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RESEARCH ARTICLE

DEVELOPMENT OF FERTILIZER RECOMMENDATION ON THE YIELD OF CHILLI AT CHARLAND OF JAMALPUR

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ABSTRACT

An experiment was carried out to develop fertilizer recommendation on the yield of chilli at multi-Location testing site, Malancha, Melandah, Jamalpur during October, 2015 to February, 2017. Local variety (Balijorimorich) was used in the study. Five treatments were included in the study these were, T_1 = Recommended dose of chemical fertilizers (RD), T_2 = Soil test-based fertilizer dose (STB), T_3 = 125% STB based fertilizer dose, T_4 = IPNS based fertilizer dose + 5 t CD/ha, T_5 = Farmers' practice. Results in both years indicated that IPNS based fertilizer dose + 5 t CD/ha significantly influenced chilli production. The highest dry yield of chilli in both the years (4.51 & 4.45 t ha^{-1}, respectively) was recorded from IPNS based fertilizer dose + 5 t CD/ha and the lowest dry yield (2.67 & 2.68 t ha^{-1}, respectively) was obtained from farmers' practice.

KEYWORDS

Fertilizer, Yield, Chilli and Charland

1. INTRODUCTION

Chilli (*Capsicum annuum*L.) is considered as the most important vegetable and spice crop throughout the world which belongs to Genus Capsicum, and family "Solanaceae" (Muthukumar and Sathya, 2017). Chilli (Capsicum) is an important crop and is considered and almost indispensable spice in daily life (Paul and Eric, 2013). The trace elements, minerals, and nutrients in their fruits have good health properties (Arimboor et at., 2015; Subha et al., 2017). Carotenoids are the pigments extracted from ripe red chili, which are lipidsoluble and mainly consist of capsorubin, capsanthin, zeaxanthin, β-cryptoxanthin, and β-carotene. These carotenoids are reported to have significant health-promoting effects, including radical scavenging activity, lipid metabolism regulation, anti-cancer effects, and anti-radiation properties (Fernandez-Bedmar and Alonso-Moraga, 2016; Fu et al., 2010).

In Bangladesh, there are about 0.82 million hectares of char land (Ahmed et al., 1987). "Charland'' is the Bengali term, its English meaning is "Riverine Island" for mid-channel island that emerges periodically from riverbed as a consequence of accretion (Elahi, 1991). Due to decreasing cultivable land, farmers of char areas (Riverine Island) in Bangladesh have been practicing intercropped garden pea with onion, coriander with onion, sweet gourd with onion, vegetables, pulse and oilseed crops with wheat are common practice to the farmers of char areas (Talukder et al., 2015; Rahman et al., 2015; Talukder et al., 2015; Talukder et al., 2016). Area under chilli cultivation was 255000 acres producing about 137000 M Ton in Rabi and Kharif seasons respectively (BBS, 2017).

In Bangladesh, chillies are grown in all the districts but plenty of chillies are produced in district of Bogra, Rangpur, Kurigram, Jamalpur, Natore and Jessore (BBS, 2017). Chilli is an important spices crop in Bangladesh. A vast area of Jamalpur district is under chilli cultivation. Chilli usually requires a longer time than most other crops. They tend to grow slowly when the temperatures are cooler and fasters when the temperatures are higher. Because of these, optimum fertilizing in chilli plants is essential to their health. Farmers of this area use fertilizer in different doses. It is necessary to find out the optimum dose of fertilizer for chilli cultivation. Therefore, the present study was done to develop fertilizer recommendation for chilli at charland of Jamalpur.

2. MATERIALS AND METHODS

The The experiment was carried out to develop fertilizer recommendation for chilli at multi-Location testing site, Malancha, Melandah, Jamalpur during October, 2015 to March, 2017. The site was of medium high land belonging to the agro-ecological zone Old Brahmaputra Floodplain under Agro-Ecological Zone 9 (UNDP and FAO, 1988). Local variety (Balijori morich) was used in the study. Five treatments were included in the study these were, T_1 = Recommended dose of chemical fertilizers (RD) - N_{100}, P_{65}, K_{100}, S_{32}, $B_{2.0}$ kg/ha), T_2 = Soil test based fertilizer dose (STB) - N_{93}, P_{51}, K_{58}, S_{16}, $B_{0.9}$ kg/ha), T_3 = 125% STB based fertilizer dose (N_{116}, P_{64}, K_{73}, S_{20}, $B_{1.13}$ kg/ha), T_4 = Integrated plant nutrient system (IPNS) - N_{70}, P_{44}, K_{47}, S_{17}, $B_{0.9}$ kg/ha) based fertilizer dose + 5 t CD/ha, T_5 = Farmers' practice (N_{73}, P_{40}, K_{50}, S_{14} kg/ha).

Randomized complete block design was followed with three replications for the experiment. The seeds of chilli were sown in broadcast on October 10, 2015 in first year and October 03, 2016 in second year. The unit plot size was 6m x 5m. The crop was fertilized according to treatment. Full amount of cowdung, P, K, S, B; and half of N were applied as basal during final land preparation. The rest of N were applied in three equal installments at 25, 50 and 70 DAS incompliance with treatment. Irrigation, weeding and other intercultural operations were done as and when necessary. The crop was harvested in first year on February 28, 2016 and

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continued upto March 19, 2016 and in second year on February 20, 2017 and continued upto March 13, 2017.Collected data were analyzed statistically with the help of MSTAT software and mean separation was done as per LSD test at 5% level of significance.

3. Results and Discussion

Two-year pooled data obtained from the study have been presented in table 1 and 2. In table 1, the yield and yield contributing characters of chilli have been mentioned and table 2, represents the economic analysis of the study. From table 1, results indicated that application of IPNS based fertilizer dose + 5 t CD/ha significantly influenced chilli production. Significant variations were found among the treatments in respect of number of chilli plant^{-1}, individual dry chilli weight, weight of fresh chilli plant^{-1}, weight of dry chilli plant^{-1} and yield (t ha^{-1}) (Table 1). The Plant height and plant m^{-2} were also differing among the treatments.

The highest number of chilli plant^{-1} (16.87) was achieved from T_4 treatment and lowest (9.30) was in T_5 treatment. The highest individual dry chilli weight (0.784 g) was found in T_4 treatment and lowest (0.671 g) was in T_5 treatment. The highest fresh weight of chilli plant^{-1} (46.89 g) was found in T_4 treatment and lowest (20.78 g) was in T_5 treatment. The highest weight of dry chilli plant^{-1} (11.72 g) was found in T_4 treatment and lowest (6.90 g) was in T_5 treatment. The highest dry chilli yield (4.48 t ha^{-1}) was recorded in T_4 treatment due to higher number of chilli plant^{-1}, individual chilli weight and maximum dry chilli weight plant^{-1} and lowest dry chilli yield (2.68 t ha^{-1}) was recorded in T_5 treatment due to lower number of chilli plant^{-1}, individual chilli weight and minimum dry chilli weight plant^{-1}.

These results are in agreement with the findings of who reported that the highest mustard seed yield (1.1 t/ha) was 120% higher over control recorded due to application of integrated plant nutrient system (IPNS) basis fertilizer management with mustard oil cake @ 0.5t/ha (Ali et al., 2003). From economic point of view, it was found that the highest gross return (Tk.4,48,000 ha^{-1}), gross margin (Tk. 3,07,796 ha^{-1}) and benefit cost ratio (3.30) was found in T_4 treatment (IPNS based fertilizer dose + 5 t CD/ha). The lowest gross return (Tk. 2,68,000 ha^{-1}), gross margin (Tk. 1,31,656 ha^{-1}) and benefit cost ratio (1.97) was found in T_5 treatment (Farmers' practice) (Table 2).

Table 1: Yield and yield attributes of chilli two-year pooled data at MLT site, Malancha, Melandah, Jamalpur during 2015-2016 and 2016-17

Treatment	Plant ht. (cm)	Plant m^{-2} (no)	Chilli plant^{-1} (no)	Individual dry chilli wt.(g)	Wt of fresh chilli plant^{-1} (g)	Wt of dry chilli plant^{-1} (g)	Dry chilli yield (t ha^{-1})
T_1	48.17	76.00	15.16	0.730	31.88	7.10	3.08
T_2	48.17	63.33	15.78	0.748	36.08	9.74	3.54
T_3	51.30	65.33	16.22	0.750	46.58	10.32	4.13
T_4	59.50	71.67	16.87	0.784	46.89	11.72	4.48
T_5	45.60	52.00	9.30	0.671	20.78	6.90	2.68
LSD $_{(0.05)}$	1.72	36.07	0.39	0.010	0.21	0.29	0.64
CV(%)	8.16	9.17	3.43	3.34	2.30	1.99	5.50

Note: T_1=Recommended dose of Chemical fertilizers (RD), T_2= Soil test-based fertilizer dose (STB), T_3= 125% STB based fertilizer dose, T_4= IPNS based fertilizer dose + 5 t CD/ha, T_5= Farmers' practice

Table 2: Cost and return of chilli at MLT site, Malancha, Melandah, Jamalpur during 2015-2016 to 2016-17

Treatment	GR (Tk ha^{-1})	Variable cost (Tk ha^{-1})	GM (Tk ha^{-1})	Benefit cost ratio (BCR)
T_1. Recommended dose of Chemical fertilizers	3,08,000/-	1,44,391/-	1,63,609/-	2.13
T_2. Soil test based fertilizer dose	3,54,000/-	1,39,700/-	2,14,300/-	2.53
T_3. 125% STB based fertilizer dose	4,13,000/-	1,43,098/-	2,69,902/-	2.89
T_4. IPNS based fertilizer dose+ 5 t CD/ha	4,48,000/-	1,40,204	3,07,796/-	3.20
T_5. Farmers' practice	2,68,000/-	1,36,344	1,31,656/-	1.97

Product was considered to calculate gross return and fertilizer cost application and additional cost were considered to calculate variable cost
Price of dry chilli-Tk. 100/kg
Inputs price (Tk. kg^{-1}): Urea = 16.00, TSP = 22.00, MoP = 15.00, Zinc sulphate = 75.00, Boric acid = 90.00 and Cowdung = 12.00

4. Discussion

Considering yield and yield contributing characters of chilli, the treatment T_4= IPNS based fertilizer dose + 5 t CD/ha produced maximum yield and T_5= Farmers' practice gained minimum. From two years pooled data, it was indicated that T_4 Treatment has an ability to produce higher dry chilli yield. So, IPNS based fertilizer (N_{70}, P_{44}, K_{47}, S_{17}, $B_{0.9}$ kg ha^{-1}) is the best combination for chilli production.

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