

## Weed management in direct sown rice

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### ABSTRACT

Field experiments were conducted during the wet seasons of 2002, to 2004 at Modipuram to find out the most effective weed control method in direct-sown rice. Results indicated that stale seedbed produced higher rice yield ( $3.58 \text{ t ha}^{-1}$ ) as compared to traditional seedbed ( $3.27 \text{ t ha}^{-1}$ ). Among weed control treatments, herbicide (Pendimethaline at  $1.2 \text{ kg a.i. ha}^{-1}$ ) + one hand weeding ( $5.14 \text{ t ha}^{-1}$ ) and criss- cross sowing + herbicide + one hand weeding ( $5.52 \text{ t ha}^{-1}$ ) produced comparable yield but significantly superior to hand weeding under taken twice. The highest net return (Rs  $15556 \text{ ha}^{-1}$ ) was recorded under criss- cross sowing + herbicide+ one hand weeding.

**Key words:** Direct sown, rice, weed control, herbicide

Rice (*Oryza sativa* L.) is usually established by transplanting in puddled field. It requires huge amount of energy input for raising seedlings, puddling transplanting, irrigations etc. With the advancement in the technology, the use of the energy resources has increased markedly. Rice can be established in different methods viz, transplanting, direct sown in wet and dry condition. Under direct seeding in dry conditions, weeds are a major constraint to rice productivity because both rice and weeds germinate almost simultaneously. Grassy weeds are more difficult to control because of their similarity to rice. Weeds can reduce the yield of dry-seeded rice up to 60 per cent. Keeping this in view, present investigation was conducted on the effect of weed management practices on productivity and profitability of direct sown unpuddled rice in north-west Uttar Pradesh.

Field experiments were carried out at Modipuram, Meerut during wet seasons of 2002 to 2004. The soil was sandy loam consisting of 63.7, 19.1 and 17.2 per cent sand, silt and clay, respectively. The pH, electrical conductivity, organic carbon, available P and available K were 8.20, 0.47 dS  $\text{m}^{-1}$ , 0.37 per cent  $3.4 \text{ mg kg}^{-1}$  and  $35 \text{ mg kg}^{-1}$  of soil, respectively. The rice cultivars Pant 12 was sown in two seedbed preparations (i.e. stale seedbed and traditional seedbed) in main plot at 20 cm apart rows within  $45 \text{ kg seed ha}^{-1}$  during second week of June. Five weed management treatments viz., hand weeding twice, herbicide (Pendimethalin at  $1.2 \text{ kg ha}^{-1}$ ) + one hand weeding,

criss-cross sowing + one hand weeding, criss-cross sowing + herbicide + one hand weeding and unweeded check were put in sub plot with three replications. For stale seedbed, preparation the field was irrigated once in April, two cross harrowing + one cultivator + one planking were performed, thereafter, it was left for germination of weed seeds for about 15 days. After germination of weed seeds, field was finally prepared by resorting to one shallow plowing with cultivator followed by planking. In traditional seed bed, two harrowing + two cultivator + one planking were done during sowing to prepare a well pulverized seedbed. A uniform dose of fertilizer was applied at 37 kg N, 60 kg P and 60 kg K plus 20 kg Zn  $\text{ha}^{-1}$  as a basal dose and rest nitrogen in two spilt of 56.5 kg N doses at 25 days after sowing (DAS) and at 55-60 DAS was topdressed uniformly on rice. Weed number and weed dry matter  $\text{m}^{-2}$  were taken as 45 days after sowing using  $0.25 \text{ m}^2$  quadrat ( $0.5 \text{ cm} \times 0.5 \text{ cm}$ ). The hand weeding was done at 25-30 DAS and 50-55 DAS for rice crop according treatment.

The dominant weeds found in the rice field were *Cyprus rotundus*, *Echinochloa colona*, *Echinochloa crus-galli*, *Cyperusiria*, *Eclipta alba*, *Setaria glauca* and *Celosia argentea*. Among the weed species, *Celosia argentea* and *Cyprus rotundus* were not controlled fully by pendimethalin. The number ( $172 \text{ m}^{-2}$ ) and dry weight of weeds ( $244.0 \text{ g m}^{-2}$ ) were significantly lower under stale seedbed compared to traditional tillage system ( $193 \text{ g m}^{-2}$ ,  $291.3 \text{ g m}^{-2}$ ,

**Table 1. Effect of seedbed preparation and weed management practices on yield attributes, weeds population, grain yield, net return and weed control efficiency in rice. (pooled data of 2002-2004)**

Treatments	Panicle (m <sup>2</sup> )	Panicle wt.(g)	Grain yield (t ha <sup>-1</sup> )	Net return (Rs. Ha <sup>-1</sup> )	Weeds no. (m <sup>2</sup> )	Dry weight of weeds (gm <sup>2</sup> )	WEC (%)
<b>Seed Bed method</b>							
Stale seed bed	299	2.85	3.58	7816.00	172	244	68
Traditional seed bed	281	2.71	3.27	5675.00	193	291	66
CD (P=0.05)	12.31	NS	NS	-	11.58	36.21	-
<b>Weed control</b>							
Hand weeding twice	338	3.02	4.53	10787.33	35	83	90
Herbicide + one hand weeding	355	3.09	5.14	15134.67	6	21	98
Criss-cross sowing + one hand weeding	178	2.46	2.27	-671.33	314	397	51
Criss-cross sowing + herbicide+ one hand weeding	360	2.85	5.21	15556.00	13	27	97
Weedy	53	2.71	0.51	-8587.00	548	811	0
CD (P=0.05)	14.57	NS	0.24	-	38.35	48.25	-

respectively). Though number of weeds m<sup>2</sup> was at par among treatments of hand weeding twice (35), herbicides + one hand weeding + criss-cross sowing and herbicide +one hand weeding but dry weight of weeds was significantly lower in herbicide + one hand weeding (21 g m<sup>2</sup>) and herbicide + one hand weeding + criss-cross sowing (27 g m<sup>2</sup>) as compared to hand weeding twice (83 g m<sup>2</sup>), (Table 1). Among the weed control treatments, hand weeding recorded significantly higher weed population (35) and weed dry biomass (83 g m<sup>2</sup>) than chemical weeding. This might be due to the growth of surviving weeds and resurgence of weed population with new flushes. The results confirm the findings of Johri and Singh, 1991). Among the weed control treatments 98 % weed control efficiency (WCE) was registered in herbicide + one hand weeding and herbicide + one hand weeding + criss-cross sowing as compared to the hand weeding twice with WCE (90 %).

The stale seed bed produced higher mean yield of rice (3.58 t ha<sup>-1</sup>) as compared to traditional seedbed (3.27 t ha<sup>-1</sup>). Among weed control treatments, herbicide + one hand weeding + criss-cross sowing (5.12 t ha<sup>-1</sup>) and herbicide + one hand weeding (5.14 t ha<sup>-1</sup>) gave similar yield but significantly superior to two hand weeding (4.53 t ha<sup>-1</sup>) (Table 1). Stale seedbed in rice resulted in significantly higher number of effective tillers m<sup>2</sup> compared to traditional seedbed preparation. Panicle weight and 1000 grain weight were numerically higher in stale seedbed than traditional seedbed preparation. Among weed control treatments, herbicide + one hand weeding and criss cross sowing, herbicide + one hand

weeding and hand weeding twice resulted similar yield attributing characters but significantly higher tyield han one hand weeding and unweeded check (Table 1). These findings confirmed the results of Sharma (2003). The net returns (Rs 7816 ha<sup>-1</sup>) were higher in stale seedbed compared to traditional seedbed preparation (Rs 5675 ha<sup>-1</sup>). Among the weed management practices, highest net return (Rs 15556 ha<sup>-1</sup>) was recorded under criss-cross sowing + herbicide + one hand weeding followed by use of herbicide + one hand weeding (Rs 15135 ha<sup>-1</sup>) but resulted higher net returns than two hand weeding (Rs 7816 ha<sup>-1</sup>). Similar results were also reported by Singh *et al.* (2000).

Thus, spraying of Pendimethelin at 1.2 kg a.i. ha<sup>-1</sup> followed by criss cross sowing + one hand weeding order at 40 days after sowing and stale seedbed preparation may be good for controlling weeds in western Uttar Pradesh.

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