

Weed Problem, Farmers Weed Control Methods in the Irrigated Wheat: A Farm Level Survey in Sindh

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INTRODUCTION

Wheat (*Triticum aestivum* L.) is a major food grain crop of Pakistan and grown on an area of 7.30 million hectares with a total annual production of 1.67 million tonnes which comes to an average yield of 1.73 t/ha (Government of Pakistan 1987). The present wheat yield per hectare is far below the production potential of recommended wheat varieties which is attributed to many factors, out of which weed control practices are of primary importance. The studies conducted by Qureshi (1982) and Sarwar and Nawaz (1985) concluded that wheat yield decreased from 16 to 30 percent due to the presence of weeds under normal conditions. Haq (1970) estimated 300 million rupees annual losses in Pakistan. Cheema et al. (1988) and Majid (1983) concluded that the chemical weed control in wheat is more economical than the conventional methods. Thus, chemical weed control is less laborious, cheaper and effective method.

Weed density in crops has increased tremendously in the last few years, particularly with the introduction of high yielding varieties of dif-

ferent crops. These new varieties require higher inputs like fertilizer, and irrigation.

Wheat yields on farmers field in Sindh or elsewhere in Pakistan are much lower than actual yield obtained at experimental farms, where package of recommended technology is applied. The present study was conducted to explain the weed problems, farmers weed control methods and possibilities of weedicide use which is considered to be the latest weed control technology in the world. The specific objectives of the study were:

1. To assess farmers perceptions about weeds and their control methods in the irrigated wheat.
2. To analyse farmers knowledge about weedicides use and its relationship to farmers practices.
3. To provide an overview of economic aspects of weed control and draw the implications for research and extension.
4. To study the constraints being faced by the farmers for using chemical weed control.

Methodology

A survey was carried out by a multidisciplinary team of Agricultural Economists of AERU Tandojam and Plant Physiologist from Plant Physiol-

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ogy Section, A.R.I. Tandojam in the irrigated wheat in Central Sind comprising of Hyderabad and Nawabshah Districts.

Questionnaire was developed and pretested before conducting the final survey to give researchers a deeper understanding of complexities faced by wheat growers. The survey was carried out in the month of April 1989 at the time of wheat harvest. Sample of 60 farmers from four talukas was randomly selected from two major growing districts of Sind i.e. Hyderabad and Nawabshah. The sample was drawn by giving due weight to wheat area planted in each sampled area. Twenty villages were randomly selected from four talukas (Table 1).

Table 1. Distribution of sample villages and respondents in the survey area.

Talukas	Respondent	Percent respondent
Tando Allahyar	15	25
Hala	12	20
Sakrand	18	30

The selected wheat growers were interviewed personally in respect of weeds problems and their control methods. Weed specialist from Plant Physiology Section, ARI, Tandojam identified and counted weeds within three square meter. Three square meters of wheat crop were harvested to investigate the yield effect due to weeds.

RESULTS AND DISCUSSION

Weeds and weed problem

In all, ten weed species were found

infesting wheat crop and are given in table-2 in order of their occurrence. Among the weeds recorded, Singh (Honey Clover) had the highest intensity of occurrence i.e. 25 percent, followed by the Dumbi Grass (*Phalaris minor*) with 22 percent infestation. It can be concluded that these two weeds are the most common weeds of wheat crop. Other weeds identified were: Jhil (Lambs quarters) 12 percent, Javi (Wild oat) 8 percent, Naro (field bind weed) 6 percent, Basari (Wild onion) 6 percent, Neli (Scarlet pimpernal) 4 percent, Kabah (Nut Sedge) 6 percent, Chabbar (Bermuda grass) 6 percent and Palak (Wild spinach) 5 percent.

Table 2. Weeds and their infestation percentage in wheat fields, during 1988-89.

Local Name	Common Name	Percent area infested
Singh*	<i>Honey clover</i>	25
Dumbi grass	<i>Little canary grass</i>	22
Jhil	<i>Lambs quarters</i>	12
Javi	<i>Wild oat</i>	8
Naro	<i>Field bind weed</i>	6
Basari	<i>Wild onion</i>	6
Neli	<i>Scarlet Pimpernal</i>	4
Kabah	<i>Nut Sedge</i>	6
Chabbar	<i>Bermuda grass</i>	6
Palak (Wild)	<i>Wild Spinach</i>	5
All		100

Incidence of weeds

Data shown in table-3 reflect the incidence of weed problem. In the sampled farmers 12 percent stated no weed problem in their wheat field, compared to 22 percent sampled

growers faced serious problem. 42 percent indicated that they have some weeds and 24 percent had opinion about (for) sufficient weeds present in their field. Table-3 further indicates that farmers with no weed problem in their fields received high yield of 3204 kg/ ha as compared to 2457 kg/ ha who identified serious weed problem in their field.

Table 3. Farmer's assessment of weeds incidence and their correlation with grain yield.

Incidence of weeds	Percent farmers	Yield kg/ha	Prob.
No weed	12	3204	
Some weed	42	3035	.37
Many weed	24	2760	
Serious weed	22	2457	
All:	100	2864	

Reasons for weed free fields

Those farmers who did not face weeds problem in their wheat fields were further clarified by enquiring about the reasons for no weed problem in their wheat field. 56 percent growers responded that, they have done good land preparation before the wheat sowing, 22 percent had fallow land in Kharif season, 12 percent perceived that they rotate with barseem after two-three years and 10 percent stated that they have grown wheat some what earlier (Table 4).

Weed control methods

Most farmers were following traditional weed control methods. These

Table 4. Farmers assessment about weeds free wheat fields.

Reasons	Percent
Better land preparation	56
Crop rotation	12
Early sowing	10
Previous fallow	22
All:	100

methods were varying from farmer to farmer according to their knowledge, type of land, land holding, and socio-economic and agro-ecological conditions. The following methods were identified in the sampled farmers (Table 5).

Hand weeding practice was used by majority of the farmers (74 percent). Mostly small farmers used family labour for weed control and they feed the pulled weeds for their animals. Hand weeding of *Phalaris* is difficult due to its high density and its resemblance with wheat plants in its early growth stage.

Use of chemicals to control weeds had become popular recently, because of their effectiveness and the higher labour cost for manual weeding. As well, herbicides offer farmers the option of more timely planting by reducing cultivations between Kharif and rabi crop (Zulfiqar *et.al* 1988). The use of herbicides shows positive effect on the grain yield of wheat (Table 5) in the studied area. These results are in agreement with Cheema *et. al* (1988). Some farmers (9 percent) had applied weedicide in their wheat fields. Whereas most of the sampled farmers used hand weeding in their field.

Table 5. Effect of different weed control methods on grain yield of wheat crop, 1988-89.

Weed control methods	Percent farmers	Average wheat yield kg/ha.	Prob.
No. weed control	17	2473	
Hand weeding	74	2710	.06
Weedicide use	9	4300	
All:	100	3048	

Reasons for non-adoption of herbicides

Farmers in the studied area were generally aware of the benefit of herbicides. However the adoption rate was very low. Data for non-adoption of herbicides are shown in table-6. Majority of the growers (42 percent) replied that weed control by herbicides is expensive, 40 percent did not apply because they used weeds as fodder, 10 and 8 percent farmers did not use herbicides due to financial constraints and share cropping respectively.

Farmers were asked about their opinion on the most effective weed control method. Most farmers (56 percent) perceived that better land management is most effective method followed by previous land fallow and crop rotation. Those farmers who used herbicides believed that this is the best method for weed control. However, this reflects farmers lack of appropriate information on wide adoption of weedicides in the area.

Table 6. Perceptions of farmers for non-adoption of herbicide in wheat fields 1988-89.

Reasons	Percent
Too expensive	42
Used for fodder	40
Financial constraints	10
Share cropping	8
All:	100

Economics of herbicides for weed control

Many studies advocate chemical method of weed control as less time consuming, less labour using, more effective and economical than traditional method. The economic analysis of herbicides guide grower to apply herbicides for different crops to maximize the profit. Study on weed management in wheat were conducted by Kubar L.A., (1989). He concluded that weedy check gave 2805 kg/ha and all the weedicides gave considerably higher yields as compared to weedy check, Buctril-M (1.5 l/ha) and Banvel-P (5 L/ha) were the best treatments in enhancing the per hectare yield of wheat crop (Table 7).

Partial budget of weedicide use in wheat

Partial budgeting is a method of organizing experimental data and information about the cost and benefit of various alternative treatments. Data from the trials laid down by Kubar L.A. (1989) is utilized for the partial budget (Table 8). The results show that hand weeding treatment gave the highest net benefit against

Table 7. Grain yield of wheat as effected by different weed control treatments

Treatment	Dose/ha*	Grain kg/ha	Absolute Increase in grain yield (kg/ha)	Percent increase
Weedy check		2805	-	-
Buctril-M	1.5 L/ha	4300	1495	53.2
Dicuran-MA	2.5 Kg/ha *	4191	1386	49.4
Banvel-P	5.0 L/ha	4303	1498	53.4
Tribunil combi	2.5 Kg/ha	4185	1380	49.1
Hand control		4847	2042	72.7

* Herbicides were applied 30 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 Kubar L.A. (1989)

the other treatments used for weed control in wheat, the second treatment Buctril-M (1.5 L/ ha) gave second highest net benefit against other treatments. Whereas the Kubar L.A. (1989) concluded that Buctril-M (1.5 L/ ha) and Banvel-P (5 L/ ha) were the best treatments for increasing per hectare yield of wheat. But partial budget indicate that Benevel-P (5 L/ ha) gave lowest net benefit against the other treatment, due to its high cost of Rs. 420/ lit.

Marginal analysis

An easier way of expressing this relationship is by calculating the marginal rate of return, which is the marginal net benefit (i.e. the change in net benefit) divided by the marginal cost (i.e. change in cost). The marginal analysis shows that hand weeding gave the highest marginal rate of return against the other treatments. These results are not agreeable with the results of Cheema, etal (1988), they concluded that the chemical weed control in wheat is more economical than the conventional method. The maxi-

mum marginal rate of return i.e. 44.97 percent was obtained with the use of Dicuran-MA, 60 WP, followed by marginal rate of return with hand weeding and bar harrow which was 25.63 and 8.95 percent respectively.

Conclusions/ Recommendations

The study was carried out to access the weeds problem and their control methods in the major cropping pattern i.e. cotton-wheat in Sindh. The survey results revealed that weeds, especially Singh (Honey Clover) and dumbi gass (*Phalaris minor*) were the major limiting weeds in efforts to increase wheat productivity in the area. Hand weeding was the most common method for controlling the weeds. Majority of the farmers were aware of the advantage of weedicide use, very few of the farmers applied weedicides in the study area.

There is a need for popularizing the use of weedicides through demonstration of on-farm trials. The yield losses in more weedy fields are enough to justify the use of

Table 8. Partial budget of weed control in wheat by different weedicide use.

	Treatment					
	Weedy check (1)	Buctril-M 1.5 l/ha (2)	Dicuran-MA 2.5 kg/ha (3)	Benevel-P 5.1/ha (4)	Tribunal 2.5 kg/ha (5)	Hand weeding (6)
Av. yield kg/ha	2805	4300	4191	4303	4185	4847
Adjusted yield kg/ha	2244	3440	3353	3442	3348	3878
Gross field benefit Rs/ha	4039	6192	6035	6196	6026	6980
Cost of herbicide Rs/ha	-	270	515	2100	688	-
Cost of labour for herbicide application Rs/ha	-	80	80	80	80	-
Cost of spray rent Rs/ha	-	50	50	50	50	-
Cost of labour for hand weeding Rs/ha	-	-	-	-	-	500
Total cost that vary Rs/ha	-	400	645	2230	818	500
Net benefit Rs/ha	4039	5792	5390	3966	5208	6480

Adjusted yield at 20 percent

Field price Rs. 1.80/kg

Hand weeding 20 man/day at Rs. 25/day.

Table 9. Marginal analysis, weed control by different weedicide use in wheat.

Treatment	Cost that vary Rs/ha	Marginal costs Rs/ha	Net benefit Rs/ha	Marginal net benefit Rs/ha	Marginal rate of return
Weedy check (No. weeding) -	-	-	4039		
Bictrul-M 1.5 L/ha	400	400	5792	1753	438%
Hand weeding	500	100	6480	688	688%

weedicides. Majority of the farmers were not aware of economics of specific inputs. If farmers understand their economic efficiency in term of net benefit, then the grower easily adopt the profitable technology.

The high costs of weedicide is also one of the major constraints for wide adoption of weedicide use. The private sector may play an important role in promoting the use of herbicide. Initially weedicides may be provided on subsidised rates for attracting towards modern technology. Once growers realize its importance, then the subsidy can be taken back in order to allow efficient use of inputs.

Weedicide sprayers and its timely availability are also considered a problem for the farmers. Small farmers can not afford to purchase sprayers independently. It is suggested that facilities may be extended to the farmers through forming cooperative societies. On the other hand, government agencies may supply the equipment on rental basis.

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