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EFFECT OF NPK FERTILIZERS ON THE GROWTH AND YIELD OF SESAME (*SESAMUM INDICUM*) LOCAL CV. T6

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Abstract

Application of N alone produced a considerable increase in vegetative growth. However, N in the presence of P resulted comparatively higher growth. The best growth was recorded where 90 kg N and 44 kg/ha each of P and K applied together. Yield of sesame seed was effectively increased by both N and P application. Maximal yield was obtained from the pot receiving 180 kg N alongwith 22 kg each of P and K/ha.

Introduction

Considering the wide range of usefulness and importance of sesame oil, countries like China, India, Burma, Turkey, Sudan, Egypt, Mexico and Venezuella are attempting to increase its production through proper management. In Bangladesh sesame production is rather comparatively low though it grows in almost all soils. The low yield of the crop may be due to improper use of fertilizers. As an instance, Singh *et al.* (1960) stated that the growth and yield of sesame are directly governed by fertilizer practices. Similarly luxuriant growth and improved yield of other oil yielding crops such as soybeans and groundnut from NPK application were also recorded by Mazzani *et al* (1968), Puntankar and Bathmal (1967) and Maples and Keogh (1970). Sen and Lahiri (1960) further observed from a field trial that P fertilization promoted growth and yield of sesame significantly.

Since the acreage under oil seeds can not be increased at the expence of cereals and other crops, stress should be given upon factors like soil fertility and soil management. A pot experiment was therefore carried out to find out the effect of NPK fertilizers on the growth and yield of sesame seeds.

Materials and Methods

A clay loam soil of Tejgaon series, Dhaka, with pH 5.5, organic matter 1.89%, and total and available N, P, K 0.09 and 0.004; 0.10 and 0.002; and 0.50 and 0.004% respectively as measured by standard analytical techniques was used in this experiment.

The soil (0-23 cm)was mixed thoroughly with urea, triple superphosphate and muriate of potash at the rate of 0, 90 and 180 kg/ha as N; 0, 22 and 44 kg/ha as P_2O_5 and K_2O as per treatment. The treated soil (9 kg/pot) was then put in 54 earthenware pots (30 cm x 25 cm size) and seeded with *Sesamum indicum* local cv. T6. The experiment was set up in 3^3 factorial design with partial confounding with two replications. Pots were arranged as sub-blocks each of nine pots and in this way two large blocks of 27 pots were made. After a few days of germination, only three healthy plants of uniform size was kept in each pot. Tap water was used for irrigating the pots. Weeds were removed as they appeared.

Height of the plants at 45 days of growth and at harvest and seed yield were recorded.

Results and Discussion

The effect of N.P.K fertilizers on the height of plant

Application of N, P and K fertilizers failed to produce any significant increase in height of the plant at flowering stage of growth. Moreover, in some treatments fertilizer application caused retardation on the growth. In the attainment of final height at maturity, N supply significantly improved the height and decidedly played better role than P and K and their combinations as well (Table 1). Higher doses of N have caused some physiological imbalance in the younger

Table 1. Effect of NPK fertilizers on the height (cm) of sesame plants at different stages of growth.

TSP-P (kg/ha)		0		22		44	
Urea-N (kg/na)	MP-K (kg/ha)	At flowering	At harvest	At flowering	At harvest	At flowering	At harvest
	0	13.03	27.94	14.45	30.63	19.74	26.94
0	22	11.89	33.02	14.60	36.39	11.83	35.96
	44	13.33	30.68	23.19	34.26	20.32	31.59
	0	12.54	39.37	14.12	47.29	21.59	42.54
90	22	12.18	29.84	13.33	47.82	21.10	51.76
	44	10.31	34.41	19.98	44.09	9.67	60.83
	0	8.10	42.24	17.93	39.37	19.20	44.78
180	22	12.21	55.24	16.66	51.35	16.96	44.01
	44	15.57	40.00	15.54	51.43	17.78	53.64

LSD at 5% level is 3.91 and 3.54 for height measured at flowering and harvesting stages respectively.

stage of growth. P supply in either stages of growth did not stimulate height significantly. It is interesting to note that at the flowering stage higher level of P supply showed a boosting effect. The increase was arrested afterwards. This, perhaps, indicates that P in the availability pool could not cope with the demand of the plant with age. Alternatively, P applied might have got fixed in soil and hence was not available to plants.

P and K combined with higher dose of N could not show any significant improvement in height (Table 1). However, lower dose of N with higher dose of P or K gave better growth. This indicates that K failed to play its role at the early stage of growth.

Summerization of results suggest that K was ineffective to increase plant height. The situation was improved when it was coupled with either N or P. N and P are directly involved in building up of plant materials. Consequently, better growth was observed by the use of N and/or P. However, the role of K can not be overruled which was evident in the fact that NPK combinations produced better result than the combinations of any two of them. Addition of 90 kg N/ha together with each of P and K at 44 kg/ha produced maximum height of the plant. This findings are in accord with the observation of Gregory and Baptiste (1936) who also found that N promoted more vegetative growth when applied in conjunction with P and K.

The effect of N.P.K fertilizers on the yield of seeds

N was found to be more effective in increasing the yield of sesame seeds than P and K (Table 2). However, higher dose of P produced significant effect

Table 2. Effect of NPK fertilizers on the seed yield of sesame (g/pot*).

Urea-N (kg/ha)	TSP-P (kg/ha) / MP-K (kg/ha)	0	22	44
0	0	0.15	0.49	0.68
	22	0.51	0.43	0.45
	44	0.20	0.46	0.55
90	0	0.71	0.89	0.57
	22	0.30	1.81	1.90
	44	0.47	1.01	2.14
180	0	0.84	0.65	1.47
	22	0.83	2,25	1.45
	44	0.41	0.66	1.30

LSD at 5% level = 0.47 *Each pot contained 3 plants

but K did not cause perceptible change. Similarly Tewari (1965) found in soybeans that N and P fertilizers increased yields significantly but K failed to show any significant response. Interaction of N and P was much more effective than those of their individual application. The findings also agreed favourably well with Singh *et al.* (1960), Levin and Zhebin (1960), and Singh and Singh (1969) who found that yields of sesame and sunflower were increased due to application of N in combination with P.

The heighest yield was recorded at 190 kg N with 22 kg each of P and K/ha and more or less similar to that of 90 kg N plus 44 kg each of P and K/ha. It was noted that later treatment had profound effect on both growth and yield of seeds. This results are supported by Trepechev's (1953) who found that on poor soils N increased yield/ha of the oil yielding plants when supplied in conjunction with PK.

Correlation between height and yield of seeds as affected by N P K

A positive significant correlation (r=+0.76, significant at 0.1% level) was obtained between height at maturity and yield of seeds. Distribution of points in the scattered diagram has also demonstrated a close relation between two components of the plant (Fig. 1). However, the same between

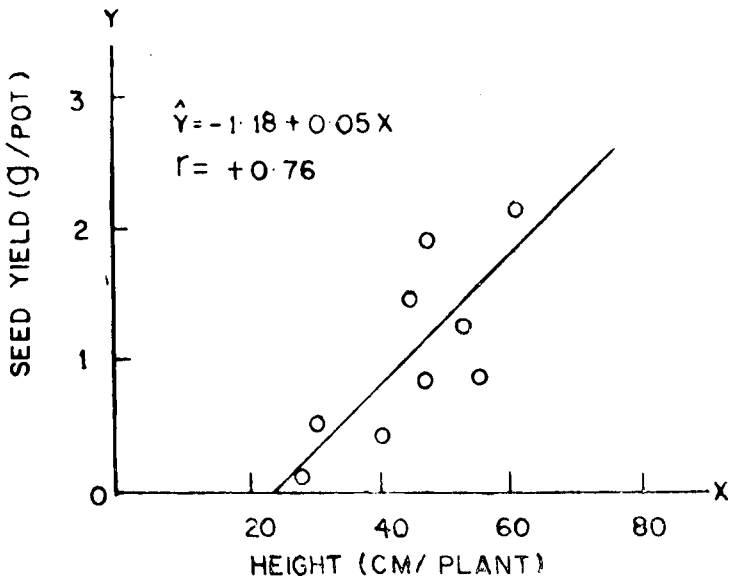

Fig. 1. Relationship between height and the estimated regression line which is drawn from the expected seed yield of sesame.

height at the flowering stage and yield was nonsignificant ($r=+0.30$ ns) indicating that early growth of the plant has positive bearing on the yield. The generally accepted fact that vigorous vegetative growth in the early stage has got impact on the yield of grains does not seem to hold true in this case.

It can be concluded based on the results presented herein that individual effect of the major fertilizers, NPK, can not do well to the vegetative growth of the plants. Moreover, economic utilization of the fertilizers by sesame may be only possible if a suitable combinations of NPK is used to boost up the seed yield.

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