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Yield of pulpable biomass of kenaf (*Hibiscus cannabinus*) varieties under various row spacings and nitrogen

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A field experiment was conducted during 1989 and 1990 at Regional Research Laboratory Farm, Jorhat (Assam), with different varieties of kenaf (*Hibiscus cannabinus* L.), to assess the performance of pulpable biomass under different row spacings and nitrogen levels.

The kenaf varieties used were 'HC 583', 'AMC 108', 'HC 269', 'MT 150' and 'JBM 4'. The soil of the experimental plots was sandy loam with an average pH 5.5. The available N, P_2O_5 and K_2O were 124.45 kg, 12.58 kg and 256.32 kg/ha respectively. Kenaf varieties were taken up for both the trials on row spacing and nitrogen requirement. Five row spacings, viz. 30, 40, 50, 60 and 70 cm with a plant-to-plant spacing of 10 cm accomodating about 333,000; 250,000; 200,000; 166,667 and 142,857 plants/ha respectively. The trial was laid out in randomized block design with 3 replications. The plot size was 25 m^2. A uniform dose of 160 kg N, 50 kg P_2O_5 and 50 kg K_2O/ha was applied at sowing time.

Table 1. Plant growth, yield of biomass and pulp of kenaf varieties as affected by various row spacings

Treatment	Plant character			
	Plant height (m)	Basal diameter (cm)	Pulpable dry biomass (tonnes/ha)	Bleached pulp yield (%)
Row spacing (cm)				
30	3.702	1.761	15.155	46.639
40	3.747	1.884	16.031	46.652
50	3.769	1.972	15.315	46.632
60	3.806	1.966	14.744	46.573
70	3.871	1.950	13.525	46.679
CD (P = 0.05)	0.011	0.025	0.021	0.084
Variety				
'HC 583'	4.009	2.066	15.454	49.799
'AMC 109'	3.824	1.833	14.865	45.126
'HC 269'	3.681	2.110	14.273	48.452
'MT 150'	3.808	1.826	15.426	45.059
'JBM 4'	3.572	1.700	14.752	44.739
CD (P = 0.05)	0.011	0.025	0.021	0.084

Table 2. Plant growth, yield of biomass and pulp of kenaf varieties as affected by various nitrogen doses

Treatment	Plant height (m)	Basal diameter (cm)	Pulpable dry biomass (t/ha)	Bleached pulp pulp yield (%)
N (kg/ha)				
0	3.607	1.780	14.214	46.739
40	3.672	1.845	14.510	46.739
80	3.729	1.876	14.922	46.736
120	3.764	1.936	15.426	46.734
160	3.798	1.966	15.872	46.734
200	3.877	2.013	16.155	46.733
240	3.938	2.062	16.361	46.731
CD (P = 0.05)	0.009	0.013	0.082	0.230
Variety				
'HC 583'	3.990	2.099	15.954	49.870
AMC 108'	3.783	1.920	15.403	45.154
'HC 269'	3.675	1.928	14.546	48.385
'MT 150'	3.811	1.961	16.023	45.571
'JBM 4'	3.587	1.719	14.832	44.694
CD (P = 0.05)	0.007	0.011	0.068	0.021

Seven levels of nitrogen, viz. 0, 40, 80, 120, 160, 200 and 240 kg/ha and 5 varieties of Kenaf were tried in randomized block design with 3 replications. Half dose of N and full dose of P_2O_5 and K_2O were applied at sowing time and remaining dose was applied 3 months after sowing. The crop was sown at 40 cm row spacing. Plot size was 25 m^2. Seeds were sown for both the trials on 5 April 1989 and 15 April 1990. Growth and yield data were recorded at the time of harvest. Harvesting was done at the time of flower initiation. Pulpable biomass is considered to be the overground stalk of kenaf, after removing the top and small branches, which are generally used for pulping. Bleached pulp yield was evaluated on laboratory scale following TAPPI (1980) procedure. Data were statistically analysed.

The plant height and basal diameter increased with the decrease in plant population per unit area (Table 1). However, biomass yield was found maximum at 40 cm, followed by 50, 30, 60 and 70 cm row spacings. It appears that there had been an increase in biomass when the plant population decreased from 333,000 to 250,000/ha and further decrease in plant population to 200,000/ha also resulted in higher yield than 333,000 plants/ha. The performance of individual plant for height and diameter was not sufficient to neutralise the loss in biomass yield sustained due to less population per unit area except in 30 cm row spacing. Similar findings were also reported by Sarma *et al.* (1986). Plant height, basal diameter and biomass yield were increased with the increase in nitrogen dose (Table 2). Dutta *et al.* (1979) and Sarma *et al.* (1986) reported positive response of growth and biomass yield to nitrogen.

Among the 5 varieties, 'HC 583' performed best and the yield of biomass was recorded maximum (16.971 tonnes/ha) with spacing and 17.043 tonnes/ha with nitrogen.

However, the influence of nitrogen on 'MT 150' was found uniform and resulted in higher biomass than 'HC 583' even at lower level of nitrogen. Sarma *et al.* (1986) also reported similar effect. In case of pulp yield, varietal variation was negligible. All the kenaf varieties were found suitable as raw material for pulp and paper industry.

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