

Research Article

Impact of pre and post emergence herbicides for controlling weeds in transplanted rice in agro-ecological zone of Gujranwala

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Abstract

The study had been planned to evaluate the effect of pre and post emergence herbicides for controlling weeds in transplanted rice during kharif 2011-2012 at Adaptive Research Farm, Gujranwala. The seven treatments studied were T-1 (Butachlor used @ 2000 ml/ha 3 days after transplanting (DAT), T-2 (Ethoxysulfuran @ 50g/ha 3DAT), T-3 (Fenoxulam @ 62.50 ml/ha 3DAT), T-4 (Ethoxysulfuran @ 50 g/ha 20DAT), T-5 (Fenoxulam @ 62.50 ml/ha 20DAT), T-7 (Orthosulfamuran @ 200 g/ha 3DAT) and T-8 (Oxadiazyl @ 100 g/ha 3DAT) were compared to untreated T-6 (Control plot). Significantly highest number of tillers/plant was recorded in T-2 (25.33), T-3 (26.00) and T-7 (24.33) during Kharif 2011. During kharif 2012, highly significant effect on numbers of tillers/plant was recorded in T-3 (25.40) & T-7 (25.66). The untreated control plot showed non-significant effect on number of tillers/plant was recorded in T-6 (18.00 & 17.70) compared to all other treatments during kharif 2011-2012. Highly significant effect on mortality of weeds (%) was recorded in T-7 (79.08 % and 78.89%) followed by T-2 (76.66% and 68.40%) & T-3 (72.10% and 69.40 %) during 2011-2012. Maximum yield (t/ha) was recorded in T-7 (3.80 and 3.75) followed by T-3 (3.76 & 3.64) and T-2 (3.53 and 3.52) respectively. The result concluded that maximum net benefit was recorded in T-8 (Orthosulfamuran) with Rs. 30,000/ha followed by T-3 (fenoxulam 3DAT) with net benefit Rs. 27000/ha. The lowest net benefit was recorded in T-1 (Butachlor 3DAT) with net benefit Rs. 12000/ha. It is concluded that although all the herbicides were involved for controlling weeds in transplanted rice however orthosulfamuran as pre-emergence gave maximum yield and benefit followed by fenoxulam.

Keywords

Pre & Post emergence herbicides, application, transplanted rice, Punjab-Pakistan.

Introduction

Rice plays a significant role in the economy of Pakistan, it contributes 20% in foreign exchange earnings and grown on an area of 1.98 million hectares with an average yield of 1.84 tonnes/ hectares (Anonymous, 2010). The paddy yield of the country is either stagnant or declining day by day due to various factors but suboptimum plant population is of significant importance in transplanted rice. Weeds posed a serious threat to the transplanted rice by competing for nutrients, light, space and moisture throughout the growing season (Mann and Ashraf, 2001). The yield reduction was recorded upto 48%, 53% and 74% in transplanted rice; flooded conditions and dry soils respectively (Ramzan, 2003). Therefore, an effective and economical weed control strategy needs should be implemented to meet the demand of staple food for increasing demand of Pakistan. Weedicide offer the most effective, economical and practical way to weed management. Comparison of manual hand weeding &

herbicides used for controlling weeds and result found that Pretilachlor (500 gha⁻¹) was most successful and effective weedicide with getting higher yield and CBR (Islam, 2000). It is further reported that control of weeds promoted yield & yield attributes productive tillers/m², 1000 grain weight (g) in rice (Ashraf *et al.*, 2006). In Pakistan very little work was carried on weed management in transplanted rice, therefore efforts were made to explore the most suitable and economical method of weed management. This effort presents the results of the studies carried out to manage the weeds through pre and post emergence herbicides in transplanted rice at agro-ecological zone of A. R. Farm, Gujranwala, Punjab-Pakistan.

Materials and Methods

The study had been planned to evaluate the effect of best herbicide for controlling weeds in transplanted rice. The

treatments studied were T-1 (Butachlor used @ 2000 ml/ha 3 days after transplanting (DAT), T-2 (Ethoxysulfuran @ 50g/ha 3DAT), T-3 (Fenoxulam @ 62.50 ml/ha 3DAT), T-4 (Ethoxysulfuran @ 50 g/ha 20DAT), T-5 (Fenoxulam @ 62.50 ml/ha 20DAT), T-7 (Orthosulfamuran @ 200 g/ha 3DAT) and T-8 (Oxadiargyl @ 100 g/ha 3DAT) were compared with untreated T-6 control plot. Transplanting of 30 days Super Basmati nursery was carried out with the help of manual labour in the 3rd week of July. Pre-treatment data of weed density were recorded by marking 30x30cm area from three locations of each treatment. Pre-emergence herbicides applied at 3DAT & post emergence herbicides were applied after 20DAT when the weeds were fully emerged in the field. After 25 days Zn SO₄ 21% crystalline form was applied in the field @ 25 kg/ha, posts treatment data of weed density was recorded 35 days after weedicide application. 1st dose of nitrogen was applied in the form of Urea @ 2.5 bags/ha at the age of 40-45 DAT. After that 2nd dose of nitrogenous fertilizer was applied in the field at the age of 70-80 days. Cartap @ 22.5 kg/ha was applied twice in the field at the end of August to 10th September. Recommended dose of Copper hydro-oxide was sprayed in the field of rice @ 1250 kg/ha against diseases of rice. The numbers of productive tillers were recorded in meter sq.

ring, take average and paddy yield (t/ha) at the time of crop maturity. The data were analysed statistically using Fishers Analysis of variance technique and LSD test for comparison of treatment (McClave, 1997). Economic analysis was carried out to determine most economical treatments in the studied area during kharif 2011-2012.

Results and Discussion

Productive tillers

Data regarding productive tillers/plant (Table I) revealed that during the year kharif 2011 T-3 (Fenoxulam 3 DAT), T-2 (Ethoxysulfuran 3 DAT) & T-7 (Orthosulfamuran 3 DAT) treated plots gave productive tillers 26.00, 25.33 & 24.33 showed highly significant effect to all other treatments. During kharif 2012, T-3 (Fenoxulam applied 3 DAT) & T-7 (Orthosulfamuran applied 3 DAT) treated plots produced 25.40 & 25.66 productive tillers that showed non significant (P>0.05) results with each other but differed statistically with rest of the treatments. Our results are in accordance with those of (Ashraf *et al.* 2006; Sandeep *et al.*, 2002; Naklange *et al.*, 1996 & Sharma *et al.*, 1995).

Table I. Impact of Pre, Post emergence herbicides on Productive tillers/plant and weeds mortality (%) on transplanted rice

Treatments	Productive Tillers/Plant		Weeds mortality (%)	
	2011	2012	2011	2012
T-1 (Butachlor @ 2000 ml/ha 3DAT)	22.67c	22.40c	54.18	57.14
T-2 (Ethoxysulfuran @ 50g/ha 3DAT)	25.33a	23.40c	76.66	68.4
T-3 (Fenoxulam @ 62.50 ml/ha 3DAT)	26.00a	25.40a	72.1	69.4
T-4 (Ethoxysulfuran @ 50g/ha 20DAT)	21.00d	22.70c	60.29	58.14
T-5 (Fenoxulam @ 62.50 ml/ha 20DAT)	21.00d	21.70d	66.58	65.16
T-6 (Control)	18.00e	17.70e	0.00	0.00
T-7 (Orthosulfamuran @ 200g/ha ⁻¹ 3DAT)	24.33ab	25.66a	79.08	79.08
T-8 (Oxadiargyl @ 100 g/ha ⁻¹ 3DAT)	22.00c	22.33c	63.95	56.43
LSD		3.128 4.267		

Weed mortality (%)

The major weeds observed in the experimental plots were *Cyperus rotundus*, *Cyperus difformis*, *Cyperus iria*, *Sphenoclea zeylanica*, *Echinochloa colona* and *Echinochloa crusgalli*, the effect of different weed management treatments against weed densities and weed mortality (%) was recorded. The results revealed (table I) that all the treatments gave significant control on weed population. However, the highest weed mortality (%) was recorded by the application of Orthosulfamuran (T-7) applied 3 DAT 79.08, 79.08% along with Ethoxysulfuran (T-2) applied 3DAT (76.66 & 68.40%). As manual weeding is laborious, tedious, expensive and time consuming method hence this

practice cannot be applicable at large scale in transplanted rice. The weed mortality in T-3 (Fenoxulam applied 3 DAT) was 72.10%, 69.40% that comparatively lower than other weedicide treatments but it also controlled the weeds population significantly. The results further revealed that weed mortality (%) was recorded (54.18-79.08%) in all the treated plots and 0% mortality was recorded in untreated weed infested plot (T-6). The densities of weeds continuously remained increasing that adversely affect the crop growth; ultimately reduction in yield. Our results are in line with (Ashraf *et al.*, 2006; Bhattacharya *et al.*, 2002; Tamilselvan *et al.*, 2001) who recorded similar results that weed can be controlled in rice crop by using suitable herbicides.

Table II. Impact of Pre, Post emergence herbicides on yield and economic analysis on transplanted rice

Treatments	Yield (t/ha)			Increase in yield over control (t/ha)	Net benefit (Rs/ha)
	2011	2012	Mean yield (t/ha)		
T-1 (Butachlor @ 2000 ml/ha 3DAT)	3.36c	3.23d	3.30d	0.320	12000
T-2 (Ethoxysulfuran @ 50g/ha 3DAT)	3.53ab	3.52ab	3.53b	0.550	20625
T-3 (Fenoxulam @ 62.50 ml/ha 3DAT)	3.76a	3.64ab	3.70a	0.720	27000
T-4 (Ethoxysulfuran @ 50g/ha 20DAT)	3.55b	3.39c	3.47c	0.490	18375
T-5 (Fenoxulam @ 62.50 ml/ha 20DAT)	3.44b	3.38c	3.41c	0.430	16125
T-6 (Control)	3.07d	2.89e	2.98e	-	-
T-7 (Orthosulfamuran @ 200g ⁻¹ 3DAT)	3.80a	3.75a	3.78a	0.800	30000
T-8 (Oxadiazyl @ 100 gha ⁻¹ 3DAT)	3.43b	3.20d	3.32d	0.340	12750

LSD

0.074 0.198

Basmati Super @ Rs. 3750/ha

Paddy Yield (t/ha)

The data on paddy yield (Table-II) depicted that paddy yield (3.80 & 3.75 t/ha) showed non significant effect ($P>0.05$) by T-7 (Orthosulfamuran applied 3 DAT) treated plot during both kharif seasons which was statistically at par with T-2 (3.53 & 3.52 t/ha) & T-3 (3.76 & 3.64 t/ha) but showed significant effect ($P<0.05$) with rest of the treatments. The paddy yield in T-1 (Butachlor applied 3 DAT) produced the lowest yield (3.36 t/ha, 3.23 t/ha) but significantly higher than control T-5 (3.07 t/ha & 2.89 t/ha). These findings were in accordance with (Ashraf *et al*, 2006; Salim, 2002) and who reported yield losses in untreated weed fields.

Economic analysis

From table II, economic analysis revealed that the highest net benefits (Rs. 30000/ha) was recorded in T-7 (Orthosulfamuran applied 3DAT) followed by (Fenoxulam applied 3DAT) with (Rs. 27000/ha); T-1 (Butachlor) gave comparatively lowest net benefits (Rs. 12000t/ha). The method of economic analysis was followed by (Kahloon *et al.*, 2012).

Conclusion

It is concluded that orthosulfamuran (T-7) used as pre-emergence gave maximum yield and benefit followed by fenoxulam. However new chemistry pre-emergence herbicides are most effective; suitable than post emergence herbicides because new chemistry pre-emergence herbicides are non resistant to weeds, produced a volatile compound and developed a layer on water that suppress the weeds in standing water. This practice is suitable only in those areas where water is standing in the field otherwise weeds can be germinated; however post emergence herbicides gave maximum result at watar condition only.

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