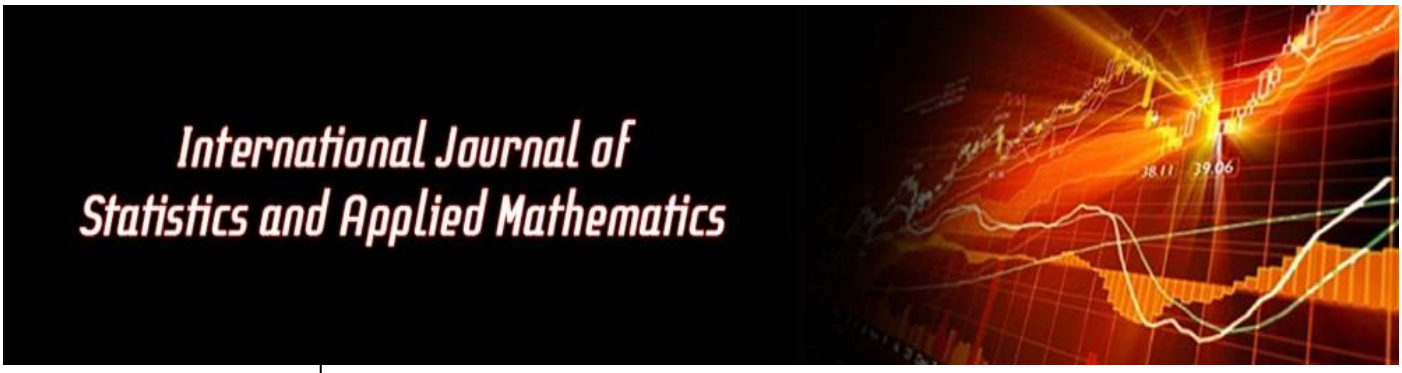
International Journal of Statistics and Applied Mathematics 2023; SP-8(6): 569-571



ISSN: 2456-1452
Maths 2023; SP-8(6): 569-571

https://www.mathsjournal.com
Received: 22-08-2023
Accepted: 28-09-2023

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Impact of different sources of nitrogen on yield and quality of potato (*Solanum tuberosum* L.) cv Kufri Chipsona-3

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Abstract
A field experiment entitled "Impact of different Sources of Nitrogen on yield and quality of Potato (*Solanum tuberosum* L.) cv Kufri Chipsona-3" was conducted during *rabi* season 2018-19 at, Fruit Research station, Entkhedi, Bhopal, Madhya Pradesh. Bhopal is located at $26^{0}13^{'}$ north latitude and $74^{0}4^{'}$ east longitude and 208 m above mean sea level. It lies in the central part of Madhya Pradesh state enjoying sub-tropical climate. The topography of the experimental field was plain with good irrigation facilities. The experiment laid down in seven treatments with control i.e. T_0- Nitrogen 00 kg/ha, T_1- Nitrogen 20 kg/ha, T_2- Nitrogen 60 kg/ha, T_3- Nitrogen 100 kg/ha, T_4- Nitrogen 140 kg/ha, T_5- Nitrogen 180 kg/ha and T_6- Nitrogen 220 kg/ha with three replications. The experiments was analyzed at Randomized Block Design. Yield characters i.e. Days to maturity, No. of tubers per plant, No. of tubers per plot (kg/ha), Yield of tuber kg/plant, Yield of tuber kg /plot and Yield of tuber q/ha. Quality parameter i.e. Dry matter and Moisture content per cent.

Keywords: Nitrogen, yield, quality and potato

Introduction
A tuberous crop is the potato (*Solanum tuberosum* L.). It is a member of the Solanaceae family. It is well known that the potato has kept millions of people alive by giving them food and nourishment during times of famine and conflict. This crop is particularly important to developing nations because of its high potential for production per unit area and time, as well as its high nutritional value, which helps to combat hunger and malnutrition and support growing populations (Pandey, 2002) [1]. One of the most significant crops in the world is the potato. Only rice, wheat, and maize rank higher than this. Potatoes are the only crop, after cereals, that can help the nation meet its food needs (Das, 1999) [2].
For crop plants to grow and develop, nitrogen is essential. It primarily affects yields through increasing leaf area; it can also affect other elements' behavior. Other effects include crop development, crop quality, and susceptibility to lodging (Poljak *et al.*, 2007) [3]. A shortage of nitrogen causes the lower leaves to eventually drop and turn yellow, which reduces the photosynthetic surface. Excess N causes a delay in the onset of tuberculosis. Additionally, there is a delay in the start of the linear phase of tuber growth, which lowers tuber production. Up to 100 kg N/ha, the response to N is often linear; at greater levels of N application, the response begins to decrease. Application of N has been shown to speed up tuber bulking and result in large-sized tubers with high yields. Potato tubers with higher nitrogen doses have higher protein contents and lower starch contents (Pandey, 2002) [1]. According to Singh and Raghav (2000) [7], there was a considerable increase in tuber production with increasing nitrogen levels. One vital component of plants that has an impact on overall plant output is nitrogen. The N efficiency of different potato varieties varies (Trehan & Kumar, 2014) [8].

Materials and Methods
A field experiment entitled "Impact of different Sources of Nitrogen on yield and quality of Potato (*Solanum tuberosum* L.) cv Kufri Chipsona-3" was conducted during *rabi* season 2018-

19 at, Fruit Research station, Entkhedi, Bhopal, Madhya Pradesh. Bhopal is located at 26˚13' north latitude and 74^{0}4' east longitude and 208 m above mean sea level. It lies in the central part of Madhya Pradesh state enjoying sub-tropical climate. The topography of the experimental field was plain with good irrigation facilities. The experiment laid down in seven treatments with control *i.e.* T_0- Nitrogen 00 kg/ha, T_1- Nitrogen 20 kg/ha, T_2- Nitrogen 60 kg/ha, T_3- Nitrogen 100 kg/ha, T_4- Nitrogen 140 kg/ha, T_5- Nitrogen 180 kg/ha and T_6- Nitrogen 220 kg/ha with three replication. The experiments was analyzed at Randomized Block Design. Yield characters i.e. Days to maturity, No. of tubers per plant, No. of tubers per plot (kg/ha), Yield of tuber kg/plant, Yield of tuber kg/plot and Yield of tuber q/ha. Quality parameter i.e. Dry matter and Moisture content per cent. The result revealed that all the parameters of yield and quality was found better under the treatments T_6- Nitrogen 220 kg/ha.

Moisture content per cent

It was calculated by the following formula:

$$\% \text{ moisture} = \frac{\text{Fresh weight of tubers} - \text{Dry weight of tubers}}{\text{Fresh weight of tubers}} \times 100$$

Results and Discussion

The minimum days to maturity was found in treatment T_6 (Nitrogen 220 kg/ha + Kufri Chipsona- 3) 86 days, while the maximum days to maturity was found in Control T_0 (103.5 days) respectively.

The, maximum no. of tubers per plant was found in treatment T_6 (Nitrogen 220 kg/ha + Kufri Chipsona- 3) 10.33, while the minimum no. of tubers per plant was found in Control T_0 (5.31) respectively. The, maximum number of tubers per plot was found in treatment T_6 (Nitrogen 220 kg/ha + Kufri Chipsona- 3) 578.67, while the minimum number of tubers per plot was found in Control T_0 (298.67) respectively. The, maximum yield of tubers g/plant was found in treatment T_6 (Nitrogen 220 kg/ha + Kufri Chipsona- 3) 580.0 g, while the minimum yield of tubers g/plant was found in Control T_0 (296.67 g) respectively. The, maximum yield of tubers kg/plot was found in treatment T_6 (Nitrogen 220 kg/ha + Kufri Chipsona- 3) 32.48 kg/plot, while the minimum yield of tubers kg/plot was found in Control T_0 (16.61 kg/plot) respectively. The, maximum yield of tubers (q/ha) was found in treatment T_6 (Nitrogen 220 kg/ha + Kufri Chipsona- 3) (360.89 q/ha), followed by the treatment (T_5) Nitrogen 180 kg/ha + Kufri Chipsona- 3, (323.97 q/ha) and (T_4) Nitrogen 140 kg/ha + Kufri Chipsona- 3 (289.13 q/ha), while the minimum yield of tubers (184.59 q/ha) was found in Control T_0 respectively. Stated differently, high densities that limit plant resources could lead to inter-plant competition, which could be mitigated by high nitrogen levels. Because the range of these variations in tuber numbers per unit area was greater than that of stolons, considerable variances could be seen in the interaction impact of all plant densities × nitrogen fertilizers. On the other hand, according to Jamaati-e-Somarin *et al.* (2010) [5], the treatments with the greatest values of stolons also produced the highest number of tubers per unit area.

Nitrogen had a substantial (p<0.01) impact on the mean tuber weight. While the control or 200 kg N ha^{-1} rates had a substantial impact on mean tuber weight, tuber weight rose with increasing nitrogen up to a certain point, with the application of 160 kg N ha^{-1} yielding the maximum value, nitrogen and plant density interactions in the potato crop (Jamaati-e-Somarin *et al*. 2010) [5]. According to Sharma and Kumar (2014) [6], the cultivar's restricted ability to use nitrogen beyond a certain point may be the cause of the poor response to future, higher dosages. The substantial interaction effects between nitrogen doses and plant density show that each combination of nitrogen dose and density had a substantial impact on the overall and seed size tuber yields. Due to their low market price, little sized tubers (grades <20 mm) are less sought after; on the other hand, medium sized tubers (28–40 mm) are more sought after due to their greater market price and seed value. Although there is little demand from consumers, large tubers (>40 mm) are sought after for industrial usage and export. Accordingly, the findings suggest that, in terms of gaining a high market value, distal half-cut pieces of large and medium-sized tubers are comparable to whole tubers of the same size (Hossain *et al.*, 2011) [4].

The, maximum dry matter was found in treatment T_6 (Nitrogen 220 kg/ha + Kufri Chipsona- 3) (25.93 %), while the minimum dry matter (21.16 %) was found in Control T_0 respectively. Total plant dry matter was affected by plant density and nitrogen, significantly (p<0.01). The findings of their study demonstrated that whereas excess rates reduced this feature, nitrogen application up to 160 kg ha^{-1} increased total plant dry matter. Plant density produced excellent results. The majority of traits demonstrated that raising the nitrogen rate to a specific rate boosted the overall plant dry matter yield before decreasing it. Interaction between nitrogen and plant density. (Jamaati-e-Somarin *et al*. 2010) [5] in potato crop.

The, maximum moisture content per cent was found in treatment T_6 (Nitrogen 220 kg/ha + Kufri Chipsona- 3) (76.66 %), while the minimum moisture content per cent (74.07 %) was found in Control T_0 respectively.

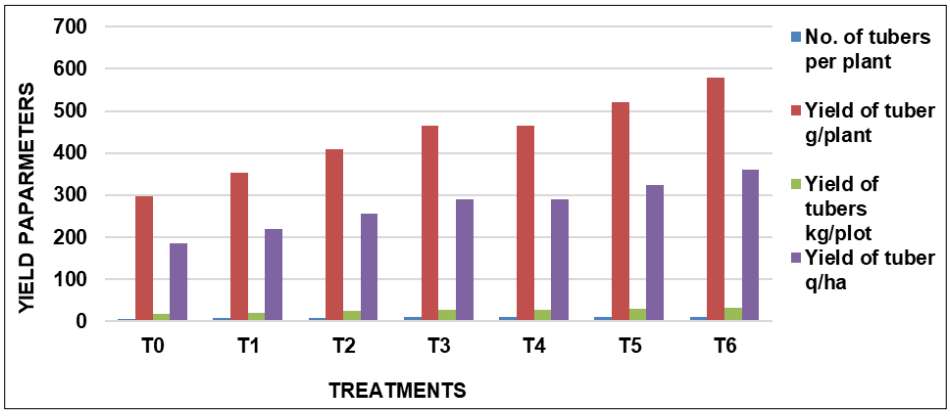

Fig 1: Response of nitrogen on yield parameters of potato crop

Table 1: Response of nitrogen on yield and quality parameters of potato crop

Treatments	Days to maturity	No. of tubers per plant	Yield of tuber g/plant	Yield of tubers kg/plot	Yield of tuber q/ha	Dry matter	Moisture content per cent
T_0	103.5	5.31	296.67	16.61	184.59	21.16	74.07
T_1	101.0	6.32	352.67	19.75	219.44	22.22	74.57
T_2	98.3	7.33	408.67	22.89	254.28	22.88	75.08
T_3	97.5	8.33	464.67	26.02	289.13	23.51	75.31
T_4	93.0	8.34	464.67	26.02	289.13	24.69	75.81
T_5	88.5	9.33	520.67	29.16	323.97	25.43	76.49
T_6	86.0	10.32	580.00	32.48	360.89	25.93	76.66
S.Em.±	0.187	0.218	15.648	0.876	9.737	0.042	0.023
CD at 5 %	0.576	0.672	48.216	2.700	30.001	0.130	0.071

Conclusion

In summary, the sentence is saying that, in the context of the study, the treatment involving 220 kg of nitrogen per hectare combined with the Kufri Chipsona-3 potato variety performed better than other nitrogen levels across all aspects of potato cultivation, including yield and quality of Potato.

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