Research Article

Evaluationary Study of Coloured Capsicum (*Capsicum Annum* L.) for Different Coloured Shade Net

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Abstract

An experiment was conducted in six different coloured shade nethouse with 75 per cent shading at Precision Farming Development Center, Agricultural Research Center, Swami Keshwanand Rajasthan Agricultural University, Beechwal, Bikaner during the year 2013-14 and 2014-15. The experiment was carried out in Completely Randomized Block Design (Factorial) with three replications. The experiment consist of six type of net color with 75 percent shading and coloures were Dark green, Light green, white, yellow, Black, Red and three different coloured capsicum (Asha- green, Orobelle- Yellow and Natasha- Red). Result found that the variety orobelle has significantly higher fruit diameter, plant height on increasing order during 60 DAT to 120 DAT whereas variety asha gave maximum number of fruit per plant and average fruit weight, yield, net return and B:C ratio. Consider to different shadenet colour the maximum fruit diameter, number of fruit per plant, average fruit weight, yield, net retrun and B:C ratio observed under red coloured shadenet whereas maximum plant height observed under black coloured shadenet.

Keywords: Capsicum, shadenet colour, Yield, Growth

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Introduction

Plants respond to light quantity, quality, direction, and periodicity. There are numerous photoreceptors in plants, including chlorophylls, phtyochromes, cryptochromes, phototropins, are ones that react to light. Light, along with other environmental cues, enables plants to adapt to environmental conditions. Efforts to manipulate plant morphology and physiology using photoselective filters have been ongoing for decades, especially in protected environments [1] and [2]. More recently, coloured shade netting designed specifically for manipulating plant development and growth has become available. These nets can be used outdoors as well as in protected structure. They can provide physical protection (birds, hail, insects, excessive radiation), affect environmental modification (humidity, shade, temperature) [3], and increase the relative proportion of diffuse (scattered) light as well as absorb various spectral bands, thereby affecting light quality. These effects can influence crops as well as the organisms associated with them. Sweet pepper (*Capsicum annum* L.) also known as 'simla mirch' is a cool season tropical crop and lacks adaptability to varied environmental conditions. Despite its economic importance, growers are not in a position to produce good quality capsicum with high productivity due to various biotic and abiotic crop factors. Color Nets represent a new agro-technological concept, which aims at combining the physical protection, together with differential filtration of the solar radiation. The shading of crops results in number of changes on both local microclimate and crop activity. Shade netting not only decreases light quantity but also alters light quality to a varying extent and might also change other environmental conditions. It was found that red and pearl shade nets significantly increased the total yield as compared to black shade nets [4]. In view of this the present experiment was conducted to study the suitability of coloured capsicum variety to shade net color on the basis of growth and yield.

Materials and Methods

An experiment was conducted in a specially designed shade net at Precision Farming Development Center, Agricultural Research Center, Swami Keshwanand Rajasthan Agricultural University, Beechwal, Bikaner during the year 2013-14 and 2014-15. The experiment was carried out in Completely Randomized Block Design (Factorial) with three replications. The experiment consisted of eighteen treatment combinations comprised of three varieties of

capsicum *viz.*, Asha green, Orobelle Yellow and Natasha Red and six different shade net colours *viz*., Dark green, Light green, white, yellow, Black and Red. Raised beds of 50 cm height, 90 cm width and 20 m length were prepared, keeping 40 cm spacing in between the beds as working path. One month age healthy seedlings were transplanted at the spacing of 45 cm x 60 cm on the raised beds and irrigated through drip irrigation. The recommended package of practices was followed. The capsicum fruits were harvested periodically. The periodical observations on growth and yields were recorded.

Results and Discussion

Growth attributes

On the basis of pooled data from **Table 1** indicated that the variety orobelle has significantly higher fruit diameter (7.15 cm) whereras minimum diameter (6.06 cm) found under variety Asha. According to plant height it was found that the after 60 days after tranplanting to 120 days after tranplanting variety orobelle get significantly higher height (39.36 cm, 70.36 cm and 91.62 cm) in increasing order and less growth (33.73 cm, 60.39 cm and 79.16 cm) found under variety asha. On 30 days after transplanting growth was non significant.

Table 1 Response of capsicum varieties to coloured shadenet on the basis of growth chracteristics. (2013-2015 pooled)

Treatment	Fruit Diameter (cm)	Plant Height (cm)			
		30 DAT	60 DAT	90 DAT	120 DAT
Variety					
Asha	6.06	15.06	33.73	60.39	79.16
Natsha	6.72	15.88	37.14	66.40	86.67
Orobelle	7.15	16.37	39.36	70.36	91.62
S.Em. ±	**0.08**	**0.40**	**0.40**	**0.64**	**0.80**
C.D. (5%)	**0.23**	**1.13**	**1.14**	**1.81**	**2.26**
Shade net Colour					
L Green	7.40	15.87	39.51	71.15	92.69
D Green	6.98	15.05	37.40	67.75	88.43
White	6.15	16.08	33.23	58.39	76.74
Yellow	6.55	15.02	35.26	63.49	83.12
Black	6.89	16.34	43.33	78.31	101.63
Red	7.65	16.18	40.77	73.36	95.45
S.Em. ±	**0.12**	**0.56**	**0.57**	**0.90**	**1.13**
C.D. (5%)	**0.33**	**1.60**	**1.61**	**2.56**	**3.20**

Consider to different shadenet colour the significantly higher fruit diameter (7.65 cm) was found under red coloured shaenet but it was at par with light green coloured shadenet. Maximum plant height (43.33 cm, 78.31 cm and 101.63 cm) in increasing order found under black shadenet during 60 days after transplanting to 120 days after tranplanting followed by red and light green coloured shadenet. On 30 DAT the plant growth showed non significant difference. The black net treatments, which reduced photosynthetically active radiation (PAR) was the main effectors of vegetative growth viz. increasing internodes, leaf and shoot lengths, and leaf widths compared with the other net colour [5].

Yield and Economics

Pooled observational data from **Table 2** showed that the variety asha gave significantly higher number of fruit per plant (29.40) and average fruit weight (75.49 gm) and it was at par with variety natasha. Maximum yield (565.37 q/ha), net return (Rs 623404.4) and B:C ratio (3.78) was found with capsicum variety asha whereas on accordance all the yield and economic character orobelle variety performe minimum. This is may be due to that the variety orobelle get higher growth but make low drymatter accumulation whereas in case of asha it was higher.

In comparison between coloured shadenets, the maximum number of fruit per plant (32.76), average fruit weight (83.82 gm), yield (612.12 q/ha), net retrun (693534.1) and B:C ratio (4.09) observed under red shadenet colour and it was at par with light green coloured shanet. all these characters found minimum under black coloured shadenet. This

was attributed to the fact that, red colour might have scattered more light resulting into availability of more diffused radiation causing higher absorption of PAR (photosynthatically active radiation) resulting in more light use efficiency and photosynthetic rate, whereas black colour acts as opaque material causing less reflection of all light spectra thereby reducing the Absorbed PAR, LUE, photosynthetic rate and dry matter accumulation and ultimately resulting into reduction in capsicum yield. Similar results were recorded by [6] and [4]. Reference [7] reported that production of three cultivars of bell pepper were increased by 16% to 32% under pearl and red compared with black netting.

Table 2 Response of capsicum varieties to coloured shadenets on the basis of yield and economics. (2013-2015 Pooled)

Treatment	Number of fruit/plant	Average fruit weight (gm)	Yield (q/ha)	Net Returns (Rs/ha)	B:C
Variety					
Asha	29.40	75.49	565.37	623404.4	3.78
Natsha	29.37	75.39	537.52	581634.5	3.59
Orobelle	28.46	73.00	473.83	486092.5	3.16
S.Em. ±	**0.25**	**0.66**	**4.53**	**6797.3**	**0.03**
C.D. (5%)	**0.70**	**1.87**	**12.87**	**19298.5**	**0.09**
Shade net Colour					
L Green	32.47	83.05	596.82	670587.3	3.99
D Green	31.32	80.01	566.21	624670.7	3.78
White	28.86	73.49	517.13	551047.2	3.45
Yellow	29.76	75.86	535.61	578761.8	3.58
Black	28.27	71.91	472.56	484189.4	3.16
Red	32.76	83.82	612.12	693534.1	4.09
S.Em. ±	**0.35**	**0.93**	**6.41**	**9612.8**	**0.04**
C.D. (5%)	**1.00**	**2.64**	**18.19**	**27292.2**	**0.12**

Diffused light has been shown to increase radiation use efficiency, yields (both at the plant and ecosystem level), and even be a factor affecting plant flowering (timing and amounts) [8] and [9]. Any shade netting can scatter radiation, especially ultraviolet because netting is usually made using ultraviolet-resistant plastic [10]. Shade netting that increases light scattering but does not affect the light spectrum has been shown to increase branching, plant compactness, and the number of flowers per plant [11]. Coloured shade nets can also increase light scattering which alone may influence plant development and growth.

Conclusion

It is concluded that the cultivation of capsicum variety Asha (green coloured) is economical best in red colour shadenet followed by light green coloured shadenet under hot arid region of Rajasthan.

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Publication History
Received 17th Feb 2017
Revised 20th Mar 2017
Accepted 04th Apr 2017
Online 30th Apr 2017