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Integrated Weed Management in Jute (*Corchorus* spp. L.)

A. K. Ghorai, A. K. Chakraborty, N. C. Pandit and R. K. Mandal
Central Research Institute for Jute and Allied Fibres, Barrackpore, Kolkata (W. B.), India

In jute, conventional manual weeding accounts for 40% of the total cost of cultivation and fibre yield reduction is upto 70%, if remains unweeded. A survey on weed flora in jute growing area (Saraswat, 1999) indicated that grassy weeds contributed about 60-70% of the total weed population. To suppress weeds in jute field culturally, short duration leafy vegetables red amaranth (*Amaranthus tricolor*) and summer radish (*Raphanus sativus*) as mixed/inter-crop may be used which may also generate an early revenue at 21-35 days after sowing (Ghorai *et al.*, 2004). The experimental soil was loam in texture having bulk density of 1.45 g cc^{-1}, pH 7.2, available nitrogen 238 kg ha^{-1} phosphorus 36 kg ha^{-1} and potassium 198 kg ha^{-1}. Variety JRO 524 was used with a fertilizer dose of 40 : 20 : 20 :: N : P_2O_5 : K_2O.

Line sown and irrigated jute experiment was conducted in RBD with eight treatments replicated thrice. The treatments consisted of unweeded control, hand weeding (HW) twice at 21 & 35 days after emergence, rice straw mulch at 5 t ha^{-1} at three days after emergence+2 HW, rice straw mulch at 10 t ha^{-1} at three days after emergence+2 HW, red amaranth (50 kg seed ha^{-1}, intercropped at sowing time)+2 HW, quizalofop-ethyl at 45 and 60 g ha^{-1} in between rows of jute at 21 days after emergence+1 HW and blanket spray of quizalofop-ethyl at 45 g ha^{-1} at 35 days after emergence. Mustard (cv. B-9) was grown after jute in sequence to see the residual effect of quizalofop-ethyl.

The dominant weed flora consisted of *Echinochloa colona*, *Digitaria* spp., *Cynodon dactylon*, *Cyperus rotundus*, *Euphorbia hirta*, *Phylanthus niruri*, *Portulaca* spp. and *Physalis minima*. Grassy weeds accounted for 93% of the total weed population, whereas sedge and broadleaved weeds were 5 and 2%, respectively (Table 1).

Cultural Control

Red amaranth smothered weeds in jute field without compromising its fibre yield (Table 1).

Table 1. Effect of treatments in line sown jute on weeds and crops

Treatment	Weed count (No. m^{-2})			Weed dry weight ($g\ m^{-2}$) 21 & 35 DAE	Jute yield (t ha^{-1})	Net return (Rs. ha^{-1})	Mustard yield (kg ha^{-1})
	Grasses	Sedges	Broadleaved				
Rice straw mulch 10 t ha^{-1}+2 HW	349	51	16	204	3.5	10028	1074
Rice straw mulch 5 t ha^{-1}+2 HW	740	30	6	364	3.0	3609	908
Jute+red Amaranth+2 HW	1001	41	12	308	2.9	7856	1278
				35.6*	5.9		
Two hand weedings	1068	72	16	598	2.6	(-) 2800	870
Quizalofop-ethyl 60 g ha^{-1} in rows+1 HW	1513**	42	10	573	2.5	7382	870
Quizalofop-ethyl 45 g ha^{-1} in rows+1 HW	1120**	70	9	346	2.4	6060	925
Quizalofop-ethyl 45 g ha^{-1}, blanket at 35 DAE	848**	89	12	458	1.2	3304	944
Unweeded control	1025	56	23	450	1.2	(-) 271	685
LSD (P=0.05)	603.83	NS	NS	159	0.7		NS

NS–Not Significant. *, **Significant at P=0.05 and P=0.01 level, respectively.

The weed smothering efficiency (WSE) was 49%. Jute fibre yield from this intercropping system and conventional manual weeding twice were 2.9 and 2.6 t ha^{-1}, respectively. It yielded an additional amount of red amaranth, 5.9 t ha^{-1} at 21 days after emergence. The fibre yield loss in unweeded plots was about 46%. The net return from this cultural method was Rs. 7856 ha^{-1}, whereas negative return was observed from manual weeding twice (Table 1).

Rice straw mulch at 10 t ha^{-1} in between rows increased the fibre production by 33% over conventional manual weeding twice (Table 1). At 21 days after emergence, mulching reduced weed dry matter by 66% over manual weeding. This fibre yield improvement is attributed to effective weed control, less nutrient mining by weeds and better hydrothermal regime of soil through mulching over bare soil cultivation (Ghorai and Bera, 1998). A total of 92 man days ha^{-1} (58 for spreading the mulch and 34 man-days for manual weeding at 21 days after emergence) were required for weeding and thinning operations. Mulched plots produced relatively higher yield of mustard than that of manually weeded plots without mulching (Table 1) in sequence. The net return from this organic approach was Rs. 10028 ha^{-1}.

Foliar spray of quizalofop-ethyl at 45 to 60 g ha^{-1} using flood jet nozzle, no. 70 at 15 to 21 DAE was very effective against grassy weeds without affecting fibre yield (Table 1). It showed no symptom of phytotoxicity on jute. Effect of direct application of this herbicide on the crop at 35 days after emergence was poor because the crop was already engulfed by *E. colona* at that stage. This herbicide did not show any residual effect on mustard (Table 1). Maximum net return from quizalofop-ethyl at 60 g ha^{-1} was Rs.7382 ha^{-1}.

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