E-ISSN: 2618-0618
P-ISSN: 2618-060X

NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; 8(9): 619-622
Received: 10-07-2025
Accepted: 13-08-2025

Tej Raj Pandey
M.Sc. Scholar, Department of Vegetable Science, CSAUA&T, Kanpur, Uttar Pradesh, India

Keshav Arya
Professor & Head, Department of Vegetable Science, CSAUA&T, Kanpur, Uttar Pradesh, India

VK Tripathi
Professor & Head, Department of Fruit Science, CSAUA&T, Kanpur, Uttar Pradesh, India

DP Singh
Associate Professor, Department of Vegetable Science, CSAUA&T, Kanpur, Uttar Pradesh, India

Rajiv
Assistant Professor, Department of Vegetable Science, CSAUA&T, Kanpur, Uttar Pradesh, India

Shubham Singh
Ph.D Scholar, Department of Vegetable Science, CSAUA&T, Kanpur, Uttar Pradesh, India

Corresponding Author:
Tej Raj Pandey
M.Sc. Scholar, Department of Vegetable Science, CSAUA&T, Kanpur, Uttar Pradesh, India

Effect of different doses of nitrogen on growth, yield and quality of potato (*Solanum tuberosum* L.) cv. kufri neelkanth

Tej Raj Pandey, Keshav Arya, VK Tripathi, DP Singh, Rajiv and Shubham Singh

DOI: https://www.doi.org/10.33545/2618060X.2025.v8.i9i.3826

Abstract
A field experiment was conducted during *rabi* season of 2024-25 at Research Field of the Vegetable Science Centre of Excellence of C. S. Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh, India. The present investigation was conducted to evaluate the effect of different nitrogen levels on growth, yield, nitrogen uptake, and economics of potato under the prevailing agro-climatic conditions. Treatments included nitrogen application rates ranging from 0 to 350 kg N/ha. The results revealed significant differences among treatments. Plant emergence improved with nitrogen application, with the highest emergence (95.93%) recorded at 100 kg N/ha, compared to 91.48% in the control. Plant height, number of shoots, and leaf production all increased progressively with nitrogen, showing sharp gains up to 150-200 kg N/ha, beyond which improvements were marginal. Maximum plant height (69.4 cm), shoot number (6.0 per plant), and leaf count (45.8) were obtained at 200-350 kg N/ha, while haulm yield (fresh: 23.4 t/ha; dry: 2.53 t/ha) plate a used beyond 200 kg N/ha. Tuber yield and its components were markedly influenced by nitrogen. The number of marketable tubers (>75 g) increased from 85.00 in the control to 234.00 at 200 kg N/ha. Total tuber yield rose from 181.20 q/ha in the control to a maximum of 378.20 q/ha at 200 kg N/ha, with a marginal decline at higher levels. Similarly, dry matter yield of tubers (6,921 kg/ha) and plants (2,344 kg/ha) peaked at 200 kg N/ha, while dry matter content showed a slight, non-significant reduction with higher nitrogen. Nitrogen uptake followed a similar trend, with maximum total uptake (140.09 kg/ha) at 200 kg N/ha. The harvest index was highest (75.01%) at 150 kg N/ha, indicating more efficient biomass partitioning at this dose. Economic analysis demonstrated that 200 kg N/ha (T_5) was the most profitable, producing the highest tuber yield (37.82 t/ha), gross income (₹3,78,200), net return (₹2,63,849), and benefit-cost ratio (2.31). Although higher nitrogen levels produced comparable yields, increased input costs reduced profitability during the experimentation.

Keywords: Growth, yield, harvest index, economics and nitrogen uptake

Introduction
Potato (*Solanum tuberosum* L.) is an herbaceous annual plant belonging to the family Solanaceae. The consumable portion is a modified underground stem. Native to South America, it was introduced to India by the Portuguese in the 16th century. Globally, it ranks as the fourth most important food crop after rice, wheat and maize. Potato is a high-energy crop that yields more food per unit area and time than other major staples. It is recognized as one of the most efficient crops in terms of dry matter production, dietary fiber, high-quality protein, essential minerals and vitamins surpassing rice, wheat and maize in nutritional value per unit area. Its role in food security and poverty alleviation, particularly in developing countries facing ongoing social and political challenges, is comparable only to the leading cereals. In addition to its role as a staple food, potato is widely processed into value-added products such as fries, dices, flakes, granules, starch, thickeners, custards and canned items. India is the world's second-largest producer of potatoes, contributing approximately 15% to global production, with an output of 60.14 million tonnes from 2.35 million hectares (Yadav *et al.* 2024) [10].
India is the second-largest producer of potatoes globally, following China. Worldwide, potato cultivation covers approximately 16.8 million hectares, yielding a total production of 383

million metric tonnes. In contrast, India cultivates potatoes on about 2.35 million hectares, producing 60.14 million tonnes. Among Indian states, Uttar Pradesh leads in potato production, contributing 0.61 million hectares of the cultivated area, 14.77 million tonnes of total production, and a productivity rate of 28.99 tonnes per hectare. The edible part of potato is the swollen portion of underground stem which is called a tuber and is designed to provide food for green leafy portion of the plant. It contains about 75% moisture, 20% dry matter, 22.6% carbohydrates, 1.6% protein and 97 kcal energy. It is rich in minerals like potassium (421 mg), phosphorus (40 mg) calcium (10 mg), iron (0.7 mg) and some vitamins viz., thiamin (0.10 mg) and vitamin C (17 mg) per 100 g of fresh weight. Potato is a short duration, high yielding and nutrient exhaustive crop. So, the use of balance fertilizers with best management practices is necessary and pre-requisite for getting better and higher yield of this crop. Nitrogen (N) is one of the foremost management priorities in potato cropping systems (Devi *et al.* 2023) [4].

Materials and Methods

A field experiment was conducted during *Rabi* season of 2024-25 at Research Field of the Vegetable Science Centre of Excellence of C. S. Azad University of Agriculture and Technology, Kanpur. The experimental location experiences a sub-humid, subtropical climate characterized by hot, dry summers, cold winters and limited rainfall. During the crop growth period, the recorded maximum and minimum temperatures ranged between 20°C to 32.4°C and 8.0°C to 16.8°C, respectively. Relative humidity during crop development varied from 95% to 97% at 7:00 AM and from 46% to 94% at 2:00 PM. The lowest humidity levels were observed during the second week of November and the first week of December at night overall, the average maximum and minimum relative humidity during the crop season in the experimental area ranged from 96% to 66.31%. The soil of the experimental field was sandy loam in texture and slightly calcareous having organic carbon 0.48%, available Nitrogen 225 kg ha^{-1} available P_2O_5 17.8 kg ha^{-1}, available K_2O 133.36 kg ha^{-1} and pH 7.86. The field experiment was conducted in Randomized Block Design (RBD) with three replications. Total number of treatments is 8 *viz.*

- **T_1:** Control (0kg of Nitrogen along with 80 kg of Phosphorous and100 kg of Potassium/ha). [N: P: K: 0:80:100] in Kg/ha.
- **T_2**: 50 kg of Nitrogen along with 80 kg of Phosphorous and 100 kg of Potassium/ha. [N: P: K: 50:80:100] in Kg/ha,
- **T_3**: 100 kg of Nitrogen along with 80 kg of Phosphorous and 100 kg of Potassium ha. [N: P: K: 100:80:100] in Kg/ha.
- **T_4**: 150 kg of Nitrogen along with 80 kg of Phosphorous and 100 kg of Potassium/ha, [N: P: K: 150:80:100] in Kg/ha.
- **T_5:** 200 kg of Nitrogen along with 80 kg of Phosphorous and 100 kg of Potassium/ha. [N: P: K: 200:80:100] in Kg/ha.
- **T_6:** 250 kg of Nitrogen along with 80 kg of Phosphorous and 100 kg of Potassium/ha. [N: P: K: 250:80:100] in Kg/ha.
- **T_7**: 300 kg of Nitrogen along with 80 kg of Phosphorous and 100 kg of Potassium/ha. [N:P: K:: 300:80:100] in Kg/ha and
- **T_8:** 350 kg of Nitrogen along with 80 kg of Phosphorous and 100 kg of Potassium/ha. [N: P: K: 300:80:100] in Kg/ha.

Crops were sown on 08.11.2024 and harvested on 11.03.2025. The average annual rainfall of about 800 mm. Recommended package of practices and fertilizers doses were applied in different treatments. Cost of cultivation was calculated by taking in to account the prevailing prices of the inputs.

Results and Discussion

Growth and Yield Parameters: Tubers showed maximum plant emergence at 30 days after planting (95.93%) under treatment of application of nitrogen @ 100 kg/ha (T_3) while a minimum per cent plant emergence (91.48%) at 30 DAP was observed in control treatment T_1 (0 kg N/ha) has also been reported by Islam *et al.* (2013) Significantly maximum plant height (69.4 cm) was recorded in the treatment of application of nitrogen @ 350 kg/ha (T_8) followed by treatment of application of nitrogen @ 250 kg/ha (T_6) which was statistically superior to rest of treatments at 75 DAP. The minimum plant height (53.50 cm) was observed in control treatment T_1 (0 kg N/ha) at harvest. Other treatments were recorded minimum plant height than treatment of application of nitrogen @ 350 kg/ha (T_8) for 25, 50 and 75 DAP. Significantly maximum number of shoots per plant was counted under treatment of application of nitrogen @ 250 kg/ha (T_5) (6.00) which was significantly superior over rest of the treatments at 75 DAP while minimum number of shoot per plant was observed in treatment T_1 (0 kg N/ha) (3.1). Other hand treatments, having increasing nitrogen levels were recorded increasing number of shoots per plant has also been reported by Banjare *et al.* (2014) [1].

Higher number of leaves per plant was found with treatment of application of nitrogen @ 250 kg/ha (T_5) (45.8) was significantly superior over rest of treatments at 75 DAP while minimum number of leaves per plant was observed in treatment T_1 (0 kg N/ha) (26.80). Among the different treatment number of leaves per plant differed significantly at 75 DAP. In treatment having increasing nitrogen levels were recorded increasing number of shoots. Citation of data regarding fresh haulm yield revealed that crop grown through different nitrogen levels have significant influence on fresh haulm yield (kg/plot). Treatment of application of nitrogen @ 200 kg/ha (T_5) gave maximum fresh haulm yield (23.40kg/plot) which was higher than treatment of application of nitrogen @ 300 kg/ha (T_7) (23.29 kg/plot) and significantly superior as compared to rest of the and treatment of application of nitrogen @ 350 kg/ha (T_8) were recorded higher tuber yield than treatment of application of nitrogen @ 250 kg/ha (T_6) and control treatment T_1 (0 kg N/ha). Yield of haulm is increased by increasing nitrogen levels. Citation of data the regarding Dry haulm yield revealed that crop grown through different nitrogen levels have significant influence on Dry haulm yield (kg/plot). Treatment of application of nitrogen @ 200 kg/ha (T_5) gave maximum fresh haulm yield (2.53kg/plot) which was higher than treatment of application of nitrogen @ 300 kg/ha (T_7) (2.52 kg/plot) and significantly superior as compared to rest of the treatments. Treatment of application of nitrogen @ 200kg/ha (T_5) and treatment of application of nitrogen @ 250 kg/ha (T_6) were recorded higher tuber yield than treatment of application of nitrogen @ 300kg/ha (T_7), treatment of application of nitrogen @ 50 kg/ha (T_2) and control treatment T_1 (0 kg N/ha). Yield of haulm is increased by increasing nitrogen levels has also been reported by Chandrakar *et al.* (2014) [2]. Among the different, number of tuber per plot differed at different grade wise viz.., 0-25, 25-75, > 75g. Treatment of application of nitrogen @ 200 kg/ha (T_5) (402) recorded significantly higher number of tuber per plot which was statistically superior to other treatments for 25-75 g and minimum was reported under control treatments T_1 (0 kg N/ha) (157) of >75g. Whereas increasing nitrogen level increases tuber number upto a certain nitrogen level after that tuber number is decreased has also been reported by Fasil *et al.* (2016) [5].

Under different treatments, weight of tuber per plot differed significantly grade wise *viz*.., 0-25, 25-75, > 75. Higher weight of tuber (33.64 kg/plot) was registered with treatment of application of nitrogen @ 200 kg/ha (T_5) at >75 g and minimum was recorded with control treatment T_1 (0 kg N/ha) (15.75 kg/plot) at > 75 g. Lowest weight of tuber for all the three grades was observed where skipping of N compared to treatment of application of nitrogen @ 50 kg/ha (T_2) and treatment of application of nitrogen @ 150 kg/ha (T_3). Among different treatments, grade wise yield of tuber (q/ha) differed at different grade wise *viz*.., 0-25, 25-75, > 75g. Maximum grade wise yield of tubers (152.45 q/ha) was observed with treatment of application of nitrogen @ 200 kg/ha (T_5) which was higher than treatment of application of nitrogen @ 150 kg/ha (T_4) (154.01 q/ha) and significantly superior as compared to rest of the treatments of tuber >75 g. Treatment of application of nitrogen @ 200 kg/ha (T_5) and treatment of application of nitrogen @ 250 kg/ha (T_6) were recorded higher tuber yield g/plant than other treatments T_2,T_3,T_4 or control plot. Citation of data regarding total tuber yield revealed that crop grown through different nitrogen levels have significant influence on total tuber yield (q/ha). Treatment of application of nitrogen @ 200 kg/ha (T_5) gave maximum total tuber yield (372.33 q/ha) which was higher than treatment of application of nitrogen @ 150 kg/ha (T_4) (337.28 q/ha) and significantly superior as compared to rest of the treatment of application of nitrogen @ 200 kg/ha (T_5) and treatment of application of nitrogen @ 250 kg/ha (T_6) were recorded higher tuber yield than treatment of application of nitrogen @ 50 kg/ha (T_2), treatment of application of nitrogen @ 100 kg/ha (T_3), treatment of application of nitrogen @ 150 kg/ha (T_4) and control treatment T_1 (0 kg N/ha). Under different levels of nitrogen, the dry matter production differed significantly. Maximum tuber dry matter content (18.74%) was recorded with control treatment T_1 (0 kg N/ha) at harvest has also been reported by Jatav *et al.* (2013) [7]. Lowest tuber dry matter content (%) was recorded where higher nitrogen level is applied *i.e.* in treatment of application of nitrogen @ 300 kg/ha (T_7). The tuber dry matter content (%) is decreased with increasing nitrogen levels. Citation of data the regarding total tuber yield revealed that crop grown through different nitrogen levels have significant influence on biomass yield (kg/ha). Treatment of application of nitrogen @ 200 kg/ha (T_5) NPK gave maximum biomass yield (13222.67 kg/ha) which was higher than treatment of application of nitrogen @ 150 kg/ha (T_4) (12158.46 kg/ha) and significantly superior as compared to rest of the treatments. Lowest biomass yield was observed whereas skipping of nitrogen that is in control treatment T_1 (0 kg N/ha) (7137.5 kg/ha). An appraisal of data indicated that different treatments have exerted significant effect on harvest index. A maximum harvest index was found with treatment of application of nitrogen @ 150 kg/ha (T_3) (73.90%) which was higher than treatment of application of nitrogen @ 50 kg/ha (T_2) (73.88%) and significantly superior as compared to rest of the treatments. Lowest harvest index was observed under treatments whereas highest nitrogen is applied *i.e.* in treatment of application of nitrogen @ 300 kg/ha (T_7) (68.43%). Similar results were reported by Dash *et al.* (2015) [3].

Quality Parameters

Among all treatment of application of nitrogen @ 300 kg/ha (T_7) recorded maximum nitrogen uptake by tuber (76.43kg/ha) which was statistically superior over other treatments while lowest nitrogen uptake by tuber were observed under the treatments whereas no nitrogen is applied *i.e.* control T_1. Different treatments shown significant effect on nutrient use efficiency of nitrogen. Fertilizer recovery (Nutrient use efficiency) (%) was maximum under treatment of application of nitrogen @ 100 kg/ha (T_3) (16.19%) followed by treatment of application of nitrogen @ 50 kg/ha (T_2) (15.70%) while minimum was recorded in treatment of application of nitrogen @ 300 kg/ha (T_7) (10.70%). Similar results were reported by Mohanty *et al.* (2014) [8].

Economics

Highest gross return was incurred under treatment of application of nitrogen @ 200 kg/ha (T_5) (316480 Rs./ha) which was higher than treatment of application of nitrogen @ 300 kg/ha (T_7) (291244 Rs./ha) and minimum was obtained under control treatment T_1 (0 kg N/ha) (156621 Rs./ha). The treatment of application of nitrogen @ 200 kg/ha (T_5) was significantly superior as compared to rest of the treatments due to higher yield. Under different nitrogen levels, net return was found maximum with treatment of application of nitrogen @ 200 kg/ha (T_5) (241544 Rs./ha) and minimum was obtained under control treatment T_1 (0 kg N/ha) (84258 Rs./ha). The treatment of application of nitrogen @ 200 kg/ha (T_5) was significantly superior as compared to rest of the treatments. Lowest net return was observed under treatments whereas omission of N than treatment of application of nitrogen @ 50 kg/ha (T_2) and treatment of application of nitrogen @ 150 kg/ha (T_3). The perusal of data it was indicated that increasing nitrogen levels significantly affect the benefit: cost ratio. But the treatment of application of nitrogen @ 200 kg/ha (T_5) (3.22) found significantly higher benefit: cost ratio and minimum with control treatment T_1 (0 kg N/ha) (1.16). The treatment of application of nitrogen @ 200 kg/ha (T_5) was significantly superior as compared to rest of the treatments while treatment of application of nitrogen @ 250 kg/ha (T_6) and treatment of application of nitrogen @ 300 kg/ha (T_7) were recorded lowest B: C ratio than T_5 (N200) has also been reported by Najm *et al.* (2010) [9].

Table 1: Effect of different doses of nitrogen on plant emergence, plant height, No. of shoots/leaves, fresh & dry haulm and tuber/plot under different treatments.

Treatments	% Plant emergence at 30 DAP	Plant height (cm)			Number of shoots per plant at 75 DAP	Number of leaves per plant at 75 DAP	Fresh haulm yield ton/ha	Dry haulm yield	Tuber/plot (gm)	
		25 DAP	50 DAP	75 DAP					0-25	25-75
T_1: Nitrogen @ 0 kg/ha	91.48	17.6	42.2	53.5	3.1	26.8	12.8	1.38	411	140
T_2: Nitrogen @50 kg/ha	94.81	18.9	48.83	63.0	4.4	35.2	14.5	1.57	414	162
T_3: Nitrogen @ 100 kg/ha	95.93	20.2	50.1	64.7	5.2	38.6	18.31	1.98	552	201
T_4: Nitrogen @150 kg/ha	94.07	21.8	52.2	67.3	5.8	42.5	21.15	2.29	673	223
T_5: Nitrogen @ 200 kg/ha	93.33	22.4	52.6	68.0	6.0	45.8	23.4	2.53	748	230
T_6: Nitrogen @250 kg/ha	94.44	22.2	53.0	68.5	5.6	43.2	22.67	2.45	724	220
T_7: Nitrogen @ 300 kg/ha	94.81	22.0	53.26	69.0	5.5	43.0	23.29	2.52	720	209
T_8: Nitrogen @ 350 kg/ha	94.44	22.1	53.6	69.4	5.3	41.6	22.91	2.48	783	204
SEm ±	0.572	0.737	1.42	2.626	0.230	1.239	0.925	0.100	27.515	9.486
CD(P=0.05)	1.735	2.235	4.25	7.966	0.697	3.757	2.805	0.302	83.459	28.772

Table 2: Effect of different doses of nitrogen on No. of tuber/plot, yield of tuber, total tuber yield and dry matter studies under different treatments.

Treatments	No. of tuber / plot >75gm	Yield of tuber (q/ha)			Total tuber yield	Total tuber q/ha	Dry matter content in tuber	Dry matter yield of tuber kg/ha	Dry matter yield of plant kg/ha	Total dry biomass kg/ha
		0-25	25-75	>75						
T_1: Nitrogen @ 0 kg/ha	85	50.07	66.33	64.8	636	181.2	18.75	3398	1282	4680
T_2: Nitrogen @50 kg/ha	138	50.47	76.71	105.23	714	232.41	18.55	4311	1452	5763
T_3: Nitrogen @ 100 kg/ha	179	67.25	95.36	135.78	932	298.39	18.44	5502	1834	7336
T_4: Nitrogen @150 kg/ha	208	81.98	105.71	157.72	1104	345.41	18.42	6362	2119	8481
T_5: Nitrogen @ 200 kg/ha	234	91.21	109.03	177.96	1212	378.2	18.30	6921	2344	9265
T_6: Nitrogen @250 kg/ha	225	88.29	104.27	171.04	1169	363.6	18.25	6636	2271	8907
T_7: Nitrogen @ 300 kg/ha	229	87.7	99.34	174.26	1158.33	361.3	18.1	6540	2334	8874
T_8: Nitrogen @ 350 kg/ha	226	83.22	96.89	172.08	1113	352.19	17.8	6269	2295	8564
SEm ±	9.731	4.85	4.585	5.442	28.644	8.424	0.408	181.82	62.982	244.94
CD(P=0.05)	29.515	13.90	13.909	16.506	86.882	25.553	1.237	551.95	191.03	742.96

Table 3: Effect of different doses of nitrogen on harvest index, nitrogen uptake by tuber/crop/plant and economics under different treatments.

Treatments	Harvest index	Nitrogen uptake by tuber kg/ha	Total nitrogen uptake by crop	Nitrogen uptake by plant kg/ha	Economics (Rs/ha)			
					Total cost of cultivation	Gross income	Net return	B:C Ratio
T_1: Nitrogen @ 0 kg/ha	72.61	48.06	71.14	23.08	111807	181200	69393	0.62
T_2: Nitrogen @50 kg/ha	74.8	60.98	87.12	26.14	112443	232400	119957	1.07
T_3: Nitrogen @ 100 kg/ha	75	77.83	110.84	33.01	113079	298400	185321	1.64
T_4: Nitrogen @150 kg/ha	75.01	90.00	128.13	38.13	113715	345400	231685	2.04
T_5: Nitrogen @ 200 kg/ha	74.7	97.9	140.09	42.19	114351	378200	263849	2.31
T_6: Nitrogen @250 kg/ha	74.5	93.86	134.74	40.88	114987	363600	248613	2.16
T_7: Nitrogen @ 300 kg/ha	73.7	92.5	134.51	42.01	115623	361300	245677	2.12
T_8: Nitrogen @ 350 kg/ha	73.2	88.67	129.98	41.31	116259	352200	235941	2.03
SEm ±	0.975	2.574	3.906	1.125	-	-	-	-
CD(P=0.05)	-	7.808	11.849	3.414	-	-	-	-

Conclusion

Presented results depict a clear cut idea about the better potato cultivation scenario in the *Indo-gangatic* alluvial region of Uttar Pradesh. Based on the experimental results, it is concluded that amongst the nitrogen levels, 300 kg N/ha recorded almost significantly higher growth parameters like plant height, number of shoots per plant, number of leaves per plant while 200 kg N/ha recorded higher yield attributing parameters like number of tubers, weight of tubers, total tuber yield etc. from potato var. Kufri Neelkanth. Thus, 200 kg N/ha recorded maximum tuber yield (372.33 q/ha) and tuber dry matter content (17.69%) is recorded in this. Similarly, 200 kg N/ha application recorded the maximum tuber number (402) of grade 25-75g along with the maximum total tuber number (1019) including all the three grades. The study of economics of kufri neelkanth cultivation and production shows that application of various nitrogen level give positive result but it was found that 250 kg/ha and 300 kg/ha nitrogen application is less beneficial than nitrogen application of 200 kg/ha which gives highest B:C ratio.

Acknowledgement

Authors are highly thankful to Professor and Head Department of Vegetable Science C S A University of Agriculture & Technology, Kanpur, Uttar Pradesh, India for providing all necessary facilities.

References

1. Banjare S, Gaurav, Sharma V, Verma SK. Potato crop growth and yield response to different levels of nitrogen under Chhattisgarh plains agro-climatic zone. Indian Journal of Science and Technology. 2014;7(10):1504-1508.
2. Chandrakar CK, Shrivastava GK, Dwivedi SK, Nivedita. Agro-techniques for increasing yield potential of *Solanum tuberosum* under drip irrigation. Journal of Crop and Weed. 2014;10(2):50-56.
3. Dash SN, Banerjee H, Chakraborty, Sarkar A. Production potential of newly released potato (*Solanum tuberosum* L.) cultivars under different nitrogen levels. SAARC Journal of Agriculture. 2015;13(2):121-130.
4. Devi S, Sharma PK, Gupta P, Kharsan M, Dubey R. Effect of different levels of NPK fertilizer on economics of potato. The Pharma Innovation Journal. 2023;12(3):5033-5036.
5. Fasil K, Niguse AM, Abereha. Effect of potassium on tuber yield and yield component of potato on loamy soils of Atsbi-Wenberta, Tigray, Ethiopia. Journal of Biology, Agriculture and Healthcare. 2016;6(3):34-39.
6. Islam Md, Monirul A, Sajeda M, Nik M, Ferdous J, Alam MS. Integrated nutrient management for potato (*Solanum tuberosum* L.) in grey terrace soil. Australian Journal of Crop Science. 2013;7(9):1235-1241.
7. Jatav MK, Kumar M, Trehan SP, Dua VK, Kumar S. Effect of nitrogen and varieties of potato on yield and agronomic nitrogen use efficiency in North-Western plains of India. Potato Journal. 2013;40(1):55-59.
8. Mohanty M, Nanda SS, Barik AK. Improving potato (*Solanum tuberosum* L.) yield and soil health through integrated nutrient management approach in East coast climatic conditions of India. Indian Journal of Agricultural Sciences. 2014;84(11):36-38.
9. Najm AA, Haj SeyedHadi MR, Fazeli F, Taghi Darzi M, Shamorady R. Effect of utilization of organic and inorganic nitrogen source on the potato shoot dry matter, leaf area index and plant height, during middle stage of growth. International Journal of Agricultural and Biological Sciences. 2010;1(10):34-40.
10. Yadav R, Panghal VPS, Rahul, et al. Response of Indian potato varieties to nitrogen fertilization regarding growth, nutrient uptake, and tuber yield. Potato Research. 2024;7(4):12-23.