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Impact of Manual and Chemical Control Over Weeds in the Direct Wet-seeded Rice (*Oryza sativa* L.)

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Abstract: Study on rice (*Oryza sativa* L.) trial on cultural and chemical weed control was carried out during Kharif 2000. Different weeds under the direct wet-seeded rice crop were controlled by using cultural techniques as well as by the use of chemicals (rice herbicides). Weedy check was also kept in both the factors. Weeds were effectively controlled with herbicides and culturing method. Maximum tillers per m² (928.10), 1000-grains weight (27.67 g) and highest paddy yield (8.89 t ha⁻¹) were recorded from Rifit. The said herbicide also controlled the weed and gave minimum dry weed biomass (9.58 g). While in the other case, hand weeding after 6 weeks of seeding showed the best results.

Key words: Rice, *Oryza sativa*, herbicides, hand weeding, chemicals

Introduction

Rice (*Oryza sativa* L.) is the staple food of millions of people in Pakistan and is next to wheat in this respect. But its importance for Pakistan as one of the major agricultural commodity can't be over emphasized. It plays a pivotal role in the economy of Pakistan by adding 20 % of the total foreign exchange into national exchange. Although a break through have been achieved in raising the yield of rice crop through transplanted rice culture but due to the lower BCR, productivity per unit area, per unit time, rising cost of inputs, non-availability of costly labor, compaction of soil structure due to peddling and failure of the nursery due to various factors i.e., unfavorable weather conditions, toxicity and plant protection problems, the trust of farmers in this system has been shaken. However, under the direct seeding culture, the major constraint in achieving the high yield potential is severe weed competition. In direct seeding, weed infestation greatly reduces the yield. Yield reduction due to weed infestation depends on the type of rice culture, planting method and cultural practices.

Yield reduction in upland paddy rice due to weed competition was as higher as 90 % (Ghosh and Sahrma, 1997) and in conditions the yield reduction ranged from 10-70 % (Kumar and Gill, 1982). Close spacing is essential to minimize weed infestation and increase paddy yield (Nigam, 1988). The yield potential of direct seeded rice is equivalent to transplanted rice through water management and weed control (Awan *et al.*, 1989). Application of herbicides and hand weeding significantly increased the yield contributing parameters in rice as well as decreased the dry weed biomass (Awan *et al.*, 1993).

Keeping in view the specific climatic conditions of D.I.Khan and the importance of rice as a cash crop as well as an export commodity, the present study was initiated so as to determine suitable cultural practices and effective herbicide for weed control in direct seeded rice.

Materials and Methods

Study on the impact of manual and chemical control over weed in direct wet-seeded rice (*Oryza sativa* L.) was conducted during the kharif season 2000 at the Agriculture Research Institute, D.I.Khan. Split plot arrangements were used with randomized complete block design (RCBD). The net plot size was 3 x 5 m² (15 m²). The detail of the experimental treatments is as follows:

Cultural practices (Main factor): P₁, No weeding; P₂, Hand weeding (6 weeks after seeding) and P₃, Hand weeding (9 weeks after seeding).

Herbicides (Sub-factor): H₁, Ronstar 12 L @ 2 liters ha⁻¹; H₂, Topstar @ 100 grams ha⁻¹; H₃, Rifit 500 EC @ 1 liter ha⁻¹; H₄, Command 3 ME @ 688 ml ha⁻¹; H₅-Acelor @ 250 ml ha⁻¹ and H₆, Weedy check (Control).

Experimental field was prepared by ploughing, harrowing and cultivator. Fertilizers were applied @ 120-90-60 kg ha⁻¹ of N, P₂O₅ and K₂O in the form of urea, DAP and SOP. One third of N and full doses of P and K were applied at the time of seed sowing. While the 2nd dose of N was applied after 25-30 days after seeding and the 3rd dose was given at the panicle initiation stage. The seeds of rice were immersed in the water for about 24 hours and then under moist gunny bags for 36 hours to a pigeon breast like shape. Seed at the rate of 100 kg ha⁻¹ was used. Pre-germinated seeds were broadcasted in the standing water. All the herbicides were applied at the post emergence stage. The data were subjected to statistical analysis using analysis of variance techniques (Steel and Torrie, 1984) while Duncan's multiple range test (Duncan, 1955) was applied to check the differences among the treatment means, if any.

Results and Discussion

Dry weeds biomass per m² (g): Data on the said parameter (Table 1) depicted that different herbicides effected dry weeds biomass significantly. Rifit treated plots produced the minimum biomass of their weeds (9.56 g) while the weedy check plots gave the highest dry weeds biomass (61.44 g). The effect of cultural control over the weeds was also significant. Hand weeding after 9 weeks of seeding showed the best results. It was also reported that application of herbicides had decreased the dry weeds biomass (Awan *et al.*, 1993).

Number of tillers/m²: Herbicides affected the number of tillers per m² of rice significantly (P < 0.05) (Table 1). Maximum tillers (928.10) were obtained from the Rifit applied plots. Whereas on the other hand, hand weeding after 6 weeks of seeding resulted in the better findings i.e., 793.17 tillers per m². The findings coincides Awan *et al.* (1993) who reported that growth and yield of rice boosted up by weed control.

Number of panicles per m²: Rifit treated plots produced the maximum panicles (591.67). In this case, the hand weeding did not significantly affect the number of panicles (Table 1). However, maximum panicles were recorded as 521.11 in plots where hand weeding was done after 6 weeks of seeding.

Occurrence of sterility (%): The analysis revealed non-significant variations on the sterility percentage in rice for both the factors (Table 1). However, Rifit was the minimum sterility producing herbicide (11.53 %) while sterility was least in plots where hand weeding was done after 9 weeks of seeding i.e. 11.67 %.

1000-grains weight (g): The weight of the 1000 grains of rice in each treatment plot showed significant (P < 0.05) differences for various herbicides (Table 1). 27.67 g was the maximum grain

Awan *et al.*: Chemical and manual weed control in rice

Table 1: Weed control and yield efficacy in rice as affected by manual as well as chemical methods

Treatments	Biomass (g m ⁻²)	Tillers m ⁻²	Panicles m ⁻²	Sterility (%)	1000-grains weight (g)	Yield (t ha ⁻¹)
P ₁ = No weeding	33.56a	757.22b	506.40NS	13.20NS	23.08NS	6.82b
P ₂ = Manual (6 WAS)	26.33b	793.17a	521.10	12.69	24.16	7.44a
P ₃ = Manual (9 WAS)	19.61c	745.89b	518.70	11.67	23.50	7.01ab
H ₁ = Ronstar 12 L	18.11c	829.44b	521.40b	11.94NS	24.57b	7.90b
H ₂ = Topstar	26.78b	761.33c	498.30b	11.68	22.71c	6.12d
H ₃ = Rifit 500 EC	9.56d	928.11a	591.70a	11.53	27.67a	8.89a
H ₄ = Command 3 ME	17.00c	840.78b	522.20b	13.42	24.53b	7.92b
H ₅ = Acelor	26.11b	759.44c	506.10b	12.74	21.71c	7.30c
H ₆ = Weedy check	61.44a	473.44d	452.60c	13.80	20.28d	4.40e

Means with different letters differ significantly at P < 0.05 NS: Non-significant WAS: Weeks after seeding

weight found in the Rifit treated plots. On the other hand, the results were remained non-significant in case of hand weeding. Anyhow, hand weeding 6 weeks after seeding gave highest 1000-grains weight of 24.16 g. Both the factors interacted significantly between each other for the said case. The results coincides with the findings of Awan *et al.* (1993) who stated that application of herbicides and hand weeding significantly increased the yield contributing parameters in rice as well as decreased the dry weed biomass.

Paddy yield (t ha⁻¹): The analysis of the yield data (Table 1) showed the significant variations for both the factors as well as the interaction between them. Rifit herbicide proved to be the best weed controller and in response gave the highest paddy yield i.e. 8.89 t ha⁻¹ while the maximum paddy yield of 7.44 t ha⁻¹ was obtained from the plots where hand weeding was performed after 6 weeks of seeding. In case of interaction, the best combination was Rifit with hand weeding after 6 weeks of seeding. These findings are supported by those the observations of Awan *et al.*, (1993) who reported that due to the establishment of the most appropriate plant population and effective weed control through chemicals, direct seeding gave better yields.

It can be concluded from the study that weeds were effectively controlled by hand weeding after 6 weeks of seeding and in Rifit

treated plots. It is, therefore seems to be the most suitable combination compared to the other combinations for the general growers of D.I.Khan area.

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