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Effect of various weed control treatment on economics of direct seeded rice under puddle condition

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Abstract

The present investigation was conducted at Instructional Farm of Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) India during the kharif season (June-October) 2006. The experiment was laid out in randomized block design comprised of eight treatments of various combinations of different herbicides viz. T₁: PIH 2023 10% SC 15 g a.i/ha at 18 DAS; T₂: PIH 2023 10% SC 20 g a.i/ha at 18 DAS; T₃: PIH 2023 10% SC 25 g a.i/ha at 18 DAS; T₄: PIH 2023 10% SC 30 g a.i/ha at 18 DAS; T₅: PIH 2023 10% SC 60 g a.i/ha at 18 DAS T₆: Almix 20% WP 4 g a.i/ha 18 DAS; T₇: Control (unweeded check) and T₈: Hand weeding at 30 DAS with three replications. Rice cultivar "IR-64" was grown as a test crop. Rice was manually sown with a seed rate of 60 kg ha⁻¹ on 25th July, 2006 and harvested on 15th and 16th November, 2006. The crop was fertilized with 100:60: 40 kg NPK ha⁻¹, respectively.

Results revealed that almost all growth parameters, yield attributes and grain yield were maximum grain yield was produced under of PIH 2023 10% SC @ 60 g a.i ha⁻¹ over rest of the treatments.

Echinochloa colona, *Cyperus* spp., *F. miliaceae*, *L. hyssopifolia* were the pre-dominant weeds in experimental plot. Minimum weed density was noted under post emergence application of Almix 4 g ha⁻¹ and PIH 2023 25 g ha⁻¹ at 20, 40, 70 and 90 DAS. Whereas, at harvest lower dry matter of weeds and highest weed control efficiency was recorded under Almix 4 g ha⁻¹ (T₆), PIH 2023 25 g ha⁻¹ and PIH 2023 60 g ha⁻¹, respectively. It was found effective to control broad spectrum of weeds viz., grasses, sedges and forbs.

Keywords: Weed management practices, productivity and economics of direct seeded rice under puddle condition

Introduction

Rice (*Oryza sativa* L.) is important staple food crop occupying 42.4 million and 3.5 million hectare in India and Chhattisgarh recently. The average productivity of rice in Chhattisgarh is about 1.58 t/ha, which is below the national average (2.05 t/ha).

The rice culture system in Chhattisgarh mainly depends on the onset and distribution of monsoonal rains. They can be broadly classified into three categories namely rice growing on upland situation mostly rainfed, medium land rice both in direct dry seeded broadcast "Biasi" and transplanting under protective irrigated conditions or both. Sometimes farmers are forced to adopt "Lehi" method. This situation arises when monsoonal rain continue for a longer period. Farmers are not in a position to adopt neither direct seeding nor transplanting. Rice is grown under conducive condition to profuse weed growth. As such during the early stages of crop growth, severe weed-crop competition is a big constraint for improving rice productivity. In the rice ecosystem of this region weeds play a dominant role by competing for nutrients, water and space with the rice crop. Based on research findings it was estimated that extent of yield reduction in rice due to weeds alone is about 15-20 per cent for transplanted rice, 30-35 per cent for direct seeded puddled rice and over 50 per cent in direct dry seeded rice.

Several herbicides such as butachlor, anilofos and pretilachlor, have been recommended for the control of weeds in rice which are effective on broad spectrum of rice weeds. Some herbicides like 2, 4-DEE controlled only broad leaf weeds. Further, these herbicides are required in large quantity, which will distort our ecosystem and increase chemical load to environment. Thus, for effective control of mixed weed flora. Evaluation of new herbicide with low application rate is required. Now-a-days herbicides are gaining popularity because of their selectiveness and effectiveness.

Materials and Methods

The present investigation was conducted at Instructional Farm of Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) India during the kharif season (June-October) 2006.

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The experiment was laid out in randomized block design comprised of eight treatments of various combinations of different herbicides viz. T₁:PIH 2023 10% SC 15 g a.i/ha at 18 DAS; T₂ : PIH 2023 10% SC 20 g a.i/ha at 18 DAS; T₃ : PIH 2023 10% SC 25 g a.i/ha at 18 DAS; T₄ : PIH 2023 10% SC 30 g a.i/ha at 18 DAS; T₅ : PIH 2023 10% SC 60 g a.i/ha at 18 DAS T₆ : Almix 20% WP 4 g a.i/ha 18 DAS; T₇ :Control (unweeded check) and T₈ : Hand weeding at 30 DAS with three replications. Rice cultivar "IR-64" was grown as a test crop. Rice was manually sown with a seed rate of 60 kg ha⁻¹ on 25th July, 2006 and harvested on 15th and 16th November, 2006. The crop was fertilized with 100:60: 40 kg NPK ha⁻¹, respectively.

Result and discussion

Effect on yield

The maximum grain yield was produced under PIH 2023 10% SC 60 g a.i/ha (48.91 q ha⁻¹) as compared to other weed management practices. Whereas minimum seed yield was observed under unweeded control (25.66 q ha⁻¹), which was significantly lower than rest of the treatments. This might be due to high growth and yield attributes as well as low crop-weed competition under these treatments. High growth in terms of LAI produced large amount of photosynthetic which acts as source and helped in developed of high yield attributes. The capacity of plants to produce seed yield depends not only on the size of photosynthetic system, it's efficiently and length of the time for which it is active but also on translocation of dry matter in to the economic sink. The final build up of yield is the cumulative function of yield components. The results are conformity with the finding by Mane and Raskar 2002 Amongst weed management practice,

PIH 2023 10% SC 60 g a.i/ha produced the maximum Straw yield of 59.34 q ha⁻¹ which was significantly superior to rest of the treatments. All the herbicides alone or in combination were significantly superior to unweeded control.

Weed index

Weed index indicate the reduction in yield due to weed competition as compared to the maximum attained grain yield. Weed index had remarkably influenced by weed management practices. Maximum weed index were noticed under unweeded control (78.00%) where as minimum weed index were registered under PIH 2023 10% SC 30 g a.i/ha (6.34%) over rest of the treatment.

Economics

The maximum total cost of cultivation was recorded under PIH 2023 10% SC 60 g a.i/ha Rs12083.00 ha⁻¹ and minimum was noted under unweeded control Rs. 10283 ha⁻¹. The highest gross return Rs.33307.40 ha⁻¹ net return Rs21274.40 ha⁻¹ and benefit cost ratio (1.83) were obtained under PIH 2023 10% SC 25 g a.i/ha. It was followed by PIH 2023 10% SC 30 g a.i/ha. The lowest value was observed under unweeded control. Total dry matter production of a plant often reflects its potentiality for its biomass production. Whereas, mobilization forwards the seed development is a important factor for realization of economic yield and serves as the yardstick for the acceptance and rejection of treatments hypothesis. Application of PIH 2023 10% SC 60 g a.i/ha gave maximum gross return, net return. This was due to lower cost of cultivation associated with higher grain yield than other herbicidal treatments. These fact are also supported by Saha *et al.* (1999) [3] and Janardhan *et al.* (1999) [2].

Table 1: Effect of different weed management practices on yield and economics of direct seeded rice under puddle condition.

Treatment	Grain yield (g/ha)	Straw yield (g/ha)	Weed index (%)	Total cost of cultivation (Rs ha ⁻¹)	Return from grain (Rs ha ⁻¹)	Return from straw (Rs ha ⁻¹)	Gross return (Rs ha ⁻¹)	Net return (Rs ha ⁻¹)	Additional net return over control	Benefit: cost ratio
T ₁ : PIH 2023 10% SC 15 g a.i/ha	41.48	47.01	9.41	10733	24473.2	3525.75	27998.95	17265.95	8486.3	1.608
T ₂ : PIH 2023 10% SC 20 g a.i/ha	43.64	48.48	7.67	10833	25747.6	3636	29383.6	18550.6	9770.95	1.712
T ₃ : PIH 2023 10% SC 25 g a.i/ha	45.71	53.45	10.85	10933	26968.9	4008.75	30977.65	20044.65	11265	1.833
T ₄ : PIH 2023 10% SC 30 g a.i/ha	46.14	48.56	6.34	11033	27222.6	3634.5	30857.1	19824.10	11044.45	1.790
T ₅ : PIH 2023 10% SC 60 g a.i/ha	48.91	59.34	7.46	12083	28856.9	4450.50	33307.40	21274.40	12494.75	1.760
T ₆ : Almix 20% WP 04 g /ha	33.60	51.17	37.99	10633	19824	3837.75	23661.75	13028.75	4249.1	1.220
T ₇ : Unweeded check	25.66	52.31	78.00	10283	15139.4	3923.25	19062.65	8779.65	-	0.850
T ₈ : Hand weeding (once)	45.28	51.58	-	10883	26715.2	3868.50	30583.70	19700.70	10921.05	1.810
SEm±	2.29	3.02	-							
CD (5%)	6.96	9.16	-							

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