International Journal of Bioresource Science
Citation: IJBS: **09**(02): 83-91, December 2022
DOI: 10.30954/2347-9655.02.2022.4

ASSOCIATION FOR AGRICULTURE ENVIRONMENT AND BIOTECHNOLOGY

Research Paper

Effect of Integrated Weed Management Practices on Growth and Fibre Yield of Olitorius Jute (*Corchorus olitorius L.*) Under New Alluvial Zone

Bikas Mandal[1], Maksud Hasan Shah[1], Saheb Bhadra[1] and Deb Prasad Ray[2]*

[1]Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India
[2]ICAR-National Institute of Natural Fibre Engineering & Technology, 12, Regent Park, Kolkata, India

*Corresponding author: drdebprasadray@gmail.com (**ORCID ID:** 0000-0002-6676-4498)

Received: 12-9-2022 **Revised:** 21-11-2022 **Accepted:** 03-12-2022

ABSTRACT

Jute is one of the most important cash crops in the alluvial zone of West Bengal and neighbouring states. Jute fibre is eco-friendly, biodegradable and recyclable in nature and hence it creates pollution free environment. In modern era of growing environmentally benign crops, the role of jute as 'Green Crop' may be highlighted and the significance of this commercial crop will not be only to produce fibre for industries as raw material but also the equivalent impact on balancing and conditioning the soil-air-environment. Field experiment was conducted during pre *kharif* season of 2019 and 2020 at Agricultural Farm, Kalyani D block, B.C.K.V, Kalyani, with jute variety "JR0 2407 (*Samapti*)" to study the Effect of integrated weed management practices on growth and fibre yield of *Olitorius* jute (*Corchorus olitorius* L.) under New Alluvial Zone. The field experiment was carried out in randomized complete block design with four replications and six treatments i.e. T_1: Pretilachlor 500g/ha within 48 hours of sowing with irrigation + one hand weeding at 15 DAS, T_2: Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (within row) at 40 DAS, T_3: Jute + Green gram (*cv Pant Mung 5*) 1:1 replacement series, T_4: Pretilachlor 500g/ha within 48 hours of sowing with irrigation + quizalofop ethyl 60 g/ha at 25 DAS, T_5: Unweeded check, and T_6 : Two hand weeding (HW) at 15 DAS and 30 DAS. Result showed that weed management had positive and favourable influence in improving plant height, yield attributes like fiber yield, stick yield and pod yield of green gram under study. The treatment T_4: Pretilachlor 500g/ha at within 48 hours of sowing with irrigation + quizalofop ethyl 60 g/ha at 25 DAS has significantly reduced the weed infestation and registered lower weed density, weed dry weight, weed index, higher weed control efficiency and yield attributes and yield of jute over T_1- Pretilachlor 500g/ha within 48 hours of sowing with irrigation + one hand weeding at 15 DAS, T37- Jute + Green gram (Pant *Mung* 5) 1:1 replacement series, and at par with T_2 Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (within row) at 40 DAS. Although for some parameters T_2 treatment registered the higher value but it was at par T_4 & T_3 treatments. Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + quizalofop ethyl 60 g/ha at 25 DAS appeared as effective and economic for managing broad spectrum weeds of pre *kharif* jute in new alluvial zone of West Bengal.

HIGHLIGHTS

- Achieving maximum yield, timely and effective weed management during the critical period of weed competition is essential for jute crop growth.
- Pretilachlor 500g/ha within 48 hours of sowing with irrigation followed by Quizalofop ethyl 60 g/ha at 25 DAS is found to be an effective and economically profitable choice for Weed Management in Jute crop.
- Application of nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (within row) at 40 DAS) (34.21 q ha^{-1}) and T_6 (Two hand weeding at 15-20 DAS and 35-40 DAS) (32.13 q ha^{-1}) results statistically similarr results.

Keywords: Pretilachlor, jute, JRO 2407, weed control efficiency, weed index

How to cite this article: Mandal, B., Shah, M.H., Bhadra, S. and Ray, D.P. (2022). Effect of Integrated Weed Management Practices on Growth and Fibre Yield of Olitorius Jute (*Corchorus olitorius* L.) Under New Alluvial Zone. *Int. J. Bioresource Sci.*, **09**(02): 83-91.

Source of Support: None; **Conflict of Interest:** None

Jute is known as the 'Golden Fibre of India' due to its golden brown colour and its importance that impart 0.42% of gross cropped area, providing livelihood to more than 40 lakh farm families. It also provides direct and indirect employment to another 10 lakh people in the industrial sector. Jute fibres are eco-friendly, biodegradable and recyclable in nature and hence it creates pollution free environment. In modern era of growing environmental friendly crops, the role of jute as 'Green Crop' may be highlighted and the significance of this commercial crop will be not only to produce fibre for industries as raw material but also the equivalent impact on favorably balancing and conditioning the soil-air- environment. So the production of jute fibres assumes high socio-economic as well as environmental significance.

India and Bangladesh has a strong heritage of jute cultivation. West Bengal occupies a place of pride in production of jute contributing about 81% of the total production and occupying 73% of total area of the country. In West Bengal except Malda, all the North Bengal districts are having productivity below the present national average. There is a problem of non-uniform productivity over 87 jute growing districts located in varying agro-climatic regions of the country including 17 jute growing districts of the State. Relatively higher productivity is observed in South Bengal than in North Bengal. Jute is a natural fiber with huge commercial importance which play an important role in India economy. The fiber of commerce is extracted from the stem of two cultivated species of jute namely tossa jute (*Corchorus olitorius* L.) and white jute (*C. capsularis* L.). Though there has been a significant increase in productivity, there is still a wide disparity in the yield level of the crop between the states as well as between the agro-climatic zones of the same state. Jute and jute-based production systems under the present system of cultivation is labor intensive and costly. Around 65- 70% of the total cost of production in jute is due to weed management and retting. The hot and humid climate with intermittent rainfall during the jute sowing season (first fortnight of April) in alluvial plains encourage profuse weed growth resulting severe weed infestation during the early crop growth phase in jute. It was also estimated that 75-80% of fibre yield may be lost due to weed infestation which is quite common in most of the jute growing situations (Sahoo and Saraswat, 1988). Therefore, weed free condition in the early stages of growth in jute always maintains higher productivity. The critical period of crop weed competition for jute crop was reported to be up to 60 DAS (Gogoi *et al.* 1992). Hence for achieving maximum yield, timely and effective weed management during the critical period of weed competition is essential. Manual weeding is very laborious, time consuming, expensive and utmost important when there is dearth of manpower. So delay weeding operation is usual and it causes decrease in crop yields and also increases the incidence of pests and diseases which are difficult to control. Therefore, it is very important to come out with proper recommendation for weed control measure that can manage the weeds economically and safely.

So most effective in reducing weed threat compared to hand weeding is through safe herbicides. Application of post-emergence herbicide like Quizalofop ethyl (5% EC) as post emergence application could control only the grass weeds (Ghorai *et al*. 2004; Bhattacharya *et al*. 2004). Fenoxaprop-ethyl also showed promise for grass weed control in jute (Sarkar, 2007). Only a few pre-emergence herbicides found moderately effective to control jute. Hence an agronomic experiment was conducted to find out practically convenient, economically feasible and environmentally safely methods of weed management in jute.

MATERIALS AND METHODS

Field experiment was carried out during *Pre Kharif* season 2019 and 2020 at Agricultural Farm of the Bidhan Chandra Krishi Viswavidhyalaya, Kalyani, Nadia, West Bengal, India to find out the response of Effect of integrated weed management practices on growth and fibre yield of Olitorius jute (*Corchorus olitorius* L.) under New Alluvial Zone. The experimental site possessing sandy loam in texture having soil pH was found to be slightly acidic in reaction (6.8) and an electrical conductivity of 0.14 dSm^{-1}. The soil organic carbon content was low (0.59%). The soil was low in available nitrogen (210.0 kg/ha) and phosphorus (19.78 kg/ha) but medium in available potassium (181.8 kg/ha). The experimental site was located at 09.75m above mean sea level, 22°58'8'' N latitude, 88°25'5''E and the

experiment was laid out in randomized block design with four replications. Jute variety "*Samapti* (JRO 2407)" was sown at spacing of 25 × 8cm. Herbicides were applied using manually operated knapsack sprayer fitted with flat fan nozzle using spray volume of 500L/ha as per the treatment. The details of the treatments T_1: Pretilachlor 500 g/ha within 48 hours of sowing with irrigation + one hand weeding at 15 DAS, T_2: Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (within row) at 40 DAS, T_3: Jute + Green gram (Pant *Mung* 5) 1:1 replacement series, T_4: Pretilachlor 500 g/ha within 48 hours of sowing with irrigation + quizalofop ethyl 60 g/ha at 25 DAS, T_5: Unweeded check, and T_6: Two hand weeding (HW) at 15 DAS and 30 DAS. Weed free check was achieved by weekly interval of hand weeding was done throughout the crop period. Randomly five plants were selected from each plot and regular biometric observations of crop parameters were recorded. Weed density (no/m^2) was recorded by putting a quadrate of 0.25m^2 at two random spots in each plot. The weed control efficiency was worked out based upon the data from weed dry weight in the field and the formula used was as follows.

$$\text{WCE (\%)} = \frac{\text{Weed dry weight in the untreated plot} - \text{Weed dry weight in the treated plot}}{\text{Weed dry weight in the untreated plot}} \times 100\ (\%)$$

The final weed data (weed count and weed dry weight) was square root transformed using the formula $(X + 0.5)^{0.5}$ for statistical analysis purpose. Weed index indicates the reduction in crop yield due to crop weed competition as compared to weed free plot. Weed index (WI) was worked out by using the formula given below.

$$\text{WI (\%)} = \frac{\text{Yield from the weed free plot} - \text{Yield from the treated plot}}{\text{Yield from the weed free plot}} \times 100$$

Plant Height and plant dry matter at 30DAS and 60 DAS were recorded for randomly selected five plants by following destructive plant sampling method. Data on Fibre yield (kg/ha) and yield components viz., fibre yield. Gross returns were calculated based on local market prices of jute fibre and net returns by subtracting the total cost of cultivation from gross returns. Benefit: cost ratio was computed by dividing gross returns with cost of cultivation.

RESULTS AND DISCUSSION

Effect on weeds flora

The experimental field was infested with three categories of weeds under nine families. The total number of species was 17 out of which *Echinochloa colona, Brachiaria ramose, Fimbristylis sp* and *Amaranthus viridis* among monocots; *Vlcia hirsula, Digera arvensis, Phyllanthus niruri, Euphorbia hirta, and Digera arvensis* among broad leaved were important weeds. *Cyperus rotundus, Cynodon dactylon* were present as a major weeds in jute field. *Digera arvensis, Phyllanthus niruri among broadleaved, Brachiaria ramose* among the grasses and *Cyperus rotundus* among the sedges were predominant throughout the cropping period. Although a whole spectrum of weeds was present in the experimental field, these four weeds constituted maximum percentage of total weed flora.

Weed density and Weed dry matter

Weedy check (control) recorded significantly the highest weed density and weed dry weight at 30, 60 & 90 DAS (Table 1-6). At 60 DAS, among the herbicidal treatments lowest number of grassy weed was observed in plot treated with T_4 (Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + Quizalofop ethyl 60 g/ha at 25 DAS) followed by T_2 (Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (with in row) at 40 DAS) (5.12, 25.79), T_6 (Two hand weeding at 15-20 DAS and 35-40 DAS) (5.35, 28.14), T_3: Jute + Green gram (Pant *Mung* 5) 1:1 replacement series (6.13, 37.13) and T_1: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS (7.08, 49.70). The maximum weed density was recorded with T_5 : Un-weeded check (9.39, 85.75). There was no significant difference among the treatments T_2, T_6, and T_3 or was statistically at per with each other. Lowest population of broadleaved weed was registered in treatment T_6 (Two hand weeding at 15-20 DAS and 35-40 DAS) (6.24, 28.53) which were statistically at par with T_4 (Pretilachlor 500 g/ha at 45-48 hours of

Table 1: Effect of weed control treatments on density of grass weeds (mean of 2 years)

Treatments	Density of grasses (No. m^{-2})		
	30 DAS	60 DAS	90 DAS
T_1: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS	5.64 (31.30)*	7.08 (49.62)	6.82 (46.01)
T_2: Nail weeder 1st at 10 DAS and 2nd at 25 DAS +one hand weeding (with in row) at 40 DAS	4.78 (22.35)	5.12 (25.71)	5.23 (26.85)
T_3: Jute + Green gram (pant *mung* 5) 1:1 replacement series	5.56 (30.41)	6.13 (37.07)	5.94 (34.78)
T_4: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + quizalofop ethyl 60 g/ha at 25 DAS	4.90 (23.51)	5.11 (25.61)	5.09 (25.41)
T_5: Unweeded check	8.8 (76.94)	9.39 (87.67)	9.18 (83.77)
T_6: Two hand weeding at 15-20 DAS and 35-40 DAS	4.98 (24.30)	5.35 (28.12)	5.20 (26.54)
S.Em(±)	0.02	0.03	0.04
CD 5%	0.05	0.06	0.07

Table 2: Effect of weed control treatments on density of sedge weeds (mean of 2 years)

Treatments	Density of sedge weeds (No.m^{-2})		
	30 DAS	60 DAS	90 DAS
T_1: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS	7.37 (53.81)*	8.76 (76.23)	8.36 (69.38)
T_2: Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (with in row) at 40 DAS	6.57 (42.66)	7.38 (53.96)	6.90 (47.11)
T_3: Jute + Green gram (pant *mung* 5) 1:1 replacement series	6.99 (48.36)	8.06 (64.46)	7.74 (59.41)
T_4: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation quizalofop ethyl 60 g/ha at 25 DAS	6.71 (44.52)	7.14 (50.47)	6.82 (46.02)
T_5: Unweeded check	10.67 (113.34)	11.23 (125.61)	10.89 (118.09)
T_6: Two hand weeding at 15-20 DAS and 35-40 DAS	6.74 (44.92)	7.45 (55.00)	7.35 (53.52)
S.Em(±)	0.016	0.021	0.024
CD 5%	0.035	0.045	0.051

Table 3: Effect of weed control treatments on density of broadleaved weeds (mean of 2 years)

Treatments	Density of broadleaved weeds (No.m^{-2})		
	30 DAS	60 DAS	90 DAS
T_1: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS	5.93 (34.66)*	8.37 (69.55)	8.07 (64.62)
T_2: Nail weeder 1st at 10 DAS and 2nd at 25 DAS +one hand weeding (with in row) at 40 DAS	5.56 (30.41)	6.59 (42.92)	6.49 (41.62)
T_3: Jute + Green gram (pant *mung* 5) 1:1 replacement series	6.20 (37.94)	7.62 (57.56)	7.48 (55.45)
T_4: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation quizalofop ethyl 60 g/ha at 25 DAS	5.65 (31.42)	6.5 (41.75)	6.07 (36.34)
T_5: Unweeded check	9.44 (88.61)	10.28 (105.18)	9.59 (91.46)
T_6: Two hand weeding at 15-20 DAS and 35- 40 DAS	5.85 (33.72)	6.24 (38.43)	6.19 (37.81)
S.Em(±)	0.018	0.024	0.026
CD 5%	0.028	0.031	0.033

Table 4: Effect of treatments on grass weed dry matter (mean of 2 years)

Treatments	Weed dry matter (g m^{-2})		
	30 DAS	60 DAS	90 DAS
T_1: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS	1.81 (2.77)*	2.26 (4.60)	(3.08) (8.98)
T_2: Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (with in row) at 40 DAS	1.33 (1.26)	1.41 (1.48)	2.18 (4.25)
T_3: Jute + Green gram (pant *mung* 5) 1:1 replacement series	1.6 (2.06)	1.93 (3.22)	2.8 (7.34)
T_4: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + quizalofop ethyl 60 g/ha at 25 DAS	1.31 (1.22)	1.67 (2.28)	2.15 (4.12)
T_5: Unweeded check	2.78 (7.22)	3.54 (12.03)	4.44 (19.21)
T_6: Two hand weeding at 15-20 DAS and 35- 40 DAS	1.52 (1.81)	1.82 (2.81)	2.42 (5.35)
S.Em(±)	0.08	0.09	0.09
CD 5%	0.17	0.20	0.20

Table 5: Effect of treatments on sedge weed dry matter (mean of 2 years)

Treatments	Weed dry matter (g m^{-2})		
	30 DAS	60 DAS	90 DAS
T_1**:** Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS	1.88 (3.03)*	2.4 (5.26)	3.23 (9.93)
T_2: Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (with in row) at 40 DAS	1.42 (1.51)	1.68 (2.32)	2.39 (5.21)
T_3: Jute + Green gram (pant *mung* 5) 1:1 replacement series	1.52 (1.81)	1.87 (2.99)	2.90 (7.91)
T_4: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation quizalofop ethyl 60 g/ha at 25 DAS	1.33 (1.26)	1.65 (2.22)	2.38 (5.16)
T_5: Unweeded check	3.08 (8.98)	3.71 (13.26)	5.15 (26.02)
T_6: Two hand weeding at 15-20 DAS and 35-40 DAS	1.60 (2.06)	2.05 (3.70)	2.55 (6.00)
S.Em(±)	0.05	0.07	0.08
CD 5%	0.12	0.16	0.17

Table 6: Effect of treatments on broadleaved weed dry matter (mean of 2 years)

Treatments	Weed dry matter (g m^{-2})		
	30 DAS	60 DAS	90 DAS
T_1 : Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS	1.59 (2.02)*	2.16 (4.16)	2.76 (7.11)
T_2 : Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (with in row) at 40 DAS	1.33 (1.26)	1.56 (1.93)	1.93 (3.22)
T_3 : Jute + Green gram (pant *mung* 5) 1:1 replacement series	1.59 (2.02)	1.90 (3.11)	2.43 (5.40)
T_4 : Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation quizalofop ethyl 60 g/ha at 25 DAS	1.28 (1.13)	1.72 (2.45)	2.28 (4.69)
T_5 : Unweeded check	2.13 (4.03)	3.68 (13.04)	4.50 (19.75)
T_6 : Two hand weeding at 15-20 DAS and 35-40 DAS	1.29 (1.16)	1.53 (1.84)	1.91 (3.14)
S.Em(±)	0.03	0.04	0.08
CD 5%	0.06	0.10	0.17

sowing with irrigation + Quizalofop ethyl 60 g/ha at 25 DAS) (6.5, 41.75), and T_2 (Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (within row) at 40 DAS) (6.59, 43.00). Like grasses, similar trend was observed in case of weed density and weed dry weight of sedge (Table 3). More herbicidal doses in T_4 (Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + Quizalofop ethyl 60 g/ha at 25 DAS) registered the lowest number and dry weight of total weeds which were statistically at par with T_2 (Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (within row) at 40 DAS) (7.38, 54.03) and T_6 (Two hand weeding at 15-20 DAS and 35-40 DAS) (7.45, 55.13). And again T_3:

Table 7: Effect of treatments on weed control efficiency (mean of 2 years)

Treatments	Weed control efficiency (%)			B:C Value
	30 DAS	60 DAS	90 DAS	
T_1 : Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15DAS	66.09	63.41	59.88	0.98
T_2 : Nail weeder 1st at 10 DAS and 2nd at 25 DAS +one hand weeding (with in row) at 40 DAS	79.80	84.86	80.40	1.29
T_3 : Jute + Green gram (pant *mung* 5) 1:1 replacement series	75.56	78.16	71.24	1.13
T_4 : Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation quizalofop ethyl 60 g/ha at 25 DAS	81.87	85.87	81.01	1.32
T_5 : Unweeded check	—	—	—	0.22
T_6 : Two hand weeding at 15-20 DAS and 35-40 DAS	79.20	79.87	79.18	1.02

Table 8: Effect of treatments on plant height of *Olitorius* jute (mean of 2 years)

Treatments	Plant height (cm)			
	30 DAS	60 DAS	90 DAS	At harvest
T_1 **:** Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS	50.18	169.15	248.63	277.00
T_2 : Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (with in row) at 40 DAS	59.84	184.75	280.50	312.28
T_3 : Jute + Green gram (pant *mung* 5) 1:1 replacement series	54.53	181.78	281.85	314.03
T_4 : Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation quizalofop ethyl 60 g/ha at 25 DAS	61.23	187.25	283.40	317.25
T_5 : Unweeded check	40.88	154.30	234.05	253.75
T_6 : Two hand weeding at 15-20 DAS and 35-40 DAS	52.35	173.85	271.78	292.25
S.Em(±)	1.75	2.22	3.09	3.84
CD 5%	3.73	4.74	6.58	8.21

Table 9: Effect of treatments on Yield of *Olitorius* jute (mean of 2 years)

Treatments	Fibre yield (q ha^{-1})	Green gram yield (q ha^{-1})	Fibre equivalent yield (q ha^{-1})	Stick yield (q ha^{-1})
T_1**:** Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS	30.10	—	30.10	104.55
T_2: Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (with in row) at 40 DAS	34.21	—	34.21	108.19
T_3: Jute + Green gram (pant *mung* 5) 1:1 replacement series	26.41	6.13	34.11	92.34
T_4: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + quizalofop ethyl 60 g/ha at 25 DAS	35.16	—	35.16	113.07
T_5: Unweeded check	21.78	—	21.78	67.65
T_6: Two hand weeding at 15-20 DAS and 35-40 DAS	32.13	—	32.13	107.43
S.Em(±)	0.19	—	—	0.57
CD 5%	0.41	—	—	1.21

Jute + Green gram (Pant *Mung* 5) 1:1 replacement series (6.13, 37.13) and T_1: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS (7.08, 49.70) are at per with each other. Nail weeding, no doubt, is a benign option though it's efficiency depends on various factors like soil moisture status, soil texture, time and method op operation, age of the crop plant and the level of infestation by weeds.

Weed control efficiency

The weed control efficiency is a measure of expressing the efficiency of weed control method. Data on weed control efficiency (WCE %) worked out at 30, 60, and 90 DAS on the basis of total weed dry weight in un-weeded control (Table 7). Weed control efficiency in T_4 (Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + Quizalofop ethyl 60 g/ha at 25 DAS) (85.87 %) at 30 DAS followed by

treatments T_2 (Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (within row) at 40 DAS (84.86%) and T_6 (Two hand weeding at 15-20 DAS and 35-40 DAS) (79.87%). at 30 DAS resulted the highest weed control efficiency. From the result, it was revealed that pre-emergence application of herbicide followed by mechanical weeding was enable to control the weeds during the early growth stages of jute. However, treatment T_1: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS (63.41%) at 30 DAS and 60 DAS noted the lowest weed control efficiency. A similar trend was also observed by Sarkar *et al*. 2006. It was due to better control of all types of weeds through hand weeding and adequate suppression of grassy weeds by the chemicals. The findings was the reflection of performance of weed flora as influenced in different treatments with regards to population and biomass production (Mandal and Mukherjee, 2018).

Effect on jute

Plant height

The data on plant height of jute were statistically analyzed and presented in table 8. It showed that plant height of jute varied significantly during different growth stages with different treatments. The result showed that weed management practices recorded significantly taller plant over T_5 (weedy check during its entire growth period). At 30, 45 and 60 DAS, the dwarf plant height was recorded with T_5 (7.2, 8.9 and 9.7 cm) which were significantly lower than other weed management treatments. Among herbicidal treatments, T_4 (Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + Quizalofop ethyl 60 g/ha at 25 DAS) recorded maximum plant height (8.9, 12.7 and 13.7 cm) followed by T_2 (Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (within row) at 40 DAS) (59.84, 8.8, 12.2 and 13.6 cm), T_6 (Two hand weeding at 15-20 DAS and 35-40 DAS) (5.35, 28.14), T_3 (Jute + Green gram (pant *mung* 5) 1:1 replacement series) (284.33 cm), and T_1: Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + one hand weeding at 15 DAS (63.41%). The weedy check plot (T_5) recorded the lowest plant height, which might be due to severe competition exerted by grassy, broadleaved as well as sedge weeds against the crop throughout the growth period of the crop (Gogoi *et al.* 1992; Annadurai *et al*. 2010; Ghorai *et al*. 2004; Bhattachrya and Mondal, 1989 and Chakraborty *et al*. 2004).

Harvest data disclosed the trend as upheld here having significantly highest plant height (317.25cm) recorded in T_4 (Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + Quizalofop ethyl 60 g/ha at 25 DAS) followed by T_3 (Jute + Green gram (pant *mung* 5) 1:1 replacement series) (314.03 cm), and lowest plant height (253.75cm) recorded in T_5 (Unweeded check). Similar style of findings were reported by Sarkar and Sinha, 2007).

Yield attributes

Fibre yield and stick yield

Different weed management practices had significant positive impacts on yield attribute and yield of jute fibre crop (Table 9 and Fig. 1). At harvest among the treatments the significantly highest fibre yield (35.16 q ha^{-1}) was recorded in T_4 (Pretilachlor

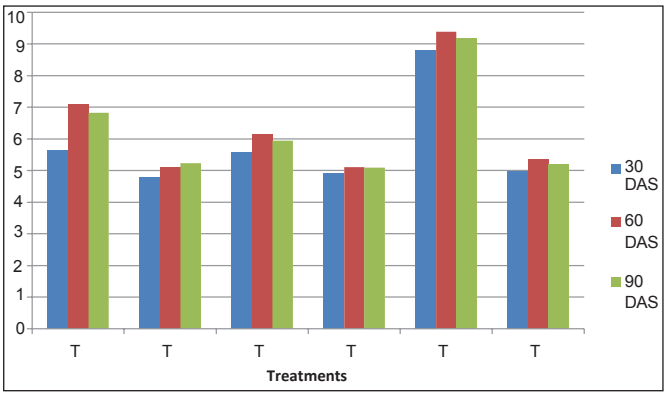

Fig. 1: Effect of weed control treatment on density of Grassy weeds (No.m^{-2})

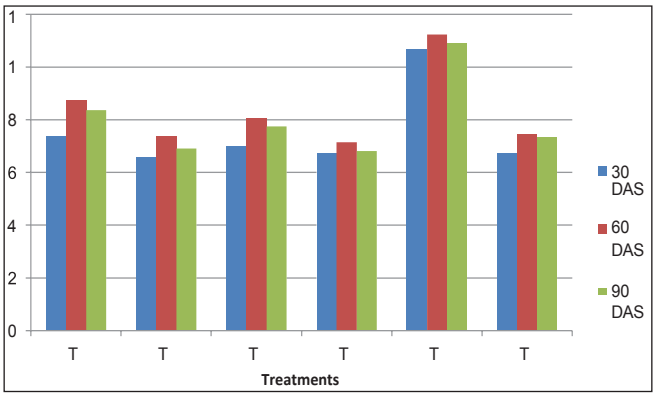

Fig. 2: Effect of weed control treatment on density of sedge weeds (No. m^{-2})

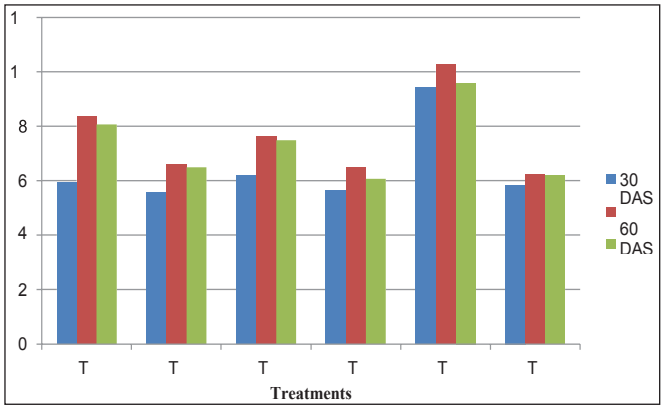

Fig. 3: Effect of weed control treatment on density of broadleaved weeds (No.m^{-2})

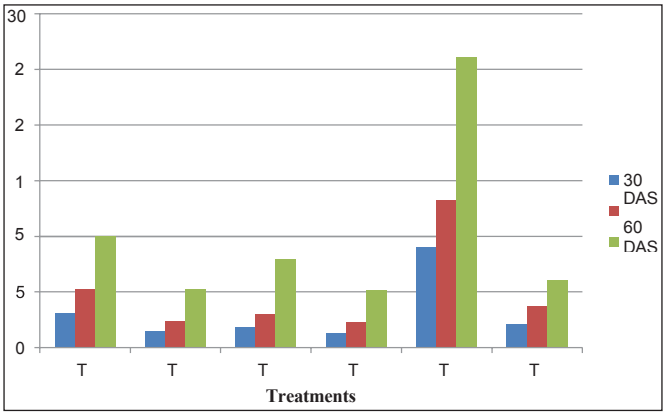

Fig. 4: Effect of treatments on dry weight of grassy weeds (g m^{-2})

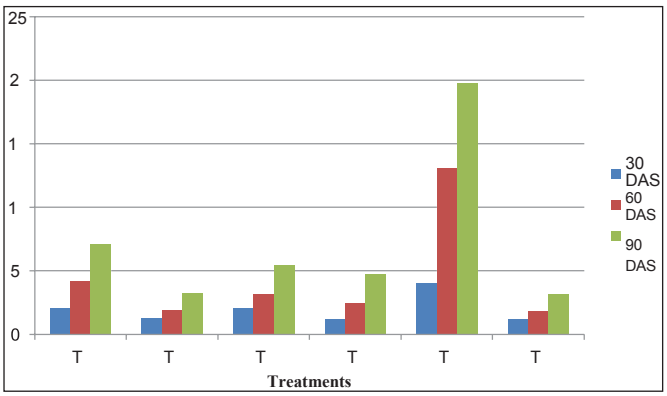

Fig. 5: Effect of treatments on dry weight of sedge weeds (g m^{-2})

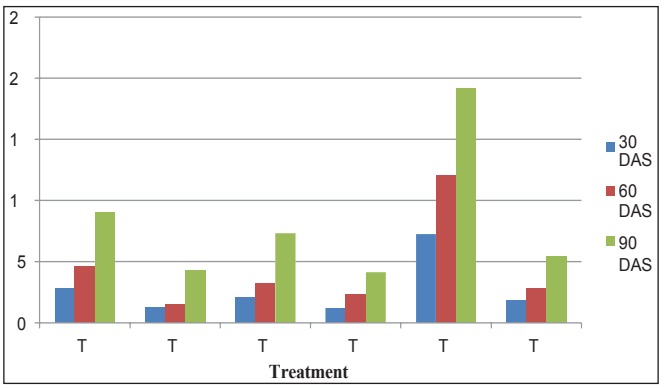

Fig. 6: Effect of treatments dry weight of broadleaved weeds (g m^{-2})

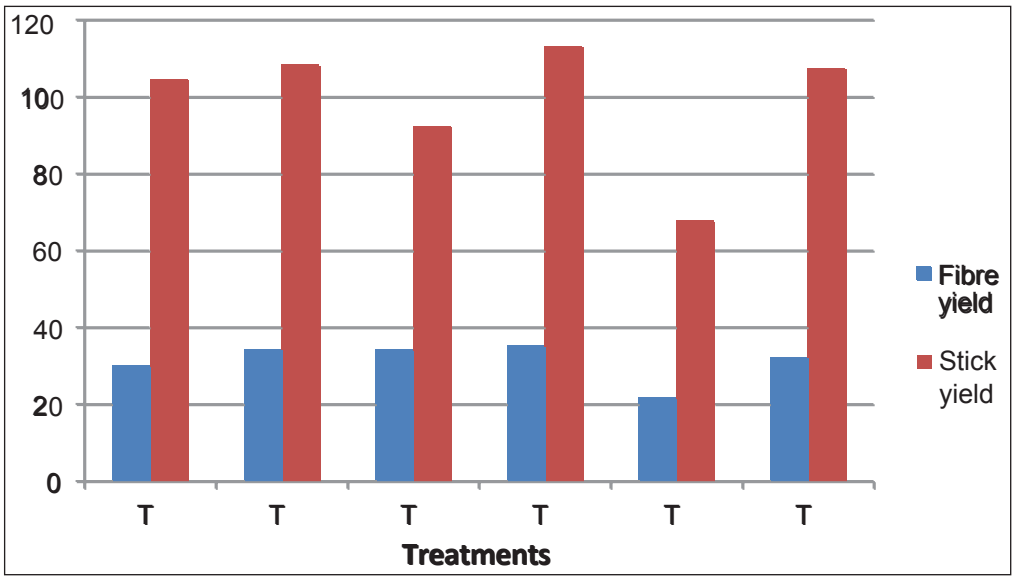

Fig. 7: Effect of treatments on yield (q ha^{-1}) of *olitorius* jute

500g/ha at 45-48 hours of sowing with irrigation + Quizalofop ethyl 60 g/ha at 25 DAS) followed by T_2 (Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding (with in row) at 40 DAS) (34.21 q ha^{-1}) and T_6 (Two hand weeding at 15-20 DAS and 35-40 DAS) (32.13 q ha^{-1}) results are statistically at par. The lowest fibre yield (21.78 q ha^{-1}) was recorded in T_5 (Unweeded check). Similar types of findings were reported by Majumdar *et al*. (2008) and Mandal and Mukherjee (2018) and among the treatments the

significantly highest stick yield (113.07 q ha^{-1}) was recorded in T_4 (Pretilachlor 500g/ha at 45-48 hours of sowing with irrigation + Quizalofop ethyl 60 g/ha at 25 DAS) followed by T2 (Nail weeder 1st at 10 DAS and 2nd at 25 DAS + one hand weeding(with in row) at 40 DAS) (108.19 q ha^{-1}) and T_6 () (107.43 q ha^{-1}) results are statistically at par. The lowest stick yield (67.65q ha^{-1}) was recorded in T_5 (Unweeded check).

CONCLUSION

From the results of the experiment, it may be concluded that Pretilachlor 500g/ha within 48 hours of sowing with irrigation followed by Quizalofop ethyl 60 g/ha at 25 DAS is found to be an effective and economically profitable choice (Table 7) for better growth as well as productivity of *olitorius* Jute in New Alluvial Zone of West Bengal. The authors very much thankful to the AICRP on Weed Management, BCKV, West Bengal Centre for all sorts of help during the work of experimentation.

REFERENCES

Gogoi, A.K., Kalita, H., Pathak, A.K. and Deka, J. 1992. Chemical weed control in capsularis jute. *Indian journal of Weed Science* **24**(3&4): 68-70.

Annadurai, K., Naveen, P., Sangu, A. and Chinnusamy, C. 2010. *Integrated Weed Management in Groundnut Based Intercropping System – A Review. Agricultural Reviews*, **31**(1): 11-20.

Ghorai, A.K, Chakraborty, A.K, Pandit, N.C, Mondal, R.K. Biswas, C.R. 2004. Grass weed control in jute by Targa super (quizalofop-ethyl 5% EC). *Pestology*., **28**: 31-34.

Bhattachrya, S.P. and Mondal, B. 1989. Studies on Weed Control in jute (*Corchorus olitorius*). *Environment & Ecology* **21**(3): 680-682.

Masumi, S.M., Ali, M.H., Islam, M.S. and Sultana, S. 2011. Influence of plant spacing and post emergence herbicide on the yield of white jute (*Corchorus capsularis*). *International Journal of Sustainable Agriculture*, **3**: 82-87.

Majumdar, B., Sarkar, S., Saha, A.R., Maitra, D.N. and Maji, B. 2008. Effect of herbicides and fungicides applied to jute (*Corchorus olimrius* L.) on fibre yield and nutrient uptake by jute and changes in microbial dynamics of soil. *Environment and Ecology,* **26**(4): 1613-1618.

Mandal, B. and Mukherjee, D. 2018. Influence of different Weed Management Practices for Higher Productivity of Jute. *International Journal of Bioresource Science*, **5**(1)**:** 21-26.

Sahoo, K.M. and Saraswat, V.N. 1988. Magnitude of losses in the yields of major crops due to weed competition in India. *Pesticide Information*, April-June, pp. 2-9.

Sarkar S. 2006. Weed management in jute (*Corchorus olitorius* L.) by post emergence herbicides. *J. Tropical Agriculture,* **44**: 71-73.

Sarkar, S., Bhattacharjee A.K. and Mitra S. 2005. Weed management in jute by trifluralin (48% EC) in the early jute-weed competition phase. *J. Crop Weed,* **2**: 30-33.

Sarkar, A.K. and Sinha, A.C. 2007. Effect of weed management practices on white jute (*Corchorus capsularis* L.) under Terai region of west Bangal. *Indian Agriculturist,* **51**(1/2): 69-72.

Sinha, N.K., Singh, D. and Roy, D.K. 2009. Weed management strategies in jute grown for seed production in calcareous soils of north Bihar. *Indian Journal of Weed Science,* **41**(1&2): 19-22.