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Original Research Article

Studies on Yield and Economics of Capsicum as Affected by Fertigation in Shade Net House under Vidarbha Conditions of Maharashtra State, India

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A B S T R A C T

An experiment was conducted to study the effect of fertigation on yield and economics of capsicum in shade net house under Vidarbha conditions of Maharashtra state at Department of Horticulture, Dr. PDKV, Akola during 2014-15 and 2015-16. The experiment was laid out in randomized block design (RBD) with nine treatments and three replications. Observations were recorded on yield and yield contributing characters as well as economics of capsicum. As regards yield and yield contributing characters viz., number of fruits plant^{-1}, average weight of fruits, yield plant^{-1}, yield square meter^{-1} and yield hectare^{-1} treatments T_8 (fertigation with 75% NP and 100% K of RDF i.e.250:150:150 kg NPK ha^{-1}) found superior over all other treatments under study with maximum yield of 113.50 t ha^{-1}. Treatment T_8 was also found economical with B:C ratio 1:3.40.

Keywords

Capsicum, Fertigation, Shade net house, Yield and economics.

Introduction

The capsicum is commonly known as bell pepper, sweet pepper, or green pepper. The domesticated peppers could be broadly classified into sweet and hot types based on their level of pungency. Sweet pepper is relatively non-pungent or less pungent with thick flesh and it is the world second most important vegetables after tomato. Sweet pepper is very rich in vitamins even more than tomato, especially in vitamin 'A' and 'C', Capsicum is accounted for about 35 percent of total carotenoid content.

Recently capsicum has become one of the most popular vegetables commercially grown under protected cultivation viz., poly house, net house etc. because of its adoptability in different protected structures. Fertigation has several advantages over traditional methods. By fertigation, the time and rate of fertilizer applied can be regulated precisely according to the plants requirement.

Fertilization above plant requirements not only increases the costs but is also detrimental to the environment such as salt accumulation in soil and ground water contamination due to leaching (Villa-Castorena *et al.*, 2003). While nutrients are in short supply, depression of growth and yield can occur (Mengel and Kirkby, 2001).

Hence, it is necessary to carry out studies on different N, P and K concentrations in the nutrient solution, using fertigation technique under shade net house conditions for higher production of bell pepper and to estimate the

potential yield at minimum cost. Hence the present experiment was undertaken to study the yield and economics of capsicum as affected by fertigation in shade net house under Vidarbha conditions of Maharashtra state.

Materials and Methods

The present experiment was conducted to study the effect of fertigation on yield and economics of capsicum in shade net house under Vidarbha conditions of Maharashtra state at Department of Horticulture, Dr. PDKV, Akola during 2014-15 and 2015-16. The experiment was laid out in randomized block design (RBD) with three replications and nine treatments viz., T_1-100% RDN, 100% RDP and 100% RDK through WSF, T_2- 100% RDN,100% RDP and 100% RDK through straight fertilizers, T_3- 75% RDN, 75% RDP and 75% RDK through straight fertilizers, T_4- 100% RDN, 75% RDP and 75% RDK through straight fertilizers, T_5-125% RDN, 75% RDP and 75% RDK through straight fertilizers, T_6-75% RDN, 100% RDP and 75% RDK through straight fertilizers, T_7- through straight fertilizers, T_8-75% RDN, 75% RDP and 100% RDK through straight fertilizers and T_9-75% RDN, 75% RDP and 125% RDK through straight fertilizers. The recommended dose of fertilizers was 250:150:150 kg NPK/ha. The fertigation was done once in a week throughout the growth stages. The spacing adopted was 50x30cm with bed/plot size 3x1m.Yield parameters viz., number of fruits plant^{-1}, average weight of fruits, yield plant^{-1}, yield square meter^{-1} and yield hectare^{-1} were studied and economics of different treatments were also worked out.

Results and Discussion

The results of the experiment with appropriate reasons are discussed below.

Effect of fertigation on average fruit weight and yield per plant

The data pertaining to effect of fertigation on fruit weight of capsicum is presented in Table 1 it is noticed that maximum fruit weight was recorded in treatment T_8 (fertigation with 75%NP and 100%K through straight fertilizers) during 2014-15,2015-16 and pooled mean (123.65 g,124.85 g and 124.25 g respectively), whereas, treatment T_8 also produced maximum fruit yield per plant during 2014-15, 2015-16 and pooled mean (2.74 kg, 3.51 kg and 3.13 kg respectively).

Maximum fruit weight and fruit yield per plant was observed in treatment T_8 during both the years of experimentation and pooled mean. The ample supply of potassium helps the plant better synthesize and utilize the vital functional elements and thus improve the fruits size and yield of the plants. These results confirm the crucial role of potassium in the production of the large yields combined with fruit quality (Yagmur, 2004). Corroborative results have also been reported by Gupta *et al.,* (2009) and Kanwar *et al.,* (2013) in capsicum.

Effect of fertigation on yield per square meter and yield per hectare (tons)

The perusal of data regarding effect of fertigation on yield per square meter and yield per hectare of capsicum presented in Table 2, it is observed that yield per square meter was maximum in treatment T_8 (fertigation with 75%NP and 100%K through straight fertilizers) during 2014-15, 2015-16 and pooled mean (9.47, 13.23 and 11.35 respectively).

Whereas, treatment T_8 also showed maximum fruit yield per hectare during 2014-15, 2015-16 and pooled mean (94.71, 132.29 and 113.50 tons/ha respectively).

The yield per hectare is directly correlated with fruit weight, fruit yield plant^{-1} or per meter square. This might have resulted in production of more fruit yield per hectare in treatment T_8. Present results are in close conformity with the findings of Sui *et al.,* (2001) in sweet pepper.

Effect of fertigation on benefit cost (B: C) ratio

Data presented in Table 3, indicated that, during both years of study various treatments of fertigation had significant influence over benefit cost ratio. For first year, B: C ratio ranged from 1.77 (T_3) to 2.82 (T_8) and second year, it ranged from 2.92 (T_3) to 3.97 (T_8).

Pooled analysis of data revealed that treatment T_8 (fertigation 75% NP and 100% K through straight fertilizer) recorded significantly highest B: C ratio (3.40) followed by T_9 (i.e. fertigation with 75% NP and 125% K) in both years (3.13). Whereas, lower B: C ratio was found in T_3 (2.35). The benefit cost ratio was maximum in T_8 (fertigation with 75% NP and 100% K through straight fertilizers) due to maximum yield hectare^{-1} and simultaneously there was also about 25 per cent saving in nitrogen and phosphorus fertigation. Moreover, most importantly the straight soluble fertilizers are cheaper in cost as compared to water soluble fertilizers. Therefore, highest yield hectare^{-1}, low rates of straight fertilizers and 25 per cent saving of nitrogen and phosphorus fertilizers are the major contributing factors for higher B:C ratio in T_8 (fertigation with 75% NP and 100% K through straight fertilizers) treatment.

The above results are in agreement with Yellavva and Patil (2009) and Imamsaheb *et al.,* (2011) in capsicum, Samsangheile and Kanaujia (2014) in chilli.

Table.1 Effect of fertigation on fruit weight and yield per plant

Treatments	Average fruit weight (g)			Yield per plant (kg)		
	2014-15	2015-16	Pooled	2014-15	2015-16	Pooled
T1	122.03	124.19	123.11	2.69	3.42	3.05
T2	120.26	123.65	121.95	2.67	3.39	3.03
T3	116.95	121.73	119.34	2.52	3.13	2.82
T4	116.27	121.54	118.91	2.54	3.23	2.87
T5	118.84	122.06	120.45	2.58	3.25	2.91
T6	116.24	121.33	118.79	2.55	3.28	2.92
T7	117.96	122.08	120.02	2.57	3.21	2.89
T8	123.65	124.85	124.25	2.74	3.51	3.13
T9	122.31	124.32	123.32	2.70	3.45	3.07
SE (m)±	0.75	0.42	0.45	0.02	0.06	0.03
CD at 5%	2.25	1.27	1.30	0.07	0.18	0.09

Table.2 Effect of fertigation on yield per square meter and yield per hectare (tons)

Treatments	Yield per square meter (kg)			Yield per hectare (tons)		
	2014-15	2015-16	Pooled	2014-15	2015-16	Pooled
T1	9.29	12.69	10.99	92.87	126.91	109.89
T2	8.85	12.43	10.64	88.54	124.33	106.44
T3	8.16	10.42	9.29	81.58	104.21	92.90
T4	8.13	10.75	9.44	81.31	107.55	94.43
T5	8.50	12.00	10.25	85.01	119.99	102.50
T6	8.36	11.72	10.04	83.60	117.16	100.38
T7	8.45	11.44	9.94	84.49	114.37	99.43
T8	9.47	13.23	11.35	94.71	132.29	113.50
T9	9.33	12.54	10.93	93.27	125.40	109.33
SE (m)±	0.14	0.29	0.16	1.43	2.82	1.63
CD at 5%	0.43	0.85	0.47	4.28	8.45	4.71

Table.3 Effect of fertigation on benefit cost (B: C) ratio

Treatments	B:C ratio		
	2014-15	2015-16	Pooled
T_1	2.26	3.41	2.83
T_2	2.38	3.53	2.95
T_3	1.77	2.92	2.35
T_4	1.89	3.04	2.47
T_5	2.35	3.50	2.93
T_6	2.08	3.23	2.65
T_7	1.94	3.09	2.52
T_8	2.82	3.97	3.40
T_9	2.55	3.70	3.13
SE (m)±	0.01	0.02	0.01
CD at 5%	0.03	0.05	0.03

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