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Research Note :

EFFECT OF NPK LEVELS ON GROWTH, YIELD AND QUALITY OF OKRA CV. ARKA ANAMIKA

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Bhindi (okra), botanically known as [*Abelmoschus esculentus* (L.)Moench] belongs to family Malvaceae. Okra is an annual vegetable crop propagated from seed in tropical and subtropical regions of the world. After harvesting fruits can be easily transported in bulk and stored for few days with much loss of quality. Okra fruits are important and used as vegetable in India, Brazil, West Africa and many other countries. For the year round consumption sundried (Africa, India), frozen and sterilized (USA) fruits are also important market production. Tender green fruits are cooked in curry and are also used in soups. The root and stem are useful for clearing cane juice. Consumable unripe *bhindi* fruits contain 10.4 g dry matter, 3100 calorie energy, 1.8 g protein, 90 mg calcium, 1.0 mg iron, 0.1 mg carotene, 0.07 mg thiamine, 0.08 mg riboflavin, 0.08 mg niacin and 18 mg vitamin C with almost comparable constituents, barring a few, in the leaves, it has multiple uses. The dry seeds contain 13-22% edible oil and 20-24% protein. The seed can also used as an animal feed. The dry fruit shell and stem containing crude fibre are suitable to manufacture paper and cardboard.

Okra plants need NPK for optimum growth and yield. Application of deficient nutrients through fertilizers, if therefore necessary, under different agro-climatic conditions can be manipulated to maximized production from a unit land area. Normally the yield per unit area increases with increase in plant population up to certain critical level, after which the yield decreases due to the competition between the plant for light, space and nutrient.

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The present investigation was carried out at Horticulture Research Farm of the Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University, Lucknow. The experiment was conducted during the year 2008-09 under Randomized Block Design with three replications. The observations were recorded on 13 yield and yield attributing traits viz. plant height (cm), no. of leaves/plant, no. of nodes/plant, stem diameter (cm), no. of days to flowering, no. of flowers/plant, days to first fruit formation, length of fruit (cm), diameter of fruit (cm), no. of fruits/plant, weight of fruit/plant (g), fruit yield/plot (kg) and fruit yield/hectare (q/ha). There were 10 treatment combinations of nitrogen, phosphorus and potash which were used to assess their effect on growth, flowering, yield and quality of okra.

Observations recorded on different yield and yield attributing traits (Table 1) revealed that application of nitrogen increased the height of plant significantly at final observation with increasing levels during experimentation. Treatment T_9 showed maximum plant height (106.58 cm) followed by T_8 (104.03 cm) and T_6 (102.02 cm), over control (T_0) to 90.67 cm. The maximum no. of leaves/plant was showed by T_9 (20.56) followed by T_6 (17.73). While, minimum no. of leaves was noted in control (9.56). The maximum no. of nodes/plant was reported in treatment T_9 (12.05) followed by T_3 (11.74) and minimum was recorded in control (8.01). Results are in conformity with Arjum and Amjab (1), Singh (5) and Verma *et al*. (6).

The diameter of main shoot of okra plants was

Table 1: Effect of different treatment combinations of NPK on growth and yield of okra.

Sl. No.	Treatments	Characters												
		Plant height (cm)	No. of leaves /plant	No. of nodes/ plant	Stem dia-meter (cm)	No. of days taken to flower-ing	No. of flower / plant	Days to first fruit forma - tion	Length of fruits (cm)	Diame ter of fruits (cm)	No. of fruits/ plant	Weight of fruits/ plant (g)	Fruit yield/ plant (kg)	Fruit yield /hect-are
1.	Control $N_0P_0K_0$ (T_0)	90.67	9.56	8.01	1.22	46.78	8.69	48.11	9.09	1.61	8.67	141.02	3.18	58.90
2.	($N_{60}P_{30}K_{30}$) $N_1P_1K_1$ (T_1)	92.93	14.15	9.07	1.79	46.50	8.87	47.30	9.90	2.10	8.89	167.90	3.24	60.05
3.	($N_{60}P_{60}K_{45}$) $N_1P_2K_2$ (T_2)	92.06	16.59	9.62	2.09	45.90	10.63	47.03	10.21	2.21	10.61	178.10	3.46	64.22
4.	($N_{60}P_{60}K_{60}$) $N_1P_3K_3$ (T_3)	99.91	16.71	11.72	2.15	45.96	10.40	46.97	11.35	2.45	10.42	170.01	3.42	63.36
5.	($N_{90}P_{30}$ K_{30}) $N_2P_1K_1$ (T_4)	100.51	14.38	9.73	1.89	45.51	10.25	47.09	11.90	2.51	10.27	162.92	3.50	64.83
6.	($N_{90}P_{60}K_{45}$) $N_2P_2K_2$ (T_5)	102.02	16.94	10.21	1.99	43.69	11.65	46.09	14.02	2.81	11.63	181.09	3.52	65.09
7.	($N_{90}P_{90}$ K_{60}) $N_2P_3K_3$ (T_6)	102.02	17.73	11.23	2.11	43.80	11.35	46.71	14.85	2.60	11.38	190.21	3.61	66.91
8.	($N_{120}P_{30}K_{30}$ $N_3P_1K_1$) (T_7)	100.81	15.58	9.64	1.99	47.90	11.28	47.18	12.00	1.98	11.25	160.81	3.51	65.00
9.	($N_{120}P_{60}K_{45}$ $N_3P_2K_2$) (T_8)	104.03	16.86	10.38	1.96	47.56	10.91	46.65	11.91	2.61	10.90	172.01	3.55	65.70
10.	($N_{120}P_{90}K_{60}$) $N_3P_3K_3$ (T_9)	106.58	20.56	12.05	2.26	43.08	12.50	46.05	15.10	2.71	12.51	209.56	3.82	70.81

recorded at 80 days after sowing. Observation indicated beneficial effect of nitrogen levels right from initial stage of plant growth. Treatment T_9 (2.26 cm) showed maximum diameter of stem. The lowest diameter of stem was noted with control (1.22 cm). The earliest flowering was recorded in T_9 (43.08 days) followed by T_5 (43.69 days). It is clear from the mean value presented in Table 1 that increasing levels of N_2, P_2O_5 and K_2O increased the number of flower formation significantly. The maximum no. of flowers/plant was recorded in T_9 (12.51) followed by T_5 (11.65). The maximum length of fruit was recorded in treatment T_9 (15.10 cm) followed by and T_6 (14.85 cm) and the thickest fruit was reported in treatment T_5 (2.81 cm) followed by T_9 (2.71 cm). The least girth of fruit was reported in control (1.61 cm). The maximum no. of fruits/plant was recorded in T_9 (12.51) followed by T_5 (11.63) and T_6 (11.38) while minimum was reported in control (8.67). Similar findings have also been reported by Chauhan and Gupta (2) and Mishra and Pandey (3).

The maximum weight of fruits/plant was recorded under treatment T_9 (209.56 g) followed by (190.21 g). The least weight of fruits/plant was recorded in control (141.02 g). The maximum weight of fruits/plot was found under treatment T_9 (3.82 kg) followed by T_6 (3.16 kg) while least was reported in control (3.18 kg). The maximum fruit yield was reported under treatment T_9 (70.81 q/ha) followed by T_6 (66.91 q/ha). The lowest fruit yield per hectare was reported in control (58.90 q/ha). Results are in line with findings of Singh and Srivastava (4) and Verma *et al.* (6).

On the basis of overall performance under present investigation, it may be concluded that the application of recommended dose of NPK (120 : 90 : 60 kg/ha) resulted the higher yield of okra in respect of various quantitative and qualitative traits.

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