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Influence of foliar nutrition through nano urea and boron on plant growth characters and seed yield in onion (*Allium cepa* L.)

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Abstract
Field experiment was conducted during 2022-23 at Saidapur farm, UAS Dharwad. The experiment was laid out in Randomized Block Design with three replications and Twelve treatments. Foliar spary of nano urea and boron take place at 45 & 60 days after planting the onion bulbs (DAP) at different levels in onion seed crop. Results reveled that among different treatment, T_9 (RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea (25 % N each) + Borax (0.5%) at 45 & 60 DAP) recorded higher plant height at 120 DAP, chlorophyll content at 90 DAP, number of umbels per plants, length of the scape, width of umbel, seed yield per plant and seed yield per hectare compared to control.

Keywords: Nano urea, boron, seed yield

Introduction
Onion (*Allium cepa* L.) belongs to family *Alliaceae* and most extensively cultivated herbaceous biennial vegetable crop. It is believed to be originated from the region between Turkmenistan and Afghanistan in Central Asia, where its wild relatives are still exists. In India, among the bulbous vegetable crops grown for commercial purpose, onion holds a prominent position. The onion is referred by various synonymous in different regional languages, such as *kanda, earulli, ullagaddi, piyaz,* and *pallando.*
The onion bulb is abundant in essential minerals such as phosphorus and calcium. Additionally, it is a valuable source of protein, vitamin C, quercetin, and flavonoids. Quercetin, found in onions, aids in elimination of free radicals within the human body.
Foliar nutrition refers to the process of supplying essential nutrients to plants by spraying their solutions onto the vegetative parts of the plant. Foliar application is practiced specific concentrations and time, allowing the plant to absorb the nutrients through the stomata of the leaves or through the cell walls and membranes.
IFFCO in collaboration with ICAR-KVKs, research institutes, and state agricultural universities have conducted extensive trials have been conducted on various crops across diverse agro-climatic regions to evaluate the efficacy of this innovative fertilizer molecule. The outcomes of these trials have revealed positive responses to the liquid formulation of nano urea.
Boron is indeed an essential micronutrient for plants, and its deficiency can pose a significant problem in many parts of India, It ranks as the second most prevalent micronutrient after zinc. It is involved in pollen germination, as it required for growth and development of pollen tubes and also fertility by facilitating the movement of sugars and other nutrients within the plant.
In view of these, the present field experiment on Influence of foliar nutrition through nano urea and boron on seed yield and quality in onion (*Allium cepa* L.) was designed with the following objectives:
1. Evaluation of foliar application of nano urea and boron on plant growth characters and seed yield of onion seed crop.

Material and Methods
The present field study was carried out during *rabi* 2022-23 at saidapur farm, University of Agricultural Sciences Dharwad.

Treatment details

This experiment consist of 12 treatments with three replications viz., T_1: RDF, T_2: RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 DAP, T_3: RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 60 DAP, T_4: RDPK+50% Nitrogen (Basal)+50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each),T_5: T_4 + Borax (0.5%) at 45 DAP, T_6: T_4 + Borax (0.5%) at 60 DAP, T_7: T_2+ Borax (0.5%) at 45 DAP, T_8: T_3 + Borax (0.5%) at 60 DAP, T_9: RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea (25 % N each) + Borax (0.5%) at 45 & 60 DAP, T_{10}: RDF + Borax (0.5%) at 45 DAP, T_{11}: Absolute control for Nitrogen, T_{12}: Absolute control. The freshly harvested onion bulbs of onion cv. Bhima Super were obtained from the Seed Unit, University of Agricultural Sciences, Dharwad. Medium and uniform size (about 3.5 cm in diameter) bulbs were planted in the unit plot. The distances between the rows and between the bulbs in a row were maintained at 60 cm and 20 cm, respectively. Before planting, the upper one fourth portion of seed bulb was cut with sharp knife and cut bulb were dipped in bavistin solution (2 g l^{-1}) for 10 minutes and then planted. Data regarding plant growth charcters are recorded at different crop growth period. Further the data obtained was subjected to statistical analysis.

Results and Discussion

The results revealed that foliar application of nano urea and boron at 45 and 60 days after planting (DAP) has recorded significantly higher plant growth parameters in onion as compared to control. Treatment T_9(RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea (25 % N each) + Borax (0.5%) at 45 & 60 DAP) was recorded higher plant height at 120 DAP (80.36 cm),chlorophyll content at 90 DAP (48.07), number of umbels per plants(3.75), length of the scape(76.35 cm), width of umbel(6.90 cm), seed yield per plant (19.33 g) and seed yield per hectare (6.57q) followed by T_6(RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each) + Borax (0.5%) at 60 DAP) and (RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each) + Borax (0.5%) at 45 DAP) and lowest were recorded in control.

The positive impact of using nano nitrogen spray in combination with boron on plant height improvement likely be attributed to enhanced nutrient absorption and transport. The increased nutrient availability could lead to improved cell division and an increase in cell protein content, which collectively contribute to height of plant. These findings are in consistent with the results of Marimuthu and Surendran (2015) [3], where the application of NPK and fertilizer sprays resulted in increased height of black gram. Similarly, Benzon *et al*. (2015) [1] observed that nano fertilizer was applied along with traditional fertilizer, even at lower application rates, it results to significant improvements in plant height.

Higher concentration of nitrogen in the leaves of plant led to higher chlorophyll content. Increased supply of nitrogen to the crop may increase the available chlorophyll content. Similar findings were reported by Mohamed *et al.* (2012) [4] in safflower and Mahdavi Khorami *et al*. (2020) [2] in sesame. Foliar application of nano urea significantly increased the chlorophyll content. Nano urea significantly increased the chlorophyll content when applied twice at pre flowering and flowering stages as compared to plants with no foliar application of nano urea.

The increase in number umbel count could be attributed to split dose application of 50 per cent of nano urea. These conditions likely promoted vigorous vegetative growth due to enhanced photosynthesis in the plants. The foliar application of nano urea improved the connection between the plant's source and sink, there by making it easier for the plant to absorb nutrients through its stomata. This enhanced nutrient uptake might explain the higher number of umbels per plant. Similarly, Sahu *et al*. (2022) [7] also found that using 75 per cent of the recommended fertilizer dose along with two foliar applications of nano urea resulted in the highest number of tillers compared to other approaches in rice.

The maximum width of umbel and length of scape were recorded from the T_9 (RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea (25 % N each) + Borax (0.5%) at 45 & 60 DAP) as compared to control. It might be due to applications of nano-technology based nitrogen applied at 45 DAP and 60 DAP helped in rapid absorption of nutrient which were optimally utilized by the plants and increased the width of the umbel. Similar findings were also reported by Rahman *et al.* (2017) [5] who reported that application of 50 per cent of recommended dose of nitrogen along with two splits of nano urea application produced maximum panicle length in rice crop

The maximum seed yield per plant and per hectare was observed from the T_9 (RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea (25 % N each) + Borax (0.5%) at 45 & 60 DAP) it is on par with the treatment T_6. It may be due to increased growth parameters like the number of umbels per plant, diameter of umbel, number of seeds per umbel results in considerable increases in seed production was observed in the foliar application of nano nutrients. The foliar spray of nano urea, which increases photosynthates assimilation and the translocation of photosynthates from source to sink. In addition, timely supply of nano urea at pre flowering and flowering stage, which contributes to the increase in seeds per umbel and seed yield per plant. Sahu *et al.* (2022) [7] reported that application of nano urea boosts the yield by promoting increase in growth of plant parts and metabolic processes like photosynthesis that cause more photosynthates to accumulate and translocate to economic parts of plant in rice crop.

Table 1: Influence of foliar spray of nano urea and boron on plant height at 120 DAP and chlorophyll content at 90 DAP of onion seed crop

	Treatment	Plant height (cm)	Chlorophyll content
T_1	Recommended dose of fertilizer	66.83	37.73
T_2	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 DAP	69.45	42.30
T_3	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 60 DAP	70.46	42.53
T_4	RDPK+50% Nitrogen (Basal)+50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each)	72.84	42.63
T_5	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each) + Borax (0.5%) at 45 DAP	76.37	43.53

T_6	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each) + Borax (0.5%) at 60 DAP	78.91	44.57
T_7	RDPK+50% Nitrogen (Basal) +50 % Nitrogen through nano urea + Borax (0.5%) at 45 DAP	73.53	42.63
T_8	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea + Borax (0.5%) at 60 DAP	75.35	43.47
T_9	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea (25 % N each) + Borax (0.5%) at 45 & 60 DAP	80.36	48.07
T_{10}	Recommended dose of fertilizer + Borax (0.5%) at 45 DAP	67.28	38.93
T_{11}	Absolute control for Nitrogen	63.53	35.13
T_{12}	Absolute control	61.64	32.57
	S.Em $\pm$	0.92	1.24
	C.D at 5%	2.72	3.65

Table 2: Influence of foliar spray of nano urea and boron on number of umbels per plant, length of scape, width of umbel, number of seeds per umbel of onion seed crop

	Treatments	**Number of umbels per plant**	**Length of scape (cm)**	**Width of umbel (cm)**
T_1	Recommended dose of fertilizer	2.43	59.51	5.59
T_2	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 DAP	2.56	65.42	6.24
T_3	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 60 DAP	2.74	66.46	6.31
T_4	RDPK+50% Nitrogen (Basal)+50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each)	2.84	68.82	6.34
T_5	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each) + Borax (0.5%) at 45 DAP	3.20	72.00	6.40
T_6	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each) + Borax (0.5%) at 60 DAP	3.60	74.91	6.45
T_7	RDPK+50% Nitrogen (Basal) +50 % Nitrogen through nano urea + Borax (0.5%) at 45 DAP	2.90	69.54	6.35
T_8	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea + Borax (0.5%) at 60 DAP	3.00	71.18	6.37
T_9	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea (25 % N each) + Borax (0.5%) at 45 & 60 DAP	3.75	76.35	6.90
T_{10}	Recommended dose of fertilizer + Borax (0.5%) at 45 DAP	2.56	63.28	6.19
T_{11}	Absolute control for Nitrogen	2.00	57.63	5.13
T_{12}	Absolute control	1.90	62.81	4.83
	S.Em $\pm$	0.16	1.40	0.17
	C.D at 5%	0.48	4.15	0.50

Table 3: Influence of foliar spray of nano urea and boron on seed yield per plant, seed yield per plot, seed yield per hectare of onion seed crop

	Treatments	**Seed yield /plant (g)**	**Seed yield /hectare (q)**
T_1	Recommended dose of fertilizer	8.63	5.21
T_2	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 DAP	10.20	5.40
T_3	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 60 DAP	10.48	5.47
T_4	RDPK+50% Nitrogen (Basal)+50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each)	10.54	5.57
T_5	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each) + Borax (0.5%) at 45 DAP	13.43	5.88
T_6	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea at 45 & 60 DAP (25 % N each) + Borax (0.5%) at 60 DAP	15.22	6.28
T_7	RDPK+50% Nitrogen (Basal) +50 % Nitrogen through nano urea + Borax (0.5%) at 45 DAP	11.27	5.63
T_8	RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea + Borax (0.5%) at 60 DAP	12.34	5.70
T_9	RDPK+50% Nitrogen (Basal) + 50% Nitrogen through nano urea (25 % N each) + Borax (0.5%) at 45 & 60 DAP	19.33	6.57
T_{10}	Recommended dose of fertilizer + Borax (0.5%) at 45 DAP	9.30	5.30
T_{11}	Absolute control for Nitrogen	6.52	4.87
T_{12}	Absolute control	6.24	2.68
	S.Em $\pm$	0.59	0.23
	C.D at 5%	1.75	0.69

Note - RDF: Recommended dose of fertilizer 125:75:125
RDPK: Recommended dose of potassium
DAP: Days after planting

Conclusion

Among all the treatments, treatment T_9 (RDPK+50% Nitrogen (Basal) +50% Nitrogen through nano urea (25% N each) + Borax (0.5%) at 45 & 60 DAP) was found best for plant growth and yield characters, like plant height, chlorophyll content, number of umbels per plant, length of the scape, width of umbels, seed yield per plant and seed yield per hectares. Thus from this study, it is concluded that foliar

application of nano urea and boron at proper growth stages of plant (45 and 60 DAP) enhances plant growth and seed yield in onion seed crop.

References

1. Benzon HRL, Rubenecia MRU, Ultra JVU, Lee SC. Nano fertilizer affects the growth, development and chemical properties of rice. International Journal of Agronomy and Agricultural Research. 2015;7(1):105-117.
2. Mahdavi Khorami A, Masoud Sinaki J, Amini Dehaghi M, Rezvan S, Damavandi A. Sesame (*Sesame indicum* L.) biochemical and physiological responses as affected by applying chemical, biological, and nano-fertilizers in field water stress conditions. Journal of Plant Nutrition. 2020;43(3):456-475.
3. Marimuthu S, Surendran U. Effect of nutrients and plant growth regulators on growth and yield of black gram in sandy loam soils of Cauvery new delta zone, India. Cogent Food and Agriculture. 2015;1(1):45-54.
4. Mohamed SJ, Jellings AJ, Fuller MP. Effect of nitrogen on Safflower physiology and productivity. African Crop Science Journal. 2012;20(4):225-238.
5. Rahman MR, Khan MA, Mahzabin IA. Efficacy and economics of urea spray technology for a locally discovered rice cultivar haridhan in Bangladesh. American Journal of Plant Biology. 2017;2(4):136-141.
6. Rathnayaka R, Mahendran, Sivaguru Iqbal, Yudistira LM, Rifnas. Influence of urea and nano nitrogen fertilizers on the growth and yield of rice (*Oryza sativa* L.) Cultivar 'Bg 250'. International Journal of Research Publications. 2018;5(2):235-238.
7. Sahu TK, Kumar Manish, Kumar, Narendra, Chandrakar T, Singh DP. Effect of nano urea application on growth and productivity of rice (*Oryza sativa* L.) under midland situation of Bastar region. The Pharma Innovation Journal. 2022;11(6):185-187.