

Original Research Article

<https://doi.org/10.20546/ijcmas.2020.911.014>

Effect of Different Concentration of N, P and K on Yield at Capsicum (*Capsicum annum* L. Var. grossum) in Soilless Media

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ABSTRACT

Keywords

Capsicum, Different concentrations of NPK, Yield parameters and Soilless growing media

Article Info

Accepted:

04 October 2020

Available Online:

10 November 2020

The present experiment was carried out during November, 2019 to April, 2020 in Shade net, Research Field, Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in Randomized Block Design (RBD), with eight treatments, replicated thrice with growing media (FYM + Vermicompost + Cocopeat) and variety (Ganga) on Capsicum. The treatments were T₁ (NPK 5 ml), T₂ (NPK 10 ml), T₃ (NPK 15.5 ml), T₄ (NPK 20 ml), T₅ (NPK 24.5 ml), T₆ (NPK 28.50 ml), T₇ (NPK 32.50 ml) and T₈ or T₀ (NPK 0 ml). From the present experimental findings in terms of yield parameters treatment T₅ was superior followed by T₃ and T₇.

Introduction

Vegetables are rich and comparatively cheaper source of vitamins. The importance of vegetable crops in India can be judged from the fact that the majority of Indian population is vegetarian. India produces the largest variety of vegetables. Consumption of vegetable provides taste, palatability, increases appetite and provides fiber for digestion and prevents constipation.

Capsicum (*Capsicum annum* L. var. grossum) is also known as bell pepper or

sweet pepper and is one of the most popular and highly remunerative annual herbaceous vegetable crops particularly for protected cultivation. Sweet pepper (*Capsicum annum* L. var. Grossum) belongs to the family solanaceae and it is different from chilli (*Capsicum annum* L.var. grossum). It is also called by other names such as shim lamirch, 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. In India, capsicum is extensively cultivated in Andhra Pradesh, Karnataka, Maharashtra, Tamilnadu, Himachal Pradesh, and hilly areas of Uttar Pradesh (Sreedhara *et al.*, 2013). In India, capsicum is grown for its mature fruits and is widely used in stuffing and baking. It is also used in salad, noodles and soup preparation. It is a very rich source of vitamins A and C (ascorbic acid). It has been found that every 100 grams of edible portion of capsicum provides 24 kcal of energy, gram of protein, 4.3 gram of carbohydrate and 0.3 gram of fat (Anon., 2010).

Water and nutrient management through drip fertigation in soilless media improves water, nutrient and air distribution in the growing medium and subsequently improves crop health and productivity. Drip fertigation in soilless cultivations used to supply complete nutrient solution with irrigation water. Fertigation scheduling is the process of determining how much water and nutrient solution to apply by fertigation volume and timing. The main goal of water and nutrient management for greenhouse soilless crops is to enhance crop growth and product quality and simultaneously reduce losses of water and nutrients to the environment. Precise amount of water and nutrients as per crop demand in different stages through drip fertigation is important to reach this goal. In order to do so, quantitative information on demand and uptake of water and nutrients and related information on crop behavior is required.

Materials and Methods

The present Experiment was conducted in Randomized Block Design (RBD), with eight treatments, replicated thrice with growing media (FYM + Vermicompost + Cocopeat) and capsicum variety (Ganga), in the Shade net, Research field, Department of Horticulture, Sam Higginbottom University of

Agriculture, Technology and Sciences, Prayagraj during November, 2019 to April, 2020. Total number of treatments were eight viz. T₁ (NPK 5 ml), T₂ (NPK 10 ml), T₃ (NPK 15.5 ml), T₄ (NPK 20 ml), T₅ (NPK 24.5 ml), T₆ (NPK 28.50 ml), T₇ (NPK 32.50 ml) and T₈ or T₀ (NPK 0 ml).

Climatic condition in the experimental site

The area of Prayagraj district comes under subtropical belt in the south east of Utter Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46^o C- 48^o C and seldom falls as low as 4^oC- 5^oC. The relative humidity ranges between 20 to 94 %. The average rainfall in this area is around 1013.4 mm annually. However, occasional precipitation is also not uncommon during winter months.

Results and Discussion

The present investigation entitled “Effect of different concentration of N, P and K on growth, yield and quality at Capsicum (*Capsicum annum* L. Var. grossum) in soilless media” was carried out during November, 2019 to April, 2020 in Shade net, Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) India.

The results of the present investigation, regarding the effect of different concentration of NPK on growth, yield and quality of Capsicum (*Capsicum annum* L. Var. grossum), have been discussed and interpreted in the light of previous research work done in India and abroad. The experiment was conducted in Randomized block design with 8 treatments, and three replications.

The results of the experiment are summarized below.

Yield Parameters

In terms of Fruit set/cluster and Number of fruits/plant for different treatment combinations Statistically significant variation was recorded maximum Fruit set/cluster and Number of fruit/plant (3.77 and 4.65 respectively) was recorded in treatment T₅ (NPK 24.5 ml), followed by T₃ (NPK 15.5 ml) with (3.21 and 4.40 respectively), whereas minimum Fruit set/cluster and Number of fruit/plant (2.34 and 3.29 respectively), was observed in treatment T₁ (NPK 5 ml). Fruit yield/plant and per 100 sq. meter for different treatment combinations maximum fruit yield (1250.32g and 551.38 kg respectively) was recorded in treatment T₅ (NPK 24.5 ml), followed by T₃ (NPK 15.5 ml) with (995.51g and 438.98 kg), whereas minimum fruit yield per plant and per 100 sq. meter (644.11 g and 284.05 kg), was observed in treatment T₁ (NPK 5 ml). This might be attributed to enhanced photosynthesis, accumulation of carbohydrates and favorable effect on vegetative growth which increased the fruit set per plant and also increases the weight and size of fruit. This finding correlates the findings of Della coasta, L. and Gianquinto, G.,(2002), Schnitzler *et al.*, (2004), Khan *et al.*, (2010), Fatma Gungor and Ertan Yildirim (2013), Mohammed Dahiru Toungos (2017) and Ngupok *et al.*, (2018) in Capsicum.

Effect of different concentration of N, P and K on No. of Flower cluster/plant, No. of Flower/cluster and Fruit set/cluster of Capsicum in Soilless media

The data on Number of flower cluster/plant after application of NPK in different treatment combinations was recorded and are presented in table 1. Critical analysis of data

displayed in table clearly marked out the obvious difference among the treatments with respect to Number of flower cluster/plant. Statistically significant variation was recorded for Number of flower cluster/plant for different treatment combination of NPK. Maximum Number of flower cluster/plant (3.80) was recorded in treatment T₅ (NPK 24.5 ml), followed by T₇ (NPK 32.5 ml) with (3.43), whereas minimum number of flower cluster/plant (2.21), was observed in treatment T₁ (NPK 5 ml). This might be due to enhanced photosynthetic and other metabolic activities which lead to increase in various plant metabolites responsible for cell division and elongation. This finding correlates the findings of Ngupok *et al.*, (2018) in Capsicum.

The data on Number of flower/cluster after application of NPK in different treatment combinations was recorded and are presented in table 2. Critical analysis of data displayed in table clearly marked out the obvious difference among the treatments with respect to Number of flower/cluster. Statistically significant variation was recorded for Number of flower/cluster for different treatment combination of NPK. Maximum Number of flower/cluster (8.67) was recorded in treatment T₅ (NPK 24.5 ml), followed by T₇ (NPK 32.5 ml) with (8.34), whereas minimum number of flower/cluster (5.66), was observed in treatment T₁ (NPK 5 ml). This might be due to enhanced photosynthetic and other metabolic activities which lead to increase in various plant metabolites responsible for cell division and elongation. This finding correlates the findings of Ngupok *et al.*, (2018) in Capsicum.

The data on Fruit set/cluster after application of NPK in different treatment combinations was recorded and are presented in table 2. Critical analysis of data displayed in table clearly marked out the obvious difference

among the treatments with respect to Fruit set/cluster. Statistically significant variation was recorded for Fruit set/cluster for different treatment combination of NPK. Maximum Fruit set/cluster (3.77) was recorded in treatment T₅ (NPK 24.5 ml), followed by T₃ (NPK 15.5 ml) with (3.21), whereas minimum Fruit set/cluster (2.34), was observed in

treatment T₁ (NPK 5 ml). This might be attributed to enhanced photosynthesis, accumulation of carbohydrates and favourable effect on vegetative growth which increased the fruit set per cluster and also increases the weight and size of fruit. This finding correlates the findings of Ngupok *et al.*, (2018) in Capsicum.

Table.1 Effect of different concentration of N, P and K on No. of Flower cluster/plant, No. of Flower/cluster and Fruit set/cluster of Capsicum in Soilless media

Treatment	Treatment Combination	No. of Flower cluster/plant	No. of Flower/cluster	Fruit set/cluster
T ₁	NPK@ 5 ml/L	2.21	5.66	2.34
T ₂	NPK @10 ml/L	2.42	7.21	2.51
T ₃	NPK @15.5 ml/L	3.39	8.10	3.21
T ₄	NPK@ 20 ml/L	2.45	8.00	2.93
T ₅	NPK @ 24.5 ml/L	3.80	8.67	3.77
T ₆	NPK @ 28.5 ml/L	2.88	6.89	3.00
T ₇	NPK @ 32.5 ml/L	3.43	8.34	3.14
T ₀	NPK @ 0 ml/L	0.00	0.00	0.00
F-Test		S	S	S
SE(d)		0.166	0.230	0.156
C.V.		7.882	4.270	7.309
C.D. at 5%		0.359	0.499	0.338

Table.2 Effect of different concentration of N, P and K on Number of Fruits/ Plant, Avg. Fruit Weight and Fruit Yield/Plant of Capsicum in Soilless media

Treatment	Treatment Combination	No. of Fruits/ Plant	Avg. Fruit Weight (g)	Fruit Yield/Plant (g)
T ₁	NPK@ 5 ml/L	3.29	196.20	644.11
T ₂	NPK @ 10 ml/L	3.73	198.95	740.38
T ₃	NPK @15.5 ml/L	4.40	226.45	995.51
T ₄	NPK@ 20 ml/L	3.78	201.09	757.98
T ₅	NPK @24.5 ml/L	4.65	269.30	1,250.32
T ₆	NPK @28.5 ml/L	3.81	203.69	777.71
T ₇	NPK @32.5 ml/L	4.16	213.66	887.84
T ₀	NPK @0 ml/L	0.00	0.00	0.00
F-Test		S	S	S
SE(d)		0.217	11.024	62.224
C.V.		7.637	7.157	10.071
C.D. at 5%		0.470	23.874	134.749

Effect of different concentration of N, P and K on number of fruits/ plant, avg. fruit weight and fruit yield/plant of capsicum in soilless media

The data on Number of fruit/plant after application of NPK in different treatment combinations was recorded and are presented in table 2. Critical analysis of data displayed in table clearly marked out the obvious difference among the treatments with respect to Number of fruit/plant. Statistically significant variation was recorded for Number of fruit/plant for different treatment combination of NPK. Maximum Number of fruit/plant (4.65) was recorded in treatment T₅ (NPK 24.5 ml), followed by T₃ (NPK 15.5 ml) with (4.40), whereas minimum Number of fruit/plant (3.29), was observed in treatment T₁ (NPK 5 ml). This might be attributed to enhanced photosynthesis, accumulation of carbohydrates and favourable effect on vegetative growth which increased the fruit set per plant and also increases the weight and size of fruit. This finding correlates the findings of Mohammed Dahiru Toungos (2017) and Ngupok *et al.*, (2018) in Capsicum.

The data on Average fruit weight (g) after application of NPK in different treatment combinations was recorded and are presented in table 2. Critical analysis of data displayed in table clearly marked out the obvious difference among the treatments with respect to Average fruit weight. Statistically significant variation was recorded for Average fruit weight for different treatment combination of NPK. Maximum fruit weight (269.30 g) was recorded in treatment T₅ (NPK 24.5 ml), followed by T₃ (NPK 15.5 ml) with (226.45 g), whereas minimum fruit weight (196.20 g), was observed in treatment T₁ (NPK 5 ml). This might be attributed to higher dose of N, P & K in treatment T₅ enhanced photosynthesis, accumulation of

carbohydrates and favorable effect on vegetative growth which increased the weight and size of fruit. This finding correlates the findings of Mohammed Dahiru Toungos (2017) and Ngupok *et al.*, (2018) in Capsicum.

The data on Fruit yield/plant (g) after application of NPK in different treatment combinations was recorded and are presented in table 2. Critical analysis of data displayed in table clearly marked out the obvious difference among the treatments with respect to Fruit yield/plant. Statistically significant variation was recorded for Fruit yield/plant for different treatment combination of NPK. Maximum fruit yield (1250.32 g) was recorded in treatment T₅ (NPK 24.5 ml), followed by T₃ (NPK 15.5 ml) with (995.51 g), whereas minimum fruit yield (644.11 g), was observed in treatment T₁ (NPK 5 ml). This might be attributed to enhanced photosynthesis, accumulation of carbohydrates, development of cell wall and cell differentiations as they boost up overall vegetative growth, biological activity of the plants and retention of more flowers and fruits which increased number of fruits per plant and size of fruits besides increasing the yield. This finding correlates the findings of Mohammed Dahiru Toungos (2017) and Ngupok *et al.*, (2018) in Capsicum.

From the present experimental findings, it is concluded that treatment T₅ (NPK @ 24.5ml) was found best in terms of flowering and fruiting parameters followed by T₃ (NPK@15.5ml) where as minimum flowering and fruit yield was observed in treatment T₁ (NPK @ 5ml).

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How to cite this article:

Mashetty Rakesh Kumar and Vijay Bahadur. 2020. Effect of Different Concentration of N, P and K on Yield at Capsicum (*Capsicum annum* L. Var. grossum) in Soilless Media. *Int.J.Curr.Microbiol.App.Sci.* 9(11): 122-127. doi: <https://doi.org/10.20546/ijcmas.2020.911.014>