

Effects of Spacing and Nitrogen Levels on Growth, Seed Yield and Quality of Spring Okra

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ABSTRACT Field experiment was conducted at CSKHPKV, Hill Agricultural Research and Extension Centre, Dhaulakuan during spring season of 2002 and 2003. It has been observed that none of the spacing treatments showed significant response with respect to plant height, number of branches per plant, fruit length, germination percentage and 100-seed weight. On the other hand, nitrogen levels have shown the increasing trend on growth parameters. Nitrogen @ 100 kg ha⁻¹ recorded significantly higher fruits/plant, seed yield (7.73 q ha⁻¹), plant height, branches/plant and fruit length. However, germination (%) and 100-seed weight were found to be non-significant with nitrogen at 100 kg ha⁻¹. Spacing of 45 cm x 15 cm was found to be significantly superior to other spacing treatments. It has also recorded the highest fruits/plant and seed yield (6.39 q ha⁻¹).

Key words: Spacing, nitrogen levels, growth, seed yield, seed quality

Okra (*Abelmoschus esculentus* L. Moench) is an important vegetable crop grown throughout the country for its green tender fruits except in extreme places, where temperature is very low in the winter season. Therefore, there is a great demand for its seed and that too with respect to quality as well as quantity. The seed, which is produced during the rainy season, deteriorates in quality and quantity due to the infestation of diseases, insect-pests, rainfall during reproductive and maturity period and excessive plant growth. Proper growth of plant is required to maximize seed yield with better quality and it is possible by growing plants at a proper spacing [1, 2] and optimum dose of nitrogenous fertilizer [3]. Lot of research work has been done on okra production but very little information is available on seed production in spring crop. Keeping in view the above facts, the present investigation was carried out to standardize the optimum plant spacing and nitrogen requirement for producing the seed of high yielding variety of okra in spring season.

MATERIALS AND METHODS

A field experiment was conducted at CSKHPKV, Hill Agricultural Research and Extension Centre,

Dhaulakuan during the spring season of 2002 and 2003. The experimental farm is situated at 30.4°N latitude and 77.5°E longitude, 468 m (amsl). The soil was acidic in reaction and medium in N, P & K availability. The texture of the soil was sandy loam. The experiment consisted of 15 treatments in all i.e., 0 (N₁), 25 (N₂), 50 (N₃), 75 (N₄) and 100 (N₅) kg ha⁻¹ nitrogen and 45 x 15 (S₁), 45 x 30 (S₂) and 30 x 30 (S₃) cm spacing between the rows and the plants. The treatments were replicated thrice in a randomized block design. The variety used was P-8. FYM @ 10 t ha⁻¹ was mixed in the soil at the time of land preparation. Recommended doses of P and K fertilizers i.e., 50 kg P₂O₅ and 60 kg K₂O ha⁻¹ were applied at the time of sowing. Nitrogenous fertilizer was applied in three split doses i.e., 1/3rd at the time of sowing along with phosphorus and potash (Basal dose) and 2nd and 3rd doses at 30 and 45 DFS. The recommended dose of nitrogen for okra crop is 75 kg ha⁻¹. Sowing of seed was done by dibbling method, wherein three seeds were sown at a hill. On germination, healthy plant was retained and the rest two plants per hill were removed at 20 DFS. All other recommended cultural practices followed were common, e.g. hoeing-

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weeding, disease and insect pest control and irrigation, etc. Observations on plant growth, yield and yield attributes have been recorded from five plants and averaged.

RESULTS AND DISCUSSION

Effects of nitrogen

Nitrogen effects on growth parameters, seed yield and yield attributes has been recorded and found to be significantly varying with the increase in the doses of nitrogen (Tables 1&2) during both the years. It is clear from the data (Table 1) that plant height, number of branches per plant and fruit length have increased with the increase in the doses of N and varied significantly between the nitrogen levels, when compared with each other. The maximum plant height, branches/plant and fruit length was recorded, where nitrogen was applied @ 100 kg ha⁻¹ and it was superior to the rest of the doses. However, the lowest value was recorded, where no nitrogen was applied (N₁). The similar trend was recorded during the 2nd year of experimentation. However, nitrogen levels could not effect the values of germination (%) and 100-seed weight (Table 2). Therefore, these values were found to be non-significant among themselves. Nitrogen @ 100 kg ha⁻¹ recorded the maximum number of fruits per plant and was significantly

superior to the other levels of N. The lowest value was observed in 0 kg N ha⁻¹. The trend was similar in both the years. The highest mean seed yield (7.73 q ha⁻¹) has been recorded under nitrogen @ 100 kg ha⁻¹, which was significantly superior to all other treatments of nitrogen. The lowest mean seed yield (5.02 q ha⁻¹) was observed, where 0 kg N ha⁻¹ was applied. Similar response of okra to nitrogen application has been reported by many other workers [4-8].

Effects of spacing

Different spacing treatments did not affect the value of plant height, fruit length, germination (%) and 100-seed weight significantly i.e., the values were found to be non-significant among themselves during both the years of experimentation (Tables 1&2). Maximum number of fruits/plant were recorded with 45 cm x 15 cm spacing and the minimum were recorded under 45 cm x 30 cm during both the years. Maximum mean seed yield (6.39 q ha⁻¹) was recorded with 45 cm x 15 cm spacing and the minimum recorded with 45 cm x 30 cm spacing.

It can be concluded from the two years observation that maximum seed yield of okra could be obtained with the application of N @ 100 kg ha⁻¹ and sowing the seed at a spacing of 45 cm x 15 cm in spring season.

Table 1. Effects of spacing and nitrogen levels on growth parameters

Treatment	Plant height (cm)		Av. no. of branches/plant		Fruit length (cm)	
	2002	2003	2002	2003	2002	2003
Nitrogen (kg ha⁻¹)						
0	21.2	23.3	1.45	1.50	8.4	8.0
25	28.4	31.2	1.90	1.82	9.3	8.8
50	33.2	33.5	2.11	2.20	10.2	10.3
75	35.0	37.3	2.43	2.34	13.4	12.5
100	39.4	40.5	2.74	2.82	14.6	14.2
CD at 5%	1.82	1.65	0.13	0.23	1.03	1.10
Spacing (cm)						
45x30	37.5	38.0	2.12	2.30	14.3	13.4
45x15	36.6	39.2	2.20	2.23	13.1	13.0
30x30	35.2	37.3	2.00	2.14	11.2	12.2
CD at 5%	NS	NS	NS	NS	NS	NS

Table 2. Effects of spacing and nitrogen levels on seed yield and yield attributes

Treatment	Germination (%)		100-seed weight (g)		Fruit length (cm)		Seed yield (q ha ⁻¹)		Mean seed yield (q ha ⁻¹)
	2002	2003	2002	2003	2002	2003	2002	2003	
Nitrogen (kg ha⁻¹)									
0	82.1	80.0	9.42	8.20	8.25	9.20	4.44	5.60	5.02
25	82.0	82.0	12.30	12.20	8.40	8.80	5.67	6.41	5.88
50	83.4	81.3	14.60	15.30	8.45	8.56	5.82	6.70	6.26
75	83.2	83.4	16.84	15.80	9.00	8.68	6.70	7.60	7.15
100	84.6	85.0	18.25	19.50	8.47	9.00	7.26	8.20	7.73
CD at 5%	NS	NS	0.94	1.02	NS	NS	0.67	0.70	
Spacing (cm)									
45x30	81.5	82.0	12.28	14.25	8.40	8.29	5.40	5.60	5.50
45x15	82.6	82.3	15.20	16.20	8.70	8.34	6.34	6.45	6.39
30x30	83.2	82.5	14.60	15.30	8.56	8.16	5.83	5.80	5.81
CD at 5%	NS	NS	0.83	0.86	NS	NS	0.48	0.44	

REFERENCES

1. NANDPURI, K.S., K.S. RANDHAWA, B.S. GREWAL & D. SINGH (1974). Seed production of okra as influenced by various dates of sowing, spacing and picking. *J. Res. PAU*, **21**(2): 145-149.
2. RASTOGI, K.B., O.P. SHARMA, N.P. SINGH & B.N. KORLA (1987). Effect of different levels of nitrogen and plant spacing on seed yield of okra. *Vegetable Sci.*, **14**: 120-123.
3. PANDEY, U.C., S. LAL, M.L. PANDITA & G.R. SINGH (1980). Effect of nitrogen and phosphorus levels on seed production of okra. *Haryana J. Hort. Sci.*, **9**(3-4): 165-169.
4. FAGERIA, M.S., P.S. ARYA, JAGMOHAN KUMAR & A.K. SINGH (1992). Effect of sowing dates and nitrogen levels on growth and seed yield of okra cv. Pusa Sawani. *Vegetable Sci.*, **19**(1): 25-29.
5. NAIK, L.B. & K. SHRINIWAS (1992). Influence of nitrogen and phosphorus fertilization on seed crop of okra. *Indian J. Agron.*, **37**(4): 769-771.
6. NATRAJ, S.K., G.N. KULKARNI, B.S. VYAKARNAHAL & S.D. SHASHIDHARAN (1992). Effect of nitrogen levels and picking of fresh fruits on seed quality of okra. *Karnataka J. Agric. Sci.*, **51**(1): 51-55.
7. FAGERIA, M.S., P.S. ARYA & A.K. SINGH (1993). Effect of sowing dates and nitrogen levels on seed yield of okra. *Haryana J. Hort. Sci.*, **22**(1): 66-68.
8. PANDEY, B.R. (1994). Studies on seed quality, seed yield and monetary returns of okra. *Vegetable Sci.*, **21**(1): 50-52.