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Effect of harvesting age on fibre yield and yield contributing characters of highly salt tolerant *C. Capsularis* variety BJRI Deshi Pat-10

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Abstract
The experiment was carried out at Jute Research Sub-station, Kalapara, Patuakhali during the jute growing season to determine optimum field duration on yield and quality of different *C. Capsularis* variety and salt tolerant Variety BJRI Deshi Pat-10. The experiment was laid out in RCBD design with three replications. One *C. Capsularis* variety BJRI Deshi Pat -8 and salt tolerant variety BJRI Deshi Pat-10 were used as study material. Crops were sown on first week of April. The crops were harvested at different harvesting age (90 days, 100 days, 110 days and 120 days) regarded as the treatment. Crops were attained normal cultural practices. Result revealed that salt tolerant variety BJRI Deshi Pat-10 gave the highest fibre yield at 110 days harvesting age.

Keywords: Harvesting age, Salt tolerant, Yield, *C. Capsularis*

1. Introduction

Bangladesh the second largest producer of jute, produces the best quality jute in the worlds and leads the export market (Rayhan *et al*., 2008) [13]. **S**oil salinity is a major factor limiting plant productivity, affecting about 95 millions hectare worldwide. In Bangladesh saline soils occur mainly along the coastal areas of the southern part of the country. Agricultural productivity is severely affected by soil salinity and the damaging effect of salt accumulation in agricultural soils has become an important environmental concern all over the world. Excess Na and Cl accumulation in plant body causes ionic imbalances that may damage the selectivity of root membranes and induce potassium deficiency (Ferdous *et al*., 2018) [10]. Salinity severely affects different physiological processes in plant like water relation traits, chlorophyll content; accumulation of organic solutes and other activities includes photosynthesis which may reduce yield (Ferdous *et al*., 2018) [9]. The total saline area of the country is about 0.88 millions hectare of which more than 0.36 million hectares is in khulna, 0.22 million hectares in Patuakhali, 0.11 million hectares in Chattagram region and 0.17 million hectare in Barishal and Noakhali region. Recently is was reported that jute can be grown rapidly in saline soils. Considering its tolerance especially to the chlorine salinity, jute has been recently suggested as a promising candidate for planting in wet lands and saline soils (Wang *et al*., 2008) [14]. Jute (*Corchorus* spp.) is one of the main cash crops of Bangladesh. It plays an important role earning about 5-6% foreign exchange through exporting jute and jute goods. Bangladesh is not only the largest producer of jute but also produces the best quality jute fibre and leads the export market. The crop is a versatile and environmental friendly biodegradable natural fibre widely grown in Asia, particularly in Bangladesh, India, and China (Ferdous *et al*., 2018) [11]. 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 tap roots (Ferdous *et al*., 2022) [10]. Jute is a common term used both for plant and the fibre obtained from the bark of the plants, *Corchorus capsularis* L. and *Corchorus olitorius* L (Islam *et al*., 2019) [7]. The productivity of jute had doubled from 1.50 t/ha during 1970-80 to about 2.04 t/ha during 2015-16. Development of high-yielding varieties were the one of the main specific technologies which made this possible. (Ferdous *et al*., 2019) [12]. In 1970-80 decades about 15-16 lakh hectare of the total cultivable land was occupied by jute has now (2021-22) been reduced to about 7.00 to 8.00 lakh hectare which produced bout 84-85 lakh bale of fibre. However, national average yield is increased from 11.324 to 11.593 bale per hectare (BBS, 2022) [2]. It is happened due to use of high yielding jute varieties and production technologies, which together contributed toward higher yield. One highly salt tolerant variety BJRI Deshi Pat-10 was developed that can be grown in saline

area of Bangladesh. There are so many attributes responsible for yield of jute fibre i.e sowing time, harvesting time/age, plant population, plant height, base diameter etc. Harvesting time of jute is very important for getting better fiber from jute. Higher fiber yield can be achieved if jute is harvested lately, but the quality of jute fiber will not be better. Because jute fiber become coarse and hard and cutting may also develop at the base of the stem. Cutting make the jute fiber hard, soily and unusable which are not desirable. So, harvesting of jute should be started from start of flowering to fruit formation stage (120-135 days after sowing). Sometimes urgent harvest may be needed if there is a possibility of heavy rain or flood. Normally *Corchorus capsularis* are harvested during July - August and *Corchorus olitorius* are harvested during August-September. With the maturity of plants their lignification particularly at the basal areas increases which make the fibre coarser, full of cutting and inferior in quality. Over mature plants also take longer time for retting. It has been observed that plant harvested at 120 days for *C. Capsularis* and at 115 days for *C. Olitorious* i.e. in budding stages gave fibre of better quality with maximum yield (Asaduzzaman. M., 1991) [2]. One highly salt tolerant *C. Capsularis* variety BJRI Deshi Pat-10 was tested in relation to harvesting age/time to ascertain optimum time of harvest for higher fibre yield.

Methodology

The experiment was conducted at Jute Research Sub-Station, Kalapara, Patuakhali during the jute growing season. The experiment was laid out in Randomized Complete Block Design with three replications. Unit plot size was 4.0m X 2.5 m. Space between plot to plot and the field was 1.0m. Salt tolerant *C. Capsularis* variety BJRI Deshi Pat-10 was tested with BJRI Deshi pat-8 were used as study material. Crops were sown on first week of April. The crops were harvested at four different harvesting age i.e. 90 days, 100 days, 110 days and 120 days after sowing were regarded as the treatment. All the intercultural operation like weeding, thinning, irrigation, insect pest and disease management were done in time and fertilizer were attended as per BJRI recommendation. Plant population, Plant height, Base diameter, Fibre yield and Stick yield were recorded from each plot. All the collected data were analyzed statistically with the help of computer statistical package (Statistix 10). The mean differences among the treatments were adjusted as per Least Significant Difference (LSD) and T-test at 0.05 level (Gomez and Gomez, 1984) [4].

Results

Result revealed that fibre yield, stick yield and other parameters like plant height, base diameter etc were not differed significantly due to variety irrespective of field duration (Table.1). Salt tolerant *C. Capsularis* variety BJRI Deshi Pat-10 gave numerically higher fibre yield (2.41 tha^{-1}) and stick yield (6.56 tha^{-1}) than BJRI Deshi pat-8 which was used as control.

Table 1: Effect of variety irrespective of field duration on fibre yield and yield component of Deshi jute

Treatment	PP(m^{-2})	PH(m)	BD(mm)	FY(tha^{-1})	SY(tha^{-1})
BJRI Deshi Pat- 10	37.03A	2.554A	18.29A	2.41A	6.56A
BJRI Deshi Pat-8	37.57A	2.739A	18.18A	2.26A	5.87A
LSD (0.05)	7.397	0.2274	1.6068	0.5993	1.6545
CV(%)	23.29	10.03	10.35	30.21	31.24

Legend: V_1= BJRI Deshi Pat- 10, V_2=BJRI Deshi pat-8; PP=Plant Population, PH=Plant height, BD=Base diameter, FY=Fibre yield, SY=Stick yield

Results reveled that plant population was differed significantly due to field duration/harvesting age irrespective of variety (Fig.1). Number of plant population were comparatively decreases with increasing time of harvesting. Significantly highest plant population (42) was obtained when crops were harvested at 120 days after sowing which was followed by 100 DAS. The crop harvested on 120 days after sowing recorded the lowest plant population (31).

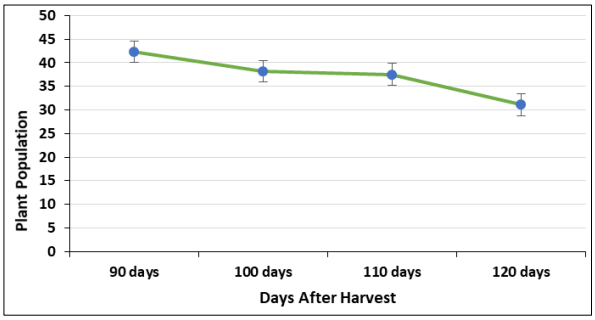

Fig 1: Plant population as affected by field duration/harvesting age

Results showed that yield and yield contributing characters like plant height and base diameter were affected significantly due to field duration/harvesting age irrespective of variety (Fig. 2 & 3). Significantly highest plant height (2.88 m) and base diameter (19.29 cm) were found when crops were harvested at 120 days after sowing. The crop harvested on 90 days after sowing recorded the lowest plant height (2.38 m) and base diameter (17.19 cm). Similar traits found in Ferdous *et al*., 2018 [9], Ferdous *et al*., 2019 [12] and Alim *et al*. 2021[1].

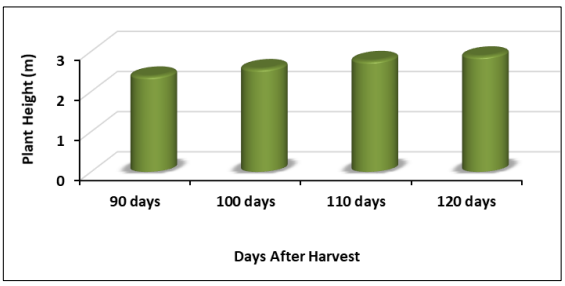

Fig 2: Plant height as affected by field duration/harvesting age

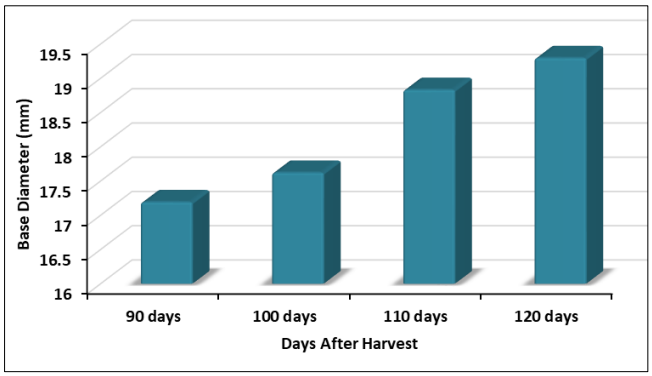

Fig 3: Base diameter as affected by field duration/harvesting age

Field duration/harvesting age irrespective of variety affected significantly on fibre yield and stick yield. Crop harvested at 110 days gave significantly highest fibre yield (2.728 tha^{-1}) and stick yield (6.645 tha^{-1}). The lowest fibre yield (1.83tha^{-1}) and stick yield (4.47tha^{-1}) were recorded when crops harvested on 90 DAS (Fig. 4). The results were in agreement with Islam *et al*. (1995) [6] and Hsu and Chi (1976) [5], Ferdous *et al*., 2019 [12] and Alim *et al*. 2021[1].

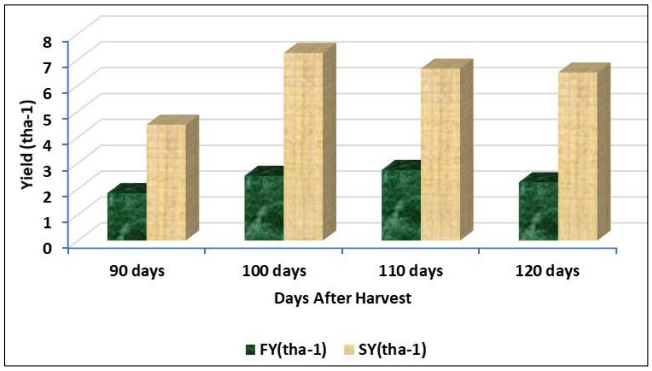

Fig 4: Fibre and stick yield as affected by field duration/harvesting age

Interaction effect of variety and harvesting age/ field duration significantly affected plant height and base diameter (Table.2). Result showed that BJRI Deshi Pat- 10 gave significantly higher plant height (2.95 m) and base diameter (18.66) when harvested at 120 days which was followed by 120 days than BJRI Deshi pat-8. Weng *et al*. (1990) [15] reported similar findings in Kenaf and jute

Table 2: Interaction effect of variety and field duration on fibre yield and yield component of Deshi jute

Treatment	PP(m^{-2})	PH(m)	BD(mm)
V1 X H1	41.33 A	2.17 D	16.68 A
V1 X H2	37.43 A	2.58 BC	17.43 A
V1 X H3	38.56 A	2.743 ABC	19.13 A
V1 X H4	30.80 A	2.81 ABC	19.91 A
V2 X H1	43.33 A	2.58 BC	17.7 A
V2 X H2	38.96 A	2.64 BC	17.81 AB
V2 X H3	36.56 A	2.78 ABC	18.53 A
V2 X H 4	31.43 A	2.95 AB	18.66 A
LSD (0.05)	15.579	0.307	3.27
%CV	23.83	6.63	10.25

Legend: V_1= BJRI Deshi Pat- 10, V_2=BJRI Deshi pat-8, H_1= 90 DAS, S_2= 100 DAS, S_3=110 DAS, S_4=120 DAS; PP=Plant Population, PH=Plant height, BD=Base diameter.

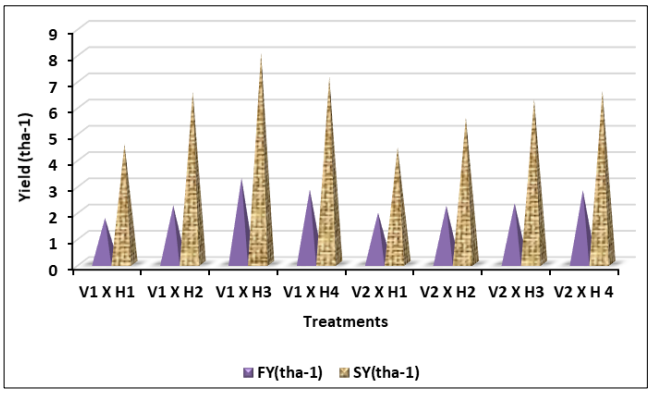

Fig 5: Interaction effect of variety and field duration on fibre yield and stick yield of Deshi jute

Fibre yield and stick yield were significantly influenced by interaction effect of variety and harvesting age/ field duration (Fig.5). Result showed that BJRI Deshi Pat- 10 gave higher fibre yield and stick yield (3.26 tha^{-1} and 8.03 tha^{-1} respectively) when harvested at 110 days which was followed by 120 days than BJRI Deshi pat-8. The results were in agreement with Islam *et al*. (1995) [6], Hsu and Chi (1976) [5], Ferdous *et al*., 2018[11] and Ferdous *et al*., 2019[12].

Conclusion

Optimum harvesting time is very important factor for getting better quality and higher fiber production in jute. From the study, it can be concluded that salt tolerant *C. Capsularis* variety BJRI Deshi Pat- 10 gave higher fibre yield when harvested at 110 days which was statistically identical to 120 days harvesting age than BJRI deshi pat-8 in saline area of Bangladesh.

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