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Scientific Processing Of Cottonseed And Its Products Vis-a-Vis Traditional Processing

Shri. Bajoria has also been Past President, The Central Organisation for Oil Industry & Trade, New Delhi and Past President of the Solvent Extractors' Association of India, Mumbai. He has been on the Reserve Bank of India Sub-Committee on inventory norms on oilseed industry. He was Chairman of Organising Committee of IASC's Global Conference of Vegetable & Oilseed Industry at Mumbai in 2005. He chaired the Globoil International Conference in Dubai in 2008. Shri Bajoria has represented vegetable oil industries on the Confederation of Indian Industries (CII) and Federation of Indian Chamber of Commerce & Industry (FICCI) committee. He was on the Managing Committee of Indian Merchants Chamber. He was declared "Oil Man of the year" at the Globoil International Conference, Mumbai, in 2001. He has been a Managing Committee member of "National Oilseeds & Oils Development Board" and has also been nominated on Consultative Committee of "Cotton Advisory Board" consecutively for four years by the Ministry of Textiles, Government of India.

Cottonseed is considered as the "Golden Goose". Each and every part of the cottonseed, which forms 2/3 portion of the seed cotton, produces valuable material catering to the needs

of indigenous industry as well as the export trade. Linters, hulls and kernels, the by-products of cottonseed are used in various consumer products, delicious food and as nutritious feed for cattle, fish and poultry.



GUEST COLUMN
Shri. Sandeep Bajoria
Chairman, All India Cottonseed Crushers' Association (AICOSCA), Mumbai

Based on the production estimates of cotton for 2016-17 (Oct-Sept.) by the Cotton Advisory Board (CAB) in its first meeting of this cotton season held on 24-10-2016 as 351 lakh bales (170 kgs. each), cottonseed production in 2016-17 will work out to 116.88 lakh tonnes.

(In estimating cottonseed production, a uniform ginning percentage of 331/3% is being used)

Cottonseed By-Products

Linters	Short fibres still clinging to the seed after ginning
Hulls	A tough protective covering of the kernel
Cottonseed oil	Extracted from the kernel
Cottonseed Cake	Expeller oilcake including both decorticated as well as undecorticated
Cottonseed Meal	Residue after extraction of oil (Solvent extracted products is referred as meal)

Cottonseed: Utilisation Pattern

Cottonseed is generally utilised for the following purposes:

1. Feeding whole cottonseed to the cattle
2. Sowing purpose
3. Processing for obtaining oil as well as by-products like linters, hulls, cottonseed oilcake and cottonseed extraction

Availability Of Cottonseed For Processing

(In tonnes except cotton)

	2013-14	2014-15	2015-16	2016-17 (P)
Cotton production (lakh bales)	398.00	386.00	338.00	351.00
Cottonseed production (@333kg/bales)	132.53	128.54	112.55	116.88
Retained for sowing & direct consumption	5.00	5.00	5.00	5.00
Marketable surplus available	127.53	123.54	107.55	111.88

P = Projection

It is indeed a matter of great pride that amongst all popular oilseeds like groundnuts, mustard seed, soybean etc. cottonseed is now number one in terms of production tonnage.

Production of Cottonseed Oil

The production of cottonseed oil for the last four years i.e 2013-14, 2014-15, 2015-16 and 2016-17 is as follows:

Production of Cottonseed Oil

Years	Production (M.T)
2013-14	15.30
2014-15	14.82
2015-16	12.91
2016-17 (Proj.)	13.43

There are 20 important facts about cottonseed oil which have been widely publicised by the American Cottonseed Processing Industry like its application in food as cooking oil, as a salad, as America's original vegetable oil, etc. The above contents are relevant to Indian cottonseed oil also.

Refined cottonseed oil has now become the second most preferred oil for frying in India, due to its nutrient values and because the shelf life of

food prepared in cottonseed oil is much longer than other oils. Refined cottonseed oil has also become very popular in states like Gujarat, Maharashtra and Andhra Pradesh. AICOSCA takes pride in this, as efforts of the Association over the decades for popularising cottonseed oil has achieved the desired results.

Processing Of Cottonseed -The Traditional Method

In this method, the seeds are simply mechanically crushed as such for production of oil without undergoing the process of delinting/dehulling, solvent extraction, etc. The process is primitive in nature and yields only about 12 - 13 % of crude oil which is inferior in quality and dark in colour. It produces about 80 - 85 of oil cake which has low nitrogen and fibre content. This also results in passing of about 7% oil in oil cake which is considered as wastage. It is a wrong assumption that oil content in the cottonseed cake raises milk yield or increases fat percentage in milk. Oil is required for generation of energy which the cattle themselves generate while rumination as stated by the National Dairy Research Institute (ICAR) Karnal.

About 95% of the cottonseed processed in the country is through the traditional method. The net result is that not only do we lose about 7% of the precious oil but it is also often of inferior quality. Oilcake obtained is also of low protein content.

Scientific Processing of Cottonseed

The scientific processing of cottonseed involves the following steps:

1. Cleaning of seed
2. Delinting
3. Dehulling
4. Separation of seed meat from hull
5. Seed meat drying
6. Flaking and rolling of seed meal
7. Cooking of seed meat
8. Extraction of oil
9. Degumming
10. Refining of oil
11. Washing of refined oil
12. Bleaching.

By adopting this method, we are able to recover almost all the oil content in the seed, valuable by-products like linter, hull, etc. besides getting the resultant oilcake (deoled cake with high protein content (40 - 42 %) and low fibre content.

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Progress of Scientific Processing of Cottonseed

(In lakh tons)

	2013-14	2014-15	2015-16	2016-17
1. Availability of cottonseed for processing	127.53	123.54	107.55	111.88
2. Cottonseed processed scientifically	8.40	9.00	9.00	9.00
3. Percentage of quantity processed scientifically to the total availability of cottonseed for processing (%)	6.59	7.21	8.36	8.04

Presently, scientific cottonseed processing is not attractive for small entrepreneurs as the returns are not very different from traditional processing to justify the additional investment though it results in national loss of valuable resources. Hence, there is need for providing incentives to this sector. Improve the cost of economics of scientific processing by conductive research. Central Institute for Research on Cotton Technology (CIRCOT) (ICAR) has been working in this direction.

It will be seen from the data presented in the table above that about 112 lakh tons of cottonseed

will be available for processing during the current year i.e 2016-17. As against the availability, an insignificant percentage is subject to scientific processing. Most of the cottonseed processed scientifically is by AICOSCA members, who are concentrated in the Southern states of Andhra Pradesh and Telangana. Based on the actual processing figures by these members, it seems, we would be processing scientifically about 9 lakh tons of cottonseed during the current year. The progress is fairly better than earlier year's figure of 5-6 lakh tons. Although the progress appears encouraging, nevertheless the situation is far from satisfactory even now, since hardly about eight to nine percent of the cottonseed production is subject to scientific processing, despite AICOSCA's sincere effort in various ways to propagate scientific processing.

Some Facts About Scientific Processing of Cottonseed

i.) India is one of the oldest cotton producing country in the world along with Egypt, Sudan, Iran and some African countries, at present producing cotton between 350 lakh bales to near about 400 lakh bales per year (vide production of 398 lakh bales in 2013-14)

ii.) In the year 2005, cottonseed production was hardly 3,50,000 tons which crossed one crore tons mark in the year 2010-11

iii.) However, cottonseed scientific processing is only about 10-11 lakh tons in the country

iv.) While availability of cottonseed is much higher i.e. 112 to 118 lakh tons

v.) Remaining seed is processed in an un-organised manner, i.e. traditional method which is primitive leaving oil in the cake of 5-6%, worth about 4000 cores which is a gross national wastage. Also losing other valuable by-products like linters and hulls in the traditional processing.

Estimated Annual Loss Of Cottonseed Products Due To Traditional Processing

Estimated Annual Loss of cottonseed by products due to traditional processing						
(Qty: Lakh Tonnes) (Value: In Rs. lakh)						
	2013-14		2014-15		2015-16	
	Qty	Value	Qty	value	Qty	Value
I] Cottonseed Oil (7%)	8.34	477574.50	8.32	439870.00	6.90	405128.67
II] Linters (4%)	4.77	112195.21	4.64	82790.31	3.94	110274.02
III] Hulls (27%)	32.17	259259.31	31.29	233725.35	26.61	398896.67
IV] Soap Stock (Hard) (0.8%)	0.95	4996.22	0.93	5590.68	0.79	4562.18
Total	46.23	854025.15	45.18	761976.34	38.24	918861.54

Percentage of Products obtained from Scientific Processing of Cottonseed

1. Linters -	5 – 8 %
2. Hulls -	20 – 25%
3. Decorticated Cottonseed Cake or Meal -	40 – 45%
4. Cottonseed Oil-	18 – 20%

AICOSCA's Efforts In Propagating Scientific Processing

AICOSCA, one of the oldest Associations of its kind, was established in the year 1959 on recommendation of an Ad-hoc Committee constituted by the Government of India to examine problems of Cottonseed Crushing Industry and make recommendation regarding its future development.

The Association is a "Public Trust" registered under Bombay Public Trust Act 1950 and is incorporated as a "Company Limited" under the Companies Act 1956. AICOSCA is also a member of the Consultative Committee of the Cotton Advisory Board, Ministry of Textiles, Government of India, The principal mandate of AICOSCA is the scientific processing of cottonseed. In this context, AICOSCA seeks to propagate scientific processing of cottonseed to prevent recurring National loss of valuable cottonseed by-products like cottonseed oil, cotton linters, hulls, etc. worth about Rs. 6000/- crores to Rs. 8000/- crores every year. AICOSCA is also called upon to formulate pragmatic policy for development of cottonseed processing industry in tune with the developed countries. AICOSCA seeks to promote the use of decorticated proteinous cottonseed extraction as animal feed in place of traditional wasteful use of whole cottonseed as well as undecorticated cottonseed oilcake and promote the use of refined cottonseed oil (termed as Heart oil) which is healthy and a cheaper cooking medium. This is achieved through education, extension work, publicity by way of issuing informative pamphlets/folders/educative films etc. The specific extension/education work done by AICOSCA so far is briefly mentioned below:

(i) Film on Scientific Processing of Cottonseed

A film on scientific processing of cottonseed was prepared by this Association in collaboration with the Council of Scientific and Industrial Research (CSIR), Govt. of India and the Technology Mission on Oilseeds & Pulses (TMOP) Minister of Agriculture, Govt. of India. The film was distributed

free of charge to various research and training organisation like Central Institute for Research on Cotton Technology (CIRCOT) ICAR, Govt. of India, Mumbai, Central Institute for Research on Cotton (CICR) Govt. of India, Nagpur, National Dairy Research Institute, Govt. of India, Karnal, ANG Ranga Agrl. University, (A.P) Hyderabad, etc. The film is being screened at various seminars/workshops on cotton. The film has been dubbed in four regional languages - Marathi, Gujarati, Tamil and Telugu. The copies of the film are given free of charge to members/other public users on demand who are associated with the processing of cotton seed.

(ii) Printing of Publicity Material in English and Regional languages

Three publicity pamphlets were printed in English, Hindi, Marathi, Gujarati and Telugu and distributed free of charge all over the country for disseminating information about AICOSCA's role. These were:

1. Scientific Processing of Cottonseed : Need of the hour
2. Cottonseed - Golden Goose : (Details of cottonseed by-products, their uses, etc.)
3. AICOSCA in the Service of Nation

(iii) Seminar on Transfer of Modern Technology in Scientific Processing

A seminar on 'Transfer of Modern Technology in Scientific Processing of Cottonseed and Export of Cottonseed by-products' was organised at Guntur (A.P) in March, 2011, in close collaboration and technical inputs from the Central Institute for Research on Cotton Technology (CIRCOT), Indian Council of Agriculture Research, Ministry of Agriculture, Govt. of India. Three principal scientists from CIRCOT participated in the seminar. More than 40 members of the cottonseed processing industry attended the seminar.

(iv) National Seminar on Emerging Potential of Cottonseed & its By-products

This seminar was organised at Mumbai in April, 2007 in collaboration with Central Institute for Research on Cotton Technology (CIRCOT), Indian Council of Agricultural Research, Government of India and the Indian Society for Cotton Improvement. Dr. Mangala Rai, the then Director General, Indian Council of Agriculture Research and Ex-officio Secretary, Ministry of Agriculture, Government of India, presided over the inaugural function of the seminar. Eight eminent subject matter specialists presented papers at the seminar, while three papers on various aspects of cottonseed processing were presented by this Association.

(v) Seminar in Guntur (A.P) in June, 2016 on Decorticated Oilseed Cake (DOC) for Cattle, Fish and Poultry Feed

AICOCA organised the above seminar which was very successful, considering the presence of 200 members, to disseminate the information of above subject among participants.

(vi) Bringing out a Monthly Newsletter

The Association brings out a Monthly Newsletter and keeps its members, concerned Government Departments, the subject matter specialists and others informed of the latest development regarding cotton in the country and the world, cottonseed production, prices of cottonseed and cottonseed products, policy issues and focuses attention on the problems of the scientific cottonseed processing industry and the measures needed for its development on modern lines. Although the Association's membership is only about seventy, 160 copies of the monthly newsletter are circulated every month and distributed to non-members free of charge. This is the only publication in India devoted exclusively to cottonseed processing industry and is published every month.

(vii) Publishing of an Annual Report during Annual General Meeting

The Association brings out an Annual Report every year giving details of the development in cottonseed processing industry in India during the year. It gives details of the achievements of the industry, including adopting scientific processing of cottonseed, excellence in export of cottonseed by-products, problems being faced etc. The Report is circulated to all concerned Government organisations and members of the trade and Industry.

(viii) Award for Excellence in Domestic Production and Export

To encourage scientific processing of cottonseed and larger use of by-products obtained during scientific processing, and promoting export of cottonseed by-products like linters, hulls, and cottonseed extraction the Association's grants the following Awards every year.

1. Award for excellence in Export of Cotton Linters.
2. Award for excellence in Domestic sales of Cottonseed Extraction (Meal).
3. Award for excellence in Export of Hulls.
4. Award for excellence in Export of Cottonseed Extraction (DOC).

(ix) Papers on Scientific Processing of Cottonseed

Almost a dozen papers on the above subject have also been presented by this Association at various Seminars organised by the cotton and

vegetable oil industry from time to time.

- (x) Delegates visit to the USA in order to modernise cottonseed processing plants, a delegation of seven leading members of our Association visited USA for studying the operation of processing plants using modern machinery in USA and also interactive meetings with M/s. Carver Inc, USA and Centrell International (A.C. Horn & Co.) Dallas, Texas USA, the world's leading manufacturers of complete range of cottonseed delinting and other oilseed processing machineries.

Constraints in Promoting Scientific Processing of Cottonseed

According to Central Institute for Research on Cotton Technology (CIRCOT) (ICAR), there are certain constraints in promoting scientific processing of cottonseed and its by-products which are as under:

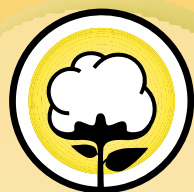
- i) Higher capital investment required as machinery costs are quite high
- ii) Seasonal availability of the raw material (cotton)
- iii) Products obtained i.e. linters, hulls, decorticated cake, mainly depend on export market hence price keep varying as well as income
- iv) Local market has more demand for undecorticated cake
- v) Lack of Government support. AICOSCA feels without proper government support the industry cannot grow.
- vi) Prices of the products obtained keep on varying depending on the demand and prices of competing products and therefore price realisation keep on varying which is again a deterrent for investment in this sector.

The Way Forward

- i) Presently returns from scientific processing not commensurate with addl. Investment but as pointed out above traditional processing results in huge loss.
- ii) Incentives needed from the Government.
- iii) Establishment of forward industrial linkages such as with the chemical industry which can utilise linters.
- iv) Research & Development on Value Addition to Products obtained from scientific processing can improve profits.
- v) Educating the livestock farmers about the benefits of high protein decorticated cake/meal over undecorticate cake.

Courtesy : Cotton India 2016-17

(The views expressed in this column are of the author and not that of Cotton Association of India)



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COTAAP Corner

Events in January 2017

At this stage, the cotton harvest is almost over. Few farmers with irrigation facilities, have kept the crop for further flush. Because of sufficient rainfall and increase in ground water sources, farmers turned to *rabi* crops. In case of rainfed fields, farmers have no urgency to remove the crop from their fields. Looking at the continuous increase in cotton rates, farmers are in a dilemma about their decision to keep or sell the produce.

Activities conducted by COTAAP

Farmer awareness drive for contamination in cotton :

Cotton is usually contaminated at the harvesting stage in the field, during handling and transportation and storage at the farmer's home. It is contamination that affects market prices and causes deterioration in textile quality. COTAAP has been conducting a clean cotton awareness campaign since last year. Display of posters, informing farmers about the advantages of contamination free cotton in village meetings, farmers rally, etc. are the activities conducted for this purpose. Using cotton



Awareness drive for cotton contamination



cloth bags for harvesting, storage and transport has also been recommended to the farmers.

COTAAP farmers participated in Mumbai Marathon 2017:

As a farmer empowerment and awareness drive, CAI President Shri. Nayan C. Mirani and immediate Past President Shri. Dhiren N. Sheth, both Trustees of COTAAP Research Foundation, took the initiative to provide a platform for farmers to be heard in urban areas. CAI came up with a theme: "Run for



Cotton farmers participate in the Mumbai Marathon



cotton” in which about 30 participants ran along with two farmers from Chopda -Shri. Kishor Patil and Shri. Chandrahas Patil. Both the farmers were dressed in traditional dhoti and kurta and carried a plough and sickle, which was highly appreciated by the crowd.

from Chopda taluka and Bahadarpur from Parola taluka. They visited the COTAAP office and appreciated the efforts made by COTAAP in the field of Agricultural Extension.

Visit of Representatives from Geneva :

Two representatives from Geneva Ms. Elena Mayer-Besting and Ms. Sara-Oona Matilda Pentikainen visited COTAAP, Chopda unit from 16th January to 18th January. The main focus of their study was to understand the role of women in the entire cotton chain and to learn the importance and role of self help groups (SHGs) in the life of rural women. Since COTAAP has successfully maintained relationships with farmers in this region, it could provide assistance for identifying respondents for the survey and for smooth communication and collection of representative data. The two ladies visited Adgaon, Malapur and Virwade villages



Field visit with COTAAP staff



Interviewing three generations of women from a rural family



With tribal women



At the Training Centre with COTAAP field staff

Growth In Capacity Of Cotton / Man- Made Fibre Textile Mills (Non SSI)

YEAR	NO. OF MILLS			INSTALLED CAPACITY		
	SPINNING	COMPOSITE	TOTAL	SPINDLES (Mn.)	ROTOR (000)	LOOMS (000)
31-03-2011	1757	183	1940	42.69	518	52
31.03.2012	1761	196	1957	43.31	523	52
31.03.2013	1771	198	1969	44.17	546	52
31.03.2014	1757	197	1954	44.47	553	51
31.03.2015	1776	200	1976	45.08	565	52
31.03.2016	1779	201	1980	46.00	581	53
2014-15 (P)						
April	1757	197	1954	44.47	553	51
May	1757	197	1954	44.47	553	51
June	1757	197	1954	44.48	553	51
July	1761	198	1959	44.55	553	52
August	1765	198	1963	44.61	557	52
September	1770	198	1968	44.72	557	52
October	1772	198	1970	44.73	558	52
November	1773	198	1971	44.75	561	52
December	1772	200	1972	44.79	562	52
January	1773	200	1973	44.81	562	52
February	1774	200	1974	45.04	564	52
March	1776	200	1976	45.08	565	52
2015-16 (P)						
April	1776	200	1976	45.09	565	52
May	1776	200	1976	45.09	565	52
June	1776	200	1976	45.10	565	52
July	1776	200	1976	45.24	565	52
August	1776	200	1976	45.08	565	52
September	1776	201	1977	45.54	511	52
October	1778	201	1979	45.57	515	52
November	1778	201	1979	44.65	573	52
December	1778	201	1979	44.69	575	52
January	1778	201	1979	45.82	579	53
February	1779	201	1980	46.02	581	53
March	1779	201	1980	46.00	581	53
2016-17 (P)						
April	1781	201	1982	46.14	578	53
May	1784	201	1985	46.18	579	53
June	1787	201	1988	46.42	583	53
July	1792	204	1996	46.85	583	53
August	1797	204	2001	46.73	586	53
September	1798	204	2002	46.94	586	53
October	1800	204	2004	46.97	586	53
November	1803	204	2007	47.04	586	53
December	1807	204	2007	47.07	587	53

P - Provisional

Source : Office of the Textile Commissioner



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1	P/H/R	ICS-101	Fine	Below 22mm	5.0-7.0	15	8886 (31600)	9026 (32100)	9026 (32100)		9121 (32400)	9121 (32400)
2	P/H/R	ICS-201	Fine	Below 22mm	5.0-7.0	15	9167 (32600)	9308 (33100)	9308 (33100)	H	9392 (33400)	9392 (33400)
3	GUJ	ICS-102	Fine	22mm	4.0-6.0	20	8858 (31500)	8998 (32000)	8998 (32000)		8998 (32000)	8998 (32000)
4	KAR	ICS-103	Fine	23mm	4.0-5.5	21	9729 (34600)	9870 (35100)	9870 (35100)		9870 (35100)	9870 (35100)
5	M/M	ICS-104	Fine	24mm	4.0-5.0	23	10742 (38200)	10882 (38700)	10882 (38700)	O	10882 (38700)	10882 (38700)
6	P/H/R	ICS-202	Fine	26mm	3.5-4.9	26	11838 (42100)	11979 (42600)	11895 (42300)		11867 (42200)	11867 (42200)
7	M/M/A	ICS-105	Fine	26mm	3.0-3.4	25	10967 (39000)	11079 (39400)	10995 (39100)	L	10911 (38800)	10911 (38800)
8	M/M/A	ICS-105	Fine	26mm	3.5-4.9	25	11304 (40200)	11417 (40600)	11332 (40300)		11248 (40000)	11248 (40000)
9	P/H/R	ICS-105	Fine	27mm	3.5-4.9	26	12007 (42700)	12148 (43200)	12063 (42900)		12035 (42800)	12035 (42800)
10	M/M/A	ICS-105	Fine	27mm	3.0-3.4	26	11079 (39400)	11192 (39800)	11107 (39500)	I	11023 (39200)	11023 (39200)
11	M/M/A	ICS-105	Fine	27mm	3.5-4.9	26	11529 (41000)	11642 (41400)	11557 (41100)		11473 (40800)	11473 (40800)
12	P/H/R	ICS-105	Fine	28mm	3.5-4.9	27	12063 (42900)	12204 (43400)	12120 (43100)	D	12120 (43100)	12120 (43100)
13	M/M/A	ICS-105	Fine	28mm	3.5-4.9	27	11670 (41500)	11782 (41900)	11698 (41600)		11614 (41300)	11614 (41300)
14	GUJ	ICS-105	Fine	28mm	3.5-4.9	27	11754 (41800)	11867 (42200)	11782 (41900)		11698 (41600)	11698 (41600)
15	M/M/A/K	ICS-105	Fine	29mm	3.5-4.9	28	11754 (41800)	11867 (42200)	11782 (41900)	A	11698 (41600)	11698 (41600)
16	GUJ	ICS-105	Fine	29mm	3.5-4.9	28	11838 (42100)	11979 (42600)	11867 (42200)		11782 (41900)	11782 (41900)
17	M/M/A/K	ICS-105	Fine	30mm	3.5-4.9	29	11951 (42500)	12092 (43000)	11979 (42600)	Y	11895 (42300)	11895 (42300)
18	M/M/A/K/T/O	ICS-105	Fine	31mm	3.5-4.9	30	12063 (42900)	12260 (43600)	12120 (43100)		12035 (42800)	12035 (42800)
19	A/K/T/O	ICS-106	Fine	32mm	3.5-4.9	31	12148 (43200)	12345 (43900)	12204 (43400)		12120 (43100)	12120 (43100)
20	M(P)/K/T	ICS-107	Fine	34mm	3.0-3.8	33	15691 (55800)	15691 (55800)	15691 (55800)		15691 (55800)	15691 (55800)

(Note: Figures in bracket indicate prices in Rs./Candy)