

Effect of integrated nutrient management on quality and economics of okra (*Abelmoschus esculentus* (L) Moench)

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ABSTRACT

A field experiment was conducted during the Kharif season of 2013 at vegetable research farm of Department of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh to evaluate the integrated nutrient management in okra, *Abelmoschus esculentus* (L) Moench in randomized block design with three replications and ten treatments. Two organic sources of nutrition viz vermicompost and Biogen were combined with NPK fertilizers and the performance was compared with the sole chemical fertilization. Among 10 treatments under study 75 per cent RDF + 25 per cent vermicompost + Biogen recorded maximum values for TSS (2.71%) and fiber content (1.75 g), minimum incidence of yellow vein mosaic virus effect, maximum total yield per hectare (46.09 q), net return per hectare (Rs 76915.75) and cost/benefit ratio (1:3.00). This study suggested that 75 per cent RDF + 25 per cent vermicompost + Biogen treatment is potential source for fruit quality and economics of okra.

Keywords: Vermicompost; Biogen; NPK, quality; economics; okra

INTRODUCTION

Okra (*Abelmoschus esculentus* L) is an important vegetable crop of Malvaceae family which supplies higher nutrition (carbohydrates, fats, protein, minerals and vitamins) in our diet. Okra is a fast growing annual which has captured a prominent position among the vegetables in India. It is a multiple use crop. It is grown practically

in all agro-ecological zones of India mainly for its immature fruits which are eaten as cooked vegetable. Dried seeds are nutritious food. It contains up to 20 per cent protein and the fiber from okra canes is a possible paper pulp source while the dried canes are a fuel source (Lyngdoh et al 2013). This vegetable is basically a self-pollinated crop, though essentially self-pollinated because of its showy corolla and

the possibility of cross-pollination by insects cannot be ruled out. Consequently cross pollination to the extent of 4.0-19.0 per cent with maximum of 42.2 per cent (Kumar 2006) is noticed with the insect assisted pollination. Okra is highly susceptible to frost and requires warm climate for fruit production.

Integrated use of organic and inorganic fertilizers improves crop productivity (Mal et al 2013). In the present Indian agriculture, keeping in view the inadequate availability of organic sources of nutrients and expected yield decline at least in the initial years, complete substitution of chemical fertilizers is not necessarily warranted. Rather organic sources should be used as partial replacement of the chemical fertilizers. Thus a strategy for judicious combination of both organic and inorganic sources of nutrients is the most viable option for nutrient management. It is economically viable and also helps in attaining sustainability in production and maintaining soil health and environment (Bairwa et al 2009). Biogen helps the root zone from unwanted gases suffocation, keeps the roots healthy and fresh, provides a long term oxygen reservoir releasing oxygen slowly, adjusts pH (soil and water) value, prevents ammonium damage and enhances microbial metabolism to remediate pollutants. Biogen works in a wide range of temperature and pH of soil and water. Hence the present investigation was conducted to frame integrated nutrient management strategy for okra.

MATERIAL and METHODS

The present investigation was conducted at vegetable research farm of Department of Horticulture, SHIATS, Allahabad during 2013-14 with ten treatments. The experiment was laid out in a randomized block design with three replications. All the recommended package of practices was followed timely for raising a healthy good crop. Seeds of okra cultivar Kashi Kranti were dibbled manually with a recommended seed rate of 10 kg/ha on 7 October 2013. Three seeds were dibbled at each hill in well prepared plot of 2.25 x 1.80 m, 30 cm apart within row and 45 cm between rows. Observations with respect to growth, yield and chemical attributes were recorded during the growth period of crop including economics. The entire dose of vermicompost, Biogen, phosphorus, potassium and half dose of nitrogen as per treatment combination per plot were applied at the time of sowing as basal dressing. The remaining half dose of nitrogen was applied in two split doses as top dressing at 30 and 45 days of sowing respectively. Economics was worked out on the basis of the existing values of inputs used and output. The crude fiber of okra was determined using the standard method (Anon 1990). The data recorded during the course of investigation were subjected to statistical analysis by analysis of variance (ANOVA) technique (Fisher 1958).

The treatments used were T₁ (recommended dose of fertilizers, control),

T₂ (25% RDF + 75% vermicompost), T₃ (50% RDF + 50% vermicompost), T₄ (75% RDF + 25% vermicompost), T₅ (100% RDF + Biogen), T₆ (25% RDF + 75% vermicompost + Biogen), T₇ (50% RDF + 50% vermicompost + Biogen), T₈ (75% RDF + 25% vermicompost + Biogen), T₉ (100% Biogen alone) and T₁₀ (100% vermicompost alone).

RESULTS and DISCUSSION

The results of the present study are given in Table 1.

The maximum TSS content (2.71%) in fruits was observed in T₈ (75% RDF + 25% vermicompost + Biogen) followed by (2.70%) in T₄ (75% RDF + 25% vermicompost) and minimum (2.60%) in T₁₀ (100% vermicompost alone). This finding is in close conformity with the work of Shreeniwas et al (2000). The maximum fiber content (1.75 g) in pods was observed in T₈ (75% RDF + 25% vermicompost + Biogen) followed by (1.74 g) in T₉ (100% Biogen alone) and minimum (1.63 g) in T₆ (25% RDF + 75% vermicompost + Biogen). This finding is supported by the work of Sharma et al (2009). The maximum number of yellow vein mosaic virus affected plants (8.33) per plot were observed in T₉ (100% Biogen alone) followed by (7.66) in T₁ (recommended

dose of fertilizers) and minimum in T₈ (75% RDF + 25% vermicompost + Biogen).

The maximum total number of fruits per plant (22.04) at total harvestings was observed in T₄ (75% RDF + 25% vermicompost) followed by (21.75) in T₁ (recommended dose of fertilizers) and minimum (20.9) in T₂ (25% RDF + 75% vermicompost) which is also supported by the finding of Bairwa et al (2009). The maximum total yield per plot (1866.97 g) was observed in T₈ (75% RDF + 25% vermicompost + Biogen) followed by (1796.32 g) in T₇ (50% RDF + 50% vermicompost + Biogen) while minimum (1275.64 g) in T₉ (100% Biogen alone). The maximum total yield per hectare (46.09 q) was observed in T₈ (75% RDF + 25% vermicompost + Biogen) followed by (46.00 q) in T₇ (50% RDF + 50% vermicompost + Biogen) and minimum (31.49 q) in T₉ (100% Biogen alone). Similar results were found by Sharma et al (2010).

The maximum net return per hectare (Rs 76915.75) was observed in T₈ (75% RDF + 25% vermicompost + Biogen) followed by (Rs 74609.87) in T₇ (50% RDF + 50% vermicompost + Biogen) and minimum (Rs 41610.25) in T₁₀ (100% vermicompost alone). The maximum benefit/cost ratio (1:3.00) was observed in T₈ (75% RDF + 25% vermicompost + Biogen) followed by (1:2.84) in T₇ (50% RDF + 50%

Table 1. Effect of integrated nutrient management on fruit quality and economics of okra

Treatment	TSS (%)	Fiber content (g)	YVMV affected plants/plot	Total # fruits/plot	Total yield /plot (g)	Yield /hectare (q)	B:C ratio
T ₁ (Recommended dose of fertilizers, control)	2.65	1.69	7.66	21.75	1447.3	35.73	1:2.4
T ₂ (25% RDF + 75% vermicompost)	2.64	1.72	7.33	20.9	1476.31	36.45	1:2.1
T ₃ (50% RDF + 50% vermicompost)	2.68	1.68	6.66	21.64	1550.96	38.29	1:2.3
T ₄ (75% RDF + 25% vermicompost)	2.70	1.70	7.00	22.04	1576.31	38.92	1:2.5
T ₅ (100% RDF + Biogen)	2.67	1.67	6.33	21.1	1625.98	40.14	1:2.7
T ₆ (25% RDF + 75% vermicompost + Biogen)	2.66	1.63	5.33	21.7	1700.97	42.00	1:2.4
T ₇ (50% RDF + 50% vermicompost + Biogen)	2.69	1.63	5.00	21.64	1796.32	46.00	1:2.8
T ₈ (75% RDF + 25% vermicompost + Biogen)	2.70	1.75	5.00	21.73	1866.97	46.09	1:3.0
T ₉ (100% Biogen alone)	2.66	1.74	8.33	21.69	1275.64	31.49	1:2.6
T ₁₀ (100% vermicompost alone)	2.60	1.74	8.33	21.18	1336.64	33.00	1:2.0
F-test	S	S	S	S	S	S	
SEm±	2.65	0.07	0.40	1.20	80.53	2.02	
CD	2.64	0.16	0.85	3.58	239.23	6.01	

YVMV= Yellow vein mosaic virus, RDF= Recommended dose of fertilizers, S= Significant

vermicompost + Biogen) and minimum (2.01) in T₁₀ (100% vermicompost alone).

CONCLUSION

Based on the results of the experiment it is concluded that treatment T₈ (75% RDF + 25% vermicompost + Biogen) was found most suitable in relation to quality and economic returns for cultivation of okra, *Abelmoschus esculentus* (L) Moench cv Kashi Kranti under the agro-climatic conditions of Allahabad, UP.

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Received: 3.8.2016

Accepted: 15.8.2016