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Evaluation of integrated nutrient management practices on growth, yield and economics of chilli

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ABSTRACT

Chilli is one of the most important energy rich vegetable-cum- spice crops in Bangladesh. An experiment was conducted at the Multi location Testing (MLT) sites (AEZ-03) at Chakloma and Goneshpur of Shibganj upazilla under Bogura district during two consecutive rabi season of 2015-16 to 2016-17 to investigate the response of chilli (Capsicum annum) to different nutrient management practices under farmer's field condition. The experiment was laid out in randomized complete block design (RCBD) with six replications. Chilli var. Magura local variety was used as experimental crop. Five treatments viz. T_1= Soil test based fertilizer dose for HYG (FRG 2012), T_2= IPNS with 3 t ha^{-1} poultry manure, T_3= IPNS with 5 t ha^{-1} cowdung, T_4= Recommended fertilizer dose based on FRG 2012 for HYG and T_5= Farmers practice. The highest chilli yield (14.44 t ha^{-1} at Chakloma & 14.95 t ha^{-1} at Goneshpur), gross return (TK. 587800 ha^{-1}) and BCR (4.54) were found from T_2 (IPNS with 3 t ha^{-1} poultry manure) which was statistically differed to other treatments whereas, the lowest yield (10.16 t ha^{-1} at Chakloma & 11.7 t ha^{-1} at Goneshpur, gross return (TK. 443400 ha^{-1}) and BCR (3.93) were obtained from treatment T_5 (Farmers practice). The Integrated plant nutrient management system produced better yield of chilli and showed significantly vary among the treatments. However, from results, it could be recommended that IPNS will be a promising technology for higher crop yields of chilli and profit as well as for the improvement of soil fertility & sustain soil productivity in Bogura region.

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I. Introduction

Bangladesh is an agro-based country. But it is a densely populated country of the word. Nowadays, the scarcities of foods are increasing day by day due to over population. The present population of

Bangladesh is about 170 million and the rate of population (about 1.42% annually) is higher than other developing countries (BBS, 2016). In this situation, the major challenges for agriculture sector of Bangladesh are to increase and sustain crop production. It can be possible to overcome this problem through cropping intensification with high yielding variety and used balanced fertilizer so that soil fertility will be managed properly. The present soil fertility status of Bangladesh is alarming due to excess use of inorganic fertilizer. Used of organic manures to meet the nutrient requirements of crop that would be an inevitable practice to incorporate nutrients into soil, and to make the balance the soil productivity. It helps to develop sustainable agriculture. Organic manures not only improve the soil physical, chemical and biological properties but also improve the moisture holding capacity of soil. In this way, organic manure can enhance crop productivity with better quality yield (BARC, 2005). Organic manure, fertilizers and other amendments either alone or in combinations could be used to develop nutrient supplying capacity of the soil (Dutta and sangtam, 2014). The application of poultry manure also increasing the pH, P, K, Ca, Mg and Mn in the soil. Poultry manure is more effective compared to other animal manures (Wijejawardena, 2000). Poultry manure could supports root-Knot nematode *solanaceous* crops such as potato, tomato, brinjal and capsicum (Gaur et al., 1971; Wijejawardena, 2000). Chilli is one of the most important vegetable-cum- spice crops in Bangladesh. It is an energy rich crop, and obviously has the requirement of balanced nutrients including secondary and micronutrients (Bidari, 2000).

It is widely used throughout the world as a major ingredient of curry powder in the culinary preparations. Chilli occupies nearly 1.77 lac hectare land with the annual production of 17.35 lac metric tons (BBS, 2016). The average yield of chilli is about 9.77 t ha^{-1} (BBS, 2016) which is comparatively low in respect to other countries. The reasons for low yield are lack of improved varieties, inadequate and irrational use of fertilizers by the farmers and depletion of native soil fertility & soil productivity due to intensive cropping. The use of inorganic fertilizer is expensive, and also hazardous to the soil environment. Chemical fertilizers cause problems not only to the soil health but also to the human health and environment. To combat this problem, it is necessary to use organic fertilizers along with chemical fertilizers that will not only boost chilli production but also save the environment. On the other hand, the yield of chilli depends on adequate supply of the essential nutrients (Alabi, 2006). N application to chilli peppers showed a significant increase in plant growth characteristics, color, yield and nutrient content of chilli (Stroehlein and Oebker, 2015). Chilli production has to be increased primarily depends on uses of high yielding variety (Chopra et al., 2005), standard agronomic practices like seed priming (Chopra et al., 2005) and balanced plant nutrition attained in soil through Integrated Nutrient management (INM). Since chemical fertilizer alone will not be able to sustain the productivity, integrated use of all potential sources of plant nutrients seems to be the only option to maintain soil fertility and crop productivity. The present study was undertaken to find out an integrated fertilizer (inorganic and organic) dose for the cultivation of chilli, and to increase soil fertility & sustain soil productivity for Bogura region.

II. Materials and Methods

The experiment was conducted at Multi location Testing (MLT) sites (AEZ-03) at Chakloma and Goneshpur of Shibganj upazilla under Bogura during two consecutive rabi season of 2015-16 to 2016-17. In the study, to evaluate the response of chilli to different nutrient management practices under farmer's field condition. The experiment was laid out in randomized complete block design (RCBD) with six replications. The crop was accommodated in 3 m × 2.4 m. Chilli var. Magura local variety was used as experimental crop. There were five treatments *viz.* T_1= Soil test based fertilizer dose for HYG (N, P, K, S, Zn & B @ 92.81, 53.56, 117.34, 2.68, 0.63, 0.57 kg ha^{-1}), T_2= IPNS with 3 t ha^{-1} poultry manure (N, P, K, S, Zn & B @ 74.81, 43.06, 102.94, 0, 0, 0 kg ha^{-1}), T_3 = IPNS with 5 t ha^{-1} cowdung (N, P, K, S, Zn & B @ 67.81, 46.06, 105.84, 0, 0, 0 kg ha^{-1}), T_4 = Recommended fertilizer dose based on FRG 2012 for HYG (N, P, K, S, Zn & B @ 121.77, 76, 130, 17.60, 1, 1.5 kg ha^{-1})and T_5= Farmers practice (N, P, K, S, Zn & B @ 138.24, 51.60, 115.5, 25.72, 0, 0 kg ha^{-1} with 3 ton cow dung). The climatic condition was cold and humid at the vegetative stage and moderately hot & high humid with frequent rain during fruiting and harvesting phase (Table 01). The fertilizers were used in treatment wise. Seedlings of Magura local variety were planted on February 20, 2016 in line. All fertilizers were applied during final land preparation except urea and MoP. One-fourth of MoP was applied at the time of final land preparation. Remaining MoP were applied three equal installments at 25, 50 and 70 days of after transplanting. Urea

was applied three equal installments at 25, 50 and 70 days of after transplanting. Before conducting the experiment soil samples were collected from the experimental fields, and then sent to the Soil Research Development Institute, Bogura for analysis to know the level of nutrient of soil. Chemical analysis of soil's results has been presented in (Table 02). Weeding, irrigation, crop protection measure and other intercultural operation were taken as and when necessary. The crop was harvested from 04 June to September 28, 2017. The yield of chilli per plot was recorded and converted into yield per hectare according to treatment. At maturity, different data were collected in different parameter wise.

Data analysis

The data obtained for yield contributing character and yield were statistically analyzed to find out the significance of differences among the treatments. The mean values of all the characters were evaluated and analysis of variance was performed by MSTAT-C software package and the mean differences were adjudged by Duncans Multiple Range Test (Gomez and Gomez, 1984). The gross economic return was calculated on the basis of prevailing market price of the commodities.

Table 01. Meteorological data recorded at the experimental site during the study period (Rabi season, 2015-16 to 2016-17)

Months	During 2015-16				During 2016-17			
	Average Temperature (^{0}C)		Average Relative Humidity (%)	Average Rainfall (mm)	Average Temperature (^{0}C)		Average Relative Humidity (%)	Average Rainfall (mm)
	Maxi.	Min.			Maxi.	Min.		
January	24.50	12.02	93.89	0.22	25.99	11.49	88.80	0.9
February	28.83	16.20	91.76	0.0	29.82	17.30	91.66	0.0
March	32.45	20.77	87.56	0.0 0.5	29.29	11.79	92.07	0.51
April	-	-	-	-	-	-	-	-
May	-	-	-	-	-	-	-	-
June	-	-	-	-	-	-	-	-
July	32.90	26.86	93.31	1.69	33.55	27.17	92.75	0.89
August	32.41	26.17	94.42	1.47	33.12	21.12	93.00	0.36
September	33.38	25.96	94.53	1.05	33.03	26.37	93.75	1.44
October	33.50	23.42	93.72	0.09	26.05	24.25	94.5	44.40
November	31.16	18.95	93.99	0.0	30.27	18.32	87.00	0.00
December	25.75	14.01	93.21	0.0	26.95	14.01	94.45	0.00

Table 02. Soil analysis values of different samples collected from Multi location Testing (MLT) sites at Chakloma and Goneshpur of Shibganj upazilla under Bogura district during the rabi season, 2015-16 to 2016-17

Sites	pH	OM (%)	Total N (%)	(meq/100g soil)	(ug/g soil)			
				K	P	S	Zn	B
Chakloma	6.1 VL	1.03 L	0.05 VL	0.03 VL	8.86 VL	26.57 O	1.25 M	0.29 L
Goneshpur	6.3 VL	1.15 L	0.06 VL	0.17 M	15.0 M	13.0 M	1.1 M	0.16 L

VL= Very Low, L=Low M = Medium, O = Optimum

III. Results and Discussion

Plant height

The results of yield and yield attributes of chilli were presented in Table 03 & 04. There was significant differed among the treatments in both locations. At Chakloma, during 2015-2016 season, the highest plant height was observed in T_2 (81.33cm) followed by 77.0, 73.33, 71.33 and 65.66cm in T_3, T_4, T_1 & T_5, respectively. Similar type of trend of result was found in 2016-2017 rabi season and they showed similar type of significant ($P \leq 0.05$). In 2016-17, the maximum plant height was found in T_2 (87.36cm)

which was followed by 85.89, 85.40 and 84.80cm in T_3, T_4 & T_1 respectively. The minimum plant height (84.50cm) was recorded in T_5. On the other hand, at Goneshpur under Shibganj upazilla in Bogura district, during 2015-2016 season, the highest plant height was observed in T_2 (73.51cm) which was followed by 73.03, 72.41 & 71.80cm in T_1, T_3 and T_4, respectively. The lowest plant height was recorded in T_5 (70.33cm). Similar type of trend of result was found in 2016-2017 rabi season and they also showed similar type of significant ($P \leq 0.05$). In 2016-17, the maximum plant height was found in T_2 (76.53cm) which was followed by 76.27, 76.23, & 76.0cm in T_3, T_1 & T_4 respectively. The minimum plant height (75.62cm) was recorded in T_5. In case of average mean value of plant height in both sites, the highest average mean value of plant height (84.34cm) was observed in T_2 at Chakloma which was statistically differed from the rest treatments, and the lowest average mean value of plant height (75.1cm) was observed in T_5 whereas, the maximum average mean value of plant height was recorded from treatment T_2 (75.01cm) at Goneshpur which was statistically differed with all other treatments. The minimum average mean value of plant height was observed in T_5 (72.97cm). Chauhan et al. (2017) also reported the same type of results. Dnyaneshwar (2015) and Malewar et al. (2012) also found almost similar results.

Number of fruits plant^{-1}

The results of yield and yield attributes of chilli were presented in Table 03 & 04. There was significant differed at 5% level of probability among the treatments in Chakloma locations. At Chakloma, during 2015-2016 season, the highest number of fruits plant^{-1} was observed in T_2 (67.80), and the lowest number of fruits plant^{-1} was recorded in T_1 (63.83). Similar type of result was found in 2016-2017 rabi season, and they also showed similar type of significant ($P \leq 0.05$). In 2016-17, the maximum number of fruits plant^{-1} was found in T_2 (68.33) whereas, the minimum number of fruits plant^{-1} (63.73) was recorded in T_5. On the other hand, at Goneshpur, during 2015-2016 seasons, there was significantly differed at 1% level of probability among the treatments. The highest number of fruits plant^{-1} was observed in T_2 (86.26) whereas the lowest number of fruits plant^{-1} was recorded in T_5 (72.40). Similar type of trend of result was found in 2016-2017 rabi season, and they showed significant differed ($P \leq 0.05$) among the treatments. In 2016-17, the maximum number of fruits plant^{-1} was found in T_2 (94.55) whereas, the minimum number of fruits plant^{-1} (81.57) was recorded in T_5. In case of average mean value of number of fruits plant^{-1} in both sites, the highest average mean value of number of fruits plant^{-1} (68.06) was observed in T_2 at Chakloma which was statistically differed ($P \leq 0.05$) from the rest treatments, and the lowest average mean value of number of fruits plant^{-1} (64.0) was observed in T_5 whereas, the maximum average mean value of number of fruits plant^{-1} was recorded from treatment T_2 (90.40) at Goneshpur which was statistically differed ($P \leq 0.01$) with all other treatments. The minimum average mean value number of fruits plant^{-1} was observed in T_5 (76.98). It also agreed with the finding of Alabi (2006), Vasuniya (2010) and Chauhan et al. (2017).

Fruit weight plant^{-1}

The results of yield and yield attributes of chilli were presented in Table 03 & 04. There was significant differed among the treatments at 1% level of probability in both locations. At Chakloma, during 2015-2016 season, the maximum fruit weight plant^{-1} was observed in T_2 (116.73g) and the minimum fruit weight plant^{-1} was recorded in T_1 (84.34g). Similar type of result was found in 2016-2017 rabi season. In 2016-17, the maximum fruit weight plant^{-1} was found in T_2 (108.85g) whereas, the minimum fruit weight plant^{-1} (86.39g) was recorded in T_4. On the other hand, at Goneshpur, during 2015-2016 season, the highest fruit weight plant^{-1} was observed in T_2 (169.5g), and lowest fruit weight plant^{-1} was recorded in T_5 (145.4 g). Similar type of trend of result was found in 2016-2017 rabi season. In 2016-17, the maximum fruit weight plant^{-1} was found in T_2 (177.4g) whereas, the minimum fruit weight plant^{-1} (153.8g) was recorded in T_5. In case of average mean value of fruit weight plant^{-1} in both sites, the maximum average mean value of fruit weight plant^{-1} (112.79g) was found from T_2 at Chakloma which was statistically differed ($P \leq 0.01$) from the other treatments, and the minimum average mean value of fruit weight plant^{-1} (85.49 g) was observed in T_5 whereas, the maximum average mean value of fruit weight plant^{-1} was recorded from treatment T_2 (173.45 g) at Goneshpur which was statistically differed ($P \leq 0.01$) with all other treatments. The minimum average mean value number of fruit weight plant^{-1} was observed in T_5 (149.60 g). The present results on fruit weight per plant were in agreement with the results reported by Vasuniya (2010), Dnyaneshwar (2015) and Hangarge et al. (2016).

Yield influenced by different nutrient management practices at two sites

The results of yield and yield attributes of chilli were presented in Table 03 & 04. There was significant differed (P≤0.05) among the treatments in both locations. At Chakloma, in 2015-2016, the highest yield was observed in T_2 (12.93 t ha^{-1}) which was followed by 12.07, 11.60 and 10.86 t ha^{-1} in T_3, T_4, & T_1, respectively. The lowest yield was recorded in T_5 (10.20 t ha^{-1}). There was significant differed at 5% level of probability. Similar type of trend of result was found in 2016-2017 rabi season and they showed similar type of significant (P≤0.05) among the treatments. In 2016-17, the maximum yield (15.96 t ha^{-1}) was found in T_2 which was followed by 15.66, 13.25 and 12.45 t ha^{-1} in T_3, T_4 & T_1 respectively. The minimum plant height (10.13 t ha^{-1}) was recorded in T_5. On the other hand, at Goneshpur under Shibganj upazilla in Bogura district, during 2015-2016 seasons, there was significantly differed at 5% level of probability among the treatments. The highest yield was observed in T_2 (15.12 t ha^{-1}) which was followed by 14.07, 12.27 and 12.11 t ha^{-1} in T_3, T_1 and T_4, respectively whereas, the lowest yield was recorded in T_5 (11.17 t ha^{-1}). Similar type of trend of result was found in 2016-2017 rabi season and they also showed similar type of significant (P≤0.05). In 2016-17, the maximum yield was found in T_2 (17.78 t ha^{-1}) which was followed by 13.18, 12.19 and 11.91 t ha^{-1} in T_3, T_4 & T_1, respectively. The minimum yield (11.50 t ha^{-1}) was recorded in T_5. In case of average mean value of yield in both sites, the highest average mean value of yield (14.44 t ha^{-1}) was observed in T_2 at Chakloma which was statistically differed at 5% level of probability from the rest treatments, and the lowest average mean value of yield (10.16 t ha^{-1}) was found in T_5 whereas, the maximum average mean value of yield was recorded from treatment T_2 (14.95 t ha^{-1}) at Goneshpur which was statistically differed (P≤0.05) with all other treatments. The minimum average mean value of yield was observed in T_5 (11.7 t ha^{-1}). The present results on yield of chilli were in agreement with the results reported by Alabi (2006), Vasuniya (2010), Dnyaneshwar (2015) and Hangarge et al. (2016).

Economic performance of chilli

The results of economic performance of chilli were presented in Table 05. During two years of investigation significantly higher gross returns (Tk. 587800 ha^{-1}), gross margin (Tk. 458375 ha^{-1}) and BC ratio (4.54) were obtained from T_2 whereas, the minimum gross return (Tk. 443400 ha^{-1}), gross margin (Tk. 330765 ha^{-1}) and BC ratio (3.93) were obtained in T_5. In the present investigation, it is indicated that the efficiency of IPNS with cow dung or poultry manure (Organic and inorganic fertilizer) gave higher economic return than other (Only chemical fertilizer) treatments. Among the efficiency of IPNS based fertilizer technology in this experiment is more profitable than other technologies for chilli cultivation in Bogura region. More or less similar result was observed in gross margin. Damke *et al.,* 1988 reported that plant height and number of branches plant^{-1} of chilli has increased by the combined application of organic and inorganic fertilizer and also significant improve in soil properties. The similar types of results were reported by Komal et al. (2019). Chopra et al. (2005) also found the superior yield of chilli genotypes with the combine application of organic and inorganic nutrient. Similar type of result was found by Pariari and Khan (2013) and Komal et al. (2019).

Table 03. Yield and yield attributes of chilli as influenced by different fertilizer package at the Multi location Testing (MLT) Sites at Chakloma of Shibganj upazilla under Bogura district during rabi season of 2015 -16 to 2016-2017.

Treatments	Plant height (cm)			Number of fruit plant^{-1}			Weight of fruit plant^{-1} (g)			Yield(t ha-1)		
	2015-16	2016-17	Mean	2015-16	2016-17	Mean	2015-16	2016-17	Mean	2015-16	2016-17	Mean
T_1	71.33c	84.80cd	78.1cd	63.83c	65.23bc	64.5bc	99.88bc	97.70bc	98.79bc	10.86bc	12.45b	11.65bc
T_2	81.33a	87.36a	84.34a	67.80a	68.33a	68.06a	116.73a	108.85a	112.79a	12.93a	15.96a	14.44a
T_3	77.00b	85.89b	81.4b	67.4ab	67.1ab	67.2ab	110.7ab	105.6ab	108.1ab	12.07ab	15.66ab	13.86ab
T_4	73.33b	85.40bc	79.4bc	66.06b	66.53b	66.3b	89.59c	86.39d	87.9dc	11.60b	13.25b	12.42b
T_5	65.66d	84.50d	75.1d	64.33b	63.73c	64.0bc	84.34d	86.65d	85.49d	10.20c	10.13c	10.16c
LSD	3.13	0.68	1.90	3.06	1.97	2.51	1.34	1.17	1.25	0.99	0.84	0.91
CV (%)	6.17	5.39	5.78	5.47	6.47	6.10	9.21	8.71	8.96	5.58	6.88	6.23
Level of Significance	*	*	*	*	*	*	**	**	**	*	*	*

In column, means followed by different letters are significantly different. *means at 5% level of probability, **means at 1% level of probability. T_1= Soil test based fertilizer dose for HYG (FRG 2012), T_2= IPNS with 3 t ha^{-1} poultry manure, T_3 = IPNS with 5 t ha^{-1} cowdung, T_4 = Recommended fertilizer dose based on FRG 2012 for HYG, T_5= Farmers practice

Table 04. Yield and yield attributes of chilli as influenced by different fertilizer package at the Multi location Testing (MLT) Sites at Goneshpur of Shibganj upazilla under Bogura district during rabi season of 2015 -16 to 2016-2017.

Treatments	Plant height (cm)			Number of fruit plant^{-1}			Weight of fruit plant^{-1} (g)			Yield (t ha-1)		
	2015-16	2016-17	Mean	2015-16	2016-17	Mean	2015-16	2016-17	Mean	2015-16	2016-17	Mean
T_1	73.03a	76.23a	74.63a	74.41bc	82.53bc	78.47bc	159.4b	166.00b	162.67b	12.27 b	11.91bc	11.9bc
T_2	73.51a	76.53a	75.01a	86.26a	94.55a	90.40a	169.5a	177.4a	173.45a	15.12 a	14.78a	14.95a
T_3	72.41ab	76.27a	74.34ab	81.86ab	91.05ab	86.45ab	168.9a	176.5a	172.7a	14.07 a	13.18ab	13.3ab
T_4	71.80ab	76.00ab	73.90ab	73.90c	82.32bc	78.11c	158.2b	166.8b	162.47b	12.11 b	12.19b	12.0bc
T_5	70.33c	75.62b	72.97cd	72.40c	81.57c	76.98c	145.4c	153.8c	149.60c	11.17bc	11.50c	11.7bc
LSD	7.14	0.45	3.79	7.84	5.51	6.67	18.52	19.70	19.11	1.54	1.39	1.46
CV (%)	8.20	7.07	7.63	8.37	6.30	7.33	9.52	9.73	9.62	9.59	10.13	9.86
Level of Significance	*	*	*	**	*	**	**	**	**	*	*	*

In column, means followed by different letters are significantly different. *means at 5% level of probability, **means at 1% level of probability. T_1= Soil test based fertilizer dose for HYG (FRG 2012), T_2= IPNS with 3 t ha^{-1} poultry manure, T_3 = IPNS with 5 t ha^{-1} cowdung, T_4 = Recommended fertilizer dose based on FRG 2012 for HYG, T_5= Farmers practice

Table 05. Economic performance of chilli as influenced by different fertilizer doses at the Multi location Testing (MLT) Sites at Chakloma and Goneshpur of Shibganj upazilla under Bogura district during rabi season of 2016 to-17.

Treatments	Average yield (Kg ha^{-1})	Gross return (Tk. ha^{-1})	Total cost (Tk. ha^{-1})	Gross margin (Tk. ha^{-1})	Benefit Cost Ratio (BCR)
T_1	11765	470600	114425	356175	4.11
T_2	14695	587800	129425	458375	4.54
T_3	13550	542200	124425	417775	4.35
T_4	12050	482000	119625	362375	4.02
T_5	11050	443400	112635	330765	3.93

Market price of Chilli @ Tk. 40 per kg, T1= Soil test based fertilizer dose for HYG (FRG 2012), T_2= IPNS with 3 t ha^{-1} poultry manure, T_3 = IPNS with 5 t ha^{-1} cowdung, T_4 = Recommended fertilizer dose based on FRG 2012 for HYG, T_5= Farmers practice

IV. Conclusion

Considering the above result of two years with two locations, it was observed that higher yield and economic returns was obtained from IPNS based fertilizer doses compared to farmers practice in both years. IPNS with cow dung or poultry manure gave higher yield and profit. Therefore, from the results, it could be recommended that IPNS will be a promising technology for higher crop yield and profit as well as for the improvement of soil fertility & sustain soil productivity.

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V. References

[1]. Alabi, D. A. (2006). Effects of fertilizer Phosphorus and poultry droppings treatments on growth and nutrient Components of pepper (*Capsicum annum).* African Journal of Biotechnology, 5, 671-677.

[2]. BARC (Bangladesh Agricultural Research Council) (2005). Fertilizer Recommendation Guide. Bangladesh Agricultural Research Council, Farmgate, New airport road, Dhaka.
[3]. BBS (Bangladesh Bureau of Statistics) (2016), Statistical Yearbook of Bangladesh. Bangladesh Bureau of statistics, Ministry of Planning. Dhaka, Bangladesh.
[4]. BIDARI, B. I. (2000). Assessment of yield and quality of Byadagi chillies (*Capsicum annum L.*) in relation to soil and management practices in Dharwod district (komataka state). PhD Thesis, University of Agricultural Science, Dharwod. Pp10-14.
[5]. Chauhan, K. S., Baghel, S. S., Mishra, K., Singh, A. K. and Singh, V. (2017). Effect of varieties and integrated nutrient management on growth and yield of chilli *(Capsicum annuum).* International Journal of Pure Applied Bioscience, 5(4), 2114-2120. https://doi.org/10.18782/2320-7051.5433
[6]. Chopra, S., Gupta, A. K., Samnotra, R. K. and Bhushan, A. (2005). Performance of chilli (*Capsicum annuum* L) genotypes under sub-tropical conditions of Jammu. Environmental Ecology, 23, 323-24.
[7]. Dnyaneshwar, K. P. (2015). Studies on integrated nutrient management of chilli (*Capsicum annum* L.) cv. Parbhani Tejas. M. Sc. thesis, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra. Pp-156-170.
[8]. Dutta, M. and Sangtam, R. (2014). Integrated Nutrient Management on Performance of Rice in Terraced Land. International Journal of Bio-resource and Stress Management, 5, 107-112. https://doi.org/10.5958/j.0976-4038.5.1.021
[9]. Gaur, A. C., Sadasivam, K. V., Viral, O. P. and Mathur, R. S. (1971). A study of the decomposition of Organic matter in an alluvial Soil, Co evaluation, microbiological and chemical transformation plant and soil. Journal of Indian Society and Soil Science, 57, 53-57.
[10]. Gomez, K. A. and Gomez, A. A. (1984). Statistical procedures for agricultural research (2nd Edition). An International Rice Research Institute Book. John Wiley and sons, New York, USA. P-680.
[11]. Hangarge, D. S., Raut, R. S., More, S. D., Pholane, L. P. and Birajdar, R. R. (2016). Response of chilli to integrated nutrient supply system. Journal of Soils and Crops, 11, 188-192
[12]. Komal, T., Satodiya, B. N. and Parmar, S. (2019). Effect of integrated nutrient management on growth, yield and economics of Chilli. International Journal of Chemical Studie, 7(4), 1640-1642
[13]. Malewar, G. U., Syed, I. and Rudraksha, G. B. (2012). Integrated Nitrogen Management in chilli (*Capsicum annuum* L.). Bulletin of Indian Institute of Soil Science, 2, 156-163.
[14]. Pariari, A. and Khan, S. (2013). Integrated nutrient management of chilli (*Capsicum annuum* L.) in Gangetic alluvial plains. Journal of Crop and Weed, 9(2), 128-130.
[15]. Stroehlein, J. L. and Oebker, N. F. (2015). Effect of Nitrogen and phosphorus on yield and tissue analysis of chillipeppers. Journal of American Society of Horticultural Sciences, 262, 65-75.
[16]. Vasuniya, K. S. (2010). Effect of integrated nutrient management practices on growth and yield of chilly (*Capsicum annum* L.) cv. Pusa Jwala. M.Sc thesis, Rajmata Vijayaraje. Pp-210-215.
[17]. Wijejawandena, J. D. H. (2000).Comparison of animal manure sources on potato and vegetable cultivation in the up country. Annals of the Srilanka Department of Agriculture, 2, 357-369.

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