

## EFFECT OF VARIETY AND HARVESTING TIME ON KENAF FIBRE YIELD GROWN IN NARAYANGANJ DISTRICT OF BANGLADESH

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### ABSTRACT

The experiment was conducted at Jute Research Sub Station (JRSS), Tarabo, Narayanganj during 2020-2021 to determine the optimum harvesting time for higher fibre yield of BJRI developed Kenaf varieties. The experiment was laid out in RCBD design with three replications. Four kenaf varieties viz., BJRI Kenaf-1, BJRI Kenaf-2, BJRI Kenaf-3 and BJRI Kenaf-4 and four harvesting age viz., 90 DAS, 100 DAS, 110 DAS and 120 DAS were used as treatment. Results revealed that BJRI kenaf-2 produced the highest fibre yield (2.62 and 3.61 t/ha) and the highest stick yield was recorded (5.22 and 6.41 t/ha) on 120DAS during 2020 and 2021, respectively. The lowest fibre yield as well as yield contributing characters were recorded from 90 DAS harvested crop irrespective of varieties in both years.

**Key words:** Kenaf, variety, fibre and stick yield

### Introduction

Kenaf (*Hibiscus cannabinus*) has become an important industrial cash crop as a source of natural fiber. In Bangladesh, Kenaf is now a promising new fibre crop and day by day the demand of kenaf fibre is increasing. In marginal land, kenaf cultivation is profitable than jute because it can be produced at minimal management practices with less labour and lower cost. The prices of jute and kenaf fibres are almost same, and as a consequence, kenaf is replacing jute in the marginal areas. At present, in Bangladesh, so many areas are covered by Kenaf like, Bhrambaria, Voirab, Netrokona, vast areas of Kishoregonj; Laksmipur, Noakhali, Shriatpur, Madaripur, some sporadic areas of Tangail, Mymensingh and Jamalpur (Islam, 2019). Harvesting time is an important factor affecting kenaf properties (Zhou *et al.*, 1998). The suitable harvesting age for kenaf depends on the usage and kenaf variety. Various industries harvest the kenaf plants for products at different harvesting times during the plant life cycle. Normally for the purpose of producing fibre kenaf is harvested after the fibre matures (4-5 month after planting or after flower blooming) but for other uses of kenaf especially for forage, kenaf is harvested in 7-8 weeks after planting. Masnira *et al.* (2015) were tested two kenaf varieties on the fibre yield showed that the tensile strength for both varieties was highest at 112 DAS and both varieties should be harvested at this age for fibre production. In Bangladesh, kenaf normally harvest at the age of 120 days. Therefore, a field experiment was designed to evaluate BJRI developed kenaf varieties of Bangladesh, BJRI kenaf-1, BJRI kenaf-2, BJRI Kenaf-3 and BJRI Kenaf -4 with different harvesting time for higher fibre yield.

### Materials and Methods

The experiment was conducted at Jute Research Sub Station (JRSS), Tarabo, Narayanganj during 2020 and 2021 to determine the optimum harvesting time of BJRI developed kenaf varieties for higher fibre yield. Four kenaf varieties viz., BJRI Kenaf-1 (V<sub>1</sub>), BJRI Kenaf-2 (V<sub>2</sub>), BJRI Kenaf-3 (V<sub>3</sub>), and BJRI Kenaf-4 (V<sub>4</sub>) and four harvesting age viz., 90 DAS (H<sub>1</sub>), 100 DAS (H<sub>2</sub>), 110 DAS (H<sub>3</sub>) and 120 DAS (H<sub>4</sub>), were used as treatment. The experiment was laid out in RCBD design with three replications. Unit plot size was 3m×3m. Space between plot to plot and around the field 1m and between replication 1.5m were maintained. Seeds of kenaf were sown in line of 30 cm apart at a specific date. Other standard cultural and

intercultural practices were followed as per BJRI recommendation. Data were recorded as plant population /m<sup>2</sup> after final thinning and at harvest, plant height and base diameter of 10 randomly selected plants of every plot at harvest, fibre wt. and stick wt. All data were subjected to analyse with R software.

## Results and Discussion

**Effect of variety on yield and yield attributes of kenaf:** Different yield contributing characters of kenaf varied significantly affected by different varieties (Table 1). No significant difference found among different varieties of 2020 and 2021 at plant population of thinning stage. The highest plant height was recorded at BJRI Kenaf-2 (251.26 cm) which was statistically identical with BJRI Kenaf-4 (250.08 cm) and the lowest was recorded in BJRI Kenaf-1 (235.51cm) which was statistically identical with BJRI Kenaf-3 (236.87 cm) in 2020 and the highest plant height was recorded at BJRI Kenaf-4 (222.61cm) and the lowest was recorded in BJRI Kenaf-1 (202.99 cm) and others are remain in the middle position in 2021. The highest base diameter was recorded at BJRI Kenaf-2 (16.27mm) and the lowest was recorded at BJRI Kenaf-3 (14.28 mm) which was statistically identical with BJRI Kenaf-1 and BJRI Kenaf-4 in 2020. No significant difference found of base diameter among varieties in 2021. Fibre weight is the ultimate yield of different kenaf varieties. The highest fibre weight was recorded at BJRI Kenaf-2 (2.26 and 2.57 t/ha) in both 2020 and 2021, respectively and the lowest was recorded at BJRI Kenaf-4 (1.99 t/ha) in 2020 and 2.21 t/ha was recorded at BJRI Kenaf-3 in 2021. The highest stick weight was recorded (4.45 and 4.82 t/ha) at BJRI Kenaf-2 in both 2020 and 2021, respectively. The lowest stick weight (4.01 t/ha) was recorded in BJRI Kenaf-4 in 2020 and other lowest stick weight was recorded (4.38 t/ha) at BJRI Kenaf-3 in 2021. Fibre and stick yield varied significantly whereas kenaf variety HC-95 perform better on the basis of fibre yield compared to other kenaf varieties reported by Mollah *et al.* (2018). Similar results were reported by Shakhesh *et al.* (2012) in kenaf and Miah *et al.* (2020) in jute.

Table 1. Effect of variety on yield and yield attributes of kenaf

Treatment	Plant population at thinning	Plant population at harvest	Plant height (cm)	Base diameter (mm)	Fibre weight (t/ha)	Stick weight (t/ha)
Year: 2020						
BJRI Kenaf-1(V <sub>1</sub> )	38.58	37.33	235.5b	14.99b	2.13ab	4.21ab
BJRI Kenaf-2(V <sub>2</sub> )	38.42	36.83	251.2a	16.27a	2.26a	4.45a
BJRI Kenaf-3(V <sub>3</sub> )	37.50	36.25	236.8b	14.28b	2.25a	4.43a
BJRI Kenaf-4(V <sub>4</sub> )	33.75	32.75	250.8a	14.89b	1.99b	4.01b
CV	5.28	5.28	9.8506	0.9242	0.239	0.3639
Year: 2021						
BJRI Kenaf-1(V <sub>1</sub> )	36.67	32.41 a	202.99c	17.27	2.37ab	4.56ab
BJRI Kenaf-2(V <sub>2</sub> )	36.50	27.75b	211.99b	18.14	2.57a	4.82ab
BJRI Kenaf 3(V <sub>3</sub> )	38.33	32.50a	206.22bc	17.42	2.21b	4.38b
BJRI Kenaf-4(V <sub>4</sub> )	39.33	32.67a	222.61a	17.67	2.46ab	5.33a
CV	4.85	4.44	7.17	0.97	0.34	0.8

**Effect of harvesting time on yield and yield attributes of kenaf:** Different yield contributing characters of kenaf varied significantly as affected by different harvesting time (Table 2). No significant difference found among different varieties of 2020 at plant population of thinning stage significant different found in 2021. The highest plant population was recorded (41.16) at 100 days after sowing (DAS) which was statistically identical with 120 DAS and the lowest was recorded (33.08) at 90 DAS and others are remain at the middle position. No significant difference found of plant population at harvest among different harvesting time in between two years. The highest plant height was recorded (251.9 and 241.12cm) and the lowest was recorded (235.2 and 176.08 cm) and others are remain in the middle position in both 2020 and 2021, respectively. The highest base diameter was recorded (16.30 mm and 19.33mm, respectively) and the

lowest was recorded (13.75 and 15.49 mm, respectively) in both 2020 and 2021. The highest fibre weight was recorded (2.54 and 3.55t/ha) and the lowest was recorded (1.65 and 1.46 t/ha) and the highest stick yield was recorded (5.02 and 6.23 t/ha) and the lowest was recorded (3.18 kg and 3.70 t/ha) and others are remain in the middle position in both 2020 and 2021, respectively. Similar results were reported by Shakhes *et al.* (2012).

Table 2. Effect of harvesting time on yield and yield attributes of kenaf

Treatment	Plant population at thinning	Plant population at harvest	Plant height (cm)	Base diameter (mm)	Fibre weight (t/ha)	Stick weight (t/ha)
Year: 2020						
90DAS (H <sub>1</sub> )	38.08	36.92	235.2c	13.75c	1.65c	3.18d
100DAS (H <sub>2</sub> )	37	35.67	241.3bc	14.74b	2.12b	4.12c
110DAS (H <sub>3</sub> )	36.92	35.42	246ab	15.65ab	2.31ab	4.53b
120DAS (H <sub>4</sub> )	36.25	35.17	251.9a	16.30a	2.54a	5.02a
CV	5.28	5.28	9.8506	0.9242	0.239	0.3639
Year: 2021						
90DAS (H <sub>1</sub> )	33.08b	28.83	176.08d	15.49c	1.46c	3.70c
100DAS (H <sub>2</sub> )	41.16a	32.17	194.19c	16.87b	1.76c	3.96c
110DAS (H <sub>3</sub> )	36.91ab	32	232.42b	18.81a	2.83b	5.13b
120DAS (H <sub>4</sub> )	39.66a	32.33	241.12a	19.33a	3.55a	6.23a
CV	4.85	4.44	7.17	0.97	0.34	0.8

**Effect of variety and harvesting time interaction on yield and yield attributes of kenaf:**

Different yield contributing characters of kenaf varied significantly as affected by different variety and harvesting time interaction (Tables 3-4). The highest plant height was recorded (260 and 250 cm, respectively) at BJRI Kenaf-4 and 120 DAS interaction and the lowest was recorded (227 and 165 cm) at BJRI Kenaf-1 and 90DAS interaction and others are remain in the middle position in both 2020 and 2021, respectively. The highest base diameter was recorded (17.35 and 19.96 mm) at BJRI Kenaf-4 and 120 DAS interaction and the lowest was recorded (14.00 and 15.64mm) at BJRI Kenaf-1 and 90DAS interaction and others are remain in the middle position in both 2020 and 2021, respectively.

Table 3. Interaction effect of variety and harvesting time on yield and yield attributes of kenaf during 2020

Treatment combination	Plant population at thinning	Plant population at harvest	Plant height (cm)	Base diameter (mm)	Fibre weight (t/ha)	Stick weight (t/ha)
V <sub>1</sub> x H <sub>1</sub>	38.33	38.33	227e	14def	1.82de	3.48fgh
V <sub>1</sub> x H <sub>2</sub>	37.33	37.33	233de	14def	1.98cd	4.02cdef
V <sub>1</sub> x H <sub>3</sub>	37	37	236cde	15.5a-d	2.27a-d	4.533a-d
V <sub>1</sub> x H <sub>4</sub>	36.67	36.667	246abcde	16.4abc	2.43abc	4.79ab
V <sub>2</sub> x H <sub>1</sub>	38.33	38.333	242abcde	15.1b-e	1.83de	3.34fgh
V <sub>2</sub> x H <sub>2</sub>	36.67	36.667	249abcd	16.1a-c	2.13bcd	3.96def
V <sub>2</sub> x H <sub>3</sub>	36	36	254abc	16.67ab	2.37abc	4.42bcde
V <sub>2</sub> x H <sub>4</sub>	36.33	36.333	260b	17.32a	2.62a	5.22a
V <sub>3</sub> x H <sub>1</sub>	38	38	232de	12.69f	1.48e	2.97gh
V <sub>3</sub> x H <sub>2</sub>	36	36	235cde	14.11def	2.50ab	4.82ab
V <sub>3</sub> x H <sub>3</sub>	35.67	35.667	239cde	14.86bcde	2.36abc	4.69abc
V <sub>3</sub> x H <sub>4</sub>	35.33	35.333	242abcde	15.46bcd	2.69a	5.21a
V <sub>4</sub> x H <sub>1</sub>	33	33	240bcde	13.33ef	1.46e	2.93h
V <sub>4</sub> x H <sub>2</sub>	32.67	32.667	248abcd	14.66cde	1.84de	3.69efg
V <sub>4</sub> x H <sub>3</sub>	33	33	254abc	15.56abcd	2.23abcd	4.45bcd
V <sub>4</sub> x H <sub>4</sub>	32.333	32.333	260a	17.35a	2.42abc	4.94ab
CV	10.94	10.94	9.8506	1.8485	0.48	0.73

Table 4. Interaction effect of variety and harvesting time on yield and yield attributes of kenaf during 2021

Treatment combination	Plant population at thinning	Plant population at harvest	Plant height (cm)	Base diameter (mm)	Fibre weight (t/ha)	Stick weight (t/ha)
V <sub>1</sub> x H <sub>1</sub>	33.00bc	29.33a-d	165f	15.64ef	1.48g	3.58efg
V <sub>1</sub> x H <sub>2</sub>	39.0ab	32.66abc	190e	16.25de	1.70fg	3.34fg
V <sub>1</sub> x H <sub>3</sub>	36.66b	37.33ab	218d	18.38a-c	2.55cde	4.60cdef
V <sub>1</sub> x H <sub>4</sub>	38.00b	30.33abcd	239abc	18.81ab	3.450ab	5.81ab
V <sub>2</sub> x H <sub>1</sub>	25.66c	21.66d	191e	16.74cde	1.38g	3.25fg
V <sub>2</sub> x H <sub>2</sub>	37.00b	29.66abcd	195e	18.12bcd	1.88efg	4.28def
V <sub>2</sub> x H <sub>3</sub>	42.00ab	27.66cd	231cd	18.73ab	2.91cd	5.08bcde
V <sub>2</sub> x H <sub>4</sub>	41.33ab	32.00abc	231cd	18.98ab	3.61a	6.41a
V <sub>3</sub> x H <sub>1</sub>	36.66b	32.00abc	153f	13.85f	1.27g	3.66efg
V <sub>3</sub> x H <sub>2</sub>	40.00ab	28.66bcd	191e	16.65cde	1.23g	2.44g
V <sub>3</sub> x H <sub>3</sub>	36.66b	34.00abc	235bc	19.09ab	3.11bc	5.766abcd
V <sub>3</sub> x H <sub>4</sub>	40.00ab	35.33abc	246ab	19.90a	3.20bc	5.66abcd
V <sub>4</sub> x H <sub>1</sub>	37.00b	32.33abc	195e	15.70ef	1.44gh	2.46g
V <sub>4</sub> x H <sub>2</sub>	48.66a	37.66a	200e	16.47cde	2.25def	5.80abcd
V <sub>4</sub> x H <sub>3</sub>	32.33bc	29.00abcd	246ab	19.03ab	2.76cd	5.08bcde
V <sub>4</sub> x H <sub>4</sub>	39.33ab	31.66abc	250a	19.96a	3.13bc	6.13abc
CV	9.7	4.88	14.34	1.94	0.68	1.61

The highest fibre yield (2.62 and 3.61 t/ha) and stick yield (5.22 t/ha and 6.41t/ha) were recorded at BJRI Kenaf-2 and 120DAS interaction and the lowest fibre yield (1.46 and 1.44 t/ha) and stick yield (2.93 t/ha and 2.46 t/ha) at BJRI Kenaf-4 and 90DAS interaction and others are remain in the middle position in both two consecutive years, respectively.

### Conclusion

It might be concluded that among BJRI released four kenaf varieties BJRI Kenaf-2 perform better considering fibre and stick yield and 120 day after sowing is the best harvesting time for getting the highest fibre and stick yield of kenaf.

### Recommendation

BJRI Kenaf-2 can be recommended as the suitable kenaf variety for fibre cultivation in industrial areas like Narayanganj district of Bangladesh.

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