

Original Research Article

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Evaluation of Response of Potato on Different Doses of Nitrogen and Potassium in Growth and Yield

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ABSTRACT

Field investigation was carried out to evaluate the Response of potato on different doses of nitrogen and potash levels on growth and yield parameters in potato var. *Kufrikundan*. The experiment comprised of 8 treatments where control is T₁ (N₀K₀), and other treatments are T₂ (N₁K₀), T₃ (N₂K₀), T₄ (N₃K₀), T₅ (N₀K₁), T₆ (N₀K₂), T₇ (N₂K₁) and T₈ (N₂K₃) was applied to all the treatments. The treatments were laid in Randomized Block Design (RBD) with 3 replication of each treatment. The variety of potato used was *Kufrikundan*. Observations on growth, yield attributing characters and yield recorded and analysed statistically. All the treatments gave better response to growth and yield attributes over control. Among the various treatment T₈ (N₃K₂) proved superior with increased plant height, number of leaves per plant, number of stolon per plant, fresh and dry weight of tuber per plant, fresh and dry weight of shoot, fresh and dry weight of root per plant, tuber yield per hectare. Next to T₈ the treatment T₇ (N₂K₁) showed better response to growth attributes, tuber yield. It is concluded that the application of Nitrogen and Potassium showed the significant difference. Hence it is suggested that the nutrients Nitrogen and Potassium promotes the growth and yield attributes of potato.

Keywords

Potato, Nitrogen,
Potassium, Growth,
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Introduction

Potato (*Solanum tuberosum* L.) is one of the most important vegetable crop growing in the world, belongs to family Solanaceae. Potato is not only a rich source of carbohydrates and calories but also furnishes high quality of amino acids, Vitamin B, Vitamin C and minerals. One hundred grams of potato tuber contains 80% moisture, 20% dry matter, 14% starch, 20% sugar, 2% protein, 1% mineral salts, 0.61% fiber and 0.1% fat (Anonymous, 2002).

Potato (*Solanum tuberosum* L.) is the most important food crop of the world. Potato is an important tuber crop rich in carbohydrates (22.6 g per 100 g of edible portion), minerals (Ca, Mg, Cu, Fe, P, K and Na), and vitamin C (17 mg) and contains 97 kilo calories energy per 100 g of edible matter and it is also used for several industrial purposes such as for production of starch, alcohol, dextrin, glucose, dyes etc.

It is consumed as vegetable alone or mixed with other vegetables such as brinjal, cabbage,

tomato, beans, cauliflower etc. It is used to make chips and other products (Thamburaj and Narendra Singh, 2005).

The effects of N and K on potato were reported by many workers in different soil and climatic conditions (Mondal *et al.*, 2007; Brar and Kaur, 2006; Sharma and Sood, 2002). However most of the research work is reported from Northern parts of India. The studies pertaining to the nutrition yield and quality of potato as influenced by the application of N and K is very meager in Andhra Pradesh. In spite of low acreage, the crop is meeting the vegetable demand of Hyderabad, Ranga Reddy and surrounding districts and is fetching good price to the potato growers.

Hence, keeping in view the above facts an experiment entitled "Evaluation of Response of potato on different doses of nitrogen, potassium and their interactions in growth and yield was conducted.

Materials and Methods

The experiment was carried out at the Experimental Field of Uttaranchal (P.G.) College of Bio-medical Sciences and Hospital, The experiment was laid out in randomized block design with 8 treatments consisting of different levels of nitrogen and potash viz., 0 (control), 60,120,180 kg N/ha and 50 kg and 0 (control), 60 and 120 kg K₂O/ha which were replicated 3 times. Nitrogen and potash was applied in the form of Urea, and M.O.P, respectively. Recommended dose of phosphorus i.e. 80 kg/ha of each was applied. The test variety used was Kufrikundan planted in furrow of 60 cm apart with a spacing of 25 cm. The soil of experimental field was clayey loam. Full doses of phosphorus and potash were applied through single super phosphate and MOP respectively as basal dose at the time of planting, whereas nitrogen was applied in each plot in split doses as per the

treatments. Half dose of the nitrogen of each treatment was applied through urea as basal dressing and remaining half dose was applied at the time of first earthing up. 35 days after planting the remaining dose of nitrogen was applied through urea. Earthing up was done at 35 days after planting (DAP). Weeding was done at the time of earthing to remove the weeds. Six irrigations were provided during the entire crop growth period. Although, irrigation was given by flood irrigation method. All the recommended package and practices were followed to raise a healthy crop.

Results and Discussion

Data presented in Table 1 reveals that the treatment effect was found to be significantly different for plant height. Increasing trend in case of plant height was observed with the increase in nitrogen and potash levels. At 30, 50, 70 and 90 DAS, It was observed that the plant height with maximum height were 24.60, 32.33, 38.67 and 38.33 cm, respectively. In general, an increase in nitrogen and potash influenced the height of the plant. Significantly maximum number of leaves was found on application of 180 kg N, 120 kg potash / hectare. Maximum number of leaves recorded at 30, 50, 70 and 90 DAS were 19.00, 31.80, 35.38 and 29.38 respectively. The increase in plant height and number of leaves with increase in nitrogen and potash. Enhancing the fresh weight of shoot with maximum being recorded under 180 kg N/ha and 120 kg K/ha (144.86 g). Maximum dry weight of shoot per plant (24.54 g) was noted in the treatment 180 and 120 kg/ha of N and K₂O.

On the perusal of yield attributing data presented in Table 2, it is evident that the maximum number of stolon per plant (24.00) was recorded under the treatment 180:120 kg N: K/ha at harvesting.

Table.1 Effect of nitrogen and potassium levels on growth parameters of potato

Treatment	Plant height (cm)				No. of leaves				Fresh weight of shoot (g)		Dry weight of shoot(g)	
	30 DAS	50 DAS	70 DAS	90 DAS	30 DAS	50 DAS	70 DAS	90 DAS	70 DAS	At Harvesting	70 DAS	At Harvesting
T1	14.23	24.60	28.35	26.68	4.53	13.06	17.87	15.53	51.70	87.08	6.72	14.10
T2	17.77	27.27	31.87	29.86	10.60	18.13	21.07	19.40	83.89	107.82	8.91	16.72
T3	19.00	28.07	32.75	31.08	11.33	18.80	21.60	19.93	90.60	121.19	9.84	17.84
T4	20.30	29.73	33.53	32.20	12.35	20.40	22.53	20.87	113.94	129.43	10.89	18.85
T5	15.43	25.80	29.30	28.30	5.80	21.53	18.47	16.13	71.99	119.49	7.64	15.35
T6	16.03	26.87	30.20	29.20	7.06	22.93	19.90	20.57	92.80	125.81	8.63	16.14
T7	21.80	30.27	37.12	37.11	16.26	26.87	26.47	25.13	121.12	133.67	18.09	22.01
T8	24.60	32.33	38.67	38.33	19.00	31.80	35.38	29.38	143.92	144.86	22.90	24.54

Table.2 Effect of nitrogen and potassium levels on yield attributing parameters of potato

Treatment	No. of stolon/plant		Fresh weight of tuber (g)		Dry weight of tuber (g)		Yield/plot (kg)
	70 DAS	At Harvesting	70 DAS	At Harvesting	70 DAS	At Harvesting	At harvesting (kg/ha)
T1	9.00	11.67	83.46	337.09	27.87	29.75	5.22
T2	11.33	15.00	150.57	524.11	46.68	41.55	6.14
T3	13.00	16.33	182.68	548.23	47.81	54.12	7.16
T4	14.00	17.67	219.47	631.21	50.42	78.26	7.43
T5	10.00	13.00	132.74	439.37	29.29	32.01	7.73
T6	11.00	14.00	141.33	478.57	30.93	38.13	8.13
T7	17.67	21.33	261.57	646.19	56.62	146.74	8.31
T8	20.67	24.00	295.44	701.84	67.89	183.92	8.79

The minimum number of stolon per plant (11.67) was counted in the treatment 0 kg N/ha, and 0 kg potash at harvesting. At harvest, fresh weight of tuber per plant ranged from minimum of 337g to maximum of 701.84 g.

The maximum dry weight of tuber per plant (183.92g) was noted on application of 180:120 kg/ha of N: K at harvesting. With regard to the yield data, presented in Table 2, it can be inferred that highest tuber yield per plot was 8.79 kg at treatment combination 180:120 kg/ha of N: K.

Thus, from the above findings, it can be summarized that increasing quantity of nitrogen significantly increased all the growth characters, yield attributes and tuber yield.

It may be also concluded on the basis of research findings that use of 120 kg K/ha be adopted for progressive growth and well development of tubers under irrigated ecosystem. Application of 120 kg K/ha produced higher tuber yield (203.42q/ha) as compared to other doses of potassium. The interaction was significant in all the growth and yield attributing characters including dry

weight of shoot and roots. However, the highest tuber yield (219.92q/ha).

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