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# EFFICACY OF DIFFERENT HERBICIDES FOR WEED CONTROL IN WHEAT CROP

**Muhammad Aslam[1], Manzoor Hussain, Ghulam Hussain and Abdul Rashid**

## ABSTRACT

*Studies were carried out to evaluate efficiency and economic effect of different post emergence herbicides on weeds in wheat crop at Regional Agricultural Research Institute, Bahawalpur, Pakistan during 2003-05. The experiment was laid out in Randomized Complete Block (RCBD) design with four replications, with plot size of 8m x 1.2m$^2$. Twelve different herbicides were applied as post emergence Viz: Panther @ 1.98 L ha$^{-1}$, Buctril Super 60 EC @ 0.82 L ha$^{-1}$, Topik15 WP @ 0.26 kg ha$^{-1}$,Logran 750 WG @ 0.26 kg ha$^{-1}$, , Isoproturon 50 WP @ 1.73 kg ha$^{-1}$, Puma Super 75 EW @1.24 L ha$^{-1}$, Pujing 75 EW @ 0.99 L ha$^{-1}$, Itlantus 35 DG @ 3.7+3.7 L ha$^{-1}$, bromaxynil + MCPA @ 1.48 L ha$^{-1}$, Buctril Super + Puma Super @ 0.82 + 1.24 L ha$^{-1}$, Logran + Puma super @ 0.26 +1.24 L ha$^{-1}$ , Topik + Panther @ 0.26+1.98 L ha$^{-1}$ and weedy check.. All herbicides significantly decreased weeds population over weedy check and Panther & Topik+ Panther give best weed control the both Broad Leaf weeds & Grassy Leaf) up to 98% and increased wheat yield by 63 & 59% over control respectively.*

**Key words**: Efficiency, Broad leave herbicides.

## INTRODUCTION

Wheat is an important cereal grain crop of the world. It is staple food of majority of the people and meets the diversified food requirements of both the urban and rural population of Pakistan. During 2004-05, it was grown on an area of 8.216 million ha $^{1}$ with an annual production of 19.5 million tons of grains giving average yield of 2.373 tons ha$^{-1}$ (Anonymous, 2005) which is far below the yield level obtained in other wheat growing countries of the world like Germany (7282 kg ha$^{-1}$), Mexico (4400 kg ha $^{1}$) and Egypt (6251 kg ha$^{-1}$) (FAO, 2000). Although there are many reasons for low productivity of wheat but weed infestation is a basic and major component of low yield in crop production system. In Pakistan, it is estimated that annual losses caused by

[1]Regional Agricultural Research Institute, Bahawalpur, Pakistan

weeds may be more than 10 billions rupees (Ahmad, 1992). Because of the high competitive ability and high reproductive potential of weeds, it is imperative to check their infestation. Weeds compete with the crop plants for nutrients, moisture, space and light. Shad (1987) reported that yield losses due to weed are in proximity of 17-25 percent which terms of wheat grain comes to about 2.43 to 3.57 million tons annually.

The weed control has been practiced since the time immemorial by manual labour and/or animal drawn implements, but these practices were laborious, tiresome and expensive due to increasing cost of labour. The growing mechanization of farm operations and over increasing Labour wages have stimulated interest in the use of chemical weed control. Chemical weed control is the easiest and most successful alternative method. Reports are available on the efficacy of different herbicides in wheat (Khan *et. al.*, 1999; Khan *et al.*, 2001; Khan, *et al.*, 2002; Qureshi *et al.*, 2002). The herbicide use in Pakistan is not widely practiced as in the agriculturally advanced nations. The interest around the testing of graminicides (Walia et al., 1998; Ormenoa and Diaz, 1998) indicates the problem posed by grasses whereas, the studies of Khan *et al.*, (2002) showed synergistic response on combined use. In another studies researchers obtained an effective control of weeds in wheat through chemicals (Khan *et al.*, 2003).

The instant studies were undertaken to find out the most effective and economical herbicide (s) for control of weed in wheat crop.

## MATERIALS AND METHODS

Studies were carried out at the Regional Agricultural Research Institute, Bahawalpur, Pakistan during the year 2003-05. The experiment was laid out in RCBD with four replications. The net plot size was 6 x 1.2m$^2$. The experiment comprised of thirteen treatments of different herbicides (Table-1). All the herbicides were applied as post emergence. Wheat variety Punjnad-I was sown in line 30cm apart with single row hand drill during the last week of November. All the phosphorus & Potash were applied at sowing while nitrogen was applied with I$^{st}$ irrigation. All other agronomic practices were kept normal and uniform for all the treatments. Observation on desired traits i.e weed kill efficiency %age, no. of grain spike$^{-1}$, 1000grain weight and grain yield were obtained.

All the data were individually subjected to the ANOVA techniques by using MSTATC computer Software and means were separated by using LSD test according to Steel and Torrie (1980).

**Table-1. Detail of treatments of herbicides used in wheat experiment.**

| Trade name | Common name | Doses $ha^{-1}$ |
|---|---|---|
| Weedy check | ---------- | ------- |
| Panther 500:50 SC | isoprotuan+diflufenican | 1.98 L |
| Buctril Super 60 EC | bromoxynil +MCPA | 0.82 L |
| Topik 15 WP | clodinafop-propargyl | 0.26 kg |
| Logran 750 WG | traisulfuron+terbutryn | 0.26 kg |
| Isoproturan 50 WP | isoproturan | 1.73 kg |
| Puma Super 75EW | fenoxapronp-p-ethyl | 1.24 L |
| Pujing 75 EW | fenoxprop-p-ethyl | 0.99 L |
| Itlantus 35DG | mesosulfuran methyl + indosulfuran methyl-Sodium | 3.7+3.7 L |
| Bromoxynil +MCPA | bromoxynil +MCPA | 1.48 L |
| Buctril Super+Puma Super | bromoxynil + MCPA)+ fenoxaprop-p-ethyl | 0.82+1.24L |
| Logran+ Puma Super | traisulfuran+terbutryn)+fenoxaprop-p-ethyl | 0.26+1.24 L |
| Topik+Panther | clodinafop-propargyl+isoproturan+ diflufenican | 0.26+1.98 L |

**Table-2. Major weeds emerging in the trial.**

| Common name | Botanical name |
|---|---|
| **Grassy weeds** | |
| Littleseed canarygrass | *Phalaris minor* |
| Wild oats | *Avena fatua* |
| **Broad leaf weeds** | |
| Common lambsquarters | *Chenopodium album* |
| Field bindweed | *Convolvulus arvensis* |
| Nettle leaf goosefoot | *Chenopodium murale* |
| Indian sweetclover | *Melilotus indica* |

## RESULTS AND DISCUSSION

### Weed kill efficiency (%)

The diversity of weed flora in the experiment is presented in Table-2. The flora comprised of both grassy and broadleaf weeds. The data exhibited that maximum weed kill efficiency (98%) of both broadleaf and grassy weeds was recorded in Panther treatment. The results indicated that application of Panther, Buctril Super, Logran Extra, and Isoporturan gave the best mortality % of broad leaved weeds which was 80-98% and Panther, Topik and Puma super prove likewise for control of grassy weeds by giving mortality of 98, 90 & 80%, respectively while combination of herbicides also gave the best weed kill efficiency % (Table-3). The results are in conformity with Khan *et al.*, (2001), Khan *et al.*, (2002), Khan *et al.*, (2003) Khan *et al.*, (1999), Marwat *et al.*, (2003) and Walia *et al.*, (1998).

**Table-3. Weeds count $m^{-2}$ and mortality %age of weeds.**

| Herbicides | Weed count before spray | | Weed count after spray | | %age Mortality | |
|---|---|---|---|---|---|---|
| | B.L† | G.W. | B.L | G.W | B.L. | G.W |
| Weedy check | 164 | 170 | - | | - | - |
| Panther 500:50 SC | 81 | 103 | 2 | 2 | 98 | 98 |
| Buctril Super 60 EC | 92 | 150 | 4 | - | 96 | - |
| Topik 15 WP | 82 | 146 | - | 15 | - | 90 |
| Logran 750 WG | 80 | 141 | 6 | - | 92 | - |
| Isoproturan 50 WP | 138 | 155 | 14 | 108 | 90 | 30 |
| Puma Super 75EW | 98 | 145 | - | - | - | 80 |
| Pujing75 EW | 92 | 127 | 46 | 29 | 50 | 35 |
| Itlantus 35DG | 155 | 118 | 91 | 82 | 41 | 30 |
| Bromoxynil +MCPA | 117 | 164 | 23 | 83 | 80 | - |
| Buctril super+Puma Super | 146 | 140 | 9 | 21 | 94 | 85 |
| Logran +Puma Super | 165 | 145 | 7 | 30 | 96 | 79 |
| Topik + Panther | 95 | 128 | 5 | 3 | 95 | 98 |

† B.L = Broadleaf weeds G.W = Grassy weeds

### No. of grains spike$^{-1}$

No. of grains spike$^{-1}$ is the most important trait contributing to grain yield in wheat. Change in number of grains spike$^{-1}$ drastically influences the ultimate grain yield. The results showed that highest No. of grains spike$^{-1}$ (49.17) were obtained in Panther while the lowest number of grains spike$^{-1}$ (43.8) were found in weedy check (Table-4). All other treatments produced almost similar number of grain spike$^{-1}$. The lowest No. of grains spike$^{-1}$ obtained in weedy check was probably due to weed crop competition, which might have greatly reduced the flow of nutrients towards the No. of grains spike$^{-1}$ at the time of fertilization. The results are in line with Marwat *et al.*, (2003), Khan *et al.*, (2001), Khan *et al.*, (2002) and Khan *et al.*, (2003). They concluded that herbicidal applications produced more grains spike$^{-1}$ than untreated control because weed competition in wheat attributed decreases reduction in number of grain spike$^{-1}$.

**1000 grain weight (g)**

Results indicated that herbicides had significant effect on 1000 grain weight. Panther application produced the highest 1000 grain weight (35.5 g) while weedy check exhibited the lowest (28.6 g) 1000 grain weight (Table-4). The findings are in a great analogy with Khalil *et al.*, (2000) who concluded that broadleaf herbicides significantly increased the 1000 grains weight in wheat.

**Grain yield (kg ha$^{-1}$)**

Analysis of variance of the data depicted that different herbicide had significant effect on grain yield. Table-4 further showed that maximum grain yield 3780 kg ha$^{-1}$ and 1:13.8 CBR was recorded in Panther treatment. It was however, statistically at par with Topik + Panther (3572 kg ha$^{-1}$), Buctril super + Puma super (3488 kg ha$^{-1}$), Topik (3453 kg ha$^{-1}$) and Puma super (3423 kg ha$^{-1}$). Minimum grain yield of only 2291 kg ha$^{-1}$ was obtained in weedy check. The best performance of Panther and other herbicidal applications could be attributed to the best control of weeds due to minimal weed competition which caused an increased flow of nutrients towards the grain and ultimately yield was increased. These results are supported by Khan *et al.*, (2001), Khan *et al.*, (2003) and Marwat *et al.* (2003). They reported that herbicidal treatments significantly increased the grain yield in wheat.

**Table-4. Effect of herbicides on yield & yield components of wheat**

| Herbicides | No. of grains Spike$^{-1}$ | 1000grwt | Grain yield (kg/ha$^{-1}$) | Increase %age | CBR |
|---|---|---|---|---|---|
| Panther | 49.17a | 35.5a | 3780a | 65 | 1:13.8 |
| Topik +Panther | 48.7ab | 35.37ab | 3572ab | 56 | 1:6.1 |
| Buctril super + Puma super | 45.9ab | 33.6abc | 3488ab | 52 | 1:5.9 |
| Topick | 44.53b | 33.9abc | 3453ab | 50 | 1:10.7 |
| Puma super | 44.53b | 33.53abc | 3423ab | 49 | 1:11.6 |
| Logran +Puma Super | 47.6ab | 34.47abc | 3375bc | 47 | 1:6.2 |
| Isoproturon | 43.63b | 32.53bc | 3030cd | 32 | 1:12.9 |
| Pujing | 45.8ab | 32.2c | 3006cd | 31 | 1:10.1 |
| Buctril Super | 43.03b | 32.1c | 2827b | 23 | 1:6.14 |
| Itlantus | 43.13b | 32.84c | 2804b | 22 | 1:4.3 |
| Bromaxynil + MCPA | 43.33b | 32.43c | 2738d | 20 | 1:8.8 |
| Logran | 44.87b | 32.37c | 2726d | 19 | 1:5.3 |
| Weed check | 43.8d | 28.6d | 2291e | | |
| LSD | 5.9 | 2.56 | 353.2 | | |
| CV | 7.9 | 4.6 | 8.01 | | |

## CONCLUSION

The herbicide like Panther (isoproturan + deflufenican) could effectively kill both grassy weed and broad weed leaf weeds. Consequent upon the reduced infestation of weeds, maximum grain yield was harvested in the treatment under reference. However, the economic appraisal revealed the herbicide Panther @ 2 liter ha$^{-1}$ applied alone as the best herbicide used as post emergence to control weeds in wheat. It gave highest economic return of 1:14 followed by Isoproturan and Puma super which also gave a close economic efficiency of 1:13 and 1:12 respectively (Table-4).

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