

Efficacy of Different Methods of Weed Control in Wheat

Muhammad Sarwar Cheema*, Muhammad Afzal*, Muhammad Saleem Ahmad** and Muhammad Aslam*

ABSTRACT

Efficacy of different methods of weed control in wheat was worked out on sandy clay loam soil of Agricultural Research Station, Bahawalpur, during 1984-85 and 1985-86. Different methods tried were weed-free, hoeing, bar harrowing, mulching, cross sowing at 150 or 200 kg seed/ha in row width of 23 and 15cm and herbicides viz. Pendimethalin [N-(1-ethylpropyl) 3, 4-dimethyl-2, 6-dinitrobenzenamine] 1.32 kg ai/ha pre-emergence, Isoproturon [3-(4-isopropyl Phenyl)-1, 1-dimethyl urea] 1 kg ai/ha post-emergence sprayed and broad cast with sand and Chlortoluron [N-(3, chloro-4 methyl phenyl)-N-N-dimethyl urea] 1.5 kg ai/ha post-emergence sprayed and broadcast with sand, were compared with unweeded check. All the weed control methods significantly increased grain yield as compared to unweeded check. Chlortoluron 1.5 kg ai/ha post-emergence, Isoproturon at 1 kg ai/ha post-emergence and cross sowing at 150 kg of wheat seed in 23cm rows controlled weeds most effectively and produced significantly higher grain yield than all other methods of weed control and were comparable with those of

weed-free conditions. Broadcast application of both the herbicides, although was less effective than spray, yet produced grain yield equal to Pendimethalin at 1.32 kg ai/ha pre-emergence and weed-free treatment.

Hoeing after first Irrigation, proved inferior to herbicides or weed-free treatments but was superior to mulching or bar harrowing. Cross sowing at 150 kg wheat seed in 23 cm rows proved one of the cheapest and useful methods of weed control which gave the highest cost: benefit ratio (1:13), followed by bar harrowing by giving 1:9.26. Application of herbicides Isoproturon at 1 kg ai/ha (post-emergence) and chlortoluron 1.5 kg ai/ha (post-emergence) by sprayer gave cost benefit ratio of 1:4.26 and 1:3.84, respectively, which were superior to their sand mix broadcast application. Hoeing gave a cost benefit ratio of 1:1.84 only. Income from weed-free treatment was even less than the relative cost of weeding.

INTRODUCTION

Weeds cause a serious problems in crop production. In traditional agricultural, weeds are kept under control by cultural practices; with hand weeding becoming costly, together with increased fertilizer use, magnitude of weed problem have increased and yield reductions of 20 to 30 percent are quite common.

The use of herbicides is becoming popular in some parts of our country but majority of the farmers still depend upon cultural practices for weed control and are unaware of the losses caused by weeds, and latest weed control technology. Bhan

*Agricultural Research Station, Bahawalpur.

**Agricultural Research Station, Karachi.

et al., (1982) reported that increasing seed rate did not reduce the weed density, however cross-sowing significantly reduced the dry weight of weeds and increased the grain yield. Also isoproturon increased the yield significantly as compared with untreated plots. Balyan *et al.* (1983) stated that methabenzthiazuron products applied post-emergence gave very effective control of *Phalaris minor* and *Avena ludoviciana* and also controlled *Chenopodium album* and other weeds. The highest grain yield were obtained with 1.4-1.8 kg/ha methabenzthiazuron applied post-emergence. Choudry *et al.* (1982) worked out the cost: benefit ratio of herbicides for the control of *Phalaris minor* (Retz.) and other weeds and got a higher cost: benefit ratio with isoproturon than methabenzthiazuron which was superior to metoxuron.

Dhiman and Kairon, (1982) reported that isoproturon application, sowing in narrow rows and hand-weeding or inter row cultivation, increased grain yield of wheat by 23 percent over the unweeded control and decreased dry matter by 44-79 percent.

Dalip and Sharma, (1983) stated that in wheat grown after rice methabenzthiazuron and isoproturon, applied pre-emergence and post-emergence, were equally effective against *Phalaris minor* and broad-leaved weeds. Metoxuron (post-emergence) was superior to its pre-emergence application against these weeds. Yield losses due to weeds, reported by Hepworth (1979) were 15-50 percent and 15-25 percent respectively. However, yield increased by 36.6, 33.0 and 34.8 percent by controlling weeds with the use of isoproturon, metoxuron and methabenzthiazuron, respectively.

Majid and Hussain (1983) worked out the effectiveness of Chlortoluron, Pendi-

methalin, bromoxynil + MCPA, MCPA-thioethyl and hand weeding on the growth and yield of wheat and found that Chlortoluron provided the best weed control (96.8 percent) and the highest grain yield of 3.4 tons per hectare was obtained.

MATERIALS AND METHODS

These studies were carried out at the Agricultural Research Station, Bahawalpur, during 1984-85 and 1985-86, the experiment was laid out in Randomized complete block design with three replications. The net plot size was 5x1.8 meters. The variety under test was 'Punjab-81'. The crop was sown in the fourth week of November during both the years. The agronomic practices were normal and those usually adopted by the farmers. Weed spectrum studies were made and post-emergence herbicides were applied after first irrigation when soil was in good moisture and crop was 3-4 leaf stage (35-40 days after sowing) while pendimethalin was applied pre-emergence just after sowing of wheat. Hoeing and bar harrowing twice were applied after first irrigation in proper moisture condition. In mulching treatment, rice straw was spread evenly in between the wheat rows. All the sowing and cross sowing operations were carried out by single row hand drill. Weed-free conditions were maintained by repeated hand weeding. In working out the cost benefit ratio of weed control methods, costs associated with inputs like fertilizer and irrigations required to raise a successful crop were kept constant. The economics of weed control was worked out on the basis of variable costs associated with different treatments on the basis of prevailing market rates. Different treatments under study were:

- T1 = Un weeded check
- T2 = Weed-free
- T3 = Bar harrowing (twice)
- T4 = Hoeing after first irrigation
- T5 = Mulching
- T6 = Cross sowing at 150 kg seed/ha, 23cm rows
- T7 = Cross sowing at 200 kg seed/ha, 15cm rows
- T8 = Pendimethalin 1.32 kg ai/ha (pre-emergence)
- T9 = Isoproturon at 1 kg ai/ha (post-emergence)
- T10 = Isoproturon at 1 kg ai/ha (broadcast with sand)
- T11 = Chlortoluron + MCPA at 1.5 kg ai/ha (post-emergence sprayed)
- T12 = Chlortoluron + MCPA at 1.5 kg ai/ha (post-emergence broadcast with sand)

The data regarding yield and yield components were recorded and analysed statistically by the Analysis of Variance method and Duncan's New Multiple Range Test at 5 percent probability level was applied to test the significance of treatment means Le Clerg *et. al.* (1962).

RESULTS AND DISCUSSION

The weeds infestation percentage data revealed that the infestation of grass weeds was 40-46 percent and rest were broad leaved weeds (Table 1).

The data on yield and its components (Table 2) revealed that all weed control methods significantly increased the grain yield and yield components as compared to unweeded check. The data revealed that chlortoluron at 1.5 kg ai/ha (post-emergence sprayed), cross sowing at 150 kg seed/ha in 23cm rows most effectively controlled the weeds and increased the grain yield (39-40%), statistically equal to weed-free treatment. All the method of

weed control significantly increased the grain yield as compared to unweeded check. Chlortoluron and Isoproturon 1.0 kg ai/ha post-emergence (mixture of herbicide with sand) applied after first irrigation in a good moisture condition, although produced grain yields equal to Pendimethalin at 1.32 kg ai/ha pre-emergence and were at par with weed-free treatments yet broadcast application of these herbicides was less effective than spray (Table 3). Results are in agreement with those of Bhan *et. al.* (1982) Balyan *et. al.* (1983), Dhimon and Kairon (1982) Dalip and Sharma (1982), Hepworth (1979) and Majid Hussain (1962).

Cost benefit ratio of different weed control methods given in Table 3 revealed that cross sowing at 150 kg wheat seed in 23cm rows provide to be the cheapest and most useful method of weed control, followed by bar harrowing. Application of herbicides Isoproturon at 1 kg ai/ha (post-emergence) and chlortoluron at 1.5 kg ai/ha (post-emergence) gave a cost benefit ratio of 1:4.26 and 1:3.84, respectively, which were superior to their broadcast application (mixture of herbicides with sand applied after first irrigation in a good moisture condition). Hoeing gave a cost benefit ratio of (1:1.84) only. Income in weed-free treatment was even less than the relative cost of weeding. Results are in accordance with those of Choudhry *et. al.* (1982).

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Table 1. Weeds and their Infestation Percentages in wheat field

Technical Name	Local Name	Infestation Percentage	
		1984-85	1985-86
<i>Phalaris minor</i> (Retz.)	Dumhi grass	46	40
<i>Chenopodium album</i> (Linn.)	Bathu	13	15
<i>Chenopodium murale</i> (L.)	Karund	15	20
<i>Coronopus didymus</i> (L.)	langhi Haloon	6	8
Other weeds	—	20	17

Table 2. Effect of Different Methods of Weed Control on Yield and Yield Components of Wheat (Punjab 81) During 1984-86

Treatments	Yield in kg/ha	Spikes m ²	Grain spike	1000 grain wt. (mg)
Unweeded check	2991 e	250 e	32 b	38.0 b
Weed free	4093 ab	400 a	36 a	44.0 a
Bar harrowing (twice)	3537 d	295 b	36 a	43.6 a
Hoeing after first irrigation	3752 c	310 b	38 a	43.5 a
Mulching	3609 d	284 b	36 a	44.0 a
Crop competition (cross sowing 150 kg/ha of seed 23cm rows)	4168 a	426 a	37 a	43.5 a
Crop competition (cross sowing 200 kg/ha of seed 15cm rows)	3645 cd	445 a	32 b	38.5 b
Pendimethalin 1.32 kg ai/ha pre-emergence	4012 b	395 a	37 a	43.5 a
Isoproturon 1.0 kg ai/ha (sprayed) post-emergence	4152 a	412 a	39 a	42.2 a
Isoproturon 1.0 kg ai/ha broadcast with sand)	4019 b	395 a	38 a	43.5 a
Chlortoluron + MCPA 1.5 kg ai/ha post-emergence (sprayed)	4176 a	415 a	38 a	43.5 a
Chlortoluron + MCPA 1.5 kg ai/ha post-emergence (broadcast with sand)	4012 b	400 a	37 a	43.5 a
Mean	3847	376	36	42.6
0.05 LSD	108.37	52.4	3.1	2.8

Figures followed by the same letter are not significantly different using DMR test at 5% probability level.

Table 3. Cost benefit ratio of different weed control methods during 1984-86.

Treatment	Yield in kg	Income in Rs.	Cost/treatment in Rs.	Net benefit in Rs.	Cost benefit ratio
Unweeded check	2991	5907	—	5907	—
Weed free	4093	8084	1140	6944	1.0.91
Bar harrowing (twice)	3537	7959	200	7759	1.9.26
Hoeing after first irrigation	3732	6986	380	6606	1.1.84
Mulching	3609	7128	290	6838	1.3.21
Crop competition (cross sowing 150 kg/ha seed in 23cm rows)	4168	8232	166	8066	1.13.00
Crop competition (cross sowing 200 kg/ha seed in 15cm rows)	3645	7199	292	6907	1.3.42
Pendimethalin 1.32 kg/ha pre-emergence	4012	7924	623	7301	1.2.24
Isoproturon 1.0 kg ai/ha (sprayed) post-emergence	4152	8200	436	7764	1.4.26
Isoproturon 1 kg ai/ha (Broadcast with sand) post-emergence	4019	7938	411	7527	1.3.94
Chlorotoluron 1.5 kg ai/ha (sprayed) post-emergence	4176	8248	484	7765	1.5.84
Chlorotoluron 1.5 kg ai/ha (broadcast with sand)	4012	7924	461	7464	1.3.38

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