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Weed dynamics in *kharif* sweet corn (*Zea mays* L. *var. Saccharata sturt.*) under different weed management practices

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Abstract
A field experiment was conducted during *kharif* season 2019 at Kolhapur (Maharashtra) to study the integrated weed management in *kharif* sweet corn. Atrazine and Pendimethalin as pre-emergence, while 2, 4-D and Topramezone as post-emergence were tested alone and in integration with hand weeding and interculturing. The results revealed that the treatments weed free check was recorded lowest weed intensity. However among all the integrated weed management methods weed free check was recorded minimum weed population. weed free check was found to be recorded significantly maximum growth, yield and quality attributes *viz*., plant height, no. of functional leaves plant^{-1}, leaf area, Dry matter plant^{-1}, green cob yield and green fodder yield and found most effective to control weeds in sweet corn and recorded lowest weed dry matter, weed index and highest weed control efficiency which is at par with treatments pre-emergence application of pendimethalin @ 1 Kg a.i. ha^{-1} + 1 hand weeding at 30 DAS and Pre emergence application of atrazine @ 1 kg a.i ha^{-1} + 2,4-D Sodium salt @ 0.5 kg a.i ha^{-1} at 30 DAS found remunerative, therefore, these integrated weed management practices could become effective and economical under sub mountain agro-climatic conditions of Maharashtra.

Keywords: Sweet corn, hand weeding, herbicides, interculturing, weed intensity weed index, weed control efficiency

Introduction
Sweet corn (*Zea mays* var. Saccharata) is a monocot crop. It belongs to the family Poaceae, origin, United States and the genus *zea*. It is genetically very closely related variety of maize with high sugar content. It is also called as sugar corn, pole corn or simply corn. Sweet corn is picked when immature (milk stage) because it has highest edible quality in milk stage and eaten as a vegetable, rather than a grain. Sweet corn must be eaten fresh, canned or frozen before the kernels become tough and starchy. Sweet corn is the recent form of grain vegetable. Presence of iron makes it highly suitable for women who suffer from Anaemia. Being a potential crop in India sweet corn occupies important place as food, animal feed, poultry feed, industrial products mainly starch and each in brewery and seed (Das *et al*., 2008) [3].

Maize has the highest role in diet among all the cereal crop throughout the world. The worldwide area under the maize crop is estimated to be 150 million ha. In India, maize is grown on an area of 9.13 m ha, with production of 27.80 million ton (Anonymous 2018). In Maharashtra, maize occupies an area of 8.81 lakh ha. with total production of 24.33 lakh tonnes. The rainfed maize area in Maharashtra is 6.93 lakh ha. with an annual production 20.14 lakh tonnes. The major maize growing districts in Maharashtra are Nasik, Aurangabad, Jalgaon, Buldhana and Jalna as a sole crop but in Western Maharashtra, particular in Kolhapur, Satara, Sangli maize is invariably grown as intercrop in sugarcane, turmeric and to limited extent in drilled paddy. Hence, area under sole maize is very limited. Therefore, there is a great scope for increasing area under sole Sweet corn in Maharashtra.

Materials and Methods
A field experiment was conducted at PG Agronomy Research farm, RCSM College of Agriculture, Kolhapur, Maharashtra during *kharif* season 2019. The soil of the experimental plot was sandy clay loam in texture and slightly alkaline in reaction (pH 7.24 and EC 0.31 dS m^{-1}) as well as low in medium in nitrogen (342 kg ha-1), moderately high available phosphorus (22.79 kg ha-1) and moderately high in available potash (259.23 kg ha-1). The experiment comprising of 9 treatments *viz*., T_1-Weedy check; T_2- Weed free check;

T_3- Atrazine @ 1 kg a.i. ha^{-1} (PE) + hoeing at 30 DAS; T_4- Atrazine @ 1 kg a.i.ha^{-1} (PE) + 2,4-D Sodium salt @ 0.5 kg a.i.ha^{-1} at 30 DAS; T_5- Pendimethalin @ 1 kg a.i.ha^{-1} (PE) + hand weeding at 30 DAS; T_6- Pendimethalin @ 1 kg a.i.ha^{-1} (PE) + hoeing at 30 DAS; T_7- Pendimethalin @ 1 kg a.i.ha^{-1} (PE) + 2,4-D Sodium salt @ 0.5 kg a.i. ha^{-1} at 30DAS; T_8- one hoeing at 20 DAS + 1 HW at 30 DAS was laid out in randomized block design with three replications. The sweet corn variety Sugar-75 was sown at 75 cm row spacing and 20 cm plant to plant spacing using seed rate of 15 kg ha-1. The crop was fertilized with 120:60:60 kg N:P_2O_5:K_2O ha-1 as basal. The pre-emergence herbicides were applied to soil on next day of sowing, while post-emergence spray was done at 30 DAS. The crop was raised as per the recommended package of practices.

Result and Discussion

Table 1: Effect of integrated weed management on weed dynamics of sweet corn

Treatment	At harvest						
	Weed intensity (m^{-2})	Number of grassy weeds (m^{-2})	Number of broad leaved weeds (m^{-2})	Number of sedges (m^{-2})	Dry matter of weed (g)	Weed control efficiency (%)	Weed index (%)
T1	61.17	18.06	19.8	15.4	94.47	-	52.19
T2	5.20	1.6	1.4	1.5	5.27	93.11	-
T3	11.70	10.3	5.2	7.8	14.97	83.26	22.42
T4	8.03	4.2	3.2	2.2	12.36	85.91	1.54
T5	6.84	3.9	1.56	1.9	10.43	87.87	1.20
T6	11.00	10.9	5.2	5.7	23.43	74.67	17.41
T7	8.53	5.2	4.1	2.79	12.89	85.37	2.63
T8	9.43	6.2	6.15	5.2	13.67	84.58	13.79
T9	14.74	9.2	13.6	6.7	25.2	72.87	23.66
C.D.at 5%	1.83	-	-	-	5.38	-	-
General mean	15.18	7.09	6.69	5.46	24.08	83.45	14.98

Effect on weed intensity

An appraisal of data presented in Table-1 showed that various weed management practices significantly influenced weed dynamics of sweet corn. Significantly the lowest weed intensity, no. of broad leaved weeds, no. of grassy weeds, weed control efficiency (%), weed index (%) were recorded under the weed-free check, however it remained mostly at par with the treatments (T_5) pre- emergence application of pendimethalin @ 1 Kg a.i. ha^{-1} along with one hand weeding at 30 DAS (T_4) that is, Pre emergence application of Atrazine @ 1 kg a.i.ha^{-1} (PE) + 2,4-D Sodium salt @ 0.5 kg a.i. ha^{-1} at 30 DAS and (T_7) Pendimethalin @ 1 kg a.i.ha^{-1} (PE) + 2,4-D Sodium salt @ 0.5 kg a.i. ha^{-1} at 30 DAS but significantly superior over rest of the treatments. Whereas, significantly the highest values of these growth and quality attributes were registered under the weedy check. The weed floral composition of the experimental site was Cynodon dactylon, Digitaria sanguinallis, Eleusine indica, Sporobolus diander, Dactyloctenium aegypticum among grasses, Cyperus rotundus, Cyperus iria among sedges, Commelina benghalensis, Oldenlandia corymbosa, Portulaca oleraceae, Cleome viscosa, Celosia argentea, Melochia chochorifolia among broad leaved weeds. Similar results were reported by Shinde *et al*. (2001) [9], Van Wychen (2001) [10], Arvadia *et al*. (2012) [2], Kamble *et al*. (2013) [5], and Mathukia (2014) [7].

Weed control efficiency (%)

The data pertaining to the weed control efficiency of different weed management treatments regarding weed control efficiency at harvest are presented in Table-1 which revealed that the highest weed control efficiency was observed in weed free check (93.11 per cent) which was also in the comparison with T_5, T_4, T_7, T_8, T_6, T_3 and T_9 in that order over the weedy check. The weed control efficiency was worked out by using the following formula:

$$\text{Weed Control Efficiency (WCE \%)} = \frac{\text{WPC-WPT}}{\text{WPC}} \text{ x } 100$$

Where

WPC - Weed population in control plot

WPT - Weed population in treated plot

The lowest weed control efficiency was recorded in weedy check over rest of the treatments. Higher the weed control efficiency better is the treatment. Similar trend of observation were reported by Kolage *et al*. (2004) [6], Arvadia *et al*. (2012) [2], Sanodia *et al*. (2013) [8] and Mathukia *et al*. (2014) [7].

Effect on Weed Index (%)

The data regarding weed index at harvest is presented in Table-1 which revealed that the highest weed index was observed in weedy check (52.19 per cent) which was also in the comparison with T_9 (23.66 per cent), T_3 (22.42 per cent), T_6 (17.41per cent), T_8 (13.79 per cent), T_7 (2.63 per cent), T_4 (1.54 per cent), and T_5 (1.20 per cent), in that order over the weedy free. The weed index was worked out by using the following formula:

$$\text{Weed Index (WI \%)} = \frac{\text{X - Y}}{\text{X}} \text{ x } 100$$

Where

X - Yield from weed free check

Y - Yield from the treatment for which weed index is to be worked out

Lower the weed index better is the treatment. The treatment weed free check was recorded minimum weed index which reflected that the lowest weed index results in highest yield of sweet corn due to lower weed crop competition. The results are in conformity with Arvadia *et al.* (2012) [2], Sanodia *et al*. (2013) [8] and Mathukia *et al*. (2014) [7].

Recommendation

It was concluded that effective control of weeds in *kharif*

sweet corn along with higher growth, quality and yield attributes could be achieved by the treatment (T_2) that is, weed free i.e adoption of hand weeding at 20, 40, and 60 DAS and (T_5) that is, Pre-emergence application of pendimethalin @ 1 kg a.i ha^{-1} along with one hand weeding at 30 DAS, (T_4) that is, Pre emergence application of Atrazine @ 1 kg a.i.ha^{-1} along with 2,4-D Sodium salt @ 0.5 kg a.i. ha^{-1} at 30 DAS and (T_7) that is, Pre emergence application of Pendimethalin @ 1 kg a.i.ha^{-1} along with 2,4-D Sodium salt @ 0.5 kg a.i. ha^{-1} at 30 DAS under sub mountain agro-climatic conditions of Kolhapur, Maharashtra.

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