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Short communication

Weed management in jute (*Corchorus olitorius* L.) by post emergence herbicides

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Abstract

A field experiment was conducted in the medium fertile neutral soil (pH 7.1) of Barrackpore, West Bengal to screen post-emergence herbicides for weed management in jute (cv. JRO 524). Highest weed control efficiency (WCE) of 96.6% was noted for the hand weeding treatment. Among the herbicides, Fenoxaprop-p-ethyl at 75 g ha^{-1} showed highest WCE (86.6%), closely followed by Quizalofop ethyl (79%). The dominant grass weed was *Echinochloa colona* (96%) and the broadleaved weeds (3%) included *Physalis minima* and *Phyllanthus niruri.* Post-emergence application of Fenoxaprop-p-ethyl @ 75 g ha^{-1} or Quizalofop ethyl @ 50 g ha^{-1} at 21 days after sowing (when the grass weeds are at four-leaf stage) effectively controlled the grass weeds giving higher jute fibre yield and net return per rupee invested (2.0 and 1.87 respectively).

Keywords: Fenoxaprop-p-ethyl, Quizalofop ethyl, Cyhalofop butyl, Economics.

Jute (*Corchorus olitorius* L.) is an important cash crop in the alluvial plains of West Bengal, Assam, Orissa, and Bihar. The hot and humid climate coupled with intermittent rainfall during the jute-growing season, however, encourages weed growth resulting in severe crop-weed competition (Saraswat, 1999); yield losses may be up to 75 to 80% (Sahoo and Saraswat, 1988); implying the need for judicious weed management. Grasses constitute the dominant weed flora in jute fields and its management using pre-emergence herbicides like Trifluralin is possible (Sarkar et al., 2005), provided the farmers get sufficient time for land preparation and herbicide application before sowing. Under rainfed situations, however, the farmers sow jute crop early to get the full benefit of the pre-monsoon showers and it may not be possible to delay the sowing even by a single day. Use of post-emergence herbicides such as Cyhalofop butyl, Quizalofop ethyl and Fenoxaprop-p-ethyl, which control weeds in broadleaved field crops like sunflower, soybean, and potato (Ito et al., 1998; Bedmar, 1997), therefore, holds promise. However, among the available post-emergence herbicides, only Quizalofop ethyl (5% EC) was found effective in controlling grass weeds of jute (Ghorai et al., 2004). Hence, a field experiment to study the effectiveness of a wider range of post-emergence herbicides for grass suppression in jute was conducted in the alluvial plains of West Bengal.

The study was carried out in a medium fertile neutral soil (pH 7.1) at Barrackpore, West Bengal (22.75°N, 88.43°E and 3 m altitude) with seven treatments [unweeded control, hand weeding twice (HW) at 3 and 5 weeks after sowing (WAS), Quizalofop ethyl @ 50 g ha^{-1}, Cyhalofop butyl @ 50 and 75 g ha^{-1}, Fenoxaprop-p-ethyl @ 50 and 75 g ha^{-1}] and three replications during 2005. The trial was laid out in randomised block design with 4 x 3 m plots. Jute seed (JRO 524) was sown at a row spacing of 25 cm in the third week of April and harvested 120 days later. All herbicides were applied as post-emergence spray 21 days after sowing (DAS), when the grass weeds were 3 to 4 leaf stage. All other standard

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agronomic practices including plant protection measures recommended for olitorius jute were followed. Observations on jute height, basal diameter, fibre yield, stick yield, type of weeds, and dry weight of weeds were recorded and analyzed using the analysis of variance technique. Weed dry weight data were transformed [$\sqrt{(x + 0.5)}$] before statistical analysis. Economic analysis was performed considering local market rates for inputs and the produce.

HW treatment (337 cm), which was statistically at par with Fenoxaprop-p-ethyl @ 75 g ha^{-1} (331 cm). Conversely, the unweeded control produced the shortest plants (239 cm). Basal diameter and stick yield of jute also followed a similar pattern (Table 1). HW treatment produced the highest fibre yield of 4205 kg ha^{-1}, while the lowest yield was in the unweeded check (1442 kg ha^{-1}). Fenoxaprop-p-ethyl at 75 g ha^{-1} and Quizalofop ethyl 50 g ha^{-1} showed the two highest fibre yields (4042

Table 1. Effect of post-emergence herbicides on weed growth, weed control efficiency, jute growth, yield, and production economics in Barrackpore, West Bengal.

Weed control methods	Dose (g ha^{-1})	Weed dry weight at 6 WAS (g m^{-2})	WCE (%)	PH (cm)	BD (cm)	Yield (kg ha^{-1})		Total costs (Rs ha^{-1})	Returns (Rs ha^{-1})		NRPRI
						Fibre	Stick		Total	Net	
Control	-	7.86 (61.35)	-	239	1.10	1442	3552	14000	16557	2557	0.18
Hand weeding (twice)	-	1.60 (2.06)	96.64	337	1.67	4205	9673	20300	47928	27628	1.36
Quizalofop ethyl	50	3.66 (12.90)	78.97	328	1.64	4025	9538	15500	44525	29025	1.87
Cyhalofop butyl	50	5.14 (25.88)	57.82	303	1.26	3491	8207	15188	39886	24698	1.63
Cyhalofop butyl	75	4.09 (16.25)	73.51	308	1.36	3545	8483	15631	40578	24947	1.60
Fenoxaprop-p-ethyl	50	4.05 (15.92)	74.05	310	1.31	3510	8176	15010	40066	25056	1.67
Fenoxaprop-p-ethyl	75	2.96 (8.25)	86.55	331	1.64	4042	9449	15364	46155	30791	2.00
CD (0.05)		3.68	-	29.4	0.39	640	1515				

Weed dry weight data represent $\sqrt{x+0.5}$ transformed values; values in parentheses indicate original; WAS weeks after sowing; WCE=weed control efficiency; PH = plant height of jute; BD = basal diameter of jute; NRPRI = Net return per rupee investment.

The dominant weeds were *Echinochloa colona* (L.) Link in the grass category (96%) and broadleaved weeds (3%) included *Physalis minima* L. and *Phyllanthus niruri* L. Very few *Cyperus rotundus* L. (<1%) was observed in the control plots. Highest weed dry weight was noted for unweeded control (61.4 g m^{-2}; Table 1) and the lowest (2.0 g m^{-2}) for HW, which is consistent with the observations of Ghorai et al. (2004) and Sarkar et al. (2005). Among the post-emergence herbicides tested, the lowest weed dry weight (8.25 g m^{-2}) was for Fenoxaprop-p-ethyl @ 75 g ha^{-1}, closely followed by Quizalofop ethyl (12.90 g m^{-2}). Highest weed control efficiency (WCE) of 96.6% was also recorded in the HW treatment, followed by Fenoxaprop-p-ethyl at 75 g ha^{-1} (86.6%) and Quizalofop ethyl (79%). Cyhalofop butyl at 50 g ha^{-1} had a relatively lower WCE (57.8%) compared to its higher dose (73.5%).

Height of jute plants at harvest was the highest in the

kg ha^{-1} and 4025 kg ha^{-1} respectively) among the chemical treatments. Although, fibre and stick yields were the highest in the hand weeded plots, due to high cost of manual labour, net return per rupee invested (NRPRI) was lower in this treatment (1.36). Post-emergence application of Fenoxaprop-p-ethyl @ 75 g ha^{-1} or Quizalofop ethyl @ 50 g ha^{-1} at 21 days after sowing (when the grass weeds were 3-4 leaf stage) not only controlled the grass weeds but also resulted in higher fibre yield and net returns.

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