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RESEARCH PAPER

Growth, yield and economics of sweet corn (*Zea mays* L. *Saccarata*) as influenced by foliar sprays of nano fertilisers

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Abstract: A field study was conducted during *rabi* 2020-21 at ICAR-KVK, UAS, Raichur (16Ë%125 N, 77Ë%205 E and 389 m) with an objective to assess the effect of foliar sprays of nano N and nano Zn on growth and yield of sweet corn crop. The experiment was laid out in the Randomized Complete Block Design (RCBD) with thirteen different nutrient treatments consisting of chemical nano nitrogen, chemical nano zinc and green nano zinc along with two recommended dose of fertilizer and absolute control treatment. The fresh cob yield (158.1 q ha^{-1}) and green fodder yield (214.5 q ha^{-1}) were significantly higher with application of 75% N, 100% P & K + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l. at 25 and 50 DAS, respectively. The magnitude of improvement in fresh cob yield was up to 18 per cent as compared to recommended dose of (150 kg N, 75 kg P_2O_5 and 37.5 kg K_2O ha^{-1}). Plant height (225.7 cm), green leaves per plant (12.60), leaf area (7130 cm^2 $plant^{-1}$), leaf area index (5.94), total dry matter accumulation (295.2 g $plant^{-1}$), SPAD (61.74) and NDVI (0.80) values were significantly influenced by foliar application of nano nitrogen and nano zinc. Nitrogen uptake (246.2 kg ha^{-1}) was higher with 75% N + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS, respectively This also recorded significantly higher gross returns (₹ 1,26,503 ha^{-1}), net returns (₹ 77,928 ha^{-1}) and B : C ratio (2.60). It was concluded that application of 75 % N, 100 % P & K + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 & 50 DAS, respectively was found optimum for sweet corn.

Key words: Foliar spray, Nano-urea, Nano-Zn, Sweet Corn

Introduction

Sweet corn (*Zea mays* L. *saccharata*) is one of the new generation maize types which is the most popular one among the different types of maize available and is extensively used for human consumption. Sweet corn originated from Peru and presently grown extensively all over America. It has been developed with higher levels of natural sugar, which makes it very popular. It is a hybridized maize variety, specially bred to increase sugar content and is also popularly called as "sugar corn".

It comes up well under a wide range of soil and climatic conditions, current maize yields have lot of potential to be exploited. To address all the difficulties of soil applied fertilizers like fixation, immobilization, volatilization, leaching and runoff to reduce all these losses, we should think of an alternate technology such as nanotechnology-based fertilizers to precisely detect and deliver correct quantity of nutrients and other inputs required by crops in suitable proportion that promote productivity while ensuring environmental safety.

Farmers are using urea and zinc sulphate fertilizers for soil as well as foliar application to crops; however, the efficacy is low. The present study was taken up to investigate the effects of N and Zn nano particles foliar application on growth and yield of sweet corn. Nano particles with small size and extensive surface area are expected to be the perfect forms for use as a N and Zn fertilizer in plants.

Material and methods

The experiment was carried out at ICAR-KVK farm, University of Agricultural Sciences, Raichur, which is situated at a latitude of 16° 15' N, longitude of 77° 20' E and at an elevation of 389 meters above mean sea level and it comes under North Eastern dry zone of Karnataka (Zone-2). The soil of the experimental site belongs to *Vertisols* (medium black soil). The soil was low in organic carbon (0.45%), available nitrogen (279.2 kg ha^{-1}), potassium (210.6 kg ha^{-1}) and medium phosphorus (29.31 kg ha^{-1}). The experiment was laid out in the Randomized Complete Block Design (RCBD) with thirteen different nutrient treatments contains of IFFCO liquid chemical nano nitrogen, IFFCO liquid chemical nano zinc and laboratory prepared liquid green nano zinc along with two recommended dose of fertilizers and absolute control treatment. These treatments were replicated thrice. T_1: Absolute control, T_2: 100% NPK (150 kg N, 75 kg P_2O_5, and 37.5 kg K_2O ha^{-1}), T_3: 100% NPK + 25 kg ha^{-1} $ZnSO_4$, T_4: 75% N + foliar application of chemically synthesized nano N @ 4 ml/l, T_5: 50% N + foliar application of chemically synthesized nano N @ 4 ml/l, T_6: 25% N + foliar application of chemically synthesized nano N @ 4 ml/l, T_7: Foliar application of chemically synthesized nano N @ 4 ml/l, T_8: T_4 + foliar application of chemically synthesized nano Zn @ 2 ml/l, T_9: T_5 + foliar application of chemically synthesized nano Zn @ 2 ml/l, T_{10}: T_6 + foliar application of chemically synthesized nano Zn @ 2 ml/l, T_{11}: T_7 + foliar application of chemically synthesized nano Zn @ 2 ml/l, T_{12}: T_4

+ foliar application of green synthesized nano Zn @ 2 ml/l and T_{13}: T_5 + foliar application of green synthesized nano Zn @ 2 ml/l. The recommended package of practices (RPP)–FYM @ 10 t + 75 kg P_2O_5 and 37.5 kg K_2O ha^{-1} will be followed for all the treatments. Foliar application of nano nitrogen and nano zinc particles will be sprayed at 25 and 50 (DAS)

Preparation and standardization ofnitrogen and zinc nano particles

Standard liquid chemical N and Zn nano particles were procured from Indian Farmers Fertilizer Co-operative Limited (IFFCO), The required concentration of standard Nitrogen nano- particles was dissolved in distilled water and kept for sonication @ 60°C for 30 min. Preparation of green nano zinc particles the spinach leaves were thoroughly washed with distilled water and dried using a solar tunnel dryer @ 40 °C for 48 hours. The dried leaves were ground using a grinder to make into a fine powder and passed through a 100 mesh sieve (150 µm). Five grams of dried powder was added to 100 ml ethanol in a 250 ml conical flask and kept for 24 hours and filtered through filter paper (Whatman No.1). The filtrate was stored at 4 Ë%C for further process. The leaf extract of spinach (50 ml) was boiled at 60-80 °C using magnetic stired on hot plate. Zinc nitrate hexahydrate $[Zn(NO_3)_2.6H_2O]$ was used as a precursor. 1 mM zinc nitrate solution was prepared using distilled water. The solution was added to the leaf extract when temperature reached to 60 Ë%C and boiled for 30 minutes or until colour changed from dark green to pale yellow. A change in the colour indicated the formation of ZnO Nano particles (Amrita *et al*., 2015).

Results and discussion

The data pertaining to plant height are furnished in the Table 1. In all growth stages, significant difference in plant height of sweet corn was noticed with nano N and nano Zn particles with different levels of recommended dose of soil applied nitrogen to that of absolute control. Significantly higher plant height was observed in 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS (58.73, 207.3 and 225.7 cm, respectively at 30, 60 DAS and at harvest), this treatment was on par with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized nano Zn @ 2 ml/l (55.27, 201.3 and 220.7 cm, respectively at 30, 60 DAS and at harvest) and 100 per cent NPK + 25 kg ha^{-1} $ZnSO_4$ (52.87, 199.8 and 213.4 cm, respectively at 30, 60 DAS and at harvest). The lower plant height was observed in absolute control (33.40, 160.3 and 169.3 cm, respectively at 30, 60 DAS and at harvest) over all other treatments. Increased plant height recorded in the 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l and 75 per cent RDN + chemically synthesized nano N @ 4 ml/l and green synthesized Zn @ 2 ml/l at 25 and 50 DAS due to adequate supply nitrogen and zinc which might have accelerated the activity of enzyme and auxin metabolism in the plant, which in turn enlarge the cell and cell elongation resulting in taller plants. This is in conformity with the works of Torres- Olivar *et al*. (2014) and Nithya *et al*. (2018).

The data pertaining to chlorophyll content by SPAD meter as influenced by foliar application of nano nitrogen and nano zinc particles with different levels of recommended dose of nitrogen is presented in Table 2. There was significant difference in chlorophyll content of sweet corn at 30 DAS with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS (42.99) and this treatment was on par with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized nano Zn @ 2 ml/l at 25 and 50 DAS (41.43) and 100 per cent NPK + 25 kg ha^{-1} $ZnSO_4$ (40.53) over rest of the treatments. Significantly lower SPAD readings were recorded in absolute control (20.44).

Significant difference in chlorophyll content of sweet corn was recorded at 60 DAS with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS

Table 1. Plant height (cm) at different growth stages of sweet corn as influenced by foliar application of nano nitrogen and nano zinc

Treatments	Plant height (cm)		
	30 DAS	60 DAS	At harvest
T_1 : Absolute control	33.40	160.3	169.3
T_2 : 100% NPK (150 kg N, 75 kg P_2O_5, and 37.5 kg K_2O/ha)	49.20	195.8	205.9
T_3 : 100% NPK + 25 kg/ha $ZnSO_4$	52.87	199.8	213.4
T_4 : 75% N + foliar application of chemically synthesized nano N @ 4 ml/l	50.73	196.0	208.3
T_5 : 50% N + foliar application of chemically synthesized nano N @ 4 ml/l	50.00	193.9	206.7
T_6 : 25% N + foliar application of chemically synthesized nano N @ 4 ml/l	48.40	188.3	204.9
T_7 : Foliar application of chemically synthesized nano N @ 4 ml/l	44.53	175.0	199.4
T_8 : T_4 + foliar application of chemically synthesized nano Zn @ 2 ml/l	58.73	207.3	225.7
T_9 : T_5 + foliar application of chemically synthesized nano Zn @ 2 ml/l	51.10	196.6	207.7
T_{10} : T_6 + foliar application of chemically synthesized nano Zn @ 2 ml/l	50.33	187.0	203.3
T_{11} : T_7 + foliar application of chemically synthesized nano Zn @ 2 ml/l	46.67	178.4	195.4
T_{12} : T_4 + foliar application of green synthesized nano Zn @ 2 ml/l	55.27	201.3	220.7
T_{13} : T_5 + foliar application of green synthesized nano Zn @ 2 ml/l	50.60	189.3	202.4
S.Em.±	2.49	3.5	4.9
C.D.(P=0.05)	7.27	10.2	14.4

Note: RD P_2O_5 and RD K_2O common for all the treatments except T_1 and Foliar application of nano N and nano Zn at @ 25 and 50 DAS

Table 2. Soil plant analysis development (SPAD) readings different growth stages of sweet corn as influenced by foliar application of nano nitrogen and nano zinc

Treatments	SPAD readings		
	30 DAS	60 DAS	At harvest
T_1 : Absolute control	20.44	31.12	38.23
T_2 : 100% NPK (150 kg N, 75 kg P_2O_5, and 37.5 kg K_2O/ha)	32.92	41.34	51.46
T_3 : 100% NPK + 25 kg/ha $ZnSO_4$	40.53	46.28	58.77
T_4 : 75% N + foliar application of chemically synthesized nano N @ 4 ml/l	39.86	44.88	56.83
T_5 : 50% N + foliar application of chemically synthesized nano N @ 4 ml/l	35.18	43.49	52.91
T_6 : 25% N + foliar application of chemically synthesized nano N @ 4 ml/l	28.41	37.52	46.62
T_7 : Foliar application of chemically synthesized nano N @ 4 ml/l	23.22	34.12	40.73
T_8 : T_4 + foliar application of chemically synthesized nano Zn @ 2 ml/l	42.99	50.75	61.74
T_9 : T_5 + foliar application of chemically synthesized nano Zn @ 2 ml/l	36.18	44.78	53.53
T_{10} : T_6 + foliar application of chemically synthesized nano Zn @ 2 ml/l	28.90	40.03	46.40
T_{11} : T_7 + foliar application of chemically synthesized nano Zn @ 2 ml/l	24.32	33.80	42.45
T_{12} : T_4 + foliar application of green synthesized nano Zn @ 2 ml/l	41.43	48.36	60.27
T_{13} : T_5 + foliar application of green synthesized nano Zn @ 2 ml/l	37.05	47.48	56.96
S.Em.±	0.94	1.82	1.18
C.D. (P=0.05)	2.73	5.32	3.44

Note: RD P_2O_5 and RD K_2O common for all the treatments except T_1 and Foliar application of nano N and nano Zn at @ 25 and 50 DAS.

(50.75) as compared to other treatments. However, it was on par with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized nano Zn @ 2 ml/l at 25 and 50 DAS (48.36) and 100 per cent NPK + 25 kg ha^{-1} $ZnSO_4$ (46.28). Significantly lower SPAD readings were recorded in absolute control (31.12).

There was significant difference in chlorophyll content of sweet corn at 60 DAS with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS (61.74) over rest of treatments. This treatment was on par with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized nano Zn @ 2 ml/l at 25 and 50 DAS (60.27) and 100 per cent NPK + 25 kg ha^{-1} $ZnSO_4$ (58.77). Significantly lower SPAD readings were recorded in absolute control (38.23).

The measurement with SPAD is an indicative of greenness of the plant, which indicates the chlorophyll content of plant. Highest SPAD value was recorded in 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS might be due to promotion of the absorption and utilization of nutrients such as nitrogen by nano-fertilizers compound as concluded by Farnia and omidi, (2015).

The economic yield of a plant is an outcome of a series of integrated interactions of various biological events involving biochemical, physiological and morphological changes which take place during its development in accordance with supply of light, water, temperature and nutrients. Significant differences were observed in yield and yield components *viz.,* cob length (cm), cob girth (cm), number of kernels per cob, cob weight (g cob^{-1}), fresh cob yield (q ha^{-1}), green fodder yield (q ha^{-1}) and Harvest index due to foliar application of nano nitrogen and nano zinc particles with different levels of recommended dose of nitrogen. Fresh cob yield of sweet corn was significantly influenced by foliar application of nano nitrogen and nano zinc particles with different levels of recommended dose of nitrogen represented in Table 3.

Among all treatments, 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS (158.1 q ha^{-1}) recorded highest fresh cob yield of sweet corn over the rest of the treatments. This was found on par with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized nano Zn @ 2 ml/l (155.1 q ha^{-1}) and 100 per cent NPK + 25 kg ha^{-1} $ZnSO_4$ (152.5 q ha^{-1}). Significantly lower cob yield was recorded in absolute control (78.34 q ha^{-1}) as compared all to other treatments.

In the present study 75 per cent RDN, 100% P & K + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS recorded higher cob length, cob girth, maximum number of kernels per cob, cob weight and cob yield this is mainly due to small size and large effective surface area of nano particles could easily penetrated into the plant lead to better uptake of nitrogen and zinc. Nitrogen is an essential element of all the amino acids in plant structures which are the building blocks of plant proteins, important in the growth and development of vital plant tissues and cells like the cell membranes and chlorophyll. Thus, plants with sufficient nitrogen will experience high rates of photosynthesis and typically exhibit vigorous plant growth and development. Zinc plays as an activator of enzymes in plants and is directly involved in the biosynthesis of auxin, which produces more cells and dry matter that in turn will be stored in seeds as sink. Thus, there was increase in kernel yield is more expected (Devlin and Withan; 1983 and Parmar snehalbhai, 2016).

Green fodder yield of sweet corn was significantly influenced by foliar application of nano nitrogen and nano zinc particles with different levels of recommended dose of nitrogen represented in Table 3. Among all treatments, 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS (214.8 q ha^{-1}) recorded higher significant green fodder yield of sweet corn as compared to other treatments. However, it was found on par with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized nano Zn @ 2 ml/l at 25 and 50 DAS (211.2 q ha^{-1}) and significantly lower green fodder yield was produced in absolute control (134.1 q ha^{-1}) as compared all to other treatments. Higher green fodder yield obtained in 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS was attributed to significant increase in dry matter production in leaves and stem at various growth stages. Progressive significant increase in dry matter production was mainly attributed to increase in growth factors like plant height. This is in conformity with the results of Devid (1962) and Bommegowda (1986). This increase in height was due to extended intermodal length. Such increase could be ascribed to higher precursor activity of nano scale Zn in auxin production (Kobayashi and mizutani, 1970).

Higher dry matter production was due to more number of leaves plant^{-1} and leaf area at harvest 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS which provided more photosynthates for the grain (sink) and more of accumulated dry matter retained in the stem at harvest, which resulted in higher stover production. These findings are in accordance with work of Catanescu (1977) and Krishnaveni and Ramaswamy (1985). Harvest index (%) of sweet corn was significantly influenced due to foliar application of nano nitrogen and nano zinc particles with different levels of recommended dose of nitrogen presented in Table 3.

Among all treatments, 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized nano Zn @ 2 ml/l at 25 and 50 DAS (42.09) recorded highest harvest index of sweet corn as compared to rest of the treatments. However, it was found on par with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS(41.88), 100 per cent NPK + 25 kg ha^{-1} $ZnSO_4$ (41.61), 100 per cent NPK (40.92), 50 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l at 25 and 50 DAS (40.67) and 50 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l at 25 and 50 DAS and chemically synthesized nano Zn @ 2 ml/l at 25 and 50 DAS (40.60). Significantly lower harvest index was recorded in absolute control (36.98) as compared all to other treatments.

Lowest cost of cultivation was noticed in absolute control (₹ 38,188 ha^{-1}) as compared to all other treatments. The highest cost of cultivation was recorded in 100 per cent RDF + 25 kg $ZnSO_4$ ha^{-1} (₹ 49,994 ha^{-1}), 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized nano zinc 2ml/l at 25 and 50 DAS (₹ 48,569 ha^{-1}) followed by 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano zinc 2ml/l at 25 and 50 DAS (₹ 48,575 ha^{-1}). (Table 4). Gross returns were significantly higher with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano zinc 2ml/l at 25 and 50 DAS (₹ 1,26,503 ha^{-1}) as compared all other treatments. However, it was on par with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized nano zinc 2ml/l at 25 and 50 DAS (₹ 1,24,080 ha^{-1}) and 100 per cent RDF + 25 kg $ZnSO_4$ ha^{-1} (₹ 1,21,984 ha^{-1}). Net returns were significantly higher with application of 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano zinc 2ml/l at 25 and 50 DAS (₹ 77,928ha^{-1}) compared all other treatments and it was on par with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized nano zinc 2ml/l at 25 and 50 DAS (₹ 75,511 ha^{-1}) and 100 per cent NPK + 25 kg ha^{-1} $ZnSO_4$ (₹ 71,990 ha^{-1}). Significantly highest

Table 3. Fresh cob yield, green fodder yield and harvest index as influenced by foliar application of nano nitrogen and nano zinc

Treatments	Fresh cob yield(q ha^{-1})	Green fodder yield (q ha^{-1})	Harvest index
T_1 : Absolute control	78.3	134.1	36.98
T_2 : 100% NPK (150 kg N, 75 kg P_2O_5, and 37.5 kg K_2O/ha)	131.4	189.7	40.92
T_3 : 100% NPK + 25 kg/ha $ZnSO_4$	152.5	207.9	41.61
T_4 : 75% N + foliar application of chemically synthesized nano N @ 4 ml/l	133.0	200.0	39.69
T_5 : 50% N + foliar application of chemically synthesized nano N @ 4 ml/l	126.4	184.4	40.67
T_6 : 25% N + foliar application of chemically synthesized nano N @ 4 ml/l	113.2	168.3	40.12
T_7 : Foliar application of chemically synthesized nano N @ 4 ml/l	85.12	132.4	39.14
T_8 : T_4 + foliar application of chemically synthesized nano Zn @ 2 ml/l	158.1	214.8	41.88
T_9 : T_5 + foliar application of chemically synthesized nano Zn @ 2 ml/l	133.5	208.6	39.03
T_{10}: T_6 + foliar application of chemically synthesized nano Zn @ 2 ml/l	118.6	178.1	39.97
T_{11}: T_7 + foliar application of chemically synthesized nano Zn @ 2 ml/l	97.92	147.3	39.94
T_{12}: T_4 + foliar application of green synthesized nano Zn @ 2 ml/l	155.1	211.2	42.09
T_{13}: T_5 + foliar application of green synthesized nano Zn @ 2 ml/l	129.9	189.9	40.60
S.Em.±	2.9	4.3	0.67
C.D. (P=0.05)	8.5	12.9	1.95

Note: RD P_2O_5 and RD K_2O common for all the treatments except T_1 and Foliar application of nano N and nano Zn at @ 25 and 50 DAS

Table 4. Economies of sweet corn as influenced by foliar application of nano nitrogen and nano zinc

Treatments	Cost of cultivation (₹ ha^{-1})	Gross returns (₹ ha^{-1})	Net returns (₹ ha^{-1})	B:C
T_1 : Absolute control	38188	62671	24483	1.64
T_2 : 100% NPK (150 kg N, 75 kg P_2O_5, and 37.5 kg K_2O/ha)	48165	105112	56947	2.18
T_3 : 100% NPK + 25 kg/ha $ZnSO_4$	49994	121984	71990	2.44
T_4 : 75% N + foliar application of chemically synthesized nano N @ 4 ml/l	48269	106400	58131	2.20
T_5 : 50% N + foliar application of chemically synthesized nano N @ 4 ml/l	47760	101134	53374	2.12
T_6 : 25% N + foliar application of chemically synthesized nano N @ 4 ml/l	47251	90545	43294	1.92
T_7 : Foliar application of chemically synthesized nano N @ 4 ml/l	46741	68092	21351	1.46
T_8 : T_4 + foliar application of chemically synthesized nano Zn @ 2 ml/l	48575	126503	77928	2.60
T_9 : T_5 + foliar application of chemically synthesized nano Zn @ 2 ml/l	48066	106827	58761	2.22
T_{10} : T_6 + foliar application of chemically synthesized nano Zn @ 2 ml/l	47557	94859	47302	1.99
T_{11} : T_7 + foliar application of chemically synthesized nano Zn @ 2 ml/l	47047	78334	31287	1.67
T_{12} : T_4 + foliar application of green synthesized nano Zn @ 2 ml/l	48569	124080	75511	2.55
T_{13} : T_5 + foliar application of green synthesized nano Zn @ 2 ml/l	48060	103952	55892	2.16
S.Em. ±	-	2321	2321	0.05
C.D. (P=0.05)	-	6776	6776	0.14

Note: RD P_2O_5 and RD K_2O common for all the treatments except T_1 and Foliar application of nano N and nano Zn at @ 25 and 50 DAS

B:C ratio (2.60) was recorded with application of 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano zinc 2ml/l as compared to all other treatments. However, it was on par with 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized nano zinc 2 ml/l at 25 and 50 DAS (2.55) and 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l (2.44). Higher profit per rupee invested was recorded in the results showed that 75 per cent RDN + foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized nano zinc 2ml/l at 25 and 50 DAS (2.60), was due to adequate fresh cob yield. Lower BC ratio was observed in only foliar application of chemically synthesized nano N @ 4 ml/l at 25 and 50 DAS (1.45) and followed by absolute control (1.64), because of higher cost of cultivation leads to lower B:C ratio. This work was confirmatory with the work of Bheeresha, (2018) and Uma, (2019).

Conclusion

It was concluded that application of 75% RDN (112.5 kg N), 100% P & K along with foliar application of chemically synthesized nano N @ 4 ml/l and chemically synthesized Zn @ 2 ml/l at 25 and 50 DAS, respectively was found optimum for higher fresh cob yield of sweet corn followed by the application of 75% RDN(112.5 kg N), 100% P & K along with foliar application of chemically synthesized nano N @ 4 ml/l and green synthesized Zn @ 2 ml/l at 25 and 50 DAS, respectively.

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