

## Efficiency of Chemical and Manual Weed Control Methods in Wheat and Correlations of Weed Populations to Grain Yield

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### ABSTRACT

An experiment was conducted at students Farm of Sind Agriculture University Tandojam during 1981 to evaluate the effect of chemical and mechanical weed control on wheat crop. The experiment was laid out in Randomized Complete Block Design with four replications and ten weed control treatments. The results revealed that the ioxynil (Actril-D) and 2, 4-D (2,4-D ester) provided excellent control (73%) of weeds, followed by bromoxynil + MCPA (Buctril-M) and chlortoluron + MCPA (Dicuron-MA) which gave 68 and 65 percent control respectively. Hand weeding after second and third irrigation eliminated 65 and 67% weeds respectively, as compared to weeding once after first irrigation (51% weed control). Highest yield (3330 Kg/ha) was obtained from plots hand weeded upto third irrigation followed by 3260 Kg/ha obtained from treatment weeded after second irrigation. Among the chemical weed control treatments bromoxynil + MCPA (Buctril-M) gave highest yield (2820 Kg/ha) followed by ioxynil (Actril-D) and 2,4-D (2,4-D ester) which recorded similar yields (2630 Kg/ha).

### INTRODUCTION

The average yield of wheat in Pakistan is very low as compared to

other countries. The reasons for low yield may be attributed to many factors and one of the most important is the competition of weeds with the crop. The weeds compete with crop for soil moisture, nutrients, light, space, carbon-dioxide and other requirements of growth and thus hamper growth and ultimately reduce the yield.

Control of weeds in wheat through mechanical method is difficult as wheat is close sown crop and any such practice may cause sufficient damage to the crop. Weed control by chemicals is easy, less expensive and time saving as large area can be commanded in smaller unit of time. Gautam and Mani (1975) concluded that a pre-emergence application of Tribunil at 1.4 Kg/ha brought about a satisfactory weed control and boosted the grain yield by 2.7 per cent over weedy check. Makhdoom and Shah (1976) found that the grain yield of wheat was enhanced by the use of weedicides to the tune of 50 per cent. Gowda and Siddapa (1980) recorded highest wheat grain yield by hand weeding and also significantly higher by the application of TOK-25 (nitrofen) and Tribunil (methabenzthiazurn). Ahmed et al. (1984) claimed good control of wheat weeds and significantly higher grain yield with the post emergence application of Dicuran-MA applied at the rate of 2.25 Kg per hectare. Present study on weed control in wheat was carried out with an object of finding out the efficiency of various mechanical and chemical weed control methods in wheat crop.

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## MATERIALS AND METHODS

An experiment was conducted on chemical and mechanical weed control methods in wheat. The plot size was 2.5 x 5.0 meters. A Randomized Complete Block Design was used having ten treatments and four replications. A detailed description of the treatments is as under:

### TREATMENTS

T<sub>1</sub> - Methabenzthiazuron (Tribunil 70% V/W) 7.50 Kg/ha(Product).

T<sub>2</sub> - Isoproturon (Arelon 75% V/W) 8.0 Pints (Product).

T<sub>3</sub> - Bromoxynil-MCPA (Buctril-M 40% V/W) 1.40 l/ha (Product).

T<sub>4</sub> - Chlortoluron + MCPA (Dicuran - MA 60% V/W) 2.50 Kg/ha (Product).

T<sub>5</sub> - Ioxynil (Actril-D 35% V/W) 2.50 Kg/ha (Product).

T<sub>6</sub> - 2,4-D (2,4-D ester 70% V/W) 3.75 lb/ha (Product).

T<sub>7</sub> - Hand weeding after first irrigation.

T<sub>8</sub> - Hand weeding after second irrigation.

T<sub>9</sub> - Hand weeding upto third irrigation.

T<sub>10</sub> - Control (Untreated).

Land was prepared as per recommendations by the Department of Agronomy. More emphasis was given on the levelling of land to apply the irrigation uniformly. The wheat variety Sonalika was sown by drilling method

at the rate of 125 Kg per hectare, the spacing between row to row was 25 centimeters. The fertilizer (DAP) at the rate of 125 Kg per hectare was applied as a basal application incorporated into the soil before sowing the seeds. The remaining amount of nitrogen, (as 150 Kg nitrogen per hectare) as Urea was top dressed on first and second irrigation. Mechanical weeding of the crop was done after first irrigation, second irrigation and third irrigation according to different treatments.

Herbicides were applied 35 days after sowing of wheat crop, after first irrigation. Before spraying, the herbicides were thoroughly mixed with water in separate container to get uniform delivery. Weeds present in experimental area were recorded before the application of the chemicals and hand weedings. In both the cases treatments were applied after the first irrigation (thirty five days after sowing) when the wheat crop was at 4 - 5 leaf stage.

Data on weed survival were recorded by counting the weeds present in the crop 15 days after application of chemical and mechanical treatments.

## RESULTS AND DISCUSSION

### WEEDS SPECIES

In all ten weeds species were found infesting wheat crop and are given in table-1 in order of their occurrence. Among the weeds recorded, Jhil (*Chenopodium album* Linn) had the highest intensity of occurrence i.e. 32.95 per cent, followed by Naro (*Convolvulus arvensis* L) with 25.35 per cent infestation which indicate that these two weeds are the most common weeds of the wheat crop in this area. Other

Table 1. Weeds infesting wheat crop

1. No	Local Name	English Name	Botanical Name	Infestation per cent
1.	Jhal	Lambs Quarters	<i>Chenopodium album</i> Linn.	32.94
2.	Naro	Field Bind Weed	<i>Convolvulus arvensis</i> L.	25.33
3.	Chhabar	Bermuda grass	<i>Cynodon dactylon</i> Pers.	9.03
4.	Billi Buti	Scarlet pimpernal	<i>Anagallis arvensis</i> L.	8.85
5.	Sinjh	Honey Clover (White)	<i>Melilotus alba</i> Desf.	7.18
6.	Matri	Milk Vetch	<i>Vicia hirsuta</i> (Gray Fish)	6.87
7.	Kabah	Nut sedge	<i>Cyperus rotundus</i> L.	4.48
8.	Halon		<i>Lupidium sativum</i>	4.97
9.	Ilsi	Linseed	<i>Linum usitatissimum</i> L.	1.07
10.	Piazi	Wild onion	<i>Asphodelus tenuifolius</i> Cav.	0.18

weed population comprised of Chhabar (*Cynodon dactylon* Pers) (9.03 per cent), Billi buti (*Anagallis arvensis* L.) 8.58 Sinjhi (*Melilotus alba* Desf.) (7.18 per cent), kabah (*Cyperus rotundus* L) (4.48 per cent) and Piazi (*Asphodelus tenuifolius* Cav.) (0.18 per cent).

The effect of chemical and hand weeding treatments on weeds is given in table-2. The results revealed that the ioxynil (Actril-D) and 2,4-D ester provided excellent control of weeds as compared to other chemical treatments. Both these chemicals gave 73 per cent control of weeds. Bucril-M (bromoxynil + MCPA) and Dicuran-MA (chlortoluron + MCPA) also showed high toxicity to weeds and gave 68 and 65 per cent control respectively. the effect of Arelon (isoproturon) was 44.50 percent whereas, Tribunil (methabenzthizuron) showed minimum effect on weeds i.e. 15 percent weed kill only.

In case of hand weeding treatments after second and upto third irrigation 65 per cent and 67 per cent weeds respectively were eliminated, compared to weeding once after first irrigation. In this case 51 per cent weed control was achieved. Almost all the treatments gave slightly increased number of weeds per meter at final counting (60 days after weedicide application) which showed that emergence or resprouting of weeds continued throughout the growth period of crop.

#### GRAIN YIELD

The yield in Kg per hectare as affected by various chemical and hand weeding treatments is presented in table-2. The results indicated that maximum grain yield of 3330 Kg per hectare was obtained from the plots where the hand weeding upto third irrigation was done followed by 3260 Kg per hectare from the plots hand weeded

after second irrigation. Among the herbicide treatments application of Buctril-M (bromoxynil + MCPA) gave the highest yield of 2820 Kg per hectare. The yield obtained from Ioxynil (Actril-D) and 2,4-D (ester) was same i.e. 2630 Kg per hectare. Yield recorded from Tribunil (methabenzthiazuron), Arelon (isoproturon) and Dicuran-MA (chlortoluron) was quite unsatisfactory because of inadequate weed control and crop toxicity. All these three treatments gave even less yield than weedy check.

#### CORRELATION CO-EFFICIENTS BETWEEN NUMBER OF WEEDS AND GRAIN YIELD

Simple correlation co-efficients between number of weeds and grain yield under different treatments are presented in table-3. The perusal of data indicated that correlation co-efficients for grain yield and number of weeds in

all three comparisons were significant. These indicate that the yield decreased with increase in weed population and vice versa. However, the rate of increase in yield varies for different control methods. The regression equation relation ship  $Y = a + bx$  indicated that for each unit change in number of weeds, there is corresponding change in grain yield of wheat.

It could be seen from figures 1-3 that in case of chemical control, the increase in yield for a unit decrease in weed population is 0.0036 Kg per hectare, for chemical and hand weeding treatments the increase is 0.0043 Kg per hectare whereas for mechanical control the increase in yield is 0.0045. The over all results revealed that due to elimination of weeds by any method there is a definite increase in grain yield. However, these results favour weed control by hand weeding method.

Table 2. Effect of chemical and mechanical control on weeds.

Treatments	Number of weeds per square Meter		Weed Control (percent)	Grain Yield/ha kg
	Before Application	15 days after application.		
Actril-D (Ioxynil)	45.0	12.40	73.40	2630 a
Buctril-M (Bromoxynil + MCPA)	31.2	10.00	68.00	2820 a
Arelon (Isoproturon)	42.8	24.20	44.00	1916 b
Dicuran MA (Chlortoluran + MCPA)	38.6	15.60	65.00	2010 b
Tribunil (Methabenzthiazuron)	36.8	31.20	15.00	894 c
2,4-D (2,4-D ester)	48.4	13.20	73.00	2630 a
Weeding after first irrigation.	62.2	30.40	51.00	2740 a
Weeding after 2nd irrigation.	70.0	20.00	65.00	3260 a
Weeding upto 3rd irrigation	42.0	14.00	67.00	3330 a
Control (unweeded)	31.6	42.00		2028 b

**Table 3. Correlation co-efficeint between weed control, chemical weed control, mechanical weed control and grain yield of wheat crop.**

Treatments	Regression Equation		
Control (Overall)	Y	4.183 - 0.0043	0.649**
Chemical Control	Y	3.588 - 0.0036	0.680**
Mechanical Control	Y	5.071 - 0.0045	0.989**

## CHEMICAL AND MECHANICAL CONTROL

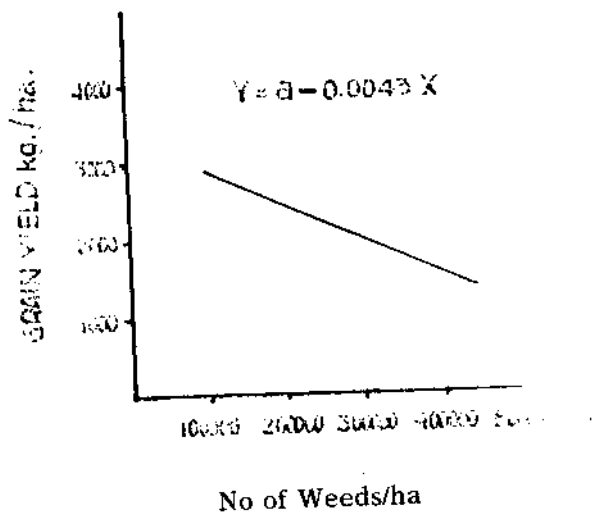
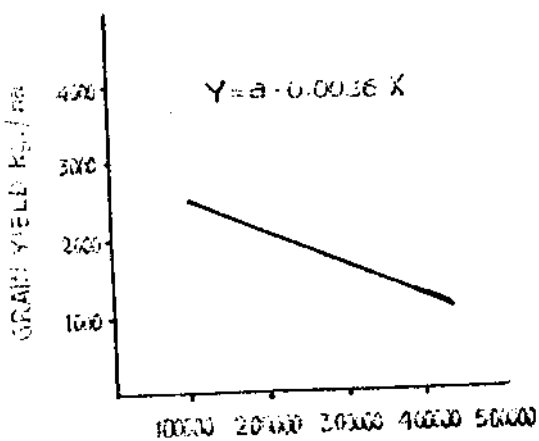
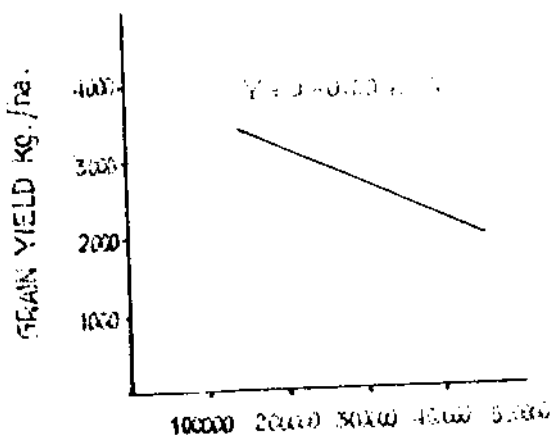


Fig. 1

### CHEMICAL CONTROL



### MECHANICAL CONTROL



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