Population Studies on Weeds Occurring in Transplanted Rice Fields and Their Chemical Control in Sind (Pakistan)

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ABSTRACT

Field survey of weeds occurring in rice fields in rice growing area of Sind viz, Sujjawal, Badin, Tando Mohammad Khan and Larkana was made by Pest Management Project during 1982 to 1987. Fifteen weed species were found frequently at all the sites of study. *Echinochloa colonum* was the most important weed followed by *Echinochloa crusgalli, Cyperus iria, C. difformis,* and *Sphenocolea zeylanica*. An experiment on weed control was conducted using the weedicides alongwith mechanical and manual weeding.

The yield data showed that hand weeding twice is the best (10,000 kg/ha), followed by mechanical weeding (9937 kg/ha), Rilaf H. 1987 E.C. (9312 kg/ha), DMA-6(8625 kg/ha), Saturn 10 G (7938 kg/ha), Avirosan 3.3 G(7875 kg/ha) and check (5562 kg/ha) respectively.

INTRODUCTION

Weeds compete with rice plant for nutrients and also serve as alternate hosts of insects pest and diseases. For a developing country like Pakistan rice is a valuable source of foreign exchange earnings. Due to the shift of labour force to Middle East countries, hand weeding is feasible for small areas but for progressive farmers they have to resort to chemical control. In Punjab the losses due to weeds are estimated to be from 20-63% depending upon the types of weeds and degree of infestation (Majid et al, 1975).

The response of weeds to various chemicals differs with the weed species and the environmental conditions prevailing in the region. There is no single herbicide which is best for a crop and weed species under all the soil and environmental conditions. Each weed-crop environmental condition requires a specific technology. Carson (1977) reported that thiobencarb (Satrun 10 G) at 2 kg + propanil at 2 kg per hectare was consistently effective and safe for the control of weeds in transplanted rice. Butachlor (Machete) at 4.5 kg per hectare slightly damaged broadcast rice but Gidnavar and Shivannandaiah (1988) applied butachlor granules at 30 kg per hectare produced the highest grain and straw yield. The next best treatment was liquid butchlor @ 2.5 litre a.i/hectare. Mukhopadhyay and De (1979) described that butachlor at 2 kg per hectare gave the best weed control and next best was granular 2, 4 D ethyl ester at 1.5 kg per hectare, the isopropyl ester of 2, 4 D was best for early maturing CV 33.30. Shahi et al. (1979) applied three herbicides namely

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butachlor, thiobencarb and 2-4 D for the control of rice weeds in transplanted rice. The application of butachlor and thiobencarb @ 1.5 kg per hectare and 2, 4-D Sodium salt at 1 kg per hectare and 2, 4-D ethyl ester at 0.15 kg per hectare were found effective in controlling the weeds and no deleterious effect was observed. Gill and Mehta (1981) proved that application of 1.5 -3 kg/hectare of butachlor or thiobencarb after 4 days of transplanting of rice increased yield.

Therefore to evolve the technology of weed control in rice in Sind condition this experiment was conducted.

MATERIALS AND METHODS

An experiment was conducted on chemical weed control in paddy. The trial was conducted in randomized complete block design with three replicates and 9 treatments including the check. The variety used was IR-6. The plot size was 0.138 ha. The treatments consisted of T1 = Butachlor @ 0.85 litre/ha (Machete 60 E.C.), T2 = Thiobencarb (Saturn 50 E.C.) @3.00 litre/ha, T3 = Thiobencarb @ 14kg/ha (Saturn 10 G), T4 = Piperophos + Dimethametryne @ 25kg/ha (Avirosan 3.3G), T5 = 2, 4-D ester @ 5 litre/ha (Rilaf 187 E.C.), T6 = 2, 4-D amine @ 0.85 litre/ha (DMA-6), T7 = Mechanical weed control using rotavator, T8 = Hand weeding twice and T9 = Check.

Data were collected on visual rate of toxicity 7, 15 and 25 days after herbicide application.

Four sites in Sind viz; Sujjawal, Badin, Tando Mohammad Khan and Larkana were visited monthly, to collect and identify the weed species infesting the rice fields. Data on weed density was recorded using a quadrate of 1 m^2 area.

RESULTS AND DISCUSSION

Survey carried out in rice fields of Sajjawal, Badin, Tando Mohammad Khan and Larkana revealed the occurance of the following weeds:

Table 1. Weed density (% of the total) in rice plots in different areas of Sind.

Name of Weed	Name of the localities			
	Sujjawal	Badin	Tando Muhammad Khan	Larkana
Cyperus diffomis	12.82	11.05	14.45	15.70
Cyperus iria	15.27	14.09	4.25	3.75
Cyperus rotundus	20.48	20.45	28.40	34.80
Echinochloa colona	5.02	6.61	8.26	10.60
E. crusgalli	10.93	7.03	6.12	6.75
Fimbristylis littoralis	7.03	5.0	0.50	4.50
Marsilea minuta	2.40	2.45	2.50	4.21
Nymphae stelleta	4.07	4.85	1.00	9.73
Paspalum distichum	10.31	11.02	1.00	9.73
Sphenoclea zeylanica	13.81	15.57	11.63	11.37
Others	5.31	5.44	2.11	0.17

Cyperus difformis, C. iria, C. rotundus, Echinochloa colona, E. crusgalli, Fimbristylis littoralis, Marsilea minuta, Nymphae stelleta, Paspalum distichum and *Sphenoclea zeylanica*

In addition to the above *Trianthema portulacastrum, Convolvulus arvensis and Cynodon dactylon* were also observed. The density and frequency of these weeds in different localities is presented in table 1.

1. *Cyperus difformis*: A minimum density of 11.05% was recorded at Badin, while maximum density of 15.70% was observed in Larkana areas. In the remaining two localities its value ranged between 12.82 and 14.45%. (Table 1)
2. *Cyperus iria:* Minimum density was observed in Larkana area, while maximum density of this weed was observed in Sujjawal and Badin area respectively (Table 1). In remaining area density ranged between 4.25 to 14.09%.
3. *Cyperus rotundus*: Maximum density of 34.82% was recorded in Larkana area, while minimum density was observed as 28.45% in Badin. In the other areas the density ranged between 20.48% to 28.04%.
4. *Echinochloa colonum*: Minimum density was observed in Badin area (6.61%) and maximum in sujjawal area (15.02%).
5. *Echinochloa crusgalli*: Minimum density of 6.12% was recorded from Tando Mohammad Khan and maximum 10.95% at Sujjawal and in other areas it ranged between 6.75 to7.03%.
6. *Fimbristylis littoralis*: Its maximum density (7.03%) was observed in Sujjawal area and minimum (0.505%) in Tando Mohammad Khan area. In rest of the area it ranged between 4.50 to 5.00%.
7. *Marsilea minuta*: This weed was with maximum density (4.21%) at Larkana and minimum (2.40%) at Sujjawal and ranged 2.45 to 2.50% in other areas.
8. *Nymphae stelleta*: Maximum density (4.85%) being at Badin and minimum at (1.00%) Tando Mohammad Khan and ranged from 4.07 to 4.21% in other areas.
9. *Paspalum distichum*: It showed a more uniform distribution. The minimum density (1.0%) was observed in Tando Mohammad Khan and maximum (11.02%) at Badin and ranged from 9.73 to 10.31% in other areas.
10. *Sphenoclea zeylanica*: The maximum density was (15.57%) at Badin and minimum at (11.37 %) at

Table 2. Herbicide toxicity to IR-6 at 15 DAT*

Herbicide Treatments	Rating**
Machete 60 E.C.	15-20
Saturn 50 E.C.	18-30
Saturn 10G	18-30
Avirosane 3.3G	20-25
Rilaf H 187 E.C.	20-30
DMA-6	18-30

* Days after transplantation.

** Scale 0-100 where 0 = no crop injury and 100 = complete crop destruction.

Table 3. Weed density per m^2 in rice trial at Sujawal before spray, after spary and paddy yield of IR-6 in different treatments at Sujjawal during 1983.

Treatments	Weed density (No./m^2)		Yield (kg/ha)
	Before spray	After spray	
Machete 60 E.C.	60.25a	7.27b	7562d
Saturn 50 E.C.	51.25b	8.25b	7780d
Saturn 10G	50.00b	8.25b	7938a
Avirosan 3.3G	55.2b	8.00b	7875d
Rilaf H 187 E.C.	50.50b	5.50b	9312d
DMA-6	54.00b	8.25b	8625c
Mechanical Weed Control	48.75b	7.75b	9937b
Hand Weeding	39.50b	0.00b	10,000a
Check	47.75b	58.75a	5562c

Means followed by the same letter do not differ at 1% probability level.

Larkana and ranged between 11.63 to 13.81% in other areas.

The toxicity by various weedicides showed little effect on rice crop and rice crop regained within a month (Table 2).

Table 3 showed that there is considerable decrease in the density of various weeds species as compared to check. In Machete, the density of 60.25/m2 was reduced to 7.27, in Saturn 50 E.C., 51.25 to 8.25 in Saturn 10G, 50.00 to 8.25, in *DMA*-6, 48.75 to 7.75, in hand weeding 39.50 to 0.0 while in check the density increased from 47.75 to 58.75.

The comparison of the data in table 3 also indicated that before spraying weedicide there was neither a significant difference among themselves nor with the control, execept T1. But after applying weedicide there was no difference amongst treatments, yet highly significant difference was found amongst the treatments and the check (Table 3).

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