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EFFICACY OF SOME NEW HERBICIDAL MOLECULES ON WEED DENSITY AND YIELD COMPONENTS OF WHEAT

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ABSTRACT

Field studies were undertaken at Malkandher Research Farm, NWFP Agricultural University, Peshawar during Rabi 2002-03, to investigate the effectiveness of different herbicides including new molecules tribenuron-methyl and thifensulfuron-methyl against grasses and broadleaf weeds. The experiment was laid out in randomized complete block design with 4 replications. The experiment comprised of 11 herbicides and a weedy check. The herbicidal treatments were post emergence applications of thifensulfuron-methyl @ 0.037, thifensulfuron-methyl @ 0.05, tribenuron-methyl @ 0.05, triasulfuron + terbutryn @ 0.15, bromoxynil + MCPA @ 0.45, isoproturon @ 0.01, carnfentrazone ethyl ester @ 0.013, MCPA @ 0.49, and chlorfluazuron @ 0.96 kg a.i ha^{-1}. Ghaznavi-98 variety of wheat in plot size of 5x 1.5 m^2 was planted during the third week of October 2002. Data were recorded on Number of tillers plant^{-1}, 1000 kernel weight (g), biological yield (t ha^{-1}) and grain yield (t ha^{-1}). The lowest weed density and maximum grain yield was recorded in Affinity 50 WDG, Buctril-M 40EC and Logran Extra 64 WDG to the tune of 4.133, 3.866 and 3.599 tons ha^{-1}, respectively. Minimum yield (2.133 tons ha^{-1}) was recorded in the weedy check plots.

Key words: herbicide efficacy, wheat, *triticum aestivum* L., weed density

INTRODUCTION

Wheat (*Triticum aestivum* L.) is classified in the tribe Hordae, genus *Triticum* and family Poaceae. Like other grasses it produces several tillers plant^{-1} depending upon soil fertility, crowding and environmental conditions. Wheat is used as a major food source all over the world. It is the staple food of Pakistan and meets the major dietary requirements. The cultivation of wheat seed is simple and adaptable to varied soil and climatic conditions. It is also known as the "King of cereals". Besides food, wheat is also used for livestock and poultry feed. A large population of the world consumes wheat in a number of ways. Wheat supplies about 73% of the calories and proteins of the average diet (Heyne, 1987).

Weeds reduce the crop yield and deteriorate the quality of produce hence reduce the market value of wheat. Weed management increases the cost of production and thus it is necessary to devise such methods which could reduce not only the cost of production but also save time and labor. One of the methods is chemical weed control, which is one of the recent origin that 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 effects of insects and diseases. There are thus, several reasons for entirely eliminating weeds from the crop

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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 future. The infested situations need the development of package of weed management technology, helpful to minimize the weed competition losses in our country. The control of weeds is basic requirement and major component of management in the production system (Young *et al.*, 1996 and Norris, 1982).

Weeds are one of the biggest threats to agriculture. They use the soil fertility, available moisture, nutrients and compete for space and sunlight with crop plant, which result in yield reduction. Annual losses in wheat amount to more than Rs.28 billion at the national level and Rs.2 billion in N.W.F.P. (Hassan and Marwat, 2001).

The major weeds competitive with wheat crop in N.W.F.P include Avena *fatua*, *Phalaris minor*, *Poa annua*, *Cirsium arvense*, *Convolvulus arvensis*, *Ammi visnaga*, *Chenopodium album*, *Fumaria indica*, *Carthamus oxycantha*, *Galuim aparine* and *Euphorbia helioscopia*.

Management of weeds has been practiced by man since the time immemorial by manual labor or animal drawn implements. These practices were hard, laborious and expensive due to increasing cost of labor. The growing mechanization of farm operations and ever increasing labor wages have stimulated interest in the use of chemical weed control. However, non-judicious use of herbicides can do harm rather benefit in productivity. The choice of best herbicides, proper time of application and proper usage of herbicides are the important considerations for lucrative returns (Fayad *et al.*, 1998).

In view of the importance of the chemical control of weeds and the vital importance of wheat as food for human beings and the relevance to the national economy, an experiment was conducted to investigate the efficacy of different herbicides for controlling weeds in wheat crop.

MATERIALS AND METHODS

The experiment was laid out at Malakandher Research Farm, N.W.F.P Agricultural University, Peshawar during Rabi season 2002-03. The experiment was laid out in Randomized complete block (RCB) design with four replications. Twelve treatments were assigned to each replication randomly. The plot size was kept at 5 x 1.5 m^2. The herbicides were applied about four weeks after emergence of the crop. The detail of the treatments is furnished in Table-1.

Table-1. Detail of herbicidal treatments used in the experiment

S.No.	Trade Name	Common Name	Rate (kg a.i.ha^{-1}
1.	Weedy check	-------------	--------
2.	Rocket 15 WP	thifensulfuron-methyl	0.04
3.	Rocket 15 WP	thifensulfuron-methyl	0.05
4.	Rocket 15 WP	thifensulfuron-methyl	0.07
5.	Rocket 75 WDG	thifensulfuron-methyl	0.05
6.	Tribenuron-methyl 75 WDG	tribenuron-methyl	0.05
7.	Logran Extra 64 WDG	triasulfuron + terbutryn	0.15
8.	Buctril-M40EC	bromoxynil+MCPA	0.45
9.	Isoproturon 50 WP	Isoproturon	0.01
10.	Affinity 50 WDG	Carfentrazone ethyl ester	0.013
11.	Agritox 50 DF	2-methyl 4-chloro phenoxy acetic acid	0.05
12.	Aim 40 WP	Chlorfluazuron	0.23

All the herbicidal treatments were applied in post-emergence with the help of a knapsack sprayer. While spraying the herbicides, all the precautionary measures were kept in mind to avoid any danger due to the misuse of the herbicides.

During the course of studies data were recorded on number of tillers plant^{-1}, 1000 kernel weight (g), biological yield (t ha^{-1}) and grain yield (t ha^{-1}). The data were subjected to the analysis of variance technique and the significant means were separated by the LSD test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Data recorded on the number of tillers plants^{-1}, 1000 kernel weight (g), biological yields (t ha^{-1}) and grain yield (t ha^{-1}) of wheat variety Ghaznavi-98, treated with different herbicides at Malkandher Farm, NWFP Agricultural University, Peshawar are presented as under:

Statistical analysis of the data showed that the number of tillers plant^{-1} were significantly affected by different herbicidal treatments (Table 2). The data revealed that maximum (7.2) tillers plant^{-1} were recorded in Affinity 50WDG treated plots. It was however, statistically comparable with Logran extra 64 WDG, Buctril-M 40 EC and Rocket 75 WP which produced 6.77, 6.75 and 6.40 tillers plant^{-1}, respectively. The minimum tillers plant^{-1} were counted in weedy check plots, Tribenuron-methyl 75WDG and Rocket 15 WP, having the values of 5.10, 5.55 and 5.60, respectively. The remaining herbicides like Aim 40 WP, Agritox 50 DF and Isoproturon 50 WDG having the values of 6.1 and 5.9 were statistically comperable. Sohail, (1993) and Baldha *et al.* (1988) reported similar results. They reported that application of herbicides significantly influeced the number of tillers plant-1. Our inferences are further in agreement with Qureshi *et al.* (2002) and Hassan *et al.* (2003), who communicated similar findings after analysis of their data on tillers m^{-2} in wheat.

The analysis of the data revealed that 1000-kernel weights were significantly affected by different herbicidal treatments (Table 2). The data revealed that maximum (35.68g, 35.30g and 34.01g) 1000 kernel weight was recorded in Affinity 40EC, Buctril-M40 EC and Logran Extra 64WDG treated plots, respectively. While Agritox 50 DF (31.09 g), Aim (32.60 g) and Rocket 15 WP (30.01) were intermediate in 1000-kernel weight accordingly. The minimum (27.1g) 1000 kernel weight was recorded in weedy check plots. The increased grain weight is attributed to the availability of resources to the wheat plant. Sohail (1993) and Marinkovic *et al.* (1997) reported similar results who concluded that broadleaf herbicides significantly increased the 1000 grains weight in wheat.

It is evident from the data in Table-2 that the biological yield of wheat was significantly affected by different herbicidal treatments. Maximum (9.599 t ha^{-1}) biological yield was recorded in Affinity 50WDG treated plots followed by Logran Extra 64WDG (7.336 t ha^{-1}) and Buctril-M40EC (7.066 t ha^{-1}). Minimum tonnage of 6.125 and 5.199 t ha^{-1} biological yield was observed in Rocket 15WP and weedy check plots. The highest biological yields in Affinity 50WDG and Logran Extra 64WDG treated plots is due to the effective control of weeds. The crop plants efficiently used the available resources. Tanveer *et al.* (1999) and Sohail (1993) reported similar results in their studies on wheat

The data regarding grain yield of wheat showed that different herbicidal treatments significantly affected grain yield of wheat. Maximum (4.133 t ha-1) grain yield was recorded in Affinity 50WDG treated plots followed by Buctril-M40 EC and Logran Extra 64WDG having 3.866, and 3.599 t ha^{-1}, respectively (Table 2). Minimum (2.666, 2.266,2.533, 2.133, 2.666 tons ha^{-1}) grain yield was recorded in Rocket 15WP, Tribeuron methyl 75WDG, Agritox, Aim and weedy check plots. All these herbicides failed to statically excel the weedy check in grain yield. The increase in grain yield in the herbicides treated plots was probably due to the effective weed control and thus the crop efficiently flourished and utilized all the available resources. Hashim *et al.* (2002) and Montazeri (1994) also reported the analogous results. They reported that herbicidal treatments significantly increased the grain yield in wheat. It is thus, concluded that the newly introduced sulfonylurea herbicides like tribenuron- methyl and thifensulfuron methyl failed to surpass the already available herbicides in grain yield. For the research on comparison of the new herbicides with standard herbicides is recommended

Table-2. No of tiller plant^{-1}, 1000 kernel weight (g), Biological yield (t ha^{-1}) and Grain yield (t ha^{-1}) as affected different herbicidal applications

Herbicides	No of tillers plant^{-1}	1000 kernel weight (g)	Biological Yield (t ha^{-1})	Grain yield (t ha^{-1})
Weedy check	5.10f	27.1e	5.199d	2.133c
Rocket15 WP	6.10cde	30.87cd	6.125bcd	2.799bc
Rocket15 WP	6.35bcde	31.22cd	6.193bc	2.266c
Rocket15 WP	5.60def	30.01d	6.800bc	2.400c
Rocket 75WDG	6.40abcd	31.79cd	6.400bcd	2.666bc
Tribenuron-methyl 75WDG	5.55ef	31.26cd	6.933bc	2.533b
Logran Extra 64WDG	6.75ab	34.01ab	7.336b	3.599ab
Buctril-M 40EC	6.77ab	35.30a	7.066b	3.866a
Isoproturon 50 WP	5.95cde	31.83cd	6.933bc	2.399c
Affinity 50 WDG	7.20a	35.68a	9.599a	4.133a
Agritox 50 DF	6.15bcde	31.09cd	7.066b	2.666c
Aim 40 WP	6.1bcde	32.60bc	5.600cd	2.533c
LSD (0.05)	0.804	2.151	1.34	0.966

Means not followed by the same letter(s) in the repective catagory are significantly different by LSD test at 5% level of probability.

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