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Influence of foliar fertilizers on growth dynamics of *rabi* maize (*Zea mays* L.) under south Gujarat condition

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Abstract

A field experiment was carried out to study the “Influence of Foliar Fertilizers on Growth Dynamics of *rabi* Maize (*Zea mays* L.) under south Gujarat Condition” at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari during *rabi* seasons of 2023-24 and 2024-25. The experiment was laid out in randomized block design with fourteen treatments and three time replicated. The soils of the experimental sites in both years were clay in texture, alkaline in nature with normal electrical conductivity, low in organic carbon and available nitrogen, medium in available phosphorus and fairly high in available potassium. The results showed that different treatments involving RDF levels and foliar fertilizers significantly influenced growth, yield attributes and yield of maize. Application of 100% RDF registered significantly higher plant height, leaf area, LAI and dry matter accumulation at 45 DAS. For 60 DAS and at harvest, application of 75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS recorded significantly higher growth parameters viz., plant height, leaf area, LAI and dry matter accumulation at 60 DAS and at harvest, during both the years and in pooled analysis, respectively.

Keywords: Foliar spray, Nano urea, Nano DAP, Rabi maize, Growth parameters, leaf area and Leaf area index

Introduction

Maize (*Zea mays* L.) is one of the world's most important cereal crops after rice and wheat and is widely recognized as the “Queen of Cereals” because of its high yield potential, wide adaptability and diverse utilization. It serves as a staple food, livestock feed and an important raw material for various industries including starch, ethanol, paper and pharmaceutical products (Erenstein *et al.*, 2022) ^[1]. Globally, maize is cultivated on about 206 million hectares with a production exceeding 1.2 billion tonnes (Anon., 2024) ^[2], whereas in India it occupies about 12.84 million hectares with a production of 46.17 million tonnes (Anon., 2025a) ^[3]. Area of 425.68 thousand hectares with a production of 970.45 thousand tonnes and an average productivity of 2280 kg/ha in Gujarat (Anon., 2025-26b) ^[3, 4].

Maize is a nutrient-exhaustive crop and responds markedly to balanced fertilization, particularly nitrogen and phosphorus throughout its growing period right from the seedling stage to grain filling stage. The demand of plants for nitrogen is more than any other nutrient and it is noticed that deficiency at any stage of growth, especially at tasseling and silking stage, may lead to virtual crop failure. Nitrogen deficiency is characterized by stunted plant growth with yellowing of green foliage, particularly the lower leaves (Dodiya *et al.*, 2024) ^[9]. As of now, 30-45% of nitrogen and 18-20% of phosphorus is utilized by plants at the farm level, while the rest is wasted due to quick chemical transformation because of leaching, which contaminates soil and water bodies and volatilization that causes emissions of ammonia gas in the atmosphere leading to air pollution and global warming along with runoff and soil fixation. Imbalanced fertilization is one of the most critical factors to be considered for N and P management. Over the long run, the application of nitrogen and phosphorus based fertilizers with less efficiency might deteriorate the quality of maize and pollute the environment (Samui *et al.*, 2022) ^[17]. These losses of fertilizer cannot be completely avoided, but can be minimized by using advanced techniques such as foliar application, split application and use of slow-release fertilizers.

Foliar fertilization has emerged as an effective complementary approach to conventional soil fertilization by supplying nutrients directly through leaves during periods of high crop demand (Toth *et al.*, 2022) [23].

Nanotechnology is a powerful tool in agriculture that utilizes nanomaterials of less than 100 nm in size and has emerged as an innovative science to develop concentrated sources of plant nutrients with a higher absorption rate, utilization efficacy and minimum losses (Upadhyay *et al.*, 2023) [24]. Nanotechnology based fertilizers are made by encapsulating or developing plant nutrients in its nanoforms and ultimately delivering in the form of nano-sized emulsions. Nano fertilizers are very effective for controlled nutrient supply to plants at different growth stages. Nanoscale nutrients can effectively enter into plant leaves, trigger nutrient pathways and achieve higher nutrient use efficiency. Although the beneficial effects of nano fertilizers have been reported, limited information is available regarding the combined foliar application of nano urea and Nano DAP with reduced recommended fertilizer doses under the agro-climatic conditions of south Gujarat.

Materials and Methods

A field experiment entitled “Influence of Foliar Fertilizers on Growth Dynamics of *rabi* Maize (*Zea mays* L.) under south Gujarat Condition” was carried out on Block - A in plot No. 13 and Block - B in plot No. 12 during the *rabi* season of 2023-24 and 2024-25, respectively at College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari. The experiment was laid out in Randomized Block Design with three replications and 14 treatments comprising T₁: Control, T₂: 100% RDF, T₃: Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS, T₄: Foliar spray of Nano DAP 4 ml/L at 45 and 60 DAS, T₅: Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS, T₆: Foliar spray of Urea 2% at 45 and 60 DAS, T₇: Foliar spray of Urea phosphate 2% at 45 and 60 DAS, T₈: Foliar spray of Urea 2% + Urea phosphate 2% at 45 and 60 DAS, T₉: 75% RDF + Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS, T₁₀: 75% RDF + Foliar spray of Nano DAP 4 ml/L at 45 and 60 DAS, T₁₁: 75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS, T₁₂: 75% RDF + Foliar spray of Urea 2% at 45 and 60 DAS, T₁₃: 75% RDF + Foliar spray of Urea phosphate 2% at 45 and 60 DAS and T₁₄: 75% RDF + Foliar spray of Urea 2% + Urea phosphate 2% at 45 and 60 DAS. The soils of the experimental sites in both years were clay in texture, alkaline in nature with normal electrical conductivity, low in organic carbon and available nitrogen, medium in available phosphorus and fairly high in available potassium. According to the data for the period of experimentation in 2023-24 and 2024-25 indicated that the mean maximum temperature varies from 28.3 to 39.2°C and 29.6 to 37.3°C, while the mean minimum temperature ranged between 11.6 to 23.7°C and 12.9 to 22.9°C, respectively. The mean relative humidity (morning) ranged between 67 to 96 and 63 to 93 per cent and at evening it ranged between 25 to 73 and 17 to 50 per cent during the experimental period, respectively. The mean bright sunshine hours per day varies from 3.9 to 9.9 and 1.4 to 10.3 during 2023-24 and 2024-25, respectively. The mean evaporation ranged from 1.9 to 5.7 and 3.2 to 5.9 mm during 1st and 2nd year, respectively. Total four different foliar fertilizers used in the experimentation, which was Nano urea (4.0% N), Nano DAP (8.0% N and 16.0% P₂O₅) @ 4 ml/L and water-soluble fertilizers urea phosphate @ 2% (17% N and 44% P₂O₅) and Conventional urea @ 2%. They were applied by using knapsack sprayer with the help of flat fan nozzle at 500 L/ha of water at 45 and 60 DAS as per treatment. *Rabi* maize variety GAYMH-3 was

sown at a spacing of 60 cm × 20 cm, using a seed rate of 25 kg/ha and the RDF (150:60:00 NPK kg/ha) was used. Leaf area was measured by lengths of all the fully opened leaf lamina per plant were measured from the base to the tip of the leaf. Breadth was taken at three portions *i.e.* below the middle, at middle and above the middle portion of the leaf lamina and then the average was taken. The products of leaf length and breadth were multiplied by the factor 0.75 (Elings, A., 2000) [10]. Calculate the leaf area index using following formula.

$$\text{Leaf area index (LAI)} = \frac{\text{Leaf area per plant (cm)}}{\text{Ground area (cm)}}$$

Results and Discussion

1) Plant Height (cm)

The result of experiments on plant height at 45, 60 DAS and at harvest of maize is summarized in Table 1. An examination of data revealed that significantly taller plants (85.89, 88.10 and 87.00 cm) were observed under treatment T₂ (100% RDF) at 45 DAS in 1st, 2nd year and pooled results of the study, respectively but it remained statistically at par with treatments T₁₁ (75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS), T₉ (75% RDF + Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS) and T₁₂ (75% RDF + Foliar spray of Urea 2% at 45 and 60 DAS). This might be due to immediate and adequate availability of essential nutrients through urea and SSP at sowing basal soil application during the early vegetative growth stage that enhances chlorophyll synthesis, cell division and vegetative growth, resulting in rapid stem elongation and increased plant height.

At 60 DAS significantly taller maize plant (138.87, 141.20 and 140.04 cm) was noted under T₁₁, which was statistically similar with treatment T₉ (75% RDF + Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS), T₂ (100% RDF) and T₁₀ (75% RDF + Foliar spray of Nano DAP 4 ml/L at 45 and 60 DAS) during both the years whereas, T₉ and T₂ during pooled study. At harvest (189.33, 193.36 and 191.35 cm) were registered with treatment T₁₁ (75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS) it remained statistically comparable with treatments T₉, T₂ and T₁₀ during 2023-24 while T₉ and T₂ during 2024-25 and in pooled results. In contrast, significantly lower plant height was observed under control treatment (T₁) at 45, 60 DAS and at harvest during both the years and in pooled results, respectively.

This superiority can be precisely attributed to the complementary and efficient supply of nitrogen and phosphorus through soil and foliar routes, ensuring continuous nutrient availability during critical growth periods. The basal application of 75% RDF met the initial crop demand, while foliar applied nano urea enhanced chlorophyll formation, photosynthetic efficiency and nitrogen assimilation. Simultaneously, nano DAP provided readily available phosphorus, which facilitated ATP generation, energy transfer and rapid cell division, thereby promoting meristematic growth. Moreover, application at 45 and 60 DAS coincided with the active vegetative and stem elongation phases, allowing better utilization of nutrients for cell elongation and internodal growth. The synergistic interaction between nitrogen and phosphorus further enhanced metabolic activities, enzyme function and growth regulating processes, ultimately increasing plant height. Similar findings were also reported by Ajithkumar *et al.* (2021) [1], Samui *et al.* (2022) [17], Meena *et al.* (2023) [14], Srivastava and Singh (2023) [20], Bhukya *et al.* (2024) [6], Das *et al.* (2024) [8], Dodiya *et al.* (2024) [9] and Gajera *et al.* (2025) [12] in maize.

2) Leaf Area (cm²) and Leaf Area Index (LAI)

Table 2 indicated that significantly higher leaf area was registered at 45 DAS under treatment of 100% RDF (T₂) were 1120.97, 1136.73 and 1128.85 cm²/plant but it was found statistically similar with 75% RDF + Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS (T₉) and 75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS (T₁₁) during 2023-24 and 2024-25, respectively. Application of 75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS (T₁₁) was found significantly superior leaf area at 60 DAS (3326.46, 3389.95 and 3358.20 cm²/plant) and at harvest (2815.03, 2899.73 and 2857.38 cm²/plant) which was statistically akin with T₉ and T₂ during first year and in pooled studies whereas T₉, T₂ and T₁₀ during the second year of experiment. Similar trend also was observed in leaf area index showed in Table 3, i.e. application of T₂ at 45 DAS while, T₁₁ at 60 DAS and harvest found significantly higher LAI. Control treatment (T₁) recorded a significantly lower leaf area and leaf area index during two consecutive years and pooled analysis, respectively.

Nutrient management may be associated with enhanced enzymatic activation and improved expansion of leaf tissues due to adequate nutrient availability. Efficient absorption of nitrogen through nano urea possibly promoted chlorophyll formation and photosynthetic activity, whereas phosphorus supplied through nano DAP might have accelerated metabolic processes and cell multiplication. Increased leaf expansion could also be attributed to improved translocation of assimilates and efficient utilization of nutrients throughout the crop growth period. Similar findings were reported by Ajithkumar *et al.* (2021)^[1], Rajesh *et al.*, Bhaurao (2022)^[5], Nagar (2022)^[15], Reddy *et al.* (2022)^[16], Tilak

(2022)^[22], Chavan *et al.* (2024)^[7] and Sushma *et al.* (2025)^[21] in maize.

3) Dry Matter Accumulation (g/plant)

Significantly higher dry matter accumulation (32.22, 33.50 and 32.86 g/plant) at 45 DAS was observed under application of T₂ which was statistically similar with the T₉, T₁₁ and T₁₀ during year of 2023-24 and T₁₁ and T₉ during second year of experiment, respectively (Table 4). Application of 75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS produce (78.58, 76.62 and 77.60 g/plant) at 60 DAS and it remained at par with treatments T₉, T₂ and T₁₀ across both the consecutive years, while T₂ and T₉ is statistically at par with T₁₁ during pooled study. However, Treatment T₁₁ registered significantly higher dry matter accumulation (189.33, 193.36, 191.35 g/plant) at harvest and it was at par with treatment T₉, T₂ and T₁₀ during both the years, while T₂ and T₉ is statistically at par with T₁₁ on pooled basis, respectively.

It might be due to improved assimilate partitioning and enhanced photosynthetic efficiency during active crop growth stages. Better nutrient absorption and translocation through nano sized particles possibly enhanced carbohydrate synthesis and biomass production. The greater leaf area and improved physiological activity under integrated nutrient management treatments may also have contributed towards efficient conversion of solar energy into plant biomass. These findings align with previous research conducted by Reddy *et al.* (2022)^[16], Samui *et al.* (2022)^[17], Meena *et al.* (2023)^[14], Sannathimmappa *et al.* (2023)^[9], Dodiya *et al.* (2024)^[9], Khan *et al.* (2024)^[13], Sanjeev *et al.* (2024)^[18], Sushma *et al.* (2025)^[21] and Vasanth *et al.* (2025)^[25] in maize.

Table 1: Plant height of maize as influenced by different treatments

Treatment		Plant height (cm)								
		45 DAS			60 DAS			At harvest		
		2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
T ₁ : Control		59.31	61.51	60.41	95.64	97.06	96.35	143.60	146.58	145.09
T ₂ : 100% RDF		85.89	88.10	87.00	132.72	135.86	134.29	179.03	183.48	181.26
T ₃ : Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS		63.57	66.14	64.86	112.70	114.01	113.36	161.91	161.56	161.73
T ₄ : Foliar spray of Nano DAP 4 ml/L at 45 and 60 DAS		62.36	64.92	63.64	110.46	112.28	111.37	158.69	161.27	159.98
T ₅ : Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS		64.18	66.08	65.13	113.96	117.66	115.81	165.55	167.15	166.35
T ₆ : Foliar spray of Urea 2% at 45 and 60 DAS		60.39	62.18	61.29	100.95	103.47	102.21	149.82	153.12	151.47
T ₇ : Foliar spray of Urea phosphate 2% at 45 and 60 DAS		59.66	62.27	60.97	100.05	101.53	100.79	148.10	150.52	149.31
T ₈ : Foliar spray of Urea 2% + Urea phosphate 2% at 45 and 60 DAS		61.63	63.82	62.73	105.26	107.71	106.48	158.20	160.06	159.13
T ₉ : 75% RDF + Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS		76.65	79.65	78.15	134.09	136.21	135.15	182.82	185.60	184.21
T ₁₀ : 75% RDF + Foliar spray of Nano DAP 4 ml/L at 45 and 60 DAS		75.11	78.06	76.58	125.32	127.56	126.44	170.06	171.97	171.02
T ₁₁ : 75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS		78.17	81.55	79.86	138.87	141.20	140.04	189.33	193.36	191.35
T ₁₂ : 75% RDF + Foliar spray of Urea 2% at 45 and 60 DAS		76.28	79.30	77.79	121.60	120.47	121.03	165.66	167.84	166.75
T ₁₃ : 75% RDF + Foliar spray of Urea phosphate 2% at 45 and 60 DAS		73.75	76.07	74.91	120.68	118.01	119.35	166.26	169.66	167.96
T ₁₄ : 75% RDF + Foliar spray of Urea 2% + Urea phosphate 2% at 45 and 60 DAS		73.67	77.02	75.34	121.64	122.47	122.06	167.23	170.67	168.95
SEm±		3.58	3.32	2.44	5.36	5.05	3.68	7.27	7.65	5.28
CD (P=0.05)		10.41	9.65	6.93	15.59	14.68	10.45	21.13	22.24	14.97
CV%		8.95	8.00	8.47	7.96	7.40	7.68	7.64	7.92	7.78
Year	SEm±	0.92			1.39			1.99		
	CD (P = 0.05)	NS			NS			NS		
Y x T	SEm±	3.15			5.21			7.46		
	CD (P = 0.05)	NS			NS			NS		

Table 2: Leaf area per plant of maize as influenced by different treatments

Treatment		Leaf area per plant (cm ²)								
		45 DAS			60 DAS			At harvest		
		2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
T ₁ : Control		889.03	906.30	897.67	2545.48	2643.03	2594.25	2094.77	2178.50	2136.63
T ₂ : 100% RDF		1120.97	1136.73	1128.85	3162.95	3126.80	3144.87	2650.73	2698.63	2674.68
T ₃ : Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS		921.83	934.93	928.38	2818.29	2856.78	2837.54	2360.97	2386.87	2373.92
T ₄ : Foliar spray of Nano DAP 4 ml/L at 45 and 60 DAS		907.50	916.03	911.77	2785.45	2810.41	2797.93	2328.37	2341.67	2335.02
T ₅ : Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS		925.67	947.57	936.62	2892.69	2923.64	2908.16	2434.17	2452.73	2443.45
T ₆ : Foliar spray of Urea 2% at 45 and 60 DAS		919.96	929.43	924.70	2728.53	2752.19	2740.36	2275.70	2285.03	2280.37
T ₇ : Foliar spray of Urea phosphate 2% at 45 and 60 DAS		902.44	913.63	908.04	2668.22	2668.59	2668.40	2216.17	2203.53	2209.85
T ₈ : Foliar spray of Urea 2% + Urea phosphate 2% at 45 and 60 DAS		898.37	907.03	902.70	2757.57	2808.50	2783.04	2303.07	2340.53	2321.80
T ₉ : 75% RDF + Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS		1032.40	1055.53	1043.97	3208.72	3203.60	3206.16	2741.57	2725.30	2733.43
T ₁₀ : 75% RDF + Foliar spray of Nano DAP 4 ml/L at 45 and 60 DAS		1018.83	1024.63	1021.73	2986.42	3058.74	3022.58	2535.03	2582.27	2558.65
T ₁₁ : 75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS		1035.37	1041.97	1038.67	3326.46	3389.95	3358.20	2815.03	2899.73	2857.38
T ₁₂ : 75% RDF + Foliar spray of Urea 2% at 45 and 60 DAS		1005.87	1013.13	1009.50	2968.61	3015.28	2991.94	2511.23	2540.47	2525.85
T ₁₃ : 75% RDF + Foliar spray of Urea phosphate 2% at 45 and 60 DAS		993.44	994.57	994.01	2936.61	2958.70	2947.66	2479.70	2486.50	2483.10
T ₁₄ : 75% RDF + Foliar spray of Urea 2% + Urea phosphate 2% at 45 and 60 DAS		985.27	1003.13	994.20	2982.31	3054.47	3018.39	2530.90	2580.27	2555.58
SEm±		34.97	37.91	25.79	115.29	119.73	83.11	87.63	109.72	70.21
CD (P=0.05)		101.65	110.21	73.18	335.14	348.04	235.84	254.73	318.94	199.24
CV%		6.25	6.70	6.48	6.86	7.03	6.95	6.20	7.67	6.98
Year	SEm±	9.75			31.41			26.54		
	CD (P=0.05)	NS			NS			NS		
Y x T	SEm±	36.47			117.53			99.29		
	CD (P=0.05)	NS			NS			NS		

Table 3: Leaf area index per plant of maize as influenced by different treatments

Treatment		Leaf area index per plant								
		45 DAS			60 DAS			At harvest		
		2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
T ₁ : Control		0.74	0.76	0.75	2.12	2.20	2.16	1.74	1.82	1.78
T ₂ : 100% RDF		0.93	0.95	0.94	2.64	2.61	2.62	2.21	2.25	2.23
T ₃ : Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS		0.77	0.78	0.77	2.35	2.38	2.37	1.97	1.99	1.98
T ₄ : Foliar spray of Nano DAP 4 ml/L at 45 and 60 DAS		0.76	0.76	0.76	2.32	2.34	2.33	1.94	1.95	1.95
T ₅ : Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS		0.77	0.79	0.78	2.41	2.44	2.42	2.03	2.04	2.04
T ₆ : Foliar spray of Urea 2% at 45 and 60 DAS		0.77	0.78	0.77	2.27	2.29	2.28	1.89	1.90	1.90
T ₇ : Foliar spray of Urea phosphate 2% at 45 and 60 DAS		0.75	0.76	0.76	2.22	2.22	2.22	1.85	1.84	1.84
T ₈ : Foliar spray of Urea 2% + Urea phosphate 2% at 45 and 60 DAS		0.75	0.76	0.75	2.30	2.34	2.32	1.92	1.95	1.94
T ₉ : 75% RDF + Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS		0.86	0.88	0.87	2.68	2.67	2.67	2.28	2.27	2.28
T ₁₀ : 75% RDF + Foliar spray of Nano DAP 4 ml/L at 45 and 60 DAS		0.85	0.85	0.85	2.49	2.55	2.52	2.11	2.15	2.13
T ₁₁ : 75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS		0.86	0.87	0.87	2.77	2.82	2.80	2.35	2.42	2.39
T ₁₂ : 75% RDF + Foliar spray of Urea 2% at 45 and 60 DAS		0.84	0.85	0.84	2.47	2.51	2.49	2.09	2.12	2.11
T ₁₃ : 75% RDF + Foliar spray of Urea phosphate 2% at 45 and 60 DAS		0.83	0.83	0.83	2.45	2.46	2.46	2.07	2.07	2.07
T ₁₄ : 75% RDF + Foliar spray of Urea 2% + Urea phosphate 2% at 45 and 60 DAS		0.82	0.84	0.83	2.48	2.54	2.51	2.11	2.15	2.13
SEm±		0.03	0.03	0.02	0.10	0.10	0.07	0.07	0.09	0.06
CD (P=0.05)		0.09	0.09	0.06	0.28	0.29	0.20	0.21	0.27	0.17
CV%		6.31	6.86	6.60	6.85	7.05	6.95	6.23	7.67	6.99
Year	SEm±	0.01			0.03			0.02		
	CD (P=0.05)	NS			NS			NS		
Y x T	SEm±	0.03			0.10			0.08		
	CD (P=0.05)	NS			NS			NS		

Table 4: Dry matter accumulation of maize as influenced by different treatments

Treatment	Dry matter accumulation (g/plant)								
	45 DAS			60 DAS			At harvest		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
T ₁ : Control	21.52	22.68	22.10	59.31	57.58	58.44	135.22	132.79	134.01
T ₂ : 100% RDF	32.22	33.50	32.86	72.95	71.16	72.06	166.33	162.15	164.24
T ₃ : Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS	25.03	26.04	25.53	65.39	63.49	64.44	149.09	146.14	147.62
T ₄ : Foliar spray of Nano DAP 4 ml/L at 45 and 60 DAS	23.93	25.23	24.58	64.08	62.21	63.14	145.42	142.59	144.01
T ₅ : Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS	25.06	26.94	26.00	67.26	65.30	66.28	153.35	148.25	150.80
T ₆ : Foliar spray of Urea 2% at 45 and 60 DAS	23.11	24.48	23.79	61.33	59.54	60.43	139.83	134.56	137.19
T ₇ : Foliar spray of Urea phosphate 2% at 45 and 60 DAS	22.45	23.20	22.82	59.88	58.13	59.00	136.52	132.04	134.28
T ₈ : Foliar spray of Urea 2% + Urea phosphate 2% at 45 and 60 DAS	23.35	24.27	23.81	61.35	59.56	60.46	139.88	134.61	137.25
T ₉ : 75% RDF + Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS	28.88	29.87	29.38	74.73	72.55	73.64	170.39	163.97	167.18
T ₁₀ : 75% RDF + Foliar spray of Nano DAP 4 ml/L at 45 and 60 DAS	27.93	28.76	28.35	71.11	68.73	69.92	161.28	155.32	158.30
T ₁₁ : 75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS	29.26	30.14	29.70	78.58	76.62	77.60	177.82	173.17	175.50
T ₁₂ : 75% RDF + Foliar spray of Urea 2% at 45 and 60 DAS	26.65	27.45	27.05	69.02	67.01	68.02	157.36	151.44	154.40
T ₁₃ : 75% RDF + Foliar spray of Urea phosphate 2% at 45 and 60 DAS	26.42	27.21	26.82	68.32	66.32	67.32	155.76	149.89	152.82
T ₁₄ : 75% RDF + Foliar spray of Urea 2% + Urea phosphate 2% at 45 and 60 DAS	27.06	27.87	27.46	69.48	67.46	68.47	158.41	153.78	156.10
SEm±	1.53	1.38	1.03	2.91	3.06	2.11	6.30	6.53	4.54
CD (P=0.05)	4.45	4.01	2.92	8.47	8.89	5.99	18.32	18.98	12.88
CV%	10.23	8.85	9.54	7.49	8.10	7.79	7.12	7.61	7.36
Year	0.39	0.39		0.80		1.72			
	NS	NS		NS		NS			
Y x T	1.46	1.46		2.99		6.42			
	NS	NS		NS		NS			

Conclusion

Based on the two years of field investigation, it can be concluded that maize crop should be fertilized with 100% RDF (150-60-00, N-P₂O₅-K₂O kg/ha) or 75% RDF + Foliar spray of Nano urea 4 ml/L at 45 and 60 DAS or 75% RDF + Foliar spray of Nano urea 4 ml/L + Nano DAP 4 ml/L at 45 and 60 DAS for getting higher growth under south Gujarat condition.

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