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Weed competitiveness of a few transplanted *ahu* rice (*Oryza sativa*) varieties

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ABSTRACT

A field experiment was conducted during autumn (*ahu*) season of 1994 and 1995 at Karimganj to study weed competitiveness of a few transplanted *ahu* rice (*Oryza sativa* L.) varieties. Grain yield loss due to weed competition in IR 36 was 7.30% in 1994 and 17.63% in 1995 compared to about 10-18 and 22-37% in respective years in Lachit, Chilarai, Rasi, Cauvery, Kmj 10-3-1 and Kasalath. IR 36 also recorded the lowest weed population and weed dry weight among the varieties.

Key words: Weed competition, Rice, Varieties

Rice (*Oryza sativa* L.), the staple cereal of eastern India including Assam, is mainly grown as transplanted *ahu* (autumn) and *sali* (winter) crops. In rainfed medium and lowlands, conditions favour weed germination and growth especially in case of *ahu* rice which is transplanted in April/ May depending on the pre-monsoon showers. Although transplanting gives rice a head start over weeds, uncontrolled weeds can still reduce rice yield as much as 50% in rainfed lowlands (Ampong - Nyarke and De Dutta, 1991).

Herbicides are most effective in weed control but emphasis now-a-days is on integrated approach of weed management for sustainable crop production. In integrated approach, eco-friendly options like bio-herbicides, allelopathy and weed competitive rice varieties are promising avenues. Hence to study the competitive ability of a few transplanted *ahu* rice varieties against weeds, this investigation was planned.

MATERIALS AND METHODS

The experiment was laid out in a split - plot design at the Regional Agricultural Research Station, Karimganj during 1994 and 1995 with 3 replications taking varieties in main plots and weediness in sub-plots. The varieties were Lachit, Chilarai, Rasi, IR 36, Kmj 10-3-1, Cauvery (all semidwarfs) and Kasalath (traditional tall). Sub-plot treatments were weed-free and weedy. Weed-free condition was created throughout the experiment by careful hand-weeding at regular intervals whenever necessary.

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The field soil was clay-loam with pH 5.6, organic carbon 1.31%, 11.2 kg/ha available P_2O_5 and 145.6 kg/ha available K_2O. Fertilizers were applied at 40 : 20 : 20 kg/ha N, P_2O_5 and K_2O respectively as per recommendation.

Twenty five days old rice seedlings were planted at a spacing of 25 × 15 cm during mid May and the crop was harvested during August in both the years.

The weeds under the weedy situation were counted by randomly placing a 0.50 m × 0.50 m quadrate in the two spots in each plot at 60 DAT. Weeds were sun-dried after washing off the roots, oven-dried at 70°C for 24 hours and weighed. Leaf area/hill of rice varieties was computed by length-width method at 60 DAT and leaf area index (LAI) was calculated. Light transmission ratio (LTR) in the rice varieties was calculated after measuring light intensity above the rice canopy and at the ground level with lux meter at 60 DAT.

RESULTS AND DISCUSSION

Effect of varieties on weeds

The experimental site was infested mainly with sedges and broad-leaved weeds. The dominant species were, *Scirpus erectus* L., *Fimbristylis miliaceae* (L.) Vahl, *Cyperus iria* L., *Ludwigia octovalis* (Jacq.) Raven and *Monochoria vaginalis* (Burm. f.) Presl.

Weed infestation varied due to variety (Table 1). IR 36 suppressed the weed population effectively and dry weight of weeds significantly. This may be attributed to its weed competitiveness due to more LAI, less LTR (Table 1) and better biomass production (Table 2). Kasalath and Rasi were also associated with lesser weed infestation. Though Kasalath, a tall local variety, exhibited significantly higher LAI and lower LTR (barring IR 36 in 1994) than other varieties; it could not match IR 36 in weed suppression perhaps because of its significantly lesser biomass production. LAI of Kasalath (5.0 in 1994, 3.8 in 1995) was the highest followed by IR 36 (4.7, 2.8) and Rasi (4.3, 2.6). Weed-free situation increased LAI (significantly in 1994) of varieties. Kasalath had the significantly lowest LTR (31.8% in 1994, 27.2 in 1995) followed by IR 36 (33.3%, 35.5%) and Rasi (35.0%, 37.7%)

Interaction of weediness and varieties was not significant except in case of LAI in 1995. However, more the LAI lesser was the LTR and consequently lesser the weed infestation.

Effect of weed competition on varieties

Main effects of weediness and varieties on grain yield were significant (Table 2). The varieties registered significantly more grain yield in weed-free than under weedy situation and IR 36 (39.85 q/ha in 1994 and 24.83 q/ha in 1995 mean yield) outyielded the other varieties. Rasi was the next best variety. The yield loss due to weed competition was also lesser in IR 36 (7.30% in 1994 and 17.63% in 1995) compared to about 10-18% and 22-37% in respective years in the other varieties.

The growth and yield of varieties were better in 1994 than 1995, probably due to adverse affect of heavy rainfall received at tillering and flowering stages during 1995.

Interaction effect was significant (Table 2). During both the years, IR 36 resulted in the best grain yield performance under weed-free situation. In 1994, IR 36 with 38.34 q/ha grain yield under weedy situation was significantly superior to Lachit (33.95 q/ha), Chilarai (34.36 q/ha), Kmj 10-3-1 (32.92 q/ha), Cauvery (33.95 q/ha), Kasalath

Table 1. Leaf area index, light transmission ratio, weed population and dry weight as influenced by rice varieties at 60 days after transplanting

Treatment	Leaf area index		Light transmission ratio (%)		Weed population/ m^2		Weed dry weight (g/m^2)	
	1994	1995	1994	1995	1994	1995	1994	1995
Weed control								
Weed free	4.6	3.1	33.6	34.3	0	0	0	0
Weedy	3.6	2.1	39.3	41.5	13.81*(191)**	11.44 (131)	9.66 (93.3)	7.78 (60.5)
CD (P = 0.05)	0.4	NS	NS	NS	Sig	Sig	Sig	Sig
Varieties								
Lachit	3.9	2.3	35.2	40.0	13.88 (196)	11.32 (131)	9.22 (86.6)	9.84 (97.4)
Chilarai	3.9	2.1	38.7	43.2	17.85 (328)	10.13 (105)	9.63 (95.4)	8.47 (72.9)
Rasi	4.3	2.6	35.0	37.7	9.83 (94)	11.10 (128)	7.98 (65.2)	8.34 (66.7)
IR 36	4.7	2.8	33.3	35.5	7.04 (50)	8.22 (68)	5.66 (32.6)	5.61 (31.9)
Kmj 10-3-1	3.6	2.0	39.9	39.9	14.32 (205)	10.48 (112)	10.16 (104.2)	7.86 (64.6)
Cauvery	3.3	2.3	39.1	42.1	14.38 (211)	10.21 (107)	12.11 (146.6)	7.39 (54.8)
Kasalath	5.0	3.8	31.8	27.2	11.57 (135)	9.49 (90)	8.93 (79.7)	7.03 (49.7)
CD (P = 0.05)	0.1	0.3	1.6	2.7	2.39	NS	1.40	1.31

* Square root transformed values; ** original data, Data on weeds as recorded under weedy situation were analysed in RBD

Table 2. Grain yield (q/ha) of transplanted *ahu* rice varieties as affected by weed competition

Weediness (W)	Varieties (V)							Mean (q/ha)
	Lachit	Chilarai	Rasi	IR 36	Kmj l0-3-1	Cauvery	Kasalath	
				1994				
Weed free	33.95	34.36	38.27	41.36	32.92	29.29	31.20	34.79
Weedy	29.77	28.32	33.88	38.34	28.74	24.42	28.12	30.23
Mean (q/ha)	31.86	31.34	36.08	39.85	30.83	26.85	29.66	
	(21.31)*	(17.58)	(11.47)	(7.30)	(12.70)	(16.63)	(9.87)	
				1995				
Weed free	18.24	21.95	26.47	27.23	21.40	21.81	21.26	22.62
Weedy	13.10	15.09	16.74	22.43	16.67	15.71	15.77	16.50
	15.67	18.52	21.61	24.83	19.03	18.76	18.52	
	(28.18)*	(31.25)	(36.76)	(17.63)	(22.10)	(27.69)	(25.82)	

		1994	*1995*
CD (P = 0.05)	for two V means averaged over all W	2.38	2.46
	two W means averaged over all V	0.56	0.53
	two W means at the same V	1.46	1.40
	two V means at same or different W	2.61	3.23

*Yield reduction in %

Figures in parentheses indicate % reduction in grain yield

(34.79 q/ha), and at par with Rasi (38.27 q/ha) under weed free situation. In 1995, IR 36 (22.43 q/ha) under weedy situation produced significantly more grain yield than Lachit (18.24 q/ha) and registered at par grain yield with Chilarai (21.95 q/ha), Kmj 10-3-1 (21.40 q/ha), Cauvery (21.81 q/ha) and Kasalath (21.26 q/ha) under weed-free situation. The superiority of IR 36 over other varieties was due to its weed competitiveness as well as high yielding abilities. This variety may be grown in areas where heavy weed infestation causes substantial yield loss of transplanted lowland *ahu* rice.

REFERENCE

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