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RESEARCH ARTICLE

Bio-efficacy of ready-mix orthosulfamuron 0.6% + pretilachlor 6% GR on transplanted rice

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ABSTRACT

A field experiment was conducted at Visva-Bharati University under red and lateritic belt of West Bengal with the objective to evaluate the bio-efficacy of ready-mix orthosulfamuron 0.6% + pretilachlor 6% GR on weeds, yield of puddled transplanted rice (PTR) and its residual effect on succeeding crop. Four doses of ready-mix orthosulfamuron 0.6% + pretilachlor 6% GR at 40 + 400, 50 + 500, 60 + 600 and 70 + 700 g/ha, sole orthosulfamuron 50% WG at 75 g/ha, sole pretilachlor 50% EC at 750 g/ha, ready-mix bensulfuron-methyl 0.6% + pretilachlor 6% GR at 60 + 600 g/ha (check), hand weeding and unweeded control were assigned in randomized complete block design, which were replicated thrice in PTR. At 30 days after application, orthosulfamuron + pretilachlor at 60 + 600 and 70 + 700 g/ha as pre-emergence were found very effective against *Panicum repens* L., *Monochoria vaginalis* (Burm.f.) C. Presl, *Alternanthera philoxeroides* (Mart.) Griseb., *Ludwigia parviflora* Roxb., *Sphenoclea zeylanica* Gaertn., and *Cyperus iria* L. with 95-96% reduction in total weed biomass and comparable with ready-mix bensulfuron-methyl 0.6% + pretilachlor 6% GR at 60 + 600 g/ha (standard check). As compared to ready-mix orthosulfamuron + pretilachlor at 70 + 700 g/ha, sole application of pretilachlor had significantly higher infestation of *P. repens, M. vaginalis, A. philoxeroides* and *L. parviflora*. Similarly, sole orthosulfamuron also recorded higher infestation of all these weeds except *L. parviflora.* There was 9.4-11.0% yield advantage in rice with application of ready-mix formulation of orthosulfamuron + pretilachlor at 60 + 600 and 70 + 700 g/ha compared to sole pretilachlor and orthosulfamuron. None of the herbicides had any adverse effect on the yield of succeeding yellow sarson and on the soil microbial population.

Keywords: Puddled transplanted rice, Soil microflora, Weed management, Yield advantage

INTRODUCTION

Weeds are one of the most important growth-limiting factors in puddled transplanted rice (PTR). Without any weed management practices, the yield reduction may vary from 35.0-38.0% in West Bengal (Duary *et al.* 2015c). In PTR, hand-weeding is the most common method of weed management. However, high wages, scarcity of labour and mimicry of some weeds with rice make this operation difficult and uneconomic. Now the farmers have a variety of herbicides available on the market. The most commonly used pre-emergence herbicides in PTR are pretilachlor, pyrazosulfuron-ethyl and oxadiargyl (Latha and Gopal 2010, Duary *et al*. 2015a). An earlier report suggests that butachlor does not have any effect on *Cyperus* spp., *Cyanotis axillaris* (L.) D. Don ex Sweet and *Commelina benghalensis* L. and pretilachlor is poor against *C. axillaris* (Singh *et al.* 2004). Similarly, pyrazosulfuron alone is unable to control grasses including *Eleusine indica* (L.) Gaertn. (Sunil and Shankaralingappa 2014). Continuous application of a single herbicide leads to shift in weed flora (Duary 2008, Duary *et al*. 2015a and 2015c, Jaiswal *et al.* 2024). In India, *Cyperus difformis* L. and *Echinochloa crus-galli* var. *crus-galli* have been reported to evolve resistance against bispyribac-sodium, a widely and extensive used herbicide in India (Heap 2024). Use of mixtures of herbicides is preferable because the job can be done in a single application, which saves time and overcomes the problem of a shift in weed flora. In recent years, the most common herbicide mixtures that are used in PTR to control weeds are metsulfuron-methyl + chlorimuron-ethyl, pretilachlor + pyrazosulfuron-ethyl, bensulfuron-methyl + pretilachlor and penoxsulam + butachlor (Duary *et al*. 2015a, Yogananda *et al.* 2021, Venkatesh and Parameswari 2022). Even the mixed application of bensulfuron-methyl + pretilachlor was reported to be poor against the *Cynodon dactylon* (L.) Pers. and *Paspalum distichum* L. in West Bengal (Teja *et al.* 2015). It is always desirable to have alternative herbicides along

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with detailed information of their efficacy for recommendation in controlling mixed weed flora. Presently, we have limited information about the relatively new ready-mix herbicide containing orthosulfamuron and pretilachlor. With this perspective, the present experiment was conducted to study the effect of ready-mix application of orthosulfamuron and pretilachlor on weed, productivity of PTR and its residual effect on soil microflora and yield of succeeding crop yellow sarson in the red and lateritic belt of West Bengal.

MATERIALS AND METHODS

A field study was conducted at the Agriculture Farm of the Institute of Agriculture, Visva-Bharati University, West Bengal, India. Rice (*Oryza sativa* L.) was transplanted during the *Kharif* season (July–October 2019 and July–November 2020) and the sowing of succeeding crop, yellow sarson (*Brassica campestris* L. var. *yellow sarson*), was done during *Rabi* season (November–February) in 2019–20 and 2020–21. The field is geographically located at about $23^0$40.0552 N latitude and $87^0$39.6122 E longitude with an average altitude of 58 m above the mean sea level of sub-humid red lateritic agro-ecological zone of the tropics. The soil of the experiment field was sandy loam (Ultisol) in texture, slightly acidic in reaction with pH 5.9, low in organic carbon (0.5%), low in available N (214.4 kg/ha), medium in available P (19.1 kg/ha) and low in available K (247.7 kg/ha). The experiment was conducted in a randomized complete block design, with eight weed management practices and one control (unweeded control) (**Table 1**) which were replicated thrice. Rice variety "*MTU 1010*" was transplanted at 20 × 15 cm spacing. Succeeding crop yellow sarson variety "*B-9*" was sown with the spacing of 30 × 10 cm. The recommended dose of 80 kg N, 40 kg P and 40 kg K/ha were applied to both the crops. In PTR, to achieve uniform distribution of herbicides, orthosulfamuron + pretilachlor on and bensulfuron-methyl + pretilachlor were mixed with fine sand at 45 kg/ha. A battery-operated knapsack sprayer equipped with a flat fan nozzle was used for foliar sprays of herbicide and the spray volume was 500 L/ha. Herbicides were applied at 3 days after transplanting. As the effect of applied herbicides to rice was studied in succeeding crop no herbicide was given to the succeeding yellow sarson.

The density and biomass of different weed species were recorded separately at 30 days after application (DAA). Weed count was recorded as number of weeds per square meter. The weeds were uprooted, cleaned by washing, placed in sunlight for few hours and were kept in a hot air oven for drying at 70^0C for 72 hours or more till constant weights were recorded. The grain of rice and seed of yellow sarson was recorded after proper threshing and drying. Soil samples from the experimental plots were collected from the space in between rows at a depth up to 15 cm at harvesting of the crop. Selective media, namely Pikovskaya's agar medium for PSB (phosphate-solubilizing bacteria), Rose Bengal agar for fungi and Jensen's Agar Medium for actinomycetes were used to enumerate soil microbial population. The data on weed density and biomass was subjected to $\sqrt{x+0.5}$ transformation before statistical analyses. Statistical analysis of experimental data was done using MSTAT – C Computer Software.

RESULT AND DISCUSSION

Weed flora in the experimental field

In rice, *Panicum repens* L. was the dominant grassy weeds (14.4% of total weed density) in the experimental plots. Among the broad-leaved weed flora *Monochoria vaginalis* (Burm.f.) C. Presl (44.0%), *Ludwigia parviflora* Roxb. (15.7%), *Alternanthera philoxeroides* (Mart.) Griseb. (11.9%) and *Sphenoclea zeylanica* Gaertn. (7.5%) were

Table 1. Treatment details

Treatment	Dose (g/ha)	Formulation kg or litre/ha	Time of application (DAT)	Water volume (in litres)
Orthosulfamuron 0.6% + pretilachlor 6% GR	40 + 400	6.67 kg	3	Mixed with sand
Orthosulfamuron 0.6% + pretilachlor 6% GR	50 + 500	8.34 kg	3	
Orthosulfamuron 0.6% + pretilachlor 6% GR	60 + 600	10.00 kg	3	
Orthosulfamuron 0.6% + pretilachlor 6% GR	70 + 700	11.66 kg	3	
Orthosulfamuron 50% WG	75	0.15 kg	3	500
Pretilachlor 50% EC	750	1.50 litre	3	500
Bensulfuron-methyl 0.6% + pretilachlor 6% GR	60 + 600	10.00 kg	3	Mixed with sand
Hand weeding	-	-	-	-
Unweeded control	-	-	-	-

DAT: days after transplanting

dominant. *Cyperus iria* L. (6.2%) was the only sedge weed observed in the experimental field. Similar weed flora in PTR were also reported by Duary *et al.* (2015a, 2015b, 2015c), Teja *et al.* (2015, 2016, 2017).

Effect on grassy weeds

The application of orthosulfamuron 0.6% + pretilachlor 6% GR with different doses significantly reduced the density (**Table 2**) as well as biomass (**Table 3**) of grassy weed *P. repens* as compared to unweeded control. Ready-mix orthosulfamuron 0.6% + pretilachlor 6% GR at 60 + 600 and 70 + 700 g/ha recorded lower *P. repens* density (66-80%) and biomass (65-85%), compared with sole application of orthosulfamuron 75 g/ha and pretilachlor 750 g/ha. The herbicide combination at 60 + 600 and 70 + 700 g/ha of orthosulfamuron 0.6% + pretilachlor 6% GR was comparable with standard check herbicide combination bensulfuron methyl 0.6% + pretilachlor 6% GR at 60 + 600 g/ha. These findings were in conformity with Yadav *et al.* (2018) and Poojitha *et al.* (2023). According to Zahan *et al.* (2017), orthosulfamuron effectively controlled grassy weeds such as *C. dactylon* and *Echinochloa colona* (L.) Link.

Effect on broad-leaved weeds

The ready-mix herbicide orthosulfamuron 0.6% + pretilachlor 6% GR at 60 + 600 and 70 + 700 g/ha was found to be most effective in reducing density (93-96%) and biomass (95-97%) of broad-leaved weeds as compared to unweeded control (**Figure 1**). Whereas only 75-88% reduction in density and 83-89% in biomass of broadleaved weeds were recorded with the sole application of pretilachlor 50% EC and orthosulfamuron 50% WG. Orthosulfamuron 0.6% + pretilachlor 6% GR in all the doses under test had complete control over *A. philoxeroides*, *L. parviflora* and *S. zeylanica* (**Table 2**). But the presence of *A.philoxeroides* was recorded in sole orthosulfamuron 50% WG and pretilachlor 50% EC and *L. parviflora* in pretilachlor 50% EC treated plot. Pretilachlor was found ineffective against *Alternanthera sessilis* (L.) R.Br. ex DC. (Dubey *et al.* 2005) and against *L. parviflora* (Teja *et al.* 2015 and

Table 2. Species wise and total weed density at 30 DAA of herbicide (pooled over two years)

Treatment	Dose (g/ha)	Weed density (no./m^2) at 30 DAA						
		P. repens	*M. vaginalis*	*A. philoxeroides*	*L. parviflora*	*S. zeylanica*	*C. iria*	Total weed
Orthosulfamuron 0.6% + pretilachlor 6% GR	40 + 400	2.58 (6)*	3.51 (12)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	4.32 (18)
Orthosulfamuron 0.6% + pretilachlor 6% GR	50 + 500	2.16(4)	3.37 (11)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	3.95 (15)
Orthosulfamuron 0.6% + pretilachlor 6% GR	60 + 600	1.54(2)	3.08 (9)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	3.38 (11)
Orthosulfamuron 0.6% + pretilachlor 6% GR	70 + 700	1.54(2)	2.23 (5)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	2.64 (7)
Orthosulfamuron 50% WG	75	2.42(6)	3.56 (13)	1.88 (3)	0.71 (0)	0.71 (0)	0.71 (0)	4.63 (21)
Pretilachlor 50% EC	750	3.21(10)	4.42 (19)	2.99 (9)	2.00 (4)	0.71 (0)	0.71 (0)	6.45 (41)
Bensulfuron-methyl 0.6%+ pretilachlor 6% GR	60 + 600	1.87(3)	2.44 (6)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	2.99 (9)
Hand weeding	-	0.71(0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)	0.71 (0)
Unweeded control	-	4.86(23)	8.36 (70)	4.45 (19)	5.03 (25)	3.57 (12)	3.15 (10)	12.61 (159)
LSD (p=0.05)		0.53	0.71	0.36	0.54	0.19	0.19	0.73

*Figures in parentheses are original values. Data were transformed SQRT (x+0.5)

Table 3. Species wise and total weed biomass at 30 DAA of herbicide (pooled over two years)

Treatment	Dose (g/ha)	Weed biomass (g/m^2) at 30 DAA						
		P. Repens	*M. vaginalis*	*A. philoxeroides*	*L. parviflora*	*S. zeylanica*	*C. iria*	Total weed
Orthosulfamuron 0.6% + pretilachlor 6% GR	40 + 400	2.28(4.73)	2.21(4.38)	0.71(0.00)	0.71(0.00)	0.71(0.00)	0.71(0.00)	3.10(9.10)
Orthosulfamuron 0.6% + pretilachlor 6% GR	50 + 500	2.01(3.54)	1.90(3.13)	0.71(0.00)	0.71(0.00)	0.71(0.00)	0.71(0.00)	2.68(6.66)
Orthosulfamuron 0.6% + pretilachlor 6% GR	60 + 600	1.12(0.76)	1.79(2.72)	0.71(0.00)	0.71(0.00)	0.71(0.00)	0.71(0.00)	1.99(3.48)
Orthosulfamuron 0.6% + pretilachlor 6% GR	70 + 700	0.95(0.41)	1.54(1.89)	0.71(0.00)	0.71(0.00)	0.71(0.00)	0.71(0.00)	1.67(2.30)
Orthosulfamuron 50% WG	75	2.04(3.70)	2.04(3.71)	1.73(2.49)	0.71(0.00)	0.71(0.00)	0.71(0.00)	3.22(9.90)
Pretilachlor 50% EC	750	2.49(5.70)	2.14(4.11)	2.28(4.73)	1.23(1.02)	0.71(0.00)	0.71(0.00)	4.00(15.6)
Bensulfuron-methyl 0.6%+ pretilachlor 6% GR	60 + 600	1.24(1.05)	1.73(2.48)	0.71(0.00)	0.71(0.00)	0.71(0.00)	0.71(0.00)	2.01(3.53)
Hand weeding	-	0.71(0.00)	0.71(0.00)	0.71(0.00)	0.71(0.00)	0.71(0.00)	0.71(0.00)	0.71(0.00)
Unweeded control	-	4.31(18.26)	4.83(23.0)	3.90(14.73)	3.61(12.5)	2.77(7.48)	2.80(7.35)	9.14(83.3)
LSD (p=0.05)		0.27	0.24	0.17	0.04	0.37	0.04	0.32

*Figures in parentheses are original values. Data were transformed SQRT (x+0.5)

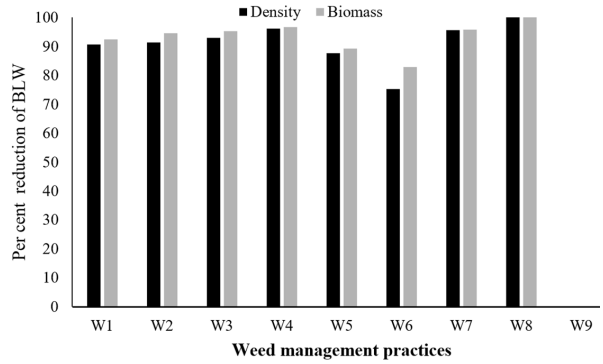
2016).

Effect on sedges

All the plots which were treated with either sole or mixed herbicide recorded complete control of sedges (**Table 2** and **3**). As usual unweeded control recorded the highest density and biomass of *C. iria*. Sole application of bensulfuron methyl or mixture with pretilachlor was very effective against sedges (Singh *et al.* 2005, Poojitha *et al.* 2023).

Effect on total weed

Orthosulfamuron 0.6% + pretilachlor 6% GR at 60 + 600 and 70 + 700 g/ha and bensulfuron methyl 0.6% + pretilachlor 6% were found very effective against the total weed having 93-96% reduction in density and 96-97% in biomass (**Table 2-3 and Figure 2**). While sole application of pretilachlor 50% EC and orthosulfamuron 50% WG recorded only 75-88% reduction in total weed density. Pretilachlor is a cell division inhibitor herbicide and orthosulfamuron inhibits Aceto Lactate Synthase (ALS) enzyme required for production of essential amino acid leucine, isoleucine and valine. Pretilachlor applied alone is more effective against grasses and also some broadleaved. While orthosulfamuron is more effective against sedges, broadleaved and some species of grasses. In the present study mix application of orthosulfamuron and pretilachlor became more effective against complex weed flora as compared to their individual application. Mix application of bensulfuron + pretilachlor was more effective against the weeds as compared to their sole application (Teja *et al.* 2015, Mohapatra *et al.* 2017, Yadav *et al.* 2018).



W1: Orthosulfamuron 0.6% + pretilachlor 6% GR at 40 + 400 g/ha; W2: Orthosulfamuron 0.6% + pretilachlor 6% GR at 50 + 500 g/ha; W3: Orthosulfamuron 0.6% + pretilachlor 6% GR at 60 + 600 g/ha; W4: Orthosulfamuron 0.6% + pretilachlor 6% GR at 70 + 700 g/ha; W5: Orthosulfamuron 50% WG at 75 g/ha; W6: Pretilachlor 50% EC at 750 g/ha; W7: Bensulfuron methyl 0.6% + pretilachlor 6% GR at 60 + 600 g/ha; W8: Hand weeding; W9: Unweeded control.

Figure 1. Effect of weed management practices on reduction in density (%) and biomass (%) of broadleaved weeds (pooled over two years)

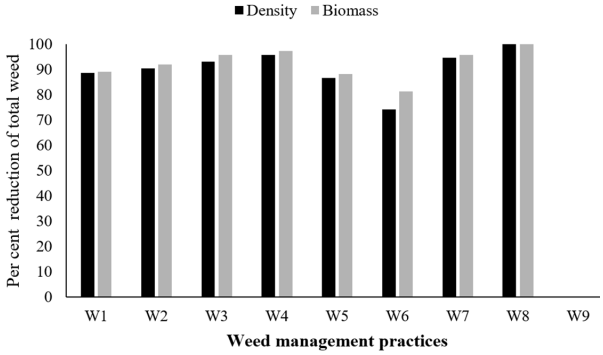


Figure 2. Effect of weed management practices on reduction in density (%) and biomass (%) of total weed (pooled over two years)

Yield of rice

The grain yield was significantly higher in the plots where orthosulfamuron 0.6% + pretilachlor 6% GR was applied at 70 + 700 and 60 + 600 g/ha (4.93 and 4.90 t/ha, respectively) which were comparable with hand weeding (4.86 t/ha) and bensulfuron-methyl 0.6% + pretilachlor 6% (4.84 t/ha). The lowest grain yield (4.03 t/ha) was recorded with unweeded control (**Table 4**). All the treatments except orthosulfamuron + pretilachlor at 40 + 400 g/ha recorded significantly higher grain yield of rice over unweeded control. Increased crop yield under different weed control treatments indicated the effect of weed infestation and competition by weeds in PTR which resulted in significant yield reduction under unweeded control by 18.3%. Ready-mix herbicide orthosulfamuron with pretilachlor both at 60 + 600 and 70 + 700 g/ha provided better weed control and produced 9.4-11.0% higher grain yield of rice as compared to sole application of orthosulfamuron and pretilachlor. The ready-mix herbicide formulation contains multiple active chemicals that are compatible with each other. This compatibility enhances their effectiveness, resulting in reduced density and biomass of complex weed flora. As a result, there is less or no competition, leading to a higher grain yield of rice. Significant response of ready-mix herbicidal treatments on yield may be attributed to favourable environment for crop due to proper weed control. This resulted in reduced competition for space, air, sunlight and nutrients. Duary *et al*. (2015a, 2015b and 2015c) and Teja *et al.* (2015, 2016 and 2017) reported similar higher yield of PTR with ready-mix herbicides in West Bengal. Higher weed biomass led to higher nutrient removal from the soil, resulting in a lower crop yield (Jaiswal *et al.* 2022, Jaiswal and Duary 2023).

Economics of rice

The highest cost of cultivation of rice was incurred in hand weeding and was 19.0-20.8% higher than the herbicide treated plots because of the higher lobour required for weeding (**Table 4**). Ready-mix herbicide orthosulfamuron + pretilachlor both at 60 + 600 and 70 + 700 g/ha fetched the highest net return (60.73-61.16 × 000 ₹/ha) and B:C ratio (1.37 each) and was at par with bensulfuron methyl + pretilachlor. Ready-mix herbicide orthosulfamuron + pretilachlor both at 60 + 600 and 70 + 700 g/ha fetched 17.7-18.5% and 15.2-16.0% higher net return than sole application of orthosulfamuron and pretilachlor, respectively. Better control of weeds with a mixture of different herbicides resulted in higher yield and, therefore, a higher return than the use of a single herbicide (Duary *et al.* 2015a).

Effect of herbicide on follow up crop *yellow sarson*

Follow up effect of orthosulfamuron 0.6% + pretilachlor 6% GR on yellow sarson observed that seed yield of *yellow sarson* did not vary significantly among the treatments (**Table 4**). It indicated that there was no residual toxicity of tested herbicides with different doses in PTR on succeeding yellow sarson. Herbicides pyrazosulfuron + pretilachlor, orthosulfamuron + pretilachlor and pretilachlor applied in PTR had no adverse effect on the yield of succeeding moong bean (*Vigna radiata*) (Venkatesh and Parameswari 2022). Similarly, pretilachlor + pyrazosulfuron-ethyl and bensulfuron-ethyl + pretilachlor applied in PTR did not have any harmful effect on the succeeding chickpea and wheat (Yadav *et al.* 2018).

Soil microbial properties

The impact of the test herbicides on soil micro-flora *viz*. total bacteria, fungi and actinomycetes recorded at harvest during both the years (**Table 5**) revealed that herbicide orthosulfamuron 0.6% + pretilachlor 6% GR did not show any adverse effect on soil bacteria, fungi and actinomycetes in crop rhizosphere. Pretilachlor and pyrazosulfuron did not show appreciable change in soil microbial population after 30 days of incubation (Latha and Gopal 2010). Dharumarajan *et al*. (2009) worked with pretilachlor in PTR and reported that at harvest the residues of this herbicide were below detectable level in soil.

Ready mix herbicide formulation of orthosulfamuron 0.6% + pretilachlor 6% GR at 60 + 600 and 70 + 700 g/ha when compared with sole application of orthosulfamuron 50% WG and pretilachlor 50% EC exhibited higher weed control when worked out against species-wise, category wise as well as total weeds, and registered higher

Table 4. Effect of treatments on yield of rice and residual yellow sarson and economics of rice cultivation (pooled over two years)

Treatment	Dose (g/ha)	Grain yield of rice(t/ha)			Seed yield of yellow sarson (t/ha)			Cost of cultivation ($\times 10^3$ ₹/ha)	Net return ($\times 10^3$ ₹/ha)	B:C
		2019	2020	Pooled	2019-20	2020-21	Pooled			
Orthosulfamuron 0.6% + pretilachlor 6% GR	40 + 400	3.93	4.78	4.35	1.19	1.27	1.23	43.62	49.85	1.14
Orthosulfamuron 0.6% + pretilachlor 6% GR	50 + 500	4.04	4.94	4.49	1.27	1.20	1.24	43.94	52.76	1.20
Orthosulfamuron 0.6% + pretilachlor 6% GR	60 + 600	4.34	5.46	4.90	1.16	1.11	1.14	44.26	60.73	1.37
Orthosulfamuron 0.6% + pretilachlor 6% GR	70 + 700	4.38	5.49	4.93	1.23	1.14	1.18	44.58	61.16	1.37
Orthosulfamuron 50% WG	75	3.91	4.98	4.44	1.09	1.08	1.09	43.84	51.58	1.18
Pretilachlor 50% EC	750	4.02	4.94	4.48	1.13	1.14	1.13	43.55	52.69	1.21
Bensulfuron-methyl 0.6% + pretilachlor 6% GR	60 + 600	4.19	5.48	4.84	1.04	1.00	1.02	44.34	59.44	1.34
Hand weeding	-	4.25	5.46	4.86	1.16	1.19	1.18	55.10	49.34	0.90
Unweeded control	-	3.64	4.41	4.03	0.99	1.04	1.02	41.90	44.75	1.07
LSD (p=0.05)		0.47	0.42	0.38	NS	NS	NS	-	7.24	0.16

Table 5. Impact of herbicides on total bacteria, fungi and actinomycetes (pooled over two years)

Treatment	Dose (g/ha)	Bacteria (CFU × 10^6 /g of soil)	Fungi (CFU × 10^4/g of soil)	Actinomycetes (CFU × 10^4/g of soil)
Orthosulfamuron 0.6% + pretilachlor 6% GR	40 + 400	15.9	8.0	2.4
Orthosulfamuron 0.6% + pretilachlor 6% GR	50 + 500	16.2	8.0	2.3
Orthosulfamuron 0.6% + pretilachlor 6% GR	60 + 600	14.9	8.0	2.3
Orthosulfamuron 0.6% + pretilachlor 6% GR	70 + 700	16.0	9.1	2.3
Orthosulfamuron 50% WG	75	15.0	7.6	2.4
Pretilachlor 50% EC	750	14.8	7.9	2.3
Bensulfuron methyl 0.6%+ pretilachlor 6% GR	60 + 600	14.9	8.4	2.2
Hand weeding	-	15.5	8.6	2.2
Unweeded control	-	15.4	9.0	2.3
LSD (p=0.05)		NS	NS	NS

grain yield of rice which was comparable with ready mixed herbicide bensulfuron-methyl 0.6% + pretilachlor 6% GR at 60 + 600 g/ha. Thus, ready-mix orthosulfamuron 0.6% + pretilachlor 6% GR at 60 + 600 kg/ha may be recommended for controlling mixed weed flora and obtaining higher grain yield of PTR in lateritic belt of West Bengal.

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