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Bio-Efficacy of Napropamide for the Control of Weeds in Jute

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Abstract

A field trial was conducted in kharif season of 2000 to evaluate the weed controlling capability of napropamide at different doses in jute (*Corchorus olitorius* L.). Fluchloralin was included as standard herbicide whereas hand weeding was taken as conventional method. The finding shows that napropamide at 2.25—2.50 kg ai/hectare though could control broad spectrum of weeds in jute, these doses were highly phytotoxic causing heavy germination failure resulting low fiber yield (6.32 q/hectare). On the other hand, the herbicide fluchloralin was at par with the cultural treatment, hand weeding However, lower dose of napropamide has got its promising effect in controlling the weeds in jute for which this experiment should be repeated for conarmation.

Jute is one of the most important fiber crops which occupy a key place in the economy of the eastern states of Indian sub-continent. Weeds pose one of the serious problems in jute cultivation resulting a loss of more than 40% in fiber yield and total failure is not uncommon. Conventional method of weed control (hand weeding) constitutes one third of the total cost of cultivation as it demands around 180 mandays per hectare (1). Hand weeding is not only costly but also time consuming, and another important hurdle is non-availability of sufficient manual laborers during the peak period. Therefore, the way out is the chemical method of weed control. Several herbicides have been tested for effective weed control in jute but unfortunately no single herbicide could accomplish the task. A new herbicide, napropamide (devrinol 10G) (United Phosphorus Limited, Mumbai, India) proved its effectiveness in controlling weeds in several crops. Keeping this in view, an experiment was undertaken to evaluate this herbicide napropamide at different rates as pre-emergence application in jute.

Methods

The experiment was laid out in a randomized block design with eight treatments, four replications and with 5 m × 4 m plot size during the kharif season of 2000 at the University Teaching Farm (22°N, 89°E, 9.75 m AMSL), Mondouri, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, West Bengal. The experimental soil was sandy-loam in texture having medium fertility with neutral soil reaction (pH 6.94). The jute variety used in this experiment was JRO-524 (Nabin) and a spacing of 25 cm × 5 cm was maintained for all the plots. The crop was fertilized with 30 kg N, 25 kg P_2O_5 and 25 kg K_2O per hectare. Observations on weeds (weed count, weed dry weight) were taken at 30, 60 and 90 days after sowing (DAS). Jute fiber yield was also recorded at harvest.

Results and Discussion

Weed Flora Present

The important weed flora found in the ex-

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Table 1. Effect of herbicides on weed population (per m²) in jute. EI, *Eleusine indica*; PM, *Physalis minima*; CR, *Cyperus rotundus*.

Treatment	Dose (kg ai/ha)	60 DAS EI	60 DAS PM	60 DAS CR	90 DAS EI	90 DAS PM	90 DAS CR
Unweeded		17.25	32.50	19.75	25.00	37.25	27.50
Hand weeded		6.00	7.75	11.50	9 50	7.00	15.25
Fluchloralin	1.500	10.50	16.75	21.50	13.50	18.25	26.00
Napropamide	1.000	12.25	17.50	25.00	15.00	19.75	29.00
Napropamide	1.125	11.50	12.25	23.50	14.25	15.00	26.25
Napropamide	1.250	9.75	9.50	22.00	11.50	13 25	24.00
Napropamide	2.250	8.25	6.00	20.50	9.75	8.50	22.75
Napropamide	2.500	7.00	4.25	16.75	8.25	7.00	20.50
CD at 5%		3.66	6.60	3.56	3.73	4 54	3.20

perimental field were *Eleusine indica* (L.), *Cyperus rotundus* L., *Echinochloa colona* (L.), *Setaria glauca* (L.), *Pennisetum pedicellatum* Trin., *Physalis minima* L. and *Phyllanthus niruri*. This findings corroborate with the findings of other authors (2).

Effect on Weed

All the treatments significantly controlled the weed population over the unweeded control (Table 1) The number of weeds was less and weed dry weight was low at the initial phase of the crop growth (30 DAS). The higher dose of Napropamide (2.25—2.50 kg ai/hectare) showed better control of weeds, particularly the broad leaved weeds. Similar findings of controlling broad leaved weeds by napropamide (3 kg ai/hectare) were also reported earlier (3) in other crops. But in contrast, it was observed that higher dose of napropamide was phytotoxic to jute crop. Similar finding of phytotoxicity was also reported earlier (4—6). Although lower dose of napropamide (1.25 kg ai/hectare) showed comparatively less phytotoxicity but significantly controlled the weed population over the untreated control. *Cyperus rotundus* was the most obnoxious weed in the field which was unaffected by most of the herbicides including napropamide. Only higher dose of napropamide was slightly effective (36.05%) ag-

Table 2. Effect of herbicides on weed dry weight (g/m²) in jute. EI, *Eleusine indica*; PM, *Physalis minima*; CR, *Cyperus rotundus*.

Treatment	Dose (kg ai/ha)	60 DAS EI	60 DAS PM	60 DAS CR	90 DAS EI	90 DAS PM	90 DAS CR
Unweeded	0.000	18.92	46.53	8.52	23.73	59.43	19.25
Hand Weeded		4.24	6.21	4.02	6.14	8.13	7.63
Fluchloralin	1.500	6.41	24.26	8.86	11.74	29.24	16.24
Napropamide	1.000	7.33	24.50	9.97	12.90	31.56	17.91
Napropamide	1.125	6.87	17.13	9.33	12.21	24.75	15.82
Napropamide	1.250	5 88	12.96	8.78	9.89	21.57	14.46
Napropamide	2 250	4.95	8.43	7.57	8.77	14.33	13.64
Napropamide	2.500	4.22	6.18	6.16	7.41	11.69	12.31
CD at 5%		6.75	4.32	0.42	2.39	4.67	3.73

Table 3. Effect of herbicides on seed germination and fiber yield.

Treatment	Dose (kg ai/ha)	Germination (%)	Fiber yield (q/ha)
Unweeded		92.00	12.75
Hand Weeded		92.00	22.14
Fluchloralin	1.500	81.25	20.85
Napropamide	1.000	52.50	15.53
Napropamide	1.125	39.50	12.24
Napropamide	1.250	33.25	10.64
Napropamide	2.250	15.50	8.43
Napropamide	2.500	9.50	6.82
CD at 5%		8.44	3.73

ainst *C. rotundus* as evidenced from weed dry weight at the later phase of the crop growth (Table 2).

Effect on Crop

Phytotoxicity. The higher doses of napropamide (2.25—2,50 kg ai/hectare) resulted phytotoxicity to the crop and the rate of phytotoxicity was positively correlated with the doses of napropamide. Similar findings of phytotoxicity due to application of napropamide was reported earlier (4—6) in other crops.

Germination of the Crop Seed. It was observed that napropamide showed adverse effect on seed germination (Table 3). Negative correlation was observed between the concentration of napropamide and the germination percentage. In all the napropamide treated plots germination was affected adversely (9.5—52.5%). Similar findings was reported earlier in soyabean (7).

Fiber Yield

The highest fiber yield (22.14 q/hectare) was obtained in hand weeded plots which was statistically at par with fluchloralin (Table 3). Earlier similar result was observed with fluchloralin (8).

Due to phytotoxicity of napropamide and poor germination percentage resulting less crop stand, the fiber yield was as low as 30.80% as compared to the hand weeded plot; which was even lower than the yield of unweeded control. Though lower dose (1 kg ai/hectare) of napropamide yielded comparatively better results (70.14% of hand weeded yield).

Thus it may be concluded that though the herbicide napropamide was effective against broad spectrum of weeds (except *C. rotundus*) in jute, it caused not only poor seed germination but also showed phytotoxicity to the crop resulting low fiber yield. As napropamide does not persist long in the soil, residual effect of this herbicide did not affect the next crop in the rotation (9). However this experiment should be repeated for confirmation of the results.

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