



EFFECT OF LOW POLY-TUNNEL ON THE GROWTH, YIELD AND HARVESTING SPAN OF SWEET PEPPER

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ABSTRACT: To study the impact of low plastic tunnel on the performance of bell pepper, an experiment was conducted from 2004-05 to 2006-07 at vegetable experimental area, Punjab Agricultural University, Ludhiana. The treatments consisted of transplanting of bell pepper during November under low plastic perforated tunnel, low plastic non perforated tunnel, without protection and February transplanting in open field. The results clearly indicated that early yield (68.7q/ha), total yield (278.2 q/ha), fruit number per plant (18.9), plant height (49.44 cm), fruit girth (33.17 cm) and harvesting span (93 days) were significantly more in low plastic non perforated tunnel as compared to unprotected and February transplanted crops. However average fruit weight was at par in all the treatments.

Keywords: Sweet pepper, poly-tunnel, harvesting span,

Under Punjab conditions bell pepper is generally transplanted during February in open. By the time the crop comes to flowering and fruiting in April when the temperature already crosses 35°C. The threshold temperature for bell pepper to flower and fruiting is 32°C beyond which flowering and fruiting is badly affected. Further during the month of May the temperature crosses 40°C affecting flowering and fruiting severely. The Punjab has extreme low temperature in winter season touching 0°C and as high as 45°C in summer thereby limiting the harvesting span of the crop. This situation suggests to modify microclimate which will increase availability span of vegetables and farmers can capture the market early in the season to get good return of the produce. The low plastic tunnel technology is very useful in protecting the crop from frost during winter along with growth of the plants which enables the farmer to get early crop and for longer period. Further the low plastic tunnels can be easily dismantled and utilized in the next year. Therefore, the present investigation was conducted to standardize the low plastic technology for raising the sweet pepper during early summer.

MATERIALS AND METHODS

The present experiment was conducted during three years (2004-05 to 2006-07). The treatments

consisted of perforated plastic tunnel (T₁), Non-perforated plastic tunnel (T₂), Unprotected transplanting (T₃) and open field (T₄). In treatment T₁ plants were protected with the help of plastic sheet but small holes were made with the help of needle in the plastic sheet. In treatment T₂ plants were completely protected with the help of plastic sheet without any hole whereas no protection was provided in treatment T₃ and in T₄. Nursery of sweet pepper was sown in mid October under net tunnel to avoid the attack of white fly and transplanted in third week of November in treatment T₁, T₂, and T₃. Nursery of T₄ treatment was sown in first week of November and transplanted in first week of February when the risk of frost is over. The polythene sheets for treatments T₁ and T₂ were removed as soon as the risk of frost is over. The transplanting was done on the both sides of raised beds maintaining the distance of 120 cm and 30 cm between rows and plants respectively. All the cultural practices were done as per package of practices for open cultivation. Data was recorded on plant height (cm), days taken to first harvest, early yield (q/hac), average fruit weight (g), fruit girth (cm), number of fruits per plant, harvesting span and total yield (q/ha).

RESULTS AND DISCUSSION

The analysis of pooled data for three years

Table 1: Effect of different treatments on growth contributing attributes in bell pepper.

Treatment		Plant height (cm)				Plant spread				Leaf area (cm ²)			
		2004-05	2005-06	2006-07	Mean	2004-05	2005-06	2006-07	Mean	2004-05	2005-06	2006-07	Mean
T ₁	Perforated plastic tunnel	49.5	48.1	49.1	48.9	55.1	49.0	52.0	52.1	1266.1	1284.0	1283.9	1278.0
T ₂	Non perforated plastic tunnel	48.7	47.4	48.2	48.2	54.4	48.9	51.7	51.7	1279.5	1278.6	1279.3	1279.1
T ₃	Unprotected	34.2	33.5	34.2	34.0	45.9	42.5	43.6	44.0	1227.4	1221.7	1223.2	1224.1
T ₄	February transplanting	35.2	34.1	35.0	34.8	45.4	41.8	43.9	43.7	1229.4	1224.3	1224.4	1226.0
C.D. (P=0.05)		4.0	3.9	4.1	4.1	4.9	4.8	5.0	5.0	NS.	NS.	NS.	NS

Table 2: Effect of different treatments on yield and yield contributing attributes in bell pepper.

Treatment		Fruit number per plant				Average fruit weight (g)				Early yield (q/ha)				Total yield (q/ha)			
		2004-05	2005-06	2006-07	Mean	2004-05	2005-06	2006-07	Mean	2004-05	2005-06	2006-07	Mean	2004-05	2005-06	2006-07	Mean
T ₁	Perforated plastic tunnel	19.0	13.5	18.2	16.9	35.0	34.6	38.7	36.1	59.4	39.1	57.4	52.0	269.9	169.5	220.3	219.9
T ₂	Non perforated plastic tunnel	18.8	13.7	18.8	17.1	35.3	34.0	40.3	36.5	66.0	38.6	51.0	51.9	268.7	166.6	235.3	223.5
T ₃	Unprotected	12.6	9.8	11.3	11.2	35.2	33.5	35.7	34.8	20.0	11.3	20.4	17.2	190.5	103.6	163.6	152.6
T ₄	February transplanting	8.4	7.9	9.0	8.4	33.8	32.0	32.5	32.8	-	-	-	-	165.2	101.2	143.5	136.6
C.D. (P=0.05)		1.8	2.1	1.0	1.9	NS	NS	NS	NS.	7.0	5.5	7.5	6.9	33.2	15.1	11.0	21.5

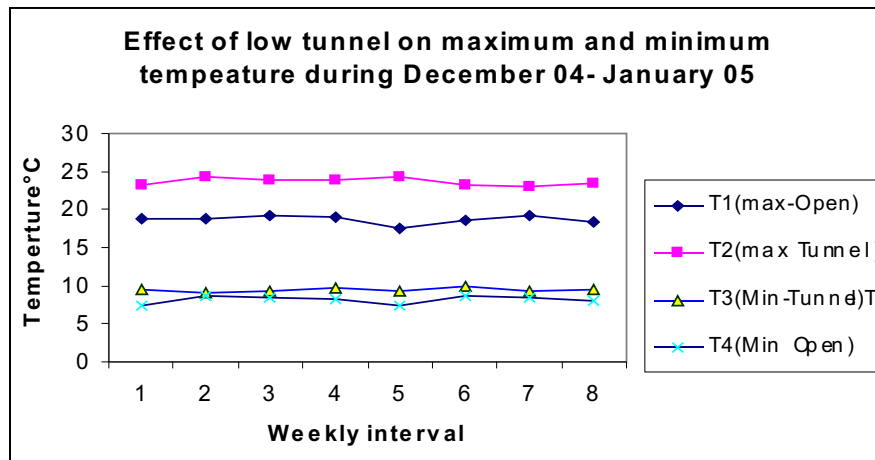
Table 3: Effect of different treatments on harvesting in bell pepper.

Treatment		Days taken to first harvest				Harvesting span			
		2004-05	2005-06	2006-07	Mean	2004-05	2005-06	2006-07	Mean
T ₁	Perforated plastic tunnel	105.7	105.0	120.3	110.3	92.0	95.3	96.0	94.4
T ₂	Non perforated plastic tunnel	103.7	103.3	120.3	109.1	92.7	93.3	84.7	90.2
T ₃	Unprotected	128.0	120.0	138.0	128.7	61.7	64	63.7	63.1
T ₄	February transplanting	79.0	78.7	89.3	82.3	51.7	53.7	42.3	49.2
C.D. (P=0.05)		7.5	8.4	10.3	4.5	4.9	4.6	5.3	2.5

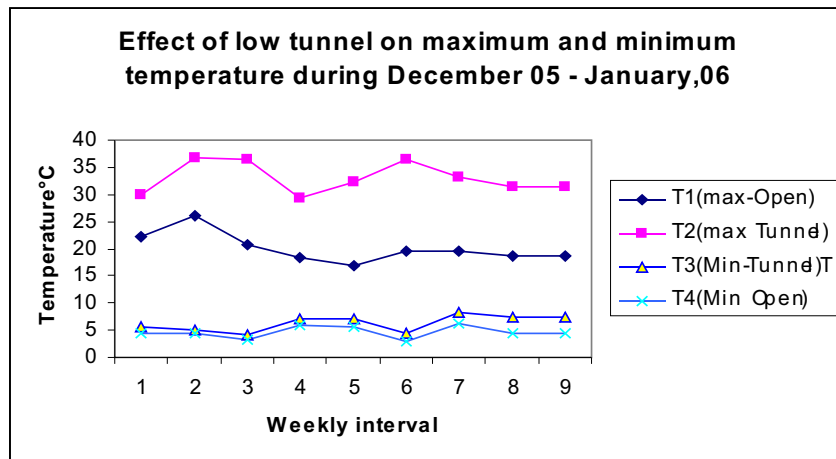
(Table 1) revealed that plant height and plant spread under protection were considerably higher than unprotected crop. Increase in height and plant spread were due to higher temperature inside the tunnel (Fig 1). Kacjan and Osvald (3) also observed taller plants under low plastic tunnels.

Days taken to first harvest were more in case of crop transplanted during November without

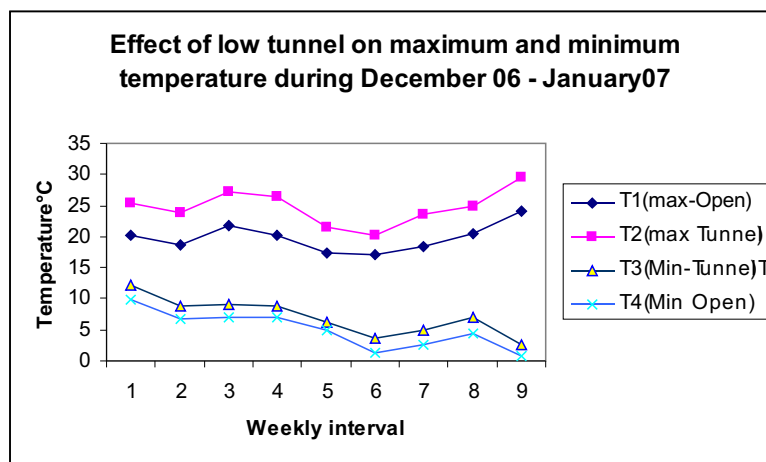
protection *i.e.* T₃ (129.50) while February transplanted crop (T₄) was ready for first picking in 78.50 days. On the other hand the early yield recorded was 68.7 q/ha under low tunnel which was significantly higher than unprotected crop (24q/ha) and the February transplanted crop produced no early yield. This might be due to the fact that crop grown under low tunnel escaped from the frost injury in December and January and there was



(a)



(b)



(c)

Fig. 1: Effect of low tunnel on maximum and minimum temperature (at weekly interval) (a) 2004-05, (b) 2005-06, (c) 2006-07.

continuous growth of the plants due to high temperature in the tunnel (Fig 1). The growth of the unprotected plants was severely affected by the frost damage and when these plants regained their vegetative growth during the month of February the plants under low tunnel started flowering. Pakyurek *et al.* (6) reported 39% increase in earliness in capsicum under protected conditions over control. Similarly, Sari *et al.* (7) revealed 51% increase in early yield under low tunnel in cucumber. They also found that average air and soil temperature were highest under low tunnel. Immirzi *et al.* (4) reported that pepper grown under plastic tunnel were 20 days in advance. Cheema *et al.* (2) also reported that tomato plants under protected conditions were earlier than normal grown conditions.

The present investigation also revealed that total yield was significantly higher than unprotected and almost double than the February transplanted crop (Table 2). This is mainly due to increase in harvesting span of the crop. Further the bell pepper got the maximum favourable time for its growth, flowering and fruiting than the February transplanted crop. The crop grown without protection got some chilling injury due to frost and took some time to recover. Buczkowska *et al.* (1) revealed that total yield under low tunnel was higher than under open conditions. Sari *et al.* (7) reported that increase in yield under low tunnel was due to increase in harvesting span in cucumber.

Fruit number per plant was recorded more under protected conditions and it was significantly higher than unprotected as well as February transplanted crop. It was also seen that unprotected bell pepper had also more fruit number than February transplanted crop. This is due to the fact that bell pepper grown under plastic tunnel got favourable conditions for maximum growth, flowering and fruiting in comparison to other treatments resulting in more number of fruits per plant. Kacjan and Osvald (3) obtained more fruits per plant under plastic tunnel in pepper. They attributed it to the increase in temperature in

tunnel during the frost period which results in more growth and yield of the crop.

The average fruit weight under low tunnel was non significantly higher than other treatments. It was also observed that average fruit weight in first two picking was significantly higher in low tunnel than the unprotected and February transplanted crop. Fruit girth was more under protected conditions (33.17cm) than the unprotected (27.94) and February transplanted crop (28.15cm).

Data presented in the Table 3 clearly indicated that harvesting span of crop under low tunnel (93 days) was significantly more than the protected as well as February transplanted crop. This is due to favourable environment of growth under low tunnel than other treatments. Macua *et al.* (5) reported in tomato that by use of plastic covers the crop get early and prolong for longer duration than the normal grown crop.

The results obtained during the two year study clearly indicated that the technology will help the growers to raise the bell pepper in early summer and increase the harvesting span of the crop fetching higher price.

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