Pak. J. Weed Sci. Res., 19(4): 419-425, 2013

EFFICACY OF DIFFERENT WEEDICIDES AS AFFECTED BY THEIR MODE OF APPLICATION IN WHEAT CROP

Abdul Aziz Baloch[1], Muhammad Saqib[2], Mohammad Safdar Baloch[2*], Muhammad Sadiq[2] and Muhammad Zubair[3]

ABSTRACT

A study was conducted at Arid Zone Research Institute, Dera Ismail Khan, Pakistan during the year 2012-13 to find out the most effective method of herbicide application for controlling weeds in wheat crop. Herbicides i.e. Buctril super @ 750 mL ha^{-1}, Puma super @ 1250 mL ha^{-1} and Buctril super @ 750 mL ha^{-1} + Puma super @ 1250 mL ha^{-1} were applied at first irrigation. These herbicides were also sprayed on moist field after first irrigation. The results revealed that Buctril super + Puma super spray suppressed weed density by 73.9 %, fresh weed weight by 72.4% and dry weed weight by 64.0%, respectively as compare to control. Maximum (111) days taken to 50% heading were noted in control treatment. The application of Buctril super + Puma super delayed maturity to 161 days, produced tallest plants of 112cm, highest number of 3.0 tillers per plant, maximum spike length of 10.2cm, maximum 59.6 grains per spike, biomass yield 14.55 t ha^{-1}, heaviest grains weight (52g) and highest grain yield of 6081 kg ha^{-1}. Buctril super in combination with Puma super spray proved to be an efficient method than their application with irrigation water.

Key words: herbicides, efficacy, herbicides, wheat, weeds.

Citation: Baloch, A.A., M. Saqib, M.S. Baloch, M.A. Khan, M. Sadiq and M. Zubair. 2013. Efficacy of different weedicides as affected by their mode of application in wheat crop. Pak. J. Weed Sci. Res. 19(4): 419-425.

INTRODUCTION

Wheat is one of the most important cereal crops of the world and plays a significant role in the economic stability of the developing countries. Its yield per unit area in Pakistan is low as compare to many advanced countries of the world, due to a number of biotic and abiotic

[1] Arid Zone Research Institute, Dera Ismail Khan, Pakistan
[2] Department of Agronomy, Faculty of Agriculture, Gomal University, D.I. Khan, Pakistan
[3] University College of Agriculture, Bahauddin Zakariya University, Multan, Pakistan
*Corresponding author's email: safdarbalochpk@yahoo.com

factors. Low yielding varieties and meager levels of inputs coupled with heavy weeds infestation remain the principal causes of poor yield. Weeds reduce production of crops by competing with crop plants for water, light, nutrients, moisture and space (Anonymous, 2005). Chaudhry *et al*. (2008) reported that when weeds are allowed to grow beyond 50 days after sowing of crop, they reduce grain yield and yield attributes substantially.

Work on weed distribution and their management techniques have extensively been done across the world (Boz *et al*., 2000; Pypsek *et al*., 2005; Khan *et al.,* 2012; Jawad *et al*., 2013; Khaliq *et al.*, 2013). Sanaullah *et al*. (2010) found that broadcasting of herbicides was efficient method than spray application. Different herbicides were compared and decrease in weed population and subsequent increase in number of tillers per meter square, number of grains per spike, grain weight and grain yield in treated plots as compare to control was observed (Virender *et al*. 2001; Hussain *et al*. 2003; Alvi *et al*. (2004). Weed infestation has been reported to reduce wheat yield by 25-30% (Nayyar *et al*., 1994). Wheat yield could easily be increased by 37% if weeds are effectively controlled (Baloch, 1993). Weed management is an important aspect of successful crop production. However, most of the farmers do not adopt proper weed management approach during critical crop-weed growth competition. The present study was, therefore, initiated to measure efficacy of different herbicides and their effective mode of application for weed control in wheat crop.

MATERIALS AND METHODS

The experiment was conducted at Arid Zone Research Institute, Dera Ismail Khan, Pakistan, during winter 2012-13. Wheat variety "Seher-2006" was planted in mid November 2012 in a randomized complete block design with three replications. The net plot size was 5mx1.8m. Seedbed was prepared by ploughing the field twice followed by rotovator before sowing. Fertilizers @ 150:120:80 NPK kg ha^{-1} were applied at the time of sowing. The following herbicides were applied through 2nd irrigation and sprayed one week after irrigation in proper moisture condition. The following herbicide treatments were studied during experimentation.

T1. Control (weedy check)
T2. Buctril super (bromoxynil+MCPA) @ 750 mL ha^{-1}+Puma super @ 1250 mL ha^{-1} (spray)
T3. Buctril super @ 750 mL ha^{-1} (spray)
T4. Puma super (fenoxaprop-p-ethyl) @1250 mL ha^{-1} (spray)
T5. Buctril super @ 750 mL ha^{-1} (irrigation)
T6. Puma super @1250 mL ha^{-1} (irrigation)

T7. Buctril super @ 750 mL ha^{-1} + Puma super @1250 mL ha^{-1} (irrigation)

Data on weed density and biomass were recorded 65 and 95 days after sowing (DAS) from randomly selected meter square quadrats from each experimental plot. Fresh weed biomass was recorded just after removing weeds from the treatments. Dry weed biomass was recorded after sun drying of weeds. The prevailing broad leaved weeds were *Convolvulus arvensis*, *Galium aparine*, *Rumex dentatus*, and *Melilotus indica* while, narrow leaved weed (grassy weed) species viz. *Avena fatua* and *Phalaris minor* were found in the experimental field. Data on number of tillers per plants, number of spikes per tiller and plant height were recorded in ten randomly selected plants. Biomass and grain yield were recorded in central two rows of each plot and converted into kg ha^{-1}. A random seed sample was obtained from each plot to take 1000-grain weight. The data recorded were subjected to analysis of variance techniques (Steel *et al*., 1997) and then LSD test at 5% level of probability was used to compare the treatment means with the help of MSTATC software program (MSTATC, 1991).

RESULTS AND DISCUSSION

Weed density was significantly affected by different herbicides. Weed density was reduced in all the treatments as compare to control (Table-1). After 65 DAS, combination of Buctril super + Puma super suppressed weed density by 73.9% as compared to control. At 95 DAS, application of both Buctril super + Puma super reduced weed population by 74.7% compared to control treatment. The combination of two herbicides applied at 65 DAS significantly reduced fresh weed biomass by 72.4% in comparison with control. While at 95 DAS, application of Buctril super + Puma super reduced fresh weed biomass by 75.2% as compared to control. Total dry weed biomass was significantly reduced by all treatments over control (Table-1). Buctril super + Puma super application (65 and 95 DAS) reduced total dry weed biomass by 64.0 and 64.7%, respectively as compared with control. Previously, Zakariyya *et al*. (2013) applied Puma Super and Buctril super, which effectively controlled weeds and resulted in lower fresh and dry weed biomass.

The use of different herbicides significantly affected days to maturity (Table-2). The application of Buctril super + Puma super delayed crop maturity up to 161 days. It was, however, statistically at par with all other treatments except control. This treatment also had tallest plants of 112cm. Significantly higher number of 3.0 tillers $plant^{-1}$, maximum spike length of 10.2cm and 59.6 grains per spike were also noted in Buctril super + Puma super treatment. O'Donovan

(2005) stated that application of different weed control practices alone may not provide adequate weed management. However, their combination can result in long-term and cost-effective weed management. Zakariyya *et al*. (2013) found that Buctril super promoted plant growth due to lesser weeds competition with crop plants. They further stated that an effective weed eradication and improvement of soil environment after herbicides application enhance the yield attributes due to higher nutrients availability to crop plants. As far as the tillers production is concerned, Noor *et al*. (2012) reported higher number of tillers when narrow leaved weeds were properly managed at tillers initiation. They also found that Puma super effectively controlled all narrow leaved weeds and contributed considerably towards off-shoots production.

Biomass yield was significantly affected by different herbicides. Buctril super + Puma super produced maximum biomass yield of 14.55 t ha^{-1} (Table-2). Effect of herbicides on grain weight was statistically significant in all treatments. Buctril super + Puma super application produced heaviest grains weight (52g). This treatment also produced the highest grain yield of 6081 kg ha^{-1}. Nadeem (2003) reported increased biological and grain yield due to chemical weed control in wheat.

CONCLUSION

The combination of Buctril super + Puma super reduced weed density by around 74%, fresh weed biomass by 72% and dry weed biomass by 64% in comparison with the control treatments. The control also showed maximum days to 50% heading. In addition, Buctril super + Puma super delayed maturity, produced tallest plants, highest number of tillers $plant^{-1}$, maximum spike length, grains $spike^{-1}$, biomass yield, and highest grain yield. Therefore, Buctril super in combination with Puma super spray performed better than application with irrigation water.

Table-1. Effect of weedicides on weed density, fresh and dry weed biomass in wheat crop during 2012-13

Treatments	Weed density m^{-2} (% compared to control)		Weed biomass			
			Fresh weed biomass gm^{-2} (% compared to control)		Dry weed biomass gm^{-2} (% compared to control)	
	65 DAS	95 DAS	65 DAS	95 DAS	65 DAS	95 DAS
T1: Control	91 a	50 a	99 a	108 a	20 a	23 a
T2: Buctril super @ 750 mL ha^{-1} + Puma super @ 1250 mL ha^{-1} (spray)	24 d (74)	13 d (75)	23 c (72)	27 e (75)	7 b (64)	8 d (65)
T3: Buctril super @ 750 mL ha^{-1} (spray)	26 d (72)	18 cd (65)	33 c (68)	33 de (69)	10 b (52)	9 cd (59)
T4: Puma super @ 1250 mL ha^{-1} (spray)	39 b (57)	18 cd (65)	72 b (27)	48 b (55)	10 b (51)	10 cd (55)
T5: Buctril super @ 750 mL ha^{-1} (irrigation)	33 bc (64)	23 b (54)	61 b (39)	48 b (55)	9 b (54)	12 b (49)
T6: Puma super @ 1250 mL ha^{-1} (irrigation)	36 b (60)	19 bc (62)	69 b (31)	47 bc (57)	8 b (59)	12 b (47)
T7: Buctril super @ 750 mL ha^{-1} + Puma super@ 1250 mL ha^{-1} (irrigation)	27 cd (71)	19 bc (61)	38 c (62)	39 cd (64)	7 b (64)	11 bc (52)
$LSD_{0.05}$	8.5	5.0	19.6	7.9	4.3	2.6
CV (%)	12.2	12.4	18.5	9.1	20.0	12.62

Means sharing different letter(s) in a column are statistically significant at 5% probability level

Table-2. Effect of weedicides on yield components and grain yield of wheat crop during 2012-13

Treatments	Days to maturity	Plant height (cm)	Tillers plant^{-1}	Spike length (cm)	Grains spike^{-1}	Biomass yield (t ha^{-1})	1000-grain weight (g)	Grain yield (kg ha^{-1})
Control	159 b	105 c	1.5 d	7.2 e	49 d	10.6 b	45 e	3326 d
Buctril super @ 750 mL ha^{-1} + Puma super @1250 mL ha^{-1} (spray)	161 a	112 a	3.0 a	10.2 a	59 a	14.6 bc	52 a	6081 a
Buctril super @ 750 mL ha^{-1} (spray)	161 a	109 ab	2.5 ab	9.4 b	57 ab	13.9 b	50 b	5645 ab
Puma super @ 1250 mL ha^{-1} (spray)	161 a	111 a	2.6 ab	9.3 bc	56 b	12.9 c	47 d	5379 b
Buctril super @ 750 mL ha^{-1} (irrigation)	160 ab	107 bc	2.0 cd	8.5 d	53 c	12.0 d	48 cd	4832 c
Puma super @ 1250 mL ha^{-1} (irrigation)	160 ab	107 bc	2.1 bc	8.3 d	54 c	11.3 e	49 bc	4422 c
B. super @750 mL ha^{-1} + P. super @ 1250 mL ha^{-1} (irrigation)	161 a	107 bc	2.2 bc	8.6 cd	53 c	11.9 de	50 b	4832 c
$LSD_{0.05}$	1.03	2.7	0.63	0.68	1.72	0.66	1.45	443.7
CV (%)	0.36	1.40	15.7	4.37	1.78	2.99	1.67	5.06

Means sharing different letter(s) in a column are statistically significant at 5% probability level

REFERENCES CITED

Alvi, S.M., C. Sanaullah and M.A. Ali. 2004. Evaluation of some herbicides for control of weeds in wheat crop. Pak. J. Life Soc. Sci. 2(1): 24-27.

Anonymous. 2005. Punjab Department of Statistics. Bureau of Statistics, Govt. of Punjab, Lahore.

Baloch, G. M. 1993. Biological control of weeds. Prog. Farmg. PARC, Islamabad. 3: 10-18.

Boz, O., M. N. Dogan and S. Dura. 2000. A survey study on distribution and density of weeds species occurring in wheat fields of Denizli Province. Turkiye herboloji Dergisi. 3: 37-52.

Chaudhry, S., M. Hussain, M. A. Ali and J. Iqbal. 2008. Effect of duration of weed competition period on yield and yield components of wheat. Pak. J. Agric. Res. 46 (1): 47-53.

Hussain, N., M. B. Khan, B. Khan, M. Tariq and S. Hanif. 2003. Spectrum of activity of different herbicides on wheat. Int. J. Abri. Biol. 5(2): 166-168.

Jawad, M., N. Khan, H. Khan, S. Zarin, Arifullah, M. Kashif, M. Adil, S. Rahman and R. Khan. 2013. Bio-herbicidal potentials of wheat (*Triticum aestivum* L.) on some of its major weeds. Pak. J. Weed Sci. Res. 19(1): 79-87.

Khaliq, A., M.R. Gondal, A. Matloob, E. Ullah, S. Hussain and G. Murtaza. 2013. Chemical weed control in wheat under different rice residue management options. Pak. J. Weed Sci. Res. 19(1): 1-14.

Khan, M.A., K. B. Marwat, A. Amin, A. Nawaz and H. Khan. 2012. Soil solarization: an organic weed management approach in cauliflower. Comm. Soil Sci. Plant Anal. 43(13): 1847-1860.

MSTATC. 1991. MSTATC package, verision 1. Michigan State Univ. USA.

Nadeem, M.A. 2003. Effect of post emergence application of herbicides on weed control and yield of maize. M. Sc. Thesis. Deptt: of Agron. Gomal Univ. D.I.Khan, Pakistan.

Noor, K., E. A. Khan, M. S. Baloch, M. A. Khan, I. U. Awan, M. Sadiq and M. Aslam. 2012. Allelopathic effect of congress grass on weeds and yield of wheat. Pak. J. Weed Sci. Res. 18(3): 307-318.

Nayyar, M. M., M. Shafi, M. I. Shah and T. Mahmood. 1994. Weed eradication studies in wheat. Abst. 4th Pak. Weed Sci. Conf. 9p.

O'Donovan, J.T. 2005. Integrated weed management in reduced tillage systems. Sakatchewan Soil Conservation Association. Alberta Research Council, Vegreville, Canada.

Pysek, P., M. Chytry, I. Tichy and I. Knollova. 2005. Invasions by alien plants in the Czech Republic: a quantitative assessment across habitats. Presha, 77: 339-354.

Sanaullah, C., J. Iqbal, M. Hussain and M. A. Ali. 2010. Comparison of different herbicidal application methods for weed control in wheat. J. Agric Res. 48(2): 193-200.

Steel, R. G. D., J. H. Torrie and D. Dickey. 1997. Principles and procedures of statistics. A biometrical approach (3rd Eds.). McGraw Hill Book Co. Inc. New York. pp. 172-177.

Virender, S., U. Walia, M. Gulshan, V. Sardana and G. Mahagan. 2001. Management of broadleaf weeds in wheat. Indian J. Weed Sci. 33(1): 69-71.

Zakariyya, M. I., I. U. Awan, M. S. Baloch, A. A. Khakwani and M. Sadiq. 2013. Integrated weed management strategies in wheat. Pak. J. Weed Sci. Res. 19(2): 217-230.