

Effect of Nitrogen, Spacing between Plants and Seed Material on Growth, Tuberization, Yield and Quality of Potato*

by

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The potato (*Solanum tuberosum* L.) is capable of producing more food per ha than any other food crop. Among the factors that influence potato production, nutrient and cultural practices have an important role. Fertilizer experiments conducted in India showed that potato has given high responses to N (Ramanujam & Singh, 1965). Pushkarnath *et al.*, (1960) also reported that 100 kg N/ha gave highly significant yield of potato. Spacing between plants play an important role on tuber yield production (Tiwari, 1962) and observed that highest yield of tubers/ha was obtained at close spacing of 15 cms. The use of out tubers is economical when seed size tubers are not available. Pushkarnath (1955) observed that cut tubers are as good as whole tubers. Looking to the above facts investigations were therefore undertaken to study the effect of N, spacing between plants and seed material on growth tuberization, yield & quality of potato.

Material and Methods: A field trial was laid out at Regional Agriculture Research Institute, Gwalior during *Rabi* 1965-66. Soil of the experimental area was sandy loam with low N and medium P and potash content with 7.4 pH. The experiment was tried in Randomised Block design replicated four times with three levels of N (0, 100 & 200 kg N/ha) two spacings between plants (15 & 23 cms) and two types of seed material (whole tubers and cut tubers). The sowing of the variety K 122 was done on 20th November, 1966. N was applied as per treatments with basal dose of 50 kg P₂O₅ and 75 kg K₂O per ha. The net plot-size kept was 3.65 × 4.9 m. In whole experimental season, crop was irrigated six times and in addition 10.6 mm and 0.5 mm rains were also received in the month of February and March respectively.

Results and Discussion: *Growth characters:* It is evident from Table 1 that the effect of N was found statistically significant over control in height per plant, number of branches per plant and dry matter production but two levels of N i.e. 100 and 200 kg N/ha were however similar in height and number of branches but dry matter production was also significantly superior with two levels of N. The difference in 100 and 200 kg N/ha is lesser than the

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difference in 100 and 0 kg N/ha in dry matter production. Similar results were also reported by Singh (1952).

The effect of two spacings on plant height was not found significant but wider spacing (23 cms) produced significantly greater number of branches and dry matter per plant.

As regards the seed material is concerned, plants from cut tubers were significantly taller and produced significantly more dry matter per plant than whole tubers but no significant difference was observed on number of branches per plant.

Tuberization: Tuberization was recorded after 45th days of sowing. The number, fresh weight & dry weight of tubers were recorded for assessing the treatment effects on tuberization. The main effects are portrayed in Table 1.

The treatments effects were non significant on number of tubers per plant, however, higher doses of N slightly decreased the number of tubers. Similar results were also reported by Bradiey and Pratt (1955).

The fresh weight of tubers/plant as expected, increased, rapidly upto the harvest of the crop and was maximum at harvesting. Application of N has increased the fresh weight substantially over control. Two doses of N i.e. 100 and 200 kg N/ha were alike in their effects. The effects of plant spacing and seed material were, however, not tangible and thus non-significant.

The effect of N, plant spacing and seed material on dry weight of tubers was not found significant. The effect of N on dry matter content of tubers was also not reported by Hukkeri (1968).

Tuber yield: Addition of N significantly increased the potato yield. The per cent increase in tuber yield due to application of 100 and 200 kg N/ha was 48.6 and 42.2 respectively over control. These results are in confirmation with Chauvan (1961). The extra dose of 200 kg N/ha over 100 kg depressed the yield slightly accounted for poor germination. The increase in the potato yield due to application of N was an outcome of increased vegetative growth (height number of branched & dry matter/plant), These findings are in line with those of Ramanujam *et al.*, (1956).

Closer spacing i.e. 15 cms between plant produced significantly higher yield of tubers over wider spacing of 23 cms. The per cent difference was 13.2 more wider spacing. These findings are in confirmation with Tiwari (1962). The reason of higher yield in closer spacing may be due to more stand,

The effect of seed material was totally not noted on the yield of potato. The results are in confirmation with Pushkarnath (1955).

Interaction: The response of N at 1st level i.e. 100 N/ha was more under wider spacing but reverse was true with higher N application. Spacing of 15 cms with 200 kg N/ha gave highest yield of 190.68 Q/ha followed by 23 cms with 100 N/ha (179.36 Q/ha) and 15 cms with 100 kg N/ha (176.40 Q/ha).

TABLE 2. *Tuber yield in Q/ha affected by nitrogen × spacing*

Spacings	Levels of N kg/ha		
	0	100	200
15 cms	123.70	176.40	190.68
23 cms	110.93	179.36	142.90
S.Em.	8.56		
C.D. (5%)	24.52		

Quality: Effect on grades of tubers: Tubers were graded into three grades according to the size and their percentage was calculated. To the perusal of Table 1 data reveals that there was significant increase in 'A' grade tuber production with increase in every level of N. The per cent increase over control was 4.84 and 12.03 with 100 and 200 kg N/ha respectively. Similar results were also reported by Reddy and Rao (1968). No significant effect was observed due to N application in 'B' and 'C' grade tubers. The effect of spacing and seed material on production of A, B and C grade tubers was not found significant.

Effect on starch content in tubers: The perusal of Table 1 reveals that all treatments have shown non-significant effect on starch content, however, starch content slightly decreased by higher level of N. Similar results were also reported by Hukkeri (1968) and Reddy and Rao (1968).

Summary: An investigation on the effect of N plant spacing and seed material on growth tuberization, yield & quality of potato was carried out during Rabi 1965-66 at the Agricultural Research Institute, Gwalior.

1. Application of N enhanced height, number of branches and dry matter was greater in plants growing at wider spacing than closer one.

2. The response to N in tuberization was favourable. There was no difference in 100 and 200 kg N/ha.

3. The potato yield was 48.6 and 42.0% higher than control by 100 and 200 kg N/ha respectively. Closer, spacing of 15 cm. between plants produced

significantly higher yield. Whole tubers and cut tubers proved equally good in tuber yield production.

4. The response to N at 1st level (100 kg N/ha) was more under wider spacing but reverse was true with higher N application (200 kg N/ha).

5. Application of N favour production of large size tubers. The response was almost linear.

6. Starch content of potato tubers was not altered by any of the three factors.

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