



Yield and Quality of White Jute (Var. Bjri Deshi Pat 8) Seed as Influenced by Line×Plant Spacing in Different Growing Areas of Bangladesh

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Abstract: The experiment was conducted at JAES, Manikganj, JRRS, Rangpur and JRSS, Jessore during 2015-16 to determine the optimum plant spacing of BJRI Deshi Pat-8 (BJC-2197) for seed production at late season. The experiment was laid out in RCBD design with three replications. Different plant spacing viz., 30cm×10cm, 30cm×12.5cm, 30cm×15cm, 35cm×10cm, 35cm×12.5cm, 35cm×15cm, 40cm×10cm, 40cm×12.5cm, 40cm×15cm, 45cm×10cm, 45cm×12.5cm and 45cm×15cm were used as treatment. The crop was harvested at proper maturity of the pods of plant as per BJRI recommendation. Results revealed that all the yield and quality contributing characters were differed significantly except branch plant⁻¹, 1000 seeds weight and Moisture percentage due to different plant spacing. The highest seed yields and germination 1398.33kg/ha⁻¹ and 92.33% at Manikganj, 1164.73kg/ha⁻¹ and 92.67% at Rangpur and; 1197.00kg/ha⁻¹ and 91.33% at Jessore, respectively were obtained from the spacing treatment 35cm×12.5cm.

Keywords: White jute, seed, yield, quality, spacing.

Abbreviations: JAES, Jute Agriculture Experimental Station; JRRS, Jute Regional Research Station.

INTRODUCTION

Jute is a cash crop grown in the summer season (Kharif¹) of Bangladesh. In 2010-11, 0.803 million ha land cultivated for jute. Production of raw jute was 1.5 million MT by volume in 2010-11. Jute cultivation area was 6% of total land area of 13 million ha, of which 8.44 million ha belongs to agricultural land. Jute cultivation area was 10% of agricultural land area. Jute production was 26% as of all agricultural crops. Annual jute seed requirement was 5,000-5,500 MT. Jute seed supply were from i) Public: 2,187 MT and from ii) Import 3,617 MT in 2010-2011(IJSG, 2012).

In northern districts like Dinajpur, Rangpur 15 days earlier than that of southern (Jessore, kustia) (Islam 2009). The varieties O-4, O-9897, and chaitali sown on 1 and 15 August produced as much as 990 and 935 kg seeds per hectare (Khan, 1997). In *C. olitorius* L. jute variety OM-1, Seed yield plant⁻¹, 1000- seed wt. and germination differed significantly due to sowing dates (Chanda, 1999). Jute seed crop could be sown from may 15 to September 30 (Talukder, 2001). Planting time (July 15 to September 15) of seeds of O-72 olitorius jute differed significantly for seed yield (Alom, 2010). The optimum time of late jute seed production was June-July for *C. capsularis* L. white August-September for *C. olitorius* L. (Islam, 2010). To get optimum plant population and desired yield, seeding rate was optimized and found that seeds having 80% viability, 5 kg/ha⁻¹ of tossa jute, 7 kg/ha⁻¹ of deshi and 12-15 kg/ha⁻¹ of Kenaf and Mesta seeds could offer desired population and optimum yield. For seed crop seed rate depends on the soil condition and planting methods followed. As a thumb rule, for Deshi jute 4.0-4.5 kg/ha in line sowing and 5.0-5.5 kg/ha in broadcast sowing should to be maintained. On the other

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hand for Tossa jute 3.0-3.5 kg/ha in line sowing and 4.0-4.5 kg/ha in broadcast sowing should be maintained. As jute seeds have no other alternative uses, it is to sow even if it is of 50% viability by adjustment the seed rate (Islam and Rahman, 2008).

The conventional practice of jute seed production is to keep a part of the fibre crop for seed harvest. Mostly we cannot maintain the line to line as well as plant to plant spacing. In case of seed production of jute, spacious environment is very much important for production of maximum number of branches and pods, resulting higher amount of quality seed, where jute plants get enough space to develop canopy horizontally. Jute plants able to grow many branches. However, maintaining the spacing in seed production of jute crop at late season is very much important. In order to improve the yield and quality of seed the experiment is designed to assess the effect of different spacing on seed production of white jute (*Corchorus capsularis* L.) in late season.

MATERIALS AND METHODS

The experiment was conducted at Jute Agriculture Experimental Station (JAES), Manikganj, Jute Research Regional Station (JRRS), Rangpur and Jute Research Sub Station (JRSS), Jessore during 2015-16 to determine the optimum plant spacing of newly released variety BJRI Deshi Pat 8 (line: BJC-2197). Different plant spacing viz., 30cm×10cm ("row to row spacing 30cm" and "plant to plant spacing 10cm"), 30cm×12.5cm, 30cm×15cm, 35cm×10cm, 35cm×12.5cm, 35cm×15cm, 40cm×10cm, 40cm×12.5cm, 40cm×15cm, 45cm×10cm, 45cm×12.5cm and 45cm×15cm were used as treatment. The experiment was laid out in RCBD design with three replications. Unit plot size would be 4.0m×2.5m. Space between plot to plot and around the field 1.0m and between replications 1.5m was maintained. Seeds were sown in assigned spacing according to treatment at late season (last week of August to 1st week of September) (Islam, 2010). Other cultural and intercultural practices were attended as per BJRI recommendation. Location wise average data of seed yield and quality attributing characters were analyzed with the help of computer statistical package (MSTAT). The mean differences among the treatments were adjusted as per Duncan's Multiple Range Test (DMRT) and T-test at 0.05 level (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Results revealed that all the yield and quality contributing characters were differed significantly except Branch plant⁻¹, 1000 SW (g) and Moisture percentage due to different plant spacing (Table 1). The highest yield 1398.33kg/ha⁻¹ was obtained at Manikganj from the spacing 35cm×12.5cm which was followed by the spacing 40cm×10.0cm (1379.33kg/ha⁻¹) and 30cm×15cm (1341.00kg/ha⁻¹). All the yield and yield contributing characters differed significantly except branch plant⁻¹ due to different spacing. Yield contributing characters were gave similar results according to the seed yield at Manikganj (Table 1). Germination percent differed significantly due to spacing. However, 1000 SW (g) and moisture percentage were insignificant due to different spacing. The highest germination was observed 92.33% at Manikganj from 35cm×12.5cm spacing which was followed by the spacing 40cm×10.0cm (91.67%) and 30cm×15cm (91.33%) (Table 2). The results were in agreement with Islam (2010) and Islam (2009).

Table 1. Effect of spacing on seed yield and yield contributing characters of white jute at Manikganj

Treatment (Spacing)		Branch plant ⁻¹	Pods plant ⁻¹	Seed pod ⁻¹	SW plant ⁻¹ (g)	SY (kg/ha ⁻¹)
	cm					
S ₁	30cm×10.0cm	4.08	38.96	27.56	5.36	1141.00
S ₂	30cm×12.5cm	5.74	56.63	33.88	7.16	1302.67
S ₃	30cm×15.0cm	5.34	70.43	35.42	8.89	1341.00
S ₄	35cm×10.0cm	4.48	63.03	34.53	7.56	1318.33

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S ₅	35cm×12.5cm	5.95	75.16	37.34	9.49	1398.33
S ₆	35cm×15.0cm	4.21	42.70	31.01	6.22	1221.00
S ₇	40cm×10.0cm	5.90	73.90	36.93	9.22	1379.33
S ₈	40cm×12.5cm	4.08	52.43	33.73	6.62	1285.00
S ₉	40cm×15.0cm	4.14	41.10	29.34	5.82	1187.67
S ₁₀	45cm×10.0cm	4.94	67.43	34.88	8.36	1336.33
S ₁₁	45cm×12.5cm	4.74	47.43	33.37	6.42	1269.33
S ₁₂	45cm×15.0cm	3.81	36.63	21.38	4.16	1074.33
LSD _(0.05)		NS	3.635	0.577	0.631	37.81

Legend: NS=Not-significant, PH=Plant height, SW=Seed weight, SY=Seed yield

Table2. Effect of spacing on seed quality contributing characters of white jute at Manikganj

Treatment (Spacing)		1000 SW (g)	Ger (%)	Mos (%)
cm				
S ₁	30cm×10.0cm	2.73	75.33	9.55
S ₂	30cm×12.5cm	2.85	82.67	10.24
S ₃	30cm×15.0cm	3.17	91.33	10.46
S ₄	35cm×10.0cm	3.01	85.67	10.30
S ₅	35cm×12.5cm	3.34	92.33	10.72
S ₆	35cm×15.0cm	2.77	78.00	9.84
S ₇	40cm×10.0cm	3.23	91.67	10.57
S ₈	40cm×12.5cm	2.84	79.67	10.12
S ₉	40cm×15.0cm	2.76	76.67	9.64
S ₁₀	45cm×10.0cm	3.13	89.00	10.36
S ₁₁	45cm×12.5cm	2.79	79.67	10.02
S ₁₂	45cm×15.0cm	2.68	74.33	9.04
LSD _(0.05)		NS	2.732	NS

Legend: NS=Not-significant, Ger=Germination, Mos=Moisture

Table3. Effect of spacing on seed yield and yield contributing characters of white jute at Rangpur

Treatment (Spacing)		Branch plant ⁻¹	Pods plant ⁻¹	Seed pod ⁻¹	SW plant ⁻¹ (g)	SY (kg ha ⁻¹)
cm						
S ₁	30cm×10.0cm	3.84	32.91	31.99	5.48	642.20
S ₂	30cm×12.5cm	5.04	42.64	40.72	6.74	952.73
S ₃	30cm×15.0cm	5.89	53.24	46.06	9.01	1107.30
S ₄	35cm×10.0cm	5.64	48.84	42.56	7.68	1007.63
S ₅	35cm×12.5cm	5.94	59.44	46.89	9.61	1164.73
S ₆	35cm×15.0cm	4.51	37.71	38.39	6.34	767.93
S ₇	40cm×10.0cm	5.84	57.24	46.72	9.34	1128.17
S ₈	40cm×12.5cm	5.38	48.44	41.56	7.28	1002.03

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S ₉	40cm×15.0cm	4.18	36.78	36.06	5.94	717.60
S ₁₀	45cm×10.0cm	5.7	50.71	45.39	8.48	1057.37
S ₁₁	45cm×12.5cm	4.78	40.18	40.56	6.54	946.73
S ₁₂	45cm×15.0cm	2.91	28.98	30.06	4.28	612.13
LSD _(0.05)		NS	2.878	1.983	0.631	53.06

Legend: NS=Not-significant, PH=Plant height, SW=Seed weight, SY=Seed yield

At Rangpur area the yield and yield contributing characters of the study material were differed significantly except branch plant⁻¹ due to different plant spacing (Table 3). The highest yield 1164.73kgha⁻¹ was obtained from the spacing 35cm×12.5cm which was followed by the spacing 40cm×10.0cm (1128.17kgha⁻¹) and 30cm×15cm (1107.30kgha⁻¹). Yield contributing characters were gave similar results according to the seed yield at Rangpur (Table 3). At Rangpur germination percent differed significantly due to spacing, however, 1000 SW (g) and moisture percentage were insignificant. The highest germination was observed 92.67% from 35cm×12.5cm spacing which was followed by the spacing 40cm×10.0cm (91.67%) and 30cm×15cm (89.33%) (Table 4). These results were in agreement with Islam (2009), Islam (2010) and Islam and Rahman (2008).

Table4. Effect of spacing on seed quality characters of white jute at Rangpur

Treatment (Spacing)		1000 SW (g)	Ger (%)	Mos (%)
cm				
S ₁	30cm×10.0cm	2.74	78.33	10.22
S ₂	30cm×12.5cm	3.01	82.33	10.48
S ₃	30cm×15.0cm	3.28	89.33	10.90
S ₄	35cm×10.0cm	3.15	85.67	10.67
S ₅	35cm×12.5cm	3.43	92.67	10.77
S ₆	35cm×15.0cm	2.97	79.67	10.28
S ₇	40cm×10.0cm	3.36	91.67	10.82
S ₈	40cm×12.5cm	3.05	83.67	10.34
S ₉	40cm×15.0cm	2.90	78.67	10.06
S ₁₀	45cm×10.0cm	3.25	87.00	10.63
S ₁₁	45cm×12.5cm	3.01	80.33	9.98
S ₁₂	45cm×15.0cm	2.70	77.33	9.55
LSD _(0.05)		NS	3.385	NS

Legend: NS = Not-significant, Ger = Germination, Mos = Moisture

Table5. Effect of spacing on seed yield and yield contributing characters of white jute at Jessore

Treatment (Spacing)		Branch plant ⁻¹	Pods plant ⁻¹	Seed pod ⁻¹	SW plant ⁻¹ (g)	SY (kg ha ⁻¹)
cm						
S ₁	30cm×10.0cm	2.78	26.10	31.69	4.38	673.67
S ₂	30cm×12.5cm	3.18	31.17	35.67	5.51	927.00
S ₃	30cm×15.0cm	3.55	36.64	37.62	6.44	1053.67
S ₄	35cm×10.0cm	3.28	32.17	35.87	5.88	945.33
S ₅	35cm×12.5cm	4.05	39.70	39.00	7.24	1197.00
S ₆	35cm×15.0cm	3.11	30.17	35.25	5.41	884.33
S ₇	40cm×10.0cm	3.65	37.80	37.99	6.88	1097.00

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S ₈	40cm×12.5cm	3.05	29.00	34.73	5.11	860.33
S ₉	40cm×15.0cm	2.95	28.17	33.35	4.88	790.33
S ₁₀	45cm×10.0cm	3.35	36.00	36.27	6.19	1000.33
S ₁₁	45cm×12.5cm	2.88	27.10	32.27	4.78	723.67
S ₁₂	45cm×15.0cm	2.71	24.84	28.89	3.68	592.00
LSD _(0.05)		NS	0.310	2.173	0.131	85.31

Legend: NS=Not-significant, PH=Plant height, SW=Seed weight, SY=Seed yield

At Jessore results showed that all the yield and yield contributing characters were differed significantly except Branch plant⁻¹ due to different plant spacing (Table 5). The highest seed yield of 1197.00kg^{ha}⁻¹ was obtained in Jessore from the spacing 35cm×12.5cm which was followed by the spacing 40cm×10cm (1097 kg^{ha}⁻¹) and 30cm×15cm (1053.67kg^{ha}⁻¹). All other yield contributing characters were gave similar results according to the seed yield (Table 5). At Jessore germination percent differed significantly due to spacing, however, 1000 SW (g) and moisture percentage were insignificant (Table 6). The highest germination was observed 91.33% at Jessore from 35cm×12.5cm spacing which was followed by the spacing 40cm×10.0cm (89.33.67%) and 30cm×15cm (86.33%) (Table 6). Results were in agreement with Islam (2009), Islam (2010) and Islam and Rahman (2008).

Table6. Effect of spacing on seed quality characters of white jute at Jessore

Treatment (Spacing)		1000 SW (g)	Ger (%)	Mos (%)
cm				
S ₁	30cm×10.0cm	2.86	77.00	9.47
S ₂	30cm×12.5cm	3.13	81.33	10.38
S ₃	30cm×15.0cm	3.20	86.33	10.71
S ₄	35cm×10.0cm	3.17	82.67	10.43
S ₅	35cm×12.5cm	3.31	91.33	11.06
S ₆	35cm×15.0cm	3.06	80.33	10.33
S ₇	40cm×10.0cm	3.27	89.33	10.77
S ₈	40cm×12.5cm	2.98	79.33	10.19
S ₉	40cm×15.0cm	2.92	78.33	9.80
S ₁₀	45cm×10.0cm	3.19	83.67	10.48
S ₁₁	45cm×12.5cm	2.89	78.00	9.65
S ₁₂	45cm×15.0cm	2.74	75.67	9.25
LSD _(0.05)		NS	1.486	NS

Legend: NS = Not-significant, Ger = Germination, Mos = Moisture

CONCLUSION

From the above results it could be concluded that the highest seed yield and germination were recorded at Manikganj, Rangpur and at Jessore from the spacing treatment 35cm×12.5cm, was followed by 40cm×10cm and 30cm×15cm. The newly released white jute var. BJRI Deshi Pat 8 could be produced for higher seed yield with line×plant spacing of 35cm×12.5cm.

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Conflict of interest: The authors declare no conflict of interest.

Author contributions: Islam, M.M. designed, performed research and wrote the manuscript; Ali, M.S., Hossain, M.S. & Rahman, M.S analyzed data.

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