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EFFECT OF SOWING DATE ON FIBRE YIELD AND YIELD ATTRIBUTES OF ADVANCED BREEDING LINE O-0412-9-4 AND O-043-7-9 OF TOSSA JUTE (*Corchorus olitorius* L.)

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Abstract

The experiment was conducted at Jute Agriculture Experimental Station (JAES), Manikganj and Jute Research Sub Station (JRSS), Jashore during 2019- 2020 to determine the optimum sowing date of advanced breeding line O-0412-9-4, O-043-7-9 of tossa jute and BJRI Tossa Pat 5 (O-795) used as control. The experiment was laid-out in factorial RCBD with three replications. Crops were sown on four different dates viz., 30 March, 15 April, 30 April and 15 May as treatment variables. Plants were harvested at 120 days after sowing. All crops were given normal cultural practices. Results showed that advanced breeding line O-0412-9-4 and O-043-7-9 sown on 30 March to 10 April gave significantly higher fibre yield of 3.11 and 3.04 t ha^{-1}, respectively) at Manikganj and 3.13 and 3.11 t ha^{-1}, respectively at and Jashore.

Introduction

Jute (*Corchorus spp*.) is a cash crop of Bangladesh. Jute is a common term used both for plant and the fibre obtained from the bark of the plants. Jute is one of the mainstays of Bangladesh economy. It plays an important role earning about 5-6% foreign exchange through exporting jute and jute goods. (Islam *et al*., 2019). Jute crop enriches the topsoil by adding organic matter through dropping leaves and left-over roots in the field (Alam *et al.,* 2019). The jute crop also greatly improves the soil fertility status by incorporating organic matter to the soil through decomposition of shaded leaves and plant residues and helps in breaking plough-pans through its long taproots. Also, jute and jute goods have been recognized as being friendly to the environment. (Haque *et al.,* 2020). Though national average yield is increased from 1.59 to 2.04 tons per hectare (BBS, 2015). But the present status of jute as a cash crop facing a problem for increasing preference to food crop due to population pressure. The quality status of jute seed at farm level is very poor and farmers are normally ignorant of seed quality and quality evaluating tests One of the most important problems for jute production in Bangladesh is the unavailability of quality seed during proper time of sowing. Only about 10 to 15% quality jute seeds are supplied by different national agencies, but the rest amount of quality seed is yet to be managed to supply (Ferdous and Islam, 2018).

Tossa Jute is a high land crop grown in the summer season in Bangladesh. It is the most important fibre crop as well as cash crop of the country (Hossain *et al.*, 2020). Tossa (*C. olitorious*) produces more biomass in poor soil and has great potentiality as renewable (annual plant) raw materials for paper pulp production. There are so many attributes responsible for yield of jute fibre i.e. sowing time, plant population, plant height, base diameter etc. In traditional jute cultivation at farm level, the farmers are usually sow seeds in different times, but optimum sowing time plays very important rules for higher yield and quality fibre. To know appropriate sowing time is very essential to produce desirable amount of tossa jute as well as biomass.

O-0412-9-4 and O-043-7-9 are promising important advanced breeding line of tossa jute. The experiment was therefore, undertaken to determine the appropriate date of sowing for advanced tossa breeding line O-0412-9-4 and O-043-7-9, at different agro-ecological zones of Bangladesh for higher fibre yield.

Materials and Methods

The experiment was conducted at Jute Agriculture Experimental Station (JAES), Manikganj, and Jute Research Sub Station (SS), Jashore during 2019-2020. The experiment was laid out in factorial RCBD with three replications. Unit plot size was 4.0m × 2.5m. Advanced breeding line of tossa O-0412-9-4, O-043-7-9 and variety BJRI Tossa Pat 5 (O-795) was used as control. Crops were sown on four different dates viz., 30 March, 15 April, 30 April and 15 May as treatment variables. Seeds were sown in line of 30 cm apart. Other cultural and intercultural practices were followed as per BJRI recommendation. Plants were harvested at 120 days after sowing. Location wise average data of fibre yield and quality attributing characters were analyzed with the help of computer statistical package (Statistix 10). The mean differences among the treatments were adjusted as per Least Significant Difference (LSD) at 0.05 level (Gomez and Gomez, 1984).

Results and Discussion

Results revealed that plant population and plant height differ significantly due to variety irrespective of sowing date at JAES Manikganj. At the same location, fibre yield and stick yield were not differed significantly due to variety irrespective of sowing date (Table 1). Advanced breeding line line O-0412-9-4 and O-043-7-9 were gave numerically higher fibre yield (2.92 t ha^{-1}) and (2.95 t ha^{-1}) over control variety O-795 (2.86 t ha^{-1}) at Manikganj. At Jashore, fiber yield and stick yield both were significantly higher than advanced breeding line O-0412-9-4 and O-043-7-9 (2.95 t ha^{-1}) and (3.07 t ha^{-1}) than control variety (2.56 t ha^{-1}). Hossain *et al*. (2015), Islam and Rahman (2008) were also reported the similar observations.

Table 1. Effect of variety irrespective of date of sowing on fibre yield and yield components of tossa jute at different locations

Location	Treatments	PP (m^{-2})	PH (m)	BD (mm)	FY (t ha^{-1})	SY (t ha^{-1})
Manikganj	O-0412	31.46	2.99	15.27	2.92	5.80
	O-043	32.82	2.90	15.11	2.95	5.84
	O-795	32.54	2.81	14.82	2.86	5.83
	$LSD_{(0.05)}$	0.90	0.14	NS	NS	NS
	CV (%)	3.28	5.56	4.06	5.46	5.63
Jashore	O-0412	32.36	2.90	15.56	2.95	6.34
	O-043	31.76	2.88	16.06	3.07	6.55
	O-795	30.40	2.90	15.68	2.56	6.07
	$LSD_{(0.05)}$	0.81	NS	0.77	0.10	0.22
	CV (%)	3.04	7.87	5.83	3.95	4.30

NS = Not-significant, PP = Plant population, PH = Plant height, BD = Base diameter, FY = Fibre yield, SY = Stick yield.

Results showed that yield and yield contributing characters like plant population, base diameter, plant height and fibre yield were significantly affected due to sowing date irrespective of variety at Manikganj (Table 2). Crop sown on 30 March gave the highest fibre and stick yields (3.13 and 6.44 t ha^{-1}, respectively). Plant height (3.06m) and base diameter (15.74 mm) were also found the highest at the same date. The crop sown on 20 March recorded the lowest fibre and stick yields (2.70 and 5.40 t ha^{-1}, respectively) at Manikganj. All the yield and yield contributing characters like plant population, base diameter, fibre yield and stick yield were significantly affected but only plant height was affected significantly due to sowing date irrespective of variety at Jashore (Table 2). Crops sown on 10 April gave the highest fibre and stick yield (3.10 t ha^{-1} and 6.45 t ha^{-1}, respectively) at Jashore. Among the

sowing dates, plant height (2.97 m) and base diameter (15.95 mm) were also found the highest crop sown 10 April. The lowest fibre and stick yield (2.91 and 6.00 t ha^{-1}, respectively) were obtained from the crop sown on 20 March. Similar observations were reported by Islam and Rahman (2008) and Islam and Alam (2012). Irrespective of locations Plant height of the advanced breeding line O-0412-9-4 and O-043-7-9were 2.95 m and 2.89 m which was 3.14 and 1.04% higher than that of BJRI Tossa Pat-5 (2.86 m) (Figure 1). Likewise, Base diameter of the advanced breeding line O-0412-9-4 and O-043-7-9 were 15.42 mm and 15.59 mm which was 1.11 and 2.22% higher than that of BJRI Tossa Pat-5 (15.25 mm) (Figure 2). Similarly, advanced breeding line O-0412-9-4 and O-043-7-9 were produced 2.94 and 3.07 t ha^{-1} fibre, respectively which was also 8.48 and 13.28% higher than that of BJRI Tossa Pat-5 (2.71 t ha^{-1}) (Figure 4). At the same time, advanced breeding line O-0412-9-4 and O-043-7-9 were produced 6.07 t ha^{-1} and 6.20 t ha^{-1} stick, respectively which was also 2.02 and 2.24% higher than that of BJRI Tossa Pat-5 (5.95 t ha^{-1}) (Figure 3). Similar observations were reported by Ferdous and Islam (2018).

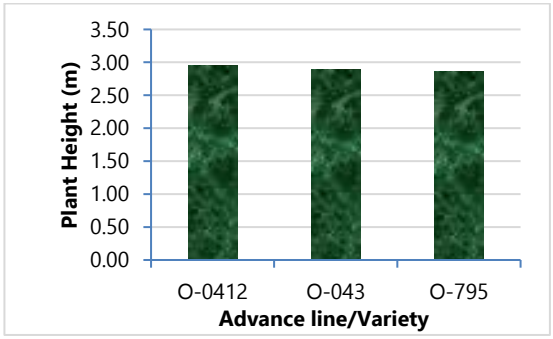

Fig. 1. Plant height as affected by advance line/variety of jute

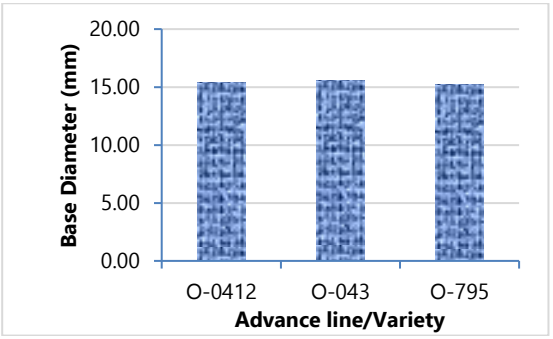

Fig. 2. Base diameter as affected by advance line/variety of jute

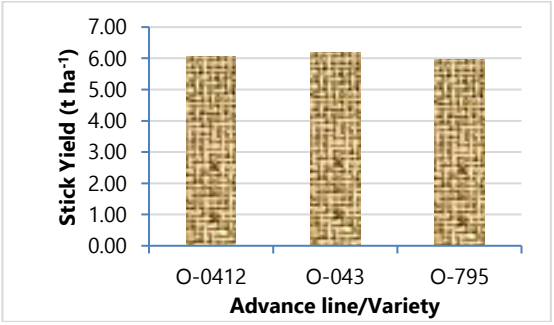

Fig. 3. Fibre yield as affected by advance line/variety of jute

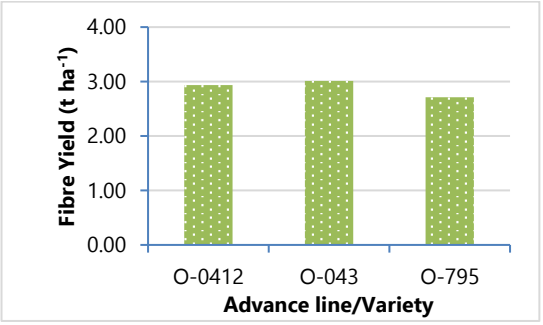

Fig. 4. Stick yield as affected by advance line/variety of jute

It was observed that yield and yield contributing characters like plant population, base diameter and plant height, fibre yield and stick yield were affected significantly due to interaction of variety and sowing date at Manikganj (Table 3). The advanced breeding line O-0412-9-4 sown on 30 March gave the highest fibre and stick yield (3.11 t ha^{-1} and 6.50 t ha^{-1}, respectively at Manikganj. The advanced breeding line O-043-7-9 sown on 10 April gave the highest fibre and stick yield (3.14 t ha^{-1} and 6.37 t ha^{-1}, respectively at Manikganj. The lowest fibre yields (2.74 t $ha^{-1}$and 2.77 t ha^{-1}, respectively) were recorded from the breeding line O-0412-9-4 and O-043-7-9 sown on 20 April at Manikganj. Hossain *et al*. (2015); Ferdous and Islam (2018); Islam and Rahman (2008) and Islam and Alam (2012) were reported the similar results.

Table 2. Effect of date of sowing irrespective of variety on fibre yield and yield components of tossa jute at different locations

Location	Treatments	PP (m^{-2})	PH (m)	BD (mm)	FY (t ha^{-1})	SY (t ha^{-1})
Manikganj	20 March	31.55	2.80	14.74	2.70	5.40
	30 March	33.35	3.06	15.74	3.13	6.44
	10 April	32.85	2.99	15.43	3.03	6.24
	20 April	31.35	2.74	14.36	2.71	5.49
	$LSD_{(0.05)}$	1.03	0.16	0.60	0.15	0.32
	CV (%)	3.28	5.56	4.06	5.46	5.63
Jashore	20 March	29.34	2.85	15.04	2.91	6.00
	30 March	34.45	2.96	15.95	3.01	6.22
	10 April	34.16	2.97	16.05	3.10	6.45
	20 April	28.07	2.79	15.10	2.96	6.08
	$LSD_{(0.05)}$	0.93	NS	0.89	0.12	0.26
	CV (%)	3.04	7.87	5.83	3.95	4.30

NS = Not-significant, PP = Plant population, PH = Plant height, BD = Base diameter, FY = Fibre yield, SY = Stick yield.

Table 3. Interaction effect of variety and date of sowing on fibre yield and yield components of tossa jute at Manikganj

Treatments	PP (m^{-2})	PH (m)	BD (mm)	FY (t ha^{-1})	SY (t ha^{-1})
V_1 x S_1	29.75	2.89	15.23	2.78	5.38
V_1 x S_2	33.14	3.13	15.94	3.11	6.50
V_1 x S_3	31.85	3.11	15.41	3.07	6.20
V_1 x S_4	31.11	2.84	14.50	2.74	5.24
V_2 x S_1	32.14	2.76	14.27	2.84	5.86
V_2 x S_2	32.31	3.08	14.83	2.93	6.31
V_2 x S_3	33.70	3.03	16.00	3.14	6.37
V_2 x S_4	33.40	2.74	14.17	2.77	5.46
V_3 x S_1	32.90	2.75	14.73	2.49	4.95
V_3 x S_2	34.70	2.78	16.46	2.65	6.45
V_3 x S_3	33.03	3.05	14.87	3.08	6.22
V_3 x S_4	29.53	2.64	14.40	2.62	5.76
$LSD_{(0.05)}$	1.79	0.73	1.04	0.27	0.56
CV (%)	3.28	5.56	4.06	5.46	5.63

NS = Not-significant; V_1= O-0412, V_2= O-043, V_3= O-795; S_1= 20 March, S_2= 30, March, S_3= 10 April, S_4= 20 April; PP = Plant population, PH = Plant height, BD = Base diameter, FY = Fibre yield, SY = Stick yield.

It was observed that yield and yield contributing characters like plant population and plant height, base diameter, fibre yield and stick yield were affected significantly due to interaction of variety and sowing date at Jashore (Table 4). The advanced breeding line O-0412-9-4 sown on 30 March gave the highest fibre and stick yields (3.13 t ha^{-1} and 6.35 t ha^{-1}, respectively) at Jashore. The advanced breeding line O-043-7-9 sown on 10 April gave the highest fibre and stick yields (3.18 t ha^{-1} and 6.41 t ha^{-1}, respectively) at Jashore. The lowest fibre yields (2.75 t ha^{-1} and 3.03 t ha^{-1}, respectively) were recorded from the breeding line O-0412-9-4 and O-043-7-9 sown on 20 March at Jashore. The similar observations were reported by Hossain *et al*. (2015) and Islam and Alam (2012).

Table 4. Interaction effect of variety and date of sowing on fibre yield and yield components of tossa jute at Jashore

Treatments	PP (m^{-2})	PH (m)	BD (mm)	FY (t ha^{-1})	SY (t ha^{-1})

V_1 x S_1	30.21	2.89	15.21	2.75	6.57
V_1 x S_2	36.48	3.17	17.29	3.13	6.35
V_1 x S_3	34.56	2.92	16.05	3.00	6.22
V_1 x S_4	28.18	2.61	15.66	2.93	6.21
V_2 x S_1	32.15	2.83	14.37	3.03	5.82
V_2 x S_2	32.68	2.84	14.41	3.03	6.34
V_2 x S_3	33.44	2.96	15.48	3.18	6.41
V_2 x S_4	28.76	2.89	15.19	3.10	6.04
V_3 x S_1	25.65	2.83	15.71	2.94	5.61
V_3 x S_2	33.32	2.88	16.13	2.85	6.00
V_3 x S_3	35.33	3.04	16.62	3.01	6.80
V_3 x S_4	27.28	2.86	14.27	2.85	5.88
$LSD_{(0.05)}$	1.62	0.39	1.53	0.22	0.45
CV (%)	3.04	7.87	5.83	3.95	4.30

NS = Not-significant; V_1= O-0412, V_2= O-043, V_3= O-795; S_1= 20 March, S_2= 30 March, S_3= 10 April, S_4= 20 April; PP = Plant population, PH = Plant height, BD = Base diameter, FY = Fibre yield, SY = Stick yield.

Conclusion

From the study, it was found that the advanced tossa breeding line O-0412-9-4 and O-043-7-9 gave higher yield and yield contributing characters like plant population and plant height, base diameter, fibre yield and stick yield when sown at on 30 March to 10 April at Manikganj and Jashore.

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