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CHEMICAL WEED CONTROL IN WHEAT

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ABSTRACT

An experiment was carried out to observe the effect of post emergence chemical weed control on weed density and grain yield of wheat during Rabi 2001-2002 and 2002-2003. The experiments were laid out in randomized complete block design with a plot size of 10 x 7 m^2. The data revealed that Topik 15 WP@250 g ha^{-1} showed maximum weed control efficacy of 97.74% and 97.86% during 2001-2002 and 2002-2003, respectively. Maximum wheat grain yield of 3285.71 and 3071.42 kg ha^{-1} was also obtained in Topik 15 WP @ 250 g ha^{-1} during both years. Thus, it is concluded from our data that Topik 15 WP is better than standard product Puma super-70 EW, hence recommended for controlling grassy weeds in wheat crop.

Key words: Herbicides, weed control, wheat *Triticum aestivum* L.

INTRODUCTION

Wheat (*Triticum aestivum* L.) is the leading cereal crop in the world. In Pakistan, wheat is a major grain crop grown on an area of 8057.4 thousand ha with annual production of 18226.10 thousand tons. In Sindh province, wheat is grown on 875.20 thousand ha with a total production of 2101 thousand tons during 2002-3 (Anonymous, 2003).

Weeds are serious negative factor in crop production, which results in great losses in crop yield, despite the use of costly inputs and improved cultural practices. The reasons for low yield are many, but one of the most serious, but less noticeable cause is the presence of weeds. Weeds compete with crops, resulting into low yields.

Chemical control method is a good answer for management of weeds, as it is easier and less time dependent as compare to manual weeding. Jarwar *et al.* (1999) observed that chemical weed control method is also effective along with cultural method of weed control. Duke and Lydon (1987) reported that chemical method of weeds in which herbicides are used to kill the weeds is usually easy, highly effective and most economical approach, and proved to be more effective than mechanical weed control.

Qureshi *et al.* (2002) found that the integration of planting pattern and herbicide produced comparable yield with herbicide Buctril-M alone and hand weeding. Sher and Saeed (1987), observed that hand weeding was found to be the best method to control weeds but was uneconomical as compared with the use of weedicides. Ansari, *et al.* (2003) reported that significantly higher grain yields were obtained with combination of mechanical and chemical weed control methods in wheat. Tunio, *et al.* (2004), found that chemical weed control along with different sowing methods and cultural practices, gave higher yields in wheat crop and satisfactory weed control measures.

The present study was planned to determine the performance of different herbicides for controlling the major weeds and their effect on grain yield of wheat crop.

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MATERIALS AND METHODS

A study was carried out with the objectives to test the efficacy of different post-emergence herbicides in wheat crop, in the experimental area of Plant Physiology Section, Agriculture Research Institute, Tandojam, during Rabi 2001-2002 and 2002-2003. Seeds of commercial variety Tandojam-83 (T.J-83) were drilled with single coulter hand driven drill in a row spacing of 25 cm at a seed rate of 125 kg ha^{-1}. Experiment was laid out in Randomized Complete Block Design (RCBD), with four replications having plot size of 7 x 10 m^{-2}. The treatments under study were:

T_1 = Topik 15 WP @ 250 g ha^{-1}.

T_2 = Arelon 70 Disp. @ 1.875 L ha^{-1}.

T_3 = Puma super 75 EW @ 1.25 L ha^{-1}.

T_4 = Isoproturon 50 WP @ 2 L ha^{-1}.

T_5 = Untreated check

The soil was loamy type. The general weather conditions at the experimental field were normal and the wind velocity was less than 5 mph, during the study period. The land was prepared by two dry plowings followed by land leveling, after applying soaking irrigation when soil came into *wattar* condition two cross plowings with rotavator plow were applied to prepare fine seed bed. The recommended dose of fertilizer i.e: 120-75-0 kg ha^{-1} of NPK in the form of DAP and Urea, was applied as per recommended application. The herbicides were applied at post-emergence level of both weed and crop, at 30 days after sowing and after application of first irrigation. The herbicides were applied by knapsack hand sprayer fitted with Tee jet nozzle under moist condition, and at 2-3 leaf stage of weeds. The observations were noted, 30 days after application of herbicide. The weed infestation % was observed as visual observation method and weed counting/recording method was quadrate method (1 m^2). The data were subjected to statistical analysis by the procedure adopted by Steel and Torrie (1984).

RESULTS AND DISCUSSION

Weed Density and Weed Control (%)

The data on total weeds (broadleaf and grassy) are presented in Table-1. A total of 517.25 weeds m^{-2} were present in the weedy check. Whereas only 11.37 weeds m^{-2} were recorded in Topik 15 WP @ 250 g ha^{-1}, while among the herbicides, the maximum weeds were recorded in Isoproturon 50 WP @ 2 L ha^{-1} having 144.37 weed m^{-2}. The present results are in conformity with the work of Duke and Lydon (1987), Sher and Saeed (1987), Hassan *et al.* (2003) and Khan *et al.* (2004), who observed that chemical weed control method is the highly effective and most economical approach. The present findings are also in accordance with those of Jarwar *et al.* (2002) and Tunio *et al.* (2004), who found that chemical weed control method is effective method for controlling the weeds in wheat crop and for maximizing of wheat yield.

The data in Table-1 further showed that average weeds m^{-2} and the effect of various herbicidal treatments revealed that herbicide Topik-15 WP showed maximum efficacy of 97.8% as compared to Arelon 70 disp. and Puma super 75 EW, which showed 89.73% and 86.55%, respectively. The lowest weed control % was observed in Isoproturon 50 WP (72.14%) at 2 L ha^{-1}. The results were statistically significant among the treatments and weed species m^{-2}, which shows that chemical weed control method has positive effective for controlling the weeds in wheat crop.

Diversity of Grasses

The data presented in Table-2 showed diversity of grassy weeds, among which *Phalaris minor* was recorded as dominant weed in both years of studies as depicted in untreated check treatments. The herbicide Topik was successful in reducing the infestation of *Phalaris minor* to only 1.4% of the weedy check. The herbicide Topik was also successful in declining the density of *Avena fatua*, *Poa annua* and *Setaria* sp. to 2.0, 7.0 and 7.9%, respectively (Table-2). As compared to the herbicide Topik, Puma super could reduce the infestation of *Phalaris minor* to a level of 16.65% and the density of *Avena fatua*, *Poa annua* and *Setaria* sp. was minimized to the extent of 8.2, 11.6 and 12.2%, respectively as compared to the untreated check. The herbicide Arelon fell in between Topik and Puma super in controlling grassy weed species (Table-2). Overall *Phalaris minor* and *Avena fatua* were observed as major grassy weeds in the experimental field of wheat crop during the study years. Ansari *et al.* (2003), reported that best weed control was the combination of chemical and mechanical weed control in wheat crop.

Grain Yield kg ha^{-1}

The grain yield is the most important attribute for obtaining higher production from wheat crop. The results regarding this character are presented in Table-3. The data revealed that on an average of both years, maximum yield of 3178.56 kg ha^{-1} under the herbicide Topik 15 WP followed by herbicide Arelon 70 disp. yielding 2900 kg ha^{-1} with an increase % over control treatment by 39.49 and 27.2%, respectively. However, higher yield 3285.71 kg ha^{-1} with an increase of 40.2% over control treatment was obtained in the year 2001-02 under herbicidal treatment of Topik 15 WP, which shows the best weed control efficacy. Present results are in accordance with those obtained by Qureshi *et al.* (2003) and Tunio *et al.* (2004), who observed significantly higher yields with chemical weed control in wheat.

Conclusively, it is enunciated that Topik-15 WP is better than standard product Puma-super 75 EW and recommended at the dose of 250 g ha^{-1} for controlling grassy weeds in wheat crop.

Table-1. **Total weed density m^{-2} and weed control efficacy (%) in different herbicidal treatments.**

Treatments	Total Weeds m^{-2}			Total Weed Control %		
	2001-02	2002-03	Average	2001-02	2002-03	Average
Topik 15 WP	12.75	10.00	11.37	97.74	97.86	97.80
Arelon 70 Disp.	63.0	44.00	53.5	88.86	90.60	89.73
Puma super 75 EW	74.50	54.25	64.37	86.83	86.28	86.55
Isoproturon 50 WP	161.00	127.75	144.37	71.55	72.73	72.14
Untreated check	566.00	468.50	517.25	-	-	-

Table-2. Weed density m^{-2} in different herbicidal treatments in wheat.

Treatments	Density of weed species m^{-2}											
	Phalaris minor			*Avena fatua*			*Poa annua*			*Setaria* Sp.		
	2001-02	2002-03	Avg.	2001-02	2002-03	Avg.	2001-02	2002-03	Avg.	2001-02	2002-03	Avg.
Topik 15 WP	4.50	3.50	4.0	3.75	3.0	3.37	2.50	1.75	2.12	2.0	1.75	1.87
Arelon 70 Disp.	28.25	24.5	26.37	15.75	12.00	13.87	5.50	4.50	5.0	3.50	3.00	3.25
Puma super 75 EW	51.0	47.5	49.25	16.75	10.75	13.75	3.75	3.25	3.50	3.00	2.75	2.87
Isoproturon 50 WP	82.25	73.75	78.0	56.0	34.00	45.0	10.75	10.25	10.50	12.00	9.75	10.87
Untreated check	300.25	291.25	295.75	206.75	128.50	167.62	32.25	28.25	30.25	26.75	20.5	23.62
Cd-I	13.6700	17.4500	-	10.4200	5.0960	-	2.7450	2.8270	-	3.5240	2.4800	-
Cd-II	19.1700	24.4700	-	14.6100	7.1450	-	3.8490	3.9630	-	4.9410	3.4770	-

Table-3. Effect of different herbicides on grain yield (kg ha^{-1}) of wheat crop.

Treatments	Grain yield			Yield increase over control (%)		
	2001-02	2002-03	Average	2001-02	2002-03	Average
Topik 15 WP	3285.71	3071.42	3178.565	40.2	38.7	39.49
Arelon 70 Disp.	3000.00	2800.00	2900.000	28.0	26.4	27.2
Puma super 75 EW	2928.57	2742.85	2835.71	25.0	23.8	24.4
Isoproturon 50 WP	2714.18	2500.00	2607.09	15.8	12.9	14.35
Untreated check	2342.85	2214.28	2278.56	00.0	00.0	00.00
Cd-I	0.7516	0.5315		-	-	-
Cd-II	1.0540	0.7451		-	-	-

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