Technical News Feature

Cotton Linters

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ABSTRACT

Cotton linters, the relatively short fuzz left on cottonseed after the cotton ginning process, is the *purest cellulose in chemistry* having hundreds of end uses. The end product available from linters is an extremely valuable annuallly renewable resource having more uses than any other part of the cottonseed. Its many uses, small cost of removal, and revenue therefrom should confirm that removal of this lint is profitable even at an average low price of three cents a pound.

An annually renewable natural resource having hundreds of end uses constitutes the raw material for the *purest cellulose in chemistry*—Cotton linters, the relatively short fuzz left on cottonseed after the cotton ginning process.

Cotton linters are normally delinted by removal of (a) first-cut linters from which is produced stuffing for mattresses, pads, cushions, surgical cotton, mixing with wool for felt, and high grade paper stock; and (b) second-cut linters from which is produced the raw material for the purest cellulose known in chemistry having literally hundreds of uses.

The U.S. Department of Defense specifications require that a nitrocellulose product from second-cut linter pulp be used in rocket propellant of missiles defending our country due to its dependable reaction.

Pulp dissolved in various chemical processes in which the linter fibers lose their physical form and identity are known as "dissolving pulp," such as the following.

Acetate process is used to produce cellulose diacetate, cellulose triacetate, cellulose butyrate, and cellulose propionate, which end products may be formed into solid molded products, thin sheets or films, or thinned with solvents to lacquers for uses in producing photographic film, clear sheet protectors, windows in envelopes, blister packaging, clear Scotch tape, eyeglass frames, large plastic signs, molded plastic boxes and fishing lures, ball point pen barrels, tool handles, automobile parts (clear dash panels, tail and backup light panes) and lacquers, coatings for bright metal parts, and flash bulbs.

Nitrate process, though not as widely used as the acetate process, is used to produce nitrocellulose products for various end products of solids, films, or lacquers used in producing fingernail polish, lacquers for wood and metal, in coating cellophane to control permeability and water absorbency, in propellants of shotgun shell shot and air-to-ground military rockets.

Ether processes are numerous and varied, used principally to produce water soluble thickeners, gels, and film-forming derivatives of cellulose, some of which are methyl cellulose, carboxymethyl cellulose, hydroxyethyl cellulose, and combinations thereof.

The resulting products are used as viscosifiers, thickeners, and/or stabilizers in toothpaste, ice cream, water-based paints, oil well drilling muds, shaving creams, shampoos, and lotions. They serve as film formers in paints, coatings, textile sizes, adhesives, reconstituted and synthetic tobaccos. Carboxymethyl cellulose is widely used as a nonredisposition agent in detergents.

Viscose process is most widely known as a source of rayon (for apparel and tire cord) but is more widely used in the processing of cotton linter pulp primarily as food casings for sausage, skinless frankfurters, and bologna.

Cotton linters are processed into another pulp category of "paper" or "papermaking" pulp.

Paper pulps processed into a number of types have various special properties designed to yield the end product papers of high tearing resistance, high porosity paper for air filter elements and low porosity paper for gasoline filters, both of which are used in the automotive industry. Other paper pulps used are in currency, stock and bond papers, fine writing and printing papers, specialty filtration and saturation papers.

The above-listed end uses of cotton linters are only some of the many worldwide uses, a valid reason that U.S. bleachers export a good percent of their linter pulp.

Another source for cellulose is wood pulp, used to a much larger degree than linter pulp for two reasons: (a) There is much more wood pulp available in the world; and (b) cheaper price as wood pulp producers have continued to increase plant processing capacity, keeping prices lower. While wood pulp is cheaper than linter pulp, the difference in price is closing rather significantly. Any finished product made from wood pulp can be made from linter pulp, but the reverse is not true.

Most importantly, linter pulp is a renewable resource each year wherever cotton is grown, and the age at which a tree is available for use can be anything from ten to a hundred times greater than a cotton plant. As wood is an indispensable material for many other purposes, it is wasteful to be used as chemical cellulose as it loses one-half to two-thirds of its substance, which literally "goes down the drain."

It is extremely important to use all our raw materials to the fullest extent, thus we can ill afford not to utilize fully the linters from the cottonseed.

Having spent over 32 years involved in and watching this "Purest Cellulose in Chemistry" being produced by cottonseed oil mills and bleaching plants in the U.S. that convert the second-cut lint to the purest cellulose, as well as numerous industries producing the end products, it is with reluctance that the inclusion of the following economics of producing the linters be in this same paper.

Some leaders in the cottonseed processing industry still question the profitability of recovering the lint, even though the changing world is making lint more valuable than ever. In addition to linters being a valuable product, their removal from the cottonseed prior to the hulling and separating and oil extraction processes results in a substantially higher yield of oil.

The *additional* oil extracted would vary depending on the method of oil extraction, either mechanical or solvent, but an increase of only 2% (40 pounds per ton of seed) would be $12.00 per ton more revenue, at 30 cents per pound of lint.

We quote one of the world's leading manufacturers of solvent extraction plants: "Direct solvent extraction of cottonseed is more efficient when the residual lint on delinted seed is less than 2-½% by weight."

"Pre-press solvent extraction processes require that lint on black seed be no more than 3% by weight and that the hull content be adjusted so that maximum protein can be achieved in the spent desolventized cake. Excessive lint in cottonseed meats will result in lower oil yields and higher solvent losses."

The basic reason for processing oilseeds, such as soybeans, sunflower, sesame, safflower, and others is *specifically* for extracting the oil and cake, whereas cottonseed has an additional revenue from linters. Even if it should become uneconomical to grow these other oilseeds for the oil and cake, cottonseed would still be available with a by-product of linters.

Too much emphasis is sometimes placed on the cost of delinting cottonseed due to an unawareness of the true monetary value which can be derived from linters.

The current cost of delinting, based on actual calculations taken from oil mills processing seed in the state of Texas in mid-1977, amounted to approximately 2.39 cents per pound. This number has been confirmed and verified by two qualified sources. This is for saw delinting operation, and the breakdown in cost per pound of lint was as follows:

Bagging and ties	.235 cents
Saws and gummer files	.131 cents
Power	.750 cents
Labor	1.010 cents
Maintenance	.160 cents
Handling	.072 cents
Total	2.358 cents per pound, f.o.b. Mill.

This confirms that *the lint room is a profitable operation even when the average price of first- and second-cut lint is as low as 3 cents a pound.* With the ever-increasing demand for the products of linter pulp, it is inconceivable that the price would ever again drop near that level. Currently, the total average price of first-cut and second-cut in mid-1977 is double the cost of delinting. For example, 60 pounds of first-cut at 10 cents a pound returns $6.00 a processed ton; 110 pounds of second-cut lint at 5.5 cents a pound returns $6.05 a processed ton; a return from the total 170 pounds first and second-cut lint of $12.05, which after a processing cost of (2.358 cents a pound) $4.00 per ton, leaves a profit of $8.05 a ton f. o. b. Mill.

In some areas of the world, lint recovered per ton is in excess of 200 pounds, for a substantially higher revenue. Lint prices on the West Coast and other parts of the world are normally higher than average U.S. prices, whereas a higher profit is realized.

Reducing lint left on seed to 2-½% or less will substantially maximize the efficiency throughout the rest of the oil mill, especially in separation of hulls and meats, thus leaving the minimum of lost oil in the hulls as well as also maximizing your oil recovery in the mechanical or solvent extraction plant.

The price of linter pulp has had a positive increase since 1971, and a strong demand and great future is seen worldwide for the "Purest Cellulose in Chemistry."

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more than 100,000 hectares. Hybrid seeds should be available for more than 200,000 hectares this year, Freckmann said. About 462,000 tons of the 481,000 ton sunflowerseed crop were crushed, producing about 194,000 tons of oil – an extraction rate of 42%, considerably higher than last year primarily because of the hybrid varieties.

Soybean yields rose to about 27.2 bushels per acre from 22.9 bushels per acre in 1976. Soybean oil production in 1977 was estimated at 25,180 metric tons, most from imported soybeans crushed at the Zadar plant that began operations July 6, 1977. National extraction rate was about 16% and may rise to 17% in 1978 because of the efficiency of the new plant. Rapeseed oil production for 1977 is estimated at 14,700 metric tons, a 42% extraction rate from 35,000 metric tons crushed. Olive oil production totaled 1,926 metric tons in 1977, compared to 2,035 metric tons in 1976.

Oilseed meal production totaled 296,564 metric tons, compared to 159,942 tons in 1976, with 157,000 tons from sunflowerseed (108,890 in 1976); 122,764 tons from soybeans (35,112 in 1976); and 16,800 from rapeseed (15,940 in 1976).

The Zadar plant may mean Yugoslavia will not import any vegetable oils during 1978, Freckmann said. About 200,000 metric tons of soybean meal may be imported during 1978. Yugoslavia is not expected to export edible vegetable oils during 1978. ●

Nigeria commercial peanut crop small

Nigeria peanut production appears to be falling because farmers find it more profitable to grow other crops, and the risks in successfully producing a good peanut crop are greater, U.S. agricultural attache W. Garth Thornburn reported in March from Lagos.

Total peanut production for 1977/78 is estimated by Thornburn at 450,000 metric tons (shelled basis), of which about 2,000 tons will be used for commercial products. About 350,000 tons are consumed in growing regions, never getting to commercial channels. Another 100,000 tons are believed held by buying agents and middlemen in anticipation of rising prices or for crushing to oil for increased profit. Last year, Thornburn reported that only 6 of 19 oilmills were operating. This year he said 80% of the mills are closed with the rest, as last year, mostly crushing cottonseed or refining imported peanut oil.

A February seminar sponsored by the Nigerian Groundnut Board recommended a 20% increase in the producer price for a ton of peanuts, which would bring the Nigerian price up to world market prices. That seminar also recommended production of suitable seed, development of better weed control techniques, crop insurance, and use of herbicides, among other steps to increase production. ●

India peanut crop may increase slightly

Peanut production in India for 1977-78 is estimated at 5.5 million metric tons in the shell, compared to the 5.3 million tons produced during 1976-77, according to a report from Charles W. Clendenen, U.S. agricultural officer in Bombay.

The government is not likely to permit exports of peanuts during calendar year 1978, Clendenen said, with peanut meal exports expected to be about 750,000 tons, the same as 1977. Edible oil imports are expected to continue around 800,000 metric tons, contingent upon the rapeseed and mustard seed crops.

An expert committee appointed last October has recommended that all possible measures be taken to expand acreage of high-yielding varieties, to develop oilseed varieties suitable for different conditions, and to assure irrigation to reduce production fluctuation.

Late last year, one government official urged that the government take over wholesale trade in edible oils and seed, a suggestion that met with encouragement when discussed by members of the Indian parliament last December, Clendenen reported. ●