www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(7): 475-477

www.thepharmajournal.com
Received: 02-04-2021
Accepted: 10-06-2021

PP Pawar
Assistant Professor, Department of Agronomy, Division of Agronomy, College of Agriculture, Dhule, Maharashtra, India

SM Dhadge
Associate Professor, Department of Agronomy – Division of Agronomy, College of Agriculture, Dhule

RA Pawar
M.Sc. Agriculture, Department of Agronomy, Division of Agronomy, College of Agriculture, Dhule, Maharashtra, India

MD Gurav
M.Sc. Agriculture, Department of Agronomy, Division of Agronomy, College of Agriculture, Dhule, Maharashtra, India

Corresponding Author:
PP Pawar
Assistant Professor, Department of Agronomy, Division of Agronomy, College of Agriculture, Dhule, Maharashtra, India

Effect of pre and post emergence herbicides application on economics of Sweet corn (*Zea mays saccharata* Sturt.)

PP Pawar, SM Dhadge, RA Pawar and MD Gurav

Abstract
An experiment entitled "Effect of pre and post emergence herbicides on growth, yield and quality of Sweet corn (*Zea mays saccharata*)" was conducted during *kharif* 2019 at Post Graduate Research Farm, Agronomy Section, College of Agriculture, Dhule. Experiment consisted of ten treatments laid out in randomized block design with three replications. Among the herbicidal treatments, green cob and fodder yield was observed better with application of pendimethalin 1000 g a.i ha^{-1} (PE) *fb* tembotrione 120 g a.i ha^{-1} (30 DAS) and it was found at par with application of pendimethalin 1.00 kg a.i ha^{-1} (PE) *fb* 2,4-D dimethyl amine 1.0 kg a.i. ha^{-1} (PoE). Among the chemical weed management treatments, application of pendimethalin 1000 g a.i. ha^{-1} (PE) *fb* tembotrione 120 g a.i ha^{-1} (30 DAS) observed higher gross and net monetary return. However, the gross and net monetary returns were maximum under weed free check but lowest B:C ratio as compared to sequential application of pendimethalin 1.00 kg a.i. ha^{-1} (PE) *fb* 2,4-D dimethyl amine1.0 kg a.i. ha^{-1} (PoE) and pendimethalin 1000 g a.i. ha^{-1} (PE) *fb* tembotrione 120 g a.i ha^{-1} (30 DAS) due to higher cost for labor weeding.

Keywords: Sweet corn, pre emergence, post emergence and herbicide

Introduction
Heavy weed infestation is one of the major constraints that limit the productivity of sweet corn crop. Wider spacing and slow growing nature of the crop during the first 3-4 weeks provide enough opportunity for weeds to invade and offer severe competition resulting in 30-100 % yield reduction (Dey *et al.* 2017) [2]. Weeds emerge fast and grow rapidly competing with the crop severally for growth resources *viz.*, nutrients, moisture, sunlight and space during entire vegetative and early reproductive stages of sweet corn. It is well established that 20 to 60 DAS is the most critical period for crop-weed competition in maize. Hence, managing weeds during this period is most critical for obtaining higher yields.
Almost all types of weed *viz*; grassy, broad leave weeds and sedges infested the sweet corn field. Weeds being a serious negative factor in crop production are responsible for market loss (28-100 %) in crop yield (Kumar *et.al* 2016) [5]. Atrazine and pendimethalin recommended as a pre emergence herbicide is not effective against some of the weeds both grassy and non-grassy as well the sedges *Cyperus rotundus.* Hence there is a need for some alternate post emergence herbicides which can be provide broad spectrum weed control in *kharif* sweet corn without affecting the crop growth and yield of crop. Use of herbicides would make weed control more acceptable to the farmers and control of weeds by using herbicides was a cheaper proposition than with manual methods

Material and Methods
The field experiment was conducted in the *kharif* season of year 2019. Climatologically, this area falls in the sub-tropical region at the North. Generally monsoon commences by third week of June and retreats at the end of September with the average annual rainfall of 607 mm. Experiment consisted of ten treatments laid out in randomized block design with three replications. The treatments consist with weedy check (T_1), weed free check (T_2), atrazine 1000 g a.i ha^{-1} (PE) *fb* halosulfuron-methyl 90 g a.i ha^{-1} (PoE) (T_3), atrazine 1000 g a.i ha^{-1} (PE) *fb* 2,4-D dimethyl amine 1000 g a.i ha^{-1} (PoE) (T_4), pendimethalin 1000 g a.i ha^{-1} (PE) *fb* halosulfuron-methyl 90 g a.i ha^{-1} (PoE) (T_5), pendimethalin 1000 g a.i ha^{-1} (PE) *fb* tembotrione 120 g a.i ha^{-1} (30 DAS) (T_6), pendimethalin 1000 g a.i ha^{-1} (PE) *fb* 2,4-D dimethyl amine 1000 g a.i ha^{-1} (PoE) (T_7), halosulfuron-methyl 90 g a.i ha^{-1} (PoE) (T_8), tembotrione 120 g a.i ha^{-1}

(PoE) (T_9), and 2,4-D dimethyl amine 1000 g a.i ha^{-1} (PoE) (T_{10}). The seed of sweet corn variety Sugar-75 was sown on 18th July 2019 at spacing of 60 x 20 cm^2 using seed rate 15 kg ha^{-1}. The fertilizer was applied as per the recommended dose to sweet corn crop as 120:60:40 kg NPK ha^{-1}. The required quantity of herbicides *viz.*, atrazine, pendimethalin, halosulfuron-methyl, tembotrione and 2,4-D was measured by weighing balance and measuring cylinder at the time of preparation of solution according to treatments. The spraying was done by using knapsack sprayer with flat fan nozzle using 500 liters of water ha^{-1}. The crop was grown with recommended package of practices and was harvested at maturity on 26th September 2019.

Results and Discussion

Effect of weed management treatments on yield attributes and yield

The important yield contributing characters like weight of grain cob^{-1} (g), number of grains cob^{-1} and number of grain rows cob^{-1} were significantly more under weed free check, among the different herbicide treatment application of pendimethalin 1.00 kg a.i. ha^{-1} (PE) *fb* tembotrione 120 g a.i. ha^{-1} (30 DAS) was significantly superior over other chemical weed management treatments but at par with pendimethalin 1.00 kg a.i. ha^{-1} (PE) *fb* 2,4- D dimethyl amine 1.00 kg a.i. ha^{-1} (PoE). The green cob and fodder yield (q ha^{-1}) of sweet corn was found to be significantly higher (157.72 and 324.22 q ha^{-1}, respectively) in treatment of weed free check. Among the different chemical treatment, spraying of pendimethalin 1.00 kg a.i ha^{-1} (PE) *fb* tembotrione 120 g a.i. ha^{-1} (30 DAS) which recorded significantly maximum green cob and fodder yield (147.94 and 306.97 q ha^{-1}) as compared to other treatments of weed control and it was found at par with application of pendimethalin 1.00 kg a.i. ha^{-1} (PE) *fb* 2,4-D dimethyl amine 1.00 kg a.i. ha^{-1} (PoE) (140.63 and 294.49 q ha^{-1}). Among the herbicide treatments tried in the experiment, application of pre-emergence herbicide followed by post emergence herbicide treatment was found significantly better than application of post-emergence herbicide only in respect of green cob and fodder yield of sweet corn may probably be due to better weed management resulting in improvement in all growth and sink parameters which contributed higher yield owing to favourable condition in absorbing soil moisture, nutrient content and sunlight.

Table 1: Number of grains cob^{-1}, number of grain rows cob^{-1} and weight of grains cob^{-1} (g) as influenced by different herbicidal treatment

Treatments	Number of grains cob^{-1}	Number of grain rows cob^{-1}	Weight of grains cob^{-1} (g)
T_1 : Weedy check	356.67	14.00	112.33
T_2 : Weed free check	643.33	16.00	226.33
T_3 : Atrazine 1000 g ha^{-1} (PE) *fb*halosulfuron-methyl 90 g ha^{-1} (PoE)	556.00	14.67	177.30
T_4 : Atrazine 1000 g ha^{-1} (PE) *fb*2,4-D dimethyl amine 1000 g ha^{-1} (PoE)	598.00	16.00	197.25
T_5 : Pendimethalin 1000 g ha^{-1} (PE) *fb* halosulfuron-methyl 90 g ha^{-1} (PoE)	550.00	14.67	178.67
T_6 : Pendimethalin 1000 g ha^{-1} (PE) *fb* tembotrione 120 g ha^{-1} (30 DAS)	628.00	16.00	210.00
T_7 : Pendimethalin 1000 g ha^{-1} (PE) *fb* 2,4-D dimethyl amine 1000 g ha^{-1} (PoE)	620.00	16.00	204.57
T_8 : Halosulfuron-methyl 90 g ha^{-1} (PoE)	463.33	14.00	149.27
T_9 : Tembotrione 120 g ha^{-1} (PoE)	566.67	15.33	183.85
T_{10}: 2,4-D dimethyl amine 1000 g ha^{-1} (PoE)	502.67	14.00	164.67
S.E.(m) ±	7.70	0.38	3.39
C.D. at 5 %	22.82	1.12	10.08
General mean	548.47	15.07	148.42

penetration during crop growing period. The green cob and fodder yield was significantly lowest under weedy check treatment. These results corelate with the findings of Dobariya *et al.* (2014) [3], Deshmukh (2017) [1] and Mitra *et al*. (2018) [7].

Effect of different weed management practices on economics of sweet corn

The gross and net monetary returns were found maximum (₹ 190144 and ₹ 123972 ha^{-1}, respectively) in weed free check treatment. Among chemical weed management treatments, application of pendimethalin 1.00 kg a.i. ha^{-1} (PE) *fb* tembotrione 120 g a.i. ha^{-1} (30 DAS) (₹ 178640 and ₹ 117368 ha^{-1}, respectively) recorded more gross and net monetary returns than other chemical weed management method followed by pendimethalin 1.00 kg a.i. ha^{-1} (PE) *fb* 2,4-D dimethyl amine 1.00 kg a.i. ha^{-1} (PoE) (₹ 170081 ha^{-1} and ₹ 112809, respectively), atrazine 1.00 kg a.i. ha^{-1} (PE) *fb* 2,4-D dimethyl amine 1.00 kg a.i. ha^{-1} (PoE) (₹ 160954 ha^{-1} and ₹ 103932, respectively) and tembotrione 120 g a.i. ha^{-1} (30 DAS) (₹ 151826 ha^{-1} and ₹ 92104, respectively). The benefit cost ratio was maximum in application of pendimethalin 1.00 kg a.i. ha^{-1} (PE) *fb* 2,4-D dimethyl amine 1.00 kg a.i. ha^{-1} (PoE) (2.97) followed by pendimethalin 1.00 kg a.i. ha^{-1} (PE) *fb* tembotrione 120 g a.i. ha^{-1} (30 DAS) (2.92) due to higher market price of tembotrione herbicide as compare to 2,4-D dimethyl amine.. These results corroborate with the findings of Kamble *et al.* (2015) [4], Deshmukh (2017) [1] and Kumar and Chawla (2019) [6].

Table 2: Green cob yield (q ha^{-1}), green fodder yield (q ha^{-1}), total cost of cultivation (₹ ha^{-}), gross returns (₹ ha^{-1}), net returns (₹ ha^{-1}) and B:C ratio in sweet corn as influenced by different treatments

Treatments	Green cob yield (q ha^{-1})	Green Fodder yield (q ha^{-1})	Total cost of cultivation (₹ ha^{-1})	Gross returns (₹ ha^{-1})	Net returns (₹ ha^{-1})	B:C ratio
T_1 : Weedy check	62922.5	16085.83	54922	79008	24086	1.44
T_2 : Weed free check	157722.2	32422.22	69922	190144	123972	2.71
T_3 : Atrazine 1000 g ha^{-1} (PE) *fb* halosulfuron-methyl 90 g ha^{-1} (PoE)	122402.8	26594.79	61922	148998	87076	2.41
T_4 : Atrazine 1000 g ha^{-1} (PE) *fb* 2,4-D dimethyl amine 1000 g ha^{-1}(PoE)	132472.2	28481.53	57022	160954	103932	2.82
T_5 : Pendimethalin 1000 g ha^{-1} (PE) *fb* halosulfuron-methyl 90 g ha^{-1} (PoE)	120423.6	26561.98	62172	146986	84814	2.36
T_6 : Pendimethalin 1000 g ha^{-1} (PE) *fb* tembotrione 120 g ha^{-1} (30 DAS)	147943.1	30697.29	61272	178640	117368	2.92
T_7 : Pendimethalin 1000 g ha^{-1} (PE) *fb* 2,4-D dimethyl amine 1000 g ha^{-1} (PoE)	140631.9	29449.38	57272	170081	112809	2.97
T_8 : Halosulfuron-methyl 90 g ha^{-1} (PoE)	94138.89	22593.33	60622	116732	56110	1.93
T_9 : Tembotrione 120 g ha^{-1} (PoE)	124402.80	27423.06	59722	151826	92104	2.54
T_{10}: 2,4-D dimethyl amine 1000 g ha^{-1} (PoE)	107923.6	24861.87	56022	132785	76763	2.37

Conclusion

Among the herbicidal treatments application of pre-emergence herbicide *i.e.* pendimethalin @ 1 kg a.i. ha^{-1} followed by post-emergence herbicide *i.e.* tembotrione @ 0.12 kg a.i. ha^{-1} at 30 DAS should be adopted for effective weed control and higher sweet corn production. From the economic point of view application of pre-emergence spray of pendimethalin @ 1.0 kg a.i. ha^{-1} followed by post- emergence herbicide 2,4-D dimethyl amine @ 1.0 kg a.i. ha^{-1} at 20 DAS and pre-emergence spray of pendimethalin @ 1.0 kg a.i. ha^{-1} followed by post-emergence herbicide tembotrione @ 0.12 kg a.i. ha^{-1} at 30 DAS could be economical viable treatments based on B:C ratio.

References

1. Deshmukh JR. Effect of integrated weed management on growth and yield of sweet corn. M.Sc. (Agri) Thesis, Dr.Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli 2017.
2. Dey P, Pratap T, Singh VP, Singh R, Singh SP. Weed management options for spring sweet corn. ISWS Golden Jubilee International Conference on "Weeds and Society: Challenges and Opportunities", ICAR- Directorate of Weed Research, Jabalpur, India during 2017 2018:297.
3. Dobariya VK, Mathukia RK, Gohil BS, Chhodavadia SK. Integrated weed management in sweet corn. Indian J. Weed Sci 2014;46(2):195-196.
4. Kamble AS, Yogeesh LN, Prashanth SM, Channabasavanna AS, Channagoudar RF. Effect of weed management practices on weed growth and yield of maize. Int. J. Sci. Environ 2015;4(6):1540-1545.
5. Kumar A, Puniya R, Sharma A, Mahajan A, Lobzang S. Sedges management in bottle gourd with halosulfuron-methyl. Indian J. Weed Sci 2016;4(3):297-299.
6. Kumar M, Chawla J. Comparative study on weed control efficacy of different pre-and post-emergence herbicides in *Kharif* maize. Indian J Weed Sci., 2019;51(1):32-35.
7. Mitra B, Bhattacharya PM, Ghosh A, Patra K, Chowdhury AK, Gathala MK. Herbicide options for effective weed management in zero-till maize. Indian J Weed Sci 2018;50(2):137-141.