Int.J.Curr.Microbiol.App.Sci (2018) *7*(5): 298-302

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 7 Number 05 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.705.038

Effect of Plant Spacing on Fruit Quality of Capsicum (*Capsicum annuum* L) Hybrid Buffalo under Natural Ventilated Polyhouse

Ghanshyam Thakur*, Anil Kumar Singh and Pankaj Kumar Maurya

Department of Horticulture, Dr. Rajendra Prasad Centeral Agricultural University Pusa, Samastipur-848 125, Bihar, India

**Corresponding author*

Keywords

Capsicum, Spacing, Fruit quality, Polyhouse

Article Info

Accepted:
04 April 2018
Available Online:
10 May 2018

A B S T R A C T

An experiment was carried out to study the Effect of plant spacing on fruit quality of Capsicum (*Capsicum annuum* L) hybrid buffalo under natural ventilated polyhouse during September, 2016 to February, 2017 at Hi-Tech Horticulture, Dr. R.P.C.A.U Pusa, Samastipur, Bihar. There were three levels of spacing 45 cm x 30 cm (4.4 plants/m^2), 45 cm x 45 cm (2.94 plants/m^2) and 45 cm x 60 cm (2.22 plants/m^2). The experiment was laid out in factorial randomized block design with three replications. Among the different spacing level, the spacing S_3 (45 cm x 60 cm) recorded maximum fruit length (9.41 cm), fruit breadth (7.26 cm), volume of fruit (299.60 cc), rind thickness (0.74 cm), self-life (7.18 days), 'A^+' (6.48 %), 'A' (26.51%) grade was recorded under S_3 (45 cm x 60 cm). B (47.08 %) and C (34.88 %) fruit grade were maximum recorded under S_1 (45 cm x 30 cm) which was significantly superior over the rest of the treatment.

Introduction

Capsicum (*Capsicum annuum* L. var. grossum Sendt) is also called as bell pepper or sweet pepper and is one of the most popular and highly remunerative annual herbaceous vegetable crops. Sweet pepper (*Capsicum annuum* L. var. grossum Sendt) is different from chilli (*Capsicum annuum* L. var. longum) belongs to the family Solanaceae. It is known by other names such as Shimla mirch, green pepper and capsicum. Capsicum is cultivated in most parts of the world, especially in temperate regions of Central and South America and European countries, tropical and subtropical regions of Asian continent mainly in India and China. Nutritionally, bell pepper are rich in vitamins particularly Vitamin A (180 IU) and vitamin C. 100 gram of edible portion of capsicum provides 24 kCal of energy, 1.3 g protein, 4.3 g carbohydrates and 0.3 g fat (Anon, 2001). In the world, area and production of bell pepper is merged with that of hot pepper (chilli pepper). Hence, the exact statistics related to bell pepper/chilli as whole is given. China is the major producer of capsicum and contributes 36 per cent of the worlds cultivated area with a production of 15.03 million tones. India contributes average annual production of 1.08 million tonnes from an area of 1.06 million hectare with a productivity of 1.12 tonnes per ha (Anon., 2014). Capsaicin is the main chemical content in sweet pepper. It

has attained a status of high value crop in India in the recent years and occupies a pride place among vegetables in Indian cuisine, because of its delicate taste and pleasant flavour coupled with rich content of ascorbic acid and other vitamins and minerals. The mature fruits (green, red and yellow) of sweet pepper are eaten raw or widely used in stuffings, bakings, pizza and burger preparations. Despite its economic importance, growers are not in position to produce good quality capsicum with high productivity due to various biotic (pest and diseases), abiotic (rainfall, temperature, relative humidity and light intensity) and crop factors (flower and fruit drop). Due to erratic behavior of weather, the crop grown in open field are often exposed to fluctuating levels of temperature, humidity, wind flows etc. Which ultimately affect the crop productivity adversely (Ochigbo and Harris 1989). Besides this, limited availability of land for cultivation hampers the vegetable production. Hence, to obtain the good quality produce and production during off season, there is a need to cultivate capsicum under protected condition such as green house or polyhouse.

Materials and Methods

The present investigation was carried out at Hi-Tech Horticulture, Dr. R.P.C.A.U PUSA, Samastipur, Bihar during September, 2016 to February, 2017 to study the performance of hybrid capsicum (*Capsicum annuum* L.) *cv*. Buffalo with different levels of spacing under naturally ventilated polyhouse. The seedlings of capsicum hybrid buffalo was planted in two rows on one meter wide bed having 50 cm path between two beds with three training levels P_1 (two shoots/plant), P_2 (three shoots/plant) and P_3 (four shoots/plant). Plants were trained with plastic thread tied to galvanized iron wire stretch overhead along the bed. The experiment was laid out in a two factor factorial plot design with three replications. The total numbers of treatments were nine. Irrigation and fertilizer were done as per the recommendation. The misting was carried out by over head mister as per need to bring temperature and relative humidity up to optimum level in polyhouse**.** The polyhouse was heated at night to maintain a minimum temperature of 16 ºC. Maximum temperatures (day time) inside the polyhouse depended on the outside air temperatures and varied from 20 ºC to 34 ºC during the cultivation period. A drip irrigation system was used for irrigation and fertilization. During the experiment Vermicompost 3 kg/m^2, N: P: K 150:150:150 Kg/ha in the form of 19:19:19 water soluble fertilizer was applied alternate day with the help of fertigation unit. Micronutrient solutions were applied through foliar spray @ 2.0 ml per liter of water at monthly interval during crop period. Five fruits from each treatment were taken, the fruit length and fruit breadth was recorded by using Vernier caliper and mean calculated and recorded in centimeters. Volume of fruit was recorded from randomly selected five fruits individually by water displacement method. The selected fruits were dipped into a jar containing water and the displaced water was measured by the measuring cylinder and mean was calculated and expressed in cubic centimeter (cc).

The selected fruits were sliced at the equatorial plane to measure the rind thickness with the help of Vernier caliper and the mean was computed and recorded in centimeter. Five fruits per treatment were selected on the basis of light green colour development of 25, 50, 75 and 100 per cent, respectively. These fruits were kept in ambient condition until they remain fresh and at acceptable quality. The number of days was calculated to express the shelf life in days were counted and recorded. The harvested fruits were categorized into different quality grades as per their respective weight. The capsicum fruits were categorized into following grades.

Results and Discussion

The fruit length and fruit breadth at different spacing levels, the highest number of fruit length (9.41 cm) and fruit breadth (7.26 cm) was recorded under S_3 (45cm × 60 cm) spacing, which was statistically at par with S_2 (45 cm × 45 cm) and significantly superior over S_1 (45 cm × 30 cm). Which might be due to more vegetative growth, more dry matter production, more leaf area, ample sunlight and aeration under wider spacing S_3 than other spacing S_1 and S_2. Similar increase in length and breadth of fruit in wider spacing was also observed by Joshi *et al.,* (1980) in tomato, Manchanda and Bhopal Singh (1988), Nagendra Prasad (2001) in bell pepper and Chougule and Mahajan (1979) in chilli.

The volume of fruits at different spacing levels at 90 DAP, the highest number of fruit volume (299.60 cc/fruits) was recorded in S_3 (45 cm × 60 cm) spacing, which was statistically at par with S_2 (45 cm × 45 cm) and significantly superior over S_1 (45 cm × 30 cm). This could be due to the increased uptake of more nutrients and buildup of sufficient photosynthates enabling the increase in size of fruits (length and breadth), ultimately resulted in the increased fruit volume. Similar findings were reported by Joshi *et al.,* (1980) in tomato, Harminder Singh *et al.,* (1997) in brinjal and Nagendra Prasad (2001) in capsicum.

Among different spacing levels of rind thickness of capsicum, the highest rind thickness (0.74 cm) was recorded under S_3 (45 cm × 60 cm) spacing which was significantly superior over S_2 (45 cm × 45 cm). Which might be due to bigger size of fruits under naturally ventilated Polyhouse, spacing S_3. The rind thickness of fruit was positively correlated with fruit size, which is similar to the observation of Stevens *et al.,* (1977).

With regard to different spacing levels, the highest Shelf life of fruit (7.18 days) was recorded under S_3 (45 cm × 60 cm) spacing which was statistically at par with S_2 (45 cm × 45 cm) and significantly superior over S_1 (45 cm × 30 cm). This is mainly because of bigger size fruits having thicker pericarp.

The different spacing levels of 'A^+' and 'A' grade, the highest 'A^+' grade fruit (6.84) and 'A' (26.51) was observed in S_3 (45 cm × 60 cm) spacing which was significantly superior over S_2 (45 cm × 45 cm). This might be due to availability of more space to spread, more moisture and nutrients and solar radiation compared to other spacing S_1 and S_2 (Table 1 and 2).

The grades are accepted by retail outlet of India

Sl. No.	Grade	Fruit weight
1	A^+	> 200 g
2	A	150-200 g with four lobes
3	B	100-150 g
4	C	< 100 g

Table.1 Effect of plant spacing on fruit length, fruit breadth, volume of fruit, rind thickness and self- life of Capsicum (*Capsicum annuum* L) hybrid buffalo under natural ventilated polyhouse

Treatment	fruit length	fruit breadth	volume of fruit	rind thickness	self- life
S_1 (45 cm x 30 cm)	8.38	6.65	291.83	0.56	6.15
S_2 (45cm x 45cm)	9.33	7.05	298.61	0.66	6.80
S_3(45cm x 60cm)	9.41	7.26	299.60	0.74	7.18
S.Em(±)	0.11	0.07	3.55	0.02	0.24
LSD(0.05)	0.34	0.22	10.65	0.07	0.71
CV%	3.80	3.15	3.59	11.05	10.60

Table.2 Effect of plant spacing on extend of fruit grade (%) of capsicum hybrid buffalo at 90 DAP

Treatment	A^+ grade %	A grade %	B grade %	C grade %
S_1 (45 cm x 30 cm)	4.00	14.03	47.08	34.88
S_2 (45cm x 45cm)	5.13	23.86	40.75	30.47
S_3(45cm x 60cm)	6.48	26.51	42.46	24.56
S.Em(±)	0.24	0.60	1. 45	0.96
LSD(0.05)	0.71	1.79	4.33	2.87
CV%	13.59	8.34	9.99	9.60

With regard to different spacing levels, the highest number of 'B' grade fruit (47.08 fruits) and 'C' grade fruit (34.88 fruits) was recorded under S_1 (45 cm × 60 cm) spacing which was significantly superior over S_2 (45 cm × 45 cm) and S_3 (45 cm × 60 cm). This might be due to not availability of more space to spread, more moisture and nutrients and solar radiation compared to other spacing S_3 and S_3.

After the experiment conducted in 2017 regarding the effect of plant spacing on fruit quality of Capsicum (*Capsicum annuum* L) hybrid buffalo under natural ventilated polyhouse. The following conclusions can be inferred

Maximum number of fruit length, fruit breadth, volume of fruit, rind thickness, self-life, 'A^+', 'A' grade was recorded under S_3 (45 cm x 60 cm). B and C fruit grade were maximum recorded under S_1 (45 cm x 30 cm).

References

Anonymous. (2001). Annual Production by Crop Quick Reference, *www.fao.stat. fao.org.*

Anonymous. (2014). Annual Production by Crop Quick Reference, *www.fao. stat.fao.org*.

Chougule, A. B. and Mahajan, P. R. (1979). Effect of varying levels of plant population, nitrogen, phosphorus and potash on growth and yield of chilli (*Capsicum annuum* L.). *Veg. Sci*. 6(2): 73-80.

Harminder Singh, M. S., Saimbhi and Bal, S. S. (1997). A note on effect of plant population density on growth and yield of brinjal hybrids. *Veg. Sci*. 24(2): 164-166.

Joshi, S., Tittal, G. L., Singh, R. P. and Mehta, J. S. (1980). Effect of spacing on yield of tomato variety HS-102. *Haryana J. Hortic. Sci*. 9(3-4): 192-194.

Manchanda, A. K. and Bhopal Singh. (1988). Effect of plant density and nitrogen on growth and fruit yield of bell pepper (*Capsicum annuum* L.). *Indian J. Agron*. 33(4): 445-447.

Nagendra prasad, H. N. (2001). Effect of plant density on growth and yield of capsicum grown under greenhouse and open conditions. *M. Sc. (Agri.) Thesis,* Univ. Agric. Sci., Bangalore, Karnataka, India.

Ochigbu AA, Harris GP (1989). Effect of film plastic cover on the growth and yield of bush tomato grown in a bed system. J. Hortl. Sci., 64(1): 300-302.

Stevens, M., Kade, A. and Holton, M. (1977). Intercultivar variation in composition of locular and pericarp portions of fresh market tomatoes. *J. American Soc. Hort. Sci*. 102: 689-692.

How to cite this article:

Ghanshyam Thakur, Anil Kumar Singh and Pankaj Kumar Maurya. 2018. Effect of Plant Spacing on Fruit Quality of Capsicum (*Capsicum annuum* L) Hybrid Buffalo under Natural Ventilated Polyhouse. *Int.J.Curr.Microbiol.App.Sci.* 7(05): 298-302.
doi: https://doi.org/10.20546/ijcmas.2018.705.038