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Effect of Integrated Nutrient Management on Chilli (*Capsicum annum* L.)

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Abstract: An investigation on effect of integrated nutrient management practices ongrowth and yield of Chilli (*Capsicum annum Linn*)"under adoptic and climatic conditions of Northern part of Rajasthan was carried out during 2022-23 at the Horticulture nursery, Suresh Gyan Vihar University, Jaipur. The experiment was laid out in randomized block design (R.B.D.) replicated three times with 11 treatments combination, namely 100% RDF (NPK), 100 % FYM, 75% NPK + 25% FYM, 50% NPK+50 % FYM, 25 % NPK + 75 % FYM, 100 % FYM +Azotobactor, 75% NPK + 25% FYM) + Azotobactor, 50 % NPK+50 % FYM) + Azotobactor), 25 % NPK + 75 % FYM) + Azotobactor), 100 % Azotobactor and control with Chilli variety Pusa Jwala The treatment receiving 75 % NPK + 25% FYM + Azotobactor 5 kg/ha recorded the highest plant height, number of branches, number of leaves (at 30, 60, 90 and 120 DAT) and yield attributes such as duration of flowering (156.58 days),fruit set % (97.14), days taken to first harvesting, duration of picking, number of fruits per plant (96.7), length of fruits/plant, weight of fruit/plant and green chilli yield kg/ha. The economic analysis clearly indicated that the highest gross income (Rs214755.40), net return (Rs 177997.27) and cost benefit ratio (4.84) were under 75% NPK + 25% FYM + Azotobactor 5 kg/ha followed by 50 % NPK+50 % FYM) + Azotobactor.

Keywords: FYM, Azotobactor, yield, net return

Introduction

Chilli (*Capsicum annum* L.) belongs to the family Solanaceae, grown for its fruit. It is one of the most important spice crops of the world and is widely cultivated throughout the warm, temperate, tropical and subtropical countries. Chilli is famous for its pleasant aromatic flavour, pungency and high colouring substance. It is used very widely in culinary, pharmaceutical and beverage industries. Hence, chilli finds diverse utility as a spice, condiment, culinary supplement, medicine and vegetable, besides it is an important commercial crop. Chilli is cultivated worldwide in an

area of 10 million ha with annual production of 8.75 million tonnes with average productivity of 8132 kg per ha (Anonymous., 2021).

The adoption of organic manures and biofertilizers, including farm yard manure and nitrogen-fixing bacteria, has significantly reduced the need for chemical fertilizers. This shift has led to the production of high-quality, agrochemical-free products, enhancing safety for human consumption (Migahed *et al.*, 2004; Khalid *et al*., 2005).

Materials and Method

The experiment was carried out at the Research Farm of the Department of Horticulture, School of Agriculture, Suresh Gyan Vihar University, Jaipur, Rajasthan during the period 2022-23. The soil of the experimental field was sandy loam in texture, medium in organic carbon, low in available nitrogen, medium in available phosphorus and rich in available potassium. The experiment was conducted in Randomized Block Design (RBD) having 11 treatments - 100% RDF (NPK), 100 % FYM, 75% NPK + 25% FYM, 50% NPK+50 % FYM, 25 % NPK + 75 % FYM, 100 % FYM +Azotobactor, 75% NPK + 25% FYM) + Azotobactor, 50 % NPK+50 % FYM) + Azotobactor), 25 % NPK + 75 % FYM) + Azotobactor), 100 % Azotobactor and control with Chilli variety Pusa Jwala with three replications. The seedlings were transplanted with a spacing of 45 cm X 30 cm in different plot size 4.5 X 3.0 m. the manure and nutrient were applied as per treatments. The quantity of organic manures viz., farm yard manure and vermicompost were applied in the soil before sowing to accomplish the recommended dose of nitrogen While, inorganic fertilizer (Urea) was applied in two splits at the time of sowing and after one month for the treatments where nitrogen was supplied through inorganic source. Inoculant of Azotobactor (nitrogen fixing bacteria) was mixed with minimum quantity of water and individual seedlings were dipped for about 15-20 minutes and transplanted in the main field immediately.

Results and Discussion

The maximum fruit set percentage (97.14%) were recorded under 75% NPK + 25% FYM + Azotobactor, which was at par with treatment 50% NPK + 50% FYM + Azotobactor, 25 % NPK+ 75 % FYM + Azotobactor), 75% NPK + 25% FYM, 50% NPK+50 % FYM and 100% RDF (NPK). The minimum fruit set percentage (81.92%) were recorded under control, followed by 100% Azotobactor, 100% FYM and 50% FYM + Azotobactor). This might be due to that healthy plant more fruit set. These results are confirmed with the findings of Mondal, *et al.* (2018) and Singh *et al.* (2010).

The maximum days to required days taken to 1st harvesting after transplanting (120.11 days) were recorded at control, followed by 100% azotobactor, 100% FYM and 100 % FYM + Azotobactor. The minimum days required todays taken to 1st harvesting after transplanting (108.54 days) was significantly recorded under 75 % NPK + 25 % FYM + Azotobactor, followed by 50 % NPK + 50 % FYM + Azotobactor, 25 % NPK + 75 % FYM + Azotobactor) and 75 % NPK + 25 % FYM. Days taken to 1st harvesting after transplanting might be due to the reasonthat appropriate balance in the levels of nitrogen and phosphorus maintained through the application of Azotobactor and FYM helps early maturity and this effect were due to maximum and beneficial action of organic and inorganic fertilizers. Theseresults are in conformity with the findings of Malawadi (2003), Uppar *et al.*(2008) and Singh *et al.* (2010).

Duration of picking and number of fruits per plant were found to be significantly influenced by nutrient management treatments. The maximum duration of the picking (105.98 days) were recorded under 75% NPK + 25% FYM + Azotobactor, followed by 50 % NPK + 50 % FYM + Azotobactor, 25 % NPK + 75 % FYM + Azotobactor, 75 % NPK + 25% FYM and (50 % NPK + 50 % FYM. Its might be due to the reason that appropriate balance in the levels of nitrogen and phosphorus maintained through inorganic fertilizers helps to increase duration of picking and this effect was due to maximum and beneficial action of nitrogen along with phosphorus and potash. The result are in conformity with the findings of Singh *et al.* (2010) and Talukder *et al.* (2019).

The fruit weight and green chilli yield kg/ha were influenced significantly by different nutrient treatments. The highest yield of green chilli (10737.77 kg/ha) were produced with an application of treatment 75% NPK + 25% FYM + Azotobactor, which was at par with treatment 50% NPK+50%FYM +Azotobactor, 25 % NPK + 75 % FYM + Azotobactor, 75% NPK + 25% FYM, 50% NPK + 50 % FYM, 25% NPK+75% FYM and 100% RDF (NPK). Its might be due to better growth observed with the application of organic manure, Azotobactor and inorganic nitrogen sources resulting in maximum height of plant, number of branches and number of fruits per plant whichhave produced more fruits. The results are in conformity with the findings of Kattimani,*et al.* (2006), Uppar *et al.* (2008), Talukder *et al.* (2019), Kattimani *et al.* (2009) and Singh *et al.* (2010).

Table 1: Effect of integrated nutrient management on yield attributes of chilli

Treatments	**Fruit set (%)**	**Days to 1st harvesting after transplanting**	**Duration of picking (Days)**	**Number of fruit per plant**
100% RDF (NPK	92.93	111.13	101.83	86.28
100% FYM	87.68	117.44	96.08	77.90
75% NPK + 25% FYM	93.52	110.46	103.17	89.93
50% NPK+50% FYM	92.16	112.32	101.45	86.38
25% NPK+75% FYM	90.30	114.90	99.55	83.66
100% FYM +Azotobactor	88.80	116.15	97.49	80.29
75% NPK + 25% FYM + Azotobactor	97.14	108.54	105.98	96.73
50% NPK+50%FYM +Azotobactor	96.06	108.92	104.84	93.91
25% NPK+75%FYM + Azotobactor	95.70	109.43	103.82	91.10
100% Azotobactor	85.33	118.48	94.51	75.21

Control	81.92	120.11	91.42	71.72
SE(m)±	2.03	2.13	2.22	3.52
CD at 5%	6.00		6.55	0.15

Table 2: Effect of integrated nutrient management on yields and economics of Chilli**.**

Treatments	Fruit weight (Kg/plant)	Fruit weight (Kg/plot)	Green chilli yield (Kg/ha)	Net Income (Rs/ha)	B:C Ratio
100% RDF (NPK	1.29	12.94	9577.45	155983.80	4.38:1
100% FYM	1.16	11.68	8647.64	131582.80	3.18:1
75% NPK + 25% FYM	1.34	13.49	9982.60	163143.87	4.46:1
50% NPK+50% FYM	1.29	12.95	9588.18	155295.96	4.25:1
25% NPK+75% FYM	1.25	12.55	9287.00	148852.43	4.03:1
100% FYM +Azotobactor	1.20	12.04	8912.19	136623.80	3.28:1
75% NPK + 25% FYM + Azotobactor	1.45	14.51	10737.77	177997.27	4.84:1
50% NPK+50%FYM +Azotobactor	1.40	14.08	10424.01	171762.56	4.67:1
25% NPK+75%FYM + Azotobactor	1.36	13.66	10112.84	165119.23	4.44:1
100% Azotobactor	1.12	11.28	8349.05	135361.00	4.28:1
Control	1.07	10.75	7961.29	127855.80	4.07:1
SE(m)±	0.052	0.52	390.75	-	-
CD at 5%	0.15	1.55	1152.75	-	-

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