

**Response of Rice to Crop Establishment and Weed Management**

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Rice is commonly taken as transplanted crop which requires heavy amount of labour in growing, uprooting of seedlings, puddling and seedling transplanting in the main field causing rise in the cost of production. In many regions, farmers fail to undertake timely transplanting which results in reduction of rice yield. The alternative to puddling and transplanting could be different methods of direct seeding because these do not require heavy amount of labour and crop matures early (7-10 days) than transplanted allowing timely planting of succeeding wheat crop (Giri, 1998). But heavy weed infestation causing poor establishment, growth and development of rice crop is major problem with direct seeding in the rainy season.

Keeping in view the above facts, a field experiment was conducted comprising different methods of crop establishment and weed management practices in rice crop during **kharif** season of 2001. The soil of the experimental field was silty clay loam in texture with pH 7.65, organic carbon 0.95%, low in available nitrogen, medium in available phosphorus and high in available potassium. The experiment was conducted in split plot design with four replications. There were five main plots comprising rice establishment methods viz., TP (transplanting of rice seedlings after puddling), WS (sowing of sprouted seeds by drum seeder after puddling), DS (dry seeding after conventional tillage), DSF (dry seeding after conventional tillage but before final tillage a flush of irrigation) and ZT (dry seeding without any tillage operation with application of glyphosate at 0.5 kg ha<sup>-1</sup>, before sowing) and sub-plot treatments were To (no weed control), Hw (one hand weeding at 30 days crop stage) and Cw (weed-free with pre-emergence best bet herbicide followed by two hand weedings at 30 and 60 days). In Cw treatment, pre-emergence butachlor at 1.5 kg ha<sup>-1</sup> was used in TP

plots, early post-emergence anilofos at 0.5 kg ha<sup>-1</sup> in the WS plots and pre-emergence pendimethalin at 1 kg ha<sup>-1</sup> in DS, DSF and ZT plots were applied. Weed species noticed at 28 days were : *Echinochloa colona* (3.7%), *Ischaemum rugosum* (2.5%), *Fimbristylis miliacea* (58.7%), *Panicum maximum* (2.4%), *Cyperus rotundus* (9.1%), *Cyperus difformis* (10.4%), *Caesulia axillaris* (10.6%), *Commelina benghalensis* (0.7%) and others (1.3%). *E. colona* was distributed more or less equally in all the establishment methods, *F. miliacea* was found more in wet seeded condition, whereas *C. axillaris* and *C. benghalensis* were found more in dry seeded condition.

Interaction between rice establishment methods and weed control practices was found significant with respect to dry weight of weeds (Table 1). Transplanting recorded significantly lower weed dry weight in all the weed management practices as compared to all other establishment methods including WS. In the dry seeding conditions, DSF recorded lower dry weight of weeds than both DS and zero tillage method of crop establishment. Moorthy (1992) also reported that stale seed bed was superior to conventional tillage in controlling the weeds. Application of herbicide caused significantly lower dry weight than weedy check and Hw in all the establishment methods.

The repercussion of establishment and weed management was clearly seen in weed infestation and final effect on grain yield. The pattern of weed dry weight had a conspicuous impact on grain yield (Table 2). In the absence of any weed control practices, transplanting recorded 5.6 t ha<sup>-1</sup> grain yield, whereas WS obtained 0.8 t ha<sup>-1</sup> and no grain yield in dry seeding methods. In one hand weeded plots, transplanting again recorded significantly higher grain yield than other methods, however, wet seeding method (WS) produced 5.1 t ha<sup>-1</sup>, while the

Table 1. Effect of establishment methods and weed management practices on total weed dry weight (g m<sup>-2</sup>) at 56 days crop stage

Rice establishment	Weed management		
	Weedy (To)	One hand weeding (Hw)	Weed-free (Cw)
T P	3.64 (39.4)	3.33 (27.2)	3.13 (21.9)
WS	4.77 (117.7)	3.60 (35.7)	3.14 (23.2)
DS	6.04 (419.5)	4.20 (66.2)	3.79 (43.2)
DSF	5.74 (311.0)	4.06 (57.2)	3.54 (33.7)
Z T	5.77 (322.2)	4.21 (66.7)	3.70 (39.7)
		S. Em±	LSD (P=0.05)
1. To compare establishment methods at the same level of weed management practices		0.05	0.15
2. To compare weed management practices at the same level of crop establishment methods		0.05	0.14

Table 2. Effects of establishment methods and weed control practices on grain yield (t ha<sup>-1</sup>) of rice

Rice establishment	Weed management		
	Weedy (To)	One hand weeding (Hw)	Weed-free (Cw)
T P	5.6	6.6	8.0
WS	0.8	5.1	8.1
DS	0.0	0.9	0.9
DSF	0.0	1.6	6.8
Z T	0.0	1.5	6.6
		S. Em±	LSD (P=0.05)
1. To compare establishment methods at the same level of weed management practices		0.06	0.16
2. To compare weed management practices at the same level of crop establishment methods		0.03	0.09

Table 3. Economics (net return in Rs. ha<sup>-1</sup>) as influenced by establishment methods and weed control practices

Rice establishment	Weed management		
	Weedy (To)	One hand weeding (Hw)	Weed-free (Cw)
T P	19080	23320	29459
WS	-6665	16595	31829
DS	-12606	-8376	20061
DSF	-12646	-4336	24031
Z T	-11942	-3992	24238

Data were not analyzed statistically.

yields in dry sowing methods were reduced drastically. With application of herbicides followed by two hand weedings at 30 and 60 days after sowing wet sowing method recorded quantitatively higher but statistically at par grain yield with transplanting.

De Datta (1981) found that under good management practices, yield of puddle seeded rice was often higher than transplanted rice. Among dry seeding methods DSF produced significantly higher yield followed by zero tillage (ZT) and lowest in DS crop.

Positive net returns were obtained in all the establishment methods with Cw weed management, whereas in weedy plots only transplanting (TP) and in single hand weeded plot at 30 days, transplanting and wet seeded establishment methods were able to obtain positive returns. Wet seeded plots (sowing of sprouted seeds in puddle condition) with use of herbicides and two hand weedings done at 30 and 60 days obtained maximum returns (Rs. 31829) followed by transplanting with similar weed management (Table 3).

## REFERENCES

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