



EFFECT OF SPACING AND PLANT ARCHITECTURE ON YIELD AND ECONOMICS OF CAPSICUM UNDER NET HOUSE CONDITIONS

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ABSTRACT: The experiment was conducted at Main Garden of Department of Horticulture, Dr. PDKV, Akola to study the effect of spacing and plant architecture on yield and economics of capsicum under nethouse condition. The experiment was laid out in Split Plot Design with four replications in aluminated net house. There were three levels of plant spacing and three levels of pruning together making nine treatment combinations. The treatments included three levels of plant spacing $S_1 = 45 \times 30$ cm, $S_2 = 45 \times 45$ cm and $S_3 = 45 \times 60$ cm, and three levels of plant architecture P_1 - pruned for four stem, P_2 - pruned for two stem and P_3 - unpruned. The results of present investigation indicate that yield per hectare was highest at in closer spacing (S_1) and four stem pruning (P_1). While, the wider spacing treatment (S_3) and unpruned (P_3) recorded minimum values in these respect. The treatment combination S_1P_1 (45 x 30 cm spacing along with the four stem pruning) have recorded the maximum values regarding yield per hectare. However, the cost; benefit ratio was found to be highest in plant spaced at 45cm x 45cm with four stem pruning (S_2P_1) and it was followed by S_1P_1 and S_2P_2 .

Keywords: Capsicum, pruning, spacing, net house condition, yield.

Sweet pepper is one of the most popular and high value vegetable crops grown for its immature fruits throughout the world. It occupies a place of pride among vegetables in Indian cuisine because of its delicacy and pleasant flavours coupled with the content of ascorbic acid and other vitamins and minerals. Sweet pepper comes in many different attractive colours including green, red and yellow. It may be eaten cooked or raw, sliced in *salads*. Its fruits are important constituents of many recipes. Its consumption is increasing all over the world with the increase in the fast food industries.

In India, with increase in population and improvement in dietary habits people realize the importance of vegetables in their diet as vegetable have high nutritive value, which are vital for body. Also in present scenario the area under cultivable land decreasing day by day due to rapid urbanization, industrialization and shrinking land holdings. Cultivation of vegetables under net-house can play a major role in improving quality, advancing maturity as well as increasing fruiting span and productivity.

Cultural practices such as plant density and pruning in capsicum under net house conditions

may help to improve its production. One way of doing this is only to increase the yield but also to obtain higher return per hectare. At present, not much information on economic feasibility of adopting different spacing and pruning practices in sweet pepper. Hence, the present investigation was taken up to study the effect of spacing and plant architecture on yield and economics of capsicum under net house conditions.

MATERIALS AND METHODS

The experiment was conducted at Main Garden of Department of Horticulture, Dr. PDKV, Akola during 2008-09 and 2009-10. The experiment was laid out in Split Plot Design with four replications in aluminated net house. There were three levels of plant spacing and three levels of pruning together making nine treatment combinations. The treatments included three levels of plant spacing $S_1 - 45 \times 30$ cm, $S_2 - 45 \times 45$ cm and $S_3 - 45 \times 60$ cm and three levels of plant architecture P_1 - pruned for four stem, P_2 - pruned for two stem and P_3 - unpruned.

The seeds of variety 'Indra' were sown in plastic cups and covered with fine soil. The cups

were irrigated regularly with the help of watering-can till the seeds germinated. Irrigation was given at an interval of 2-4 days during first fortnight and thereafter at weekly interval. After preparation of raised beds of 3m x 1m size and application of basal dose of fertilizers, five week old seedlings of uniform height from the nursery beds were transplanted at a spacing mentioned in the treatments in main plots. The seedlings were dipped in the solution of Monocrotophos 1 ml + 2 g Copper Oxychloride + 2 g Redomil/ lit, just before transplanting. The seedlings were irrigated immediately after transplanting. Pruning was done by sharp knife to cut out unwanted axillary buds and branches depending on the treatment whether two stem and four stem. Before and after every treatment was pruned, the knife was washed with Bavistin solution. Pruning was carried at seven days interval from twenty days after transplanting.

Observation on vegetative growth and flowering parameters were recorded at 30 days after sowing. The parameters on yield and quality of capsicum were also studied. Information on costs of seed, plastic cups for seed sowing, nylon wire for pruning and rate of capsicum fruits per tonne were recorded for the purpose of working out economics. The cost of cultivation, gross income, net profit and cost benefit ratio were calculated.

RESULTS AND DISCUSSION

Yield of capsicum per hectare was found to be significantly influenced by different spacing treatments during both the years of experimentation. The data of 2008-09 trial indicate that the closer spacing treatment (S_1) recorded significantly maximum yield per hectare (72.18 t ha^{-1}). However, significantly least effective treatment was (S_3) recording 56.10 t ha^{-1} yield of capsicum. The data in Table 1 for the year 2009-10 revealed that, significantly superior results in respect of yield per hectare (76.64 t ha^{-1}) were exhibited due to the closer spacing (S_1). However, the wider spacing treatment (S_3) exhibited inferior results in respect of yield per hectare recording 57.93 t ha^{-1} yield of capsicum. The pooled data exhibited significantly maximum yield

per hectare (74.41 t ha^{-1}) in the closer spacing (S_1). However, significantly minimum yield per hectare (56.97 t ha^{-1}) was noted in S_3 . Yield per hectare was maximum at the closest spacing of 45 x 30 cm due to higher population maintained per unit area. Similar results were reported by Sharma and Peshin (3), and Chaudhary *et al.* (2) in sweet pepper.

The data pertaining to yield per hectare during the first year 2008-09 envisaged that P_1 to be most effective treatment recording maximum yield of 80.68 t ha^{-1} and was significantly superior over other treatments, while, treatment P_3 receiving unpruned, recorded minimum yield per hectare (48.08 t ha^{-1}). Similar trend was observed during the second year of experimentation where maximum yield (84.49 t ha^{-1}) was recorded in four stem pruning which was followed by 73.97 t ha^{-1} yield in treatment P_2 . Both the pruning treatments were significantly superior over treatment P_3 recording minimum yield per hectare (50.81 t ha^{-1}). The yield of capsicum per hectare was significantly maximum under the treatment P_1 recording 82.59 t ha^{-1} in pooled results. However, it was minimum with unpruned treatment, P_3 (49.45 t ha^{-1}).

Maximum yield per hectare recorded in pruned plants might be due to the fact that the pruned plants produced more number of flowers and fruits and thereby increased total fruit yield per plant and per meter square. These results are similar with the findings of Shetty and Manohar, (4) in capsicum.

Interaction effect of spacing and plant architecture had shown significant influence on yield of capsicum per hectare during both the years of experimentation. The treatment combination S_1P_1 recorded significantly maximum yield per hectare (90.88 , 96.78 and 93.83 t ha^{-1}) during 2008-09, 2009-10 and for pooled results, respectively. However, significantly minimum yield per hectare was noted in the treatment combination S_3P_3 during

Table 1. Effect of spacing and plant architecture on capsicum yield per hectare.

Treat.	Yield per hectare (t)											
	First Year (2008-09)				Second Year (2009-10)				Pooled			
	P ₁	P ₂	P ₃	Mean	P ₁	P ₂	P ₃	Mean	P ₁	P ₂	P ₃	Mean
S ₁	90.88	72.15	53.50	72.18	96.78	77.28	55.86	76.64	93.83	74.71	54.68	74.41
S ₂	85.17	74.29	47.44	68.97	89.21	81.87	53.0	74.69	87.19	78.08	50.22	71.83
S ₃	66	58.73	43.3	56.10	67.48	62.71	43.59	57.93	66.74	60.72	43.44	56.97
Mean	80.68	68.39	48.08		84.49	73.97	50.81		82.59	71.18	49.45	
Interaction effect (S x P)												
	S	P	S P	S	P	S P	S	P	S P			
C.D. (P = 0.05)	1.24	2.49	3.71	1.37	1.78	2.66	1.29	1.56	2.71			

Table2: Yield, cost and returns from capsicum under different spacing and plant architecture.

Treatments	Cost of cultivation (Rs.)	Yield ha ⁻¹ (tonnes)	Gross income (Rs.)	Net profit (Rs.)	C : B ratio
S ₁ P ₁	5,53,850	93.83	23,45,750	17,91,900	1:3.2
S ₁ P ₂	5,35,850	74.71	18,67,750	13,31,900	1:2.4
S ₁ P ₃	5,17,850	54.68	13,67,000	8,49,150	1:1.6
S ₂ P ₁	4,82,550	87.19	21,79,750	16,97,200	1:3.5
S ₂ P ₂	4,69,950	78.08	19,52,000	14,82,000	1:3.1
S ₂ P ₃	4,57,350	50.22	12,55,500	7,98,150	1:1.7
S ₃ P ₁	4,43,550	66.74	16,68,500	12,24,950	1:2.7
S ₃ P ₂	4,34,550	60.72	15,18,000	10,83,450	1:2.4
S ₃ P ₃	4,25,550	43.44	10,86,000	6,60,450	1:1.5

Plastic cups for seed sowing @ 60 Rs. / 100 cups; Seed cost @ 550 Rs. for 10 g; Nylon wire for pruning 60 Rs./kg; Capsicum costs @ 2500 Rs. / ton.

the year 2008-09 (43.3 t ha⁻¹), 2009-10 (43.59 t ha⁻¹) and in pooled results (43.44 t ha⁻¹).

The results (Table 2) show that with increased density of planting the cost of cultivation also increased mainly due to the increased cost of planting material and cost benefit ratio decreased

The treatment combination S₂P₁ produced 87.19 t/ha yield and gave the Rs.16,97,200 net profit with highest cost benefit ratio (1:3.5) followed by the treatment combination of closer spacing with four stem pruning (S₁P₁) and medium spaced plant with two stem pruning (S₂P₂). However, the lower cost benefit ratio was observed under the treatment having wider spacing and unpruned plant (S₃P₃). The above results are in agreement with Dhillon *et al.* (1) and Zende (5) in capsicum.

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