

## Effect of integrated nutrient management growth and yield of okra (*Abelmoschus esculentus* (L). Moench) cv. Arka Anamika

K Gayathri and P Syam Sundar Reddy

Received : November, 2012 / Accepted : May, 2013

Okra or Bhendi (*Abelmoschus esculentus*(L).Moench) is one of the important summer vegetable grown widely in sub-tropical region of the world for its tender pods. India ranks first in the world with a production of 3.5 million tonnes (70 % of the total world production) from an area of 0.35 million ha. Okra requires heavy manuring for its potential production. However, the use of expensive commercial fertilizers as per a requirement of the crop is not much affordable to the average farmers. Therefore, the application of plant nutrients through organic sources likes compost, farm yard manure and bio fertilizers remain the alternative choice of the growers for maintaining its sustainable production (Subbiah *et al.*, 1982, Gaur 1990).

The field experiment with okra, cv. *Arka Anamika* was conducted from October-2010 to January-2011 at the Horticultural Research Station ( HRS ), Venkataramannagudem, West Godavari district. The design followed was RBD with 12 treatments and three replications. The treatments included Recommended dose of NPK (100:50:50 kg /ha) (T<sub>1</sub>), Farmyard manure @ 20 t/ha (T<sub>2</sub>), Vermicompost @ 8 t/ha (T<sub>3</sub>), Poultry manure @ 7 t/ha (T<sub>4</sub>), 50% of RDF+ 50% of RDN through FYM (T<sub>5</sub>), 50% of RDF +50% of RDN through vermicompost (T<sub>6</sub>), 50% of RDF+50% RDN through poultry manure (T<sub>7</sub>), 50% of RDF +25% of RDN through FYM + 25% RDN through vermicompost (T<sub>8</sub>), 50% of RDF +25% of RDN through poultry manure +25% of RDN through vermicompost (T<sub>9</sub>), 50% of RDF +25% of RDN through poultry manure +25% of RDN through FYM (T<sub>10</sub>), 33.3% of RDN through poultry manure +33.3% of RDN through FYM +33.3% of RDN through vermicompost (T<sub>11</sub>), Control (No fertilizers + No organic manures) (T<sub>12</sub>). The crop was raised with a spacing of 60 cm × 30 cm and plot size of 3.6 m × 2.1m. standard cultural practices recommended for Okra

was followed uniformly for all the experimental plots. The growth and yield attributes were recorded in the five randomly selected plants in each plot were tagged to arrive mean values. The data were subjected to statistical scrutiny.

The results obtained from the present investigation are presented below.

### *Growth and yield characters*

Growth attributes were accentuated and differ significantly by different treatments (Table 1). The perusal of result indicated that okra plants fertilized with recommended dose of NPK (100: 50: 50 kg / ha) gave maximum plant height (104.42 cm), plant girth (3.18 cm), number of nodes per plant (15.07), and dry weight of the plant (53.77 g), with least number of days to 50 % flowering (32.8 days) and days to first picking (38.47 days). It was followed by the treatment comprising 50% of RDF +50% of RDN through vermicompost (T<sub>6</sub>). Readily available N from inorganic fertilizers was responsible for promoting better plant height and same was reported by Ray *et al.* (2005) and Patel *et al.* (2009) in bhendi. Nitrogen is a very important constituent of protoplasm and its favourable effect on chlorophyll content of leaves might have increased the synthesis of carbohydrates, amino acids etc., from which the phytohormones such as auxins, gibberellins, cytokinins and ethylene have been synthesized resulting in increased plant height. These results are supported by Ashish Ranjan and Vinit Chaudhary (2006). The beneficial effect of application of organic manures along with inorganic manures increasing the vegetative growth of plant can be attributed to the synergistic effect of organic manures in making available more plant nutrient by improving the soil physical condition and solubilizing the nutrients in soil. Moreover, the organic manures are also significant sources of major and micronutrients much needed by the plants as reported by (Rafi *et al.*, 2002). The lowest vegetative growth was recorded with control. Days to

**Table 1:** Effect of Organic manures and inorganic fertilizers on morphological characters of Okra cv. 'Arka Anamika'

Treatments	Plant height (cm)	Stem girth (cm)	Number of nodes per plant	Inter nodal length (cm)	Dry weight of the plant (g)	Days to 50 per cent of flowering	Days to first picking
T <sub>1</sub>	104.42	3.18	15.07	6.64	53.77	32.80	38.47
T <sub>2</sub>	71.72	1.41	7.63	9.15	26.17	39.07	44.93
T <sub>3</sub>	70.75	1.31	6.73	10.82	22.83	38.53	47.00
T <sub>4</sub>	71.56	1.27	6.13	11.40	20.50	40.60	46.33
T <sub>5</sub>	85.84	1.63	9.07	9.91	30.17	39.40	45.27
T <sub>6</sub>	94.12	2.71	12.47	7.88	45.67	35.20	41.33
T <sub>7</sub>	90.26	1.37	7.13	12.14	30.33	41.07	47.47
T <sub>8</sub>	90.79	2.13	11.07	8.24	41.50	35.00	42.00
T <sub>9</sub>	91.01	1.41	7.33	12.76	29.50	41.07	49.47
T <sub>10</sub>	81.55	1.80	8.67	9.51	37.33	39.00	46.33
T <sub>11</sub>	70.94	1.41	6.53	10.80	26.17	40.60	46.30
T <sub>12</sub>	61.30	1.06	5.80	10.66	11.50	47.33	55.00
C.D. (P=0.05)	19.738	0.331	2.174	3.107	5.557	4.948	3.923
SE m±	3.299	0.112	0.736	1.052	1.882	1.676	1.329
CV%	6.97	11.27	14.769	18.241	10.42	7.41	5.023

50 per cent flowering shows significant superiority over control might be due to increased photosynthetic activity and uptake of food nutrients resulting in early flowering as reported by Sharma and Bhalla (1995) and Patel *et al.* (2009) in bhendi. The earliness in inorganic fertilized treatments may be due to quick release of nutrients to the soil and quick uptake by the plants resulting better vegetative growth, flowering and fruiting as compared to combined application of inorganic and organic manures. Quick release of nutrients favored both vegetative and reproductive growth phases. These results are in conformity with the findings of Chaterjee *et al.* (2005).

### Yield and yield attributes

Various treatments had significantly altered most of pod attributing parameters (Table 2). Maximum number of pods per plant (16.47), maximum pod length (17.07 cm), maximum pod weight (15 g), maximum pod yield per plant (238.33 g), maximum pod yield per plot (10.29 kg) and maximum pod yield (135.83 q/ha) was obtained

by application of Recommended dose of NPK (100:50:50 kg /ha) (T<sub>1</sub>).

Followed by 50% of RDF +50% of RDN through vermicompost (T<sub>6</sub>), 50% of RDF +25% of RDN through FYM + 25% RDN through vermicompost (T<sub>8</sub>). The treatments received complete organic manures recorded lesser yield compared to pure inorganic and combination of organic and inorganic. These results are in conformity with the findings of Sharma and Bhalla (1995), who reported significant superiority in growth parameters with the application of fertilizers over control and attributed it to increased photosynthetic activity and uptake of food nutrients, resulting in significantly longer and wider fruits. The significantly highest yield in inorganic fertilized plots may be due to early vegetative growth, earliness in flowering and fruiting as well as individual fruit weight. These results are in conformity with the findings of Chaterjee *et al.* (2005).

Higher yield response due to organic manures is ascribed to improvement in physical and biological properties of

**Table 2:** Effect of Organic manures and inorganic fertilizers on yield and yield attributing characters of okra cv. 'Arka anamika'

Treatments	Number of pods per plant	Pod length (cm)	Pod weight (g)	Pod yield per plant (g)	Pod yield (q/ha)
T <sub>1</sub>	16.47	17.07	15.00	238.33	135.83
T <sub>2</sub>	8.13	11.13	11.47	94.06	52.91
T <sub>3</sub>	8.67	9.13	10.53	92.06	51.15
T <sub>4</sub>	8.67	9.27	9.80	80.00	44.53
T <sub>5</sub>	13.40	16.67	12.77	161.67	88.18
T <sub>6</sub>	14.33	16.00	14.53	206.67	111.11
T <sub>7</sub>	9.07	13.00	13.60	120.00	63.67
T <sub>8</sub>	12.47	15.87	13.93	165.00	94.71
T <sub>9</sub>	11.07	12.47	13.40	146.07	81.92
T <sub>10</sub>	10.47	13.40	12.60	134.28	74.25
T <sub>11</sub>	8.80	10.87	9.20	95.01	51.81
T <sub>12</sub>	7.80	8.47	8.60	66.36	37.70
C.D. (P=0.05)	3.161	2.677	3.907	20.953	13.226
SE m±	1.071	0.907	1.324	7.098	4.481
CV%	17.208	12.293	18.92	9.23	10.490

the soil resulting in better supply of nutrients which lead to good crop growth and yield. These results are in line with the findings of Premsekhar and Rajashree (2009). The significantly highest number of seeds per pod (69.20) recorded by Recommended dose of NPK (100:50:50 kg /ha) (T<sub>1</sub>), which was on par with 50% of RDF +50% of RDN through vermicompost (T<sub>6</sub>), 50% of RDF +25% of RDN through FYM + 25% RDN through vermicompost (T<sub>8</sub>). The reason could be that under these treatments pods were more linear compared to other treatments resulting in the greater number of seeds because of increased availability of food materials from the foliage for the development as reported by Brown (1958).

### **Economics**

The economics of cultivation in the present investigation showed that among the treatments, application of Recommended dose of NPK (100:50:50 kg /ha) (T<sub>1</sub>) resulted in a higher benefit : cost ratio of (4.29). Followed by 50% of RDF +50% of RDN through vermicompost (T<sub>6</sub>) resulted in a benefit : cost ratio of (3.12). This might be due to the higher yield obtained under this treatment.

(Market rates used in calculation: Pod – Rs. 20/kg, Urea – Rs. 10/kg, SSP – Rs. 10/kg, MOP – 12/kg, FYM Rs. 100/q, Poultry manure Rs. 50/q, Vermicompost – Rs. 250/q and Labour wages used in calculation Rs. 147/ men and women)

### **References**

- Ranjan A and Chaudhary V (2006) Effect of integrated nutrient management on growth and yield of okra (*Abelmoschus esculentus*). Journal of Applied Biology 16 : 11-13.
- Brown TJ (1958) Poultry manure – a practical balance fertilizer. Poultry Digest 17:108.
- Chaterjee GP, Thapa U and Tripathy P (2005) Effect of organic nutrition in sprouting broccoli (*Brassica oleracea* L. var. Italica Plenck). Vegetable Science 32(1): 51-54.
- Gaur AC (1990) Phosphate solubilising micro-organisms as biofertilizers. Omega Scientific Publishers, New Delhi, pp. 176.
- Mohd Rafi, Narwadkar PR, Prabhu T and Sajindranath AK (2002) Effect of organic and inorganic fertilizers on growth and yield of tomato (*Lycopersicum esculentum* Mill. ) South Indian Horticulture 50 (4-6) : 522-526.
- Patel AP, Tandel YN, Patel CR, Patel MA and Patel PB (2009) Effect on combined application of organic manures with inorganic fertilizers on growth and yield of okra cv. PARBHANI KRANTI. Asian Journal of Horticulture 4 (1) :78-81.
- Premsekhar M and Rajashree V (2009) Influence of Organic Manures on Growth, Yield and Quality of Okra. American-Eurasian. Journal of Sustainable Agriculture 3(1):6-8.
- Ray R, Patra SK, Ghosh KK and Sahoo SK (2005) Integrated Nutrient management in okra (*Abelmoschus esculentus* L., Moench) in a river basin. Indian Journal of Horticulture 62( 3 ):260-264.
- Sharma NK and Bhalla PL (1995) Influence of Integrated Nutrient Management on growth, yield and economics in Okra (*Abelmoschus esculentus* L. Moench). Vegetable Science 22(1) : 1-4.
- Subbiah K, Helhiah J, Ravi Kumar GK and Raja Gopal S (1982) Effect of combine application of organic and inorganic fertilizers on the yield and nutrient uptake of MDV-1 chilli. Indian Horticulture 30(1): 45-47.