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STUDIES ON FIBER YIELD OF DIFFERENT GENOMIC GROUPS OF BANANA

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Abstract

An experiment "studies on evaluation of different genomic groups of banana (*Musa paradisiaca* L.) for fiber extraction and its quality" was conducted at Horticultural Research Station, Kovvur (A.P), India. Maximum fiber recovery percentage was recorded in KovvurBontha (ABB) (0.788) followed by KarpuraChekkarakeli (AAB) (0.676) whereas maximum fiber extractable pseudostem percentage was recorded in KovvurBontha (ABB) (64.66), followed by FHIA-3 hybrid (60.67) and the highest fiber yield was recorded in KovvurBontha (ABB) 302.682 Kg ha^{-1} followed by KarpuraChakkerakeli 258.620 Kg ha^{-1}.

Key words : Banana, fiber yield characters, genomic groups.

Introduction

Banana **(***Musa paradisiaca* L.**)**is one of the most important fruit crops, grown in both tropical and subtropical regions of the world.It belongs to the family *Musaceae*. In India, banana is considered as "Kalpatharu" because each and every part of the plant is used for specific purposes. India is the largest producer of banana with a share of 32.8% in total global production. The major banana growing states in India are TamilNadu, Gujarat, Maharashtra, Andhra Pradesh, Orissa, West Bengal and Assam. Andhra Pradesh ranks fourth place both in production and productivity. In Andhra Pradesh, it is widely grown in East Godavari, West Godavari, Guntur, Vizianagaram, Kurnool, Ananthapur and Kadapadistricts. Banana farming generates huge quantities of biomass in the form of pseudostem, leaves, suckers etc, which goes as waste due to lack of availability of suitable technology for its commercial utilization. On an average, banana produces 60-80 tonnes of pseudostem/ha. The production of Synthetic and other natural fibers are reduced by the extraction of fiber from banana pseudostem.About 1.5 million tons of dry banana fibers are produced from the outer sheath of pseudostem annually. With an increasing demand for Banana fibers both in Indian and International markets, the acreage and production are expected to increase in the coming years, thus generating more of the pseudostem biomass waste.The increase in area under banana cultivation, produces enormous amount of biomass is regarded as the major source of natural fibers in the near future (Jarman, 1977). All banana varieties are suitable for fiber extraction (Mohapatra *et al*., 2010). Though, fiber can be extracted from all cultivars of banana, the fiber yield varies with genomic status, ploidy level and stage of maturity. The fresh banana plant yields about 0.6% to 1.0% fiber depending on the variety used and method of extraction followed (Uma *et al*., 2002). In India, every year crores of rupees are going waste due to lack of awareness among the rural people as well as unavailability of suitable technology for fiber extraction.

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Materials and Methods

The investigation on "Studies on evaluation of different genomic groups of banana (*Musa paradisiaca* L.) for fiber extraction and its quality" was carried out at the Horticultural Research Station, Kovvur, West Godavari district of Andhra Pradesh, India during 2015-16 with four banana cultivars *viz.,* Grand Naine (AAA), KarpuraChekkarakeli (AAB), Kovvur Bontha (ABB) and FHIA-3 (AABB). The experiment was conducted in factorial completely randomized block design with three replications. Biometrical observation on fiber yield attributing characters were recorded and statistically analysed.

Results and Discussion

It is evident from table 1 that among fiber extraction treatments, fiber recovery percentage was highest (1.172) in (C_4) fiber extracted with machine followed by fiber extracted with (C_2) 0.5% NaOH (0.466%) and lowest fiber recovery percentage (0.328) was recorded in fiber extracted with 0.75% NaOH. The similar results were reported by Preethi and Balakrishna Murthy (2013) in banana. Among different varieties tested, KovvurBontha (0.788) showed highest fiber recovery percentage followed by KarpuraChakkerakeli (V_2) 0.676 per cent and Grand Naine (0.541) varieties, whereas the fiber recovery percentage was minimum (0.293) in FHIA-3 (V_4) banana hybrid. The variation in fiber recovery percentage among different genomic groups of banana could be attributed to variation in genetic constitution of genotypes. The results are in conformity with earlier findings of Uma *et al*. (2005) and Preethi and Balakrishna Murthy (2013) in banana. Among the interactions, the fiber recovery percentage was more in treatment combination of fiber extracted with machine in variety KovvurBontha 1.663 (V_3C_4) followed by fiber extracted with machine in variety KarpuraChakkerakeli 1.260 (V_2C_4) and fiber extracted with machine in variety Grand Naine 1.130 (V_1C_4). The lowest fiber recovery percentage (0.140) was observed in (V_4C_3) fiber extracted with 0.75% NaOH in FHIA-3 hybrid.

It is evident from table 2 that significant differences were observed among different genomic groups of banana for fiber extractable pseudostem percentage. The KovvurBontha (ABB) recorded the highest fiber extractable pseudostem percentage (64.66) followed by FHIA-3 hybrid (60.67) and KarpuraChakkerakeli (59.62) variety. The lowest fiber extractable pseudostem percentage was observed in variety Grand Naine (AAA) (58.03). The difference in fiber extractable pseudostem percentage among the genotypes could be attributed to the genetic constitution of the genotypes. Fiber extraction was not possible from the entire banana pseudostem, only 9-10 layers of banana sheaths are fit for extraction of the fiber. The results are in conformity with the earlier results obtained by Uma *et al*. (2002) in screening of banana germplasm suitability for fiber production in 66 accessions.

It is evident from table 3 that among treatments, fiber yield was significantly highest in (472.360 Kg ha^{-1}) in fiber extracted with (C_4) machine followed by C_2 (0.5% NaOH) and C_1 (0.25% NaOH) 194.727 Kg ha^{-1} and 145.245 Kg ha^{-1}, respectively. The fiber yield was low (144.661 Kg ha^{-1}) in fiber extracted with 0.75% NaOH. The fiber yield was more with machine extraction than with NaOH (0.25%, 0.5% and 0.75%). Similar results were reported by Uma *et al*. (2007) in banana. The fiber yield was more with 0.5% NaOH than with 0.75% NaOH. It could be attributed to removal of gum and cellulose from fiber polymer system by using excess alakali as reported by Ghosh (1988) in pineapple leaf fiber and Kundu *et al*. (1995) in ramie. Among different varieties

Table 1 : Effect of different methods of fiber extraction on fiber recovery percentage in different genomic groups of banana.

Treatments	Fiber Recovery (%)				
	Varieties				
	Grand Naine (V_1)	KarpuraChekkarakeli (V_2)	KovvurBontha (V_3)	FHIA-3 (V_4)	Mean
0.25% NaOH (C_1)	0.317	0.447	0.397	0.170	0.333
0.5% NaOH (C_2)	0.430	0.583	0.620	0.230	0.466
0.75% NaOH (C_3)	0.287	0.413	0.470	0.140	0.328
Machine extraction (C_4)	1.130	1.260	1.663	0.633	1.172
Mean	0.541	0.676	0.788	0.293	
Factors	**SE(m)±**		**CD at 5%**		
V	0.028		0.080		
C	0.028		0.080		
V×C	0.055		0.161		

Table 2 : Fiber extractable pseudostem percentage in different genomic groups of Banana.

Variety	Fiber extractable pseudostem (%)
Grand Naine (AAA)	58.03
KarpuraChekkarakeli (AAB)	59.62
KovvurBontha (ABB)	64.66
FHIA-3 (AABB)	60.67
SEm±	0.613
CDat 5%	1.855

Table 3 : Effect of different methods of fiber extraction on fiber yield in different genomic groups of banana.

Treatments	Fiber yield (kg ha^{-1})				
			Varieties		
	V_1	V_2	V_3	V_4	Mean
0.25 % NaOH (C_1)	158.493	159.210	167.742	95.535	145.245
0.5 % NaOH (C_2)	211.887	219.980	224.380	122.660	194.727
0.75 % NaOH (C_3)	123.907	173.963	205.650	75.123	144.661
Machine extraction (C_4)	460.100	481.325	612.957	335.060	472.360
Mean	238.597	258.620	302.682	157.095	
Factors	SE(m)±		CD at 5%		
V	6.9769		20.1036		
C	6.9769		20.1036		
V×C	13.9538		40.207		

tested, the highest fiber yield was recorded in (V_3) Kovvur Bontha (ABB) 302.682 Kg ha^{-1}, followed by (V_2) KarpuraChakkerakeli (258.620 Kg ha^{-1}) and Grand Naine (238.597 Kg ha^{-1}) varieties. Lowest fiber yield was recorded in (V_4) FHIA-3 hybrid (157.095 Kg ha^{-1}). It is inferred that 'B' genomic group might have contributed more fiber production due to presence of more (64.66%) percentage of fiber extractable pseudostem in Kovvur Bontha variety. The ABB and AAB genomic groups were more suitable for fiber extraction. The similar results were reported by Brew Baker and Umali (1995) in *Musa balbisiana* and *Musa textilis* (B and T genomes); Uma *et al*. (2005) in banana. The ABB and AAB genomic groups were more suitable for fiber extraction to obtain more yield. Among interactions, the treatment combination, extraction of fiber with machine in KovvurBontha variety recorded significantly the highest fiber yield 612.957 Kg ha^{-1} (V_3C_4) followed by varieties KarpuraChakkerakeli 481.325 Kg ha^{-1} (V_2C_4) and extraction of fiber with machine in Grand Naine 460.100 Kg ha^{-1} (V_1C_4). The lowest fiber yield (75.123 Kg ha^{-1}) was observed in (V_4C_3) extraction of fiber with 0.75 per cent NaOH in FHIA-3.

Conclusion

Based on the results obtained, it could be concluded that fiber extraction with machine in KovvurBontha (ABB) showed highest fiber yield (612.957 Kg ha^{-1} followed by KarpuraChakkerakeli (AAB) indicating that B genomic group might have contributed for more fiber production.

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