



P-ISSN: 2349-8528

E-ISSN: 2321-4902

www.chemijournal.com

IJCS 2021; 9(2): 330-333

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Received: 17-12-2020

Accepted: 27-02-2021

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Effect of different organic manures on growth and yield of chilli (*Capsicum annum* L.) cv. Pusa Jwala under in Bundelkhand region of U.P.

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DOI: <https://doi.org/10.22271/chemi.2021.v9.i2e.11842>

Abstract

The present investigation entitled “Effect of different organic manures on growth and yield of chilli (*Capsicum annum* L.) cv. Pusa Jwala under in Bundelkhand region of U.P.” Was carried out the organic research farm Karguwan Ji Institute of Agricultural Sciences Bundelkhand University, Jhansi (Uttar Pradesh) during *rabi* season of the year 2019-2020. The experiment was laid out in a randomized complete block design with three replications comprising 8 *viz.* T₀-Control, T₁- Farm yard manure, T₂-Poultry manure, T₃-Vermicompost, T₄-Neem cake, T₅-Farm yard manure (50%) + Vermicompost (50%), T₆-Farm yard manure (50%) + Poultry manure (50%) and T₇- Farm yard manure (50%) + Neem cake (50%). The result showed that the treatment T₆ FYM (50%) +Poultry manure (50%) gave maximum and significantly, plant height (18.70, 28.36, 40.49 and 56.70 cm), Stem diameter (0.49, 0.90, 1.56 and 1.94 cm), Number of Branches (4.00, 9.66, 14.66 and 21.33) 30, 60, 90 and 120 DAT respectively, Plant diameter (40.48 cm), Days to 1st flowering (39.66 days), Number of fruit per plants (132.33), Fruit length (8.63 cm), Fruit diameter (1.92 cm), Average fruit weight (1.59), Fruit yield (7832.55 kg/ha) and Dry fruit weight (31.57g). Application of T₆ FYM (50%) +Poultry manure (50%) significantly superior to other treatments.

Keywords: Chilli, organic manures, yield, growth

Introduction

Chilli (*Capsicum annum* L.) is one of the most important commercial crops of India. It belongs to the genus *Capsicum* L. under the family Solanaceae. Chilli is grown for its pungent fruits, which are used both as green and ripe or dry form. It is becoming an important crop worldwide due to its wide diversity and high quality, flavour, concentration of vitamins and other antioxidants (Bahurupe *et al.*, 2013) [3].

Mexico is the primary center of origin of chilli with secondary center in Guatemala and Bulgaria (Salvador, 2002). It was introduced in Europe by Columbus in 1st century and spread to rest of the globe along the spice trading routes to Africa, India, China and Japan. It was introduced in India from Brazil during 1584 by the Portuguese (Thamburaj and Singh, 2003) [11].

The major chilli growing countries are India, China, Mexico, Japan, Korea, Ethiopia, Uganda, Nigeria, Thailand, Turkey, Indonesia, Yugoslavia, Spain, Italy, Hungary, Bulgaria, Pakistan and Sri Lanka. Among these countries, India is the largest and China is the next largest exporter of chilli, and the other chilli exporting countries are Indonesia, Japan, Mexico, Uganda, Kenya, Nigeria, and Sudan, Spain and Eastern Europe, especially Hungary are the largest exporters of paprika. Among the most important states only for Andhra Pradesh, Maharashtra, Karnataka, and Tamil Nadu account for three fourths of the total area. The other state having large area under Chillies is Madhya Pradesh, Punjab and Bihar. Uttar Pradesh is known for pickle chilli grows area, more so in the eastern districts of Balia, Azamgrah, Basti and Gazipur. Organic farming has assumed importance as an offshoot of environmental concerns in the western world. The almost total dependence on chemical fertilizer, pesticides, herbicides and growth regulators for enhancing crop productivity gradually culminated in a situation where in need to reconsider the alternative for chemical agriculture gradually developed in the Western World. It is a well-documented fact that increased dependence on agro-chemicals including fertilizers has led to several adverse effects on the environment.

Organic agriculture cannot be adopted uniformly under all farming situations. The technology has a role to play in the cultivation of high value crops, fruits, vegetable, spices, and condiments, medicinal and aromatic plants. The organically cultivated food crops have a vast untapped export potential growing at 10-15 per cent per year. The sustainable agricultural practice can effectively prevent entry of pesticides and toxicants in the food chain and prevent soil and water pollution *vis-a-vis* health hazards. It adopted with a blend of ecologically safe modern technologies, organic agriculture, though not in its orthodox version, has the potential to be accepted by the farmers. Theoretically, organic agriculture is the most ideal system of farming. The main aim of investigation was find out of the "Effect of different organic manures on growth and yield of the chilli like effect of organic nutrient on growth and yield of the chilli and analyze the economics of organic manure in production of chilli.

Materials and Methods

The present investigation was carried out at organic research farm karguwan ji, Bundelkhand University, Jhansi (Uttar Pradesh) during *rabi* season 2019-2020. The soil of experimental field was sandy loam with good drainage and uniform texture with low to N (130.46 kg ha⁻¹), medium to P (16.36 kg ha⁻¹), K (172.31 kg ha⁻¹) status and soil pH (7.16). Seed of Pusa Jwala variety of chilli were used in the experiment. The layout was under Randomized Block Design (R.B.D.) with eight treatment and randomized design in three replications. The different organic manures treatments tried were.

T₀: Control @ (no manure)

T₁: Farm yard manure @ 20 t ha⁻¹

T₂: Poultry manure @ 3 t ha⁻¹

T₃: Vermicompost @ 6 t ha⁻¹

T₄: Neem cake @ 1 t ha⁻¹

T₅: Farm yard manure @ 12 t ha⁻¹ + Vermicompost @ 3 t ha⁻¹

T₆: Farm yard manure @ 12 t ha⁻¹ + Poultry manure @ 1.5 t ha⁻¹

T₇: Farm yard manure 12 t ha⁻¹ + Neem cake 0.5 t ha⁻¹

There were altogether twenty four plots each of 2.40 x 1.80 m² size. Transplanting was done on November, 2019-2020 with spacing 60 x 45 cm. During the life cycle of the plants,

hoeing, weeding and irrigation were provided at proper time so as facilitate better growth and development of crop. The observation were recorded i.e. Plant height (cm), Stem diameter (cm), Number of branches per plant, Plant diameter (cm), Days to first flowering, Number of fruit per plant, Fruit length (cm), Fruit diameter (cm), Average fruit weight (g), Dry fruit weight (g) and Fruit yield (kg ha⁻¹). The dry fruit weight 100g riper fruits were picked from each plant and sun dried. After sun drying, total weight was calculated in gram.

Results and Discussion

Growth parameters

The results presented in Table 1 and Table 2 clearly that the Farm yard manure + Poultry manure as well as other organic manures in various combinations had a significant influence on growth parameter of chilli in the presence of different doses of organic manures. Furthermore, the results indicated that Plant height (cm), Stem diameter (cm), Number of branches per plant, Plant spread (cm) and Days to first flowering increased significantly with all these treatments. In the treatment of combination of Farm yard manure @ 12 t ha⁻¹ + Poultry manure @ 1.5 t ha⁻¹ show the maximum Plant height (30 DAT 18.70 cm, 60 DAT 28.36 cm, 90 DAT 40.49 cm and 120 DAT 56.70 cm), Stem diameter (30 DAT 0.49 cm, 60 DAT 0.90 cm, 90 DAT 1.56 cm and 120 DAT 1.94 cm), Number of branches per plant (30 DAT 4.00, 60 DAT 9.66, 90 DAT 14.66 and 120 DAT 21.33), Plant spread (40.48 cm) and Days to first flowering lowest days of flowering 39.66 DAT). Compared to the untreated Control (the height of plant 30 DAT 13.15 cm, 60 DAT 19.34 cm, 90 DAT 31.46 cm and 120 DAT 40.17 cm, Stem diameter 30 DAT 0.19 cm, 60 DAT 0.26 cm, 90 DAT 0.75 cm and 120 DAT 1.12 cm, Number of branches per plant 30 DAT 1.66, 60 DAT 4.33, 90 DAT 7.33 and 120 DAT 11.66, Plant spread 30.07 cm, and Days to first flowering the late days flowering 53.33 DAT). Similar finding were reported by Angadi *et al.*, (2017)^[2] in tomato, Miglani *et al.*, (2017)^[7], Doifode and Nandkar (2014)^[6].

Organic manure influence both yield and plant micronutrients contents and thus help sustain crop productivity (Mottaghian *et al.*, 2008)^[8]. The good plant growth, Stem diameter, Number of branches per plant, Plant spread and Days to first flowering may be due to higher level of Farm yard manure + Poultry manure which might have.

Table 1: The effect of organic manures and their combinations on growth parameters on plant height 30, 60, 90 and 120 DAT and Stem diameter 30, 60, 90 and 120 DAT of chilli (*Capsicum annum* L.)

Tr. No.	Plant height (cm)				Stem diameter (cm)			
	30 (DAT)	60 (DAT)	90 (DAT)	120 (DAT)	30 (DAT)	60 (DAT)	90 (DAT)	120 (DAT)
T ₀	13.15	19.34	31.46	40.17	0.19	0.26	0.75	1.12
T ₁	14.48	23.46	34.29	45.60	0.26	0.43	1.10	1.40
T ₂	16.33	25.86	37.82	49.46	0.42	0.74	1.29	1.70
T ₃	16.40	25.42	37.73	49.33	0.32	0.47	1.23	1.53
T ₄	16.23	24.20	36.39	46.48	0.29	0.43	1.19	1.42
T ₅	16.94	26.33	38.52	50.92	0.44	0.82	1.37	1.84
T ₆	18.70	28.36	40.49	56.70	0.49	0.90	1.56	1.94
T ₇	15.51	24.59	36.68	47.78	0.35	0.62	1.22	1.65
SE(m) ±	0.35	0.66	0.54	0.22	0.008	0.009	0.009	0.011
C.D. at 5%	1.08	2.04	1.67	0.69	0.024	0.013	0.013	0.034

Table 2: Effect of organic manures and their combinations on number of branches 30, 60, 90 and 120 DAT, Plant spread and Days to 1st flowering of chilli (*Capsicum annum L.*)

Tr. No.	Number of branches				Plant spread (cm)	Days to 1 st flowering (DAT)
	30 (DAT)	60 (DAT)	90 (DAT)	120 (DAT)	At Harvest stage	
T ₀	1.66	4.33	7.33	11.66	30.07	53.33
T ₁	2.00	5.66	8.66	13.00	33.08	48.33
T ₂	3.00	6.66	11.33	16.33	35.67	45.00
T ₃	2.33	6.66	10.66	16.00	35.37	44.66
T ₄	2.00	6.00	9.33	14.00	33.76	47.66
T ₅	3.33	8.33	13.00	17.66	38.74	43.00
T ₆	4.00	9.66	14.66	21.33	40.48	39.66
T ₇	2.00	6.33	11.33	16.00	34.37	46.66
SE(m) ±	0.28	0.38	0.27	0.49	0.46	0.43
C.D. at 5%	0.87	1.16	0.83	1.52	1.43	1.33

Table 3: The Effect of organic manures and their combinations on number of fruit per plants of chilli (cm), Fruit length (cm), Fruit diameter (cm), Average Fruit weight (g), Dry fruit weight (g) and Fruit yield (kg ha⁻¹) of chilli (*Capsicum annum L.*)

Tr. No.	Number of fruit per plant (DAT)	Fruit length (cm)	Fruit diameter (cm)	Average Fruit weight (g)	Dry fruit weight (g)	Fruit yield (kg ha ⁻¹)
T ₀	102.00	5.32	1.12	1.18	23.99	4465.27
T ₁	106.33	6.30	1.37	1.23	25.52	4881.16
T ₂	122.33	7.73	1.60	1.46	26.95	6637.34
T ₃	116.66	7.30	1.55	1.27	26.82	5511.56
T ₄	113.00	6.43	1.39	1.26	25.84	5297.06
T ₅	127.33	8.25	1.71	1.53	27.52	7244.59
T ₆	132.33	8.63	1.92	1.59	31.57	7832.55
T ₇	120.66	7.05	1.43	1.32	26.04	5933.63
SE(m) ±	0.85	0.087	0.041	0.011	0.32	68.45
C.D. at 5%	2.62	0.26	0.12	0.035	0.99	209.65

Yield parameter

The results presented in Table 4. The yield parameters such as Number of fruit per plant, Fruit length (cm), Fruit diameter (cm), Average fruit weight (g), Dry fruit weight (g) and Fruit yield (kg ha⁻¹) increased significantly by all treatments. The treatments of combined application of Farm yard manure + Poultry manure recorded higher number of fruit per plant (132.33), Fruit length (8.63 cm), Fruit diameter (1.92 cm), Average fruit weight (1.59 g), Dry fruit weight (31.57 g) and Fruit yield (7832.55 kg ha⁻¹). These parameters were found highest in this treatment compared to control. The increase in yield parameters may be due to better root proliferation, more uptake of nutrients and water, higher plant growth, more photosynthesis and enhanced food accumulation. These findings are in conformity with those of Wange and Kale (2003)^[12] in okra.

Organic manures thereby increasing the availability of nutrients, especially protein synthesis further it was suggested that significantly increased in Number of fruit per plant, Fruit length, Fruit diameter, Average fruit weight, Dry fruit weight and Fruit yield might have accelerated the mobility of photosynthetic from source to the sink which was influenced by the growth hormones which released from FYM and Poultry Manure the organic sources.

Similar finding were reported by Amrithalingam (1988)^[1], Dileep and Sasikala (2009)^[5], Deshpande *et al.*, (2010)^[4], Singh *et al.*, (2014)^[9] in chilli crop and Singh *et al.*, (2017)^[10] in tomato.

Conclusions

All the treatment show significantly differences for most of the trait under study. The treatment T₆ (Farm yard manure @ 12 t ha⁻¹ + Poultry manure @ 1.5 t ha⁻¹), was found as the best treatment for majority of traits *viz.* Plant height (cm), plant diameter (cm), stem diameter (cm), number of branches per plant, days of first flowering, number of fruit per plant, fruit

length (cm), fruit diameter (cm), dry fruit weight (g), average fruit weight (g) and fruit yield (kg ha⁻¹). Maximum yield per hectare were also obtained from T₆ with 7832.55 (kg ha⁻¹).

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