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Evaluation of Different Weed Control Practices on Rice through Participatory Approach

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Abstract

One on farm trial (OFT) was conducted to find out suitable weed control methods for *kharif* rice (cv Star). The Japanise paddy weeder treated plot recorded highest grain yield (65.4 q/ha), whereas minimum yield was found under herbicide (2, 4-D) treated plot (40.9 q/ha). The weeding efficiency was highest (85.81%) in recommended hand weeding method (two hand weeding), whereas minimum (62.46%) in chemical control method. The recommended hand weeding recorded maximum cost of weeding while minimum in Japanise paddy weeder. The field capacity was observed to be maximum in Cono paddy weeder treated plot i. e. 0.0104 ha/h and minimum field capacity was 0.00202 ha/h under farmers practice. The highest benefit ; cost ratio (2.70) was recorded by Japanise paddy weeder. In split of low cost of cultivation in chemical control plot, farmers reaction was negative because they were in opinion that the chemicals left some residual effect in soil leading to low yield of crop. The Japanise paddy weeder was suitable for weed management in rice field under the prevailing bio-physical and social economic condition of Chatra district.

Key words : Japanise paddy weeder, Cono paddy weeder, 2, 4–D, Hybrid rice, Weed control efficiency.

Rice (*Oryza sativa*) is the most important crop of the Jharkhand state and Chatra district. It occupies about 60% cultivated area of Chatra district. Its average productivity is 30 q/ha in the district. Weed infestation is the major problem of rice cultivation in this area during *kharif* season. The problem becomes more aggravated when there is continuous rain. There is need of an effective weed control method for rice crop which is suitable and economically viable in resource poor farmer field's situation. The farmers resort to manual weeding, which undoubtedly accomplishes the job effectively, but it is costly and painstaking. Mechanical and chemical control methods of weeding are feasible to minimize cost of cultivation. In chemical weed control method, it has got its own limitation compared to other methods and is some times beyond the reach of small farmers because of high cost of chemicals and not available at proper time in local market. Farmers are also in the opinion that the productivity of soil would be reduced due to accumulation of residual toxicity in future which also justified with the findings of Kathiresan (1). Hence, there is need to find out suitable mechanical implements for weeding of rice. Keeping this in view one on farm trial (OFT) was conducted for judging the efficacy and economically viability of different weeding methods in the bio-physical and socio-economic condition of Chatra district.

Methods

The study was undertaken in four villages viz. Purani, Mahuri, Singrawa and Pipra in Itkhori Block of Chatra district under KVK with five treatments in randomized block design with four replications during *kharif* of 2007 and 2008. The experiment was conducted in Tar III and Don III types of land (medium) where yield reduction was noted due to heavy weed infestation. The experimental soil was sandy loam, slightly acidic, low in available N and P and medium in K.

A recommended fertilizer dose of N, P and K at 120, 60 and 75 kg/ha was applied uniformly in the form of urea, single super phosphate and muriate of potash respectively. The detailed treatments for weed control practices on transplanted hybrid rice (cv Star)

Table 1. Effect of different weed control methods on weed population, weeding efficiency, field capacity man-days requirement and cost of weeding. * Average of two weedings.

Treatments	Nos.of weeds before weeding	Nos. of weeds after weeding	Weeding efficiency (%)	Field capacity (ha/h)	Man-days requirement for weeding (Nos./ha)	Cost of weeding (Rs/ha)
Farmers practice	17.8	2.91	82.88	0.00202	61.75	4322
Recommended hand weeding	17.6	2.49*	85.81*	0.00225 *	112.13	7849
Japanise paddy weeder	18.2	4.10	77.40	0.0095	13.15	920
Cono paddy weeder	17.5	4.80	72.57	0.0104	11.06	774
Chemical control	19.45	7.30	62.46	1.10	1.10	490
CD (P = 0.05)	-	2.23	2.79	0.95	3.83	-

are given bellow : T_1– Farmers Practices i. e. one hand weeding at 25 days after transplanting (DAT), T_2— Recommended hand weeding (twice at 21 and 42 DAT), T_3—Japanise Paddy weeder (once at 25 DAT), T_4— Cono paddy weeder (once at 25 DAT), T_5—Herbicide application (2, 4-D at 1 kg a. i. /ha applied at 25 DAT) .

The experimental plot size was kept as 50 m × 20 m for all treatments. Two mechanical paddy weeders viz. Japanise paddy weeder and Cono paddy weeder were used for mechanical weeding. Weeding by farmers practices and recommended hand weeding were taken for treatment comparison. For evaluation of different weeding methods weed population before and after weeding were recorded. Numbers of weeds per square meter were counted and weeding efficiency was calculated by using the following formula.

Weeding efficiency (%) = (Nos. of weeds before weeding — Nos. of weeds after weeding) × 100/Nos. of weeds before weeding.

At harvest, tiller number per hill, grain and straw yield were recorded on net plot basis and tabulated as q/ha. Field capacity for each weed control method was also calculated.

Results and Discussion

Effect on Weeds

All the weed control practices significantly reduced the weed population. Controlling of weeds through the recommended hand weeding practice recorded lowest weed population followed by Japanise paddy weeder (Table 1). The weeding efficiency of different practices ranged from 60.32 to 85.81%. The highest weeding efficiency was noted under recommended hand weeding practice followed by Japanise paddy weeder. This was obvious that manual weeding done twice at 21 and 42 days after transplanting was effective in controlling weeds but consumed more time. The lowest weeding efficiency was recorded under chemical control method. The field capacity was observed to be maximum i. e. 0.0104 ha/h under Cono paddy weeder due to weeding blade fitted on drum and run smoothly (2).

Effect on Crop

The maximum number of tillers per hill (18.57) was recorded under Japanise paddy weeder treated plot due to manipulation of the soil with water created good aeration and loosening of soil around the root rhizosphere leading to emergence of more number of tillers (Table 2). The increase in tiller number might be due to decrease in crop-weed competition during the critical crop growth stages and thereby provided better nutrition to crop (3). The minimum number of tillers was found in chemical control method due to no aeration and no tilth of soil resulting more weeds in the field as compared to the other treatments.

The maximum grain yield (65.4 q/ha) was obtained under Japanise paddy weeder treated plot due to emerging of more tillers (Table 2) . The lowest grain yield noted in chemical weeding was possibly due to absence of any aeration effects (4). Besides, the herbicide was less effective in controlling wide range of weeds because most of the herbicides were effective against narrow range of weed species (5). Timely and effective control of weeds with Japanise paddy weeder

Table 2. Effect of different weed control methods on tillers number, grain yield, net income and benefit : cost ratio. Selling price of rice at Rs 600/q and straw Rs 70/q.

Treatments	Nos. of tillers/ hill	Cost of culti-vation (Rs/ha)	Grain yield (q/ha)	Net income (Rs/ha)	Bene-fit : cost ratio
Farmers practice	14.42	15809	48.1	19291	1.22
Recommended hand weeding	15.49	19336	63.7	25114	1.29
Japanise paddy weeder	18.57	12407	65.4	33593	2.70
Cono paddy weeder	15.35	12261	59.6	29089	2.37
Chemical control	12.80	13014	40.9	17673	1.48
CD (*P*=0.05)	1.84		3.86		

might have resulted in increased growth and thereby grain yield. Similar observations were also reported by Mukherjee and Singh (6).

Economics

The cost of weeding was highest i. e. Rs 7,849/ha in recommended weeding practice due to twice weeding operations which consumed more laborers (Table 1). The lowest cost of weeding (Rs 774/ha) was recorded in Japanise paddy weeder treated plot due to its higher field capacity as compared to the rest. The time required in man-days/ha was observed to be maximum (112.13 man-days/ha) in the treatment received recommended hand weeding. The minimum man-days was required in chemical control method. The cost of cultivation was maximum in the recommended hand weeding treatment due to its low field capacity. The minimum cost of cultivation was observed where weeding was done by Japanise paddy weeder due to its higher field capacity and less man days requirement as compared to recommended hand weeding. Higher net return (Rs 33,593/ha) and benefit : cost ratio (2.70) was obtained under Japanise paddy weeder treated plot as compared to the other weed control practices (Table 2).

The Japanise paddy weeder recorded maximum yield and benefit : cost ratio and minimum man-days requirement for weeding. Though chemical weed control method recorded lowest requirement of man-days and higher benefit : cost ratio than the recommended hand weeding and farmers practice, this method was not accepted due to negative farmer's reaction. However, farmers reaction was positive towards Japanise paddy weeder for better performance than other weeding methods. Hence, Japanise paddy weeder may be recommended for weeding in rice during *kharif* season.

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