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EFFECT OF DIFFERENT HERBICIDES ON WEED DENSITY AND SOME AGRONOMIC TRAITS OF WHEAT

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ABSTRACT

Field study was conducted at Malakandher Research Farm, NWFP Agricultural University, Peshawar during Rabi 2003 04 to study the effect of different herbicides on weed density and some agronomic traits of wheat. The experiment was laid out in randomized complete block design with four replications. The experiment comprised of seven herbicides and a control. The herbicidal treatments were post emergence applications of Affinity (carfentrazone ethyl ester), WH-01 (clodinofop propargyl), Pujing (fenoxaprop-p-ethyl), Sencor (metribuzin), Puma super (fenoxaprop-p-ethyl) Pujing + Sencor (fenoxaprop-p-ethyl +metribuzin), Puma super + Sencor (fenoxaprop-p-ethyl+ metriuzin) and weedy check. Ghaznavi-98 variety of wheat in plot size of 5x1 m^2 was planted in 13th November 2003. The data were recorded on weed density m^{-2}, Plant height at maturity (cm), Wheat Spike length (cm), grains weight $spike^{-1}$, 1000 grains weight (g), and grain yield (t ha^{-1}). For controlling weeds (Puma super + metribuzin) proved to be the best, giving only (16.00) weeds m^{-2} as compared to (98.75) in control treatments. The major weeds infesting the experiment were Avena fatua, Coronopus didymus, Euphorbia helioscopia, Fumaria indica, Convolvulus arvensis, Rumex dentatus, Chenopodium album, Poa annua, Medicago denticulata, and Vicia sativa. The maximum grain yield (1.51 t ha^{-1}) was recorded in Pujing + Sencor followed by 1.343 t ha^{-1} in Puma super + Sencor treated plots. While, the minimum grain yield (0.713 t ha^{-1}) was recorded in weedy check plots. The herbicide mixtures of Sencor with Pujing or Puma super are recommended for the effective management of weeds in wheat.

Key words: Weeds herbicides wheat weed density yield and yield components

INTRODUCTION

Wheat (*Triticum aestivum* L.) belongs to the tribe Hordae, genus *Triticum* and family Poaceae. It is an annual self-pollinated and a long day plant. Like other grasses it produces several tillers $plant^{-1}$ depending upon soil fertility, seed rate and environmental conditions. It is a stable food of Pakistan and meets the major dietary requirements. Wheat is also used in the manufacture of beer and other alcoholic beverages and industrial alcohol. It is also an excellent food for livestock and poultry. The straw of the wheat is used for seating chairs, baskets, feed cattle's and Vickers work.

At the national level, during 2002-03, the area under wheat cultivation was 8.034 million ha, with a production of 19.1833 million tons. The area consisted of about 7.001

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million ha irrigated and 1.033 million ha of un-irrigated land. At provincial level, in NWFP, the area under wheat cultivation was about 0.732 million ha. One third of this area in NWFP is irrigated, while two third is rain fed giving a total production of 1.064 million tons at the rate of 1454 kg ha^{-1} (Anonymous, 2003).

Weed management is not accomplished by using cultural practices exclusively. Herbicides offer an additional tool to control weeds in conjunction with cultural practices, but are not intended as a replacement for proper management practices.

The success of a herbicide application is dependent upon weed species, the timeliness and thoroughness of application, conditions at the time of application, herbicide rate, and crop management after the application. If the decision is to use a herbicide, carefully read the label. Following the label will reduce the likelihood of crop injury, reduce off-target movement of herbicide, and maximize weed control. (Nati, 1994).

Major weeds that infested the experiment apart from the planted wild oats were *Phalaris minor, Poa annua, Cirsium arvense, Convolvulus arvensis, Chenopodium album, Fumaria indica, Carthamus oxycantha, Galium aparine* and *Euphorbia helioscopia.*

Weeds reduce the crop yield, deteriorate the quality of farm produce and hence reduce the market value of wheat. Weed management increases the cost of production and thus it is necessary to device such methods which could reduce not only the cost of production but also save time and labor. Among the weed control methods, the chemical control is one of the recent origin, which is being emphasized, in modern agriculture (Taj et al. 1986).

It has been estimated that crop losses due to weed competition throughout the world as a whole, are greater than those resulting from the combined effect of insect pests and diseases. Weeds may encourage the development of fungal diseases, provide shelter for pests of all kinds and act as host plants for parasitic nematodes. There are thus, several reasons for entirely eliminating weeds from the crop environment. As a matter of fact, with the rising costs of labor and power, the use of herbicides will be the only acceptable method of weed control in the future. (Young et al., 1996 and Norris, 1982).

In light of the crop losses due to weeds, an experiment was conducted with these objectives a) to evaluate different herbicides for controlling weeds including wild oats in wheat b) to study the effect of different herbicides on the yield and yield components of wheat and c) to identify the weeds flora infesting wheat crop.

MATERIALS AND METHODS

Field study was undertaken at Malakandher Research Farm, NWFP Agricultural University, Peshawar during the Rabi season 2003-4. The seed of Ghaznavi-98 variety at the rate of 120 k ha^{-1} was sown on 13th November 2003 with the help of a hand hoe. The experiment consisted of eight treatments replicated four times, using Randomized Complete Block (RCB) design. The size of each treatment was 5 x $1m^2$, consisting of four rows each 25 cm apart and 5 m long. The treatments included seven herbicides and a weedy check. All the recommended cultural practices were carried out uniformly in all the treatments during the experiment.

The detail of the treatments was as under:

Table-1. Detail of Treatments Used In the Experiment

S.No	Trade Name	Common Name	Spectrum of Activity	kg a.i ha^{-1}
1.	Affinity 50WDG	carfentrazone ethyl ester	Broad spectrum	0.013
2.	WH-01 15WP	clodinofop propargyl	Grass killer	0.04
3.	Pujing 75 EW	fenoxaprop-p-ethyl	Grass killer	1.00
4.	Sencor 70 WP	metribuzin	Broad spectrum	1.00
5.	Puma Super 75 EW	fenoxaprop-p-ethyl	Grass killer	1.00
6.	Pujing 75 EW + Sencor 70 WP	fenoxaprop-p-ethyl +metribuzin	Broad spectrum	1.00+1.00
7.	Puma super 75 EW + Sencor 70 WP	fenoxaprop-p-ethyl + metriuzin	Broad spectrum	1.00+1.00
8.	Weedy check	----------	----------	---------

All the herbicides were applied with the help of a knap sack sprayer, 35 days after planting of wheat. While spraying the herbicides all the precautionary measures were followed to avoid any herbicides injury.

During the course of the studies, data were recorded on weed density m^{-2}, plant height at maturity (cm), spike length (cm), grain weight (g) $spike^{-1}$, 1000-grain weight (g) and grain yield (t ha^{-1}). The data for the individual trait were subjected to ANOVA and the significant means were separated by using LSD test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Data recorded on the weed density m^{-2}, wheat plant height (cm), wheat spike length (cm), grain weight $spike^{-1}$, 1000 grains weight (g) and grain yield (t ha^{-1}) of wheat variety Ghaznavi-98, treated with different herbicides at Malakandher Research Farm, NWFP Agricultural University, Peshawar are presented as under:

1. Weeds density m^{-2}

The major weeds infesting the experiment were *Avena fatua*, *Coronopus didymus*, *Euphorbia helioscopia*, *Fumaria indica*, *Convolvulus arvensis*, *Rumex dentatus*, *Chenopodium sp.* *Poa annua*, *Medicago denticulata* and *Vicia sativa*. The analysis of data showed that different herbicidal treatments had significant effect on weeds density m^{-2} (Table-2). The analysis of data revealed that maximum weeds density m^{-2} (98.75) was recorded in weedy check followed by 45.00 in Puma super 75EW. The lowest weeds density (16.00) was recorded in Puma super+ Sencor, followed by 21.25 in Pujing+ Sencor, and 21.75 m^{-2} in Affinity 50 WP. The weeds density of Sencor, Pujing and WH-01 are statistically comparable to one another. These findings are in agreement with the work of Khalil et al. (1999; 2000) and Kotru et al. (1999), who managed weeds significantly in wheat crop with different herbicides.

2. Plant height (cm)

The analysis of data showed that different treatments had non-significant effect on plant height (Table-2). The perusal of data further revealed that the maximum plant

height (89.250 cm) was obtained in Pujing, followed by 85.250 cm in Pujing+ Sencor While, minimum plant height (83.00 cm) was recorded in weedy check and WH-01 (83.750 cm) treated plots. The treatments Sencor, Affinity 50 WP, Puma super+ Sencor and Puma super 75EW possessed almost same height measuring 83.00, 82.25, 81.75 and 81.00, respectively. The similarity in plant height among all the treatment shows that plant height is strictly governed by genetic control and environment has a meager effect on it. The results are corroborated by the work of Khalil et al, (1999). They reported that plant height was not affected by the herbicidal application in wheat.

3. Spike length (cm)

Statistical analysis of data revealed significant effect of different herbicides on spike length (cm) [Table-2]. The highest spike length (9.15 cm) was obtained from Sencor treated plots. The minimum spike length (8.00 cm), (7.95 cm) and (7.15 cm) was obtained from Pujing, Affinity and Puma super treatments. Our findings are in an analogy with the work of Khalil *et al.* (1999). They reported that application of post- emergence herbicides in wheat crop produced the highest spikes length.

4. Grain weight spike^{-1}

Grains weight spike^{-1} was significantly affected (P=0.0004) by various herbicidal treatments. The data (Table-2) exhibited the highest (2.408) grain weight spike^{-1} from Sencor treated plots followed by 2.325 in Pujing + Sencor and 2.055 in Pujing. The minimum grain size was recorded in weedy check (1.625), Puma Super (1.598) Affinity (1.825) and WH-01 (1.875). The highest number of grains spike^{-1} obtained from Sencor treatment were perhaps due its best elimination of weeds, while the lowest number of grains spike^{-1} obtained from weedy check plots was probably due to the weed competition.

5. 1000-grains weight (g)

Statistical analysis of the data revealed that herbicides had non-significant effect on 1000- grains weight (Table-2). The highest (37.793 g) 1000 grain weight was obtained from Sencor plots while the lowest 1000-grains weight (32.850 g) was obtained from the control treatments. The maximum 1000-grain weight in Sencor is attributed to the availability of resources to wheat crop.

6. Grain Yield (t ha^{-1})

Analysis of variance of the data exhibited that herbicides had significant effect on the grain yield. The data show that the maximum grain yield (1.510 ton ha^{-1}) was produced by Pujing+Sencor, which was at par with the other herbicidal treatments except Affinity (1.275), WH01 (1.337), Sencor (1.273) and Puma super+ Sencor (1.343). The herbicides Pujing (0.800) and Puma super (0.960) failed to outyielded the weedy check. The highest grain yield obtained from Pujing+ Sencor treatment was perhaps due to its best phytotoxic effect on weeds, while the lowest grain yield obtained from Puma super, Pujing and weedy treatments were probably due to merely controlling the grassy weeds by the two herbicides and competition of all weeds in the weedy check. Hashim et al. (2002) and Montazeri (1994) also reported the analogous results. they reported that herbicidal treatments significantly increased the grain yield in wheat.

Table-2. Effect of different herbicides on weed density and different parameters of wheat.

Treatments	Weed density m^{-2}	Plant height (cm)	Spike length (cm)	Grain weight $spike^{-1}$ (g)	1000-grain wt.(g)	Grain yield ($t\ ha^{-1}$)
Affinity 50 WDG	21.75c[3]	82.25	7.95bc	1.825c-e	35.800	1.275ab
WH-01 15WP	25.50bc	83.75	8.55ab	1.875c-e	33.755	1.337ab
Pujing 75 EW	31.25bc	89.25	8.00bc	2.055bc	36.443	0.800c
Sencor 70 WP	31.00bc	83.00	9.15a	2.408a	37.793	1.273ab
Puma super 75 EW	45.00b	81.00	7.15c	1.598e	35.700	0.960bc
Pujing 75 EW+ Sencor 70 WP	21.25c	85.25	8.45ab	2.325ab	32.258	1.510a
Puma super 75EW + Sencor 70 WP	16.00c	81.75	8.35ab	1.950cd	33.450	1.343ab
Weedy check	98.75a	83.00	8.10bc	1.625de	32.850	0.713c

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[3]Means sharing a letter in common, in the respective category, do not differ significantly by LSD test at 5% probability level.

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