

Integrated weed management in wetseeded rice

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Abstract : Field experiments were conducted during 1999-2000 at Agricultural College and Research Institute, Tamil Nadu Agricultural University, Killikulam, Tamil Nadu, to identify the effective and economic weed management for wetseeded rice. Experimental fields were dominated by grassy weeds especially *Echinochloa colona*. Pre-emergence application of pretilachlor + safener @ 0.3 kg ha⁻¹ on 8 DAS + handweeding twice on 30 and 45 DAS registered increased yield attributes and yield besides, higher weed control efficiency.

Key words: Wetseeded rice, Weed control efficiency, Yield attributes.

Introduction

Severe weed infestation in wetseeded rice is the main criteria responsible for yield reduction. Weed growth and competition is more in wetseeded rice because, the soil conditions favour simultaneous germination of weed seeds along with paddy seeds (James Martin, 1998). The extent of weed intensity caused an yield loss of 72.6 per cent in direct seeded puddled rice (Kolhe and Tripathi, 1998). The only effective method to control weeds in the early stage is pre-emergence application of herbicides. Increased intensity of weeds at later stages of wetseeded rice calls for a suitable combination of physical, chemical, cultural and possibly, biological weed control techniques to achieve maximum benefits through minimum yield loss and reasonable weed control. But the development of integrated weed management should be agronomically feasible, economically viable as well as environmentally safe to improve the productivity of wetseeded rice.

Materials and Methods

Field experiments were conducted during kar and late pishanam seasons of 1999-2000 at Agricultural College and Research Institute, Killikulam. The soil of the experimental field was sandy clay loam in texture, nearly neutral pH. The fertility status of the soil was low in available nitrogen (176.0 and 168.0 kg ha⁻¹), high in available phosphorus (27.5 and 32.6 kg ha⁻¹) and medium in available potassium (126.0 and 144.0 kg ha⁻¹).

Twelve weed control treatments were tested in randomised block design with three replications. The treatments comprised of three pre-emergence herbicides, pretilachlor + safener (0.3 kg ha⁻¹ on 4 DAS), butachlor (1.0 kg ha⁻¹ on 8 DAS), pendimethalin (1.0 kg ha⁻¹ on 8 DAS) and one

early post-emergence herbicide butanil (butachlor 1.12 kg a.i ha⁻¹) + propanil (1.12 kg a.i ha⁻¹) on 15 DAS) in combination with either mechanical weeding or and weeding twice on 30 and 45 DAS. In addition, green manure (Dhaincha) intercropping and incorporation by conoweeder, mechanical weeding and hand weeding alone twice (25 and 50 DAS) compared with unweeded control.

Results and Discussion

Effect of treatments on weeds (Table 1)

The weed flora in the experimental fields consisted of grasses, viz. *Echinochloa colona* Link., *E crus-galli* L. and *Cynodon dactylon* Pers.; Sedges, viz. *Cyperus difformis* L., *Cyperus iria* L., *Cyperus rotundus* L., and *Fimbristylis muliacea* L.; broad leaved weeds, viz. *Ammania baccifera* L., *Eclipta alba* Hassak., *Ludwigia parviflora* Robx., *Marsilea quadrifoliata* L. and *Monochoria vaginalis* Pers. The distribution of weed flora was in the order of grassy weeds, sedges, and broad leaved weeds in both seasons.

Weed control treatments significantly influenced the weed density, weed dry weight, weed control rating and weed control efficiency. There was noticeable variation in weed characters between the seasons. The wetseeded rice experienced severe weed competition during late pishanam season, which might be due to favourable weather condition leading to vigorous growth of the weed. Better weed control was recorded with pre-emergence application of pretilachlor + safener followed by hand weeding twice on 30 and 45 DAS. All the weed control treatments reduced the weed dry matter compared with unweeded control. Pre-emergence application of pretilachlor + safener followed by hand weeding twice on 30 and 45 DAS recorded lower weed biomass and accounted higher weed control efficiency

Table 1. Effect of weed control treatments in wetseeded rice

Treatments	Weed density (No. m ⁻²) 60 DAS		Weed dry weight (kg ha ⁻¹) 60 DAS		Weed control efficiency (%) 60 DAS		B:C ratio	
	K	LP	K	K	LP	LP	K	LP
T ₁ Pretilachlor + MW (Safener)	18.33 (1.19)	31.33 (1.52)	10.17 (1.08)	29.27 (1.49)	94.2	87.3	3.66	3.11
T ₂ Pretilachlor + HW (Safener)	9.33 (1.05)	25.67 (1.44)	7.52 (0.97)	24.83 (1.43)	95.7	89.2	4.12	3.69
T ₃ Butachlor + MW	17.33 (1.28)	39.00 (1.61)	15.76 (1.25)	38.25 (1.60)	91.0	83.4	3.44	3.05
T ₄ Butachlor + HW	14.67 (1.22)	33.33 (1.55)	12.81 (1.71)	31.86 (1.53)	92.7	86.2	3.22	3.11
T ₅ Pendimethalin + MW	14.67 (1.22)	32.00 (1.53)	11.50 (1.13)	31.19 (1.52)	93.4	86.5	3.79	3.44
T ₆ Pendimethalin + HW	13.67 (1.12)	27.00 (1.46)	9.86 (1.07)	25.39 (1.44)	94.4	89.0	3.86	3.40
T ₇ Butanil + MW	15.67 (1.25)	36.33 (1.58)	15.45 (1.24)	32.86 (1.54)	91.2	85.7	3.64	3.27
T ₈ Butanil + HW	18.00 (1.29)	34.67 (1.56)	17.67 (1.29)	35.61 (1.57)	89.9	84.5	3.39	2.96
T ₉ Dhaincha incorporation by conoweeder	18.00 (1.29)	40.00 (1.62)	18.96 (1.32)	40.29 (1.63)	89.2	82.5	3.41	3.08
T ₁₀ Mechanical weeding (MW) twice	24.33 (1.42)	38.33 (1.60)	24.25 (1.41)	37.79 (1.60)	86.2	83.6	3.60	3.06
T ₁₁ Hand weeding twice (HW)	11.33 (1.12)	27.00 (1.46)	10.70 (1.10)	26.73 (1.46)	93.9	88.4	3.35	3.06
T ₁₂ Unweeded control.	170.00 (2.23)	204.00 (2.32)	175.53 (2.25)	230.23 (2.37)	0.0	0.0	2.07	1.77
CD (P=0.05)	0.12	0.09	0.11	0.08	-	-	-	-

K-kar, LP-Late pishanam MW-Mechanical weeding HW-Hand weeding Figures in parentheses : transformed(log x+2) value

Table 2. Effect of weed control treatments on yield and yield attributes in wet seeded rice

Treatments	Plant population (No. m ⁻²)			Productive tillers (m ⁻²)			No. of filled grains panicle ⁻¹			1000 grain weight (g)			Grain yield (t ha ⁻¹)					
	K			LP			K			LP			K			LP		
	K	LP	K	LP	K	LP	K	LP	K	LP	K	LP	K	LP	K	LP		
T ₁ Pretilachlor + MW (Safener)	291.6	277.0	343.00	351.67	89.07	81.73	22.41	22.34	4.65	4.33								
T ₂ Pretilachlor + HW (Safener)	306.3	271.6	409.00	374.00	85.33	87.60	22.99	23.03	5.73	5.15								
T ₃ Butachlor + MW	270.0	252.0	319.33	307.33	74.87	73.40	22.76	22.24	4.45	3.95								
T ₄ Butachlor + HW	266.6	256.0	323.33	312.67	77.07	75.93	22.73	22.53	4.50	4.37								
T ₅ Pendimethalin + MW	271.3	269.6	336.00	319.67	81.67	79.87	22.77	22.60	5.00	4.53								
T ₆ Pendimethalin + HW	276.3	272.3	342.00	323.23	82.13	80.13	22.88	22.61	5.52	4.85								
T ₇ Butanil + MW	271.3	264.3	334.00	327.33	78.27	70.40	22.33	22.34	4.75	4.27								
T ₈ Butanil + HW	274.0	266.3	338.00	335.67	79.60	71.93	22.42	22.47	4.81	4.18								
T ₉ Dhaincha incorporation by conoweeder	261.3	251.3	306.00	305.00	72.00	67.20	22.20	22.21	4.28	3.87								
T ₁₀ Mechanical weeding (MW) twice	268.0	260.0	317.00	301.67	74.00	73.00	22.26	22.21	4.57	4.00								
T ₁₁ Hand weeding twice (HW)	273.6	266.3	328.00	334.67	78.47	76.27	22.43	22.43	5.05	4.62								
T ₁₂ Unweeded control	252.3	249.6	264.33	262.67	61.07	62.60	21.47	21.60	2.45	2.08								
CD (P=0.05)	9.08	8.16	10.67	9.12	1.02	0.85	0.45	0.49	0.22	0.16								

K-kar LP- Late pishanam MW - Mechanical weeding HW - Hand weeding

(95.7 and 89.2%). Intercropping of dhaincha led to higher weed smothering efficiency. At 40 DAS, smothering efficiency was higher in kar (46.4%) than Late pishanam (32%). In terms of economics, pre-emergence application of pretilachlor + safener followed by hand weeding twice on 30 and 45 DAS recorded higher B:C values (4.12 and 3.86).

Effect of treatments on yield attributes and yield of crop (Table 2)

The yield attributes of rice viz. plant population, productive tillers, number of filled grains per panicle and 1000 grain weight were significantly influenced by all weed control treatments. Plant population and productive tillers m⁻² were markedly more with pre-emergence application of pretilachlor + safener followed by hand weeding twice on 30 and 45 DAS. Severe weed competition exerted by weeds for the available resources throughout the crop growth period might have lowered the filled grains / panicle under unweeded control. Similar results was also reported by Bhanumurthy (1987). Grain yield was significantly increased by weed control treatments over unweeded control. Pre emergence application of pretilachlor + safener followed by hand weeding twice recorded higher grain yield of 4.65 and 4.33 t ha⁻¹ in kar and late pishanam respectively. Nandal and Hari Om (1998) reported similar results. Pendimethalin + hand weeding twice was in next order of performance in respect of yield attributes and yield of wetseeded rice. Similar finding was also observed by Ramamoorthy and Balasubramanian (1995).

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