The Andhra Agric. J 67 (2): 26-30, 2020

Performance of *olitorius* Jute at Varied plant Density and Topping in Coastal Andhra Pradesh

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ABSTRACT

An experiment was conducted at Agricultural College Farm, Bapatla to assess performance of jute at varied plant densities and topping practices during *kharif*, 2019. It was carried out with JRO 524 (Navin) variety of jute, in a randomized block design with factorial concept and replicated thrice. Results indicated that maximum drymatter accumulation was recorded with a plant density of 83, 333 plants ha^{-1}(D_3) and topping at 45 DAS, which was on par with plant density of 2, 22, 222 plants ha^{-1}(D_2) and topping at 30DAS.More number of branches $plant^{-1}$ were noticed with density of 83, 333 plants ha^{-1}(D_3) and it was found on parity with 1,66, 666 plants ha^{-1}(D_1). Maximum seed yield and stalk yield were obtained with plant density of 83, 333 plants ha^{-1}(D_3) and it was found on par with a density of 2, 22, 222 plants ha^{-1}(D_2). Topping at 45 DAS, which was found at par with 30 DASresulted in maximum seed yield which was found in par with toppong at 30DAS. harvest index was nin-significant for both plant densities and topping practices in olitorus jute.

Keywords: *Jute, Plant density, Topping practices and yield.*

Jute is a very important prospective fibre as well as cash crop of West Bengal. It is also an important commercial crop of Assam, Bihar, Orissa and eastern Uttar Pradesh earning foreign exchange and supporting nearly 7 million small and marginal farmers and industrial employees (Kumar *et al*. 2010). Jute has tremendous potential to sequester the atmospheric CO_2.One hectare of jute crop sequesters as high as 15 MT of CO_2 in 100 days, which is higher than that of several tree crops (Kumar *et al*. 2012). Therefore, jute farming deserves international support and application in view of its contribution towards greener environment. West Bengal occupies 70% area under jute in the country but it is mainly grown for fibre purpose only. They depend for seed on non-jute growing states like Maharashtra, Andhra Pradesh, Karnataka and Telangana where the weather conditions are congenial for quality seed production. Seed production in jute can be enhanced by adopting suitable agro-techniques. Hence, a trial was conducted with different plant densities and topping at different times in coastal Andhra Pradesh.

MATERIAL AND METHODS

The experiment was conducted at Agricultural College Farm, Bapatla, Andhra Pradesh during *kharif* 2019. The soil of the experimental field was clay in texture, neutral in reaction, medium in organic carbon and low in available nitrogen, high in phosphorus and potassium. The experiment was laid out in randomized block design with factorial concept and replicated thrice with two factors i.e. plant density and topping practices. The treatments consisted of three plant densities i.e. 1.66 lakh plants ha^{-1} (D_1), 2.2 lakh plants ha^{-1} (D_2) and 83,333 plants ha^{-1} (D_3) and four Topping practices T_1 (No topping), T_2 (topping at 30 DAS), T_3 (topping at 45 DAS) and T_4 (topping at 60 DAS). Jute was sown on 14th August 2019. Recommended fertilizers @ 20 kg N, 30 kg P_2O_5 and 30 kg K_2O ha^{-1} were applied uniformly in the form of urea, single superphosphate and muriate of potash. Half of the nitrogen, entire quantity of phosphorus and potassium were applied basally. Remaining half of nitrogen was applied at 30 DAS.All recommended cultural practices and plant protection measures were followed throughout the crop growing season.

RESULTS AND DISCUSSION

There was variation in drymatter accumulation of jute from 30 DAS to 75 DAS and from 75 DAS to at harvest. Maximum drymatter accumulation was recorded in crop sown with a plant density of 2,22,222 plants ha^{-1} (D_2) which was significantly superior over remaining two plant densities from 30DAS to 60 DAS. The highest drymatter accumulation was obtained with a density of 83,333 plants ha^{-1} (D_3) and it was on par with plant density of 2,22,222 plants ha^{-1} (D_2) from 75 DAS to harest. Lowest drymatter accumulation was observed with a density of 1,66,666 plants ha^{-1} (D_1) (Table 1). Among the topping practices, maximum drymatter accumulation was obtained with topping at 45 DAS (T_3) which was significantly superior over no

Table 1. Drymatter accumulation (kg ha^{-1}) of *olitorius* jute at different stages as influenced by plant density and topping practices.

Treatments	Dry matter accumulation (kg ha^{-1})						
	30 DAS	45 DAS	60 DAS	75 DAS	90 DAS	105 DAS	At HARVEST
Plant density							
D_1: 30 cm x 20 cm (1,66,666 plantsha$^{-1)}$	90	542	1711	3947	5778	6601	6810
D_2: 45 cm x 10 cm (2,22,222 plants ha^{-1})	112	642	2445	4992	7272	8154	8355
D_3: 60 cm x 20 cm (83,333 plants ha^{-1}	72	584	1624	5569	7932	8954	9413
SEm±	9.99	58.85	238.59	398.28	631.21	414.23	434.19
CD (P=0.05)	29	NS	700	1168	1851	1214	1273
Topping practices							
T_1: No topping	90	543	1822	4103	6114	6968	7172
T_2: 30 DAS	95	662	2034	5150	7334	7690	8292
T_3: 45 DAS	93	602	1976	5869	8067	9002	9286
T_4: 60 DAS	88	552	1874	4222	6461	7953	8021
SEm±	11.53	67.95	275.5	459.9	728.85	478.3	501.36
CD (P=0.05)	NS	NS	NS	1348	NS	1403	1470
Interaction							
SEm±	19.97	117.69	477.17	796.5	1262.4	828.4	868.3
CD (P=0.05)	NS	NS	NS	2336	NS	NS	NS
CV%	12.6	11.5	14.3	9.5	10.4	6	6.1

Table 1(a). Interaction effect of plant density and topping practices on drymatter accumulation of *olitorius* jute at 75 DAS

Plant Densities	Drymatter accumulation (kg ha^{-1})				
	Topping Practices				
	T_1: No topping	T_2: 30 DAS	T_3: 45 DAS	T_4: 60 DAS	Mean
Plant density					
D_1: 30 cm x 20 cm (1,66,666 plants ha^{-1})	3243.1	4212	4747	3585	3947
D_2: 45 cm x 10 cm (2,22,222 plants ha^{-1})	4099	5062	6655	4152	4992
D_3: 60 cm x 20 cm (83,333 plants ha^{-1})	4967	6175	6206	4929	5569
Mean	4103	5150	5869	4222	
SEm±	796.5				
CD (p=0.05)	2336				

Table 2. Number of branches plant^{-1}of *olitorius* jute at different growth stages as influencedby plant density and topping practices

Treatments	Number of branches plant^{-1}					
	45 DAS	60 DAS	75 DAS	90 DAS	105 DAS	At HARVEST
Plant density						
D_1: 30 cm x 20 cm (1,66,666 plants ha^{-1})	2.8	4.6	7.1	12	13.5	13.5
D_2: 45 cm x 10 cm (2,22,222 plants ha^{-1})	2.5	4.5	6.7	10.6	11.3	11.3
D_3: 60 cm x 20 cm (83,333 plants ha^{-1})	4.1	7.2	10.9	17	17.9	17.9
SEm±	0.34	0.67	0.77	1.19	1.28	1.47
CD (P=0.05)	0.1	1.9	2.3	3.5	3.8	4.3
Topping practices						
T_1: No topping	2	3.9	6.2	9.6	9.9	9.9
T_2: 30 DAS	3	5.1	7.4	13.6	14.1	14.1
T_3: 45 DAS	4.7	0.2	11.3	17	20.2	20.2
T_4: 60 DAS	2.7	4.5	7.9	12.6	12.6	12.6
SEm±	0.39	0.78	0.89	1.37	1.48	1.7
CD (P=0.05)	1.1	2.3	2.6	4	4.4	5
Interaction						
SEm±	0.67	1.34	1.54	2.38	2.57	2.94
CD (P=0.05)	NS	NS	4.5	NS	NS	NS
CV%	12.5	14.3	10.8	10.4	10.4	11.9

Table 2(a). Interaction effect of plant density and topping practices on number of branches per plant in *olitorius* jute at 75 DAS

Plant Densities	Number of branches plant^{-1}				
	Topping Practices				
	T_1: No topping	T_2: 30 DAS	T_3: 45 DAS	T_4: 60 DAS	Mean
Plant density					
D_1: 30 cm x 20 cm (1,66,666 plants ha^{-1})	9.6	20.2	28.9	26	27.1
D_2:45 cm x 10 cm (2,22,222 plants ha^{-1})	18.2	23	21	17.8	20
D_3: 60 cm x 20 cm (83,333 plants ha^{-1})	27.6	23.8	52	27.2	32.6
Mean	18.4	22.3	33.9	23.6	24.5
SEm±	1.54				
CD (p=0.05)	4.5				

Table 3. Seed yield (kg ha^{-1}), Stalk yield (kg ha^{-1}), and Harvest index (%) of *olitorius* jute as influenced by plant density and topping practices

Treatments	Seed yield (kg ha^{-1})	Stalk yield (kg ha^{-1})	Harvest index (%)
Plant density			
D_1: 30 cm x 20 cm (1,66,666 plants ha^{-1})	1699	5048	27.1
D_2: 45 cm x 10 cm (2,22,222 plants ha^{-1})	2200	6134	25.9
D_2: 60 cm x 20 cm (83,333 plants ha^{-1})	2388	6812	32.6
SEm±	144.65	387.54	1.91
CD (P=0.05)	424	1136	NS
Topping practices			
T_1: No topping	1824	5324	25.4
T_2: 30 DAS	2196	6077	26.3
T_3: 45 DAS	2463	6718	26.6
T_4: 60 DAS	1900	5873	26.6
SEm±	167.03	447.49	2.21
CD (P=0.05)	489	1312	NS
Interaction			
SEm±	289.3	775.07	3.83
CD (P=0.05)	NS	NS	NS
CV%	7.9	7.5	8.4

topping (T_1). It was on par with topping at 30 DAS (T_2) and topping at 60 DAS (T_4) at 105 DAS and at harvest. However, the interaction between both the factors for drymatter accumulation was significant only at 75 DAS. At 75 DAS, the highest drymatter of jute was produced by crop sown with a plant density of 83, 333 plants ha^{-1} (D_3) along with topping at 45 DAS (T_3) compared to all other combinations of plant density and topping practices (Table 1a). This might be due to more per plant drymatter accumulation at a wider spacing tried at 60 cm x 20 cm 83,333 plants ha^{-1} due to more vigour and less competition from neighbouring plants. These results are in accordance with the findings of Sangeetha (2015) Das *et al.* (2018).

More number of branches plant^{-1}was obtained with plant density of 83,333 plants ha^{-1} which was significantly superior over other plant densities i.e.1,66,666 plants ha^{-1}and 2,22,222 plants ha^{-1} at different stages. Highest number of branches plant^{-1} were recorded with topping at 45 DAS (T_3) which was significantly superior over topping at 30 DAS(T_2)and 60 DAS(T_4).Lowest number of branches plant^{-1}were noticed with no topping practice(T_1).(Table 2)Interaction between plant density and topping practices reached level of significance only at 75 DAS.Maximum number of branches plant^{-1}were recorded when crop was sown with a spacing of 60 cm x 20 cm (D_3) along with topping done at 45 DAS (T_3) which was significantly superior over other treatments.(Table 2a).Number of branches plant^{-1} produced were maximum in D_3 (83,333 plants ha$^{-1)}$. It was due to more vigour by an individual plant at wider spacing, topping at 30 DAS might have promoted much vegetative growth since it was done early and better reproductive growth was obtained with topping at 45 DAS. Similar views were also expressed by More and Pachrane (2017) and Patra *et al.* (2017)

Maximum seed yield (2388 kg ha^{-1}) and stalk yield (6812 kg ha^{-1}) of jute were obtained in crop sown with (60 cm x 20 cm) with a density of 83, 333 plants ha^{-1}(D_3), which was significantly superior over 30 cm x 20 cm with 1,66, 666 plants ha^{-1}(D_1) and it was on par with 45 cm x 10 cm ha^{-1}(D_2) (Table 3). Topping at 45 DAS (T_3) recorded highest seed yield (2463 kg ha^{-1}) which was on par with topping at 30 DAS. Maximum stalk yield of 6718 kg ha^{-1} was obtained with topping at 45 DAS and it was found on par with 30 DAS and 60 DAS. Harvest index did not alter significantly due to plant densities and topping practices. In wider spacing, less competition between plants and more availability of various resources lead to maximum yield, topping at appropriate stage i.e. 45 DAS lead to increase in various yield attributes along with more branches per plant accumulating more drymatter and finally resulting in more yield when compared to no topping and topping at 60 DAS. These results are in tune with the findings of Tripathi *et al*. (2010), Ghosh and Das (2015) and Patra *et al*. (2017)

CONCLUSION

It can be concluded that plant density of 83, 333plants ha^{-1} and with topping at 45 DAS can be a good management practice for higher seed yield of olitorius jute in coastal Andhra Pradesh.

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Received on 28.07.2020 and revised on 26.09.2020