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Dry matter accumulation and fodder yield of sweet corn as influenced by weed management practices

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Abstract

The experiment was carried out during *rabi* season of 2016 at Research Cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh). Maize has been an important cereal because of its great production potential and adoptability to wide range of environments. In Indian agriculture, maize assumes a special significance on account of its utilization as food, feed and fodder. The highest dry matter accumulation plant⁻¹ was recorded in atrazine 1.25 kg *a.i.* ha⁻¹ (PE) followed by one hand hoeing at 30 DAS (T₉) and the lower dry matter was observed in weedy check as compared to other treatments. Significantly higher number of leaves per plant was obtained under atrazine 1.25 kg *a.i.* ha⁻¹ (PE) followed by one hand hoeing at 30 DAS (T₉). The atrazine 1.25 kg *a.i.* ha⁻¹ (PE) followed by one hoeing at 30 DAS recorded significantly higher fodder yield and harvest index.

Keywords: atrazine, dry matter and cereal

Introduction

Maize (*Zea mays* L.) belong to family poaceae is a one of the most important staple food crop of the world and ranks next to wheat and rice. Maize has been an important cereal because of its great production potential and adoptability to wide range of environments. Maize occupies an important place in Indian economy. Maize is considered as the “Queen of Cereals”. Being a C₄ plant, it is capable to utilize solar radiation more efficiently even at higher radiation intensity. In Indian agriculture, maize assumes a special significance on account of its utilization as food, feed and fodder besides several industrial uses for the production of starch, syrup, alcohol, acetic acid, lactic acid etc. Sweet corn has highest edible quality in milk stage. In sweet corn best nutritional quality depends on moisture (72.7%) and total solids (22.3%) comprising of carbohydrate (81%), protein (13%) and lipids (3.5%). Yield loss due to weeds in maize varies from 28 to 93%, depending on the type of weed flora and intensity and duration of crop-weed competition (Sharma and Thakur, 1998) [5]. They reported that unchecked weed growth in sandy loam soils of Punjab reduced maize yield by 61.3% compared to weed free check. Weed infestation is a major constraint in maize cultivation that can cause 33 to 72% of yield loss (Thakur and Sharma, 1996) [6]. Reduction in Average global yield losses due to weed competition ranged from 34 to 60% (Akobundu 1987) [1].

Materials and Methods

The experiment was carried out during *rabi* season of 2016 at Research Cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh). The field experiment was work out in randomized block design with 11 treatments *viz.* Oxadiargyl 0.090 kg *a.i.* ha⁻¹PE (T₁), Metribuzin 0.40 kg *a.i.* ha⁻¹ PE (T₂), Atrazine 1.25 kg *a.i.* ha⁻¹ PE (T₃), Tembotrione 0.120 kg *a.i.* ha⁻¹ PoE (T₄), Sulfosulfuron 0.030 kg *a.i.* ha⁻¹ PoE (T₅), Atrazine 1.25 kg *a.i.* ha⁻¹EPoE (T₆), Oxadiargyl 0.090 kg *a.i.* ha⁻¹ PE followed by one hoeing at 30 DAS (T₇), Metribuzin 0.40 kg *a.i.* ha⁻¹ PE followed by one hoeing at 30 DAS (T₈), Atrazine 1.25 kg *a.i.* ha⁻¹ PE followed by one hoeing at 30 DAS (T₉), Hand weeding twice at 20 & 40 DAS (T₁₀) and Weedy check (T₁₁). Treatments were replicated thrice in randomized block design. The allocation of these treatments was done randomly and all the cultural practices were followed as per recommended. The five randomly collected plants per plot were dried at room temperature for two days and then oven dried at 60 °C till a constant weight is obtained. The oven dry weight was recorded for estimating the dry matter accumulation in g plant⁻¹. The number of green and fully opened leaves on the observational plants was counted manually.

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The fodder yield from each net plot was weighed separately and converted into t ha⁻¹ by multiplying conversion factor. The harvest index of sweet corn was worked out with help of formula.

Results and Discussion

The results revealed that dry matter accumulation increased with the advancement of crop age till harvest stage. At 30 DAS, no- significant variation in dry matter plant⁻¹ was observed in all treatments. The highest dry matter accumulation plant⁻¹ was recorded in atrazine 1.25 kg a.i. ha⁻¹ (PE) followed by one hand hoeing at 30 DAS (T₉). Significantly the low dry matter was observed in weedy check as compared to other treatments. Dry matter production is largely a function of photosynthetic surface which has also influenced more under T₉ resulting in higher dry matter accumulation. As a result of minimum competition, height of plants, and leaves were at higher side which resulted in higher dry matter production. These results are found to be in close conformity with Sharar *et al.* (2003) [4]. Significantly higher number of leaves per plant was obtained under atrazine 1.25 kg a.i. ha⁻¹ (PE) followed by one hand hoeing at 30 DAS (T₉)

which was found at par with hand weeding twice (T₁₀), metribuzin 0.40 kg a.i. ha⁻¹PE one hoeing at 30 DAS (T₈) and tembotrione 0.120 kg a.i. ha⁻¹ PoE (T₄). The weedy check (T₁₁) recorded significantly lower number of leaves plant⁻¹ at each date of observations as compared to other treatments indicating that weeds reduced the plant height due to competition for growth resources. The increased number of functional leaves plant⁻¹ under atrazine 1.25 kg a.i. ha⁻¹ (PE) followed by one hand hoeing at 30 DAS (T₉) was due to reduced weed competition. These results are found to be in close conformity with Arvadia *et al.* (2012) [2] and Sandhya Rani *et al.* (2013). The atrazine 1.25 kg a.i. ha⁻¹ (PE) followed by one hoeing at 30 DAS recorded significantly higher fodder yield (34.63 t ha⁻¹) and it was at par with hand weeding twice (34.35 t ha⁻¹) and metribuzin 0.4 kg a.i. ha⁻¹ (PE) followed by hoeing at 30 DAS (33.57 t ha⁻¹) which was significantly superior over rest of the weed management treatment. The significantly higher harvest index was observed under atrazine 1.25 kg a.i. ha⁻¹ PE followed by one hoeing at 30 DAS (34.48) which was found comparable with hand weeding twice at 20 & 40 DAS (33.90), metribuzin 0.40 kg a.i. ha⁻¹ PE followed by one hoeing at 30 DAS (33.67).

Table 1: Number of leaves, dry matter accumulation fodder yield and harvest index of maize as influenced by weed management practices

Treatments	Number of leaves plant ⁻¹				Dry matter accumulation plant ⁻¹				Fodder yield t ha ⁻¹	Harvest index (%)
	30 DAS	60 DAS	90 DAS	At harvest	30 DAS	60 DAS	90 DAS	At harvest		
T ₁ : Oxadiargyl 0.090 kg a.i. ha ⁻¹ PE	6.14	8.27	11.93	10.60	6.13	13.14	86.00	197.72	28.87	32.15
T ₂ : Metribuzin 0.40 kg a.i. ha ⁻¹ PE	6.17	8.59	12.70	11.67	7.34	16.19	93.58	200.75	29.71	32.26
T ₃ : Atrazine 1.25 kg a.i. ha ⁻¹ PE	6.21	9.00	13.03	11.93	7.38	20.05	101.85	209.21	30.75	32.89
T ₄ : Tembotrione 0.120 kg a.i. ha ⁻¹ PoE	6.06	9.06	13.11	12.26	6.91	25.00	111.99	212.22	32.47	33.44
T ₅ : Sulfosulfuron 0.030 kg a.i. ha ⁻¹ PoE	6.05	-----	-----	-----	6.47	-----	-----	-----	-----	-----
T ₆ : Atrazine 1.25 kg a.i. ha ⁻¹ EPoE	6.07	9.05	13.08	12.10	7.14	22.12	106.90	211.15	31.57	33.33
T ₇ : Oxadiargyl 0.090 kg a.i. ha ⁻¹ PE followed by one hoeing at 30 DAS	6.13	8.80	12.80	11.53	6.61	18.34	97.73	205.13	30.36	32.48
T ₈ : Metribuzin 0.40 kg a.i. ha ⁻¹ PE followed by one hoeing at 30 DAS	6.19	9.60	13.33	12.47	7.36	28.28	116.41	219.90	33.57	33.67
T ₉ : Atrazine 1.25 kg a.i. ha ⁻¹ PE followed by one hoeing at 30 DAS	6.24	9.93	13.67	12.80	7.37	36.15	124.26	226.76	34.63	34.48
T ₁₀ : Hand weeding twice at 20 & 40 DAS	6.20	9.80	13.40	12.67	7.33	31.11	120.23	222.10	34.53	33.90
T ₁₁ : Weedy check	6.07	7.07	9.93	9.53	6.54	9.52	44.15	105.13	19.96	28.57
SEM±	0.14	0.28	0.16	0.18	0.35	1.74	1.46	1.76	0.54	0.30
CD (P=0.05)	NS	0.82	0.48	0.59	NS	5.13	4.32	5.20	1.60	0.89

Conclusion

Significantly higher number of leaves plant⁻¹, highest dry matter accumulation plant⁻¹, fodder yield and Harvest index were recorded under atrazine 1.25 kg a.i. ha⁻¹ (PE) followed by one hand hoeing at 30 DAS.

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