



COTTON LINTER



**Zonal Technology Management and Business Planning and Development Unit
(ZTM-BPD Unit)**

**Central Institute for Research on Cotton Technology (CIRCOT)
(Indian Council of Agricultural Research)**

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Nurturing Technologies for Realising Business Endeavours!

Introduction

Linters are the short fuzzy fibres adhering to the seed after the ginning of seed cotton. They are recovered from the seed with delinting machines and are categorized as first cut, second cut and mill run depending on the type of delinting process adopted. Linters are rich in cellulose and is a potential source of raw material for various industrial products. The quality of raw linters determines the quality of the final products that are manufactured from them. One of the major drawbacks of linters produced from Indian cotton is their high ash content due to the presence of trash comprising of burrs, boll rinds, bracts, leaves and hulls. Among the trash components, dry leaf bits have been identified as the major contributor to the ash content of linters.

Percentage of Linters in different species

	Percentage
<i>G. arboreum</i>	5.9
<i>G. herbaceum</i>	4.3
<i>G. hirsutum</i>	10.5



Cotton Seed

Mechanical delinting is an energy intensive process. The energy consumption during saw delinting has been recognized as one of the impediments in promoting this technology. It is now realized that 50% of the operational cost in delinting process is due to electricity consumption. Therefore, there is an urgent need to direct research attention to improve the energy efficiency in delinting operation. Alternate energy efficient and productive methods of removing linters, preserving the quality of the product have been developed by CIRCOT and is being improvised.

CIRCOT Microbial Pretreatment for Energy-Efficient Delinting process

CIRCOT has undertaken trials in mills using a microbial consortium. Cottonseeds were sprayed with the consortium to 1% moisture pickup followed by delinting. The results are given below:

	Wt. Of CottonSeed (Kg)	Wt. Of Linters (kg)	Process Times (min)	Energy Consumed (unit)
Control	1000	39	44	77
Treated	1000	41	42	67

Uses of Linters

Bleached linters are a good source of preparing speciality grade paper, viscose rayon, cellulose acetate, cellulose nitrate, carboxymethyl cellulose, etc. CIRCOT process yielded about 70% of microcrystalline cellulose (MCC) on acid hydrolysis.

Properties of Paper prepared from linters

Properties/Treatment	2% NaOH	4% NaOH	6% NaOH
Grammage	60±1	60±1	60±1
Burst Factor	19	24	29
Tear Factor	107	128	143
Breaking Length (m)	2997	3216	3849
Number of double folds	38	46	78

Microcrystalline Cellulose

- » Acid hydrolysis
- » Recovery - 70%
- » Cost of Ground Powder - Rs.200/kg
- » Cost of Spray dried powder - Rs.300/kg
- » Used as filler in tablets

Production of Chemical cotton from linter

The cleaned linter sample is digested using different concentrations of caustic soda solution keeping material to liquor ratio of 1:5. The digestion is carried out at different temperatures and pressures for 1.5 to 3.0 h. The linters are then bleached.

Properties of Chemical cotton

Treatment	Ether soluble matter (%)	Total ash (%)	Acid insoluble ash (%)	Alpha cellulose (%)	Fluidity (Reciprocal poise) 20°C	Viscosity (Poise) 20°C
T-1	0.10	0.11	0.005	99.0	4.53	0.2207
T-2	0.12	0.10	0.060	98.9	4.78	0.2092
T-3	0.12	0.19	0.070	98.6	11.00	0.0909

The Chemical Cotton prepared by giving three different treatments, comply with the requirements for nitro cellulose and cellulose acetate.

In the production of various derivatives, the purification of the raw linters assumes significant importance. The purification process comprises chiefly the mechanical cleaning and alkali pressure boiling followed by bleaching process.

Statistics

Month-wise Cottonseed processing: November 2012 - May 2013

(Unit in Tonnes)

Andhra Pradesh	Seed Delinted	Linter Production	Linter Exported
November 2012	55369	3141	924
December 2012	100980	5624	2107
January 2013	108335	5597	4024
February 2013	102824	5093	1775
March 2013	89089	4457	1461
April 2013	59498	3231	1321
May 2013	25888	1343	2048
Total	541983	28486	13660

*Source, All India Cottonseed Crushers Association (AICOSCA)

Cotton Linter is a high-value item of export. The processors are mainly dependent on export markets. The price fluctuation is highly depending on demand, ranging from Rs. 22-55 per kg.

Estimated Production of Linter(2012-2013): 50,000 Tonnes.



Saw Delinter

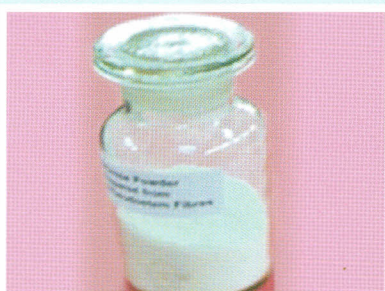
Products from Cotton Linter - CIRCOT Technologies



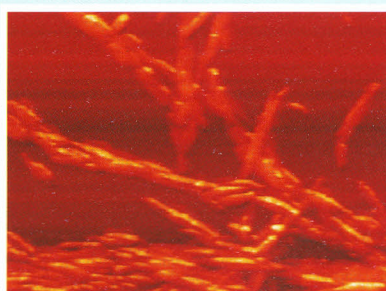
Executive Stationary Items from Linter Paper
(Carry Bag, Writing Pad & Folder)



Greeting cards from linter



Micro Crystalline Cellulose



NanoCellulose from Linter

Technologies offered by CIRCOT on Cotton Linter

- CIRCOT Microbial Pretreatment for energy efficient delinting
- Process for production of chemical cotton
- Microcrystalline Cellulose
- Pulp and paper.

For further details contact

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