Annals of Plant and Soil Research 17(3): 277-279 (2015)

INTEGRATED WEED MANAGEMENT IN JUTE

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Received: September, 2014; Revised accepted; June, 2015

ABSTRACT

A field experiment was conducted during 2011 and 2012 at Crop Research Station, Bahraich to study the effect of integrated weed management practices on growth and yield of jute eight weed management practices were laid out in randomized block design with three replications. Jute capsularis variety JRC-321 was grown as test crop. Jute was sown at a spacing of 30 X 10 cm and fertilized with 80 kg N + 40 kg P_2O_5 + 40 kg K_2O ha^{-1}. Plant height, basal diameter, green weight, fiber yield and weed control efficiency were significantly higher with two hand weeding at 20 and 40 days after sowing in comparison to other treatments. The higher fiber yield (30.48 q ha^{-1}) and net profit (₹43580 ha^{-1}) were recorded under two hand weeding which was significantly superior to other weed management practices. The lower weed bio mass was observed under two hand weeding at 20 and 40 days after sowing of jute crop.

Keywords: Weed control, yield, economics, jute

INTRODUCTION

Jute *(Chorchorus capsularis*) is the most important fibre crop in India is grown at different part of India as rain fed crop with the onset of mansoon showers. The initial growth rate of jute is very slow, thus heavy infestation of weeds during the early stages is a major constraint limiting the productivity of this crop. Ghorai (2008), Singh *et al.* (2007), Rajput (2000) reported 75 % reduction in jute yield due to weed infestation. Singh *et al.* (2004) also reported 76 % yield reduction in transplanted rice due to grasses, sedges and broad leaved weed. Halder and Patra (2007) reported two hand weeding were most effective against all types of weeds in transplanted rice. Weed control approach with herbicides and non-chemical methods in jute provides effective and acceptable weed management for realizing high production.Manual weeding is also one alternative to control weed flora in jute field but chemical weed control is very important method to control weed infestation in jute field. Keeping this view in mind a field experiment was conducted to find out the effective weed management practices in jute crop.

MATERIALS AND METHODS

The field experiment was conducted during 2011-12 and 2012-13 at Crop Research Station, Bahraich (U.P.). The soil of experimental field was sandy loam, medium in available N (320 kg ha^{-1}), P (14 kg ha^{-1}) and K (275 kg ha^{-1}) with neutral pH (7.5). The experiment was laid out in randomized block design with three replications. eight treatments were: T_1 – Butachlor 1 kg ha^{-1} + one hand weeding at 15-20 DAS, T_2 – Butachlor 1.5 kg ha^{-1} + one hand weeding at 15-20 DAS, T_3 – Butachlor 1 kg (g) ha^{-1} with sowing + one hand weeding at 15-20 DAS, T_4 – Butachlor 1.5 kg (g) ha^{-1} with sowing + one hand weeding at 15-20 DAS, T_5 – Pretilachlore 1 kg ha^{-1} at sowing + one hand weeding at 15-20 DAS, T_6 – Quizalofop-p-ethyl @ 0.60 kg ha^{-1} + one hand weeding at 15-20 DAS, T_7 – Two hand weeding 20 DAS and 40 DAS, T_8 –weedy check. Jute variety JRC-321 was sown at 30 cm distance on 25 April in both the year of experimentation. Recommended dose of 80 kg N + 40 kg P_2O_5 + 40 kg K_2O ha^{-1} was applied through urea, diammonium phosphate and muriate of potash, respectively. Half dose of N and full dose of P and K were applied at the time of sowing and ½ dose of nitrogen was used in two split doses as top dressing in crop. Weed control method was adopted as per treatments. Two thinning were done after two and three weeks of sowing and plant to plant distance was maintained 10 cm. The agronomical practices like irrigation, plant protection measures and inter culture operations were done from time to time. The crop was harvested at 120 days from date of sowing in both the years. Growth characters were recorded before harvesting of crop at full growth stage and fibre yield was recorded after cutting of crop. Weed biomass was recorded in field according to date of observation. The plant samples were analysed for N,P and K by adopting standard procedures (Jackson,1973). Uptake of nutrients by calculated by multiplying yield data with nutrient contents.The economics of each treatments wae calculated on the basis of prevailing market price of produce and inputs.

RESULTS AND DISCUSSION

Weed:

The experimental field was infested with Cyprus rotundas, Cynodon dactylon Echinochloa colona, Bracharia ramose and Fimbristylis miliacea and major broad leaved weeds were Molochia corchorifalia, Digera arvens, Euphoribia hirta, Phyllanthus niruri and Amaranthus viridis. This might be due to the fact that wider raw spacing of jute provided relatively conducive condition forgrowth of

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weeds. The similar finding were also reported by Singh *et al.* (2007), Ghorai *et al.* (2008), Rajput (2000), Kundu (1980), Sarkar and Bhatacharya (2005).

Table 1: Effect of weed control methods on plant growth, yield attributes and fibre yield of jute (mean of two years)

Treatments	Plant height (cm)	Basal diameter (cm)	Fibre (q ha^{-1})	Weed index (%)	Weed control efficiency (%)
T_1 - Butachlor 50 % EC @ 1 kg ai/ ha + 1 hand weeding at 15-20 DAE	365.65	1.48	26.52	65.7	84.95
T_2 - Butachlor 50 % EC @ 1.5 kg ai /ha + 1 hand weeding at 15-20 DAE	370.55	1.53	27.78	67.2	88.2
T_3 - Butachlor 5 G @ 1 kg/ha with sowing + 1 hand weeding at 15-20 DAE	366.85	1.51	27.02	66.3	86.1
T_4 - Butachlor 5 G @ 1.5 kg /ha with sowing + 1 hand weeding at 15-20 DAE	368.2	1.54	27.60	67.0	86.95
T_5 - Pretichlor 50 % EC @ 1 kg ai/ha at sowing + 1 hand weeding at 15-20 DAE	364.85	1.5	25.88	65.5	84.7
T_6 - Quizalofopethyle @ 0.60 kg ai /ha + sticker @ 1/ml at 15 days + 1 Hand weeding at 20 DAE	380.1	1.58	29.20	68.8	88.2
T_8 - Two hand weeding at 15-20 DAS and 35-40 DAS	386.15	1.66	30.48	70.2	96.95
T_7 - weedy Check	144.2	0.69	9.06		
CD (P=0.05)	1.77	0.02	0.59	1.5	1.25

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. There were significant differences in treatments on total weed biomass at 15, 30 and 45 days after sowing of the crop. The lowest weed biomass was recorded with two hand weeding followed by application of Quizalofop-p-ethyl @ 0.60 kg ha^{-1} + one hand weeding at 20 days of sowing. The maximum total weed biomass at 15, 35 and 45 days of sowing was recorded under treatment weedy check. This might be due to no application of any weed management practice resulting in more weeds (Table 2). The similar results were also reported by Singh *et al.* (2007), Ghorai *et al.* (2008) and Rajput (2000) in jute.

Weed control efficiency

The data on weed control efficiency (Table 1) indicated that at harvest the maximum weed was observed under two hand weeding at 20 and 40 days after sowing followed by butachlere+one hand weeding (T_2) and quizalofop–p – ethyl+one hand weeding (T_6). It was noted that two hand weedings were more effective to control weed population in jute field in comparison to other weed control methods. The application of Quizalofop-p-ethyl was found at second place for controlling the weed population (Table 1).

Weed index

The maximum weed index on loss of yield was observed under weedy eheck (Table 1). Weed index was found to be minimum under hand weeding followed by application of Quizalofop-p-ethyl + I hand weeding at 20 days of sowing.

Yield attributes and fibre yield

All the treatments produced significantly higher yield and yield attributes like fibre yield, plant height and basal diameter over weedy check (control). The maximum value of these parameters were recorded in the treatment having two hand weeding followed by application of Quizalofopethyle + 1 hand weeding at 20 days of sowing. The higher plant height (385.6 cm) was recorded under two hand weeding. It is proved that hand weeding has more pronounced effect on growth of jute crop compared to other weed control methods. The maximum plant diameter (1.66 cm) was noted under two hand weeding. The minimum basal diameter (0.66 cm) was recorded under unweeded field which was due to higher weed population affecting plant growth. Practice of two hand weeding proved to be significantly superior over other weed control methods in respect of fibre yield of crop. The highest (30.48 q ha^{-1}) fibre yield was recorded under two hand weeding. The maximum yield of fibre under two hand weeding at might be due to higher plant height and basal diameter of plant which ultimately increased at yield. The similar findings were also reported by Kumar *et al.* (2012), Singh *et al.* (2007) and Halder *et al.* (2007).

Economics

All the weed control treatments gave considerably higher net profit over weedy check (Table).The maximum net profit of (₹ 43550 ha^{-1}) was recorded under two hand weeding followed by application of Quizalofop-p-ethyl + 1 hand weeding (₹ 42413 ha^{-1}). The minimum net profit of (₹. 7026 ha^{-1}) was noted under weedy check field which might

Table 2: Weed biomass nutrient uptake and economics of Jute as affected by weed control methods (mean of two years)

Treatments :	Nutrient uptake kg/ha			Weed biomass			Net return (₹. ha^{-1})	B:C ratio
	N	P	K	15 DAS	35 DAS	45 DAS		
T_1 - Butachlor 50 % EC @ 1 kg ai/ ha + 1 hand weeding at 15-20 DAE	74.7	31.6	81.8	1.89	1.10	1.61	36707	2.97
T_2 - Butachlor 50 % EC @ 1.5 kg ai /ha + 1 hand weeding at 15-20 DAE	77.8	33.6	84.9	1.64	0.80	1.29	39345	3.04
T_3 - Butachlor 5 G @ 1 kg /ha with sowing + 1 hand weeding at 15-20 DAE	76.0	31.3	83.1	1.91	1.03	1.44	37786	2.98
T_4 - Butachlor 5 G @ 1.5 kg /ha with sowing + 1 hand weeding at 15-20 DAE	77.6	33.6	86.5	1.78	0.83	1.38	38978	3.00
T_5 - Pretichlor 50 % EC @ 1 kg ai/ha at sowing + 1 hand weeding at 15-20 DAE	72.3	29.1	77.4	2.09	1.15	1.41	35400	2.86
T_6 - Quizalofop-p-ethyl @ 0.60 kg ai /ha + sticker@ 1 /ml at 15 days + 1 Hand weeding at 20 DAE	84.5	35.7	88.6	1.5	0.75	1.15	42413	3.10
T_7 - weedy Check	36.2	14.0	35.3	3.35	7.45	10.53	7026	1.58
T_8 - Two hand weeding at 15-20 DAS and 35-40 DAS	87.2	36.1	92.9	0.23	0.36	0.28	43550	3.05
CD (P=0.05)	1.53	1.04	2.57	0.087	0.07	6.8	977	0.06

be due to low yield recorded under same treatment. The higher C:B ratio was received under Quizalofop – p – elhyl + one hand weeding (1:3.10) followed by two hand weeding (3.05). The lowest value was recorded under weedy check. Data (Table 2) revealed that the maximum uptake of N, P and K by crop was recorded two hand weedings. However, all the weed control treatments recorded significantly higher nutrient uptake than the weedy check. The lowest values of N, P and K uptake were noted under weedy check. On the basis of two results, it may be concluded that two hand weeding in jute at 20 and 40 days after sowing was found more productive and remunerative in comparison to other integrated weed management practices and recommended to farmers to adopt this practice for controlling weeds in jute crop.

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