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INFLUENCE OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH, YIELD AND QUALITY OF OKRA (*ABELMOSCHUS ESCULENTUS* (*L.*) MOENCH)

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Abstarct

A field experiment was conducted during *kharif* season of 2010 to study the effect of INM on growth, yield and quality of okra var. Prabhani Kranti. Application of 10 t FYM, 120 kg each of N and P_2O_5/ha were found significantly superior in enhancing growth, yield and quality of okra over their respective preceding levels. Addition of 10 t FYM/ha resulted in maximum green pod yield (78.20 q/ha), protein content (16.50%), Protein yield (340.5 kg/ha), N-uptake 74.50 kg/ha and P-uptake 6.80 kg/ha. The highest level of N and P_2O_5 (120 kg/ha) also augmented the above parameters up to the same extent. Thus, in order to secure maximum yield 10 t FYM with 120 kg/ha each of N and P_2O_5 is essential under the existing agro-climatic conditions.

Key words: Integrated nutrient management, growth, yield and quality of okra.

Introduction

Okra or bhindi (*Abelmoschus esculentus L.)* is an important vegetable crop of India. The productivity of this crop can be enhanced only by supplying the balanced nutrients to the nutrient deficient soils. In fact, the indiscriminate use of chemical fertilizers without organic manures is known to degrade physico- chemical as well as biological properties of the soil. The use of different type of organics improves soil properties, increases fertilizer use efficiency, mitigates short supply of micronutrients, stimulates the proliferation of several groups of soil microorganisms and improves ecological balance of rhizosphere. Farmyard manure is well known as a store house of plant nutrients. Use of chemical fertilizers in combination with organic manure is essentially required to improve soil health (Raghuwanshi *et al.* (2016). Looking to the poor fertility condition of the intensively cropped lands and for securing sustainable yield okra, the present research work was taken up.

Materials and methods

A field experiment was conducted during *kharif* season of 2010 at the Agriculture Research Station, Kalai, Aligarh, C.S.A. Univ. of Agric. & Tech., Kanpur (U.P.). The soil of the experimental field was clay-loam having pH 7.1, organic carbon 0.40%, available -N, P_2O_5 and K_2O 49.50 and 197.0 kg/ha, respectively. The treatments comprised of two levels of FYM (0 and 10 t/ha), four levels of nitrogen (0, 40, 80 and 120kg /ha) and three levels of phosphorus (0, 60 and 120 kg/ha). The experiment was laid out in split-plot design with three replications. The FYM was kept in the main–plots and NP combinations in the sub-plots. Okra variety Prabhani Kranti was sown on 25 July @18kg/ha with recommended package of practices. The protein contact was determined by following the procedure of Jackson (1973).

Results and discussion

Growth Parameters

The data in table 1 reveal that the plant height, primary and secondary branches and leaves/plant were increased significantly due to 10t FYM/ha, 120kg N/ha or 120kg P_2O_5/ha as compared to their respective preceding levels. The beneficial effect of FYM on growth parameters may

Table 1: Growth, yield and yield-attributes protein content and nutrients uptake of okra as influenced by INM treatments.

Treatments	Plant Height (cm)	Primary branches /Plant	Secondary branches /Plant	Leaves / Plant	Pods / Plant	Green pod yield (q/ha)	Protein content (%)	Protein yield (kg/ha)	N-uptake (Pods+ levels) (kg/ha)	P-uptake (Pods+ levels (kg/ha)
FYM (t/ha)										
0	62.50	2.80	4.80	31.25	8.30	59.50	15.20	225.0	51.10	4.16
10	82.33	5.85	10.66	45.50	15.60	78.20	16.50	340.5	74.50	6.80
CD (P=0.05)	NS	1.20	0.72	3.50	2.30	1.80	NS	54.0	8.30	0.20
N-levels (kg/ha)										
0	59.50	2.75	5.25	32.00	8.80	58.80	15.30	226.5	52.00	4.18
40	60.33	4.00	9.50	38.50	15.00	70.50	16.00	330.0	68.50	6.33
80	68.00	4.66	10.00	43.66	16.30	80.90	16.80	338.4	72.80	7.00
120	80.50	5.75	11.25	48.25	18.10	95.50	17.00	345.8	76.50	7.45
CD (P=0.05)	1.37	0.15	1.20	1.20	0.46	1.10	0.60	15.0	2.40	0.25
P_2O_5 levels (kg/ha)										
0	58.50	2.50	4.90	31.50	9.00	58.50	15.20	226.9	51.00	4.12
60	63.20	4.25	8.66	40.00	16.50	80.00	17.00	335.6	68.50	6.98
120	78.50	5.00	11.00	46.50	17.50	88.50	17.50	339.5	75.00	7.25
CD (P=0.05)	1.37	0.15	1.20	1.50	NS	1.10	0.60	15.0	2.30	0.24

be attributed to its multifarious role *i.e.* Improvement of physico-chemical and biological properties of the soil and contribution towards controlled release of nitrogen (Singh, 2010) as well as significantly higher photosynthetic rate (Varma, 2010). The beneficial effect of nitrogen upto 120 kg/ha on these growth parameters may be ascribed to the fact N is an integral part of the chlorophyll, all proteins, enzymes and structure materials. In fact, leaf is the factory for the conversion of solar energy into the chemical energy by the process of photosynthesis. The significant role of increased applied-N might have encouraged the multiplication of cell division, photosynthesis and foliage enlargement up to maximum extent (Yadav, 2010). The better development of plant growth with phosphorus fertilizers might be due to its key role in root development energy translocation and metabolic processes (Singh, 2017).

Yield-attributes and yield

Application of 10 t FYM\ha recorded significantly higher pods/plant and hence green pod yield (78.20 q/ha) over control (59.5 q/ha). Similarly, the highest level of nitrogen and phosphorus (120 kg/ha) resulted in significantly higher number of pods (17.50 to 18.10/plant), consequently gave significantly higher green pod yield (88.50 to 95.50 q/ha) over their respective preceding levels. The higher yield and yield-attributes may be due to significant increases in growth parameters under highest nutrient levels which translocated increased photosynthetic towards the reproductive organ (sink). These results corroborate the findings of Reddy and Chand (2008), Varma (2010) and Singh (2010).

Protein yield and nutrients uptake

The data in table 1 further indicate that the highest level of applies FYM, nitrogen and phosphorus nutrients registered maximum protein content (16.50 to 17.50%), protein yield (339.5 to 345.8 kg/ha), N-uptake (74.50 to 76.50 kg/ha) and P-uptake (6.80 to 7.45 kg/ha) by okra var Prabhani Kranti. The variable response of applied organic and inorganic sources of nutrients on protein content may be attributed to their differential quantum of supplying nitrogen which is a constituent of amino acid precursor of protein synthesis or nitrogen metabolism of the plant. The maximum N and P uptake by okra was due to maximum nutrient content and yield of okra under the increased supply of nutrients. The present findings are in consonance with those of Farag and Dormancy (1994), Patil *et al.* (2004) and Selvi and Perumal, (2004).

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