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Growth, Flowering and Yield of Chilli, *Capsicum annuum* L. as influenced by spacing and Growing Conditions

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ABSTRACT

In this work a field study was conducted to evaluate the effect of Spacing and growing conditions on Chilli at the department of Horticulture, CCS Haryana Agricultural University, Hisar during 2011-12 and 2012-13 to investigate growth and yield of Chilli as influenced by growing conditions and spacing. There were two different growing conditions viz. low tunnel and open field conditions and three levels of spacing viz. 60x30cm, 60x45 cm, 60x60 cm. Two years average data indicated that maximum yield was obtained when Chilli was grown under low tunnel as compare to open field cultivation. The increase in yield to the extent of 38 per cent in addition to better fruit quality was observed under low tunnel. The plant spacing had significant variation in almost all the growth and yield components Number of branches/plant, number of fruits/plant, and yield/plant were increased with the increasing of plant spacing but plant height was found to be significantly increased with the decreasing plant spacing

Key words: *Plant spacing, Growing conditions, Chilli, Growth, Yield.*

INTRODUCTION

Chilli pepper (*Capsicum annuum* L.) is an important spice and cash crop in many countries of the world. Growing vegetable demand could be achieved through bringing additional area under cultivation crops, using hybrid crops and adoption of improved agro-techniques. Protected cultivation of vegetables could be used to improve yield, quantity and quality[3&13]. Vegetables grown under field conditions are exposed to abiotic and biotic stress which affects productivity and quality. Protected cultivation has the potential to reduce biotic and abiotic stress. A low tunnel structure can modify environmental conditions with reduced labor. 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 vegetable crops suitable for domestic as well as export purposes is the best alternative for using land and other resources more efficiently[12]. Chilli belongs to the family solanaceae, are native to tropical South America. It is now widely cultivated in Central and South America, Peru, in almost all the European counties, Honkong and India. It is the world's second most important vegetables after tomato[1].

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Successful cultivation of any crop depends in several factors. Plant spacing is of the important aspects for production system of different crops. Optimum plant spacing ensures proper growth and development of plant resulting maximum yield of crop and economic use of land. There are very few reports regarding the growing conditions and spacing to cultivate the crop under the agro climatic conditions of Hisar, Haryana. Considering the above facts, the present experiment was undertaken to standardize suitable growing conditions and spacing for higher yield at the experimental site.

MATERIAL AND METHODS

The experiment was conducted at the PFDC area, CCS HAU, Hisar during 2011-12 & 2012-13. The experiment was laid out in a Randomized Complete Block Design with three replications. The seedlings of Chilli hybrids were planted in the month of November at three spacing i.e. 60x30cm, 60x45cm and 60x60cm under low tunnel and open field. Transparent plastic sheet of 50 micron were stretched over the iron hoops covering the entire row of the plant just after planting and removed in the month of February. The crop was irrigated with drip irrigation system when needed depending on the moisture status of the soil and requirement of plants. Plots with seedlings were regularly observed to find out any damage or dead seedlings for its replacement and weeding was done as per requirement and also plant protected measure were done against insect & disease. Data were collected from five plants were randomly selected from each plot for data collection on growth & yield characteristics during the growth of plants and at harvesting time of the crop.

RESULTS AND DISCUSSION

Growth, development, productivity and post harvest quality of any crop largely depend on the interaction between the plant genetics and the environmental conditions under which they are grow. Good and early growth started in winter months under low tunnels, whereas, the growth started in open condition only in the month of February due to freezing temperature prevailing in region. Chilli crop can not tolerate the frost. Earliness in was under low tunnel might be due to the micro-climate which enhance the photosynthesis[15]. In all Chilli hybrids plant height was highest under low tunnel compared to open field. This may be due to enhanced photosynthesis and respiration due to the favorable micro climatic conditions in the low tunnel. This agrees with results of Ramesh and Arumugam[8] on vegetables grown under poly house and Ryelski[11] and El-Aidy et al[2]. in Sweet papper. The effect of plant spacing was found to be significant on plant height. It was also found that the lowest spacing 60x30 cm produced the plants with higher plant height as compared to other higher spacing. The closet spacing (60x30 cm) produced the tallest plant (48.33) and the shortest plant (38.83 cm) were obtained from the widest spacing (60x60 cm). The results of the present study for this character are in agreement with the findings of Maya et al[6] . Viloria et al.[16] and Manchanda et al.[4] also expressed similar opinion on plant height of Sweet pepper. Number of branches per plant were higher under low tunnel than in open field. This might be due to the favorable micro-climatic conditions. Similar results were reported by Rylski[11]. Number of branches per plant differed significantly by different spacing levels (table-1). Maximum average number of branches (16.17) per plant was recorded from plants of the widest spacing (60x60 cm). The lowest number of branches (11.67) per plant was recorded from the closet spacing (60x30 cm) which was statistically different from other treatments. The results of the present study for this character is in agreement with the findings of Ravanappa et al.[9]. This might be due to the plants of wider spacing could receive more light, nutrients and other resources than the plants of close spacing. Number of fruits per plant were also higher under low tunnel (103.84) than the open field conditions (40.11). This might be due to high relative humidity inside the low tunnels, which enhanced vegetative growth and

improved fruit production. These results agree with findings of Priya et al.[7]. The number of fruits per plant varied significantly under different plant spacing (table1). The highest average number of fruits (82.00) per plant was recorded from the widest spacing (60x60 cm) which was significantly higher than those of other spacing. The lowest number of fruits (57.50) per plant was noted under the closet spacing (60x30 cm). Reduced number of plants under wider spacing undergone less inter or intra plant competition which caused an increased number of fruits per plant. The results agree with the findings of Shrivastava[14] .The results are in agreement with the report of Mishriky and Alphonse[5] who stated that the number of fruits per plant and yield per plant decreased with closer plant spacing. Yield per plant (300.45 g/plant) and estimated yield per hectare (111.53 q/ha) was significantly higher in low tunnel condition than the open fields. Environment is the aggregate of all external conditions which influence growth and development of plants. Temperature can be controlled and regulated under protected conditions and better growth of plants might be expected under low tunnel. Relative humidity reduces evaporation loss from plants which lead to optimum utilization of nutrients. It also maintains turgidity of cells which is useful in enzyme activity leading to a higher yield[10]. Yield per plant was significantly influenced by spacing levels. The maximum yield (316.67 g/plant) was recorded from the widest spacing (60x60 cm) and differed significantly from that of the other spacing. The lowest yield (163.67 g/plant) was obtained from the closed spacing (60x30 cm). The wider spacing facilitated the plants to develop properly with less inter and intra plant competition for utilizing the available resources resulting higher yield per plant. On the other hand, in higher population density reduced yield per plant might be attributed to lesser fruit yield per plant. The result of the present experiment is in agreement with the findings of Ravanappa et al.[9].whereas estimated yield per hectare is non significant among different spacing.

Table 1: Effect of growing conditions and Spacing on growth and yield of chilli

Treatment	Plant height (cm)	No. of branches/plant	No. of fruits/plant	Yield/plant (g)	Estimated yield/ha (q/ha)
(A) Growing conditions					
Low tunnel	52.44	21.22	103.89	300.45	111.53
Open condition	32.78	6.78	40.11	183.00	68.18
C.D. at 5%	3.66	2.19	8.84	27.46	9.90
(B) Spacing					
60x30	48.33	11.67	57.50	163.67	90.93
60x45	40.17	14.17	76.50	244.83	90.68
60x60	38.83	16.17	82.00	316.67	97.96
C.D. at 5%	4.49	2.68	10.83	33.64	NS
Interaction (AxB)	NS	NS	NS	NS	NS

CONCLUSION

Therefore, it was evident from the above results that low tunnel condition found to be the best for production of Chilli under the area of the CCS Haryana Agricultural University, Hisar conditions.

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