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Effects of different herbicide doses of weed control measures on yield and yield attributes in maize crop

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Abstract

The present investigation entitled, "Effects of different herbicide doses of weed control measures on yield and yield attributes in maize crop" was carried out during 2021-22 at Shivalik Research Farm, SIPS, Dehradun, and Uttarakhand. The experiment was laid out in a Random Block Design with 7 treatments {T1 Un-weeded, T2 Hand weeding (20+40 DAS), T3 Atrazine 50% WP (0-3 DAS), T4 Alachlor 50% EC (0-3 DAS), T5Metachlor T6 Metribuzine & T7 2, 4-D (Etyl ester)} and three replications. Observation related to yield and yield attributes recorded that there were no significant differences in plant population initially and at harvest due to weed management practices, Maximum number of cobs per plant was obtained 1.65 in T4 Alachlor 50% EC (0-3 DAS), Maximum length of cobs per plant obtained 15.54 in T4 Alachlor 50% EC (0-3 DAS), highest grain yield was 3563.68 in T4 Alachlor 50% EC (0-3 DAS), maximum number of kernels per cob obtained 14.64 in T4 Alachlor 50% EC (0-3 DAS). Application of Alachlor 50% EC (0-3 DAS) has found to be most effective as well as perfect for exploiting the maximum grain yield. Therefore, it has observed during the field experiment during the present field experiments that application of Alachlor 50% EC (0-3 DAS) found fruitful because it not only control the weed density or weed population but also increase the yield of maize crops.

Keywords: Yield, yield attributes, weeds density, cobs per plant and plant population etc.

Introduction

Maize (*Zea mays* L.) is the world's leading crop and it is one of the most versatile emerging crops having wider adaptability. Maize is known as queen of cereals because of its highest genetic yield potential among food grain. Maize is the only cereal food crop that can be grown in diverse seasons and ecologies. Apart from this, maize is an important industrial raw material and provides large opportunity for value addition. It occupies an area of 9.25 m ha with 25.2 productions (IIMR Annual report 2016-17). Though the crop favorably responds to better crop management both in *Kharif* and *Rabi*. The erratic rainfall pattern of the South-west monsoon comes in the way of timely field operations of *Kharif* in absence of any major environmental impediments in *Zaid*, the desired field operation can be planned and executed of the most desired time. Moreover, the various environmental factors including absence of many major disease and insect-pest in this season help in realizing better profit from every additional unit of monetary inputs. Some of the important favouring maize cultivation in *zaid* is briefly discussed below. Many factors that affects crop yield adversely, losses caused by weeds are rank first. Weeds emerge fast, grow rapidly and competing with the crop severally for growth resources *viz.*, nutrients, moisture, sunlight and space during entire vegetative growth and early reproductive stages of maize. They also transpire lot of valuable conserved moisture and absorb large quantities of nutrients from the soil. Further, wide space provided to the maize, allows fast growth of variety of weed species (Mukhrjee and Rai, 2016) [15].

Materials and Methods

The present investigation entitled "Effects of different herbicide doses of weed control measures on yield and yield attributes in maize crop" was carried out during 2021-22 at Shivalik Research Farm, SIPS, Dehradun, and Uttarakhand. The experiment was laid out in a Random Block Design with 7 treatments {T1 Un-weeded, T2 Hand weeding (20+40 DAS), T3 Atrazine 50% WP (0-3 DAS), T4 Alachlor 50% EC (0-3 DAS), T5Metachlor T6 Metribuzine & T7 2, 4-D (Etyl ester)} and three replications. Observation related to yield and yield

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attributes recorded viz. Final plant stand, Cob length, Cob girth, Cob weight, Cobs plant⁻¹, Grains cob⁻¹, Grains weight cob⁻¹, Test weight, Grain yield, Stover yield, Biological yield and Harvest index. All the data recorded in this experiment were statistically analyzed with the help of calculating machine following the procedure for Randomized Block Design given by Cochran and Cox (1950). All the data recorded in this experiment were statistically analyzed as based on Analysis of variance and the Critical Differences (C.D.) was calculated whenever needed

Result and Discussion

Plant height at various stages of crop growth revealed that all the weed management practices significantly increased the plant height than weedy check.

Among the different herbicide doses, the maximum plant height was recorded in Alachlor 50% EC (0-3 DAS) T4 at all the stages of crop growth that might be due to uninhibited utilization of resources by maize. Similar observations were also reported by Sultana *et al.*, (2012) [12] and Sinha *et al.* (2003) [10].

Table: 1 Plant heights (cm) at different growth stages of maize affected by different herbicide doses

Treatment	Plant height cm			
	Plant height 20 DAS	Plant height 40 DAS	Plant height 60 DAS	Plant height 80DAS
Un-weeded (weedy check) T1	47.16	82.09	112.52	178.60
Hand weeding (20+40 DAS) T2	49.33	90.01	128.86	191.33
Atrazine 50% WP (0-3 DAS) T3	50.64	89.15	129.06	193.06
Alachlor 50% EC (0-3 DAS) T4	52.02	92.55	133.68	205.66
Metachlor T5	51.16	91.79	130.62	202.65
Metribuzine T6	50.70	90.05	130.43	201.14
2,4-D (Etyal ester) T7	49.27	88.60	127.86	191.03
SEM ±	1.13	2.71	3.87	6.04
CD at 5%	4.50	8.13	10.99	18.415

It revealed from table 1 that different doses of herbicides significantly influenced the plant height throughout the crop period. The highest plants height were recorded with Alachlor 50% EC (0-3 DAS) T4 at 20 (52.02cm), 40 (92.55cm), 60

DAS (133.68 cm) and at 80 DAS (205.66 cm). While significantly lowest plant height of 47.16 cm, 82.09 cm, 112.52cm and 178.60 cm were observed in weedy check (T1).

Table 2: Yield and yield contributing characters influenced by Different doses of herbicides

Treatments	Number of cobs per plant	Length of cobs per plant	Grain yield	Number of kernels per cob
Un-weeded (weedy check) T1	0.67	8.62	1179.32	11.25
Hand weeding (20+40 DAS) T2	1.13	11.17	2238.93	12.21
Atrazine 50% WP (0-3 DAS) T3	1.22	12.42	2368.71	12.53
Alachlor 50% EC (0-3 DAS) T4	1.65	15.54	3563.68	14.64
Metachlor T5	1.52	14.97	3325.23	13.54
Metribuzine T6	1.40	14.35	3289.00	12.50
2,4-D (Etyal ester) T7	1.20	11.23	2889.65	11.65
SEM ±	0.03	0.15	91.84	0.47
CD at 5%	0.09	0.46	274.17	1.42

Yield and yield attributing character of maize were found statistically significant at every stage of yield attributes of maize.

Table 2 depicted that yield and yield attributing character of maize highly influenced by different doses of herbicide used. Table 2 clearly depicted that yield and yield attributing character of maize were found statistically significant at every stage of yield attributes of maize.

Table 2 revealed that number of cobs per plant was significantly influenced by different doses of herbicide used in maize crop. Maximum number of cobs per plant were obtained 1.65 in T4 Alachlor 50% EC (0-3 DAS) followed by 1.52 and 1.40, T 5 and T6 respectively. The minimum number of cobs per plant was obtained 0.67 in T1 (weedy check).

Table 2 also revealed that length of cobs per plant was significantly affected by different doses of herbicides used in maize. Maximum length of cobs per plant obtained 15.54 followed by 14.47 and 14.55 in T4 Alachlor 50% EC (0-3 DAS) followed by 1.52 and 1.40, T 5 and T6 respectively. The lowest cob length was found 8.62 in T1 (weedy check)

Table 2 revealed that grain yield was significantly affected by

different doses of herbicides used in maize. The highest grain yield were 3563.68 found followed by 3325.23 and 3289.00 in 65 in T4 Alachlor 50% EC (0-3 DAS) followed by 1.52 and 1.40, T 5 and T6 respectively. The lowest grain yield was obtained 1179.32 in T1 (weedy check).

Table 2 revealed that number of kernels per cob was significantly affected by different doses of herbicides used in maize. The maximum number of kernels per cob obtained 14.64 followed by 13.64 and 12.50 in T4 Alachlor 50% EC (0-3 DAS) followed by 1.52 and 1.40, T 5 and T6 respectively. The minimum number of kernels per cob obtained 11.25 in T1 (weedy check).

Summary and Conclusion

Results revealed that there were no significant differences in plant population initially and at harvest due to weed management practices. Results depicted that among the different herbicide doses, the maximum plant height was recorded in Alachlor 50% EC (0-3 DAS) T4 at all the stages of crop growth. It revealed from results that Maximum number of cobs per plant was obtained 1.65 in T4 Alachlor 50% EC (0-3 DAS). The minimum number of cobs per plant

was obtained 0.67 in T1 (weedy check). It revealed from results that Maximum length of cobs per plant obtained 15.54 in T4 Alachlor 50% EC (0-3 DAS). The lowest cob length was found 8.62 in T1 (weedy check). It revealed from results that the highest grain yield was 3563.68 in T4 Alachlor 50% EC (0-3 DAS). The lowest grain yield was obtained 1179.32 in T1 (weedy check). It revealed from results that the maximum number of kernels per cob obtained 14.64 in T4 Alachlor 50% EC (0-3 DAS). The minimum number of kernels per cob obtained 11.25 in T1 (weedy check).

Application of Alachlor 50% EC (0-3 DAS) has found to be most effective as well as perfect for exploiting the maximum grain yield.

Therefore, it has observed during the field experiment during the present field experiments that application of Alachlor 50% EC (0-3 DAS) found fruitful because it not only control the weed density or weed population but also increase the yield of maize crops.

Based on the present investigation results, it can be suggested to carry out the research for two more seasons for drawing valid conclusions. Further, the in depth of study is needed for control of weeds in the early stages of crop growth.

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