STUDIES ON CHEMICAL WEED CONTROL IN WHEAT *(Triticum aestivum* L.*)*

Muhammad Ishfaq Khan, Gul Hassan, Ijaz Ahmad Khan and Imtiaz Khan[1]

ABSTRACT

For the efficacy of different herbicides for controlling weeds in wheat, an experiment was conducted at Malkandher Research Farm, NWFP Agricultural University Peshawar, Pakistan during Rabi season 2002-03. The experiment was laid out in randomized complete block design with 5 replications. The experiment comprised of 8 herbicides and a weedy check. The herbicidal treatments were the post-emergence application of Rocket 75 WDG (thifensulfuron-methyl) + Tribenuron-methyl (tirbenuron-methyl) 75 WDG @ 0.027 + 027, Rocket 75 WDG (thifensulfuron-methyl) + Tribenuron-methyl (tirbenuron-methyl) 75 WDG @ 0.037 + 0.037, Rocket 75 WDG (thifensulfuron-methyl) + Isoproturon (isoproturon) 50 WP @ 0.046 + 0.741, Tribenuron-methyl 75WDG (tirbenuron-methyl) + Isoproturon (isoproturon) 50 WP @ 0.046 + 0.741, Aim (chlorfluazuron) 40 WP @ 0.296, Logran Extra (triasulfuron + terbutryn) 64 WDG @ 0.158, Buctril-M (bromoxynil + MCPA) 40 EC @ 0.494 and Affinity (carfentrazone ethyl ester) 50 WDG @ 0.016 kg a.i ha^{-1} Ghaznavi-98 variety of wheat was seeded in a plot size of 6 x 2 m^{2} during third week of October 2002. The data were recorded on weed density after application of herbicides, number of spikes m^{-2}, number of grains spike^{-1} and grains yield (t ha^{-1}). For controlling weeds Affinity proved to be the best, having only 13.80 as compared to 248.8 weeds m^{-2} in weedy check plots. As a consequence of leading in the yield components, Affinity 50WDG outyieldedall other treatments by producing 4.6 t ha^{-1}. It was however statistically at par with plots treated with Buctril-M 40EC with grain yield of 4.2. The minimum yield of 2.8 t ha^{-1} recorded in weedy check was comparable with the tank mixed Rocket 75 WDG and Aim 40WP.

Key words: Wheat herbicides weed management yield and yield components.

INTRODUCTION

Wheat (*Triticum aestivum* L.) is an annual self-pollinated and photoperiodically long day winter cereal. The best soil for wheat is medium loam. Wheat has adapted itself to the varied climatic and soil conditions to such an extent that it is being sown and harvested in every inhabited part of the world and principal food crop of the world. Major wheat producing countries are USA, China, Germany, Argentina, Australia, India and Pakistan. Wheat ranks first among the cereal crops in Pakistan and is the main staple food of the Pakistani diet. The average yield of wheat in Pakistan does not go beyond 30-35% of its optimum potential. Wheat is used for grinding of flour for baking bread, pastry, biscuits and many other products. Wheat is also used for making macaroni as well as breakfast foods. Wheat grain is also used as one of the ingredient for poultry feed. Wheat straw is also an important by-product and is used as feed for livestock. Bran from wheat

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flour industry is fed to animals as concentrate. It supplies about 73% of the calories and protein of the average diet (Heyne, 1987). At present in Pakistan total area under wheat crop during 2001-02 was 8.058 million ha and production was 18.26 million tons. During the same year, total area and production in NWFP was 0.747 million ha with a production of 0.89 million tons respectively (Anonymous 2002).

The integrated efforts of different governmental agencies have fortunately been successful during the past three years in not only achieving self-sufficiency in food but also leaving an export surplus of lacs of tons. The major interventions resulting in a quantum jump in production have been the balanced use of fertilizer, better availability of certified seed of high yielding cultivars and more importantly the effective management of grassy weeds particularly wild oats. The tempo of accelerated production however, needs to be sustained. Still there exists a gap between the potential and actual yields.

Major bottlenecks for these gaps are scarcity of water and lack of inputs, but the most challenging one is the weed competition. Weeds use the soil nutrients, available moisture and compete for space and sunlight with the crop plants, hence dwindling the crop yields. Weeds also deteriorate the quality of farm produce and consequently reduce the market value. Pervaiz and Quazi (1999) reported that 17.25% losses to wheat crop by weeds. The losses on annual basis in wheat amount to more than 28 billion at the national level and 2 billion in NWFP (Hassan and Marwat, 2001). The infested situations need the development of package of weed management technology, helpful to avoid crop losses in our country. Control of weeds is a basic requirement and major component of management in most production systems (Young and Ogg, 1994).

The weeds competitive with wheat crop specially in NWFP are *Avena fatua*, *Phalaris minor*, *Anagallis arvensis*, *Poa annua*, *Cirsium arvensis*, *Carthmus oxycantha*, *Cynodon dactylon*, *Coronopus didymus*, *Silybum marianum*, *Convolulus arvensis*, *Alhagi maurorum* and *Euphorbia helioscopia*. Management of weeds has been practiced since the time immemorial by manual labor or animal drawn implements. These practices however, are hard, laborious and expensive due to increasing cost of labour. The growing mechanization of farm operations and ever increasing labour wages have stimulated interest in the use of chemical weed control. Non-judicious use of herbicides can do harm rather than benefit in productivity. The choice of best herbicide, proper time of application and proper dose of herbicide is the important consideration for lucrative returns. Nati (1994) reported that 2,4-D and MCPA were likely to be effective against broad leaved weeds in wheat. Diclfop-methyl applied alone and in combination with Isoproturon significantly increased the grain yield of wheat (Samar *et al.*, 1993). In view of the weeds problem of wheat crop, these studies were initiated to investigate the efficacy of different herbicides against different weeds in wheat.

MATERIALS AND METHODS

The experiment was laid out in Randomized Complete Block (RCB) design with five replications at Malkandher Research Farm, NWFP Agricultural University, Peshawar during rabi season 2002-03. Nine treatments were assigned to each replication randomly. Sub-plot size was 6 x 2 m^2. Each treatment had five rows, 25 cm apart. Cultivar Ghaznavi-98 was seeded on October 05, 2002. Post emergence herbicides were applied after the complete emergence of crop and weeds. The herbicides were sprayed during the 3rd week of November 2002.

The detail of treatments during the study is as under.

S.No.	Treatments	Common Name	Rate (kg a.i. ha^{-1})
1.	Weedy check	-------------------------	-----------------------
2.	Rocket 75 WDG + Tribenuron-methyl 75 WDG	thifensulfuron-methyl+ tribenuron-methyl	0.027+ 0.027
3.	Rocket 75 WDG + Tribenuron-methyl 75 WDG	thifensulfuron-methyl+ tribenuron-methyl	0.037 + 0.37
4.	Rocket 75 WDG + Isoproturon 50 WP	thifensulfuorn-methyl+ isoproturon	0.046 + 0.741
5.	Tribenuron-methyl 75 WDG+ Isoproturon 50 WP	tribenuron-methyl+ isoproturon	0.046 + 0.741
6.	Aim 40 WP	chlorfluazuron	0.296
7.	Logron-Extra 64 WDG	triasulfuron+terbutryn	0.158
8.	Buctril-M 40 EC	bromoxylin+MCPA	0.494
9.	Affinity 50 WDG	carnfentrazone ethyl ester	0.016

Data were recorded on the parameters like weed density, number of spikes m^{-2}, number of grains spike^{-1}, and grain yield (tons ha^{-1}). All the data were subjected to the ANOVA technique by using MSTATC computer software and the significant means were separated by using LSD test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Statistically analysis of the data showed that there was a significant effect of different herbicides on weed density m^{-2} (Table-1). Minimum weeds m^{-2} (13.80) was recorded in plots treated with Affinity 50 WDG, which however was statistically at par with Buctril-M 40 EC (24.0 m^{-2}) and Logran Extra (33.40 m^{-2}) as compared to 248.8 plants m^{-2} in the weedy check. The variability in weeds population in different treatments is attributed to the differential efficacy herbicides. These findings are corroborated with the work of Punia *et al.*, (1996) and Hassan *et al.*, (2003), who reported that some herbicides provide an excellent weed control in wheat.

Number of spikes m^{-2} (Table-1) was also significantly affected by herbicides as weed control measure. Highest (328.0) number of spikes m^{-2} was recorded in plots treated with Affinity 50 WDG. It was closely followed by the herbicide Buctril-M and Logran Extra (239.6 each)all other herbicides ranging from 239.6 to 290.0. The lowest (221.0) number of spikes m^{-2} was noted in weedy checks plots. The probable reason for increased number of spike me^{-2} in Affinity treated plots, could be the most effective weed control offered by it. Similar results were also reported by Khalil *et al.*, (1999), who concluded that that application of post-emergence herbicides in wheat significantly increased number of spikes m^{-2}.

Results showed that different herbicidal treatments had also significant effects on number of grains spike^{-1} (Table-1). From the perusal of data in Table-1, it was observed that plots treated with Affinity 50WDG had the highest number of grains spike^{-1} (64.85). However, it was statistically at par with Buctril-M 40EC (60.16), Aim 40WP (59.92), Rocket 75 WDG + Tribenuron-methyl 75 WDG (58.44), Rocket 75 WDG + Tribenuron-methyl 75 WDG (57.0) and Tribenuron-methyl 75 WDG + Isoproturon 50 WP (59.64). Minimum (48.37) grains spike^{-1} were recorded in weedy check. The reason for increased

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Herbicides also had a significant effect on the grain yield (Table-1). Perusal of ... grain yield was observed in plots treated ... 1 40EC (4.2 t ha^{-1}). The minimum ... plots, the tank mixtures involving ... yield in Affinity 50 WDG treated plots was due to effective weed control than any other herbicide. These results are in line with the findings of Punia *et al.*, (1996). 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.

Table-1. Effect of different herbicidal treatment on weed density after application of herbicides, Number of spikes m^{-2}, Number of grains spike^{-1} and Grain yield (t ha^{-1})

Treatments	Weed density 30 DAT(*)	Number of spikes m^{-2}	Number of grains spike^{-1}	Grain yield (t ha^{-1})
Rocket 75 WDG +Tribenuron-methyl 75 WDG	73. 00 b(**)	290.0 b	58.44 ab	3.2 de
Rocket 75 WDG +Tribenuron-methyl 75 WDG	62.20 b	280.4 b	57.0 b	2.9 e
Rocket 75 WDG +Isoproturon 50 WP	59.20 b	268.4 bc	49.60 c	2.9 e
Tribenuron- methyl 75WDG+Isoproturon 50 WP	67.60 b	252.4 c	59.64 ab	3.6 cd
Aim 40 WP	59.80 b	239.2 b	59.92 ab	3.1 de
Logran Extra 64 WDG	33. 40 c	239.6 b	57.28 b	4.0 bc
Buctril-M 40 EC	24.00 c	239.6 b	60.16 ab	4.2 ab
Affinity	13.80 c	328.0 a	64.58 a	4.6 a
Weedy check	248. 80 a	221.0 d	48.37 c	2.8 e

* DAT = Days after treatment.

** Means not followed by the same letter (s) in the respective category significantly different by LSD test at 5 % level of probability.

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