

Performance evaluation of tomato crop under shadenet house and open field conditions in the Shahdol district

■ Deepak Chouhan, Mrigendra Singh, P.N. Tripathi and Alpana Sharma

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See end of the Paper for authors' affiliation

Correspondence to :

Deepak Chouhan

Krishi Vigyan Kendra (JNKVV),
Shahdol (M.P.) India

Email: deepakchouhan22@gmail.com

■ **ABSTRACT** : The performance of tomato crop cultivation in open field and under shadenet house condition was evaluated at farmers field in Shahdol district. Under shadenet house condition green colour shade net having 50 per cent shade factor was used in the study. Similar crop along with similar cultural practices in the open field and shade net cultivation was selected for performance evaluation. Drip irrigation facility with similar frequency of irrigation was done on both fields. The study revealed that under shade net condition performance of tomato the crop yield, plant height, harvest duration and number of harvest increased by 56.92 per cent, 53.37 per cent, 38.86 per cent and 59.38 per cent, respectively over open field cultivation.

■ **KEY WORDS** : Shadenet, Tomato, Yield, Plant characteristics, Plant height

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Tomato (*Lycopersicon esculentum* Mill.) belongs to solanaceae family is one of the most popular and nutritious vegetable crops grown all over the in India. This vegetable extensively grown in Andra Pradesh, Karnataka, Madhya Pradesh, Odisha and Gujarat. Presently, tomato grown in area of 879 thousands hectare with the production of 18226 thousands MT (National Horticultural Board, 2013). Protected cultivation of vegetables could be used to improve yield quantity and quality (Singh *et al.*, 1999; Ganesan, 2004 and Shahak *et al.*, 2008). Tomato grown under field conditions is exposed to abiotic and biotic stress which affects productivity and quality. Protected cultivation has the potential to reduce biotic and abiotic stresses. 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 tomato vegetable crops suitable for domestic as well as export purposes is the best alternative for using land and other resources more efficiently (Sanwal *et al.*, 2004). India is second largest vegetable producer in the world next to China; however it's per capita per day availability is well below 92g whereas the recommended consumption is 284 g. Protected cultivation technologies are being utilized all over the world but the level and extent of their use may be different among different countries. Agronomical practices play an important role for obtaining higher yields especially under protected structures. To make its cultivation successful, polyhouses and plastic-mulching are most suitable solutions (Chandra *et al.*, 2000 and Singh *et al.*, 2004 and 2010). The production of off-season vegetable crops under net house conditions was

evaluated for total yield, earliness and other character and incidence of insect pests (Cheema *et al.*, 2004). The cultivation of vegetables in net house can play a better role in improving quality, advancing maturity as well as increasing fruiting span and productivity. Singh and Sirohi (2008) reported that protected cultivation of vegetables offers distinct advantages of quality, productivity and favourable market price to the growers. Dixit (2007) studied the performance of leafy vegetables under protected environment and open field condition. Protected structure offers an opportunity for extended period of cultivation under frost free and comparatively higher night temperature conditions. Singh and Asrey (2005) also recommended that cultivation of tomato in a greenhouse would help obtain high productivity and better return. In shadenet house increase number of harvesting in tomato as compare to open field condition (Chouhan *et al.*, 2018). Tomato (*Solanum lycopersicon* L.) is available throughout the year in India. Therefore, an effort has been made to study the performance of tomato crop undershadenet house as well as open field condition.

METHODOLOGY

The study was conducted under shade net house and open field condition at farmers field in Shahdol district. Tomato crop was selected for this study and technical guidance was provided by JNKVV, Krishi Vigyan Kendra Shahdol. Shahdol district characterized by hot sub humid climate and sandy loam soil. The cropping area for study was 2000 m² in 8 farmer’s field. The tomato crop selected for study was 30 day after transplanted in shadenet and open field condition with a

spacing of 60 cm plant to plant (P-P) and 30 cm row to row (R-R). Lateral line with inline drippers have 2 lph discharge was installed for irrigation as well as fertigation of tomato crops.

RESULTS AND DISCUSSION

The results are presented under the head Plant characteristics, Yield parameter

Plant growth characteristics :

Plant growth characteristics such as plant height, number of branches, day of first flowering, day of harvesting, total number of harvesting, harvesting duration were measured for tomato crop under shade net house and open field was shown in Table 1. The plant height, number of branches per plant, number of harvesting and harvest duration were higher for the tomato crop cultivation in shade net over open field. The first flowering in open field tomato was 70.38 DAT because of hot temperature in this district and in shad net tomato crop flowering was late 79.5 DAT. Total harvest duration in shade net house was 64.63 day and 46.75 day in open field.

Yield parameter :

Yield parameter such as fruit weight, number of fruit per plant, yield per plant, yield per plot and productivity was measured and shown in Table 2. In shade net house fruit size was big and fruit weight was 60.56 g and in open field fruit quality was small and fruit weight was 40.61 g. Total numbers of fruit per plant was recorded higher (88.75) in shade net as compare to

Table 1 : Performance of tomato crop

	Plant height, cm		Number of branches		Day to first flowering		Day to first harvest		Number of harvesting		Harvest duration	
	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
1	60.4	92.5	30	42	68	75	82	90	3	6	45	60
2	56.7	98.1	28	38	65	78	80	95	3	6	46	68
3	65.6	104.6	32	35	68	76	85	92	4	5	50	60
4	68.9	95.8	25	45	72	79	89	94	3	6	45	70
5	78.2	109.5	32	43	71	82	86	99	4	6	45	72
6	75.6	107.8	34	39	74	81	90	98	4	5	50	62
7	62.5	104.2	29	37	75	85	92	102	4	5	48	55
8	64.6	98.9	31	48	70	80	88	97	4	6	45	70
Average	66.56	101.43	30.13	40.88	70.38	79.50	86.50	95.88	3.63	5.63	46.75	64.63

T₁ :- Open field
T₂ :- Shade net

Table 2 : Performance of tomato yield parameters

	Fruit weight, g		Ten fruit weight, g		Number of fruit per plant		Yield per plant, kg		Yield per plot, q		Yield per ha, q	
	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂
1	43.31	52.78	445.2	525.6	58	84	3.5	6.8	71	116.8	355	584
2	39.45	59.46	462.7	591.4	62	78	3.4	7.1	82	138.4	410	692
3	40.36	60.05	438.4	601.5	64	96	4.2	8	79.6	124.8	398	624
4	42.54	65.1	453.5	650.4	55	88	5.5	7.6	88.4	127.4	442	637
5	35.42	62.45	455.3	620.7	59	95	5.2	8.2	77	135	385	675
6	45.61	59.74	463.4	598.3	63	82	3.7	7.6	85.2	124	426	620
7	38.56	62.55	458.6	622.5	60	89	3	7.4	86.8	130.2	434	651
8	39.56	62.35	449.5	619.4	68	98	3.4	7.8	89.8	135	449	675
Average	40.61	60.56	453.33	603.73	61.13	88.75	3.99	7.56	82.48	128.95	412.38	644.75

T₁ :- Open fieldT₂ :- Shade net**Table 3 : Percentage improvement in tomato performance**

	Yield per ha	Number of fruit per plant	Fruit weight	Plant height	Harvest duration	Number of harvest
1	64.51	44.83	21.87	53.15	33.33	100
2	68.78	25.81	50.72	73.02	47.83	100
3	56.78	50.00	48.79	59.45	20.00	25
4	44.12	60.00	53.03	39.04	55.56	100
5	75.32	61.02	76.31	40.03	60.00	50
6	45.54	30.16	30.98	42.59	24.00	25
7	50.00	48.33	62.21	66.72	14.58	25
8	50.33	44.12	57.61	52.94	55.56	50
Average	56.92	45.53	50.19	53.37	38.86	59.38

open field (61.13) with an impact shown on yield *i.e.* per plant yield was more in shade net house tomato cultivation is 7.56 kg and open field condition is 3.99 kg. In shade net house yield per plot was 128.95 q and in open field condition yield per plot was 82.84 q. Tomato productivity was 412.38 q/ha in open field and 644.75 q/ha in shade net house.

Performance improvement :

Table 3 reveals that yield per ha, number of fruit per plant, fruit weight, plant height, harvest duration and number of harvest were 56.92, 45.53, 50.19, 53.37, 38.86, 59.38 per cent more, respectively, under shade net house condition compared to the open field condition. These findings demonstrate the suitability as well as economic feasibility of shadenet house as compare to open field condition in adverse and off season condition in Shahdol district. Therefore, it may be concluded that shadenet house could be a feasible option growing farmers for tomato to obtained higher yield as compare to open field condition.

Conclusion :

Cultivation of high value crop under covered cultivation is gaining momentum in India in recent past. In the present study experimental trials were taken up to study the performance of tomato crop under shade net having 50 per cent shade factor in comparison to open field cultivation. The findings of the study revealed that under shade net the crop yield was increase by 56.92 per cent over open field cultivation.

Authors' affiliations:

Mrigendra Singh, P.N. Tripathi and Alpana Sharma, Krishi Vigyan Kendra (JNKVV), **Shahdol (M.P.) India**

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