Plant Archives Vol. 26, Supplement 2, 2026 pp. 2001-2005 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2026.v26.supplement-2.249

GROWTH, YIELD ATTRIBUTES AND YIELD OF ZERO TILL MAIZE AS INFLUENCED BY VARIOUS NUTRIENT LEVELS AND WEED MANAGEMENT PRACTICES

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(Date of Receiving : 09-04-2026; Date of Revision : 26-05-2026; Date of Acceptance : 12-06-2026)

ABSTRACT

A field experiment was carried out at S.V. Agricultural College Farm, Tirupati during *rabi* seasons of 2022-23 and 2023-24 to determine the effect of various nutrient levels and weed management strategies on growth, yield attributes and yield of zero till maize. The results demonstrated that, among various nutrient levels, 125 % RDF recorded higher growth, yield attributes and yield of zero till maize. In terms of weed management practices, hand weeding twice at 20 and 40 DAS resulted in significantly higher growth and yield attributes as well as yield of zero till maize followed by PoE application of mesotrione + atrazine 875 g/ha at 20 DAS *fb* HW at 40 DAS. Significantly unweeded check registered the lowest growth, yield attributes and yield of zero till maize on sandy loam soils of Southern Agro-Climatic zone of Andhra Pradesh.

Keywords **:** Nutrient levels, Growth parameters, Yield attributes and Yield.

Introduction

Maize (*Zea mays* L.) is the world's third most significant cereal crop, following wheat and rice. Maize is cultivated on 9.68 million hectares in India, with a total yield of 31.51 million tons and a productivity of 3195 kg/ha. Zero-tillage improves soil qualities and lowers production costs, but also results in higher yield loss due to significant weed infestation and uneven nutrition. Maize is becoming increasingly important in conservation agriculture since it is a widely spaced crop with a modest growth rate in its early stages. Crop establishment and weed management strategies are crucial in zero tillage maize cultivation but difficult to manage using traditional methods such as hand weeding. Reduction in yield of maize may be as high as 40-60% or even more depending upon the intensity and types of weed infestation Naveen *et al*. (2023a). Chemical weed management using pre- and post-emergence herbicides may provide efficient and cost effective weed control tactics throughout important stages of crop weed competition, which human or mechanical weeding may not be able to do owing to higher cultivation expenses (Yadav *et al.*, 2022). Among the growth inputs mineral nutrition also plays a vital role in maize production. Nutrition losses caused by weeds can be effectively tackled either by effective weed management or through the use of higher fertilizer or combination of both. In view of these facts present investigation was therefore undertaken

Material and Methods

A field experiment was undertaken at S.V. Agricultural College's wet land farm in Tirupati during the *rabi* seasons of 2022-23 and 2023-24. The soil had a sandy clay loam texture, a neutral reaction, low electrical conductivity, low organic carbon, low available nitrogen, medium available phosphorus and potassium. The experiment was laid up in split-plot

design, with the treatments in the main plot consisting of three nutrient levels *viz.,* 125 % RDF, 100 % RDF and 75 % RDF under main plots and six weed management practices assigned to sub plots *viz.,* Post-emergence (PoE) application of topramezone 25.2 g/ha at 20 DAS *fb* hand weeding at 40 DAS, PoE application of halosulfuron-methyl 67.7 g/ha + ethoxysulfuron 20 g/ha (tank-mix) at 20 DAS *fb* hand weeding at 40 DAS, PoE application of halosulfuron-methyl 67.7 g/ha + tembotrione 100 g/ha (tank mix) at 20 DAS *fb* hand weeding at 40 DAS, PoE application of mesotrione + atrazine 875 g/ha (ready mix) at 20 DAS *fb* hand weeding at 40 DAS, Hand weeding twice at 20 and 40 DAS and Unweeded check. The recommended fertilizer dose (RDF) for zero till maize in Andhra Pradesh's Southern Agro-Climatic zone was 240-80-80 kg N-P-K/ha. The maize variety "DHM-117" @ 20 kg/ha were dibbled at a spacing of 60 cm x 20 cm under no-till condition manually to obtain required plant population. Nutrients were applied in accordance with the treatments in the form of urea, single superphosphate, and potassium muriate. One fourth dose of nitrogen along with entire dose of phosphorus was applied at the time of sowing while potassium was applied in two splits, half at the time of sowing and the remaining half at tasselling and silking stage. The remaining quantity of nitrogen was applied at 25-30 DAS, 45-50 DAS and 60-65 DAS. Post-emergence herbicides were sprayed as per the treatments. The data collected on various crop factors during the study was statistically evaluated using the analysis of variance approach proposed by Panse and Sukhatme (1985). Statistical significance was determined using the F test at the 5 % level of probability and treatment averages were compared using the crucial difference method.

Results and Discussion

Plant growth parameters

Plant growth parameters *viz.,* plant height (cm), leaf area index and dry matter accumulation (kg/ha) were significantly higher with 125 % RDF, which was statistically comparable with 100 % RDF (Table 1). Higher nutrient availability might have increased the cell division and elongation leading to better elongation of internodes resulted in conspicuous increase plant height and leaf area index leading to higher dry matter production. Similar results were reported by Kumar *et al*. (2022a) and Deewan *et al.* (2018). The lowest values of above said growth parameters were registered with 75 % RDF, which was significantly lower than rest of nutrient levels due to inadequate nutrients that lead to poor root development, limiting the plant's ability to absorb water and other nutrients which are necessary for overall growth. Among the various weed management practices, higher values of above said growth parameters were obtained with HW twice at 20 and 40 DAS, which was statistically comparable with PoE application of mesotrione + atrazine 875 g/ha at 20 DAS *fb* HW at 40 DAS. Effective control of all the categories of weeds during the entire crop growing period may helped to produce better stature of crop as reflected by taller plants, higher leaf area index and enhanced photosynthates, which in turn resulted in higher dry matter production. Similar findings were also reported by Harisha *et al.* (2023) and Wasnik *et al.* (2022). The next best weed management practice in recording higher growth parameters were PoE application of halosulfuron-methyl 67.7 g/ha + tembotrione 100 g/ha at 20 DAS *fb* HW at 40 DAS, which was significantly superior to PoE application of halosulfuron-methyl 67.7 g/ha + ethoxysulfuron 20 g/ha at 20 DAS *fb* HW at 40 DAS and PoE application of topramezone 25.2 g/ha at 20 DAS *fb* HW at 40 DAS with significant disparity between the later two. Significantly lower values of above said growth parameters were recorded with unweeded check at harvest during both the years of study as well as in pooled mean. This may be owed to more absorption of water and nutrients by the weeds than crop during the entire growing period leading to lower plant height, LAI and ultimately the dry matter production.

Yield attributes

Yield attributes of maize *viz.,* cob length, cob girth, number of kernel rows cob^{-1}, number of kernels row^{-1} and 100-kernel weight were recorded significantly higher with application of 125 % RDF. Synergetic effect of concomitant supply of nutrients that enhanced production and translocation of assimilates to developing cobs with higher girth. Better translocation of photosynthates to the sink resulted in larger sized kernels that lead to higher number of kernel rows cob^{-1}, number of kernels row^{-1} and test weight. These findings corroborate with the results of Kumar *et al*. (2022b) and Ray *et al.* (2020). The next best nutrient level in recording higher values of above said yield attributes was 100 % RDF, which was significantly superior over 75 % RDF due to low nutrient availability leads to stunted growth and reduced cob size due to insufficient resources for proper development (Table 1). As regards to weed management practices, higher values were recorded with HW twice at 20 and 40 DAS, which was statistically comparable with PoE application of mesotrione + atrazine 875 g/ha at 20 DAS *fb* HW at 40 DAS. This might be due to increased photosynthetic

efficiency, dry matter production and distribution to the economic parts, which in turn increased the capacity of the sink to produce more number of kernels cob^{-1}. The results were in conformity with the findings of Harisha *et al.* (2023) and Sahoo *et al*. (2023). The next best weed management practice in recording higher values of yield attributes were PoE application of halosulfuron-methyl 67.7 g/ha + tembotrione 100 g/ha at 20 DAS *fb* HW at 40 DAS, which was however at par with PoE application of halosulfuron-methyl 67.7 g/ha + ethoxysulfuron 20 g/ha at 20 DAS *fb* HW at 40 DAS, which inturn was at par with PoE application of topramezone 25.2 g/ha at 20 DAS *fb* HW at 40 DAS in the descending order. Significantly lower values were noticed with unweeded check during both the years of experimentation as well as in pooled mean and this might be due to lesser dry matter production by the crop which inturn resulted in poor partitioning efficiency of photosynthates from source to sink.

Yield

Kernel and stover yield of zero till maize differed significantly with nutrient levels and weed management practices d during both instances of study and pooled mean (Table 2). Among the various nutrient levels, significantly higher kernel yield was recorded with the application of 125 % RDF, which was superior to rest of the nutrient levels. Précised application of nutrient levels might be accountable for amplifying yield parameters and inturn the yield. This was in consonance with the findings of Kumar *et al*. (2022b) and Naveen *et al.* (2023a). The next best nutrient level in recoding higher yield was 100 % RDF, which was followed by 75 % RDF, which was recorded the lowest yield during both the years of study as well as in pooled mean. This might be due to poor availability of nutrients, which led to deflated stature of growth parameters, yield attributes and finally lower kernel yield. Among the weed management practices, higher kernel and stover yield of zero till maize was observed with HW twice at 20 and 40 DAS, which was statistically comparable with PoE application of mesotrione + atrazine 875 g/ha at 20 DAS *fb* HW at 40 DAS. Lower crop weed competition for growth resources throughout the crop growing period enabling the crop for maximum utilization of resources, which enhanced the vegetative and reproductive potential of the crop that reflected in the form of higher yield of maize. The results corroborates with the findings of Harisha *et al.* (2023), Balaji *et al.* (2022) and Chhokar *et al.* (2019). The next best weed management practice in recording higher yields was PoE application of halosulfuron-methyl 67.7 g/ha + tembotrione 100 g/ha at 20 DAS *fb* HW at 40 DAS, which was followed by PoE application of halosulfuron-methyl 67.7 g/ha + ethoxysulfuron 20 g/ha at 20 DAS *fb* HW at 40 DAS and PoE application of topramezone 25.2 g/ha at 20 DAS *fb* HW at 40 DAS with significant disparity among them. Unweeded check recorded significantly lower yield during both the years of experimentation as well as in pooled mean. This might be due to greater competition for growth resources among the crop and weeds as evident by the lowest crop stature, lesser dry matter production, which impoverished partitioning efficiency of assimilates from source to sink that lead to diminished yield attributes and yield of maize.

Economics

The highest net returns and benefit: cost ratio were realized with 125 % RDF, which was significantly superior to rest of the nutrient levels during both the years of study as well as pooled mean (Table 2). Higher nutrient levels contribute to increased net returns through enhanced productivity, cost-effectiveness and resource efficiency of zero till maize. The results obtained in this experiment were in line with the findings of Hulmani *et al.* (2022) and Barde *et al*. (2021). Application of 100 % RDF was the next best nutrient level in recording higher net returns than 75 % RDF, which registered the lowest net returns and benefit: cost ratio. Among the weed management practices tested, higher net returns of zero till maize was observed with HW twice at 20 and 40 DAS, which was statistically comparable with PoE application of mesotrione + atrazine 875 g/ha at 20 DAS *fb* HW at 40 DAS. Higher benefit: cost ratio was observed with PoE application of mesotrione + atrazine 875 g ha^{-1} at 20 DAS *fb* HW at 40 DAS, which was statistically comparable with HW twice at 20 and 40 DAS. Increased kernel and stover yield as a result of effective control of all the categories of weeds and reduced cost of cultivation in these weed management practices. The results were in conformity with the earlier reports of Bhagat *et al.* (2022) and Yadav *et al.* (2022). The next best weed management practice in recording higher net returns and benefit: cost ratio were PoE application of halosulfuron-methyl 67.7 g/ha + tembotrione 100 g/ha at 20 DAS *fb* HW at 40 DAS, which was significantly superior to PoE application of halosulfuron-methyl 67.7 g/ha + ethoxysulfuron 20 g/ha at 20 DAS *fb* HW at 40 DAS and PoE application of topramezone 25.2 g/ha at 20 DAS *fb* HW at 40 DAS with significant disparity between the later two. The lowest net returns benefit: cost ratio were registered in unweeded check, which was significantly lesser than rest of the weed management practices during both the years of study as well as in pooled mean due to

declined yields due to the presence of excessive weed population.

From the results it can be concluded that higher growth parameters, yield attributes and yield of zero till maize were recorded with 125 % RDF followed by 100 % RDF. Among the various weed management practices, higher growth parameters, yield attributes and yield of zero till maize were recorded with HW twice at 20 and 40 DAS followed by PoE application of mesotrione + atrazine 875 g/ha at 20 DAS *fb* HW at 40 DAS on sandy loam soils of Southern Agro-Climatic zone of Andhra Pradesh.

Table 1 : Growth and yield attributes of zero till maize at harvest as influenced by nutrient levels and weed management practices (Average of two years)

Treatments	Plant height (cm)	Leaf area index	Dry matter production (kg/ha)	Cob length (cm)	Cob girth (cm)	Number of Kernel Rows Cob^{-1}	Number of Kernels Row^{-1}	100-kernel weight (gm)
Nutrient levels (3)								
125 % RDF	141	3.48	11039	15.71	13.75	13.14	22.28	22.22
100 % RDF	123	3.25	9814	14.73	12.77	11.94	21.14	21.11
75 % RDF	107	3.03	8362	13.74	11.78	11.14	20.09	19.91
SEm±	**2.6**	**0.051**	**124.5**	**0.224**	**0.168**	**0.182**	**0.251**	**0.261**
CD (P=0.05)	**10**	**0.20**	**489**	**0.88**	**0.66**	**0.71**	**0.98**	**1.02**
Weed management practices (6)								
PoE application of topramezone 25.2 g/ha at 20 DAS *fb* hand weeding at 40 DAS	108	3.04	8845	12.60	10.64	11.23	19.54	19.79
PoE application of halosulfuron-methyl 67.7 g/ha + ethoxysulfuron 20 g/ha (tank-mix) at 20 DAS *fb* hand weeding at 40 DAS	115	3.21	9660	14.40	12.44	11.82	21.88	20.98
PoE application of halosulfuron-methyl 67.7 g/ha + tembotrione 100 g/ha (tank mix) at 20 DAS *fb* hand weeding at 40 DAS	136	3.37	10769	15.97	14.01	12.41	23.34	21.81
PoE application of mesotrione + atrazine 875 g/ha (ready mix) at 20 DAS *fb* hand weeding at 40 DAS	145	3.53	11553	17.43	15.47	13.44	24.18	22.77
Hand weeding twice at 20 and 40 DAS	150	3.65	11962	18.12	16.16	14.04	24.85	24.04
Unweeded check	88	2.71	5640	9.82	7.86	9.57	14.76	18.68
SEm±	**2.4**	**0.048**	**209.3**	**0.280**	**0.276**	**0.287**	**0.373**	**0.352**
CD (P=0.05)	**7**	**0.14**	**604**	**0.81**	**0.80**	**0.83**	**1.08**	**1.05**

Table 2 : Yield and Economics of zero till maize as influenced by nutrient levels and weed management practices (Average of two years)

Treatments	Grain yield (kg/ha)	Straw yield (kg/ha)	Net returns (Rs. ha^{-1})	B:C ratio
Nutrient levels (3)				
125 % RDF	4748	6167	48493	1.89
100 % RDF	4153	5535	39227	1.77
75 % RDF	3239	4997	23689	1.50
SEm±	**79.3**	**105.1**	**1602**	**0.025**
CD (P=0.05)	**315**	**413**	**6290**	**0.10**
Weed management practices (6)				
PE application of pretilachlor 750 g/ha *fb* bispyribac-sodium 25 g/ha + pyrazosulfuron-ethyl 25 g/ha (tank-mix) at 20 DAT	3618	5102	27591	1.54

PE application of penoxulum + butachlor 820 g/ha (ready mix) *fb* bispyribac-sodium 25 g/ha + fenoxaprop-p-ethyl 60 g/ha (tank-mix) at 20 DAT	4004	5531	35224	1.69
PE application of triafamone + ethoxysulfuron 67.5 g/ha (ready mix) *fb* halosulfuron-methyl 67.7 g/ha + fenoxaprop-p-ethyl 60 g/ha (tank-mix) at 20 DAT	4539	6105	43890	1.82
PE application of bensulfuron methyl + pretilachlor 660 g/ha (ready mix) *fb* hand weeding at 40 DAT	4906	6522	54594	2.08
Hand weeding twice at 20 and 40 DAT	5075	6762	54812	2.02
Unweeded check	2139	3376	6706	1.17
SEm±	**92.5**	**116.7**	**1773**	**0.028**
CD (P=0.05)	**270**	**337**	**5120**	**0.08**

References

Balaji, E., Raman, R., Krishnamoorthy, R and Dhanasekaran, K. (2022). Effect of weed management practices on growth and yield of maize (*Zea mays* L.). *International Journal of Botany Studies*, **7(1),** 296-298.

Barde, B., Sasode, D.S., Joshi, E., Singh, V and Patel, R. (2021). Effect of integrated nutrient management on growth, yield attributes, yield and economics of sweet corn under northern tract condition of Madhya Pradesh. *The Journal of Phytopharmacology*. **10(5),** 374-377.

Bhagat, S., Kumar, A and Puniya, R. (2022). Effect of different herbicidal treatments on weeds, maize productivity and nutrient uptake by weeds and maize (*Zea mays* L.). *The Pharma Innovation Journal*. **11(10),** 1627-1630.

Chhokar, R.S., Sharma, R.K., Gill, S.C and Singh, R.K. (2019). Mesotrione and atrazine combination to control diverse weed flora in maize. *Indian Journal of Weed Science*. **51(2),** 145-150.

Deewan, P., Mundra. S.L., Trivedi, J., Meena, R.H and Verma, R. (2018). Nutrient uptake in maize under different weed and nutrient management options. *Indian Journal of Weed Science*. **50(3),** 278-281.

Harisha, S., Seenappa, C., Kalyanamurthy, K.N., Thimmegowda, M.N., Krishnamurthy, N., Umashankar and Hanumanthappa, D.C. (2023). Effect of new generation mesotrione herbicide on growth and yield of maize (*Zea mays* L.). *The Mysore Journal of Agricultural Sciences*, **57**(1), 96-101.

Hulmani, S., Salakinkop, S.R and Somangouda, G. (2022). Productivity, nutrient use efficiency, energetic and economics of winter maize in south India. *PLoS One*. **17(7),** 1-25.

Kumar, A., Vivek and Naresh, R.K. (2022a). Herbicides combination effects on *Cyprus iria* and nutrient studies of transplanted rice in western Uttar Pradesh. *The Pharma Innovation Journal.* **11**(2), 944-948.

Kumar, P., Kumar, M., Kumar, A., Gharsiram., Bhutekar, S and Kumar, S. (2022b). Effect of conservation tillage and nutrient management on maize in maize-pigeon pea intercropping system. *The Pharma Innovation Journal*. **11(2),** 1005-1010.

Naveen, P., Akhil, K., Lakshmi, Y.S and Reddy, M.S. (2023a). Effect of tillage, crop residue management and nutrient levels on energetics, microbial growth, dehydrogenase activity, weed parameters, quality parameters and soil physico-chemical properties of maize (*Zea mays* L.). *International Journal of Environment and Climate Change*. **13(12),** 114-126.

Panse, V.G and Sukhatme, P.V. (1985). *Statistical Methods for Agricultural Workers*. Indian Council of Agricultural Research, New Delhi. 100-174.

Ray, K., Banerjee, H., Dutta, S., Sarkar, S., Murrell, T.S., Singh, V.K and Majumdar, K. (2020). Macronutrient management effects on nutrient accumulation, partitioning, remobilization and yield of hybrid maize cultivars. *Frontiers in Plant Science.* **11**, 1307.

Sahoo, U., Malik, G.C., Banerjee, M., Maitra, S and Sairam, M. (2023). Effect of ready mix application of herbicide on weed dynamics and productivity of maize in lateritic belt of West Bengal. *Agricultural Science Digest*. **8**, 1-7.

Wasnik, V.K., Ghosh, P.K., Halli, H.M and Gupta, G. (2022). Effect of tillage and weed control measures on the yield and economic efficiency of maize under rainfed conditions of semi-arid region. *Indian Journal of Weed Science*. **54(1),** 51-57.

Yadav, D., Sidar, R.S., Singh, V.K. and Neti, S. 2022. Effect on weed dynamics, crop growth and yield of maize (*Zea mays* L.). *The Pharma Innovation Journal*. **11**(8), 1489-1491.