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Economics of Integrated Weed Management Practices in Rice

M. Meyyappan[1], C. Ilango[2], S. Natarajan[3] and A. Angayarkanni[4]

[1]Assistant Professor of Agronomy, Annamalai University
[2]Deputy Farm Supt., Annamalai University
[3]Professor of Agronomy, Annamalai University
[4]Professor of Soil Science and Agricultural chemistry, Annamalai University
Corresponding author: meyysagronomy @ yahoo.com

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Abstract

In order to exalt the yield of rice under SRI by means of weed management practices, two field experiments were conducted during spring season in 2011 and 2012 in a randomized block design with ten treatments and three replications. Among the various treatments tested, the highest net return and BCR of 41193, 2.70 and 44362, 2.78 were obtained in the first and second experiment respectively due to the application of butachlor @ 1.5 kg ai/ha followed by cono weeding four times at weekly interval from 21st to 42 DAT.

Key words: Conoweeding, BCR, Butachlor, Net income

Introduction

In Tamil Nadu, rice is cultivated in an area of 1.4 M ha with a total production of 3.22 Mt and the productivity is 2.68 t/ ha. Rice accounts for 34 per cent out of total cropped area, 65 per cent of total irrigated area in Tamil Nadu and consumes about 80 per cent of total available water in the state. In Tamil Nadu rice is cultivated during three major seasons *viz.*, *Kuruvai* (15.7%), *Samba* (74.7%) and *Navarai* (9.6%). Out of total food grain production in the state, rice accounts for 85.2 per cent. Tamil Nadu state ranks 2nd in rice productivity and contributes 7.08 per cent in National production. At present in Tamil Nadu, the area under rice was decreased by 1.6 lakh ha when compared to 1990-91. In Tamil Nadu, SRI was adopted in an area of 0.75 M ha (2008 – 09). The average yield obtained during *Navarai* season in Tamil Nadu is 2978 kg/ ha. In Cuddalore district, rice is cultivated in an area of 1,14,291 ha and the productivity is 2.5 t /ha. Effort is needed to increase production in pace with unprecedented increase in demand. Rice is a predominant cereal and a staple food and its yield has to be improved due to impending challenges from predicted climate and demography changes. Rice production in India has increased by 4.5 times during the last 57 years from 30.9 Mt in 1950 to 89.13 Mt in 2010. However, rice productivity is growing at a much slower rate compared to that recorded in the earlier decades. All India mean growth rate is literally stagnant at 0.54 per cent only. Stagnant productivity on one hand and the higher food grains demand on the other hand to feed the ever growing population are becoming the major challenges in India. Weeds are major biological constraint to obtain optimum yield and productivity (Rao and Nagamani, 2013) and it causes yield losses from 15 to 76 per cent in rice (Mishra *et al.*, 2012).

Materials and Methods

With a view to exalt the yield of rice under SRI by means of various integrated weed management options, two field experiments were conducted during the *Navarai* season (Spring season) 2011 and 2012 at Annamalai University experimental farm. The first field experiment was conducted in Q_6 field of wetland and the second field experiment was conducted in T_1 field of wetland in the Northern block of the experimental farm which is located at 11^0 24' North latitude, 79^0 44' East longitude and at an elevation of +5.79m above mean sea level. Clayey loam is the texture of the farm soil with 237, 20, 312 and 229, 18, 241 kg of available NPK/ha in Q_6 and T_1 fields respectively. (pH 7.9 and 8.4). The field experiments were conducted with with ADT - 36 rice cultivar and consisting of ten treatments viz., T_1- Un weeded Control; T_2 - Hand weeding twice on 20 and 35 days after transplanting; T_3 - Butachlor @ 1.5 kg a.i/ ha + Hand weeding on 35th days after transplanting;T_4 - Butachlor @ 1.5 kg a.i/ ha + Almix @20g/ ha on 21 days after transplanting; T_5 - Cono weeding on 10, 20, 30 and 40 days after transplanting; T_6 - Butachlor @ 1.5 kg a.i/ ha + Cono weeding on 25th and 40th days after transplanting; T_7 - Butachlor@ 1.5 kg a.i /ha + Weekly Cono weeding from 21st to 42 days after transplanting (21, 28, 35 and 42 Days after transplanting); T_8 - Butachlor@ 1.5 kg a.i/ha + Cono weeding on 20, 30 and 40 days after transplanting; T_9 - Butachlor@ 1.5 kg a.i /ha + Cono weeding on 30, 40 and 50 days after transplanting andT_{10} - Fortnightly cono weeding on 15, 30 and 45 days after transplanting. The experiments were conducted in Randomized Block Design with three replications. Sand @ 50 kg/ha was used to apply butachlor to respective plots on 3 DAT. Almix was applied with the help of knapsack sprayer by using water @ 500 l/

ha on 21 DAT . Recommended cultivation practices were followed for both the crops.

Results and Discussion

The added cost of cultivation for various weed management treatments ranged from Rs. 730 to Rs. 2630 for both the experiments. The cost incurred for cono weeding one time was Rs. 500. Among the weed control treatments, the least cost of cultivation was noticed in the application of butachlor @ 1.5 kg / ha followed by the spraying of almix @ 20 g/ ha on 21 days after transplanting and the highest was noticed in the application of butachlor 1.5 kg /ha followed by cono weeding four times at weekly interval in both the experiments. Within the treatments tested, the highest net income and BCR of Rs. 41193, 2.70 and Rs. 44362, 2.78 was observed in the application of butachlor@ 1.5 kg /ha plus weekly cono weeding from 21st to 42 days after transplanting in the first and second experiments, respectively. Bhagat Singh *et al.* (2009) lends support for this result. The second best was the application of butachlor @ 1.5 kg / ha plus cono weeding on 25th and 40th day after transplanting. Application of pre emergence herbicide butachlor @ 1.5 kg /. ha followed by post emergence application of Almix @ 20 g /ha resulted in increased net income and BCR of Rs. 37,163 and 2.66 and Rs. 40,642 and 2.76 over conventional method of butachlor application @ 1.5 kg./ha supplemented with hand weeding on 35 days after transplanting in the first and second experiments, respectively. Cono weeding four times at 10 days intervals gave additional net income and BCR of Rs. 7350, 0.28 and Rs. 3620, 0.13 over cono weeding three times at 15 days interval in first and second experiments, respectively. Similar higher BC ratio was earlier reported by Ilangovan *et al.* (2012). Twice hand weeding resulted in increased net income and BCR of Rs. 26,740, 1.10 and Rs. 28,498, 1.11 over un weeded control in the first and second experiments, respectively. The least net income and BCR was noticed in un weeded control in both the experiments.

Results of the present study revealed that pre emergence application of butachlor @ 1.5 kg ai/ha followed by cono weeding four times at weekly intervals from 21st to 42 DAT gave the highest net return and BCR in both the experiments.

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Table 1: Economics of different weed control practices in SRI - *Navarai* 2011

Treatment	Cost of Cultivation (₹/ha)	Added cost of cultivation (₹/ha)	Total Cost of Cultivation (₹/ha)	Grain* Yield/ha (kg/ha)	Straw** yield (kg/ha)	Gross income (₹/ha)	Net Income (₹ /ha)	BCR
T_1	21597	0	21597	2270	3970	26670	5073	1.23
T_2	21597	2400	23997	4860	7210	55810	31813	2.33
T_3	21597	1830	23427	5240	7620	60020	36593	2.56
T_4	21597	730	22327	5190	7590	59490	37163	2.66
T_5	21597	2000	23597	4950	7480	56980	33383	2.41
T_6	21597	1630	23227	5350	7710	61210	37983	2.64
T_7	21597	2630	24227	5740	8020	65420	41193	2.70
T_8	21597	2130	23727	5320	7690	60890	37163	2.57
T_9	21597	2130	23727	5140	7540	58940	35213	2.48
T_{10}	21597	1500	23097	4260	6530	49130	26033	2.13

* Grain cost – Rs.10 per kg, **Straw cost – Rs.1 per kg

Table 2: Economics of different weed control practices in SRI - *Navarai* 2012

Treatments	Cost of Cultivation (₹/ha)	Added cost of cultivation (₹/ha)	Total Cost of Cultivation (₹/ha)	Grain* Yield (kg/ha)	Straw** yield (kg/ha)	Gross income (₹/ha)	Net Income (₹/ha)	BCR
T_1	22318	0	22318	2750	4670	32170	9852	1.44
T_2	22318	2400	24718	5540	7660	63060	38342	2.55
T_3	22318	1830	24148	5690	7700	64600	40452	2.68
T_4	22318	730	23048	5600	7690	63690	40642	2.76
T_5	22318	2000	24318	5290	8020	60920	36602	2.51
T_6	22318	1630	23948	5800	7880	65880	41932	2.75
T_7	22318	2630	24948	6110	8210	69310	44362	2.78
T_8	22318	2130	24448	5430	8100	62400	37952	2.55
T_9	22318	2130	24448	5470	7950	62650	38202	2.56
T_{10}	22318	1500	23818	4890	7900	56800	32982	2.38

*Grain cost – Rs.10 per kg, **Straw cost – Rs.1 per kg