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RESEARCH PAPER

Yield and growth of okra as influenced by integrated nutrient management

ASHISH RANJAN, K.P. SINGH*, R.K. ROY, V.K. PANDEY AND JHABBU RAI
Department of Horticulture (Vegetable and Floriculture), Bihar Agricultural College, SABOUR (BIHAR) INDIA
(Email : vikuranjan@gmail.com)

Abstract : The growth and yield contributing characters of okra exhibited their best expression in the treatment, involving substitution of 25 per cent of recommended dose of nutrients through FYM. It was closely followed by the combination of inorganic fertilizer and poultry manure in the same proportion. These two treatments superceded the treatment pertaining to the application of recommended dose of fertilizers in respect of growth and yield contributing characters and also the ultimate yield. Spraying of nitrogen (18 kg ha^{-1}) was very effective in increasing fruit yield. As a result of foliar feeding of 18 kg N ha^{-1} to okra the yield levels at 50 per cent and 75 per cent of the recommended doses were statistically equal to that recorded with the application of 100 per cent of the recommended dose of fertilizers.

Key Words : Okra, Growth, Yield, Integrated nutrient management

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INTRODUCTION

Okra [*Abelmoschus esculentus* (L) Moench] is an important vegetable crop which produces fruit continuously for a long time. Being high biomass producer, it has high nutritional need. Whereas, use of expensive chemical fertilizers as per requirement of the crop is not much affordable to the average farmers. In order to reduce nutritional needs especially nitrogen one, viable approach is to opt for foliar feeding of a part of nitrogen, in place of conventional top dressing. Thus present investigation has been undertaken to find out the suitable integrated nutrient management system for okra cultivation under agro-climatic condition of south Bihar Alluvial plains.

MATERIALS AND METHODS

A field experiment was conducted on sandy loam textured soil during *Kharif* season of 2001 at Vegetable Research Farm, Bihar Agricultural College, Sabour (Bihar). The soil of experimental field was neutral (pH 7.3) in reaction and containing 0.5 per cent organic carbon, 294 kg/ha available nitrogen, 26.3 kg/ha available phosphorus and 210 kg/ha available potassium. Twelve treatments consisting of inorganic fertilizers alone or in various combinations with sources of organic matter were tested in Randomized Block Design in three replications. The treatment comprised of three organic sources *viz*., FYM, poultry manure and cake mixture substituting 25 per cent, 50 per cent of the optimum dose of NPK thus making six treatments, which were evaluated against three varying levels of inorganic fertilizers along with one unfertilized control, besides, the experiment included two treatments involving foliar feeding of 18 kg N ha^{-1} in two spray out of 50 per cent and 75 per cent doses of nitrogen applied once each in these treatments (at an interval of 15 days after 1st top dressing). The recommended dose of NPK for okra was 100:60:60 kg : N : P_2O_5: K_2O ha^{-1}. Arka Anamica was the test variety. Crop was raised with the package of practices recommended for the crop in the region.

RESULTS AND DISCUSSION

Application of nutrient in 75:25 proportion as inorganic

* **Author for correspondence. (Present Address)** : Krishi Vigyan Kendra, ARWAL (BIHAR) INDIA

fertilizer and FYM (T_{-6}) closely followed by the same proportion of inorganic fertilizer and poultry manure (T_{-8}) recorded maximum leaf area index and number of branches per plant (Table 1). The effect of the treatments under test on days taken to 50 per cent flowering was not pronounced enough to touch the level of significance. Amongst different sources of organic matter, the application of cake mixture was not as effective as those of FYM and poultry manure. It was pertinent to note here that foliar feedings of a part of nitrogen out of 50 per cent and 75 per cent of the recommended dose of fertilizer (T_{-4}) indicating there by the high effectiveness of foliar feeding in okra

Effect on yield contributing characters and yield:

Yield contributing characters of okra other than fruit weight and fruit diameter exhibited their best response in the treatment getting 75 per cent of recommended dose of NPK in inorganic form and balance 25 per cent nitrogen substituted

Table 1 : Effect on growth characters

	Treatments	Days taken to 50% flowering	No. of branches per plant	Leaf area index (cm)
T_{-1}	Control	60.06	1.60	1.50
T_{-2}	50% of R/D	58.04	2.06	2.41
T_{-3}	75% of R/D	57.73	1.40	2.75
T_{-4}	R/D	55.20	2.86	2.90
T_{-5}	50% of R/D+50% through FYM	55.86	5.80	2.99
T_{-6}	75% of R/D+25% through FYM	55.67	3.20	3.29
T_{-7}	50% of R/D+50% through poultry manure (PM)	56.73	2.60	2.94
T_{-8}	75% of R/D+25% through PM	56.47	3.00	3.21
T_{-9}	50% of R/D+50%through cake mixture	57.20	2.53	2.98
T_{-10}	75% of R/D+25%through cake mixture	57.07	2.73	2.98
T_{-11}	50% of N inclusive of two foliar spary of N each of 2% urea solution and full dose of P_2O_5 and K_2O	56.33	2.53	2.80
T_{-12}	75% of N inclusive of two foliar spray of 2% urea solution R/D of P_2O_5 and K_2O	56.00	2.60	2.98
	S.E.±	1.451	0.2394	0.0981
	C.D. (P=0.05)	NS	0.4955	0.2035

NS=Non-significant

Table 2 : Effect on yield and yield contributing characters

	Treatments	Yield (q/ha)	Fruits weight (g)	No. of fruits per plant	Fruit diameter (cm)	Fruit length (cm)
T_{-1}	Control	49.02	11.80	8.30	4.80	9.12
T_{-2}	50% of R/D	79.07	13.45	11.20	5.50	11.20
T_{-3}	75% of R/D	89.01	13.57	12.80	5.67	11.80
T_{-4}	R/D	97.15	14.07	13.60	5.90	12.80
T_{-5}	50% of R/D+50% through FYM	102.13	15.38	14.00	5.90	13.20
T_{-6}	75% of R/D+25% through FYM	111.10	14.80	15.73	6.20	13.50
T_{-7}	50% of R/D+50% through poultry manure (PM)	98.03	15.05	13.80	6.04	13.00
T_{-8}	75% of R/D+25% through PM	108.02	14.62	15.33	6.30	13.40
T_{-9}	50% of R/D+50%through cake mixture	90.77	14.62	13.06	5.69	12.30
T_{-10}	75% of R/D+25%through cake mixture	94.00	14.05	14.20	5.80	13.30
T_{-11}	50% of N inclusive of two foliar spary of N each of 2% urea solution and full dose of P_2O_5 and K_2O	93.92	14.15	13.20	5.70	12.60
T_{-12}	75% of N inclusive of two foliar spray of 2% urea solution R/D of P_2O_5 and K_2O	102.70	14.58	13.93	6.00	13.10
	S.E.±	5.7475	0.3997	0.5485	0.2030	0.3228
	C.D. (P=0.05)	11.9873	0.8274	1.1353	0.4202	0.6682

through FYM (T_{-6}). However, diameter of fruit was the highest when 25 per cent of NPK was substituted by poultry manure (T_{-8}) and the weight of individual fruit was the maximum in the treatment getting inorganic fertilizers and FYM in two equal halves (T_{-5}). Different levels of NPK were slso put to test which indicated a gradual rise in yield level with successive increment upto recommended dose (T_{-4}). Only the treatment getting 75 per cent of NPK as inorganic plus 25 per cent through FYM out yield the recommended dose of NPK as inorganic sources alone (T_{-4}), significantly. Although, all the organi-inorganic combinations exhibited an edge over the recommended dose of inorganic fertilizer (T_{-4}), but the different were not significant (Table 2).

Spraying of nitrogen as foliar was very effective in increasing fruit yield. Both 50 per cent and 75 per cent dose of nitrogen, but their 18 kg N ha^{-1} supplied as foliar feeding gave statistically equal yield to that of treatment getting full recommended dose of NPK (T_{-4}). Result established economy in use of nitrogen as a result of foliar feeding of nitrogen at least upto an extent of 25 kg N ha^{-1}.

These findings are in agreement with the findings of Sharma and Bhulla (1995), Singh *et al*. (1997), Tripathy and Maity (2009), Olaniye *et al.* (2010). The greater efficacy of FYM in comparison to poultry manure and cake mixture might have been because the FYM used was fully decomposed material. The mineralization of FYM is very rapid thus eliminating chances of immobilization of nutrient for a longer period. Besides, FYM is also a rich sources of various part plant stimulants like auxin, heteroauxins, gibberellins etc (Yawalkar *et al.*, 1992) might have helped in acceleration of various physiological phenomenon favourably.

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