

## Effect of nitrogen levels and weed management in hybrid rice

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### ABSTRACT

The effect of different levels of nitrogen (0, 100, 150 and 200 kg ha<sup>-1</sup>) and certain weeding practices on hybrid rice (ADTRH-1) were studied during both dry and wet season of 2003. Response of nitrogen was noticed up to 150 kg ha<sup>-1</sup> with the maximum grain yield of 5.80 t ha<sup>-1</sup>. In respect of weed management practices, highest rice grain yield was obtained with weed free (6.24 t ha<sup>-1</sup>) followed by butachlor 1.5 kg a.i. ha<sup>-1</sup> at 3 days after transplanting (DAT) + hand weeding at 40 DAT (5.78 t ha<sup>-1</sup>) and the effect was comparable with that of hand weeding at 20 and 40 DAT.

**Key words:** Hybrid rice, nitrogen levels, weed management

Weeds are considered to be a major constraint in achieving higher rice yield that caused a reduction of 10-90 percent grain yield in Indian rice fields (Nair *et al.*, 2000). Studies on the response of rice hybrid to various levels of nitrogen in combination with different weeding practices is not well documented and hence a field investigation was carried out at the Experiment Farm, Annamalai University during dry season (Feb-June) and wet season (June-October) of the year 2003 with hybrid rice ADTRH-1 in a randomized block design using factorial technique involving two factors (nitrogen levels and weeding practices) replicated thrice. Nitrogen levels were 0, 100, 150 and 200 kg ha<sup>-1</sup> while weeding practices consisted of six treatments viz., weedy check, weed free, butachlor 1.5 kg a.i. ha<sup>-1</sup> at 3 days after transplanting (DAT) butachlor 1.5 kg a.i. ha<sup>-1</sup> at 3 DAT + hand weeding at 40 DAT, one hand weeding at 20 DAT and weeding at 20 and 40 DAT. The soil was clay loam having pH 7.3, organic carbon 0.96%, available nitrogen 249.5 kg ha<sup>-1</sup>, P<sub>2</sub>O<sub>5</sub> 1865 kg ha<sup>-1</sup> and K<sub>2</sub>O 310.55 kg ha<sup>-1</sup>. Phosphorus and potassium each @ 60 kg ha<sup>-1</sup> was uniformly applied to all the plots. Nitrogen was applied as per treatment schedule in split doses, 50 per cent at basal, 25 per cent at maximum tillering and 25 per cent at panicle primordial initiation stage. Entire phosphorus and 75 percent K<sub>2</sub>O were applied as basal while 25 per cent K<sub>2</sub>O was applied at primordial initiation stages. Twenty-three day old seedlings of rice were planted with a spacing

of 20x20 cm. Butachlor was applied 3 days after transplanting using 600 lit of water ha<sup>-1</sup> in a high volume hand operated sprayer. Observation on weed count, weed dry weight, productivity tillers, filled grains/number of panicle<sup>-1</sup> and grain yield plot<sup>-1</sup> were estimated using standard procedure.

The major weed species of the experimental consisted of *Echinochloa colonum* (L.), *E. crusgali* (L.), *Cyperus rotundus* (L.), *C. difformis* (L.), *Sphenoclea zeylanica* (G.) and *Bergia capensis*.

Weed population increased with increasing levels of N and the increase was significant up to 150 kg ha<sup>-1</sup> (Table 1). With regard to weeding practices, weed free check recorded the least weed count (3.72 and 3.61 in the dry and wet season respectively) and followed by butachlor @ 1.5 ai kg ha<sup>-1</sup> + handweeding at 40 DAT (W<sub>4</sub>) (5.07 and 5.37 m<sup>-2</sup> in the dry and wet season, respectively). Interaction effect was significant on weed dry matter production between N levels and weeding practices (Table 2). Least weed dry matter production, next to weed free was recorded with W<sub>4</sub> (155 and 182 g m<sup>-1</sup> in the first and second season, respectively) and two hand weedings at 20 and 40 DAT (W<sub>6</sub>) recorded a similar weed dry matter production (165 and 188 g m<sup>-2</sup> in the dry and wet season, respectively) as that of W<sub>4</sub>. Increase in N levels did not increase the weed dry matter in W<sub>4</sub>, W<sub>6</sub> and W<sub>2</sub> but not with the other weeding practices. A similar report

**Table 1. Effect of nitrogen levels and weed management on total weed count and yield of hybrid rice ADTRH-1**

Treatment	Total weed number m <sup>2</sup>		Productive tillers m <sup>2</sup>		Filled grains panicle <sup>-1</sup>		Gain yield (t ha <sup>-1</sup> )		Weed control efficiency (%)	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Nitrogen levels										
Control	(27.28) 4.84	(26.40) 5.06	246	231	72	69	3.85	3.80	(58.00) 7.64	(76.50) 7.54
100 kg N ha <sup>-1</sup>	(37.31) 5.47	(39.84) 6.31	369	356	88	84	5.05	4.91	(60.00) 7.77	(57.00) 7.58
150 kg N ha <sup>-1</sup>	(42.20) 6.07	(43.57) 6.60	423	417	107	104	5.62	5.47	(58.00) 7.64	(56.30) 7.53
200 kg N ha <sup>-1</sup>	(47.40) 6.45	(48.50) 7.00	425	419	108	104	5.71	5.55	-	-
CD (P=0.05)	0.49	0.56	2	2	2	1	0.24	0.25	-	-
Weeding practices										
W <sub>1</sub> -Weedy check	(81.35) 8.99	(85.56) 9.25	241	226	75	71	3.80	3.71	-	-
W <sub>2</sub> -Weed free	(3.72) 1.90	(3.61) 2.02	449	429	109	105	6.24	6.17	(98.00) 9.92	(96.50) 9.84
W <sub>3</sub> -Butachlor 1.5 kg ai ha <sup>-1</sup> at 3 DAT	(46.02) 6.74	(49.00) 7.00	360	340	87	84	4.55	4.38	(44.00) 6.67	(41.00) 6.44
W <sub>4</sub> -Butachlor 1.5 kg ai ha <sup>-1</sup> at 3 DAT + hand weeding at 40 DAT	(26.47) 5.07	(28.83) 5.37	411	400	104	101	5.78	5.63	(75.00) 8.68	(72.00) 8.51
W <sub>5</sub> - hand weeding at 20 DAT	(47.89) 6.88	(50.97) 7.14	358	338	85	82	4.35	4.20	(42.50) 6.55	(40.50) 6.40
W <sub>6</sub> - hand weeding at 20 and 40 DAT	(27.29) 5.20	(30.47) 5.52	407	398	102	100	5.62	5.50	(74.00) 8.63	(72.00) 8.51
CD (P=0.05)	0.60	0.61	3	2	2	2	0.30	0.31	-	-

Figures in parentheses indicate original values and other  $\sqrt{X}+0.5$  transformed values.  
DAT (Days after transplanting)

**Table 2. Interaction between Nitrogen and weed control methods on weed dry weight (gm<sup>2</sup>).**

Weeding practices	Nitrogen levels										
	Season	N <sub>0</sub>		N <sub>100</sub>		N <sub>150</sub>		N <sub>200</sub>		Mean	
		Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
W <sub>1</sub> -Weedy check	550.44	600.00	723.87	778.63	807.05	867.71	840.18	900.18	730.38	786.63	
W <sub>2</sub> -Weed free	28.36	35.66	32.12	40.13	34.33	44.28	38.44	48.40	33.31	42.13	
W <sub>3</sub> -Butachlor 1.5 kg ha <sup>-1</sup> at 3 DAT	350.36	396.36	400.55	469.99	449.58	512.91	471.58	521.00	418.83	475.06	
W <sub>4</sub> -Butachlor 1.5 kg ai ha <sup>-1</sup> at 3 DAT + hand weeding at 40 DAT	155.48	182.48	183.51	209.55	203.29	240.66	220.49	255.15	190.68	221.96	
W <sub>5</sub> - hand weeding at 20 DAT	361.65	410.00	411.57	478.00	455.93	518.00	478.06	539.00	426.76	486.25	
W <sub>6</sub> - hand weeding at 20 and 40 DAT	165.06	188.62	192.71	218.00	212.53	248.04	230.04	260.52	199.84	228.79	
Mean	268.56	302.18	324.06	365.72	360.40	405.26	379.79	420.70	-	-	
CD (P=0.05)	Dry season		Wet season								
N levels	28.28		30.17								
Weed management	34.63		36.95								
N X W	69.27		73.90								

was earlier reported by (Sing *et al.*, 2001)  $W_2$  recorded the highest WCE of 98% followed by  $W_4$  and  $W_6$  (74%).

Rice grain yield increased with increasing levels of N (Table 1). Highest rice grain yield (5.62 and 5.47 t ha<sup>-1</sup> in the dry and wet season respectively) was obtained with N 150 kg ha<sup>-1</sup>. Yield response of hybrid rice was noticed up to 150 kg ha<sup>-1</sup> (Samrathlal Meena *et al.*, 2003). Next tow weed free,  $W_4$  recorded the highest rice grain yield (5.78 and 5.63 t ha<sup>-1</sup> in the dry and wet season, respectively) and  $W_6$  produced a similar and equal effect as that of  $W_4$ . Weed free environment diverted all the available resources towards crop utilization and resulted in highest rice grain yield (Manjulatha and Reddy, 1998).

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