2V3	84.13	82.13	80.13	82.13	6.96	6.38	5.87	6.40	7.40	6.71	6.28	6.80
P3V1	87.13	82.13	81.13	83.46	7.22	6.89	6.17	6.76	7.32	7.31	6.41	7.01
P3V2	84.13	82.13	80.13	82.13	6.84	6.84	5.96	6.55	7.49	7.49	6.30	7.10
P3V3	82.13	82.13	80.13	81.46	6.62	6.34	5.77	6.24	7.03	6.51	6.22	6.58
CD (P=0.05)												
P×V		0.762					0.081		0.075			
P×B		0.762					0.081		0.075			
V×B		0.762					0.081		0.075			
P×V×B		1.320					0.141		0.131			

and 1.43) followed by V2 (633.79 and 1.42) and V3 (583.18 and 1.32) respectively. The treatment B1 recorded higher vigour index I & II (651.96 & 1.46), followed by B2 & B3 (630.07 and 1.41) and (575.90 and 1.29), respectively.

The interactions (P×V, P×B, V×B, P×V×B) were recorded significant (P=0.01) differences among the variables P, V and B. Among the interactions, the

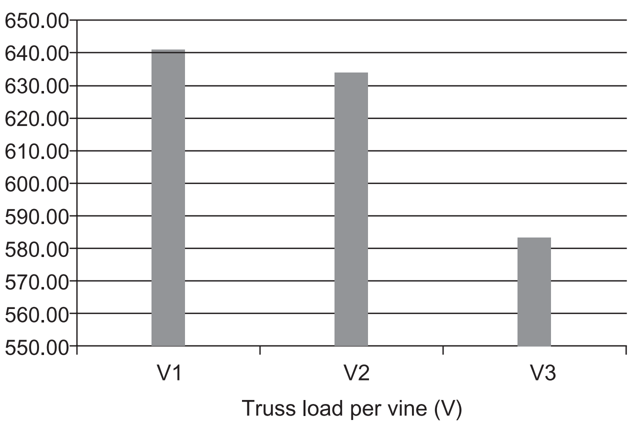

Fig 3 Effect of truss load per plant on vigour index -I

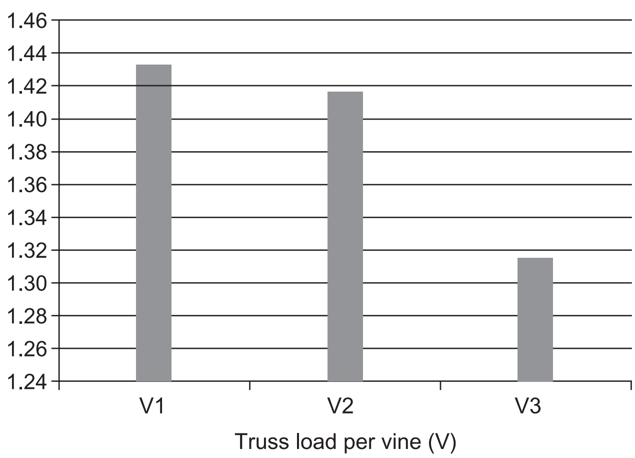

Fig 4 Effect of truss load per plant on vigour index -II

Table 4 Effect of growing structures, truss load and berry retention on seed quality attributes of cherry tomato

<table>
<tr><th rowspan="2">Parameter</th><th colspan="4">Seedling dry weight (g)</th><th colspan="4">Vigour index - I</th><th colspan="4">Vigour index – II</th><th colspan="4">EC (µS/g/cm)</th></tr>
<tr><th>2011-12</th><th>2012-13</th><th>Pooled</th><th></th><th>2011-12</th><th>2012-13</th><th>Pooled</th><th></th><th>2011-12</th><th>2012-13</th><th>Pooled</th><th></th><th>2011-12</th><th>2012-13</th><th>Pooled</th><th></th></tr>
<tr><td colspan="17">Structure (P)</td></tr>
<tr><td>P1</td><td>0.0167</td><td>0.0163</td><td>0.0166</td><td></td><td>662.41</td><td>638.97</td><td>650.64</td><td></td><td>1.50</td><td>1.44</td><td>1.47</td><td></td><td>0.0068</td><td>0.0104</td><td>0.0086</td><td></td></tr>
<tr><td>P2</td><td>0.0163</td><td>0.0160</td><td>0.0163</td><td></td><td>621.36</td><td>602.22</td><td>611.76</td><td></td><td>1.41</td><td>1.35</td><td>1.38</td><td></td><td>0.0070</td><td>0.0109</td><td>0.0089</td><td></td></tr>
<tr><td>P3</td><td>0.0156</td><td>0.0154</td><td>0.0154</td><td></td><td>602.15</td><td>588.95</td><td>595.55</td><td></td><td>1.34</td><td>1.29</td><td>1.32</td><td></td><td>0.0073</td><td>0.0109</td><td>0.0090</td><td></td></tr>
<tr><td>CD (P=0.05)</td><td>0.0000</td><td>0.0000</td><td>0.0000</td><td></td><td>3.21</td><td>3.20</td><td>3.145</td><td></td><td>0.01</td><td>0.01</td><td>0.009</td><td></td><td>0.0000</td><td>0.0000</td><td>0.0000</td><td></td></tr>
<tr><td colspan="17">Truss load per vine (V)</td></tr>
<tr><td>V1</td><td>0.0164</td><td>0.0162</td><td>0.0164</td><td></td><td>648.08</td><td>633.86</td><td>640.97</td><td></td><td>1.46</td><td>1.41</td><td>1.43</td><td></td><td>0.0069</td><td>0.0094</td><td>0.0083</td><td></td></tr>
<tr><td>V2</td><td>0.0164</td><td>0.0160</td><td>0.0162</td><td></td><td>642.74</td><td>624.90</td><td>633.79</td><td></td><td>1.44</td><td>1.39</td><td>1.42</td><td></td><td>0.0069</td><td>0.0099</td><td>0.0084</td><td></td></tr>
<tr><td>V3</td><td>0.0157</td><td>0.0156</td><td>0.0157</td><td></td><td>595.11</td><td>571.37</td><td>583.18</td><td></td><td>1.34</td><td>1.29</td><td>1.32</td><td></td><td>0.0073</td><td>0.0129</td><td>0.0099</td><td></td></tr>
<tr><td>CD (P=0.05)</td><td>0.0000</td><td>0.0000</td><td>0.0000</td><td></td><td>3.21</td><td>3.20</td><td>3.145</td><td></td><td>0.01</td><td>0.01</td><td>0.009</td><td></td><td>0.0000</td><td>0.0000</td><td>0.0000</td><td></td></tr>
<tr><td colspan="17">Berry retention per truss (B)</td></tr>
<tr><td>B1</td><td>0.0172</td><td>0.0169</td><td>0.0170</td><td></td><td>662.03</td><td>641.97</td><td>651.96</td><td></td><td>1.49</td><td>1.44</td><td>1.46</td><td></td><td>0.0066</td><td>0.0094</td><td>0.0080</td><td></td></tr>
<tr><td>B2</td><td>0.0164</td><td>0.0160</td><td>0.0164</td><td></td><td>639.00</td><td>621.20</td><td>630.07</td><td></td><td>1.44</td><td>1.39</td><td>1.41</td><td></td><td>0.0070</td><td>0.0112</td><td>0.0091</td><td></td></tr>
<tr><td>B3</td><td>0.0149</td><td>0.0149</td><td>0.0149</td><td></td><td>584.90</td><td>566.97</td><td>575.90</td><td></td><td>1.31</td><td>1.27</td><td>1.29</td><td></td><td>0.0076</td><td>0.0116</td><td>0.0096</td><td></td></tr>
<tr><td>CD (P=0.05)</td><td>0.0000</td><td>0.0000</td><td>0.0000</td><td></td><td>3.21</td><td>3.20</td><td>3.145</td><td></td><td>0.01</td><td>0.01</td><td>0.009</td><td></td><td>0.0000</td><td>0.0000</td><td>0.0000</td><td></td></tr>
<tr><td>Interactions (Pooled)</td><td>B1</td><td>B2</td><td>B3</td><td>Mean</td><td>B1</td><td>B2</td><td>B3</td><td>Mean</td><td>B1</td><td>B2</td><td>B3</td><td>Mean</td><td>B1</td><td>B2</td><td>B3</td><td>Mean</td></tr>
<tr><td>P1V1</td><td>0.0180</td><td>0.0170</td><td>0.0150</td><td>0.0167</td><td>715.03</td><td>683.59</td><td>609.80</td><td>669.47</td><td>1.66</td><td>1.53</td><td>1.38</td><td>1.53</td><td>0.0060</td><td>0.0120</td><td>0.0110</td><td>0.0097</td></tr>
<tr><td>P1V2</td><td>0.0180</td><td>0.0170</td><td>0.0150</td><td>0.0167</td><td>704.96</td><td>668.33</td><td>609.89</td><td>661.06</td><td>1.59</td><td>1.47</td><td>1.37</td><td>1.47</td><td>0.0060</td><td>0.0120</td><td>0.0070</td><td>0.0083</td></tr>
<tr><td>P1V3</td><td>0.0170</td><td>0.0160</td><td>0.0160</td><td>0.0163</td><td>637.05</td><td>604.03</td><td>623.03</td><td>621.37</td><td>1.48</td><td>1.34</td><td>1.39</td><td>1.41</td><td>0.0120</td><td>0.0060</td><td>0.0070</td><td>0.0083</td></tr>
<tr><td>P2V1</td><td>0.0180</td><td>0.0170</td><td>0.0150</td><td>0.0167</td><td>674.52</td><td>645.70</td><td>597.41</td><td>639.21</td><td>1.53</td><td>1.44</td><td>1.36</td><td>1.44</td><td>0.0060</td><td>0.0070</td><td>0.0080</td><td>0.0070</td></tr>
<tr><td>P2V2</td><td>0.0170</td><td>0.0170</td><td>0.0160</td><td>0.0167</td><td>639.46</td><td>623.66</td><td>583.90</td><td>615.67</td><td>1.43</td><td>1.39</td><td>1.32</td><td>1.38</td><td>0.0110</td><td>0.0110</td><td>0.0110</td><td>0.0110</td></tr>
<tr><td>P2V3</td><td>0.0170</td><td>0.0160</td><td>0.0140</td><td>0.0157</td><td>630.17</td><td>573.97</td><td>537.05</td><td>580.39</td><td>1.40</td><td>1.36</td><td>1.21</td><td>1.32</td><td>0.0120</td><td>0.0070</td><td>0.0080</td><td>0.0090</td></tr>
<tr><td>P3V1</td><td>0.0150</td><td>0.0160</td><td>0.0150</td><td>0.0153</td><td>643.97</td><td>683.58</td><td>566.49</td><td>631.35</td><td>1.53</td><td>1.43</td><td>1.28</td><td>1.41</td><td>0.0110</td><td>0.0070</td><td>0.0080</td><td>0.0087</td></tr>
<tr><td>P3V2</td><td>0.0170</td><td>0.0170</td><td>0.0140</td><td>0.0160</td><td>638.54</td><td>645.70</td><td>538.30</td><td>607.51</td><td>1.42</td><td>1.34</td><td>1.19</td><td>1.32</td><td>0.0110</td><td>0.0120</td><td>0.0080</td><td>0.0103</td></tr>
<tr><td>P3V3</td><td>0.0160</td><td>0.0150</td><td>0.0140</td><td>0.0150</td><td>583.98</td><td>542.11</td><td>517.23</td><td>547.77</td><td>1.30</td><td>1.24</td><td>1.12</td><td>1.22</td><td>0.0070</td><td>0.0080</td><td>0.0080</td><td>0.0077</td></tr>
<tr><td colspan="17">CD (P=0.05)</td></tr>
<tr><td>P×V</td><td colspan="4">0.000</td><td colspan="4">5.447</td><td colspan="4">0.016</td><td colspan="4">0.000</td></tr>
<tr><td>P×B</td><td colspan="4">0.000</td><td colspan="4">5.447</td><td colspan="4">0.016</td><td colspan="4">0.000</td></tr>
<tr><td>V×B</td><td colspan="4">0.000</td><td colspan="4">5.447</td><td colspan="4">0.016</td><td colspan="4">0.000</td></tr>
<tr><td>P×V×B</td><td colspan="4">0.000</td><td colspan="4">9.435</td><td colspan="4">0.028</td><td colspan="4">0.000</td></tr>
</table>

combination P1V1B1 (715.03 and 1.66) recorded significantly higher vigour indices (Fig 3, 4).

The seedling length differed significantly among the structures, truss load per plant and berry per truss in both years and in pooled means (Table 3). Significantly superior seedling length was recorded in P1 (6.82 and 7.29 cm), in comparison with P2 (6.70 and 7.10 cm) and P3 (6.51 and 6.90 cm). The truss load per plant was higher in V1 (6.81 and 7.24 cm) followed by V2 (6.75 and 7.20 cm) and V3 (6.48 and 6.85 cm). The maximum seedling length was recorded in B1 (7.11 and 7.49 cm), followed by B2 (6.71 and 7.18 cm) and B3 (6.21 and 6.62 cm).The significant increase in seedling length in the P1 could be attributed to the higher 100 seed weight and better seed development as compared to P2 & P3, being more food assimilates in P1. The results of the present investigation were in conformity with Cheema (2006), who reported that higher seed quality parameters were higher in polyhouse produced seed.

The interactions were differed significantly (P×V, P×B, V×B, P×V×B). Among the interactions, P1V1B1 (7.43 cm and 7.84 cm) recorded significantly higher value for seedling length.

The dry weight differed significantly in structures and truss load/plant and number of berry/truss (Table 4). Higher values for this variable was observed under P1 condition (0.0166 g) as compared to P2 (0.0163 g) and P3 (0.0154 g). The higher seedling dry weight in P1 was due to higher seedling length in P1. Among the truss load/plant, V1 recorded more seedling dry weight (0.0164 g) under P1 structure, as compared to V2 and V3 (0.0162 g) and (0.0157 g) respectively. The number of berries thinned to five per truss (B1) recorded more dry weight (0.0170 g), followed by B2 (0.0164 g) and B3 (0.0149 g). The significantly higher dry weight in V1 & B1 is probably being the higher seedling length.

The interactions of P×V, P×B, V×B, P×V×B have shown significant (P=0.01) differences among the variables under study. Among the interactions P1V1B1, P1V2B1 and P2V1B1 stood first by recording the higher mean value for both the character under study (0.0180 g).

Significant difference for electrical conductivity among structures, truss/plant and berry/truss were recorded (Table 4). The lower EC was recorded in P1 (0.0086μS/g/cm) and followed by P2 (0.0089 μS/g/cm) and higher EC under P3 (0.0090 μS/g/cm). The lowest EC for truss load per plant was observed in V1 (0.0083 μS/g/cm) followed by V2 (0.0084 μS/g/cm) and maximum in V3 (0.0099 μS/g/cm). The treatment B1 recorded for lowest EC (0.0080 μS/g/cm), followed by B2 and B3 (0.0091 and 0.0096 μS/g/cm).

The interactions of P×V, P×B, V×B, P×V×B have shown significant (P=0.01) differences among the treatments.

CONCLUSION

The seed production of cherry tomato var Pusa Cherry Selection-1 should be done under semi-climate controlled polyhouse; retaining five truss/plant and pruning truss to 10 berry, to obtain better berry development, higher seed yield per berry and better seed quality attributes followed by naturally ventilated polyhouse with the same level of truss and berry removal.

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