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Effect of nitrogen on pulpable biomass yield of roselle (*Hibiscus sabdariffa*)

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ABSTRACT

A field experiment was conducted during 1995 and 1996 to study the effect of nitrogen levels on yield of pulpable biomass (stalk) of 4 varieties of roselle (*Hibiscus sabdariffa* L.). With the increased dose of nitrogen, stalk yield was increased. Nitrogen up to 160 kg/ha was found proportionate to the yield and further addition of nitrogen showed no significant result. Higher biomass was recorded in 'HS 7910' (15.8 tonnes/ha). Pulp yield unbleached 50 to 53% and bleached 45 to 47% was found comparable to the traditional raw materials like bamboo and pine.

Key words : Roselle, N, Pulpable biomass

Roselle (*Hibiscus sabdariffa* L.), a non-wood fast-growing herbaceous annual, is a suitable raw material for pulp and paper industry (Sarma *et al.*, 1991). It enjoys a unique advantage of having long and short fibre inbast fibre and woody part of the plant respectively, making it almost a naturally blended pulping raw material (Sharma *et al.*, 1983). Since information on administration of nitrogenous fertilizer for production of biomass (stalk) from roselle is very scanty, an experiment was carried out to study the effect of nitrogen on the yield of pulpable biomass of 4 roselle varieties.

MATERIALS AND METHODS

A field trial was conducted during 1995 and 1996 at Jorhat. The soil was sandy loam with an average pH 5.5. The available N, P_2O_5 and K_2O were 0.36, 0.009 and 0.005% respectively. Roselle varieties were 'HS 4288', 'HS 7910', 'JBS 2-1' and 'JBS 2-2'. Doses of nitrogen as urea were 0, 40,80, 120, 160, 200 and 240 kg/ha along with a uniform dose of 50 kg/ha phosphorus and potash. Plot size was 25 m^2. Row- to row-spacing was kept 40 cm. The experiment was laid out in randomized block design with 3 replications. Seed was sown on 15 April 1995 and 10 April 1996 and stalk harvesting was done on 20 October 1995 and 25 October 1996. Nitrogen was applied in 2 split doses,half basal along with P and K, rest after 3 months as side-dressing. Plant height and basal diameter were recorded just before the harvesting of plants. The overground stalk was accounted as pulpable

Table 1. Effect of variety and nitrogen on growth, biomass and pulp yield of roselle

Treatment	Plant height (m)	Basal diameter (cm)	Green biomass of stalk (kg/plot) (25 m²)	Dry biomass of stalk (tonnes/ha)	Pulp yield (%)	
					Unbleached	Bleached
Variety						
'HS 4288'	3.95	2.05	94.00	15.20	52.0	45.2
'HS 7910'	4.15	2.17	98.50	15.80	50.5	45.3
'JBS 2-1'	3.85	1.95	92.70	14.90	52.7	47.4
'JBS 2-2'	3.94	1.99	93.20	14.95	53.0	46.5
CD (P = 0.05)	0.007	.004	0.029			
N(kg/ha)						
0	3.67	1.71	80.95	12.95		
40	3.75	1.85	87.85	14.15		
80	3.89	1.89	92.10	14.85		
120	4.10	1.95	96.90	15.40		
160	4.15	2.05	102.15	16.40		
200	4.20	2.10	103.20	16.75		
240	4.30	2.15	105.10	16.88		
CD (P = 0.05)	0.012	0.008	0.052			

biological yield. Moisture (%) was determined by oven-dry method. Pooled data on growth characters and biomass yield were statistically analysed.

RESULTS AND DISCUSSION

Plant height, basal diameter and stalk yield under different doses of N were significant (Table 1). Growth parameters and biomass yield were higher in'HS 7910'. Biomass increased with an increase in dose of N. Nitrogen up to 160 kg/ha was found proportionate to the yield and further increase in N caused no significant gain. The increase in dry pulpable biomass yield/ha was 9.2, 14.6, 18.9, 24.3, 29.3 and 30.3% over the control for 40, 80, 120, 160, 200 and 240 kg N/ha respectively. The interaction effect of variety and N was significant. Higher stalk yield was recorded in 'HS 7910' for each dose of N. Similar findings were recorded by Sarma *et al.* (1991, 1990). Wood and Muchow (1980) found the best result in kenaf with N @ 200 kg/ha. Yield of pulp (50–53%) was comparable to the traditional raw materials like bamboo and pine. Pulp yield showed no difference for the varieties of roselle.

REFERENCES

Sarma, T.C., Ali, F., Bordoloi, D.N. and Chaliha, B.P. 1991. Requirement of row spacing and nitrogen levels of some roselle varieties and their pulp yield and quality. *Journal Biological Science Society of North-East India* **1** : 17–24.

Sarma, T.C., Ali, F., Bordoloi, D.N., Chaliha, B.P. and Baruah, J.N. 1990. Dhaincha–a non-wood fibrous plant for pulp and paper. *Indian Forester* **16** (4) : 296–302.

Sarma, T.C., Ali, F., Bordoloi, D.N., Chaliha, B.P. and Baruah, J.N. 1986. Studies of biomass production of kenaf (*Hibiscus cannabinus* L.). *Plantation Crops* **1** : 143–151.

Sharma, Y.K., Dhoundiyal, S.N. and Mathur, G.M. 1983. Use of kenaf and roselle as paper making fibres. *Indian Forester* **109** (6) : 401–406.

Wood, I.M. and Muchow, R.C. 1980. Estimation of optimal rate of application of nitrogen for kenaf (*Hibiscus cannabinus*) for paper pulp production. CSIRO Australian Tropical Agronomy, Tech. Memo No. 25.