

## Effect of Nitrogen and Potassium on Growth and Yield of Radish

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### ABSTRACT

An investigation was carried out to comprehend the effect of varying levels of nitrogen and potassium on growth and yield of radish. Nitrogen significantly influenced number of leaves and leaf area index (LAI) but not dry matter content of leaf. Potassium and interaction of N and K failed to significantly increase the number of leaves, and dry matter content with an exception of N and K interaction on LAI. In general, potassium significantly influenced the yield and their attributes while the influence of N and interaction failed to reach the level of significance except for fresh weight. However, there was a marked increase in various parameters of yield and their attributes following nitrogen application. In general, N1 (25 kg/ha) and K3 (60 kg/ha) proved to be promising than all the other treatments.

Radish (*Raphanus sativus L*) is an important root vegetable grown as an off season crops during summer in mid and high hills and as a main crop during winter in plain and foothills of North-East Region. It is popularly grown for its edible fleshy root and well known for its short duration. Besides, being used as a vegetables in various preparations, it is also considered to have high medicinal value. Radish being a quick growing crop required proper fertilization for sustaining better economic productivity. Fertilization has an immense bearing on production of the crop and NPK are considered important for maximising the production of radish (Bhat, 1996). A fertilizer schedule based on location specific field experiment will be more meaningful for recommendation to the growers in a rolling topography. Therefore, a need was felt to study the effect of various level of N and K on growth and yield of radish and thereby formulate a fertilizer schedule under the prevailing agro-climatic condition of Nagaland.

### MATERIAL AND METHODS

The investigation was conducted in the experimental farm of the School of Agricultural Sciences & Rural Development, Nagaland University, Medziphema, during October to December 1997. The soil was sandy-loam in texture, well drained with 4.4 pH, organic carbon 1.08% and available NPK 24.19 kg/ha, 4.92 kg/ha, 28.0 kg/ha, respectively. The seeds of cv, Pusa Chetki were sown on 4 October, 1997 at a spacing of 30x7cm in a plot of 2x2m five plants of uniform in growth and free from the attack of pest and diseases were selected for various observation. The experiment was laid out in factorial randomised block design with 3 replications and 4 levels each of N (0, 25, 50 & 75 kg/ha) and K (0, 20, 40 & 60 kg/ha). Urea and muriate of potash

were used as a source of nitrogen and potassium. Full dose of  $K_2O$  and half of N along with a constant dose of  $P_2O_5$  (50 kg/ha) in the form of SSP were applied at sowing time while the remaining half dose of N was applied 30 days after sowing (DAS). The observations were taken at 45 DAS. Leaf area index (LAI) was worked out by dividing total leaf area of plant with ground space occupied.

## RESULTS AND DISCUSSION

Number of leaves per plant was significantly influenced by various level of N, while potash and their interaction did not have any affect on the number of leaves plant.  $N_1$  treatment (25 kg N/ha) was found to be more promising than the higher levels of N. These findings are in agreement with the observation made by Joshi and Chauhan (1985). However, Pandey and Joshua (1987) reported that N at 120 kg/ha produced maximum number of leaves. The non-significant influence of K on number of leaves was in congruence with the results of Habben (1973), who reported that the elevated levels of K did not affect the top growth.

Significant influence of nitrogen treatment on leaf area index (LAI) was evident, with  $N_0$  treatment recording the lowest LAI and  $N_1$  &  $N_2$  recording the highest LAI. This increase in LAI was perhaps due to increased number of leaves and size of leaf. An increase in LAI with rising level of N has been reported by Hedge (1987). Srinivas and Naik (1990) also noted a highest LAI in 100 kg N/ha treatment. Potassium in general did not have any significant affect on LAI, barring a marginal increase following the treatment with  $K_3$  (60 kg/ha). When the nutrient supply is sub-optimal, the leaf growth rate was low and thus the LAI can be limited to low rates of net photosynthate and/or insufficient cell expansion (Marschner, 1986). LAI was significantly influenced by the interaction of nitrogen and potassium.

Dry matter accumulation was not significantly influenced by N, K and their interactions. However, maximum dry matter accumulation was noted with the  $N_1$  and  $K_3$  treatment. Enhanced dry matter accumulation might be ascribed to better vegetative growth of the plant.

Length of root was not markedly affected by the N, K and their interactions. However, there was a dose dependent increase in length of root. Nitrogen in general increased the length and girth of radish root (Sounda *et al.*, 1989). Park and Fritz (1983) also recorded slight concomitant increase in root size of radish cv. Rex with rising level of nitrogen.

Fresh weight of root was significantly influenced by N, K and their interaction, with  $N_3$  and  $K_3$  recording the highest fresh weight of root. Marked increase in root weight of radish was also recorded by Bagchi (1982). Pandey and Joshua (1987) observed an increased root weight of radish at 80kg N/ha. The role of K in root growth is well established. Potassium deficient plants nearly always have poorly developed root system (Day and Ludeki, 1993).

Root yield per plot and projected yield were not much influenced by N. In general, there was only marginal increase in root yield with nitrogen application. However, significant increase in root yield was noted following K treatment with highest yield recorded in  $K_3$  (60 kg/ha) treatment. Park and Fritz (1983) found that with rising level of N there was a slight concomitant increase in the yield of radish cv. Rex. The increase in root yield with N application might be

due to increase in some of the growth and yield components (Srinivas and Naik, 1990). The maximum yield as obtained in the present investigation with  $K_3$  (60 kg/ha) was due to higher fresh weight, length and thickness of root. The interaction between N and K failed to influence the yield of radish significantly.

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**Table No. 1 Effect of different levels of nitrogen and potassium on various growth and yield parameter in radish**

Treatments	No. of Leaves	Leaf Area Index (LAI)	Dry Matter Content (%)	Length of Root (Cm)	Fresh Weight of Root (gm)	Root Yield/Plot (kg/plot)	Projected Yield (q/ha)
<b>Nitrogen</b>							
N <sub>0</sub>	14.33	8.50	7.86	22.16	124.68	18.70	467.50
N <sub>1</sub>	15.96	10.50	6.14	23.33	138.19	20.73	518.25
N <sub>2</sub>	15.69	10.50	7.84	23.24	136.45	20.47	511.75
N <sub>3</sub>	15.10	9.23	7.96	23.49	138.20	20.73	518.25
SE ±	0.69	0.57	0.33	0.73	4.89	1.97	—
LSD (p=0.05)	1.35	1.12	N.S	N.S	9.57	N.S	—
<b>Potassium</b>							
K <sub>0</sub>	14.85	9.88	8.24	21.84	116.97	17.55	438.75
K <sub>1</sub>	15.31	9.41	7.67	22.52	131.88	19.66	491.50
K <sub>2</sub>	15.62	9.35	7.52	23.34	138.24	20.74	518.50
K <sub>3</sub>	15.33	10.10	8.06	24.45	151.19	22.68	576.00
SE ±	0.69	0.57	8.33	0.73	4.98	1.97	—
LSD (p=0.05)	N.S	N.S	N.S	N.S	9.59	3.86	—
<b>Interactions (N×K)</b>							
SE ±	1.26	1.14	0.66	1.47	9.79	3.93	—
LSD (p=0.05)	N.S	2.24	N.S	N.S	19.18	N.S	—