Pak. J. Agri. Sci. Vol.37(3-4), 2000

EFFICACY OF TRIBUNAL AT VARIOUS CONCENTRATIONS WITH AND WITHOUT SURFACTANT FOR THE CONTROL OF WEEDS IN WHEAT

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Investigation pertaining to the efficacy of tribunil herbicide at various concentrations with and without a surfactant for the control of wheat weeds was carried out at the University of Agriculture, Faisalabad. Addition or a surfactant improved the efficacy of tribunil herbicide spray by increasing rentention of the spray solution and decreasing bounce off loss. Application of tribunil *(if)* 2 kg ha" + 0.2 % surfactant resulted in better weed control and eliminated their competition with wheat crop by increasing weed mortality to the extent of 88.46 % as compared to control. It resulted in higher grain yield and maximized the net benefit among the tested treatments. Addition or a surfactant also increased net benefit over application of tribunil alone. All the weedicide treatments with or without a surfactant significantly decreased the weed flora. Application of tribunil and tribunil plus a surfactant also resulted in increased fertile tillers, number of grains per spike as well as grain weight as compared to other treatments.

Key words: efficacy of tribunil, surfactant, weeds in wheat

INTRODUCTION

In the modern agriculture, use of herbicides has become inevitable for the control of weeds. However, the efficacy of the herbicides is not fully realised as a lot of spray material is lost through run off, leaching and volatilization. Spray solution is repelled due to the presence of waxy cuticle on the plant leaf surface. Thus, the effectiveness of contact herbicides depends largely upon uniform and complete welting of the plant. Without wetting agents, herbicide remains in the form of droplets. The addition of a surfactant increases the effectiveness of herbicides by lowering down the interfacial tension and improving uniformity of wetting of the plant foliage. It resulted in less bounce off which contributed to the increased effectiveness of the herbicides.

Hunter (1982) observed that the control of cow cokIe weed *(Vaccaria segetultsi* with chlorsulfuron Ca) 20 - 80 g ha" was improved by the addition of a surfactant. It was observed that at 4 leaf stage of weeds, 5 g of chlorsulfuron ha' + a surfactant was equivalent to 40' g chlorsulfuron without a surfactant. Walia and Gill (1984) advocated that various surfactants namely sandovit (dJ. 0.1 % and hyoxid (1W, 0.25% enhanced weed control efficacy of metoxuron and isoproturon, applied Cli), 1.2 and 0.75 kg ha"' respectively. It significantly increased the grain yield of wheat crop.

Gill and Mehra (1987) found that addition of hyoxid -x-lOO increased the efficacy ofmethabenzthiazuron against dumbi sitti *(phlaris minor)* in enabling the rate to be reduced to n.525 kg without impairing control and gave the highest yield. Ruiter et al. (1987) found that in winter wheat under controlled conditions. the addition of 0.5 % (v/v) armoblen T/2 or agrol LN enhanced the activity of both glyphosate and fluazifop-p-butvl. Malik et al. (1989) reported that application of'isoprotnron. metoxurou and diclofop-methyl in wheat alone or with a non-ionic surfactant selwet ((l' n.l % greatly increased herbicide toxicity to wild pea *(lathvrus aphaca).* wild oats *(avena sterilis sub sp. /udovieiana).* common vetch *(1/(';'0 sill/m)* and Lambsquarter *(Chenopodium a/hum).* Reduced rates or isoproturon in combination with 2. 4-d+surfactant provided yields similaar to those obtained from higher rates of isoproturon alone.

Ruiter et al. (1990) reported that cationic and anionic surfactants enhanced the retention of spray material on plant species with a reflective leaf surface such as *Salanum nigrum, Chamomilla recutita, Elymus repens.* wheat peas and tomatoes. Donald and Prato (llJ91) studied thal chlorsulfuron, metosulfuron and Ga-13lO.1() (trisulfuronl av 10-20 g ha:' + an ionic surfactant generally controlled both koehia *(Kochia scoparia)* and wild mustard *iSinapus arvensusi* equally well. The above given studies indicate that the addition of a surfactant improved the cffectvicncss of a herbicide in controlling the weeds associated with wheat crop.

Since wheat stands as a major cash crop in Pakistan. a quantitative assessment of the effectiveness of adding a surfactant in controlling weed growth associated with wheat crop under local conditions appeared to be a dire need for improving the wheat production The reported study was tnus conducted to locally evaluate the performance

and efficiency of methabenzthiazuron (tribunil) at different rates with the addition of a surfactant at the rate of 0.2% of the spray solution.

MATERIALS AND METHODS

The study was carried out at the Agronomic Research Farm of the University of Agriculture, Faisalabad. The experiment was laid out in randomized compete block design with 4 replications using a net plot size of 1:5 m x 7 m. A commercial wheat variety (Pak-81) was used as a test crop. The crop was sown with the help of a sigle row hand drill in 25 cm apart rows using a seed rate of lOO kg ha"! Nitrogen and phosphatic fertilizers were appliled at the rate of 100 and 75 kg ha"' respectively, Five irrigations were applied to the crop during the growth season. The experiment comprised seven weed control treatments as described below:

Treatments		Description
T_1	=	Control (weedy check)
T_2	=	Tribunil @ 1.5 kg ha"'
T_3	=	Tribunil *(a)* 1.5 kg ha"' + 0.2 % surfactant
T_4	=	Tribunil (ql. 1.75 kg ha"'
T_5	=	Tribunil *(a)* 1.75 kg ha"' + 0.2 % surfactant
T_6	=	Tribunil (di, 2.00 kg ha"'
T_7	=	Tribunil @ 2.00 kg ha"' + 0.2 % surfactant

The data collected under each treatment comprised weed mortality percentage. weed count at harvest weed biomass. plant height number of fertile tillers. number of grains per spike. grain yield and straw yield. Analysis of variance was used to determine the significance of differences among treatments. Least significant difference test was applied to test the significance of differences between individual treatment means (Steel and Torrie. 1984).

RESU(,TS AND DISCUSSION

Maximum weed mortality (88.47%) was recorded with the application of tribunil (dl. 2.00 kg ha"' + 0.2% surfactant. Jollowed by tribunil *(ij),* 2.00 kg ha"' (Table 1). Minimum mortality was observed in plots treated with tribunil @ 1.5 kg ha"' (T). The variation in the pattern of weed mortality may be attributed to the herbicidal doses and addition of a surfactant. Plots treated with tribunil m. 2 kg ha"' + 0.2 % surfactant (T,) and tribunil m: 2 kg ha"' (T 6) gave minimum weed count. These were followed by tribunil *ia:* 1,75 kg ha:' + 0.2 % surfactant (T,) and tribunil *(a)* 1.75 kg ha"' (T_4). Minimum weed biomass (7.35 g) was recorded in plots treated with tribunil *(a)* 2 kg ha"' + 0.2 % surfactant (T.) which was due to the effective weed control. It was followed by tribunil (4) 2 kg ha' \ (T 6)' being statistically at pa~ with tribunil @ I. 75 kg ha" + 0.2 % surfactant. Maximum weed biomass (35.62 g) was recorded in weedy check plots. Plant height remained statistically at par in all treatments which showed that tribunil application with and without a surfactant had no positive or negative effect on the growth of wheat crop. Number of fertile tillers was significantly influenced by herbicide spray and all the treatments produced more fertile tillers compared with weedy check (T_1). Tribunil @ 2 kg ha" + 0.2 % surfactant (T_7) produced maximum number of fertile tillers due to effective weed control. Maximum number of grains per spike (5~.17) was recorded in plots treated with tribunil @ 2 kg ha:' + 0.2 <X, surfactant (T_7). Less weed-crop competition led to increased utilization of nutrients by the wheat crop. It was followed by tribunil @ 2 kg ha"' (T J and tribunil *(0)* 1.75 kg ha" + 0.2 0/. surfactant (T_5). The highest gram yield (5.56 t ha") was obtained by the ;lpplication of tribunil @ 2 kg ha"' + 0.2 % surfactant (T.) because of effective weed control which largely eliminated weed-crop competition and this led to vigorous crop development: Addition of a surfactant enchanced the efficacy of tribunil.

Economic analysis is an important criterion for evaluating the effectiveness of any weed control practice in terms of the net benefit to the farmers. The relevant data and results of economic analysis of different weed control treatments are presented in Table 2. The data revealed that addition of a surfactant enhanced the herbicidal effectiveness and magnitude of response than the application of tribunil alone. Application of tribunil (dj, 2 kg ha"' + 0.2 % surfactant (T_7) proved to be the most economical which provided maximum net benefit (Rs. 21,325) than tribunil @. 2 kg ha' <TJ which was statistically at par with tribunil *(a* 1:75 kg ha:' + 0.2 % surfactant (T,).

Table [illegible]. Effect of [illegible] of wheat

Treatments	Weed mortality (%)	Weed count at harvest	Weed biomass	Plant height (cm)	No. of fertile tillers	No. of grains per spike	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})
[illegible] = [illegible]	[illegible]	48.25 a	35.62 a	[illegible]	316.25 d	42.90 d	4.19 e	8.86 e
[illegible] = Tribunil @ 1.5 kg ha^{-1}	52.62 e	[illegible]	[illegible]	[illegible]	[illegible]	45.57 cd	4.72 d	9.10 [illegible]
[illegible] = Tribunil @ 1.5 kg ha^{-1} + 0.2% surfactant	[illegible]1 d	[illegible]	13.67 c	[illegible]	330.25 bcd	47.22 bcd	4.89 cd	9.49 cde
T_4 = Tribunil @ 1.75 kg ha^{-1}	75.07 c	[illegible]	[illegible]	[illegible]	[illegible]	48.22 bc	[illegible]	9.90 bcd
[illegible] = Tribunil @ 1.75 kg ha^{-1} + 0.2% surfactant	[illegible]	13.25 cd	9.57 d	[illegible]	342.25 abc	50.27 abc	5.14 bc	10.14 bc
[illegible] = Tribunil @ 2 kg ha^{-1}	81.44 b	[illegible]	[illegible]	[illegible]	344.50 ab	51.50 ab	5.21 b	10.57 ab
T_7 = Tribunil @ 2 kg ha^{-1} + 0.2% surfactant	[illegible]	9.25 d	7.35 e	[illegible]	[illegible]	[illegible]	5.56 a	11.36 a

Table 2. Economic analysis

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]								
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
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[illegible]			[illegible]		[illegible]		[illegible]	

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