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Effect of various weed management practices on weed indices in sweet corn (*Zea mays* var.*saccharata*)

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ABSTRACT

Field experiment was carried out at Vangudi village of Udaiyarpalayam taluk, Ariyalur district, Tamil Nadu during July to October 2022 to study the effect of various weed management practices on weed indices in sweet corn (*Zea mays* var. *saccharata*). The soil of the experimental field was sandy clay loam in texture with a pH of 7.8. The experiment was laid out in randomized block design with ten treatments and replicated thrice.Among the different treatments, pre-emergence application of metolachlor 50% EC @ 1 kg a.i. ha^{-1} on 3 DAS+ Intercropping (Blackgram)(T_8) which helps in decreasing different weed population and diminishing the weed biomass which increases the green cob yield. Pre-emergence application of metolachlor 50% EC@ 1 kg a.i. ha^{-1} on 3 DAS + Intercropping (Blackgram) recorded the higher weed control index.

Key words: *Sweet corn, Metolachlor, Blackgram, Weed management and weed control index*

Introduction

Sweet corn (*Zea mays* var. *saccharata*) also called as sugar corn is a type of maize with high sugar content belongs to the family poaceace, it is one of the warm season crops. In India, maize occupies an area of 9.9 million hectares with a production of 32.50 million tonnes and with a productivity of 3.28 t ha^{-1} (USDA, 2022). In Tamil Nadu, it is cultivated in an area of 0.33 million hectares with a production of 2.61 million tonnes with a productivity of 7.06 t ha^{-1} and also it occupies the fourth position in India (Salient statistics on agriculture, 2022). Weeds compete with sweet corn plants for essential resources such as sunlight, water, and nutrients. This competition can lead to stunted growth of sweet corn, reduced ear size, and overall lower yields. Yogita Ghardea *et al*. (2018) reported that the yield losses due to weeds competition in maize are estimated to vary from 8.5 to 51 per cent. Unlike traditional field corn, which is harvested when the kernels are dry and mature, sweet corn is harvested in the milk stage, when the kernels are still tender and contain a higher sugar content (Zohair Mahmoud Mirdad, 2010). Sweet corn is a medium plant type and provides green ears within 75 to 85 days after sowing. Sweet corn is consumed as raw or used as an ingredient in the preparation of soup, salad, manchurians and chinese dishes. In India, sweet corn is cultivated on very small area by some farmers and private sectors to meet the demands of many industries. Unlike field corn types, which are picked when the kernels are dried and completely matured, sweet corn varieties are harvested when the kernels are still in milky

([1]Research Scholar, [2]Associate Professor) stage. Sweet corn is harvested when immature and eaten as a vegetable, rather than a grain (Carla *et al.*, 2021). Ayana (2023) stated that maize crop is sensitive to weed challenges during the early growth period due to slow growth in the first 3 to 4 weeks.There is a great scope for commercial sweet corn production due to increasing demand of sweet corn in the market. The use of herbicide is an effective method for controlling weed infestation, which enables a quicker breakthrough and contributes to an increase in maize yield. Hence, the present study has been conducted to study the various methods of weed controlin sweet corn.

Materials and Methods

During July to October, 2022a field experiment was conducted in the farmer's field in Vangudi village of Udaiyarpalayam taluk, Ariyalur district of Tamil Nadu. The experimental field was located at 11°25′ North latitude and 79°45′ East longitude with an altitude of +18.0 m above mean sea level.The crop season recorded a maximum temperature which ranged from 31.9 ºC to 36.2 ºC with a mean of 33.7 ºC. The minimum temperature ranged from 22.9 ºC to 24.7ºC with a mean of 23.9 ºC. The relative humidity ranged from 67.2 to 79.7 per cent with a mean of 74.21 per cent. The crop period received a rain fall of 192.2 mm distributed over 18 rainy days during crop season. The texture of the experimental field soil was sandy clay loam in with a pH of 7.8. The soil was low in available nitrogen, medium in available phosphorus and potassium. The experiment was randomized block design, with three replications and ten treatments. The treatment schedule were as follows: T_1 -Unweeded control, T_2 -Two hand weeding on 15 and 30 DAS, T_3-Pendimethalin 30% EC @ 1 kg a.i. ha^{-1} on 3 DAS, T_4- Metolachlor 50% EC @ 1 kg a.i. ha^{-1} on 3 DAS, T_5-Pendimethalin 30% EC @ 1 kg a.i. ha^{-1} on 3 DAS + One hand weeding on 30 DAS, T_6 -Metolachlor 50% EC @ 1 kg a.i. ha^{-1} on 3 DAS + One hand weeding on 30 DAS, T_7-Pendimethalin 30% EC @ 1 kg a.i. ha^{-1} on 3 DAS + Intercropping (Blackgram), T_8 -Metolachlor 50% EC @ 1 kg a.i. ha^{-1} on 3 DAS + Intercropping (Blackgram), T_9-Pendimethalin 30% EC @ 1 kg a.i. ha^{-1} on 3 DAS + Sugarcane trash mulching on 21 DAS and T_{10} -Metolachlor 50% EC @ 1 kg a.i. ha^{-1} on 3 DAS + Sugarcane trash mulching on 21 DAS. The sweet corn hybrid sugar-75 seeds were dibbled at the rate of 12.5 kg ha^{-1} with the spacing of 60 × 20 cm. Blackgram variety VBN 8 was sown at rate of 20 kg ha^{-1} with spacing of 30 × 10 cm. All other standard cultural practices were followed during the cropping season. Pre-emergence application of pendimethalin and metolachlor was done with the help of knapsack sprayer fitted with a flood fan nozzle with a spray volume of 500 L ha^{-1} as per treatment schedule. In manual weed control treatments, weeds are uprooted within the row and between the rows using with hand weeding as per days mentioned in each treatment. The weed count (density) was taken from the tagged spot of 0.25 m^2 in the randomly selected each net plot and were calculated and converted into square meter basis for convenience. In order to draw a valid conclusion, the weed count data were subjected to ($\sqrt{X+0.5}$) as suggested by Gomez and Gomez (1984) before statistical analysis. For weed biomass, the weeds were air dried completely till they attained constant weight and finally recorded for each treatment and converted into g m^{-2}. Weed control index was calculated by the formula suggested by Misra and Josh (1979). The observations were recorded on total weed count, weed biomass and weed control index by adopting appropriate procedure.

Results and Discussion

Effect on weeds

Weed flora present in the experimental field was composite in nature comprising of grasses, sedges and broad leaved weeds (BLW). The major weeds are *Cyperus rotundus*, *Cynodondactylon*, *Digera arvensis* and *Cleome viscose* were the dominant weed species in the experimental field. This wide range of weeds in sweet corn was also reported by Sreelatha *et al*. (2020).

Effects on total weed count

Significantly maximum total weed count(188.43 m^{-2}) was recorded under unweeded control (T_1) where as it significantly lowest weed count (42.26 m^{-2}) with treatment T_8-Pre-emergence application of metolachlor 50% EC @ 1 kg a.i. ha^{-1} on 3 DAS + Intercropping (Blackgram) on 45 DAS. The studies significant the importance T_8-Pre-emergence application of metolachlor 50% EC @ 1 kg a.i. ha^{-1} on 3 DAS + Intercropping (Blackgram) which could benefit the

Table 1. Effect of various weed management practices on total weed count (m^{-2}), weed biomass ($g\ m^{-2}$) and weed control index on 45 DAS in sweet corn

Treatments	Total weed count (m^{-2})	Weed biomass ($g\ m^{-2}$)	WCI
T_1- Unweededcontrol	13.75(188.43)	194.32	-
T_2- Twohand weedingon15 and30DAS	7.94(62.57)	25.89	86.68
T_3- Pre-emergence application of pendimethalin 30%EC@1kga.i.ha^{-1}on 3 DAS	12.64(159.25)	88.51	54.45
T_4- Pre-emergence application of metolachlor 50% EC @ 1kga.i. ha^{-1} on 3 DAS	11.99(143.23)	78.96	59.37
T_5- Pre-emergence application of pendimethalin 30%EC@1kga.i.ha^{-1} on 3 DAS + One hand weeding on 30 DAS	10.92(118.69)	64.27	66.93
T_6- Pre-emergence application of metolachlor 50% EC @ 1kga.i. ha^{-1} on 3 DAS + One hand weeding on 30 DAS	10.23(104.25)	56.43	70.96
T_7- Pre-emergence application of pendimethalin 30%EC@1kga.i.ha^{-1} on 3 DAS + Intercropping (Blackgram)	7.57(56.86)	23.98	87.66
T_8- Pre-emergence application of metolachlor 50% EC @ 1kga.i. ha^{-1} on 3 DAS + Intercropping (Blackgram)	6.54(42.26)	19.56	89.93
T_9- Pre-emergence application of pendimethalin 30%EC@1kga.i.ha^{-1} on 3 DAS+Sugarcane trash mulching on 21 DAS	9.48(89.45)	43.68	77.52
T_{10}- Pre-emergence application of Metolachlor 50% EC @ 1kga.i. ha^{-1} on 3 DAS +Sugarcane trash mulching on 21 DAS	8.61(73.65)	37.87	80.51
S. Em$\pm$	0.21	1.08	-
CD(P=0.05)	0.63	3.24	-

crops in reducing the different weed density and ultimately reduced the weeding frequency during crop weed competition of crop. It might due to efficient and prolonged weed control by pre-emergence herbicides efficiently, supplemented with intercropping control the late emergence weeds. Metolachlor is an herbicide of chloroacetanilide group used as a pre-emergence herbicide to control initial flush of weeds and it control initial flush of annual grasses and some of the broad leaf weeds. The primary mode of action involves inhibiting the synthesis of very long chain fatty acids in the plants. The shading effect from the intercrop can hinder the germination and growth of various weeds, including grasses, sedges and broad leaved weeds. By limiting sunlight penetration to the soil surface, the intercrop

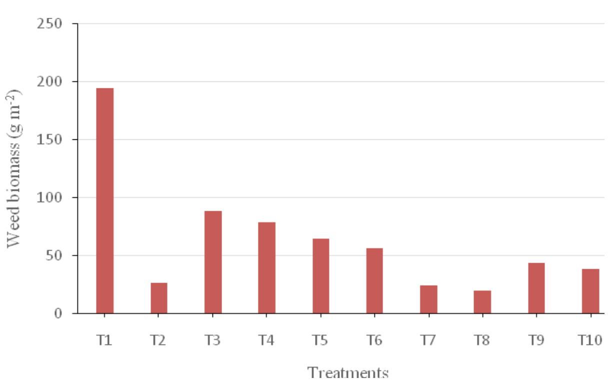

Fig. 1. Weed biomass ($g\ m^{-2}$) on 45 DAS

competes with weeds for light and resources, creating an environment that is less conducive for weed growth. This can result in effective weed control throughout the growing season of sweet corn. Similar reduction in weed count has been reported earlier by Borger *et al*. (2010) and Khan *et al*. (2021).

Effect on weed biomass

Significantly lower weed biomass (19.56 $g\ m^{-2}$) on 45 DAS was recorded by pre-emergence application of metolachlor 50% EC @ 1 kg a.i. ha^{-1} on 3 DAS + Intercropping (Blackgram) (T_8) due to effective control of weed seeds germination in the early stages of crop growth (Fig. 1). The death of susceptible weed species by metolachlor application was due to the inhibits the enzyme acetolactate synthase (ALS) in the chloroplasts of weeds in sweet corn which is in line with the findings of Saleem *et al.* (2015) and Chang *et al*. (2021). The intercropping of maize with blackgram could had a synergistic effect in reducing the amount of light penetrating the canopy, resulting in lower weed density and weed biomass in the plot with maize intercropped with legumes compared to the sole maize plot.

Effect on weed control index

Adoption of weed management practices had significant effect on weed control index. Among the treatments, pre-emergence application of metolachlor 50% EC @ 1 kg a.i. ha^{-1} on 3 DAS + Intercropping (Blackgram) (T_8) recorded 89.93 per cent was found to be superior in weed control index. This might be due to effective weed control achieved under this integrated weed management treatment in terms of reduced weed biomass of weeds and the continuance of earlier effect made by the pre-emergence herbicide performed evenly with intercropping at later stages of the crop growth accounted with very low weed biomass. Results were almost similarly reported by Thalkar *et al*. (2022) and Maitra *et al*. (2023).

Conclusion

Based on the experiment results, it concluded that pre-emergence application of metolachlor 50% EC @ 1 kg a.i. ha^{-1} on 3 DAS + Intercropping (Blackgram) (T_8) in sweet corn is most effective weed control methods for obtaining lower total weed count, weed biomass and higher weed control index.

Conflict of Interest- None

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