

Influence of time of nitrogen application on number and size of potato (*Solanum tuberosum*) tubers

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In potato (*Solanum tuberosum* L.) split application of nitrogen is beneficial, as it minimizes the leaching loss of N. Application of N generally increases tuber number as well as size (Pushkarnath, 1976) and at higher levels it increases vegetative growth and delays the tuber initiation. Although split application of N has been tried earlier, the effect of N applied before and after the tuber initiation on tuber number and size is less understood. Hence an attempt was made to study the effect of N applied at and after tuber initiation on number and size of potato tubers at final harvest.

The field experiment was conducted at New Delhi during the winter (*rabi*) season of 1989–90, in a randomized block design with 4 replications. The soil of the experimental field was sandy loam in texture, containing organic carbon 0.46%, and available N, P and K 181.8, 12.8 and 200 kg/ha respectively, with a pH 8.2. Two levels of N, i.e. the recommended level (150 kg/ha) and reduced level (75 kg/ha), were applied in 3 split combinations— at the time of tuber initiation (30 days after planting and after tuber initiation 45 days after planting), and basal application of 150 kg/ha as the control. The details of the treatment combinations are given in Table 1. A uniform dose of

phosphorus @ 80 kg P_2O_5 /ha through single superphosphate and potassium @ 100 kg K_2O /ha as muriate of potash was applied at planting. As the N was applied through urea, it was mixed thoroughly with the soil to prevent direct contact with sprouts. Seed-tubers of cultivar 'Kufri Bahar' weighing 40 g were planted in 50 cm × 20 cm spacing. The planting was done during the third week of October and harvesting in the first week of February.

In 'Kufri Bahar' potato-tuber initiation begins at about 30 days after planting and continues for at least 2 weeks under short-day conditions. Therefore top-dressing was done at 30 or 45 days after planting.

Application of 150 kg/ha either as basal or in splits recorded significantly higher tuber yield than 75 kg N/ha (Table 1). The highest tuber yield was recorded with 50 kg N/ha at planting + 100 kg as top-dressed at 30 days after planting. Increase in tuber yield in this treatment may be attributed to higher number as well as weight of large-sized tubers (weighing more than 5 cm). The results confirm the findings of Hay and Walker (1989). Higher tuber yield in this treatment could also be ascribed to greater vegetative growth, as reflected by higher ground cover. This could be owing to better

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Table 1. Tuber yield and yield-contributing characters of potato as influenced by split application of nitrogen

N (kg/ha)	Stems/ plant	Ground cover (%)	Stovers/ plant	Tuber yield (q/ha)					Dry-matter in tuber (%)
				Diameter (cm)					
				> 5	> 4	> 3	< 3	Total	
T ₁ , 150 basal	3.2	80.5	28.5	205.00 (40.2)	79.00 (33.7)	15.00 (11.7)	11.85 (21.5)	310.85 (107.1)	18.7
<i>Split at 30 DAP</i>									
T ₂ , 100 + 50	3.7	85.0	28.0	260.00 (50.2)	76.00 (31.2)	8.75 (8.2)	7.50 (13.0)	352.25 (102.6)	18.4
T ₃ , 50 + 100	3.2	87.0	27.7	294.00 (59.5)	68.50 (29.5)	16.25 (12.2)	15.60 (24.2)	394.35 (125.4)	18.5
T ₄ , 50 + 25	3.5	75.5	28.7	158.00 (24.0)	54.00 (31.5)	23.75 (12.0)	13.75 (21.2)	249.50 (88.7)	18.2
<i>Split at 45 DAP</i>									
T ₅ , 100 + 50	4.0	87.0	27.0	272.00 (54.2)	85.50 (37.5)	14.35 (11.7)	11.25 (20.7)	383.1 (124.1)	18.5
T ₆ , 50 + 100	3.5	87.5	26.2	243.00 (52.5)	74.00 (32.7)	12.50 (11.6)	10.60 (18.2)	340.1 (114.9)	18.4
T ₇ , 50 + 25	3.7	71.0	16.2	140.50 (21.2)	55.50 (28.7)	15.00 (9.7)	9.35 (17.7)	220.35 (77.3)	16.8
CD (P=0.05)	NS	4.0	5.2	41.50 (6.7)	NS (4.2)	5.30 (4.1)	NS (3.5)	41.00 (15.5)	0.7

DAP, Days after planting

Values in parentheses indicate number of tuber/plot

availability of N, since the recovery of N from splitted dose remained higher than the whole dose of N applied at planting (Sharma *et al.* (1975).

It appears that N influences tuber yield mainly due to increase in tuber number/stem, since there was no significant difference in the stem number/plant. N is able to affect the stem number (Hay and Walker, 1989). Application of two-thirds of the recommended dose of N at tuber initiation (T_3) increased the tuber number significantly compared with basal (T_1) or one-third top-dressed at tuber initiation (T_2). As there was no significant difference in the stolon number amongst these 3 treatments, higher tuber number in T_3 could be attributed to more efficient conversion of stolon tips into tubers. The results indicated that application of 50 kg N/ha as basal dose is sufficient to build up early vegetative growth and produce good number of stolons.

Application of 100 kg N/ha as top-dressing at the time of tuber initiation helps maintain fairly large foliage growth and convert maximum number of stolon tips into tubers, owing to better availability of N for a longer time. Dry-matter content of tubers did not differ among the treatments except in T_7 where it was low due to reduced and delayed application of split dose. Tuber-dry matter is less affected by applied N (Harris, 1987).

REFERENCES

- Harris, P. M. 1978. *Mineral Nutrition*, 217 pp. (In) *The Potato Crop*. Harris, P. M. (Ed.). Chapman & Hall, London.
- Hay, R. K. M. and Walker, A. J. 1989. *An Introduction to Physiology of Crop Yield*. 207 pp. Longman, Essex.
- Pushkarnath, 1976. *Potato in Sub-tropics*, pp. 72-108. Longman Orient Ltd, New Delhi.
- Sharma, R. C., Grewal, J. S., Sud, K. C. and Saini, S. S. 1975. Effect of biuret content in urea and nitrogen sources on the yield and composition of potato tubers. *Plant and Soil* 43 : 701-5.

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Response of azolla (*Azolla pinnata*) to rice (*Oryza sativa*) herbicides

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Beneficial effects of dual culture of azolla in rice (*Oryza sativa* L.) fields have been well documented. However, inoculation period of azolla coincides with pre-

emergence (pre-em) herbicide application time. Hence investigation was taken up to study the effect of promising rice herbicides on biomass production of azolla and to

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