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Integrated weed management in jute of *tarai* region of Uttar Pradesh

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ABSTRACT

A field experiment was conducted during 2014-15 and 2015-16 at Crop Research Station, Bahraich (U.P.) to study the effect of different chemical and cultural practices of weed control in Capsularis jute on fiber yield and economics of weed management practices. Six treatments viz,. T1- Pretilachlor 50% EC @ 900ml/ha at 45-48 hours of sowing with irrigation + one hand weeding (15 DAS), T2- nail under 1st at 5-6 DAE and 2nd at 10 DAE + one hand weeding at 15 DAE, T3- Jute + Green gram (Pant moong-5) (1:1), T4- Jute + Green gram (TMB-37) (1:1), T5- un-weeded check, T6- Two hand weeding at 15-20 DAE and 35-40 DAE were tested in randomized block design with three replications. Among all the methods of weed control, Jute + green gram (1:1) produced tallest plant (369.1cm), basal diameter (2.3cm), green biomass (393.02q/ha) and jute fiber yield (21.66 q ha^{-1}), Pant moong-5 yield 2.25 q ha^{-1} and jute equivalent yield of 25.54 q ha^{-1} with net profit of Rs.40953 and B:C ratio 1.46. Nutrient uptake data revealed that highest nutrient uptake N-85.2kg, P-40.5kg and K-95.8kg ha^{1} were recorded under treatment-3.

Keywords: Integrated weed management, fiber yield, economics

INTRODUCTION

Jute is an important fiber crop in India grown by small and marginal farmers. Jute crop faces serious weed infestation during its early growth period and can reduce fiber yield by 75 to 80 % if not controlled. The weed flora associated with jute includes all categories of weeds *viz.,* grasses,sedges and broad leaved. Grasses and sedges are the main competing flora where as broad leaved weeds poses comparatively less competition. The weed seed germinate along with the jute is a costly affair and cost around 40 % of total cost of production (Saraswat, 1980). Due to higher cost involvement and non-availability of farm laborers at peak time attempts are being made for chemical weed control by using pre and post emergence herbicides. *Tarai* region of Uttar Pradesh is having hot and humid climate coupled with maximum rainfall during jute season encourages good growth and yield of jute. These factors also encourage profuse growth of weeds. Therefore, top priority is to be given for controlling weeds in time to ensure high fiber yield. Keeping this view, present study was undertaken to reduce the crop weed competition and to suppress the weed growth at early stage of jute crop.

MATERIALS AND METHODS

The field experiment was conducted in a sandy loam soil for two years during 2013-14 and2014-15 at Crop Research Station, Bahraich (U.P.). The experimental soil had Ph 7.5, organic carbon 0.25, available N,P and K 240,15,and 225 kg ha^{1} , respectively. There were six treatment combination *viz,.* T1- Pretilachlor 50% EC @ 900ml/ha at 45-48 hours of sowing with irrigation + one hand weeding (15 DAS), T2- nail under 1st at 5-6 DAE and 2nd at 10 DAE + one hand weeding at 15 DAE, T3- Jute + green gram (Pant moong-5) (1:1), T4- Jute + Green gram (TMB-37) (1:1), T5- un-weeded check, T6- Two hand weeding at 15-20 DAE and 35-40 DAE. The experiment was laid out in randomized block design and treatments were replicated three times. Half dose of nitrogen and full dose of P and K were applied at the time of sowing as basal as urea, single superphosphate and muriate of potash, respectively. Remaining half dose of N was applied in two equal split as top dressing in crop at 35 and at 65 days of sowing. Jute variety JRO-524 was sown on 10.04.2013 and 10.04.2014 with 30 cm line to line spacing whereas 10 cm plant to plant distance was maintained by thinning at 20 and 30 days after sowing. Irrigations were done in crop after 10 days interval and intercultural operation were done according to need of crop. Jute crop was harvested at 120 days from date of sowing in both the years and intercrops were harvested after 90 days after sowing. The growth characters were recorded before harvesting of the crop at full growth stage and fiber yield and yield of green gram were recorded after harvesting of the crop. Weed biomass was recorded in field according to date of M.V. SINGH,

observation. The economics of each treatment were calculated on the basis of prevailing market price and of produce and inputs.

RESULTS AND DISCUSSION

Weed

The experimental field was infested with *Cyperus rotundus, Cynodon dactylon, Echinodhloa cona, Bracharia ramose and Fimbristyts miliacea* and major broad leaved weeds were *Malochia carchorifalia,Digera ravens, Euphorbia hirta, Phyllanthus niruri and amaranthusvirdis.* This might be due to fact that under row spacing of jute provided relatively conducive environment for growth of weeds. Similar findings were also reported by Singh et.al (2015), Sarkar and Bhattcharya (2005) and Majumdar *et al.* (2008).

Table 1: Effect of Integrated Weed Management on growth and yield jute crop (Mean of two yeara)

Treatment	Plant height (cm)	Basal diameter (cm)	Plant population Lakh/ha	Green weight (q/ha)	Jute fiber yield (q/ha)	Green gram seed yield (q/ha)	Jute equivalent yield (q/ha)	Net profit (Rs/ha)	B:C ratio
T_1	325.7	1.80	2.98	340.11	18.03	--	18.03	21178	0.77
T_2	346.6	1.90	2.94	359.79	19.42	--	19.42	26529	1.02
T_3	369.1	2.30	2.95	393.02	21.66	2.25	25.42	40953	1.46
T_4	366.1	2.20	2.96	375.45	20.45	2.15	24.15	37203	1.33
T_5	207.9	1.20	2.94	187.3	13.42	--	13.42	19378	1.15
T_6	371.3	2.50	2.95	403.81	22.28	--	22.28	29653	0.97
SEm	6.63	0.06	0.02	10.33	0.65	--	0.28		
CD (0.05)	11.4	0.19	NS	32.54	1.09	--	0.88		

T_1-Butilachlor 50% EC @ 900ml/ha at 45-48 hours of sowing with irrigation + one hand weeding (15 DAS), T_2-nail under 1st at 5-6 DAE and 2nd at 10 DAE + one hand weeding at 15 DAE, T_3- Jute + Green gram (Pant moong-5) (1:1), T_4- Jute + Green gram (TMB-37) (1:1), T_5- unweeded check, T_6- Two hand weeding at 15-20 DAE and 35-40 DAE

Total weed biomass

The data on weed biomass (Table 2) indicated that chemical and cultural methods of weed control resulted in considerable reduction in total weed biomass at all the growth stages. Therefore, significant differences in total biomass at 15, 30, and 45 days after sowing of the crop were recorded among treatments. The highest weed biomass 4.03, 9.22 and 12.73 q ha^{-1} were recorded at 15, 35 and 45 days after sowing under weedy check treatment, while lowest values 1.08, 1.72 and 2.33 q ha^{-1} were recorded at 15, 35 and 45 days after sowing under treatment 2 i.e., hand weeding at 15-20 and 35-40 days after sowing followed by T4- Jute+ Green gram (TMB 37) (1:1) row ratio. The higher weed biomass under weedy check treatment might be due to no application of any weed management practices resulting in more weeds (Table 2). Similar results were also reported by Singh *et al*. 2015) and Majumdar *et al.* (2008).

Weed control efficiency

The data (Table) revealed that higher weed control efficiency was recorded in treatment 2- hand weeding at 15-20 and 35-40 DAS which was 84.6, 81.3 and 81.6% at 15, 35 and 45 DAE, respectively, followed by treatment 3- Jute + green gram (Pant Mung 5) (1:1) row ratio. It was noted that two hand weeding were more effective to control weed population in jute field in comparison to other weed control methods. The lowest value of weed control efficiency was noted under T1- application of Pretilachlar 50% EC @ 900 ml/ha at 45-48 hours of sowing with irrigation + one hand weeding (15 DAS) which was 58.6, 57.4 and 55.3 % at 15, 35 and 45 DAE, respectively.

Weed Index

The maximum weed index on loss of yield was observed under weedy check (Table 2). Weed index was found to be minimum under application of Pretilachlorw 50% EC @ 900 ml ha^{-1} at 45-48 hours of sowing with irrigation and one hand weeding (15 DAE).

Table 2: Effect of Integrated Weed Management on weed biomass, weed control efficiency and nutrient uptake

Treatments	Weed biomass (q ha^{-1})			Weed control efficiency (%)			Weed index
	15 DAS	35 DAS	45 DAS	15 DAS	35 DAS	45 DAS	
T_1	2.91	3.92	5.61	58.60	57.48	55.93	34.35
T_2	2.55	3.05	4.22	63.72	66.91	66.84	44.70
T_3	2.06	2.59	3.61	70.69	71.90	71.64	90.35
T_4	2.02	2.58	3.62	71.26	72.01	71.56	79.95
T_5	7.03	9.22	12.73	--	--	--	86.58
T_6	1.08	1.72	2.33	84.62	81.34	81.69	66.02
SEm	0.12	0.15	0.13	0.21	0.23	0.22	0.18
CD (0.05)	0.37	0.47	0.40	0.65	0.72	0.69	0.56

Yield attributes and fiber yield

All the treatments produced significantly higher yield and yield attributes like fiber yield, plant height and basal diameter over weed check (Table 1). The maximum value of these parameters were recorded with the treatment having two hand weeding but higher jute equivalent yield 25.51 q ha^{-1} was recorded under jute + green gram (Pant mung 5) (1:1) which was due to extra yield of green gram (2025 q ha^{-1}) were obtained under same treatment. The higher plant height (371.3cm) , basal diameter (2.50cm), plant population (2.95 lac ha^{-1}), green weight (403.81 q ha^{-1}) were recorded under two hand weeding at 15-20 and 35-40 DAS followed by treatment- jute + green gram. Thus, hand weeding has more pronounced effect on growth of jute crop compared to other weed control methods. The minimum plant height (207.9cm), basal diameter (1.20cm), plant population (2.94 lac ha^{-1}), green biomass (183.30 q ha^{-1}) were recorded under weedy check. This might be due to higher weed population which adversely affects the plant growth and other yield parameters. Data revealed that higher yield (22.28 q ha^{-1}) was noted under two hand weeding but highest jute equivalent yield (25.54 q ha^{-1}) was recorded under jute + green gram (1:1 ratio) which was found significantly superior to other weed control methods. It might be due to additional yield of mung bean (2.25 q ha^{-1}) obtained under same treatment. The maximum fiber yield obtained under two hand weeding might be due to higher plant height, higher basal diameter, green biomass as well as higher plant population/ha, which ultimately enhanced the fiber yield. Similar findings were also noticed by Kumar *et al.* (2012) and Singh *et al.* (2015).

Economics

Economics of each treatment was calculated on the basis of prevailing local market price of inputs and out puts. The data (Table 1) revealed that all the weed control treatments gave considerable higher net profit over weedy check. The maximum net profit of Rs.40953was recorded under treatment- jute + green gram (1:1 ratio). It might be due to additional yield of mungbean (2.25 q ha^{-1}) obtained along with 21.66 q ha^{-1} fiber yield. The minimum net profit of Rs. 19378 was noted under weedy check. It might be due to low yield obtained under this treatment, which adversely affects the economic characters. The next higher value of net profit (Rs.37203) was noted under jute + green gram (1:1 ratio) which was due to additional yield of green gram (2.15 q ha^{-1}) other than jute fiber yield of 20.45 q ha^{-1}. This is the major reason for increasing the net profit under jute + green gram treatment. The data revealed that higher B:C ratio (1.46) was recorded under jute + green gram (Pant mung 5, 1:1 ratio) treatment which might be due to higher net profit under this treatment. The next highest B:C ratio (1.33)was recorded under jute + green gram (TMB 37, 1:1 ratio) .The minimum B:C ratio (0.77) was found under application of Pretilachlore 50% EC 900ml/ha at 45-48 hours of sowing with irrigation + one hand weeding (15DAS)

On the basis of results, it may be concluded that jute + green gram (Pant mung 5, 1:1 ratio) was found more effective and remunerative for weed control and net profit in jute crop. Therefore, it is recommended for cultivation of jute in Eastern Uttar Pradesh that farmers should apply the production.

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