ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 10, Iss 08, 2021

Effect Of Inm On Quality And Yield Attributes Of Sweet Pepper (*Capsicum Annum* L.) Cv. California

Ajeet Mishra, Krishna Kumar Mishra, Aneeta Yadav, Abhishek Tiwari, Jitendra Ojha and Adarsh Pandey

Faculty of Agricultural Science and Allied Industries at Rama University, Kanpur (U.P.).

Abstract

The present investigation entitled "Effect of integrated nutrient management on quality & yield attributes of sweet pepper *(Capsicum annuum* L.*)* cv. California." was conducted at the experimental farm of Faculty of Agricultural Sciences & Allied Industries, Rama University, Mandhna, Kanpur (U.P.) during *Rabi* season 2018-19. The experiment was laid out in randomized complete block design with three replications comprising of 9 treatments combinations. The treatments were T_0 = Control, T_1: 100% RDF Nitrogen + vermicompost, T_2: 100% RDF Nitrogen + FYM, T_3: 100% RDF Zn + Nitrogen, T_4: 100% RDF Phosphorus + FYM, T_5: 100% RDF Potash + Boron, T_6: 100% RDF Nitrogen + Phosphorus + Boron, T_7 : 100% RDF FYM + Vermicompost, T_8: 100% RDF Nitrogen + Zn. Plant height was recorded maximum in T_6 (55.65 cm) and minimum was observed in T_0 (30.75 cm), Number of branches/plant was recorded maximum in T_6 (6.61) and minimum in T_0 (3.40). Plant spread was maximum in T_6 (44.50 cm) through recommended package of fertilization and minimum in T_0 (25.35 cm). Maximum and minimum stalk length were observed in T_7 (42.87 cm) and T_1 (33.16 cm). Application of 100% RDF + Nitrogen+ phosphorus+ Boron in Sweet Pepper var. California proved to be the best treatment which produced superior growth and highest seed yield (686.39 q/ha).

Introduction

Sweet Pepper (*Capsicum annuum* L.) is a warm season crop belongs to the family Solanaceae having chromosome number 2n=24. Capsicum is the richest source of vitamin C. Capsicum generally used for salad and pickles etc. Capsicum sp. is an important commercial spice and vegetable crop for small and marginal farmers. in India among the five cultivated species of the genus Capsicum, *Capsicum annuum* is the most widely cultivated in India for its pungency (chilli syn. hot pepper). Fruits that are dried for spicy powders, paprika for pickles are non-pungent (*capsicum syn.* bell pepper, sweet pepper, Shimla mirch). Next category is the fruits which are cooked as vegetables or used as stuffing in fast food preparations like pizza and burgers. It is commercially grown in Himachal Pradesh, Jammu and Kashmir, Uttarakhand, Arunachal Pradesh and Darjeeling district of West Bengal during summer months and as an autumn crop in Maharashtra, Karnataka, Tamil Nadu and Bihar. The continuous use of high level of chemical fertilizers leads to decrease the nutrient uptake efficiency of plants, resulting in either stagnation or decrease in yield and also causing environmental pollution (Singh and Kalloo, 2000). In recent times, the concept of integrated nutrient management has been receiving increasing attention worldwide obviously for reasons of minimizing of fertilizer usage, safe guarding and ensuring scientific management

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 10, Iss 08, 2021

of soil health for optimum growth, yield and quality of crops in an integrated manner in a specific agro-ecological situations, through balanced use of organic and inorganic plant nutrients, so that one can harvest good yield without deteriorating soil health. The two major agro techniques which are largely important in greenhouse crop production are, use of suitable growing media and optimum fertigation schedule. Bell pepper or sweet pepper can be grown on a wide variety of soils, but its shallow and fibrous root system is sensitive to water logging and prone to attack by various soil borne diseases such as fusarium, phytophthora and bacterial wilt. The characteristic of an ideal growing medium are high porosity for better aeration, good drainage and water holding capacity with biological and chemical stability. These features are not common in soil based growing media and the greenhouse vegetable growers are facing problems, however, the research world over shows that sweet pepper can be grown very successfully using different soilless growing media. Similarly, another important component of protected cultivation which influences productivity and quality of produce is application of fertilizers with the irrigation called fertigation. This is a regular and widely accepted practice under protected conditions. Fertigation also provides an opportunity to control the concentrates of individual nutrients in the form of soluble fertilizers to meet the crop need according to its stage of development and greenhouse environment.

Materials and methods

The present investigation was conducted at Agricultural Research Farm, Faculty of Agricultural Sciences & Allied Industries, Rama University, Kanpur (U.P.) during *Rabi* season 2018-19. The experimental farm falls under the Indo-gangetic alluvial tract of Central Uttar Pradesh. The farm was well laid out and irrigated by tube well. Geographically, Kanpur is situated in the central part of U.P. and subtropical tract of North India between latitude ranging from 25^0 56' to 28^0 58' North and longitude 79^0 31' to 80^0 34' East and is located at an elevation of about 125.9 meters above mean sea level in gangetic plain. The field experiment was carried out in loamy sand soil, alluvial in origin, light brown in colour , well drained ,fairly retentive of moisture ,loamy (0.48%) and medium in available phosphorus (30.2 kg ha $^{-1}$) and available potassium (315 kg ha^{-1}).

Results and discussion

The present field investigation was made mainly to find out the effect of INM on Quality & Yield attributes of sweet pepper.

Plant height (cm)

Maximum plant height was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF**T_6**(55.65cm) followed by F.Y.M+ vermicompost 100% RDF **T_7** (53.25cm). While minimum plant height (cm) were observed under control **T_0** (30.75cm)of the sweet pepper crop.. The same finding also reported bySajan *et al.,* (2002), Siddesh (2006),Bhattarai (2009), Desh pandey *et al.*,(2010), Lal and Kanaujia (2013).

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 10, Iss 08, 2021

Number of branches/plant

Maximum number of branches/plant was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF **T_6** (06.61) followed by F.Y.M+ vermicompost 100% RDF**T_7**(06.35/plant) at all growth stage. While minimum number of branches/plant were observed under control **T_0** (3.40/plant) of the sweet pepper crop.The same finding also reported by Rani *et al.*,(2015), Gowda *et al.*,(2002), Siddesh (2006).

Number of plant spread (cm)

Maximum number of plant spread (cm) was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF**T_6**(44.50 cm) followed by F.Y.M+ vermicompost 100% RDF **T_7** (42.87cm) at all growth stage. While minimum plant spread (cm) were observed under control **T_0** (25.35cm) of the sweet pepper crop.The same finding also reported by Lal and Kanaujia (2013), Tuti *et al.*, (2014), Deshpandey *et al.*, (2010).

Number of fruit/plant

Maximum number of fruit/plant was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF **T_6** (19.00/plant) followed by F.Y.M+ vermicompost 100% RDF**T_7** (18.75/plant at all growth stage. While minimum No. of fruit/plant were observed under control**T_0**(9.95 /plant) of the sweet pepper crop.The same finding also reported by Sangan *et al.*,(2002), Deshpandey *et al.*, (2010), Chetri *et al.*, (2012).

Number of fruit length (cm)

Maximum number of fruit length (cm) was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF **T_6** (8.20 cm) followed by F.Y.M+ vermicompost 100% RDF**T_7** (8.00cm) at all growth stage. While minimum fruit length (cm) were observed under control **T_0** (5.15cm) of the sweet pepper crop.The same finding also reported by Tuti *et al.*,(2014), Lal and Kanaujia (2013), Chetri *et al.*, (2012).

Number of fruit diameter (cm)

Maximum number of fruit diameter (cm) was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF**T_6**(7.89cm) followed by F.Y.M+ vermicompost 100% RDF **T_7** (7.70cm) at all growth stage. While minimum fruit diameter (cm) were observed under control**T_0** (4.46cm) of the sweet pepper crop.The same finding also reported by Tuti *et al.*,(2014), Lal and Kanaujia (2013), Rani *et al.*, (2015).

Average weight (g)

Maximum average weight (g) was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF **T_6** (93.92cm) followed by F.Y.M+ vermicompost 100% RDF **T_7** (93.79cm) at all growth stage. While minimum averageweight (g) were observed under control**T_0** (58.97gm) of the sweet pepper crop.The same finding also reported by Tuti *et al.*,(2014), Lal and Kanaujia (2013), Deshpandey *et al.*, (2010).

Average fruit (kg/plot),(kg/ha)

Maximum average fruit(kg/plot),(kg/ha) was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF **T_6** (37.19 kg/plot),(686.39kg/ha) followed by F.Y.M+ vermicompost 100% RDF **T_7(**37.06kg/plot),(670.26kg/plot) at all growth stage. While minimum average fruit (kg/plot),(kg/ha) were

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 10, Iss 08, 2021

observed under control**T_0** (11.96kg/plot),(221.51kg/ha) of the sweet pepper crop.The same finding also reported by Tuti *et al.*,(2014), Lal and Kanaujia (2013), Deshpandey *et al.*, (2010).

Vitamin C content (mg /100 g)

Maximum vitamin c content (mg /100 g) was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF **T_6** (243.34) content followed by F.Y.M+ vermicompost 100% RDF **T_7** (225.44) content at all growth stage. While minimum vitamin c content (mg /100 g) were observed under control **T_0** (103.80)contentof the sweet pepper crop.The same finding also reported by Battari (2009), Jaipaul *et al* (2011), Chetri *et al.*, (2012), Jananthi *et al.*, (2014).

Chlorophyll content (mg/100g)

Maximum Chlorophyll content(mg /100 g) was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF**T_6**(732.66) followed by F.Y.M+ vermicompost 100% RDF **T_7** (712.69) at all growth stage. While minimum of Chlorophyll content (mg /100g) were observed under control**T_0** (407.55)

Dry matter (g)

Maximum and dry matter (g) was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF**T_6** (9.93gm) followed by F.Y.M+ vermicompost 100% RDF**T_7** (9.57 gm) at all growth stage. While minimum dry matter (g) were observed under control**T_0** (5.67gm)of the sweet pepper crop.The same finding also reported by Malik *et al.*,(2011), Gowda et al.,(2002), Kondap *et al.*, (2012).

Total number of nitrogen (%) fruit, phosphorus (%) fruit, potash (%) fruit

Maximum number of nitrogen (%) fruit, phosphorus (%) fruit, potash (%) fruit was observed under mixtures of Nitrogen+ phosphorus+ Boron 100% RDF **T_6**(4.38),(0.46),(3.55) followed by F.Y.M+ vermicompost 100% RDF**T_7** (4.25),(0.43),(3.41) at all growth stage. While minimum nitrogen (%) fruit, phosphorus (%) fruit, potash (%) fruit were observed under control**T_0** (1.30),(0.13),(1.12) of the sweet pepper crop.The same finding also reported by Malik *et al.*,(2011), Shiva *et al.*,(2015), Gowda *et al.*, (2002), Raj Narayan *et al*.,(2004).

Conclusion

On the basis of above result and discussion, it may be inferred that the (T_6) 100% RDF nitrogen+ phosphorus+ boron give maximum plant growth and yield in central U.P.

Application of 100% RDF Nitrogen+ phosphorus+ Boron in Sweet Pepper var. California proved the best treatment which produced superior growth and yield attributing characters and gave 686.39 kg/ha more seed yield and Rs. 34319/ha increase in Net Income.

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 10, Iss 08, 2021

Sr.No	Treatment	Dose	Plant height (cm)		No. of branches/plant	Plant spread	No of fruit/ p	Fruit length(cm)	Fruit diameter
			Transplant time	Harvest					
T_0	Control	0	10.30	30.75	3.40	25.35	9.95	5.15	4.46
T_1	Nitrogen+ vermin compost	(100% RDF)	10.93	42.63	4.70	33.16	14.00	6.00	5.23
T_2	Nitrogen+ F.Y.M	(100% RDF)	11.03	45.14	7.97	34.45	14.70	6.30	5.43
T_3	Zn+ nitrogen	(100% RDF)	10.86	46.01	5.29	36.53	16.00	7.00	6.10
T_4	Phosphorus+ F.Y.M	(100% RDF)	10.18	48.14	5.47	37.81	16.55	7.20	6.50
T_5	Potash+ Boron	(100% RDF)	10.86	49.79	5.84	39.62	16.78	7.60	6.85
T_6	Nitrogen+ phosphorus+ Boron	(100% RDF)	10.90	55.65	6.61	44.50	19.00	8.20	7.89
T_7	F.Y.M+ vermicompost	(100% RDF)	9.89	53.25	6.35	42.87	18.75	8.00	7.70
T_8	Nitrogen+ Zn	(100% RDF)	11.09	51.44	6.07	41.16	18.50	7.95	7.16
	C.D. (P= 5%)		N.S	4.30	0.70	3.70	1.97	0.99	1.18

Sr.	Treatmen	Dose	Average weight(g)	Average fruit(kg/plot)	Average fruit(kg/ha)	Vitamin c content	Chlorophyll Content	Dry matter(g)	N (%) Fruit	P (%) fruit	K (%) Fruit
T_0	Control	0	58.97	11.96	221.51	103.80	407.55	5.67	1.30	0.13	1.12
T_1	Nitrogen+ vermicompost	(100% RDF)	84.07	24.11	446.49	166.13	522.75	7.84	2.97	0.25	2.02
T_2	Nitrogen+ F.Y.M	(100% RDF)	84.46	25.09	464.76	163.98	538.27	8.13	3.13	0.29	2.10
T_3	Zn+ nitrogen	(100% RDF)	89.23	29.24	541.63	173.34	612.58	8.60	3.63	0.32	2.45
T_4	Phosphorus+ F.Y.M	(100% RDF)	89.51	30.03	556.16	180.08	626.50	8.83	3.83	0.35	2.79
T_5	Potash+ Boron	(100% RDF)	89.73	30.90	572.27	189.42	647.16	9.14	3.99	0.38	2.96
T_6	Nitrogen+ phosphorus+ Boron	(100% RDF)	93.92	37.19	686.39	243.34	732.66	9.93	4.38	0.46	3.55
T_7	F.Y.M+	(100%	93.79	37.06	670.2	225.4	712.69	9.57	4.25	0.43	3.41

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 10, Iss 08, 2021

	vermicompost	RDF)			6	4					
T_8	Nitrogen+ Zn	(100% RDF)	93.39	35.41	655.89	210.77	700.33	9.44	4.10	0.40	3.15
	C.D. (P= 5%)		4.32	2.10	45.21	19.75	45.33	1.03	0.45	0.10	0.33

References

1. Bhattarai, D. R. (2009). Studies on integrated nutrient management for fruit and seed yield on bell pepper (Capsicum annuum L.). M.Sc. (Horti.) Thesis, UHF, Solan.
2. Chetri, D. A., Singh, A. K. and Singh, V. B. (2012). Effect of integrated nutrient management on yield, quality and nutrient uptake in capsicum (Capsicum annuum L.) cv. California Wonder. J. Soils and Crops. 22(1): 44-48.
3. Jaipaul, Sharma, S., Dixit, A. K. and Sharma, A. K. (2011). Growth and yield of capsicum (Capsicum annuum L.) and garden pea (Pisum sativum L.) as influenced by organic manure and biofertilizers. Indian J. Agr. Sci. 81(7): 637-42.
4. Kondapa, D., Radder, B. M., Patil, P. L., Hebsur, N. S. and Alagundagi, S. C. (2009). Effect of integrated nutrient management on growth, yield and economics of chilli (cv. Byadgi Dabba) in a vertisol. Karnataka J. Agr. Sci. 22(2): 438-40.
5. Lal, S. and Kanaujia, S. P. (2013). Integrated nutrient management in capsicum under low cost polyhouse condition. Ann. Hort. 6(2): 170-77.
6. Malik, A. A., Chattoo, M. A., Sheemar, G. and Rashid, R. (2011). Growth, yield and fruit quality of sweet pepper hybrid SH-SP-5 (Capsicum annuum L.) as affected by integration inorganic fertilizers and organic manures (FYM). J. Agr. Tech.7(4):1037-48.
7. Raj Narayan, Magray, G. H., Nazeer Ahmed, and Samanta, A. (2004). Organic manures on nutrient uptake and quality of capsicum (Capsicum annuum L. var. grossum). Hort. J. 17(2): 141-44.
8. Rani, P. L, Balaswamy, K., Rao, A. R. and Masthan, S. C. (2015). Evaluation of integrated nutrient management practices on growth, yield and economics of green chilli cv. Pusa Jwala (Capsicum annuum L.). I. J. B. S. M. 6(1): 076-080.
9. Sajan, K. M., Gowda, K. K., Kumar, S. N. and Sreeramu. (2002). Effect of bio-fertilizers on growth and yield of chilli (Capsicum annuum L.) cv. Byadagi Dabba at different levels of nitrogen and phosphorus. J. Spices Aromatic Crops 11(1): 58-61.

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 10, Iss 08, 2021

10. Shiva, K. N., Srinivasan, V., Zachariah, T. J. and Leela, N. K. (2015). Integrated nutrient management on growth, yield and quality of paprika alike chillies (Capsicum annuum L.).J. Spices Aromatic Crops 24(2): 92-97.
11. Siddesh, H. K. (2006). Studies on integrated nutrient management on seed yield and quality of chilli. Master of Science (Agriculture) Thesis submitted to the University of Agricultural Sciences, Dharwad.
12. Singh, A., Singh, K. G. and Gosal, S. K. (2009). Integrated nutrient management in sweet pepper (Capsicum annuum L. var. grossum) grown in naturally ventilated pollyhouse. Department of Microbiology, PAU, Ludhiana 36(2): 171-74.
13. Singh, K. P. and Kalloo, G. (2000). Nutrient management in vegetable crops. Fertilizer News, 45: 77-81.
14. Singh, S., Singh, R. N., Prasad, J. and Kumar, B. (2002). Effect of green manuring, FYM and biofertilizers in relation to fertilizer nitrogen on yield and major nutrient uptake by upland rice. J. Indian Soci. Soil Sci. 50(3): 313-14.
15. Tariq, M., Ali, Q., Khan, A., Khan, G. A., Rashid, B. L., Rahi, M. S., Ali, A., Nasir, I. A. and Husnain, T. (2014). Yield potential study of Capsicum annuum L. under the application of PGPR. Advanc. Life Sci. 1(4): 202-07.
16. Tuti, M. D., Hedau, N. K., Kumar, J. and Bhatt, B. (2014). Effect of organic and inorganic sources of nutrients on yield, economics, and energetics of pepper and soil properties in naturally ventilated polyhouse. Archives of Agronomy and Soil Sci. 60(7).