

Response of Yield and Yield Attributes of Capsicum by Coloured Shade Net and Shading Intensity

ABSTRACT

An experiment was conducted at the Precision Farming Development Centre, ARS, Swami Keshwanand Rajasthan Agricultural University, Bikaner during 2015-16 to -2017-18 on loamy sand soil. The experiment comprised of four coloured net viz., green, red, white and black and three shading intensity (35%, 50% and 75%) under Factorial Randomized Block Design (FRBD) with three replications. Based on the three season pooled data the result revealed that Capsicum gave maximum average fruit weight (86.77 g), average fruit length (25.91) and yield (558.24 q/ha) in red color shade net which is significantly higher over green, white and black colored net. Whereas in shading intensity the maximum average fruit weight (87.14 g), average fruit length (26.15) and yield (542.44 q/ha) recorded with 50 percent of shading intensity which is significantly higher over 35 and 75 percent shading intensity.

Key words: Capsicum, Fruit Length, Shade Net, Shading Intensity and Yield

1. INTRODUCTION

In Capsicum (*Capsicum annum* L.) also known as *simla mirch* or bell pepper is a cool season tropical crop and lacks adaptability to varied environmental conditions. It is reported to be the native of tropical America. Capsicum are used as vegetable as well as condiment. The mature fruits (green, red and yellow) of capsicum are eaten raw (salads) or widely used in stuffings, bakings, pizza and burger preparations due to its mild pungency and taste. Capsicum is rich source of vitamin A and C and consumed by almost every Indian (Allen 1975). The average annual production of capsicum in India is 1.60 lakh MT from an area of 12,000 ha (Castellano *et al.* 2008). Despite its economic importance, growers are not in a position to produce good quality capsicum with high productivity due to various biotic (pest and dis- eases), abiotic (rainfall, temperature, relative humidity and light intensity) and crop factors (flower and fruit drop). Hence, to obtain a good quality produce and production during off season, there is a need to cultivate capsicum under protected conditions such as green houses or poly houses or

shade net houses (El-Aidy *et al.* 1993). Shade net can be commercially exploited for successful year-round cultivation of high value thermo sensitive vegetable sweet pepper. Cultivation of capsicums are widely grown in shade net due to higher productivity and economic feasibility. Through there are number of varieties and hybrids available for cultivation, the information relating to performance of different coloured capsicum varieties and hybrids for quality attributes under protected environment is scanty. Hence, the present study was conducted to assess the performance of different cultivars of capsicum in terms growth, yield and quality parameters under shade net and open field condition. Shading effect of external nets of different colours (white, green, yellow and red) on the yield of two “kapija” pepper (*Capsicum annuum* L.) cultivars was examined in walk-in plastic tunnels in Hungary under real cultivation circumstances. Shading nets decreased incoming radiation by 23-39% and reduced photosynthetically active radiation by 32-46%. The highest retention was obtained by yellow and green nets, in the range of 450-550 nm and 550-670 nm, respectively.

2. MATERIALS AND METHOD

An experiment was conducted at the Precision Farming Development Centre, ARS, Swami Keshwanand Rajasthan Agricultural University, Bikaner during 2015-2018 on loamy sand soil. Geographically, the study area is located at 28° 10' N latitude, 73° 18' E longitude and 223.88 meters above mean sea level and this region falls under agro-climatic zone I C of Rajasthan. The climate of this tract is typically arid nature by aridity of the atmosphere and some salinity in the rhizosphere with extremes of temperature in summers and winters. There is wide range of temperature in summer (40° to 48°C) and in winter (-1° to 10°C) with annual rainfall of 250-270 mm. The soil of experimental field was loamy sand in texture, slightly alkaline in reaction. The experiment was laid out in Factorial Randomized Block Design with three replications. The experiment comprised of four coloured net treatment viz., green, red, white and black and three shading intensity (35%, 50% and 75%). Standard crop production practice and methods were followed for weeding, fertilizer application and crop protection management to grow the crop. Capsicum was grown as per standard horticulture practices. The yield attributes and yields were recorded according to standard methods. The experimental data were subjected to statistical analysis by adopting appropriate method of analysis of variance assuming homogeneity, analysis of the data was carried out to establish the trend of treatments applied as per Panse and Sukhatme [6]. Wherever, the F values were found

significant at 5% level of probability, the critical difference (CD) values were computed for making comparison among the treatment means.

3. RESULTS AND DISCUSSION

Effect of different coloured shade net on yield attributes and yield: - Based on three year pooled mean it is evident from data (Table 1,2,3) that red coloured shade net exhibited maximum average fruit weight (86.77 g), average fruit length (25.91 cm) and yield (558.24 q/ha). Plants grown under black coloured nets with 40% shadow had a 10.3% higher yield of than control plants grown without nets. Red and pearl shade-nets significantly increased the total yield by 30% which was associated with both higher productivity per plant and larger fruits. The major response to the photoselective filtration was the production of more fruits per plant, with essentially no reduction of fruit size or quality. This might be due to the reduced transpiration and improved plant water status and net photosynthesis under shaded conditions. According to the available literature, it is evident that shading is one of the promising methods to control the plant growth characteristics in order to increase yield and quality of pepper. Moderate shading (30% to 47%) increased total and marketable yields probably as a result of amelioration of heat stress (reduction in canopy and root zone temperatures) compared with unshaded plants (Díaz-Pérez, 2014). The number of fruits produced per plant throughout the growing season was 30–40% higher, and the yield ($t\ ha^{-1}$) 20–30% higher under these photoselective nets, in all tested cultivars, while fruit size was comparable with the black shade-net (control) (Shahak, 2008). In Serbia, bell pepper grown under coloured nets with 40% or 50% shade had higher total yields compared with unshaded plants (Ilic *et al.*, 2011). It also recorded that greater yield and higher fruit quality for sweet pepper hybrids grown under photo-selective (red and blue) shading net houses compared with those obtained from open field. According to the authors, the loss of commercial fruit by solar blight is significant in open crops. Peppers grown in an arid region under red and yellow shade-nets (30% relative shading in PAR) had a significantly higher yield compared with black nets of the same shading factors, with no reduction in fruit size (Fallik *et al.*, 2009). The production of bell pepper increased by 16% to 32% under pearl and red compared with black netting. With roughly 50% shade, commercial production was greater than in full sunlight, although less than with 26% (Rylski, Spigelman, 1986). Shade can increase total and marketable yields of pepper grown in the open field in hot climates, but shade is far more deleterious

in a cool and cloudy environment. These studies suggest that shade is more beneficial under high compared with low sunlight intensity on both a daily and a seasonal basis.

Effect of shading intensity on yield attributes and yield: - Based on three year pooled mean it is evident from data (Table 1,2,3) that 50 percent shading intensity reported maximum average fruit weight (87.14 g), average fruit length ((26.15 cm) and yield (542.44 q/ha). Results indicated that with the increase of shading intensity, yields decreased considerably, being significant in the case of 'Karpex' cultivar. According to Díaz-Pérez (2014) optimal shading intensity could be reached by reducing the infrared range in order to maximize cooling effect and, in the meantime, minimize the decrease in PAR, thus, photosynthetic activity. Zhu *et al.* (2012) reported that effect of shading on pepper yield and quality was highly dependent on geographic area and cultivation technology.

4. CONCLUSION

Based on the results of three-year experimentation it may be concluded that capsicum gave maximum average fruit weight (86.77 g), average fruit length (25.91) and yield (558.24 q/ha) in red color shade net which is significantly higher over green, white and black colored net. Whereas in shading intensity the maximum average fruit weight (87.14 g), average fruit length (26.15) and yield (542.44 q/ha) recorded with 50 percent of shading intensity which is significantly higher over 35 and 75 percent shading intensity.

Table 1: Effect of coloured shade net with different shading intensity on average fruit weight of capsicum

Treatment	Average fruit weight (g)			
Year	2015-16	2016-17	2017-18	Pooled
Net Colour				
Green	87.78	83.02	74.71	81.84
Red	92.89	88.04	79.37	86.77
White	91.32	86.48	77.93	85.24
Black	84.13	79.44	71.38	78.32
S. Em.±	0.66	0.76	0.70	0.68
C.D. (p=5%)	1.90	2.17	2.02	1.93
Shading intensity				
35%	81.33	76.71	68.84	75.62
50%	93.28	88.42	79.73	87.14
75%	92.47	87.61	78.98	86.35
S. Em.±	0.57	0.65	0.61	0.59
C.D. (p=5%)	1.65	1.88	0.68	1.67

Table 2: Effect of coloured shade net with different shading intensity on average fruit length of capsicum

Treatment	Average fruit length (cm)			
Year	2015-16	2016-17	2017-18	Pooled
Net Colour				
Green	25.80	24.82	22.09	24.24
Red	27.53	26.53	23.67	25.91
White	27.02	26.02	23.20	25.41
Black	24.62	23.73	21.07	23.14
S. Em.±	0.28	0.37	0.35	0.32
C.D. (p=5%)	0.81	1.07	1.00	0.92
Shading intensity				
35%	23.87	22.92	20.32	22.37
50%	27.74	26.79	23.92	26.15
75%	27.11	26.12	23.29	25.51
S. Em.±	0.24	0.32	0.30	0.28
C.D. (p=5%)	0.70	0.93	0.86	0.79

Table 3: Effect of coloured shade net with different shading intensity on yield of capsicum

Treatment	Yield (q/ha)			
Year	2015-16	2016-17	2017-18	Pooled
Net Colour				
Green	516.69	486.19	443.66	482.18
Red	596.13	563.25	515.32	558.24
White	576.24	543.95	497.38	539.19
Black	443.91	415.60	378.01	412.51
S. Em.±	9.60	9.45	8.79	8.94
C.D. (p=5%)	27.60	27.17	25.26	25.35
Shading intensity				
35%	449.16	420.69	382.74	417.53
50%	579.63	547.24	500.44	542.44
75%	570.94	538.82	492.60	534.12
S. Em.±	8.32	8.19	7.61	7.75
C.D. (p=5%)	23.90	23.53	21.88	21.95

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