

## EFFICIENCY OF VARIOUS WEED MANAGEMENT PRACTICES IN WHEAT

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### ABSTRACT

*An experiment was conducted to study the efficiency of various weed management practices in wheat at Plant Physiology Section, Agricultural Research Institute, Tandojam. The results revealed that broad leaved weeds were predominantly present in the experimental area. The weed species like *Chenopodium album* and *Convolvulus arvensis* had maximum intensity of 31.98 and 31.02 %, respectively. Weeds were controlled in all the treatments except planting patterns where weed population was increased but biomass was decreased as compared to weedy check. Results indicated that the treatments had highly significant effects on plant height, tillers m<sup>-2</sup>, grain weight and grain yield, whereas number of grains were significantly affected by different weed management practices. Buctril-M alone gave the maximum increase in all the parameters studied. Whereas skip row sowing gave the minimum increase. The highest (85.47%) weed control was recorded under hand weeding for full season and it was statistically at par with Buctril M 40 EC alone and its combination with different planting geometries. Consequently the top scorers out yielded rest of the treatments included in the studies. The response of different planting geometries alone was not very promising, however.*

**Keywords:** Herbicide efficiency, weed management practices, wheat yield, *Triticum aestivum*

### INTRODUCTION

Wheat (*Triticum aestivum* L.) is the most widely grown cereal grain crop in the world, except in the rice eating regions of Asia. Wheat products are the principal cereal foods of an overwhelming majority of the world's inhabitants. Wheat has great adaptability to a wide variety of soil and climatic conditions. But, the important wheat growing areas of the world are located in temperate zones. Wheat is occupying an important position in the economy of Pakistan. A better progress has been made in increasing the per acre yield of wheat in the country during the last few years. But, still Pakistan has a low yield as compared to advanced wheat growing countries. The reasons for low yield are many, but one of the most serious but less noticeable cause of the low yield is the presence of weeds. The crop in Pakistan suffers on the average, losses to the extent of 10 % due to weeds (Ahmad, 1967). The main reason is using of lower input cost by the farmers. However, for increasing per acre

yield of wheat, use of high yielding varieties and improved cultural practices are two main dominant factors. Frisen and Kanwar (1980) suggested that the crop yields could not be increased without integrated weed management system.

Weed management involves various methods to check the weeds below economic injury level. Weeds can be controlled by manual, cultural and chemical methods. According to reports, the 50% of the farmers in wheat growing areas of India, used a combination of manual and chemical control of weeds (Zahir and Gupta, 1981). But the best method is the one which combines all these activities and should be cheap, effective and easy to adopt and finally helpful in increasing crop yield. For weed management, planting patterns such as row spacing: close row, cross row and skip row, and weed control by hand integrated with chemical weed control play an important role in checking weeds. Sharma et al (1985) reported that application of isoproturon at the rate of 0.5 kg/ha in combination with cross row sowing and closer spaced rows (15 cm) reduced the weed competition and resulted in positive advantage in yield attributes and increased grain yield.

Jarwar et al (1999) observed that chemical weed control method is also effective along with cultural methods of weed control. However, a combination of chemical, cultural and hand weed control methods was more effective in controlling weeds than their isolated applications (Rao, 1983). While, Shabir (1990) found that hand weeding treatment gave the maximum increase in the yield of wheat, whereas skip row sowing gave the lowest yield.

There is no much work on integrated weed management done in Sindh, hence the present studies were initiated to determine the effect of chemical, cultural and mechanical methods of weed control on grain yield of wheat crop.

## **MATERIALS AND METHODS**

The study was conducted at experimental field of Plant Physiology Section, Agriculture Research Institute, Tandojam, to determine the efficiency of various weed management practices in wheat during rabi season 1999-2000. The experiment was laid out in randomized complete block design with four replications. The plot size was kept at 8.78 x 9.39 m<sup>2</sup>.

The land was prepared by two cross plowings with mould board plow followed by levelling. After applying soaking irrigation when soil came into 'wattar' condition, two cross plowings with rotavator were done for the fine seedbed preparation. Wheat variety Tandojam-83 was sown by different sowing patterns as per treatments under study with single row hand drill on November 26, 1999. The seed rate of 125 kg/ha was used for sowing of wheat. The NP fertilizer dose of 137-67-0 (kg ha<sup>-1</sup>) was applied at the time of sowing and first irrigation.

The irrigation was applied at different growth stages of wheat viz: crown root initiation, tillering, flowering, anthesis, milky and dough stages. All other cultural practices were kept normal and uniform for all the experimental units. The treatments under study included hand weed control for full season, Buctril-M at 1.25 L ha<sup>-1</sup>, close row sowing (15 cm) + Buctril-M at 1 L ha<sup>-1</sup>, cross row sowing + Buctril-M at 1 L ha<sup>-1</sup>, skip row sowing + Buctril-M at 1 L ha<sup>-1</sup>, close row sowing (15 cm apart), skip row sowing (every 5<sup>th</sup> row missing), cross row sowing (both way), and weedy check for full season.

The herbicide Buctril-M 40 EC was sprayed after first irrigation under moist conditions at 3-5 leaf stage of wheat. A knap sack hand sprayer (solo type) with T. jet nozzle and spray volume of 300 L ha<sup>-1</sup> was used.

The standard procedures were followed to collect the data on various weed and wheat plant parameters. Weed density was recorded from each treatment before application of herbicide and weed intensity was calculated on the basis of weed density m<sup>-2</sup> and density of total weeds. Weed population was recorded from one square meter, randomly selected from individual plots one day before weedicide application and also 30 days after the spray of weedicide. The data were subjected to statistical analysis according to the experimental design. The test of significance was applied where it was necessary, following the procedures as outlined by Gomez and Gomez (1984).

## RESULTS AND DISCUSSION

### Weed Infestation Intensity (%)

The results presented in Table-1 showed infestation intensities of broad leaved weeds, grasses and sedges. The results indicated the broad leaved weed had more intensity than grassy weeds, whereas weed species *Chenopodium album* and *Convolvulus arvensis* had the highest intensity of 31.98 % and 31.02 %, respectively. Among the grasses and sedges, *Phalaris minor* and *Cyperus rotundus* had the maximum intensities of 5.43 and 4.27 %, respectively.

The weeds were present in the experiment on an average of total weeds, which is 69.18 m<sup>2</sup>. Present results are in accordance with the results of Zahir and Gupta (1981), who suggested the combination of mechanical and chemical methods for the control of weeds. However such weeds were controlled by different methods including manual, cultural and chemical.

### Weed Control Percent

The effect of various weed management practices and its control percent is presented in Table-2. Results revealed that all the weed management treatments controlled the weeds ranging from 48.61 to 85.47%. While in planting patterns the weed population decreased from 17.71 to 13.38%. However, the lowest (-48.61%) weed control was recorded in close row sowing pattern, combined with herbicide Buctril-M 40 EC (at 1 L ha<sup>-1</sup>). The maximum (+85.47%) weed control was obtained in the hand weed control during full season.

Buctril-M 40 EC alone gave, -60.85 % weed control, but when combined with different planting patterns such as close row sowing, cross row sowing and skip row sowing, the weed control efficiency from 48.61% to 64.33% and -67.00%, respectively. The reason for low response of weed control under close row combined with Buctril-M 40 EC could be due to population of both weed and wheat crop. It was observed that weed population increased in cross row sowing as compared to the weedy check to these of + 7.71%, + 8.48 % and +13.38% in cross, close and skip row sowing, respectively. Present findings are supported by the work of Sharma et al (1985) and Gajendara et al (1994) who concluded that cross, row sowing, close spaced rows reduced the weed competition and increased yield attributes positively.

### ***Growth and Yield Characters***

The data regarding different yield and its components as affected by various weed management practices are presented in Table-3. The data showed that highest (82.70 cm) plant height was recorded in Buctril-M 40 EC alone followed by the treatment cross row sowing with Buctril-M 40 EC with 82.40 cm having maximum (13.52%) increase over weedy check. Weedy check treatment gave maximum plant height of only 72.85 cm. The close row sowing combined with Buctril-M 40 EC increased the plant height up to 13.10 % over weedy check.

The results indicated that mean number of tiller/m<sup>2</sup> ranged from 202.00 to 248.00. the highest (248.00) number of tillers/m<sup>2</sup> were obtained in the treatment where weedicide Buctril-M 40 EC was applied alone. This increase was the highest among all the treatments and amounted to 22.77 % over the weedy check. Whereas a decrease of 2.59 % was recorded in skip row over the weedy check. Jarwar et al, (1999) observed that use of weedicides can increase the yield parameters and decrease the weed population.

The results for grain number/spike revealed that mean number of grains per spike increased in all treatments from 0.29 % to 11.97 %. The highest (56.10) mean number of grains per spike were recorded under chemical treatment with the use of Buctril-M 40 EC alone at 1.25 L ha<sup>-1</sup>, followed by other cultural treatments. Whereas lowest (50.25) mean number of grains/spike were obtained in skip row sowing as compared to weedy check for full season. It was also observed that the combined application with various planting patterns of weedicide Buctril-M 40 EC treatment were better than their isolated application. These results are in accordance with the findings of Ahmad (1967) and Shabir (1990) who concluded that hand weeding gave maximum increase in yield of wheat, whereas skip row sowing gave the lowest yield.

The maximum (31.79%) increase of mean grain weight per spike over weedy check for full season was recorded in Buctril-M 40 EC alone, followed by the cross row sowing combined with Buctril-M (27.46%) and hand control for full season (22.79%).

The grain yield is an important attribute for maximizing the per acre production of wheat. Results revealed that grain yield ranged from 2365.35 to 4063.55 kg ha<sup>-1</sup> under weedy check for full season and Buctril-M 40 EC alone showing an increase of 71.79 %. The skip row sowing pattern produced the lowest grain yield of only 2486.65 kg ha<sup>-1</sup>. It was however, statistically at par with the weedy check (2365.25), close (2698.92) and cross row (3062.82) spacing alone. The integration of planting geometry and Buctril-M 40 EC produced statistically comparable yield with the Buctril alone and hand weeding (3760.27). In the top treatments the increase was registered from 34.62 to 71.79 % over the weedy check (Table-3). These results are in conformity with the findings of Abbasi and Makhdoom (1984) who reported that wheat grain yield can be increased up to 62-78% by controlling weeds.

It is concluded from the present results that herbicide Buctril-M 40 EC @ 1.25 L. ha<sup>-1</sup> alone is conducive for the highest yield and statistically equal to manual hand weeding, combined method (along with planting pattern and herbicides Buctril-M 40 EC), gave the better performance for the control of weeds in wheat crop.

**Table-1. Average weed density and intensity before treatment application**

Weed species present	Density %/m <sup>2</sup>	Intensity %
<i>Chenopodium album</i>	22.13	31.98
<i>Convolvulus arvensis</i>	21.46	31.02
<i>Melilotus alba</i>	12.43	17.76
<i>Anagallis arvensis</i>	2.60	3.75
<i>Rumex dentatus</i>	1.58	2.28
<i>Phalaris minor</i>	3.76	5.43
<i>Cynodon dactylon</i>	1.27	1.83
<i>Cynodon dactylon</i>	0.44	0.63
<i>Cyperus rotundus</i>	2.96	4.27
<i>Asphodelus tenuifolius</i>	0.55	0.79
Average	69.18	---

**Table-2. Effect of various weed management practices on weed control in wheat**

	Weeds present	Weeds	Percentage
Hand weed control full season	60.25	8.75	-85.47
Buctril-M (a 1.25 L. ha <sup>-1</sup> alone	58.75	23.00	-48.61
Close row sowing + Buctril-M (a 1.00 L. ha <sup>-1</sup>	65.25	27.75	-48.61
Cross row sowing + Buctril-M (a 1.00 lit/ha	71.50	25.50	-64.33
Skip row sowing + Buctril-M (a 1.00 lit/ha	74.25	24.50	-67.00
Close row sowing alone	70.75	76.75	-8.48
Skip row sowing alone	71.00	80.50	+13.38
Cross row sowing alone	71.25	76.75	-7.71
Weedy check for full season	80.50	95.75	---

**Table-3. Effect of Various Weed Management Practices on Growth and Yield Characters of Wheat**

Treatments	Plant height (cm)	%increase over weedy check	Tillers/m <sup>2</sup>	% increase over weedy check	Grains/spike	% increase over weedy check	Grain weight/ear (g)	% increase over weedy check	Grain yield (kg/ha)	% increase over weedy check
Hand weed control full season	82.20	12.83	242.75 a	20.17	54.35 a	8.48	2.37 c	22.79	3660.27 a	58.97
Buctril-M @ 1.25 Lit/ha	82.70 a	13.52	248.00 a	22.77	56.120 a	11.97	2.54	31.60	4063.55 a	71.79
Close row sowing+ Buctril-M @1.0 lit/ha	79.65 b	9.33	233.25 a	15.47	54.30 a	8.38	2.30 c	19.17	3457.05 a	46.15
Cross row sowing + Buctril-M @1.0 lit/ha	82.40 a	13.10	238.75 a	18.19	54.75 a	9.28	2.46 b	27.46	3820.95 a	61.53
Skip row sowing + Buctril-M 1.0 lit/ha	78.90 b	8.30	226.75 a	12.25	51.50 a	2.79	2.24 c	16.06	3184.25 a	34.62
Close row sowing	77.55 b	6.45	217.75 a	7.79	51.00 a	1.79	2.06 e	6.73	2698.92 b	14.10
Skip row sowing	76.00 c	4.32	207.25 b	2.59	50.25 a	0.29	2.01 e	4.14	2486.65 b	5.12
Cross row sowing	78.85 b	8.23	222.50 a	10.14	51.40 a	2.59	2.16 d	11.91	3062.82 a	29.48
Weedy check for full season	72.85 d	---	202.00 b	----	50.10 a	---	1.93 f	----	236 5.25b	-----
SE for treatment means	0.50	---	2.76	----	1.38	---	0.02	---	114.37	-----
LSD1 0.05	1.48	---	8.07	---	4.04	---	0.07	----	333.85	-----
LSD2 0.05	2.01	---	10.93	---	5.45	---	0.20	----	452.38	-----

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