EFFECT OF DIFFERENT DOSES OF NITROGEN AND PHOSPHORUS ON GROWTH OF OKRA (*Abelmoschus esculentus L.* Moench) CV. ARKA ANAMIKA

Abstarct:

Background: A field experiment was conducted to know the effect of different doses of nitrogen and phosphorus on growth of okra (*Abelmoschus esculentus L.* Moench) cv. Arka anamika was carried out at Horticultural Farm of Palli-Siksha Bhavana (Institute of Agriculture), Visva-Bharati, Sriniketan, West Bengal during 2020. The experiment was laid out in a RCBD (Randomized complete block design) consisting of twelve treatments with 3 replications. Treatments included were four levels of nitrogen (0, 100, 120 and 140 kg N/ha) and three levels of phosphorus (0, 80 and 100 kg P/ha). The statistical analysis indicated that growth was significantly influenced with application of nitrogen and phosphorus. The characters plant height, number of branches per plant, first flowering, fifty percent of flowering, fruit length, fruit diameter exhibited best results with the treatment N3P2 (140 kg N ha + 100 kg P ha). Present investigation, therefore, indicated better response of the plants towards application of 140 kg/ha nitrogen and 100 kg/ha phosphorus which was found to be most remunerative with regard to their growth of okra.

Key words: Nitrogen, phosphorous, okra.

Introduction:

Okra is a warm season vegetable crop and it grows in warm summer season with minimum and maximum temperatures of 18^{o}c and 35^{o}c respectively (Sajid *et al.*,2012). In India it is grown all through summer and rainy season. It is notably grown for its immature green pods. Pods can be easily transported even in bulk amount and it can be stored without deteriorating its quality. Healthy seed is a prerequisite for higher productivity and production. It has deep tap root system and semi-woody stem with green or occasionally pigmented stem. Androecium consists of numerous Monadelphous stamens with apically divergent filaments whereas gynoecium is a single compound pistil with two to many carpels. Okra fruit contains 20 - 30 oval, smooth, dark green to

dark brown seeds. One of the predominant problems in okra cultivation in India is heavy yield losses due to the selection of low yielding cultivars. Higher yield can be achieved by choosing the best cultivar and cultivating in the ideal cropping season. However, productivity can be stepped forward via cautious evaluation and selection of right okra varieties primarily based on location (Singla *et al.,* 2018).

Phosphorus take part in diverse physiological techniques and assist in nutrients uptake elevate root growth and they assure an excellent pod yield. Phosphorus play imperative function in photosynthesis and respiration. It is an essential element of nucleic acids and phospholipids. Plants absorb phosphorus in the inorganic form, in particularly as the orthophosphate H2PO4 ion. Phosphorus support early aspect of crop development, accompany the germination process and leading to enrich the ultimate yield, specifically in Phosphorous poor soil (Lakra *et al.,* 2017).

Potassium is other crucial plant nutrient that plays a dynamic task in enzyme activation, water regulation, translocation of assimilates photosynthesis and protein synthesis. It counterbalances harmful consequences of surplus nitrogen in plant life. The reaction of crop to potassium will increase considerably in the presence of nitrogen (Kumar *et al.,* 2017). Potassium convey vigour and disease resistance to the plant and performs a vital position in crop productiveness (Meena *et al.,* 2017).

Material and Methods:

The experiment was conducted to know the effect of different doses of nitrogen and phosphorus on growth of okra (*Abelmoschus esculentus L.* Moench) cv. Arka anamika was carried out at Horticultural Farm of Palli-Sisksha Bhavana (Institute of Agriculture), Visva- Bharati, Sriniketan, West Bengal during 2020. The experiment was laid out in a RCBD (Randomized complete block design) consisting of twelve treatments with 3 replications, with the treatment combinations T0 - Control, T1 - 0 kg N ha + 0 kg P ha, T2 - 100 kg N ha + 0 kg P ha, T3 - 120 kg N ha + 0 kg P ha, T4 - 140 kg N ha + 0 kg P ha, T5 - 0 kg N ha + 80 kg P ha, T6 - 100 kg N ha + 80 kg P ha, T7 - 120 kg N ha + 80 kgP ha, T8 - 140 kg N ha + 80 kg P ha, T9 - 0 kg N ha + 100 kg P ha, T10 - 100 kg N ha + 100 kg Pha, T11 - 120 kg N ha + 100 kg P ha, T12 - 140 kg N ha + 100 kg P ha.

Results and Discussion:

Parameters:

The perusal of data indicate that plant height measured at final stage (i.e., 60 DAS) was not influenced markedly by the application of different levels of phosphorous, though, numerical increase in plant height was recorded in dose dependent manner. The maximum value of plant height (53.9 cm) was recorded with the application of highest level of phosphorous P2 (100 kg/ha) and the lowest value in this regard (52.3 cm) was recorded in control (P0), that the application of nitrogen had failed to influence the number of branch per plant remarkably in spite of numerical increment in the value in dose dependent manner. The highest number of branches (6.4) was observed when N3 (140 N kg/ha) was applied, while the lowest number of branches (5.2) was observed in N0 (control). The recorded data clearly indicates that each level of nitrogen had significant influence on this parameter. Earliness was observed in number of days to fifty per cent flowering. However, minimum number of days to fifty percent flowering (45.4) was observed in N3 (140 N kg/ha) and maximum number of days (60.6) recorded in N0 (control). The perusal data revealed that days to fifty percent flowering showed remarkable effect on phosphorus. However, minimum number of days to reach fifty per cent 30 flowering (49.7) P2 was recorded when phosphorous was applied at its highest level (100 P kg/ha) maximum number of days taken to fifty percent flowering (54) was recorded in P0 (control). Regarding combined application of both nitrogen and phosphorous showed significant variation with respect to days to fifty per cent flowering. However decreased number of days to flowering (45) was recorded in N3P2 (140 N and 100 P kg/ha) and it was at par with N2P2 (120 N and 100 P kg/ha) delayed flowering (64) was observed in N0P0(control). The recorded data indicated that each level of nitrogen had markedly influence on fruit diameter. It was found to be increased with the increasing nitrogen levels in a dose dependent manner. The maximum fruit diameter (6.1 mm) was recorded with the highest level of nitrogen (N3 140 Nkg/ha) and minimum value (4.8 mm) in this regard was recorded in the control plot N0 (control). A closer review of data revealed that application of nitrogen markedly influenced on fruit length of okra which increased sequentially with enhanced of nitrogen levels. The highest level (140 N kg/ha) of applied nitrogen (N3) recorded maximum fruit length (17.8 cm) whereas, the lowest value in this regard (15 cm) was observed in N0 (control).

Discussions:

Increased plant height by application of higher concentrations of nitrogen can lead to the formation of more tissue, as it has a significant impact on plant vegetative properties with increased cell division and cell elongation. These results are consistent with the findings of Omotoso and Shittu (2007) and Firoz (2009), who found that increased nitrogen and phosphorus levels increased the number of branches per plant at various stages of plant growth. Similar variations in the number

of branches per plant were also reported by Muhammad Ajmal et al. The use of nitrogen and phosphorus in this study promoted vegetative growth and the number of flowers produced was proportionately higher. This result is consistent with previous findings by Moniruzzaman and Quamruzzaman (2009), Firoz (2009), and Osmond and Kang (2008), who found that higher nitrogen and phosphorus content in okra resulted in higher growth parameters and higher yields.

Conclusion:

From the present investigation concluded that among all the treatments considered the treatment with nitrogen @ 140 N kg/ha and phosphorous @ 100 P kg/ha resulted into maximum increase in vegetative and reproductive growth of okra var. Arka Anamika .It may, therefore, be concluded on the basis of the present findings that the application of nitrogen at 140 kg/ha and phosphorous at 100 kg/ha along with the basal application of potassium 60kg/ha and FYM at the rate of 30 t/ha is the most effective for increasing yield under sub humid climate of the lateritic tract of birbhum district of west Bengal.

Table 1: Effect of Nitrogen and phosphorus and their combination on growth of Okra

Treatments	Plant Height (60 DAS)	Number Of Branches (AT60 DAS)	Days to first flowering	Days to 50% flowering
N0	46.2 cm	5.2	51.7	60.6
N1	50.1	5.5	42.8	52.3
N2	54.4	5.7	38.1	48.0
N3	62.5	6.4	36	45.4
S. Em	2.88	0.34	0.61	0.35
CD	8.45	NS	1.80	1.02

Table 2: Effect of Nitrogen and phosphorus and their combination on growth of Okra

Treatments	Days to firstfruit picking	Fruit diameter (mm)	Fruit length (cm)
N0	59.6	4.8	15.0
N1	54.8	5.5	16.7
N2	51.5	5.9	17.3
N3	47.3	6.1	17.8
S. Em	0.36	0.14	0.43
CD	1.07	0.41	1.26

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