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Response of Maize under Different Weed Management

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Abstract: The research work was conducted to find out the performance of maize under different weed management. The treatments were weeding with khurpa, hand hoe, wheat mulch, oat mulch, Primixtra 500FW @ 1.5 litres per acre, Stomp 330EC @ 1 litre per acre and weedy check. Maximum emergence m^{-2} (17.50) was for oat mulch, which was at par with wheat mulch (16.75). Minimum weeds density m^{-2} (3.75), maximum cob length (17.77 cm), number of grains cob^{-1} (380) 1000-grains weight (294 g) and grain yield (3943) were recorded for Primixtra 500FW. The weed species infesting the field were *Cyprus rotendus, Sorghum helepense, Cynodon dactlon, Leptochloa* sp., *Echinochloa crussgalli, Tribulus terrestris, Convolvulus arvensis and Portulaca oleracea* etc.

Key words: Maize, weed control methods, mulches, herbicides, yield, yield components

Introduction

Maize (*Zea mays* L.) plant has a mono solid stem and large narrow leaves, arranged alternately on opposite sides of the stem. Staminate inflorescence, tassel is terminating the main axis of the stem. The pistilate inflorescence, ear, is produced as side shoot enclosed by modified leaves called husks. Maize is the third most important cereal in Pakistan after wheat and rice. Due to many industrial products made from maize crop, maize demand in world as well as in Pakistan is increasing from year to year, considerably.

Weed is a nutrient absorbing competitive plant, which grows out of place spontaneously and possesses the characteristics of plentiful growth and reproduction even under adverse conditions. For the competitive ability weeds form a serious negative effect in crop production and are responsible for marked losses in crop yield (Mamun *et al.,* 1993). About 10% loss of agricultural crops occurs due to weed competition (Zimdhal, 1980). Food loss through weed competition has been estimated to be 25% in developing countries where herbicides are used rarely and 5% in the developed countries where herbicides are widely used (Parker and Fryer, 1975).

Different weed control methods have been used to control the weeds i.e. cultural, mechanical, biological and chemical; but cultural, mechanical and chemical are more frequent used in Pakistan. Koller (1991) reported that mulch sowing plus mechanical weeding in maize significantly reduced the weed density and ultimately increased yield and yield components of maize. Gill *et al.* (1992) reported that application of herbicides and hand weeding or mechanical weeding significantly increased the yield and yield contributing parameters in maize as well as decreased the weed density and biomass. Pfefferkorn *et al.* (1992) showed a good control of weeds through mulches or herbicides, hoeing and reported significant increase in cob length, number of grains cob^{-1} and grain weight. Ammon *et al.* (1994) evaluated different mulches in maize and reported that mulch prevent weed emergence.

Keeping in view, the importance of the problem the study was conducted with the objective to find out the most suitable method for weed control in maize.

Materials and Methods

The research work was conducted at NWFP Agricultural University Research Farm, Malkandher, Peshawar, Pakistan during Kharif season, 2000. The experiment was laid out in randomized complete block (RCB) design with four replications. The size of the plot was 4x4.5 m^2, having six rows, 75 cm apart. After complete emergence the crop was thinned to a plant to plant distance of 25 cm. The experiment comprised of the following treatments.

Treatments	Application time/rate
Weeding with Khurpa	15 days after sowing of the crop
Hand hoe	15 days after sowing of the crop
Wheat straw mulch	just after sowing of the crop @ 1500 kg ha^{-1}
Oat straw mulch	just after sowing of the crop @ 1500 kg ha^{-1}
Primixtra 500FW	pre-emergence @ 1.5 litres $acre^{-1}$
Stomp 330EC	pre-emergence @ 1 litre $acre^{-1}$
Weedy check	----------

The following parameters were recorded during the study: emergence m^{-2}, weeds density m^{-2} (35 days after emergence), plant height at maturity (cm), number of cobs $plant^{-1}$, cob length (cm), number of grains cob^{-1}, 1000 grains weight (g) and grain yield (kg ha^{-1}). Standard agronomic procedures were followed to record data regarding different parameters.

The data recorded for each trait was individually subjected to the ANOVA techniques by using MSTATC computer software and means were separated by using Fisher's Protected LSD test (Steel and Torrie, 1980).

Results and Discussion

Emergence m^{-2}: Statistical analysis of the data showed that different treatments had significant effect on the emergence m^{-2} (Table 1). Comparison of the means of the treatments reflected that maximum emergence m^{-2} (17.50) was recorded in oat mulch treated plots, which was at par with wheat mulch treated plots (16.75). The possible reason of increase in emergence m^{-2} for mulch treated plots could be the conservation of moisture in seedbed consequently the increase in water availability to the maize seed.

Weed density m^{-2}: The data showed significant ($P < 0.05$) effect of different treatments on weeds density m^{-2}. 18.75 were maximum weeds m^{-2} recorded in weedy check plots while 3.75 were minimum weeds m^{-2} recorded in Primixtra 500FW treated plots (Table 1). The variability in weed population in different treatments can be attributed to the fact that some treatments were more effective for weed control than others. Similar results were reported by Gill *et al.* (1992).

Plant height (cm): Data pertaining to plant height is presented in Table 1. The data revealed that different treatments had non-significant effect on plant height. However, maximum of 140.5 was recorded in weedy check.

Number of cobs $plant^{-1}$: The analysis revealed non-significant variation on number of cobs $plant^{-1}$ for various treatments (Table 1). However, 1.02 was maximum number of cobs $plant^{-1}$ recorded in Primixtra 500FW treated plots and 0.90 was minimum number of cobs $plant^{-1}$ recorded in weedy check.

Cob length (cm): Data on the said parameter (Table 1) revealed that various treatments had significant effect on cob length. Maximum cob length (17.77 cm) was recorded in Primixtra 500FW treated plots while minimum cob length (14.95) was recorded for weedy check plots. As the crop/weed competition decreased in Primixtra 500FW treated plots, the cob length also increased. These results are in analogy with those reported by Pfefferkorn *et al.* (1992).

Number of grains cob^{-1}: Number of grains cob^{-1} was significantly affected by various treatment (Table 1). The data exhibited that highest (380) number of grains cob^{-1} were obtained from Primixtra 500FW treated plots while lowest number (333) of grains cob^{-1} were obtained from weedy check plots. Similar results were also reported by Pfefferkorn *et al.* (1992) who stated that there was significant increase in number of grains cob^{-1} with the application of herbicides in maize.

1000 grain weight (g): The weight of 1000 grain of maize showed significant differences for various treatments (Table 1). Maximum 1000 grain weight (294 g) was recorded in Primixtra 500FW treated plots while minimum seed weight (288 g) was recorded in weedy check plots. The reason of decreased in 1000 seed weight in weedy check plots is attributed to the increasing weed per crop competition.

Grain yield (kg ha^{-1}): Statistical analysis of the data (Table 1) showed that different treatments had significant

Table 1: Emergence m^{-2}, weed density m^{-2}, plant height (cm), number of cobs $plant^{-1}$, cob length (cm), number of grains cob^{-1}, 1000 grain weight (g) and grain yield (kg ha^{-1}) as effected by different weed control methods

Weed control methods	Emergence m^{-2}	Weed density m^{-2}	Plant height (cm)	Number of cobs $plant^{-1}$	Cob length (cm)	Number of grains cob	1000-grain weight (g)	Grain yield (kg ha^{-1})
Weeding with Khurpa	14.25b	8.75b	139.5	0.95	16.58abc	360b	290.8b	3390b
Hand hoe	14.00b	9.50b	139.2	0.95	17.17ab	360b	291.5ab	3431b
Wheat mulch	16.75a	10.50b	140.0	0.96	15.88cd	361b	290.5bc	3392b
Oat mulch	17.50a	10.00b	139.0	0.97	16.35bc	367b	291.8ab	3412b
Primixtra 500FW	15.50ab	3.75c	138.9	1.02	17.77a	380a	294.0a	3943a
Stomp 330EC	15.50ab	11.25b	139.5	0.98	16.20bcd	365b	290.0bc	3398b
Weedy check	14.25b	18.75a	140.5	0.90	14.95d	333c	288.0c	2819c
LSD(0.05)	2.43	3.132	NS	NS	1.27	12.21	2.56	175

* Means followed by different letters in the respective column are significantly different at 5% level of probability, using LSD test
NS = Non significant

($P < 0.05$) effect on seed yield of maize. Primixtra 500FW proved to be the best weed controller and in response gave the highest grain yield i.e. 3943 kg ha^{-1}. Minimum grain yield (2819 kg ha^{-1}) was recorded in weedy check pots. All other treatments were statistically at par with each other. Similar results were also reported by Gill *et al.* (1992), who stated that application of herbicides increased seed yield significantly.

From the present experiment it can be concluded that Primixtra 500FW is very effective for weed control in maize and may be recommended in maize as pre-emergence herbicide.

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