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Research Article

Effect of N and P Levels on the Growth and Yield of Okra (*Abelmoschus esculentus* (L.) Moench) cv. Punjab-8

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ABSTRACT

A field experiment was conducted in the Department of Horticulture, Khalsa College, Amritsar during 2016-17 to study the Effect of N and P levels on the growth and yield of okra (Abelmoschus esculentus (L.) Moench) cv. Punjab-8. The crop was sown in first week of March. The investigation was laid out in RBD with eight treatment combinations replicated thrice with spacing of 45×30 cm. Results of the study showed that the different levels of N and P had significant effect on physical characteristics of okra. It is evident from the results that the treatment T_6 (N 125 % + P 20 kg) significantly affected the vegetative characters in terms of maximum plant height (142.43 cm), stem diameter (2.45 cm), number of leaves (35.10), leaf area (83.30 cm^2) and minimum number of days to 50% flowering (32.33) and first picking (38.33). Treatment T_4 (N 100 % + P 20 kg) was a remarkable treatment generating maximum number of flowers (48.63), pod length (13.75 cm), pod girth (2.02 cm), pod weight (16.54 g), number of pods per plant (20.72) and yield (143.20 q/ha).

Keywords: *Okra, Punjab-8, Nitrogen, Phosphorus, Yield, Pod.*

INTRODUCTION

Okra or lady's finger, (*Abelmoschus esculentus* (L.) Moench) is an important vegetable of the tropical and sub tropical region of the world. It belongs to the family Malvaceae. In India, it is commonly grown in Uttar Pradesh, Bihar, Orissa, West Bengal, Andhra Pradesh, Karnataka, Punjab and Assam (Attigah et al., 2013). India ranks first in production and second in area of okra cultivation. Total area under okra in India is 533 thousand ha with production of 6346 thousand MT covering India's 5.7 per cent of total vegetable area. India produces 6346 thousand MT of Okra. Its productivity in India is 11.9 MT/ha (NHB 2014). It is mostly cultivated for its tender green pods but sometimes they are canned as well as dehydrated. Green tender fruits are fried, cooked in curry and are also used in soups. Fruits are rich in proteins, vitamin C, calcium, potassium and other mineral matters (Gopalan et al., 2007). Okra plant requires warm temperature and is unable to withstand low temperature for long.

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Optimum temperature is in the range of 21 to 30˚C, with minimum and maximum temperature of 18˚C and 35˚C respectively (Abd El-Kader et al., 2010). Okra is one of the main food crops and farmers cultivate it to meet the increasing food demand in India. Okra produces fruits for a long time and thus needs proper and sufficient supply of plant nutrients for higher yields and better quality. Lack of sufficient amount of these nutrients results in poor performance of the crop growth due to the decline in soil productive potential and fertility status which in turn lowers the yield (Patel et al., 2009). Sufficient nitrogen and phosphorus supply improves cell division, foliage production and photosynthetic activity of plant, thus producing higher number of flowers and fruits (Das et al., 2014). Okra requires heavy manuring for its potential production and good quality green pods. Nitrogen as well as phosphorus plays an important role in fruit, seed and quality development of okra. NPK fertilizer has been reported to give a yield increase in okra (Babatola, 2006).

Farmers are currently cultivating okra with inappropriate rate of fertilizers. As in Punjab only nitrogen is recommended for the production of okra by PAU, Ludhiana (Anon 2016) but people are unaware of the fact. Therefore the effect of phosphorus on okra needs to be evaluated. In recognition of the economic importance of okra and the increment of the productivity, the present investigation was undertaken to find the most suitable levels of N and P which would produce maximum yield of okra in Punjab. Thus, this study was undertaken with the following objectives:

- To determine the effect of different levels of N and P on the growth and yield of okra.
- To find out the most suitable amount of N and P for growth and yield of okra.

MATERIALS AND METHODS

The present investigation on Effect of N and P levels on the growth and yield of okra (*Abelmoschus esculentus* (L.) Moench) cv. Punjab-8 was carried out in an experimental plot of Department of Horticulture, Khalsa College, Amritsar during 2016-17.

DESIGN AND EXPERIMENTAL LAYOUT

The experiment was laid out in Completely Randomized Block Design with eight treatments each replicated thrice at spacing of 45 cm × 30 cm. The experimental field was divided into 24 individual plots and the treatments in each replication were allotted randomly. Treatments are as T_1: Control, T_2: N 100 % [RDF], T_3: N 100 % + P 10 kg/acre, T_4: N 100 % + P 20 kg/acre, T_5: N 125 % + P 10 kg/acre, T_6: N 125 % + P 20 kg/acre, T_7: N 75 % + P 10 kg/acre and T_8: N 75 % + P 20 kg/acre. {Where, N 100 %= 36 kg/acre, N 125 % = 45 kg/acre, N 75% = 27 kg/acre}. Crop was sown in the first week of March.

The plots were properly levelled for even and efficient distribution of fertilizers. The fertilizers used as source of nitrogen and phosphorus were urea and single superphosphate respectively. Fertilizers were applied by placement method. Nitrogen was applied in two split doses. First dose of N along with full dose of phosphorus was applied at the time of sowing while the remaining half of N was applied at flowering stage. Cultural practices such as weeding, hoeing, earthing up, irrigation and sprays against insects, pests and diseases were done uniformly in all treatments of each replication.

The following parameters were studied during the course of experiment

1. Days to germination
2. Plant height (cm)
3. Stem diameter (cm)
4. Number of leaves per plant
5. Leaf area (cm^2)
6. Days to 50% flowering
7. Number of flowers per plant
8. Days to first picking
9. Pod length (cm)
10. Pod girth (cm)
11. Pod weight (g)
12. Number of pods per plant
13. Yield (q/ha)

Statistical analysis and interpretation of data was done by following the Fisher analysis of variance technique and results were tested at 5% level of significance. Critical differences were worked for the effects which were significant.

RESULTS AND DISCUSSION

Vegetative characters

Growth characters were accentuated and differ significantly by different treatments (Table 1). The perusal of result indicated that okra plants fertilized with N 125 % + P 20 kg gave maximum plant height (142.43 cm), stem diameter (2.45 cm), Number of leaves per plant (35.10), leaf area (83.30 cm^2) with least number of days to germination (9.33), 50% flowering (32.33) and first picking (38.33). It was followed by treatment comprising N 100 % + P 20 kg.

Table 1: Effect of N and P levels on vegetative characters of okra cv. Punjab-8

Treatments	Days to germination	Plant height (cm)	Stem diameter (cm)	No. of leaves per plant	Leaf area (cm^2)	Days to 50% flowering	No. of flowers per plant	Days to first picking
T_1	10.32	95.37	1.47	19.77	56.60	41.67	36.04	49.67
T_2	10.67	118.5	1.79	24.43	68.03	38.67	41.90	44.33
T_3	9.67	125.37	1.86	25.89	69.00	35.44	46.73	42.33
T_4	9.67	130.53	2.20	27.07	70.90	35.33	48.63	41.00
T_5	9.56	135.57	2.22	32.83	78.03	34.33	38.03	40.33
T_6	9.33	142.43	2.45	35.10	83.30	32.33	37.69	38.33
T_7	9.69	100.30	1.73	23.53	66.43	36.33	39.91	46.33
T_8	9.33	101.77	1.77	23.87	66.83	37.33	40.37	46.33
Mean	**9.78**	**118.73**	**1.94**	**26.56**	**69.89**	**36.43**	**41.16**	**43.58**
CD at 5% level	**0.90**	**3.49**	**0.19**	**2.51**	**5.79**	**1.07**	**5.20**	**1.45**

The increase in the height might be due to the higher dose of nitrogen which might have enhanced the cell division and formation of more tissues resulting in luxuriant vegetative growth and same was reported by Firoz (2009) in okra. Nitrogen is an essential part of chlorophyll which helps in protein synthesis. Increase in number of leaves per plant might be due to the sufficient amount of nitrogen provided from ideal environment and balanced nutrition to the plants, which increased the number of leaves. These are supported by the findings of Mohsen and Abdul-Fattah (2015) and Iyagba et al. (2013). The phosphorus feeding might have enhanced the development of reproductive parts, stimulated blooming which in turn led to pod setting earlier (Das et al., 2014) and Mal et al., 2013). Seed germination process is mainly controlled by viability of seed, adequate moisture, proper temperature and good aeration.

Yield and yield attributes

Various treatments had significantly altered most of yield attributing characters (Table 2). Maximum pod length (13.75 cm), pod girth (2.02 cm), pod weight (16.54 g), number of pods per plant (20.72) and yield (143.20 q/ha) was obtained by the application of N 100 % + P 20 kg (T_4). Throughout the whole research pod length acted as a tone character for economic yield which was dependent upon the prevailing environmental conditions, reflecting that more the fertilizer dose better the pod length as compared to the control. Singh et al. (2008) and Bairwa et al. (2009) observed the similar results in okra which revealed that

treated plants produced the longer pods than the untreated ones. Pod weight of okra increased with the increase in nitrogen and phosphorus levels upto certain level which is in consonance with the present results (Bhushan et al., 2013). Vigour of the plant and more number of leaves by the application of fertilizers are the key factors in increasing the number of pods per plant. This is attributed through the findings of Abeykoon et al. (2010) who observed that the application of recommended doses of fertilizers increased the number of pods in okra. Olaniyi et al. (2010) observed in his study that the application of nutrients caused a significant effect on the yield as compared to the unfertilized ones. So more number of pods per plant and fruit length are the key concern in increasing the yield of okra.

Table 2: Effect of N and P levels on yield and yield attributes of okra cv. Punjab-8

Treatments	Pod length (cm)	Pod girth (cm)	Pod weight (g)	No. of pods per plant	Yield (q/ha)
T_1	11.33	1.91	13.20	15.40	82.86
T_2	13.54	1.90	15.84	18.99	115.84
T_3	13.45	2.00	16.24	20.70	132.09
T_4	13.75	2.02	16.54	20.72	143.20
T_5	12.49	1.97	14.16	18.17	104.30
T_6	12.18	1.98	13.45	17.80	102.51
T_7	12.39	1.92	15.07	18.40	104.63
T_8	12.80	1.95	15.55	18.97	107.18
Mean	**12.74**	**1.96**	**15.01**	**18.64**	**111.58**
CD at 5% level	**0.49**	**0.07**	**0.99**	**1.15**	**6.41**

CONCLUSION

In the light of results recorded throughout the whole research period it can be concluded that the application of N 125 % + P 20 kg/acre improved the vegetative characters of plants while the treatment of N 100 % + P 20 kg/acre was found to be the best for increasing the yield and performance in respect of various quantitative and qualitative traits. Hence the treatment N 100 % + P 20 kg/acre can be successfully used for successful okra cultivation.

REFERENCES

Abd El-Kader, A. A., Shaaban, S. M., & Abd El-Fattah, M. S. (2010). Effect of irrigation levels and organic compost on okra plants (*Abelmoschus esculentus* L.) grown in sandy calcareous soil. *Agriculture and Biology Journal of North America 1*, 225-231.

Anonymous, (2016) Package and practices for cultivation of vegetables. PAU Ludhiana 1 & 52.

Attigah, A. S., Asiedu, E. K., Agyarko, K., & Dapaah, H. K. (2013). Growth and yield of okra (*Abelmoschus esculentus* L.) as affected by organic and inorganic fertilizers. *ARPN Journal of Agriculture and Biological Science 8*, 766-770.

Babatola, L. A. (2006). Effect of NPK 15:15:15 on the performance and storage life of okra. Proceeding of Horticultural Society of Nigeria Conference: 74-78.

Bairwa, H. L., Mahawer, L. N., Shukla, A. K., & Mathur S R (2009). Response of integrated nutrient management on growth, yield and quality of okra (*Abelmoschus esculentus*). *Indian Journal of Agricultural Sciences 79*, 381-384.

Das, A. K., Prasad, B., & Singh, R. (2014). Response of chemical fertilizer and vermicompost on okra *cv*. Parbhani kranti. *The Asian Journal of Horticulture 9*, 372-376.

Firoz, Z. A. (2009). Impact of nitrogen and phosphorus on growth and yield of okra in hill slope conditions. *Bangladesh Journal of Agriculture Research 34*, 713-722.

Gopalan, C., Rama sastri, B. V., & Balasubramanian, S. (2007). Nutritive value of indian foods, published by National Institute of Nutrition (NIN), ICMR.

Iyagba, A. G., Onuegbu, B. A., & Ibe, A. E. (2013). Growth and yield response of okra to NPK fertilizer rates and weed interference in South-eastern Nigeria. *International Research Journal of Agricultural Science and Soil Science 3*, 328-335.

Mal, B., Mahapatra, P., & Mohanty, S. (2013). Effect of diazotrophs and chemical fertilizers on production and economics of okra (*Abelmoschus esculentus* L.) cultivars. *American Journal of Plant Sciences 5*, 168-174.

Mohsen, A. A. M., & Abdel-fattah, M. K. (2015). Effect of different levels of nitrogen and phosphorus fertilizer in combination with botanical compost on growth and yield of Okra under sandy soil conditions in Egypt. *Asian Journal of Agriculture Research 9*, 249-258.

National Horticulture Board (2014). www.nationalhorticultureboard.com per statistic per area and production statistic.

Olaniyi, J. O., Akanbi, W. B., Olaniran, O. A., and Ilupeju, O. T. (2010). The effect of organo- mineral and inorganic fertilizers on the growth, fruit yield, quality and chemical components of okra. *Journal of Animal and Plant Sciences 9*, 1135-1140.

Patel, A. P., Tandel, Y. N., Patel, C. R., Patel, M. A., & Patel, P. B. (2009). Effect on combined application of organic manures with inorganic fertilizers on growth and yield of okra cv. Parbhani Kranti. *The Asian Journal of Horticulture 4*, 78-81.

Singh, J. P., Katiyar, P. N., & Singh, P. C. (2008). Effect of different levels of nitrogen and spacing on fruiting attributes, yield and nitrogen content of okra (*Abelmoschus esculentus* (L.) Moench). *Annals of Horticulture 1*, 64-66.