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Effect of balanced fertilization on growth, yield and economics of potato (*Solanum tuberosum* L.)

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Abstract
A field experiment was conducted during two consecutive *rabi* and summer seasons of 2021-22 and 2022-23 on loamy sand soil at Agronomy Instructional Farm, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat to study the effect of Balanced Fertilization on growth, yield and economics of Potato (*Solanum tuberosum L.*). There were total ten different treatments *viz.*, T_1: RDN, T_2: RDNP, T_3: RDNK, T_4: RDPK, T_5: RDNPK, T_6: RDN + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha, T_7: RDNP + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha, T_8: RDNK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha, T_9: RDPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha and T_{10}: RDNPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha were tested in randomized block design with three replications. Among the different balanced fertilization treatments effect of RDNPK + 25 kg/ha $FeSO_4$ and 10 kg/ha $ZnSO_4$ proved superior with respect to significantly higher plant height, number of stems per hill, crop growth rate, relative growth rate, number of tubers per plant, grade wise tuber yield, total tuber yield (425.02 q/ha), haulm yield (22.76 q/ha) as well as net return (₹2,92,579/ha). However, all these parameters were stood statistically at par with treatment RDNPK. Whereas, maximum BCR (2.54) was recorded with treatment RDNPK.

Keywords: Balanced fertilization, potato, growth, yield, economics

1. Introduction
Potato is a high yielding and exhaustive crop, thus requiring a variety of plant nutrients in balance for better growth and development. The balance nutrient composition of potato is responded by the availability of both macro and micronutrients. Macronutrients such as nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) and sulphur (S) are needed in large quantities with respect to their physiological functions in plant metabolism and for tuber yield formation. Also, the micronutrients *viz.*, zinc (Zn), iron (Fe), manganese (Mn), sodium (Na), copper (Cu), aluminum (Al) and boron (B) are needed in small quantities but their inclusion in the fertilizer schedule is very essential to sustain production and quality (Koch *et al.*, 2020) [3].
Ensuring a balanced fertilization helps in terms of realizing better quality production. An under - supply of nitrogen reduces the weight of the tubers, whereas an excess of nitrogen will deform them. A lack of phosphorus limits tuber reproduction and consequently reduces the number of tubers. Potassium is crucial to many metabolic functions, including the movement of sugars from the leaves to the tubers. It also promotes photosynthesis and research has shown that tuber yield can be influenced by the photosynthetic activity and duration of the leaf canopy. It is required in greater quantities than all of the other elements Singh *et al.*, (2014) [9]. Fertilization programs will differ depending on the use of the crop. Balance fertilization is important for boosting up the yield. Also, the response of macro-nutrients is known to vary considerably with variety and locality Ravikant and Chadha (2009) [8].

2. Materials and Methods
The experiment was conducted during the two consecutive *rabi* and summer seasons of the year 2021-22 and 2022-23 at Agronomy Instructional Farm, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat. Geographically, Sardarkrushinagar is situated at 24°-19' North latitude and 72°-19' East

longitude with an elevation of 154.52 metre above the mean sea level and represents in the North Gujarat Agro-climatic region. The climate of Sardarkrushinagar is subtropical monsoon type and comes under semi-arid region. The soil of experimental field was loamy sand in texture having pH 7.56 and slightly alkaline in reaction. The soil was low in available nitrogen, DTPA extractable Fe and Zn, medium in available phosphorus and potassium status.

The experiment was laid out in randomized block design with ten treatments *viz*., T_1: RDN, T_2: RDNP, T_3: RDNK, T_4: RDPK, T_5: RDNPK, T_6: RDN + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha, T_7: RDNP + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha, T_8: RDNK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha, T_9: RDPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha and T_{10}: RDNPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha replicated three times in gross plot size of 6.0 m × 4.5 m.

The experimental field was prepared for planting of potato by cross cultivation with a tractor drawn cultivator followed by harrowing and planking to obtain good tilth for better germination and establishment of plants. Stubbles of previous crops were removed from the field. The furrows were opened at a distance of 50 cm for the planting of potato tubers. The bunds and field channels were prepared with the help of bullock drawn bund former. Well decomposed farm yard manure @ 10 t per hectare was applied as common 8 days before sowing of experiment and mixed well with the soil. The recommended dose of fertilizer for potato (275:137.5:275 kg N:P:K/ha). Half dose of nitrogen (137.5 kg/ha) through urea, full dose of phosphorus (137.5 kg/ha) through DAP and full dose of potassium (275 kg/ha) through muriate of potash were applied in previously opened furrows as per treatments before planting the tubers. Similarly, Fe and Zn in the form of $FeSO_4.7H_2O$ (19% Fe) and $ZnSO_4.7H_2O$ (21% Zn), respectively were applied in previously opened furrows as per treatments as basal. The remaining half dose of nitrogen (137.5 kg/ha) was applied as top dressing in the form of urea at 35 days after planting. Seed tubers of variety 'Kufri Pukhraj' were cut in pieces, keeping two to three live eye buds having approximately 30 to 35 g weight. These cut tuber pieces were dry treated with the mixture of Mancozeb 75WP@ 1 kg/ha + talc powder @ 5 kg/ha before planting to prevent rotting of cut pieces of seed potato. The treated cut pieces of potato tubers were planted 20 cm apart in previously opened furrows at 50 cm spacing using seed rate of 3500 kg tubers/ha.

The observation on growth and yield attributes such as plant height at 50 DAP and at harvest and number of tubers per plant at 50 DAP was recorded from five randomly selected potato plants from each net plot at physiological maturity stage. The dry matter accumulation per plant (g) recorded at 25, 50 and 75 DAP were used to calculate crop growth rate (CGR) and relative growth rate. The total numbers of tubers from five tagged plants at harvest were counted from each net plot and their average number of tubers per plant was worked out and recorded for each plot separately. The whole produce of each net plot was graded manually in three categories *viz.*, small size (< 25 g), medium size (25-75 g) and large size (> 75 g) and their yield were recorded separately for each plot. Thereafter, it was converted into quintal per hectare after complete drying the haulm was weighed in kilogram per net plot. Thereafter, it was converted into quintals per hectare. The gross and net realization were calculated, based on the prevailing market prices of all the inputs and tuber and haulm yield of potato during the years of investigation. The benefit cost ratio was calculated by using gross realization (₹/ha) divided by cost of cultivation (₹/ha). The pooled analysis of the two years data was carried out as per procedure suggested by Cochran and Cox (1967) [1].

3. Results and Discussion

3.1 Effect of balanced fertilization on growth attributes

1. Plant height (cm)

The pooled results (Table 1) showed that an application of RDNPK + $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha (T_{10}) produced significantly higher plant height at 50 DAP (41.8 cm) and at harvest (65.2 cm), which remained statistically at par with treatments T_5 (application of recommended dose of N, P and K) (39.8 and 63.0 cm), T_8 (application of recommended dose of N and K + $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha) (38.5 and 62.1 cm) and T_7 (application of recommended dose of N and P + $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha) (38.4 and 60.6 cm) at 50 DAP and at harvest, respectively.

The magnitude of increase in plant height of potato by the treatments T_{10}, T_5, T_8 and T_7 was 25.90, 19.88, 15.96 and 15.66 percent at 50 DAP and 29.37, 25.00, 23.21, and 20.24 percent at harvest higher over treatment T_1 (application of recommended dose of N only).

The beneficial effect of balanced fertilization treatments on plant height observed in present study could be attributed to the fact that balanced fertilization improves the physical and chemical properties of soil including supply of almost all the essential plant nutrients for growth and development of plants. Thus, balanced nutrition under favorable environment might have helped in production of new tissues and development of new shoots might have ultimately increased plant growth in terms of plant height. These results are in agreement with those reported by Kumar *et al* (2020) [4] and Vaghela *et al.* (2023) [10].

2. Number of stems per hill

Among all treatments, application of recommended dose of N, P and K along with $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha (T_{10}) to potato registered significantly higher number of stems per hill at 50 DAP (4.80) (Table 1). However, it remained statistically at par with treatments T_8 (Recommended dose of N and K + $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha) (4.57), T_5 (RDNPK) (4.55) and T_7 (RDNP + $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha) (4.32).

This could be due to the vital role of macro and micro nutrients on root development, chlorophyll content of leaves, starch synthesis, N metabolism and respiration. These nutrients have role in development of meristematic tissues at the growing points or cells are dividing and primary tissues are formed. Thus, application of nutrients in balance results in the improvement in number of stems per hill and number of compound leaves. These findings are in close harmony with the results of Raghuwanshi *et al.* (2021) [8] and Vaghela *et al.* (2023) [10].

3. Crop growth rate (g/m^2/day)

The results of the Crop growth rate (CGR) for different treatments observed between 25-50 and 50-75 DAP were presented in the (Table 2).

The results showed that significantly higher crop growth rate at 25-50 and 50-75 DAP (7.55 and 17.50 g/m^2/day) was noted with application of treatment T_{10} (RDNPK + $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha). Whereas application of recommended dose of N (T_1) obtained significantly lower CGR value of 3.96 and 8.26 g/m^2/day between 25-50 and 50-75 DAP.

The higher crop growth rate under this treatment might be due to higher leaf area indices and dry matter accumulation. The crop growth rate was initially low, reached its peak between 41-70 days after planting due to the increased accumulation of dry matter which resulted in an increase in crop growth rate. Furthermore, the dry matters increased linearly up to 70 days

after planting in each cultivar. so, the crop growth rate was found highest between 41 and 70 days after planting. (Gogoi *et al.*, 2023) [2].

4. Relative growth rate (mg/m²/day)

The results of the Crop growth rate (CGR) for different treatments observed between 25-50 and 50-75 DAP were presented in the Table 2. Application of treatment T_{10} (RDNPK + $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha) recorded significantly higher relative growth rate of (17.90 and 24.38 mg/g/day) between 25-50 and 50-75 DAP.

Application of major and micronutrients to potato crop produced higher dry matter accumulation per plant due to continuous and adequate supply of essential plant nutrients from conjunctive use of organic and inorganic sources of nutrients. Response of nutrients added 100% or 125% of recommended dose of fertilizer significantly increased the crop growth rate and relative growth rate of potato was observed by Mukherjee (2017) [6].

3.2 Effect of balanced fertilization on yield attributes

1. Number of tubers per plant

The pooled data presented in Table 3 revealed that significantly higher number of tubers per plant of 6.16 was measured with application of treatment T_{10} (RDNPK + $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha). This was remained at par with treatment T5 (RDNPK) (5.88). Application of all three major nutrients *viz*; nitrogen, phosphorus and potassium with micro nutrients play an important role in increasing the number of tubers per plant and the mean weight of tuber per plant. This could be due to the significant role of nitrogen and potassium on photosynthesis, favors high energy status which helps the crop for timely and appropriate nutrients translocation and water absorption by roots which resulted in production of more photosynthates led to formation of more number of tubers per plant. These results are confirmed by Chaudhary *et al.* (2019) in potato crop.

2. Grade wise tuber yield

An appraisal of data summarized in Table 4.3 showed that balanced fertilizer treatments had significant effect on small size (<25 g), medium size (25-75 g) and large size (>75g) tuber yield (q/ha) of potato. An application of recommended dose of N, P and K + $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha (T_{10}) obtained significantly higher small, medium and large size tuber yield of potato (18.66, 176.68 and 229.67 q/ha) as compared to other treatments. Moreover, significantly lower small, medium and large size tuber (>75 g) yield was registered under treatment T_1 (RDN) (10.95, 127.33 and 175.98 q/ha). It was due to supply of major and micro nutrients which plays an important role in vegetative growth of potato by increasing chlorophyll content in leaves and accumulating more photosynthates in plant tissue. This resulted in increment of fresh and dry weight of plant as well as fresh and dry weight of tubers in each grade ultimately improved tuber yield. These results are in agreement with Raghuwanshi *et al.* (2021) [7].

3. Total tuber and haulm yield

The data outlined in Table 4.3 indicated that the total tuber and haulm yield differed significantly due to various balanced fertilizer treatments in pooled results. Significantly higher total tuber and haulm yield (425.02 and 22.76 q/ha) was observed with application of RDNPK + $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha (T_{10}) and it remained statically at par with treatment T5 (RDNPK), which recorded total tuber and haulm yield of 408.78 and 21.80 q/ha, respectively. Application of recommended dose of N only (T_1) recorded significantly lower total tuber and haulm yield (314.26 and 17.38 q/ha). The magnitude of increase in total tuber yield under treatments T_{10} and T_5 was 35.24 and 30.08 percent and haulm yield 30.96 and 25.43 percent in pooled results, respectively over treatment T_1.

Improved vegetative growth in response to application of macro and micro nutrients through chemical fertilizer (RDF) facilitating higher photosynthesis and translocation of assimilates to reproductive parts of the plant might be reason for recording higher total tuber and haulm yield of potato. These results are in line with the findings of Mukherjee (2017) [6] and Lenka and Das (2019) [5].

3.2 Effect of balanced fertilization on economics

The data accommodated in Table 4 showed that application of N-P-K along with $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha (T_{10}) executed in potato accrued higher gross realization (₹4,87,632/ha) and net realization of (₹2,92,579/ha) which was closely followed by the treatment T_5 (RDNPK) with ₹4,69,104/ha and (₹2,84,647/ha). While, recommended dose of N, P and K (T_5) to potato fetched higher benefit: cost ratio of 2.54 followed by T_{10} (RDNPK + $FeSO_4$ 25 kg/ha and $ZnSO_4$ 10 kg/ha) (2.50).

Table 1: Plant height and number of stems per hill of potato as influenced by different balanced fertilization treatments (pooled of 2 years)

Treatment	Plant height (cm)		Number of stems per hill
	At 50 DAP	At harvest	At 50 DAP
T_1: RDN	33.2	50.4	3.71
T_2: RDNP	35.0	55.3	3.79
T_3: RDNK	35.1	56.7	3.85
T_4: RDPK	33.6	54.1	3.72
T_5: RDNPK	39.8	63.0	4.55
T_6: RDN + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	35.3	56.5	4.01
T_7: RDNP + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	38.4	60.6	4.32
T_8: RDNK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	38.5	62.1	4.57
T_9: RDPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	35.2	59.1	4.15
T_{10}: RDNPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	41.8	65.2	4.80
Mean	36.6	58.32	4.15
S.Em.±	1.3	1.7	0.18
C.D. (P=0.05)	3.6	5.0	0.50
Year			
S.Em.±	0.56	0.78	0.08
C.D. (P=0.05)	NS	NS	NS
Y × T			
S.Em.±	1.77	2.47	0.25
C.D. (P=0.05)	NS	NS	NS
C.V.%	8.4	7.3	10.38

Table 2: Crop growth rate and relative growth rate of potato as influenced by different balanced fertilization treatments (pooled of 2 years)

Treatment	Crop growth rate (g/m²/day)		Relative growth rate (mg/m²/day)	
	At 25-50 DAP	At 50 -75 DAP	At 25-50 DAP	At 50 -75 DAP
T_1: RDN	3.96	8.26	13.83	19.10
T_2: RDNP	4.46	8.98	16.95	21.38
T_3: RDNK	4.35	8.89	16.73	21.36
T_4: RDPK	5.28	10.58	17.01	21.08
T_5: RDNPK	7.16	15.38	17.70	22.59
T_6: RDN + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	5.23	10.83	15.00	19.91
T_7: RDNP + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	5.25	10.79	16.14	20.84
T_8: RDNK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	6.54	13.49	17.53	21.54
T_9: RDPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	5.27	10.71	16.60	21.01
T_{10}: RDNPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	7.55	17.50	17.90	24.38
Mean	5.50	11.54	16.54	21.32
S.Em.±	0.24	0.30	0.74	0.62
C.D. (P=0.05)	0.70	0.87	2.11	1.79
Year				
S.Em.±	0.11	0.14	0.33	0.28
C.D. (P=0.05)	0.31	NS	NS	NS
Y × T				
S.Em.±	0.34	0.43	1.04	0.88
C.D. (P=0.05)	NS	NS	NS	NS
C.V.%	10.85	6.41	10.90	7.16

Table 3: Number of tubers per plant, grade wise tuber yield, total tuber yield and haulm yield of potato as influenced by different balanced fertilization treatments (pooled of 2 years)

Treatment	Number of tubers per plant	Grade wise tuber yield (q/ha)			Total tuber yield (q/ha)	Haulm yield (q/ha)
		Small size (<25 g)	Medium size (25-75 g)	Large size (>75 g)		
T_1: RDN	4.58	10.95	127.33	175.98	314.26	17.38
T_2: RDNP	4.67	13.59	135.25	187.48	336.32	18.74
T_3: RDNK	4.81	14.46	138.89	191.78	345.13	19.54
T_4: RDPK	4.61	12.68	131.39	180.62	324.69	17.93
T_5: RDNPK	5.88	17.86	159.31	231.61	408.78	21.80
T_6: RDN + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	5.07	12.49	136.73	179.10	328.33	18.85
T_7: RDNP + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	5.18	15.48	139.63	197.58	352.69	20.52
T_8: RDNK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	5.21	16.73	144.23	204.89	365.86	20.92
T_9: RDPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	5.03	15.05	132.37	188.40	335.82	19.53
T_{10}: RDNPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	6.16	18.66	176.68	229.67	425.02	22.76
Mean	5.12	14.80	142.18	196.71	353.69	19.84
S.Em.±	0.20	0.56	6.50	9.84	12.51	0.62
C.D. (P=0.05)	0.58	1.60	18.64	28.22	35.88	1.71
Year						
S.Em.±	0.09	0.25	2.91	4.40	5.60	0.26
C.D. (P=0.05)	NS	0.71	NS	NS	NS	NS
Y × T						
S.Em.±	0.29	0.79	9.19	13.91	17.69	0.83
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS
C.V.%	9.65	9.23	11.20	12.25	8.66	7.28

Table 4: Economics of potato as influenced by different balanced fertilization treatments (pooled of 2 years)

Treatment	Marketable tuber yield (kg/ha)	Gross realization (₹/ha)	Cost of cultivation (₹/ha)	Net realization (₹/ha)	B:C ratio
T_1: RDN	30332	363984	159816	204168	2.28
T_2: RDNP	32273	387276	168843	218433	2.29
T_3: RDNK	33067	396804	175430	221374	2.26
T_4: RDPK	31201	374412	180672	193740	2.07
T_5: RDNPK	39092	469104	184457	284647	2.54
T_6: RDN + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	31583	378996	170412	208584	2.22
T_7: RDNP + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	33721	404652	179439	225213	2.26
T_8: RDNK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	34913	418956	186026	232930	2.25
T_9: RDPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	32077	384924	191267	193657	2.01
T_{10}: RDNPK + $FeSO_4$ 25 kg/ha + $ZnSO_4$ 10 kg/ha	40636	487632	195053	292579	2.50

4. Conclusion

On the basis of two years of field experimentation, it is concluded that potato crop should be fertilized with either recommended dose of N-P-K (275:137.5:275 kg N:P:K/ha) along with 25 kg FeSO4 /ha and 10 kg $ZnSO_4$/ha or application of recommended dose of N-P-K to obtain higher potato yield and net realization.

5. References

1. Cochran WG, Cox GM. Experimental Designs. New York: John Wiley and Sons; 1967. p. 546-568.
2. Gogoi KN, Lhungdium J, Abonmai T, Luikham E, Devi KN, Singh S. Impact of various nitrogen rates on the performance of winter potato (var. Kufri Sinduri) in valley areas of Manipur, India. Int J Environ Clim Change. 2023;13(9):220-7.
3. Koch M, Naumann M, Pawelzik E, Gransee A, Thiel H. The importance of nutrient management for potato production part I: Plant nutrition and yield. Potato Res. 2020;63(1):97-119.
4. Kumar V, Aulakh CS, Kaur J, Chawla N. Nutrition management effects on productivity and tuber quality of potato (*Solanum tuberosum* L.). Indian J Agron. 2020;65(3):337-43.
5. Lenka B, Das SK. Effect of boron and zinc application on growth and productivity of potato (*Solanum tuberosum* L.) at alluvial soil (Entisols) of India. Indian J Agron. 2019;64(1):129-37.
6. Mukherjee D. Influence of mulching and graded fertility levels on microbial population, growth and productivity of potato (*Solanum tuberosum* L.). Int J Curr Microbiol Appl Sci. 2017;6(10):4784-92.
7. Raghuwanshi R, Singh SP, Tomar RS, Sharma SK, Bhadauria SS, Kashyap A, *et al*. Effect of nutrient omissions on growth, yield, nutrient uptake and economics of potato (*Solanum tuberosum* L.) in northern Madhya Pradesh. Int J Chem Stud. 2021;9(1):2159-63.
8. Ravikant, Chadha S. Effect of planting season and fertility regimes on different potato cultivars. Potato J. 2009;36(1-2):68-71.
9. Singh S, Kumar D, Chandel BS. Effect of balanced fertilization on yield, uptake and economics of potato (*Solanum tuberosum* L.) in alluvial soil. Indian J Agron. 2014;59(3):451-4.
10. Vaghela SJ, Patel JK, Patel RN, Zapadiya DM. Response of potato (*Solanum tuberosum* L.) to split application of nitrogen under North Gujarat agro-climatic condition. Int J Plant Soil Sci. 2023;35(19):479-86.