



ORIGINAL RESEARCH PAPER

Agricultural Science

RESPONSE OF FOLIAR NUTRITION AND PLANT GROWTH REGULATIONS ON THE GROWTH AND YIELD OF SWEET CORN

KEY WORDS: Sweet Corn, Chelated Zinc, Urea Foliar Spray, NPK, ethrel Foliar Spray

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ABSTRACT

The experiments were conducted in Randomized Block Design with eight treatments and replicated thrice viz., recommended dose of NPK + 1 percent urea foliar spray at 30 and 50 DAS (T1), recommended dose of NPK + 2 percent DAP Foliar spray at 30 and 50 DAS (T2), recommended dose of NPK + 1 percent Zinc sulphate foliar spray at 30 and 50 DAS (T3), recommended dose of NPK + 1 percent chelated zinc foliar spray at 30 and 50 DAS (T4), recommended dose of NPK + 1 percent ethrel foliar spray at 30 and 50 DAS (T5), recommended dose of NPK + 200ppm mepquat chloride foliar spray at 30 and 50 DAS (T6), recommended dose of NPK + Water spray at 30 and 50 DAS (T7), recommended dose of NPK + 20 ppm indole acetic foliar spray at 30 and 50 DAS (T8).

INTRODUCTION

Maize is one of the most important cereal crops in the world, both as food for human and silage for animal. It ranks third position after wheat and rice in world grain production. Maize was initially classified according to the difference of carbohydrate stored in the endosperm. Sweet corn (Zea mays corn var. saccharata var. rugora, also called Indian corn, sugar corn and pop corn) is one of the types in maize with high sugar content. Sweet corn is the result of a naturally occurring recessive nutrition in the gene which control conversion of sugar to starch inside the endosperm of the corn kernel. It is one of the most popular vegetable in the USA, Europe and other advanced countries in the world. India is the seventh maize producer with 14.06 million tones of products on 7.18 million hectares and a yield of 1959 kg ha⁻¹ (Anonymous, 2011). In Andhra Pradesh, during the year 2011, has grown to an area of 7.44 lakh ha-1 (Annual Report 2011, ANGRAU, and Hyderabad).

Among the essentials nutrients, macro-elements such as nitrogen, phosphorus and potassium play a crucial role in deciding the growth and yield of maize. Foliar fertilization is simple and effective method of providing nutrients to crops (Alexander and Schroeder, 1987). Foliar application will be more efficient than soil application at the later growth stage when there is preferential assimilates translocation into seeds and root activity for nutrient uptake is limited. The foliar application of di-ammonium phosphate was found beneficial than soil application (Chandrasekhar and Bangarusamy, 2003). Zinc is a trace element found in all soils. It is an essential element for plants, animals and humans. Foliar application of growth regulators and chemicals at the flowering stage may improve the physiological efficiency and play a significant

role in raising the productivity of the crop (Dashora and Jain, 2004). The foliar spray of chemical nutrients along with chemical fertilizers and growth regulators would be a sound proportion in the input management leading to better yields.

MATERIALS AND METHODS

The field experiment was carried out Annamalai University Experiment Farm, Annamalai Nagar during February to May (summer) 2017 to study the response of Foliar Nutrition (Urea, DAP, Zinc Sulphate, Chelated Zinc, Ethrel, Mepiquat Chloride, Indole Acetic Acid) and Plant Growth Regulations on the Growth and Yield of Sweet Corn. The climate of Annamalai Nagar is moderately warm with hot summer months. The average rainfall of Annamalai Nagar is 1699.5mm received during north- east monsoon (1020.7mm) South- West monsoon (382.5mm) and hot weather period (296.3mm) and received rainfall of 18.8mm disturbed over 3 rainy days. The maximum temperature ranged from 30.4 to 37.6°C with a mean of 34.43°C. The minimum temperature ranged from 22.4 to 26.8°C with a mean 24.61°C. The humidity ranged from 82 to 90 percent with a mean of 85 percent.

The soil of the field was moderately drained clay loam in texture with low in available nitrogen, medium in available phosphorus and high in available potassium. The sweet corn hybrid Sugar 75 was chosen for this experiment. The foliar nutrients were applied as per the treatment schedule.

RESULTS

GROWTH ATTRIBUTES

The observations recorded on plant height, leaf area index and dry matter production during 30 DAS and at harvest are presented in Table 1.

Table 1. Effect of foliar nutrition and growth regulations on Plant height (cm), Leaf area index and Dry matter production at different growth stages in Sweet Corn

Treatments	Plant height(cm)			Leaf area index		Dry matter production(kg ha ⁻¹)	
	30 DAS	60 DAS	Harvest	30 DAS	Harvest	30 DAS	Harvest
T ₁	92.06	170.86	185.26	2.74	6.15	3837.83	12420.25
T ₂	95.86	173.80	189.21	2.82	3.38	3996.95	12981.13
T ₃	88.80	166.73	181.53	2.67	5.93	3681.48	11872.72
T ₄	88.02	166.27	180.13	2.65	5.78	3578.36	11529.53
T ₅	77.66	153.66	167.00	2.42	5.02	3100.93	9870.64
T ₆	84.53	160.93	176.46	2.57	5.52	3417.71	10976.43
T ₇	73.06	150.80	160.26	2.28	4.78	2950.83	9320.31
T ₈	81.20	157.53	172.40	2.50	5.29	3261.58	10418.46
SE _d	1.63	1.27	1.81	0.02	0.09	73.80	272.50
CD(p=0.05)	3.25	2.54	3.62	0.05	0.18	147.59	545

Among the different treatments, the maximum plant height, leaf area index and dry matter production were observed under T₂ (Recommended dose of NPK +2 percent DAP foliar spray at 30 and 50 DAS) at all stages of crop growth. This treatment was found to be significantly superior over other treatments by recording the highest plant height of 95.86, 173.86 and 189.21 cm at 30 DAS, 60 DAS and at harvest respectively. The leaf area index of 2.82 and 3.38 cm at 30 DAS and at harvest. The dry matter production of 3996.95 and 12981.13 cm at 30 DAS and at harvest. The treatments T₃ (Recommended dose of NPK + 1 percent Zinc sulphate foliar spray at 30 and 50 DAS) and T₄ (Recommended dose of NPK + 1 percent chelated zinc foliar spray at 30 and 50 DAS) were found to be on par with each other and ranked next. The minimum plant height observed under T₇ (recommended dose of NPK + Water spray at 30 and 50 DAS) treatment.

Table2. Effect of foliar nutrition and plant growth regulators on cob length (cm), cob diameter (cm) and number of grains cob⁻¹

Treatments	cob length (cm)	diameter (cm)	number of grains cob ⁻¹
T ₁	17.99	6.14	396
T ₂	19.06	6.55	417
T ₃	17.00	5.75	376
T ₄	16.37	5.58	361
T ₅	13.31	4.35	297
T ₆	15.35	5.18	340
T ₇	12.36	4.00	275
T ₈	14.29	4.73	318
SE _d	0.44	0.15	9.48
CD(p=0.05)	0.87	0.31	18.96

The data recorded on the growth attributes in the basis of cob length, cob diameter and grain number cob⁻¹ is presented in the above table 2.

Among the treatments, the sweet corn was more promising and recorded the highest grain growth. Application of treatment T₂ (Recommended dose of NPK +2 percent DAP foliar spray at 30 and 50 DAS) recorded the highest in cob length of 19.06cm, cob diameter of 6.55cm and number of grains cob⁻¹ of 417 and the treatment T₇ recorded the lowest cob length of 12.36cm, cob diameter of 4.00cm and number of grains cob⁻¹ of 275 during the experiment.

YIELD AND YIELD COMPONENTS

The data recorded on the yield attributes in the basis of grain yield (kg ha⁻¹) and stover yields (kg ha-1) are presented in Table 3.

Table3. Effect of foliar nutrition and plant growth regulators in grain yield and stover yield

Treatments	grain yield (kg ha ⁻¹)	stover yield (kg ha-1)
T ₁	5491.44	8314
T ₂	5762.09	8663
T ₃	5220.79	7975
T ₄	5138.43	7668
T ₅	4325.24	6647
T ₆	4865.04	7331
T ₇	4053.90	6310
T ₈	4595.89	6986
SE _d	132.07	159.33
CD(p=0.05)	264.15	318.67

Among the treatments, the application of treatment T₂ (Recommended dose of NPK +2 percent DAP foliar spray at 30 and 50 DAS) registered the highest grain yield of 5762.09 kg ha⁻¹. It was followed by treatment T₁ (recommended dose of NPK + 1 percent urea foliar spray at 30 and 50 DAS). The treatments T₃ (Recommended dose of NPK + 1 percent Zinc sulphate foliar spray at 30 and 50 DAS) and T₄ (Recommended dose of NPK + 1 percent chelated zinc foliar spray at 30 and 50

DAS) were on par with each other and ranked next. The treatments T₆, T₈ and T₅ come next in order. The least grain yield of 4053.90 kg ha⁻¹ during the experiment period was recommended dose of NPK + Water spray at 30 and 50 DAS (T₇).

DISCUSSION AND CONCLUSION

The biometric observation on various growth and yield parameters, nutrient uptake and soil fertility status were statistically analysed. The results obtained were summarized here. Among the treatments, recommended dose of NPK + 2 per cent DAP foliar spray at 30 and 50 DAS (T₂) favourably increased the growth components viz., plant height, leaf area index and dry matter production as compared to other treatments. The least value of growth components were recorded recommended dose of NPK + water spray at 30 and 50 DAS (T₇).

The yield components viz., con length, cob diameter and grain number cob⁻¹ was significantly increased under the treatment T₂ as compared to the other treatments. The yield components were significantly decreased under the treatment T₇. The highest grain yield and stover yield of 5762.09 and 8314 kg ha⁻¹ respectively were recorded under recommended treatment T₂. The least grain yield and stover yield of 4053.90 and 6310 kg ha⁻¹ respectively were recorded under recommended treatment T₇.

Based on the results of the experiments carried out at Annamalai University Experimental Farm, it can be concluded that application of recommended dose of NPK + 2 per cent DAP foliar spray at 30 and 50 DAS were found to be the more efficient and economic methods for increasing the grain yield of sweet corn. These practices also resulted in the highest return rupee⁻¹ invested in sweet corn.

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