

## Influence of seeding methods and weed management practices on direct seeded rice

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### ABSTRACT

**A field experiment was conducted to study the influence of seeding methods and weed management practices on direct seeded rice. Study revealed that drum seeding + green manure method of seeding establishment and pre-emergence application of pretilachlor + safener at the rate of 0.45 kg/ha at 5 days after sowing (DAS) + hand weeding (HW) at 45 DAS registered improved crop growth parameters, yield attributes and grain yield of crop with lower weed count and weed dry matter.**

**Key words :** Direct seeded rice, Method of seeding, Weed management

The drum seeding technology on puddled field is a good alternative to transplanted system because it involves minimal use of labour. The drum seeding has many advantages like cost reduction, faster growth and establishment, easiness in interculture, lesser seed rate and higher yield compared to broadcasting method (Gao 1995). One of the major causes for low yields of direct-seeded puddled rice is inadequate weed control measures. The competition is more severe in direct seeded rice, as crop and weeds emerge simultaneously starting from early period of growth of crop and inter-culture cause reduction in the rice yield. The yield loss due to weeds varied from 40 to 100% in direct seeded rice (Choubey *et al.* 2001). Intercropping suppresses weeds better than sole rice cropping and thus provides an opportunity to utilize crops themselves as a tool of weed management (Rao and Shetty 1976). Although manual weeding is effective and most common practice of weed control in direct seeded rice on puddled soil yet it has several limitations particularly during peak period. Hence, chemical weed control may be economical alternative (Samantaray *et al.* 1992). Therefore, the present study was taken up to study the influence of seeding methods and weed management practices on direct seeded rice.

A field experiment was conducted at Tamil Nadu Agricultural University, Coimbatore during *rabi* (August to January) season of 2004-2005 to study the effect of weed control in direct seeded rice under lowland ecosystem. The soil of experimental field was clay loam with pH of 8.1, organic carbon 0.67%, available nitrogen 235 kg/ha, phosphorus 18 kg/ha and potassium 525 kg/ha. Rice cultivar 'CO43' was chosen for the study. The experiment was laid out in split plot design with different seeding methods (drum seeding, drum seeding + green manure, broadcasting) in main plots and weed

management practices (cyhalofop-butyl at 15 DAS + hand weeding on 45 DAS, pretilachlor + safener on 5 DAS + hand weeding at 45 DAS, hand weeding twice at 20 and 45 DAS, unweeded check) in sub plots. The treatments were replicated three times. The sole rice was sown at a row spacing of 25 cm, while rice and dhaincha (*Sesbania*) seeds were sown in alternate rows of 12.5 cm apart. The dual cropped "dhaincha" was incorporated at 35 DAS by using "cono weeder". Pretilachlor + safener was applied at the rate of 0.45 kg/ha and cyhalofop-butyl was applied at the rate of 60 g/ha. Observations on weeds, crop growth, yield attributes and yield were recorded. The data on weed count and weed dry matter were transformed for statistical analysis.

### Weed flora

Weed flora identified in experimental field consisted of grasses, sedges and broad leaved weeds (BLW) from unweeded check plot at flowering stage of the crop. The major grasses were *Echinochloa crusgalli* (L.) and *E. colona* (L.) while the sedges included *Cyperus difformis* (L.), *C. iria* (L.) and *C. rotundus* (L.). Among the broad leaved weeds *Eclipta alba* (L.) Hassak, *Ammania baccifera* (L.) and *Ludwigia parviflora* Roxb. were the dominant species.

### Effect on weeds

The dual cropping of dhaincha with drum seeded rice had marked depression in total weed density and weed dry matter accumulation at all the stages over other method of seeding (Table 1). This might be due to dual cropping of green manure as smother intercrop in rice to reduce weed growth as earlier reported by several workers (Angadi and Umaphathy 1997, Ravisankar 2002).

Among the weed management practices, pretilachlor + safener at 5 DAS + hand weeding at 45 DAS registered significantly lowest total weed density and dry matter

**Table 1** Effect of seeding methods and weed management practices on total weed count, weed dry matter, weed control efficiency and weed index of direct seeded wet rice

Treatments	Total weed count (no./m <sup>2</sup> )			Weed dry matter (g/m <sup>2</sup> )			Weed control efficiency (%)			Weed index (%)
	40 DAS	60 DAS	At maturity	40 DAS	60 DAS	At maturity	40 DAS	60 DAS	At maturity	
<b>Seeding methods</b>										
Drum seeding	7.8(65.6)	7.1(54.2)	7.8(65.5)	7.2(54.4)	6.3(43.3)	8.8(81.3)	-	-	-	-
Drum seeding + green manure	7.4(55.7)	6.6(46.9)	7.6(62.8)	6.6(46.2)	5.8(37.9)	8.5(77.2)	-	-	-	-
Broadcasting	7.9(65.0)	7.5(60.2)	8.3(73.2)	7.3(55.6)	6.8(50.2)	9.2(89.2)	-	-	-	-
LSD (P = 0.05)	0.3	0.4	0.2	0.2	0.4	0.3				
<b>Weed management</b>										
Cyhalofop-butyl at 15 DAS + 1 HW at 45 DAS	6.9(50.9)	6.4(40.4)	7.2(52.0)	6.3(38.9)	5.7(31.9)	8.4(70.6)	60.4	69.6	54.8	10.20
Pretilachlor + safener at 5DAS + 1 HW at 45 DAS	6.6(42.6)	5.1(25.4)	5.3(28.3)	5.7(32.3)	4.1(16.8)	6.2(37.8)	67.1	83.9	75.8	0.00
HW twice at 20 and 45 DAS	6.9(47.5)	6.3(40.1)	7.4(55.2)	6.2(38.8)	5.6(31.7)	8.1(65.6)	60.5	69.8	58.0	8.92
Unweeded check	10.4(107.4)	10.5(109.1)	11.6(133.2)	9.9(98.2)	10.2(104.8)	12.5(156.3)	-	-	-	64.64
LSD (P = 0.05)	0.3	0.4	0.5	0.4	0.4	0.4				

Figures in the parenthesis denotes original values: DAS-Days after sowing; HW-Hand weeding

**Table 2** Effect of seeding methods and weed management practices on growth and yield attributes and grain yield of direct seeded wet rice

Treatments	Growth parameters			Yield attributes			
	Plant height (cm) at maturity	Leaf area index (LAI) at flowering	No of tillers/m <sup>2</sup> at maturity	Dry matter production (kg/ha) at maturity	Panicles/m <sup>2</sup> (no.)	Filled grains/panicle (no.)	Grain yield (kg/ha)
<b>Seeding methods</b>							
Drum seeding	76.5	4.51	493	9791	337	90.2	4099
Drum seeding + green manure	79.8	4.65	501	10068	349	91.8	4286
Broadcasting	73.2	4.27	461	9142	315	87.8	3842
LSD (P = 0.05)	2.6	0.15	21	301	18	2.2	201
<b>Weed management</b>							
Cyhalofop-butyl at 15 DAS + 1 HW at 45 DAS	78.4	4.40	507	10918	356	92.6	4629
Pretilachlor + safener at 5 DAS + 1 HW at 45 DAS	82.1	4.76	548	11991	399	96.2	5155
HW twice at 20 and 45 DAS	77.1	4.55	501	11242	363	92.7	4695
Unweeded check	68.6	4.20	383	4983	217	78.2	1823
LSD (P = 0.05)	3.6	0.2	60	521	20	2.5	205

accumulation of weeds at all the stages. This might be due to effective control of weed seed germination in the early stages of crop growth by pretilachlor + safener. This is in line with the findings of Subramanian (2003). The next lowest total weed density was observed in hand weeding twice at 20 and 45 DAS and it was at par with cyhalofop-butyl at 15 DAS + hand weeding at 45 DAS.

The weed management practices, pretilachlor + safener at 5 DAS + hand weeding at 45 DAS recorded highest weed control efficiency of 67.1, 83.9, and 75.8% at 40, 60 DAS and maturity stages, respectively. The cyhalofop-butyl at 15 DAS + hand weeding at 45 DAS and hand weeding twice at 20 and 45 DAS treatments had comparable weed control efficiency. In the present study, pretilachlor + safener at 5 DAS + hand weeding at 45 DAS recorded higher grain productivity and yield realised in other treatments were related as yield loss to this treatment. Pretilachlor plus safener along with hand weeding at 45 DAS effectively checked weed growth, density and weed dry weight, resulted in higher weed control efficiency (Venkataraman *et al.* 2000, Raju *et al.* 2001).

#### Effect on crop

The drum seeding + green manure method of seeding registered significantly taller plants at maturity than the other method of seeding. The increased leaf area index (LAI), more number of tillers/m<sup>2</sup>, higher dry matter production (kg/ha) were also recorded in drum seeding + green manure method of seeding than other method of seeding and it was comparable with drum seeding alone (Table 2).

Among the weed management practices, pretilachlor + safener at 5 DAS + hand weeding at 45 DAS recorded taller plants, increased LAI, higher number of tillers and higher crop dry matter production than the other treatments. This was followed by hand weeding twice at 20 and 45 DAS which was comparable with cyhalofop-butyl at 15 DAS + hand weeding at 45 DAS. The comparatively weed free condition provided by application of pretilachlor + safener at 5 DAS + hand weeding at 45 DAS had enhanced the tiller production and LAI which resulted in higher dry mass production (DMP) of rice. This is consistent with the findings of Karupiah (1995). The dual cropping of dhaincha in drum seeded rice enhanced the yield components *viz.*, panicles/m<sup>2</sup>, filled grains/panicle and higher grain yield (4286 kg/ha) than broadcasting. Drum seeding alone had comparable results with drum seeding + green manure. This might be due to weed free environment that prevailed during critical period of crop growth, lesser nutrient removal by weeds, higher value of growth parameters of rice such as tillers and DMP and also due to additional nutrient supply by the

decomposition of *in situ* incorporated dhaincha and weeds which increased the sink capacity of the crop.

Regarding weed management practices, the pretilachlor + safener at 5 DAS + hand weeding at 45 DAS recorded higher values of yield components *viz.*, panicles/m<sup>2</sup>, filled grains/panicle, and higher grain yield (5155 kg/ha) than cyhalofop-butyl at 15 DAS + hand weeding at 45 DAS and hand weeding twice at 20 and 45 DAS. This had increased the capacity of NPK uptake, Leaf area index (LAI) and sinks sizes which in turn increased the panicles number/m<sup>2</sup> and number of filled grains/panicle. Similar observations were also made by Gogoi *et al.* (2000). The hand weeding twice at 20 and 45 DAS and cyhalofop-butyl at 15 DAS + hand weeding at 45 DAS registered comparable grain yield.

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