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RESPONSE OF WEED MANAGEMENT STRATEGIES ON PERFORMANCE OF MAIZE AT DEHRADUN, UTTRAKHAND, INDIA

Hema Adhikari, Diksha Nautiyal*, Ashwani Rawat and Manisha

Department of Agriculture, Agriculture Faculty, DevBhoomi Institute of Management Studies, Dehradun, Uttarakhand, India

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ABSTRACT

The field experiment was conducted at the Dehradun. During March – June 2020 to the evaluation of different weed management practices on maize. The field experiment was laid out in randomized block design with three replications. Hybrid maize TMMH-806 was used as a test variety. The experiment comprised of eight treatments *viz.*, T₁ – unweeded check, T₂ – hand weeding twice at 15 and 35 DAS, T₃- atrazine @ 1.5 kg ha⁻¹(3 DAS) + one hand weeding, T₄ –tembotrione @ 100g ha⁻¹ (21 DAS) + one hand weeding, T₅ – topramezone @ 75g ha⁻¹ (21 DAS) + one hand weeding, T₆ – atrazine @ 1.5 kg ha⁻¹(3 DAS) + tembotrione @ 100g ha⁻¹ (21 DAS), T₇ – atrazine @ 1.5 kg ha⁻¹(3 DAS) + topramezone @ 75g ha⁻¹ (21 DAS) and T₈ - weed free plot. The effect of application of pre emergence and post emergence herbicide atrazine and tembotrione on individual weed species count, total weed count, weed DMP, weed control index, nutrient uptake by weeds and growth attributes, and an effort was also made quantify and illustrate the economic advantage of chemical weed control in hybrid maize. The growth parameters *viz.*, Plant height, LAI and crop dry matter production were significantly higher in the weed free plot (T₈). However, it was on par with T₆- atrazine @ 1.5 kg ha⁻¹(3 DAS) + tembotrione @ 100g ha⁻¹ (21 DAS). The least growth parameters of plant height, LAI and crop dry matter production were registered in unweeded check (T₁).

Keywords: Hybrid maize, weed management, tembotrione, Herbicides.

INTRODUCTION

Maize is one of the most important cereal crops grown all over the globe. Being a C₄ plant, maize is very efficient in converting solar energy into dry matter and has very high genetic yield potential. Hence it is called as ‘miracle crop’ and also a “queen of cereal” (Ravisankar *et al.*, 2017). It is a rich source of carbohydrates and has a higher percentage of proteins than other cereals. Maize grain contains starch (72%), protein (10%), oil (4.8%), fibre (5.8%), sugar (3.0%) and ash (1.7%) (Sakthivel, 2014). Maize is one of the important cereal crops for food, feed, and fodder for livestock, raw materials for industries, besides being recently used as biofuel and nutritional security for the many sectors in the country (Kumar *et al.*, 2016).

Maximum crop productivity loss is caused by weeds and about 33 percent of the potential production is lost due to weed competition. Among the various pests, weeds compete with crop plants for nutrients, water, sunlight and space. The presence of weeds reduces the photosynthetic efficiency, dry matter production and distribution to economical parts and thereby reduces sink capacity of crop resulting in poor grain yield. Weeds alone deplete 30-40 percent of applied nutrients from the soil (Mundra *et al.*, 2003). Keeping this in view, the present study was chosen to find out the effect of new herbicides on the growth and development of maize.

MATERIALS AND METHODS

The field experiment was carried out during, 2020 at Experimental field of, Dehradun. It is a district of Uttarakhand state in northern India. It is located in the western Himalayan region 1, the location of experimental farm is situated at 30°33' North latitude and 77°94' East longitude at an altitude of 597 m above mean sea level (MSL). The climate of Dehradun also depends upon the altitude, and the temperature sometimes falls below the freezing point. During the summer ranges between 36° C -16.7° C in winter. The temperature ranges from 23.4° C to 75.2°C. Dehradun gets the annual rainfall is 2115.4 mm/year. The hottest, coldest, wettest and windiest month respectively is June (29°C), January (14°C), August (673.6 mm avg) and April (3 km/hr). The maximum temperature is (32°C) and the minimum temperature is (24°C). The relative humidity is 85 percent and the pressure is 999m bar. The field experiment was laid out in randomized block design with three replications. The variety used for the experiment was Hybrid maize TMMH-806.

RESULTS AND DISCUSSION

The observation on plant height recorded at 60 DAS and at harvest stage is presented in Table 1. The treatments exerted significantly influence over the plant height at 60 DAS and at harvest. Among the weed control measures in maize, T₈- weed-free plot resulted in taller plants of 185.67

and 222.63 at 60 DAS and at harvest stage, respectively and which was on par with T₆ - atrazine @ 1.5 kg ha⁻¹ (3 DAS) + tembotrione @ 100 g ha⁻¹ (21 DAS) recorded plant height was 182.29 and 216.57 cm at 60 DAS and at harvest stage, respectively. T₁- unweeded check registered the least plant height of 112.06 and 129.14 cm at 60 DAS and at harvest stage, respectively. The data on leaf area index of maize crop recorded at 60 DAS is presented in Table 1. All the treatments significantly influenced the LAI of the maize crop. Among the weed control measures compared, the highest leaf area index of 7.89 was recorded with T₈- weed-free plot, which was on par with the application of atrazine @ 1.5 kg ha⁻¹ (3 DAS) + tembotrione @ 100 g ha⁻¹ (21 DAS) (T₆) value is 7.70. The least leaf area index of 5.04 at

60 DAS was recorded in T₁- unweeded check. The observations recorded on crop dry matter production at 30, 60 DAS and harvest stage are presented in Table 1. All the treatments attained significance in influencing crop dry matter production. Among weed control measures compared, T₈- weed-free plot performed better under-recording highest dry matter production of 4418, 8916 and 14640 kg ha⁻¹ at 30, 60 DAS and harvest stage, respectively. This was on par with the treatment, T₆- atrazine @ 1.5 kg ha⁻¹ (3 DAS) + tembotrione @ 100 g ha⁻¹ (21 DAS) by recording of 4308, 8791 and 14454 kg ha⁻¹ at 30, 60 DAS and harvest stage, respectively. The lowest dry matter production of 2164, 4714 and 7355 kg ha⁻¹ at 30, 60 DAS and harvest stage, respectively were recorded with T₁- unweeded check

Table 1 : Effect of weed control treatments on plant height (cm), LAI and DMP in maize

Treatments	PLANT HEIGHT (cm)		LAI	DRY MATTER PRODUCTION		
	60 DAS	HARVEST	LAI 60 DAS	30 DAS	60 DAS	Harvest
T ₁ - Unweeded Check	112.06	129.14	5.04	2164	4714	7355
T ₂ - Hand weeding twice at 15 and 35 DAS.	173.17	205.48	7.22	3558	8041	13593
T ₃ - Atrazine @ 1.5 kg ha ⁻¹ (3 DAS)+ One hand weeding	152.06	171.76	5.72	2586	7025	11686
T ₄ - Tembotrione @ 100 g ha ⁻¹ (3 DAS) + One hand weeding	163.71	190.64	6.42	3003	7505	12594
T ₅ - Topramezone @ 75 g ha ⁻¹ (21 DAS) + One hand weeding	161.92	184.82	6.21	2905	7375	12449
T ₆ - Atrazine @ 1.5 kg ha ⁻¹ (3 DAS) + Tembotrione @ 100 g ha ⁻¹ (21 DAS)	182.29	216.57	7.70	4308	8791	14454
T ₇ - Atrazine @ 1.5 kg ha ⁻¹ (3 DAS) + Topramezone @ 75 g ha ⁻¹ (21 DAS)	172.16	202.29	7.10	3450	7913	13414
T ₈ - Weed free plot	185.67	222.63	7.89	4418	8916	14640
S.E _d	3.78	5.10	0.11	52.61	62.43	89.26
CD(p=0.05)	8.09	10.93	0.24	112.60	133.62	191.02

CONCLUSION

From the above results, it is concluded that growth parameters of maize viz., Plant height, LAI and crop dry matter production were significantly higher in the weed free plot (T₈). However, it was on par with T₆- atrazine @ 1.5 kg ha⁻¹ (3 DAS) + tembotrione @ 100g ha⁻¹ (21 DAS). The least growth parameters of plant height, LAI and crop dry matter production were registered in unweeded check (T₁).

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