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EFFECT OF DIFFERENT LEVELS OF FERTILIZERS ON GROWTH, YIELD AND ECONOMIC UNDER DIFFERENT OKRA GENOTYPES (*ABELOMOSCHUS ESCULANTUS*)

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Abstract

The field experiment was conducted at College of Horticulture Bidar, during the year 2013 – 2014 to know effect of different levels of fertilizers on growth, yield and economic under different okra genotypes (*Abelomoschus esculantus*). For the data, it was revealed that significantly higher yield per plot and per heacter (10.49 kg/plot and 9.72 t/ha) was recorded in V_4 (Arka Anamica). While the lower yield per plot and per heacter was observed in V_1 (Selection-1) (9.70 kg/plot and 8.98 t/ha). Among various fertilizer levels, significantly higher yield per plot and per heacter was observed in F_1 (100% recommended NPK) (10.46 kg/ plot and 9.68 t/ha). Among the treatments imposed, the treatment V_2F_1 obtained highest yield (12.23 t/ha) and net income (Rs. 84623.96/ha), gross income (Rs. 122314.81/ha) and B: C ratio (3.25).

Key words : Fertilizer levels, genotypes and economics.

Introduction

Okra (*Abelmoschus esculentus* L. Moench) is an economically important vegetable crop grown in tropical and sub-tropical parts of the world. Fresh okra fruit contains 2.1g protein, 0.2g fat, 8g carbohydrate, 36g calories, 1.7g fiber, 175.2 mg minerals, 232.7 vitamin and 88ml of water per 100g of edible portion (Siemonsrna and Kouame, 2004). Okra has huge potential in the enhancement of livelihood of stakeholders in both rural and urban areas (NAP, 2006). It has been used as blood plasma replacement or blood volume expander (Siemonsma and Kouame, 2004). India ranks first in the world with 6.35 million tonnes of okra produced from over 0.53 million ha land (NHB, 2013). Okra is known by many local names in different parts of the world. It is called lady's finger in England, gumbo in the United States of America, guino-gombo in Spanish, guibeiro in Portuguese and bhendi in India.

The nutrient requirements of crops depend upon soil texture, types of previous vegetation cover, cropping intensity and soil moisture. Fertilizers are generally applied to improve the crop yield, nutritional quality and aesthetic value of crops (Sikander *et al*., 2009). Nitrogen, phosphorus and potassium elements perform different functions in crops growth and development and none of them can be substituted to act for one another in its special function in the crop, therefore, there is need for fertilizer application in order to obtain optimum yield. One of the reasons of low yield in okra is imbalanced fertilizer use. Nitrogen is the important part of plant parts such as chlorophyll, amino acid, proteins and pigments. It is most essential for vigorous growth and branching, leaf development and enlargement root expansion, high photosynthetic activity and formation of protoplasm. For these reasons, nitrogen increases crop yield and improves quality. Nitrogen fertilizers being used for vegetable production has increased by 21% between 1997 to 2003 (Mubashir *et al*., 2010). Therefore, proper attention must be given to these nutrients while planning a project on plant nutrition (Khalil, 2006). Phosphorus is a key element in the formation of high energy compounds, such as AMP, ADP and ATP (adenosine mono-di- and tripphosphate), contributing to improve yield and quality of crops, playing essential role in photosynthesis and respiration. It is necessary for energy transformation in plant cells, cell division, development of meristem tissue, early root development, branching and flowering and seed development. Hence, attempt has been made to study the influence of different levels of fertilizers on growth, yield and economic on various okra genotypes

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Table 1 : Plant height and number of branches of okra genotypes as influenced by different levels of fertilizer.

Treatments	Plant height (cm)		Number of branches
Genotypes	**30 DAS**	**60 DAS**	**60 DAS**
1. V_1 – Selection-1	12.72	55.16	11.47
2. V_2 – Ankur-40	14.62	57.49	12.04
3. V_3 – Arundhati	13.31	54.21	12.30
4. V_4 - Arka Anamica	11.72	52.55	12.14
Mean	13.09	54.85	11.98
S. Em.±	0.82	2.47	0.20
C.D. at 5%	3.22	9.70	0.78
Fertilizers levels			
1. F_1-100% RDF	13.62	56.02	12.49
2. F_2-75% RDF	13.62	55.65	11.92
3. F_3-50% RDF	12.22	52.89	11.55
Mean	13.09	54.85	11.98
S. Em.±	0.88	2.67	0.23
C.D. at 5%	2.63	7.92	0.68
F at the same V levels			
S. Em.±	1.53	4.62	0.40
C.D. at 5%	NS	NS	NS
V at the same or different F levels			
S. Em.±	1.56	4.70	0.40
C.D. at 5%	NS	NS	NS

NS - Non significant.

(*Abelomoschus esculantus*) in order to identify suitable fertilizer level along with best suitable genotype under Bidar condition.

Materials and Methods

The experiment was conducted in the College of Horticulture, Bidar, which is situated in the north eastern transition zone *i.e*., zone-II of region-I in Karnataka state. The location corresponds to 17°58'26" North latitude and 77°29'34" East longitude. The average annual rainfall is 722 mm and is at an elevation of 389m above mean sea level (MSL), to know the influence of different levels of fertilizers on growth, yield and economic on various genotypes of okra (*Abelomoschus esculantus*). The experiment was laid out using split plot design with total 12 treatments with three replications, main plot consist of four genotypes *viz*., V_1 – Sel-1, V2 – Ankur-40, V_3 – Arundathi, V_4 - Arka Anamika and sub plot includes three levels of fertilizers *viz*., F_1- 100% RDF, F_2- 75% RDF and F_3- 50% RDF. The spacing adopted for planting was 120 × 90 cm. The plots were irrigated immediately after the completion of sowing. Thinning of excess seedlings and gap filling was undertaken one week after germination. All cultural practices have followed as per package of practices of UHS, Bagalkot. The observations *viz*., plant height, number of branches, days to 50% flowering, yield per plot and yield per ha. Economics were worked out. The collected data were subjected for statistical analysis.

Results and Discussion

Performance of genotypes

The data on the plant height and number of branches are recorded at different stages of crop growth (30 and 60 days after sowing) is presented in table 1.

Plant height of okra differed significantly with different levels of fertilizer at 30 and 60 days after sowing. Among the different levels of fertilizer, the significantly highest plant height (14.62 cm and 57.49 at 30 and 60 DAS) was observed in V_2 - Ankur-40. Number of branches per plant recorded significantly higher in V_3 (Arundathi) of 12.30 at 60 days after sowing. The data pertaining to yield and yield parameters of okra is presented in table 2.

Significantly highest numbers of days to 50 per cent flowering are recorded in V_3 (Arundhati) (39.89 days). Significantly highest average fruit weight was recorded in V_1 (selection-1) (22.94 g) followed by V_3 (Arundhati) (22.51 g). Minimum fruit weight was observed in V_2 (Ankur-40) (18.83g). Among the genotypes significantly higher yield per plot and per heacter (10.49 kg/plot and 9.72 t/ha) was recorded in V_4 (Arka Anamica). While the lower yield per plot and per heacter was observed in V_1 (Selection-1) (9.70 kg /plot and 8.98 t/ha).

Effect of different fertilizer levels:

Plant height differed significantly at different levels of fertilizer. Among the different levels of fertilizer, plant height at 30 and 60 DAS of 13.62 and 56.02 cm were recorded in F_1 (100% recommended NPK). The highest dose of NPK might have enhanced cell division and formation of more tissues resulting in luxuriant vegetative growth and thereby increasing plant height (Meyer and Anderson, 2003).

Number of branches per plant differed significantly due to different fertilizer levels at 60 DAS. Maximum no of branches were found in F_1 (100% recommended NPK) of 12.49. Simillar result were observed in research findings of Mal (2013) in okra.

Significantly highest number of days to 50 per cent

Table 2 : Effect of different levels of fertilizer on yield and yield attributing characters of okra genotypes.

Treatments				
Genotypes	**Days to 50 per cent flowering**	**Average fruit weight (gms)**	**Yield per plot (kg)**	**Yield per hectare (t)**
1. V_1 – Selection-1	38.22	22.94	9.70	8.98
2. V_2 – Ankur-40	39.22	18.83	9.90	9.17
3. V_3 – Arundhati	39.89	22.51	9.76	9.03
4. V_4- Arka Anamica	39.78	21.79	10.49	9.72
Mean	39.278	21.518	9.963	9.225
S. Em.±	0.19	0.84	0.14	0.13
C.D. at 5%	0.76	3.29	0.57	0.53
Fertilizer levels				
1. F_1-100% RDF	38.58	23.84	10.46	9.68
2. F_2-75% RDF	38.58	22.53	10.15	9.40
3. F_3-50% RDF	40.67	18.18	9.28	8.59
Mean	39.278	21.518	9.963	9.225
S. Em.±	0.42	1.06	0.23	0.21
C.D. at 5%	1.26	3.16	0.68	0.63
F at the same V levels				
S. Em.±	0.73	1.84	0.40	0.37
C.D. at 5%	2.18	5.47	1.18	1.09
V at the same or different F levels				
S. Em.±	0.66	1.80	0.37	0.35
C.D. at 5%	1.98	5.35	1.11	1.03

NS - Non significant.

Table 3 : Economics of growing okra genotypes as influenced by different levels of fertilizer.

Treatments	**Yield (t/ha)**	**Gross returns (Rs./ha)**	**Cost of cultivation (Rs./ha)**	**Net returns (Rs./ha)**	**B:C ratio**
V_1F_1	8.44	84351.85	37690.85	46661.00	2.24
V_1F_2	8.93	89259.26	36151.02	53108.24	2.47
V_1F_3	9.14	91358.02	34611.42	56746.60	2.64
V_2F_1	12.23	122314.81	37690.85	84623.96	3.25
V_2F_2	9.40	93981.48	36151.02	57830.46	2.60
V_2F_3	9.75	97530.86	34611.42	62919.44	2.82
V_3F_1	9.29	92932.10	37690.85	55241.25	2.47
V_3F_2	9.16	91574.07	36151.02	55423.05	2.53
V_3F_3	9.10	90987.65	34611.42	56376.23	2.63
V_4F_1	8.83	88271.60	37690.85	50580.75	2.34
V_4F_2	8.68	86759.26	36151.02	50608.24	2.40
V_4F_3	7.76	77623.46	34611.42	43012.04	2.24

Note : Price of fruit Rs. 10 per kg.

flowering are (40.67 days) were recorded in F_3 (50% recommended NPK). Significantly higher average fruit weight (23.84 g) were recorded in F_1 (100% recommended NPK) over the F_2 (75% recommended NPK) (22.53 g) and F_3 (50% recommended NPK) (18.18). Among various fertilizer levels, significantly higher yield per plot and per heacter was observed in F_1 (100% recommended NPK) (10.46 kg/ plot and 9.68 t/ha). This result aggress the findings of by Firoz (2009) by application of 100 per cent recommended nitrogen in okra. Singh *et al.* (2012) also found that application of N:P:K in ratio of 120:90:60 given maximum yield per heacter in okra. Lower

yield was found in F_3 (50% recommended NPK) (9.28kg/ plot and 8.59 t/ha).

Interaction

The interaction effects of various treatment combinations was found to be non significant.

Economics

The data on economics of okra genotypes as influenced by different fertilizer levels are presented in table 3.

Among the treatments imposed, the treatment V_2F_1 obtained highest yield (12.23 t/ha) and net income (Rs. 84623.96/ha), gross income (Rs. 122314.81/ha). The lowest yield (7.76 t/ha) of okra was recorded in V_4F_3 with net income of Rs. 43012.04 per hectare, gross income of Rs. 77623.46 per hectare.

Higher B: C ratio (3.25) was recorded in the treatment V_2F_1. Firoz (2009) also found that application 100 per cent N and P will give raise higher B:C ratio in okra.

References

Firoz, Z. A. (2009). Impact of nitrogen and phosphorus on the growth and yield of okra (*Abelmoschus esculentus* (L.) Moench) in hill slope condition. *Bangladesh J. Agril. Res*., **34(4)** : 713-722.

Indian Horticulture Data Base (2013). *Ministry of Agriculture Government of India*. www.nhb.gov.in. pp. 155.

Khalil, I. A. (2006). *Crops and Cropping patterns In Pakistan: Crop Nutrition*. 6th Chapter. HEC Publisher, Islamabad. pp. 64-65.

Mal, B., P. Mahapatra, S. Mohanty and H. N. Mishra (2013). Growth and yield parameters of okra (*Abelmoschus esculentus*) influenced by Diazotrophs and chemical fertilizers. *Journal of Crop and Weed*, **9(2)** : 109-112.

Meyer, B. S. and D. B. Anderson (2003). Nitrogen and phosphorus leaching during the decomposition of broad leaf forest litter. *Polish J. Soil Sci*., **36** : 21-29.

Mubashir, M., S. A. Malik, A. A. Khan, T. M. Ansari, S. Wright, M. V. Brown and K. R. Islam (2010). Growth, yield and nitrate accumulation of irrigated carrot and okra in response to nitrogen fertilization. *Pak. J. Bot*., **42(4)** : 2513-2521.

National Academies Press Lost Crops of Africa Volume **II**: *Vegetables*. www.nap.edu - 301.

Siesmonsma, J. S. and C. Kouame (2004). Plant Resource of Tropical Africa 2. *PROTA Foundation*, Wageningen, Netherlands: 21-29.

Sikander, A. S., M. Dawar, Tariq and M. J. Zaki (2009). Management of root diseases by combination of different soils with fertilizers. *Pak. J. Bot*., **41(6)**: 3219-3225.

Singh, S. K., Sanjay Kumar, Yogesh Chandra Yadav and Adesh Kumar (2012). Effect of NPK levels on growth, yield and quality of okra cv. Arka Anamika. *Hort Flora Research Spectrum*, **1(2)** : 190-192.