

# Effect of Weed Management Practices on Weed Control Index, Yield and Yield Components of Sweet Corn

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## Abstract

Maize (*Zea mays* L) is the most important cereal crop next rice and wheat in India and also a predominant cereal in the global agricultural economy. Weed management is a serious challenge for successful cultivation of sweet corn. Weeds compete with the crops for the available resources viz., light, nutrient, moisture and space particularly at the initial stages of crop growth period. This reflects to the drastic reduction of yield and quality of final produce. Hence the present study was undertaken with the following objective to assess effectiveness of pre emergence and post-emergence herbicide in comparison with hand weeding on sweet corn. Field experiment were conducted during 2013 at the Annamalai University Experimental Farm, Department of Agronomy, Faculty of Agriculture, Annamalai Nagar with different weed management practices to assess the weed control index, yield components and yield in sweet corn (*Zea mays* L). Results clearly indicated that twice hand weeding on 20 and 40 DAS (days after sowing) significantly increases the growth and yield components in sweet corn. Highest green cob yield (14560 kg ha<sup>-1</sup>) was resulted from this treatment followed by atrazine 1 kg ha<sup>-1</sup> as pre-emergence herbicide at 3 DAS + one hand weeding at 40 DAS (14265 kg ha<sup>-1</sup>). The least values of growth and yield components were recorded in weedy check.

**Keywords:** Atrazine; Green cob yield; Paraquat; Sweet corn

## Introduction

Sweet corn (*Zea mays* corn var. saccharata var. rugosa also called as Indian corn, sugar corn and popcorn) is a variety of maize with high sugar content. Due to its delicacy and sweet flavors and crop nature it has a prominent place as an indispensable ingredient in many fancy dishes of today's cuisine and it is highly nutritive value crop. To augment higher yield crop per unit area, proper weed management is most important factor which cause marked effect on the growth and eventually the yield of a crop. Further weed causes a huge loss, and the magnitude of losses largely depends upon the

composition of weed flora, period of crop crop-weed competition and its intensity. The season -long weed competition caused considerable yield loss in maize [1] weed reduce crop yield by competing for light, water, nutrient and carbon dioxide, interfere with harvesting and increase the cost involved in crop production [2]. If weed growth is minimized during critical period of crop weed competition, the yield can be equivalent to that of weed free yield. Weed management can be formulated to minimize the losses due to weeds by means of integrated approach strategy. Manual weeding alone is not sufficient

to ensure adequate weed control in maize field. It should be supplemented with chemical or herbicide for effective weed control. Choice for selection of safe herbicides determines the success of weed control programme. But it is difficult to find broad spectrum of herbicides as herbicides are often crop specific. Pre-emergence herbicides ensure significant promising weed control and save the crop from initial weed competition and nutrient drain. Similarly the post emergence herbicide also has a significant role in reducing the crop weed competition at the time of critical growth stages of the crop.

### Materials and Methods

A field experiment with 10 treatment was laid out in randomized block design, replicated thrice, were undertaken at the experimental farm, Annamalai University, Department of Agronomy, Faculty of Agriculture, Annamalai Nagar during *khari*f (July – October) 2013 in sweet corn. Soil was clayey loam with pH 7.8, organic carbon 0.31%, and low in nitrogen (246.5 kg ha<sup>-1</sup>), medium in phosphorous (16.7 kg ha<sup>-1</sup>) and high

in potassium (327.5 kg ha<sup>-1</sup>). The treatments comprised of atrazine 1 kg ha<sup>-1</sup> as pre-emergence herbicide at 3 DAS, atrazine 1 kg ha<sup>-1</sup> as pre-emergence herbicide at 3 DAS + one hand weeding at 20 DAS, atrazine 1 kg ha<sup>-1</sup> as pre-emergence herbicide at 3 DAS + one hand weeding at 40 DAS, paraquat 0.5 kg ha<sup>-1</sup> as post-emergence herbicide at 21 DAS, paraquat 0.5 kg ha<sup>-1</sup> as post-emergence herbicide at 21 DAS + one hand weeding at 40 DAS, atrazine 1 kg ha<sup>-1</sup> as pre-emergence herbicide at 3 DAS + paraquat 0.5 kg ha<sup>-1</sup> as post-emergence herbicide at 21 DAS, hand weeding at 20 DAS, hand weeding at 40 DAS, hand weeding at 20 & 40 DAS and weedy check. All the recommended package of practices except weed control was followed for raising the sweet corn. Sweet corn f1 hybrid, sugar-75 was sown with a seed rate of 7.5 kg ha<sup>-1</sup> in rows spaced at 60 x 30 cm. Irrigation was adjusted with weather condition and receipt of rain including pre sowing once. Weed population and biomass was recorded at 30 and 60 DAS by using quadrat of 0.25m<sup>2</sup> fixed randomly at four places in each plot. Data on weed biomass, WCI, crop yield components and yield was recorded from net plot areas.

### Results and Discussion

Treatments	Weed Biomass (60 DAS) g m <sup>-2</sup>	WCI (%)	Grains cob <sup>-1</sup>	Cob length (cm)	Cob diameter (cm)	Green cob yield (kg ha <sup>-1</sup> )
Atrazine 1 kg ha <sup>-1</sup> as pre-emergence herbicide at 3 DAS	42.11	71.02	363	17.04	5.05	11732
Atrazine 1 kg ha <sup>-1</sup> as pre-emergence herbicide at 3 DAS + one hand weeding at 20 DAS	33.12	77.2	385	18.3	5.29	12678
Atrazine 1 kg ha <sup>-1</sup> as pre-emergence herbicide at 3 DAS + one hand weeding at 40 DAS	13.06	91.01	430	22.04	6.12	14265
Paraquat 0.5 kg ha <sup>-1</sup> as post-emergence herbicide at 21 DAS	49.72	65.78	344	16.23	4.18	10917
Paraquat 0.5 kg ha <sup>-1</sup> as post-emergence herbicide at 21 DAS + one hand weeding at 40 DAS	29.57	79.64	406	19.3	6.03	13357
Atrazine 1 kg ha <sup>-1</sup> as pre-emergence herbicide at 3 DAS + paraquat 0.5 kg ha <sup>-1</sup> as post-emergence herbicide at 21 DAS	26.8	81.55	412	20.2	6.06	13674
Hand weeding at 20 DAS	120.8	16.86	300	16.04	4.02	9436
Hand weeding at 40 DAS	56.67	60.99	324	16.17	4.09	10225
Hand weeding at 20 & 40 DAS	9.41	93.52	432	22.26	6.14	14560
Weedy check	145.3	-	281	14.81	3.24	8590
SEd	1.29		5.68	0.21	0.12	457.92
CD	2.71		11.93	0.43	0.26	961.63

Table 1: Effect of weed management practices on sweet corn.

\*Two years pooled data

### Effect on Weed and Crop

Effective weed control and reduced weed competition in sweet corn by twice hand weeding ( $T_9$ ) enables the crop with higher nutrient saving and uptake which favors better cob length, cob diameter, grains  $\text{cob}^{-1}$  and green cob yield. In weedy check ( $T_{10}$ ), because of severe weed competition from the beginning of the crop duration interfered with the nutrient uptake, light and space for rooting was responsible for lesser plant height, LAI and DMP.

Twice hand weeding at 20 and 40 DAS resulted in the least weed biomass because of the least weed count and less competition throughout the crop duration. Weedy check recorded significantly higher weed biomass compared to other treatments. This may be due to the weed competition throughout the crop duration and resulted in the highest weed count. Similar findings were reported by Pratik, et al. (2013) [3].

Lower density of weeds coupled with lower biomass in twice hand weeding at 20 and 40 DAS resulted in the highest weed control index of 93.52 per cent. Higher density of weeds coupled with higher weed biomass in weedy check might have resulted in greater depletion of nutrient and moisture. This could have deprived the factors of crop production which was ultimately reflected in poor yield and less weed control index.

Weedy check recorded significantly least yield attributes viz., cob length, cob diameter, individual cob weight, number of grains  $\text{cob}^{-1}$ , green cobs yield and stover yield. This may be due to severe weed competition throughout the crop growth. Twice hand weeding offer satisfactory weed control, providing a perfect weed free environment all throughout the critical period of crop growth and offering the highest yield components of the crop in terms of cob length, cob diameter, individual cob weight, number of grains  $\text{cob}^{-1}$ , green cobs yield and stover yield. This result it in agreement with the findings of Bakhtair Gul, et al. (2011) and Hawaldar and Agasimani (2012) [4,5].

According to Poonam, et al. (2013) [6] and sandhya Rani, et al. (2011) [7] keeping crop weed free in twice hand weeding at 20 and 40 DAS resulted in significant reduction in nutrient removal by weeds as compared to weedy check. As regard to the effect of weed control measures, atrazine  $1 \text{ kg ha}^{-1}$  as pre-emergence herbicide at 3 DAS + one hand weeding at 40 DAS registered the highest values of yield components and yield comparable to that of twice hand weeding at 20 DAS and 40 DAS. The

enhancement in sweet corn yield and its components might be attributed to the higher efficiency of weed control treatments that enables crop plants to make good use of environmental resources thus, increasing the competitiveness of sweet corn against weeds. In addition, manual weeding improves soil structure, aeration, water penetration and the availability of nutrients for crop plants. It could be attributed to the significantly lower weed population, dry matter accumulation of weeds and hence recorded higher green cob yield, stover  $\text{yield plant}^{-1}$ , higher number of grains  $\text{cob}^{-1}$  and hundred grain weights in this treatment. These results are in agreement with the findings of Sunitha, et al. (2010) [8] and Diego, et al. (2012) [9].

### Conclusion

On the basis of the experimentation, it can be concluded that twice hand weeding was comparable with atrazine  $1 \text{ kg ha}^{-1}$  as pre emergence herbicide at 3 DAS + one hand weeding at 40 DAS and was more efficient in controlling weeds.

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