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Weed Management Practices in Direct Seeded Rice in Medium Land under Rainfed condition of Sub Agro Climatic Zone – VI

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ABSTRACT

The field experiment was conducted at Zonal Research Station, Darisai, East Singhbhum, Jharkhand during *kharif* season from 2016 to 2017 to study the weed management practices in direct seeded rice in medium land underrainfed condition of sub agro climatic zone – VI to find out the most suitable and effective weed management practices in direct seeded rice. All the treatments were tested in random bock design with three replication and nine treatments i.e., T_1: Butachlor @1kg a.i/ha, pre emergence, T_2: Pretilachlor @1kg a.i/ha, pre emergence, T_3 : Pendimethalin @1kg a.i /ha, T_4: Bispyribac sodium @ 25 g a.i/ha, at 15 DAS, T_5: Butachlor @1kg a.i/ha+ Bispyribac sodium @ 25 g a.i/ha, T_6 : Pretilachlor @1kg a.i/ha+ Bispyribac sodium @ 25 g a.i/ha, T_7: Pendimethalin @1kg a.i /ha+ Bispyribac sodium @ 25 g a.i/ha, T_8: HW at 20 and 40 DAS, T_9: Weedy check. In experiment result showed that the application of pretilachlor @ 1 kg a.i./ha + bispyribac sodium @ 25 g a.i./ha at 15 DAS increased WCE (85.4%), yield (34.6 q/ha) and B:C ratio (1.54) and also proved to be the most cost effective weed management practice in direct seeded rice.

Key words: *Direct seeded rice, Weed management, Sub agro climatic zone*

Introduction

Rice is the vital staple food of India. India is the 2nd largest producer of rice next to china. Soil and climate in District East Singhbhum of Jharkhand is suitable for the growing of rice. The most common methods of rice crop establishment are transplanting and direct seeding (Kumar *et al*., 2016). Transplanted rice seedling is the major establishment practices in most part of rice-growing areas, although this practice need more labour, time, water and energy, as well as deteriorates the soil properties due to formation of compact hard soil surface, whereas direct seeding of rice aids in quick establishment and early harvest than transplanted rice and facilitates timely wheat sowing (Singh *et al*., 2007). Presently, in direct seeded rice is gaining momentum due to labour shortage during peak season of transplanting and availability of water for short periods (Singh *et al*., 2017). Direct seeded rice need only 34% of the total labour requirement and saves 27% of the total cost of the transplanted crop (Mishra and Singh, 2011). However, direct seeding is subjected to grater weed competition than transplanted rice resulting in reduced grain yield by 15 -60%. Mukhopadhyay *et al.* 1972, also reported that heavy weed infestation is major constraint in direct seeded rice which cause drastic reduction in yield (74-98%).Therefore, adapting weed management practice give significant yield and income to the farmers.

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Material and Methods

The field experiment was carried out during 2016 to 2017 at Zonal Research Station, Darisai, Birsa Agricultural University, Ranchi, Jharkhand which is situated at 22°24´north latitude, 86°23´ east longitude and altitude of 521 meter above mean sea level. Humid and sub tropical type of climate found in this zone with annual rainfall approx. 1200 to 1400 mm. The maximum rainfall was 63.5mm. The minimum and maximum temperature was 15.2^{0}c and 34.5 ^{0}C respectively. The soil type is sandy loam with acidic in nature (pH 6.4) in reaction, very low in organic carbon (0.38%), available phosphorus (19 kg/ha) and available potassium (134 kg/ha). The experiment was laid out in random block design with nine treatments replicated thrice. The treatment were consisted of T_1:Butachlor @1kg /ha, pre emergence, T_2:Pretilachlor @1kg /ha, pre emergence, T_3 : Pendimethalin @1kg /ha, T_4: Bispyribac sodium @ 25 g /ha, at 15 DAS, T_5:Butachlor @1kg /ha+ Bispyribac sodium @ 25 g /ha, T_6: Pretilachlor @1kg a.i/ha+ Bispyribac sodium @ 25 g /ha, T_7: Pendimethalin @1kg /ha+ Bispyribac sodium @ 25 g /ha, T_8: HW at 20 and 40 DAS, T_9: Weedy check. Variety Navin was taken for experiment with spacing 20cm row to row distance and 70 kg/ha seed rate. The full dose of fertilizer of 80 kg nitrogen/ha, 40 kg phosphorus/ha and 20 kg potassium/ha were applied in rice crop. Data on weeds were subjected to squre-root transformation (" (X + 0.5). All the cultural operation were carried out uniformly.

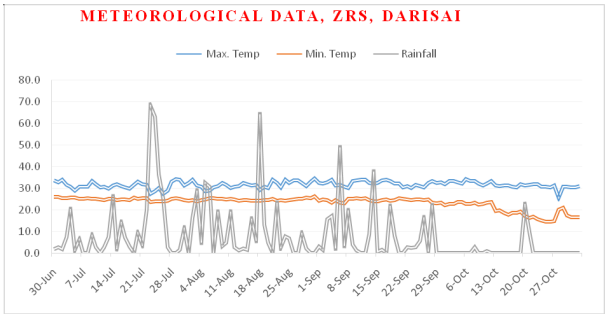

Fig. 1. Weather condition of the research site during 2016 and 2017

Results and Discussion

Weeds

The experimental field wasinfested during *kharif* season with narrow leaf weeds, viz. *Echinochloacrusgalli*, *Echinochloacolonum*, *Digitariasanginalis*, *Dactylocteniumaegyptium*, *Commelinanudifolia*, broad leaf weeds, viz. *Ludwigiaparviflora*, *Eclipta alba*, while among sedges *Cyperus* spp. *Echinochloacolonum*, *Echinochloacrusgalli* are most serious weeds affecting significantly in all methods of rice establishment (Mishra *et al.*, 2011). Several amount of variation occur in dominance and abundance of weed species due to change in crop establishment and weed management practices (Singh *et al*., 2005). Direct seeding also favors sedges such as *Cyprus* spp. and *Fimbristylismiliacea*. Presently, weedy rice is emerging as a major constraints in direct seeded rice (Yaduraju and Mishra, 2005). Weed management practices were significantly affected the density and dry matter of weed in direct seeded rice. Table 1 and Fig.2 showed that among weedicide application of pretilachlor @ 1 kg/ha + bispyribac sodium @ 25 g /ha in direct seeded rice lowered the weed dry matter (35.0 g/m^2). Similarly, reduction in dry matter accumulation by weed was 85% compared to weedy check. Ghosh *et al.* 2013

Table 1. Effect of different weed control methods on weeds dry matter (g/m^2) and WCE (%) on Direct Seeded Rice (mean data)

Treatment	Weed dry matter (g/m^2)	WCE(%)
T_1Butachlor @1kg a.i/ha, pre emergence	62.40	74.0
T_2Pretilachlor @1kg a.i/ha, pre emergence	53.80	77.5
T_3Pendimethalin @1kg a.i /ha	67.55	71.8
T_4Bispyribac sodium @ 25 g a.i/ha, at 15 DAS	50.65	78.8
T_5Butachlor @1kg a.i/ha+ Bispyribac sodium @ 25 g a.i/ha	37.40	84.4
T_6Pretilachlor @1kg a.i/ha+ Bispyribac sodium @ 25 g a.i/ha	35.00	85.3
T_7Pendimethalin @1kg a.i /ha+ Bispyribac sodium @ 25 g a.i/ha	40.65	83.0
T_8 HW at 20 and 40 DAS	9.35	96.0
T_9 Weedy check	240.20	-
C.D (5%)	10.90	-

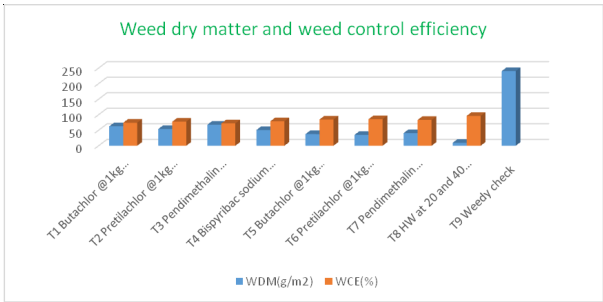

Fig. 2. Graphical representation of weed dry matter (g/m^2) weed control efficiency (%)

reported effective weed control in different rice ecosystem by bispyribac sodium. Maximum weed control efficiency was also recorded by the application of pretilachlor @ 1 kg /ha + Bispyribac sodium @ 25 g/ha (85.3%) compared to weedy check.

Yield and yield attributes

All the treatment of rice under study were significantly influenced due to climate variation and different weed management practices within two years. The highest grain yield was recorded from hand weeding (34.95 q/ha) but it is time consuming and expensive practice. Among weedicide the highest rice grain yield was recorded in pretilachlor @ 1 kg/ha + bispyribac sodium @ 25 g /ha(34.05 q/ha) compared to weedy check (12.3 q/ha). Similarly straw yield was significantly highest in pretilachlor @ 1 kg/ha + bispyribac sodium @ 25 g/ha (64.45 q/ha). The highest grain yield was probably due to the plant height, 1000 seed weight, panicle length and highest number of seed/panicle in this treatment. On the other hand, the lowest grain yield and straw yield was recorded in weedy check (12.3 and 20.8 q/ha), respectively due to lodging and lack of effective weed control method. Average mean analysis of two years revealed that direct seeded rice produced significantly higher grain yield, which was 76% higher than weedy check. Among weedicide application of pretilachlor @ 1 kg/ha + bispyribac sodium @ 25 g/harecorded maximum harvest index (34.56%) and lowest weed index (2.58%) compared to weedy check. Chauhan *et al*. 2014 reported that application of pretilachlor resulted in a significant increase in grain yield compared with non treated control.

Economics

The mean data of two (2016 and 2017) years revealed that the application of pretilachlor @ 1 kg/ha

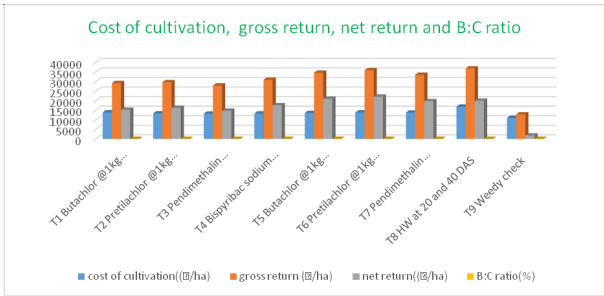

Fig. 3. Graphical representation of economic of direct seeded rice.

Table 2. Effect of different weed control methods on weeds, yield and yield attributes under Direct Seeded Rice cultivation during 2016 and 2017 (mean data)

Treatment	Plant height (cm)	Panicle length (cm)	No. of Seed/ panicle	1000 seed weight	Seed yield (q/ha)	Straw yield (q/ha)	HI (%)	WI (%)
T_1Butachlor @1kg a.i/ha, pre emergence	97.6	20.7	94.65	19.40	27.80	49.9	35.77	20.46
T_2Pretilachlor @1kg a.i/ha, pre emergence	98.6	21.0	97.20	20.25	28.25	50.6	35.82	19.17
T_3Pendimethalin @1kg a.i /ha	95.1	19.4	85.70	19.15	26.60	48.3	35.51	23.89
T_4Bispyribac sodium @ 25 g a.i/ha, at 15 DAS	98.7	21.3	97.85	20.55	29.55	51.2	36.59	15.45
T_5Butachlor @1kg a.i/ha+ Bispyribac sodium @ 25 g a.i/ha	102.0	22.5	113.35	22.10	32.75	63.2	34.13	6.29
T_6Pretilachlor @1kg a.i/ha+ Bispyribac sodium @ 25 g a.i/ha	102.9	23.3	118.85	22.65	34.05	64.4	34.56	2.58
T_7Pendimethalin @1kg a.i /ha+ Bispyribac sodium @ 25 g a.i/ha	100.8	21.9	104.75	20.95	31.70	61.4	34.09	9.30
T_8 HW at 20 and 40 DAS	103.8	23.6	121.60	23.10	34.95	65.5	34.79	-
T_9 Weedy check	71.9	18.15	66.2	18.25	12.30	20.8	37.16	64.81
C.D (5%)	6.65	2	14.1	1.1	3.1	3.85	-	-

Table 3. Effect of different weed control methods on weeds economics under Direct Seeded Rice cultivation *kharif* 2016 and 2017 (mean data)

Treatment	1000 seed weight (g)	Seed yield (q/ha)	Straw yield (q/ha)	Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net returns (Rs./ha)	B:C Ratio
T_1 Butachlor @1kg a.i/ha, pre emergence	19.4	27.8	49.9	13900	29181	15281	1.10
T_2 Pretilachlor @1kg a.i/ha, pre emergence	20.25	28.25	50.6	13400	29647	16247	1.21
T_3 Pendimethalin @1kg a.i /ha	19.15	26.6	48.3	13200	27956	14756	1.12
T_4 Bispyribac sodium @ 25 g a.i/ha, at 15 DAS	20.55	29.55	51.2	13300	30906	17606	1.32
T_5 Butachlor @1kg a.i/ha+ Bispyribac sodium @ 25 g a.i/ha	22.1	32.75	63.2	13600	34611	21011	1.54
T_6 Pretilachlor @1 kg a.i/ha+ Bispyribac sodium @ 25 g a.i/ha	22.65	34.05	64.45	13850	35925	22075	1.60
T_7 Pendimethalin @1 kg a.i /ha+ Bispyribac sodium @ 25 g a.i/ha	20.95	31.7	61.4	13760	33521	19761	1.43
T_8 HW at 20 and 40 DAS	23.1	34.95	65.5	16850	36854	20004	1.18
T_9 Weedy check	18.25	12.3	20.8	11000	12835	1835	0.16
CD (5%)	1.1	3.1	3.85	-	-	-	-

+ bispyribac sodium @ 25 g/ha at 15 DAS increased WCE (85.3% and 85.4%) respectively. The mean data of two year (Table 3 and Fig. 3) revealed that the application of weedicide pretilachlor @ I kg/ha +bispyribac sodium @ 25 g/ha at 15 DAS recorded the maximum gross return (Rs.35925/ha), net return (Rs.22075/ha) and benefit: cost ratio in direct seeded rice 1.59 also observed higher benefit: cost ratio in direct seeded rice by the application of pretilachlor @ 1 kg /ha +bispyribac sodium @ 25 g/ha. Hussain *et al*.(2008) reported that bispyribac sodium weedicide recorded significantly maximum gross returns, net returns and B:C ratio.

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