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**PJBS**

ISSN 1028-8880

**Pakistan  
Journal of Biological Sciences**

**ANSI***net*

Asian Network for Scientific Information  
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

## Effectiveness of Different Rates of Post-emergence Herbicides in Wheat (*Triticum aestivum* L.)

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### Abstract

Two herbicides namely Logran and Tolkan were evaluated at three different rates i.e., low, medium and high on Inqulab and Pasban varieties of wheat (*Triticum aestivum* L.). The results showed that herbicide activity index value was maximum with high rates and minimum with low rates of herbicides. Significant improvement was recorded in various morphological and yield components of wheat by low and medium rates while high rates caused detrimental effect. Recommended rates of both Logran and Tolkan produced about 37% greater grain yield than weedy check which was almost equal to hand weeding. Two varieties exhibited non-significant difference for various parameters.

**Key words:** Wheat, Herbicides logran and tolkan, growth and yield

### Introduction

Herbicides are being extensively used for weed control all over the world and are getting popularity in Pakistan. However, our farming community is unaware of various aspects of herbicide application, which is not a simple phenomenon. There is no single herbicide available for a crop under all situations. Therefore, unwise selection of a herbicide may produce harmful effects on crop yield (Khan and Makhdum, 1987). Due to variation in genetic make up of different cultivars, they show different response to the same herbicide (Gill and Bowran, 1990). Time of application of a herbicide has immense importance in controlling the weeds; which are more susceptible to a herbicide at one time than the other (Orr *et al.*, 1993).

The rate of a herbicide application has tremendous significance, because different rates of the same herbicide produce variable results (Angiras and Sharma, 1995). Their activity becomes altered at higher rates and they check plant growth due to the toxic effects (Balyan *et al.*, 1991). To avoid injurious effects of herbicides, their application at proper rates becomes imperative. The present studies were carried out to ascertain the most appropriate doses of two post-emergence herbicides for effective weed control.

### Materials and Methods

Experiment was conducted at University of Agriculture, Faisalabad during 1996-97 in a split plot design using two wheat varieties viz. Inqulab and Pasban, treated with post-emergence herbicides at three different rates, 25 days after sowing the crop. Eight herbicidal treatments, including hand weeding and weedy check, replicated thrice were thried for each variety. Low, medium and high concentrations of herbicides namely logran (Terbutryn + Triasulfuron) and Tolkan (Isoproturon) were sprayed with knap sack sprayer using 50% of recommended rate, recommended rate and 150% of the recommended rate for the above three concentrations, respectively. Logran at 80 g, 160 g and 240 g a.i./ha stood for low, medium and high concentrations, while Tolkan comprised of 625,

1250 and 1875 g a.i./ha for three doses respectively. All other cultural practices were common for various treatments.

Herbicide activity index (HAI) value was calculated from weed population forty days after herbicidal spray. Data for various morphological and yield parameters of wheat were collected and analyzed using analysis of variance technique while Duncan's Multiple Range Test was applied to compare treatment means (Steel and Torrie, 1980).

### Results and Discussion

All the herbicidal treatments applied to wheat crop reduced weed population (Table 1). Herbicide activity index (HAI) values ranged from 66 per cent (lower rates) to 88 per cent (higher rates) showing significant difference for the effectiveness of different doses. Better control of weeds by higher rates of herbicides is a commonly observed fact (Saini and Angiras, 1991). The efficacy of two chemicals seems almost equal for controlling the weeds.

Flag leaf area, number of fertile tillers and ear length were maximum in hand weeding treatment followed by plots treated with recommended rates of herbicides. Minimum vegetative growth corresponded to higher herbicidal doses and weedy check confirming many previous reports (Ahmad *et al.*, 1989).

All the yield components were also influenced significantly by the herbicide application. The highest number of grains was recorded with medium or recommended rates of herbicides and the minimum was noted in weedy check. Similarly 1000-grain weight was significantly affected by herbicides. Plants in hand weeding plots produced the heaviest grains (38.52 g) followed by the plots treated with recommended rates of herbicides. Increase in grain weight by herbicide application confirms several previous findings (Whiting and Richards, 1991). Highest grain yield per hectare by chemical treatment was noted in recommended rates of Tolkan (1377 kg) and Logran (1376 kg) and these were almost equal to that produced with hand weeding (1392 kg). These treatments

Table 1: Effect of different rates of herbicides in wheat crop

	Logran (Terbrotryn + Triasulfuron)			Tolkan (Isoproturon)			Hand Weeding	Weedy check control
	Low	Medium	High	Low	Medium	High		
HA1 value (%)	65.70 <sup>b</sup>	84.15 <sup>a</sup>	88.18 <sup>a</sup>	66.97 <sup>b</sup>	80.77 <sup>a</sup>	86.95 <sup>a</sup>	-	-
Flag leaf area (cm <sup>2</sup> )	10.05 <sup>c</sup>	12.75 <sup>a</sup>	9.97 <sup>c</sup>	11.32 <sup>b</sup>	12.64 <sup>a</sup>	8.81 <sup>d</sup>	12.93 <sup>a</sup>	9.15 <sup>d</sup>
No. of fertile tillers/plant	3.73 <sup>ab</sup>	4.37 <sup>a</sup>	3.30 <sup>b</sup>	3.78 <sup>ab</sup>	3.73 <sup>ab</sup>	3.35 <sup>b</sup>	4.02 <sup>ab</sup>	3.13 <sup>b</sup>
Ear length (cm)	8.27 <sup>d</sup>	9.65 <sup>a</sup>	8.50 <sup>cd</sup>	8.90 <sup>bc</sup>	8.85 <sup>bc</sup>	8.38 <sup>d</sup>	9.18 <sup>b</sup>	8.05 <sup>d</sup>
No. of grains/ear	35.05 <sup>d</sup>	41.25 <sup>b</sup>	34.87 <sup>d</sup>	37.80 <sup>c</sup>	41.37 <sup>b</sup>	33.30 <sup>e</sup>	43.53 <sup>a</sup>	33.28 <sup>e</sup>
1000-grain weight (g)	35.25 <sup>b</sup>	37.80 <sup>a</sup>	30.42 <sup>c</sup>	33.88 <sup>b</sup>	38.45 <sup>a</sup>	39.42 <sup>d</sup>	38.52 <sup>a</sup>	29.63 <sup>d</sup>
Yield/hectare (kg)	1142.00 <sup>b</sup>	1376.00 <sup>a</sup>	1014.00 <sup>c</sup>	1151.00 <sup>b</sup>	1377.00 <sup>a</sup>	980.00 <sup>c</sup>	1392.00 <sup>a</sup>	1008.00 <sup>c</sup>
Increase in grain yield over control (%)	12.97 <sup>b</sup>	37.08 <sup>a</sup>	0.98 <sup>c</sup>	14.29 <sup>b</sup>	37.18 <sup>a</sup>	-2.66 <sup>c</sup>	38.76 <sup>a</sup>	

Low = 50% of recommended dose; Medium = Recommended dose; High = 150% higher to recommended dose

yielded 37.18, 37.08 and 38.76 per cent more grains than weedy check respectively.

Perusal of data on grain yield indicates that treatments can be arranged into three groups; with highest (hand weeding and herbicidal treatments sprayed at recommended rates), medium (plots sprayed with herbicides at low rates) and the lowest yield producing (incorporates high rates of these herbicides and weedy check).

Low rates of herbicides failed to successfully control the weeds and could not cause prominent enhancement in grain yield. High rates decreased weed population at the greatest degree of effectiveness, but yield was not improved due to their detrimental and toxic effects on wheat plants. Medium rates showed good performance and improved grain yield by reducing intensity of weed crop competition without harmful effects on crop. The results confirm the previous findings which indicate that medium rates of herbicides produced better grain yield (Tewari *et al.*, 1993 and Ahuja and Yaduraju, 1989), while higher rates of herbicides have been reported to reduce grain yield of wheat (Hallgren, 1993).

The results of present investigation showed that the two herbicides Logran and Tolkan are equally effective for improvement in wheat yield by controlling weeds; the two varieties exhibited minor and statistically non-significant differences in all the parameters.

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