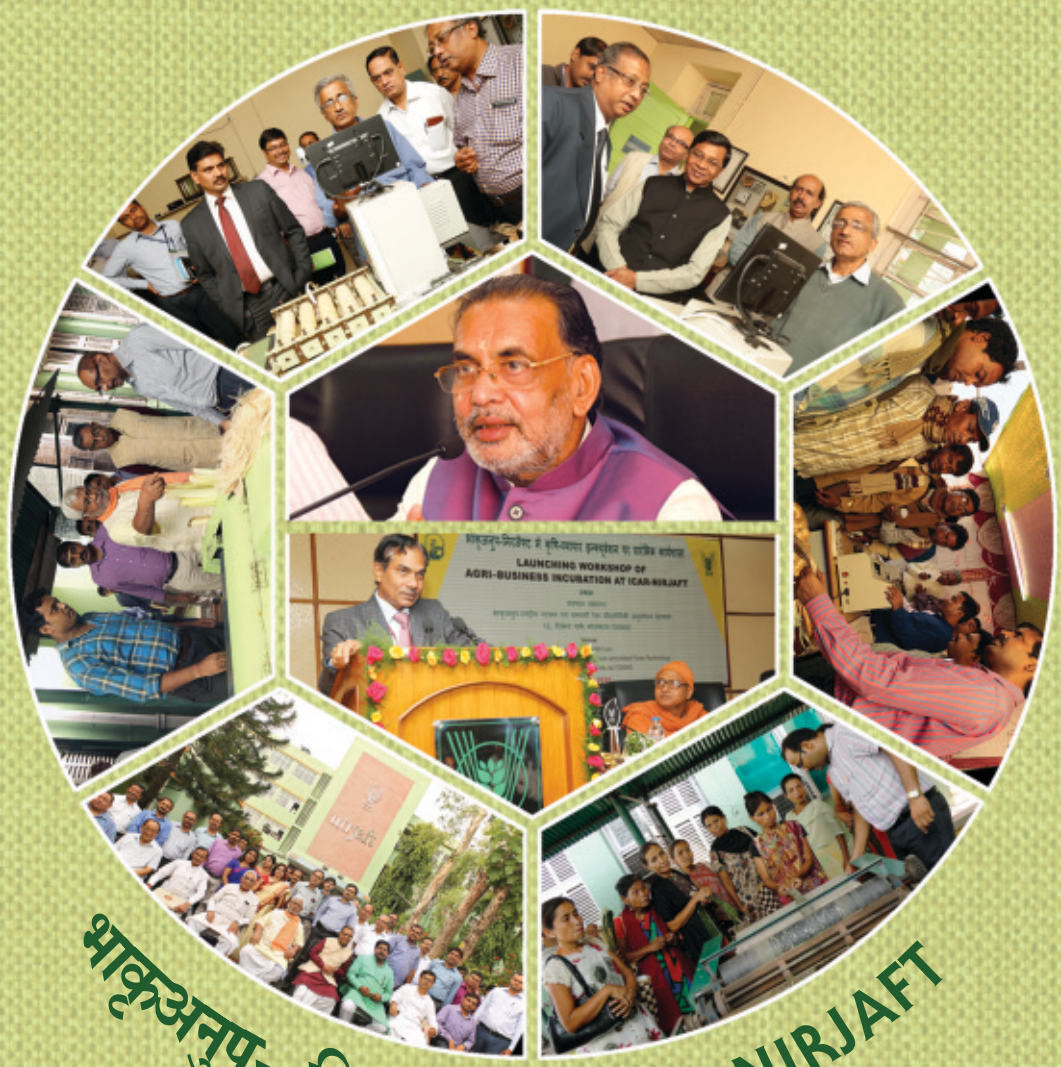
ANNUAL REPORT
2016-17



भाकृअनुप- निरजैफट ◆ ICAR-NIRJAFT

Indian Council of Agricultural Research

ICAR-National Institute of Research on Jute & Allied Fibre Technology

(ISO 9001:2008)

Annual Report
2016-17

ICAR-National Institute of Research
on Jute & Allied Fibre Technology
Indian Council of Agricultural Research
(An ISO 9001:2008 certified institute)
12, Regent Park, Kolkata-700040
राष्ट्रीय पटसन एवं समवर्गी रेशा प्रौद्योगिकी अनुसंधान संस्थान
भारतीय कृषि अनुसंधान परिषद
12, रीजेन्ट पार्क, कोलकाता - 700040

ICAR - NATIONAL INSTITUTE OF RESEARCH ON JUTE & ALLIED FIBRE TECHNOLOGY

(An ISO 9001: 2008 certified institution)

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Contents

Foreword

India is the largest jute producing and consuming country and accounts for about 60% of the world production of jute fibres. From Jute sector, India earned nearly Rs. 1814 Crores during 2014-15 in which hessian was the single largest component accounted for Rs. 770 Crores, followed by Jute diversified products (Rs.609 Crores), sacking (Rs.330 Crores) and yarn (Rs.139 Crores). This is a good sign that the contribution of JDPs which has crossed 43% of the total export earnings of our country. This clearly indicates that the value addition and product diversification are the need of the hour. Mechanical dumping is one of the main areas of threatening in the world due to non-biodegradability of synthetic materials. After plastic compounds, textile & clothing is the second important contributors on mechanical dumping. It is time to sustain the world for our future generations and this is right time to expose all possible natural sources for their right and proper utilisation in order to reduce the consumption of synthetic materials. Fashion also plays an important role in augmentation of the consumption of synthetic fibres in the textile due to their ease of tailoring in the desirable material and durability. However, synthetic fibres are non-biodegradable; inherently unsustainable material; creates nitrous oxide; uses large amounts of water during manufacturing and consumes high energy which it is mainly responsible for high carbon print. ICAR-NIRJAFT is a pioneering research institute in carrying basic, strategic and applied research in the area of jute and allied fibres as well as disseminating the technologies for its stakeholders particularly jute growing farmers, jute based entrepreneurs and handicraft persons particularly in the village area of the eastern regions. Institute particularly focuses developmental activities in the area of under-explored allied fibres like Ramie fibre, Pine apple leaf fibre, Sunnhemp fibre, Banana fibre and Flax fibre in order to highlight them to the world for their sustainable advantages. Institute have conducted seventeen frontline demonstration on Jute Power Ribboner, Accelerated chemical retting on Jute & Mesta plant, Dry retting of Jute plant & Degumming of Ramie plant/ fibres in different areas of the eastern regions of our country; conducted two participatory technology development-cum-training programs; fourteen exhibitions in different meetings ; conducted one winter school, three national level training programs sponsored by National Food Security Mission (NFSM) , four self-sponsored training program and a training program under NEH component of ICAR-NIRJAFT and two scientists- Farmers interface in this financial year. Institute is constantly working for the uplift of the economy of stakeholders of the jute and allied fibres particularly for farmers from eastern region of our country and I hope its impact plays a major role in the economy of our country in near future I appreciated the efforts taken by the editorial team to bring for this annual report of our institute.

Kolkata
30th June, 2017

Dr. Gautam Roy
Director (Acting)

GLIMPSES OF 2016-17

ICAR-NIRJAFT is a premier R&D institute for post harvest technologies on of jute and allied fibres and has developed the following new products or processes in 2016-17. Among them, some have potential for commercialisation to enhance the remuneration of entrepreneurs, industries and farmers. Utilisation of agro-waste, advanced fibre extraction, fibre and fabric evaluation, utilisation of lesser known fibres, processing for new/eco-friendly products and conductive polymer composites, functional finishing, sustainable chemical processing, eco-friendly dyes, are addressed by the developed technologies.

New Products / Process / Machine / Instrument / Technology Developed

- Development of new grading system for Mesta & Bimli
- Development of Electronic Fibre Bundle Strength Tester , Electronic Fibre Fineness Meter and Electronic Colour & Lustre Meter for Ramie, Sunnhemp and also for multiple fibres (Ramie, Sunhemp, Sisal & Flax fibre)
- Development of grading systems for Ramie, Flax, Sunnhemp and Sisal fibres
- Gum profiling and optimization of degumming of Ramie
- Chemical profiling of Ramie gum in high gum and low gum lines
- Expert system for analysis of defects in jute fabrics during inspection
- Methodology to print jute fabric with natural dyes
- Process to prepare pulp for the sanitary napkins
- Methodology to develop tissue paper from jute from ASAM pulping process
- Development of union fabrics from cotton yarn and jute /banana blended yarn
- Functional finishing of cotton/ jute /banana blended fabric
- Technology to develop activated carbon from jute stick
- Process to remove acid and reactive dyes from effluent by activated carbon
- Methodology to develop jute: polyaniline based conductive polymer composite
- Process to modify black coloured yak fibre into to golden yellow colour
- Concept of making blended yarn from jute, and unmodified & modified yak fibres
- Development of woven fabric from jute/yak fibres blended yarn
- Methodology to apply banana pseudo stem extract as Flame retardant finishing chemical
- Methodology to prepare and apply chitosan: jasmine oil microcapsule for aroma finishing
- Process to develop jute nonwoven: unsaturated polyester resin based rigid composite
- Methodology to ret jute fibre by mechanic-microbial method

Patent

- Granted – 1
- Filed – 2

Training / Workshop / Extension activities

- Field level demonstrations = 17
- Participatory technology development cum training programs = 2
- ICAR Sponsored winter school = 1
- NFSM sponsored training programs = 3
- Self-sponsored training programs = 4
- Training programs under NEH component = 1
- Scientists-Farmers interface = 2
- Training programs on JDP = 5
- In-house seminar = 25
- Participation in exhibition = 14

Institute Activities

- Inauguration of Agri Business Incubation Centre of the institute by Dr. Trilochan Mohapatra, Secretary DARE & Director General, ICAR on 15th June 2016
- Organisation of Technology and Machinery Demonstration Mela at KVK-Jagatballavpur, Howrah on May 27, 2016
- Celebration of 79th Foundation Day on January 3, 2017 with lecture delivered by Dr. K.K. Satapathy, Former Director, ICAR-NIRJAFT
- 4th C.R. Nodder memorial lecture was delivered by Dr. S. Sreenivasan, Former Director, ICAR-CIRCOT, Mumbai
- Observation of Vigilance Awareness Week program from 31st October to 5th November, 2016
- One day panel discussion on Natural Fibre based Diversified Products-Imperatives for Growth in collaboration with The Indian Natural Fibre Society (TINFS) on April 2, 2016
- First brainstorming lecture delivered by Dr. Indra Mani Mishra, Head, Division of Agricultural Engineering, IARI, New Delhi on August 17, 2016
- Second brainstorming lecture delivered by Dr. Raj Kachru, Ex-Assistant Director General (Process Engg. & ARIS), ICAR and Former Member, AGM, ICAR on November 4, 2016

- Third brainstorming lecture was delivered by Dr. Nabarun Bhattacharyya, Director, C-DAC, Kolkata on March 24, 2017
- Celebration of first Swachh Bharat Pakhwara from 16th to 31st May, 2016
- A medical camp in collaboration with Apollo Clinic was organised to check up health of individual staff under Swachh bharat Pakhwara on October 16, 2016
- One-day workshop on complementary nature of conventional and digital library in modern information dissemination system on December 12, 2016
- Hindi cell organised four workshops on June 27, August 20, December 17, 2016 & February 25, 2017
- A training program "Parangat" was organized from 06.01.2017 to 06.02.2017 and in which 31 staff members were trained
- Hindi fortnight Celebration was observed in the Institute during 14-29 September, 2016
- Independence day and republic day were celebrated
- Eleven programs under MGMG were organised at different villages
- A winter school on Value addition in jute and allied fibres through product diversification & waste utilization from 15th September to 5th October 2016
- One IMC meeting, one PMEC meeting, two IRC meeting and four ITMC meeting were held during 2016-17.
- The institute is executing all works as per the norms of ISO 9001:2008.
- The institute budget was ₹. 2,74,72,000/- (Plan) and ₹.16,68,00,000 (Non-plan), out of which the actual expenditure was ₹.1,97,22,236 (71.8% utilisation) and ₹.16,40,04,592 (98.3% utilisation) respectively.
- Resource Generation of the institute was ₹ 32,12,278/-
- Video conference with Dr. Trilochan Mohapatra, Honourable DG, ICAR & Secretary DARE on March 7, 2017
- Wi-Fi facility for the Institute campus was inaugurated on March 24, 2017
- Regularization and digitization of institute land records, uploading of institute map on Google earth (Latitude: 22° 28′ 52.92″ N, Longitude: 88° 21′ 08.73″ E)

Awards

- Best Stall in Exhibition = 3
- Best Paper / Poster = 2
- Commendation Letter = 1
- Outstanding achievement award = 1

Publications

- Research Papers = 34
- Popular article = 15
- Book Chapters = 8
- Seminar papers = 11
- Books = 2
- Compilations = 2
- Technical bulletins = 11
- Training Manuals = 5

Research paper / Poster presentation = 57
Lead / invited paper presentation = 9
MoA & MoU signed = 4

Project details

Division	Number of projects			
	Ongoing	Completed	Extended	Started
Quality Evaluation and Improvement (QEI) Division	3	1	–	1
Mechanical Processing (MP) Division	2	4	2	1
Chemical and Biochemical Processing (CBP) Division	6	–	–	2
Transfer of Technology (TOT) Division	2	--	1	–
External funded projects*	7	–	–	–

* *The projects are sponsored by National Funds for Basic Strategic and Frontier Application Research in Agriculture, ICAR; Consortium Research Platform - Natural Fibre ; National Agricultural Science Fund, ICAR and MoT, Govt. of India.*

Instruments Procured

- Mass mixture
- Digital IR Moisture Analyser
- Banana Sap Extraction machine
- Magnetic hot plate
- Multi parameter analyser for water
- BOD for waste water analyser

ICAR-National Institute of Research on Jute & Allied Fibre Technology

The institute was formerly known as Jute Technological Research Laboratory (JTRL) and was set up by the Indian Central Jute Committee, Government of India on the recommendation of the Royal Commission on Agriculture in 1936 at Calcutta. The institution was officially established on January 3, 1939 by Lord Linlithgow, the then Viceroy and Governor-General of India. In 1965, it became a constituent unit under the centralized administrative control of the Indian Council of Agricultural Research (ICAR), New Delhi, and has been renamed as the National Institute of Research on Jute and Allied Fibre Technology (NIRJAFT) on 1996, to carry out basic and applied researches related to post harvest processes of jute and allied fibres such as mesta, linseed/flax, sisal, ramie, banana, sunnhemp, pineapple leaf, dhaincha, coconut fibre and other lesser known long vegetable fibres. NIRJAFT is also committed to pursuit the knowledge transfer and economic development activities that benefit the local, regional and national constituents.

The institute is located on the southern fringe of Kolkata, known as Tollygunge, with a total plot area around 17,628 sqm. During last seven decades, the institute was flourished with multifarious disciplines and carved a niche as a centre of excellence for research on jute and allied fibres catering to the entrepreneurs and industry. The institute is adequately equipped with the state of the art laboratories having sophisticated tools, instruments and processing machinery.

Mandate

- Basic and strategic research on processing jute & allied fibres and their agro-residues, development of value added products and quality assessment.
- Skill development and business incubation service on jute and allied fibre technologies

The administration is headed by the Director and he manages the system with the help of Management Committee, Joint Council and Grievance Cell. The R & D is being managed by Research Advisory Committee and Institute Research Council. The R&D programs of the institute are implemented through the following four divisions.

Quality Evaluation and Improvement (QEI) Division:

QEI division is engaged in research on fibre extraction, evaluation, quality assurance and grading. Up gradation of quality, evaluation of physiochemical properties, chemical modification of jute and allied fibres are the major contribution of this division including extraction of useful chemicals from agricultural by-products of fibre crops.

Mechanical Processing (MP) Division:

MP division carries out basic and applied research on mechanical processing, quality control and product development from ligno-cellulosic & long vegetable fibres. Improvement of process, productivity & product quality; design & development of product, machinery & instrument; quality assessment on geo-textile, agro-textile, apparel, packaging, automotive and industrial textiles are the main areas of research of this division.

Chemical and Biochemical Processing (CBP) Division:

CBP division is exclusively working on chemical/ biochemical processing, quality control and product development from ligno-cellulosic & long vegetable fibres. It has major contribution on pulp & paper; bleaching, dyeing & finishing; particle & fibre board; composites from jute and allied fibres. Nano technology and biomass utilization are also important areas where scientists of this division are working.

Transfer of Technology (TOT) Division:

The mandate of ToT division is to transfer institute's technologies, develop entrepreneurship providing technical training and capacity building, arrange front line demonstrations and participate in different exhibitions, fairs and mela for promoting the developed technologies. It is also developing the project profile of viable technologies and rendering technical assistance for incubators.

Design, Development and Maintenance (DDM) Section:

DDM section assists in design and development or modification of machinery/prototype, equipment, and instruments for institutional purposes. It is also engaged in customary maintenance of machines and instruments; civil & electrical infrastructure of campus; security aspects, new infrastructure building activities; monitoring of car etc.

Quality Assurance (QA) Section:

QAS section deals with evaluation of fibre quality and grading of jute and allied fibres. It is associated with CRIJAF in All India Network Project (AINP) for jute and mesta. The section coordinates the system for acquiring and maintenance of ISO certification of the institute.

Priority setting, Monitoring & Evaluation (PME) Cell

The PME cell helps in designing and monitoring the R&D programs of the institute. It is responsible for convening meetings of the Institute Research committee, Research

Advisory Committee and compiling the monthly, quarterly, half-yearly and annual technical reports of the institute. This unit also coordinates in technical inquiries from the council as well as Parliament questions from time to time.

Library:

It acts as a centre of repository for scientific and technological information of jute & allied fibres including other ancillary disciplines by maintaining a large number of books, journals, reports, reprints, pamphlets. The library has developed suitable infrastructure for computerized operation.

STAFF POSITION AS ON 31/03/2017

Category	Sanctioned Posts	Post filled	Posts Vacant
RMP	01	00	01
Scientific	44	20	24
Technical	60	42	18
Administrative	35	19	16
Skilled Support Staff	41	25	16
Auxiliary(Canteen Staff)	04	02	02
Total	185	108	77

The institute has efficient administrative section under guidance of The Director to support the research and dissemination activities. It also contains well managed guest house called scientists' home, trainees' hostel, and farmers' hostel. It is also equipped with auditorium, conference hall, conference room and meeting room to organise seminar, meetings and other programmes regularly.

Organogram of ICAR-NIRJAFT, Kolkata

Parliamentary Standing Committee on Agriculture with ICAR-NIRJAFT staff members during their visit on June 17, 2016

QUALITY EVALUATION & IMPROVEMENT DIVISION

PRIORITY AREAS OF RESEARCH

- Research on fibre extraction, quality assurance and grading
- Evaluation of physiochemical properties, chemical modification of jute and allied fibres
- Extraction of useful chemicals from agricultural by-products of fibre crops
- Skill development on extraction of jute and allied fibre technologies

ACHIEVEMENTS

- Development of new grading system for Mesta & Bimli
- Development of Electronic Fibre Bundle Strength Tester, Electronic Fibre Fineness Meter and Electronic Colour & Lustre Meter for multiple fibres (Ramie, Sunhemp, Sisal & Flax fibre)
- Development of grading systems of Ramie, Flax, Sunnhemp and Sisal fibres
- Gum profiling and optimization of degumming of ramie
- Chemical profiling of Ramie gum in high gum and low gum lines

QEI 15: Performance evaluation of crop specific agro-textiles

Dr. B.Saha, Dr. S. Debnath, Dr. SB.Roy and Dr. D. Das

Agro-textile mulches of different thickness were compared in respect of moisture conservation, weed suppression, yield of crops, microbial population, nutrient availability in soil and bio-degradability.

Moisture conservation, weed suppression and yield of crops under different agro-climatic zones

In Sriniketan, Birbhum available moisture varied from 10% to 22% in 400 GSM agro-textile mulched plots in maize. In Gayeshpur, available moisture capacity was found to be highest in 400GSM plots (35%) followed by 350GSM plots (30%) over control in bitter gourd. Highest yield of maize was observed in 300GSM mulched plots followed by 350 and 400GSM plots. In case of brinjal highest yield was obtained in 300 GSM plots and estimated profit was Rs 1,00,000 (approx) from one ha of land during 6 months of cultivation. Yield of bitter gourd (29.8t/ha) was found to be highest under 300GSM followed by 350 and 400GSM plots. Highest curd wt of broccoli was observed in 300GSM agro-textile mulch plots followed by 350 and 400 GSM agro-textile mulched plots. In Narendrapur, weed suppression was 83% in 400GSM plots over control in broccoli cultivation system

Microbial population

Microbial population varied from 7.25 x105 CFU in control to 32.5 x105 CFU in 500 GSM agro-textile mulches. Total bacteria population was found to be highest (48x107) in 400 GSM plots followed by 350 and 300GSM plots. Azospirillum, Rhizobium and phosphate solubilising bacteria are found to be active in the rhizosphere.

Nutrient availability in soil

Chemical analysis of alluvial soils reveals that, organic carbon (%) increased from 0.65 in control to 0.85 in 400 GSM plots. Available P increased from 15kg /ha in control to 25 kg/ha under agro-textile mulched plots. Available K increased from 161kg/ha in control to 250kg/ha under 300GSM agro-textile mulched plots.

Bio-degradability of Agro-textiles

It has been observed that after 8 months of exposure and use as agro-textile at RKMU the jute nonwoven fabric can retain between 40-50% strength to its original strength in case of low GSM fabric (300 g/m^2) but its strength is in the tune of 83-86% in case of heavier GSM (400 g/m^2) fabric. At Srinekatan, the low GSM (300 g/m^2) fabric could retain 44-51% of its

original strength. However, the retention strength of the fabrics were in the range of 51-76% in case of heavier fabric (500 g/m^2)

Cost-benefit ratio

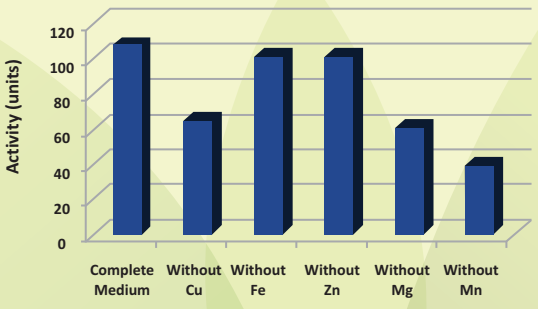
It was observed that cost: benefit ratio of brinjal without jute mulching was 1:1.3 whereas with jut mulching it was found to be 1:1.45. Cost: Benefit for broccoli , chilli and tomato was 1:1.78.

QEI 17: Laccase from microbes for value addition in jute

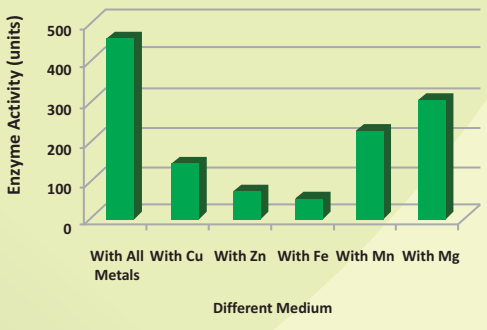
Dr. A. Das & Dr. B.Saha

Previously, a bacterial and a fungal culture possessing laccase activity were isolated from rotten woods. These cultures were further tested for growth and cultural conditions giving highest enzyme activity. The fungal culture gave highest laccase activity on 11th day of growth on solid matrix. The fungal culture, when grown in the presence or absence of biologically important metal ions (Cu^2+, Fe^2+, Zn^2+, Mg^2+ and Mn^2+), laccase activity was found to vary. While all the metal ions together showed positive effect on laccase activity, individual effects were different. Removal of Fe^2+ and Zn^2+ seemed to have almost no effect on laccase activity.

On the other hand, removal of Cu^2+, Mg^2+ and Mn^2+ had negative impact on laccase activity. It is concluded that these three metal ions might have some important role in enzyme activity. When these metal ions were sequentially added (one at a time) to the medium showed similar pattern, with Mg^2+ and Mn^2+ showing maximum induction of enzyme activity. As compared to other metal ions, Mg^2+ and Mn^2+ showed higher mycelial growth in terms of soluble protein. Thus, Fe^2+ and Zn^2+ ions might have some inhibitory role in the catalytic reaction by laccase as per Figure 1b.



1(a)



1(b)

Fig. QEI-17.1: Effect of metal ions on laccase activity

QEI-18: Comprehensive Mesta and Bimli Fibre Grading System

Dr. S. C. Saha & Mr. A. Sarkar

The aim of this project is to develop a comprehensive Mesta and Bimli fibre grading system. During the reported period, Mesta and Bimli fibres were collected from different states like, Tripura, Andhra Pradesh and West Bengal and their physical properties were tested. BIS introduced Mesta grading system in 1981 and Bimli grading system in 1986 with six and four grades respectively. In both the cases six physical parameters i.e., strength, root content, defects, fineness, colour and density are considered.

However, the above grading system is not in practice due to complex nature and some drawbacks. To simplify the grading system, we interact with farmers and industries people and this grading system decides its marketing strategy and efficient utilization.

Table QEI-18.1: Proposed grading table for Mesta Fibre

Grade	Strength	Defects	Root content by (Length %)	Colour	Fineness	Total Score
M-1	Very Good **25**	Free from major and minor defects but 10% minor defects may be allowed **25**	**(⩽ 6) 25**	V. Good **10**	Very Fine **15**	**100**
M-2	Good **20**	90% free from major defects but 20% minor defects may be allowed **18**	**(> 6 - ⩽ 10) 17**	V. Good **10**	Very Fine **15**	**80**
M-3	Good **20**	80% free from major defects and 30% minor defects may be allowed **13**	**(>10 - ⩽ 15) 10**	Good **7**	Fine **10**	**60**
M-4	Average **12**	70% free from major defects and 40% minor defects may be allowed **08**	**(>10 - ⩽ 15) 10**	Average **5**	Coarse **5**	**40**
M-5	Poor **5**	60% free from major defects **4**	(>15) **3**	Poor **3**	Coarse **5**	**20**
M-6	**All Mesta not conforming to any of the above grades but of commercial value**					

One workshop was organized at Vizianagaram, on 28th January, 2017 at the Agricultural Research Station auditorium, Vizianagaram, Andhra Pradesh for finalization of Mesta & Bimli Grading System. In the present project, the existing drawback has been eliminated and the proposed Mesta and Bimli grading are given Table 1 & 2.

Table QEI-18.2: Proposed grading table for BIMLI fibre						
Grade	**Strength**	**Defects**	**Root content by (Length %)**	**Colour**	**Fineness**	**Total Score**
B-1	Very Good **25**	Free from major and minor defects but 10% minor defects may be allowed **25**	**(⩽ 6) 25**	Good **10**	Very Fine **15**	**100**
B-2	Good **20**	90% free from major defects but 20% minor defects may be allowed **18**	**(> 6 - ⩽ 10) 17**	Average **5**	Very Fine **15**	**75**
B-3	Average **15**	80% free from major defects and 30% minor defects may be allowed **10**	**(>10 - ⩽ 15) 10**	Average **5**	Fine **10**	**50**
B-4	Poor **7**	70% free from major defects and 40% minor defects may be allowed **05**	**(>10 - ⩽ 15) 10**	Poor **3**	Coarse **5**	**25**
M-6	**All Mesta not conforming to any of the above grades but of commercial value**					

QEI 19: Development of technology for extraction and characterization of nanocellulose from jute caddies/ jute Stick

Dr. DP.Ray & Dr. RK.Ghosh

Lignocellulosic fibers have become the focus of scientists and technologists because of their tremendous advantages and now it is possible to isolate cellulose nanofibrils and nanowhiskers from various lignocellulosic wastes. Nanocrystalline cellulose (NCC) is typically a rigid rod-shaped monocrystalline cellulose domain (whisker) with 1–100 nm in dimension. NCC can be used in regenerative medicine optical application. The present project aims to develop nanocellulose from the low cost jute stick and jute caddies.

Collection of Jute waste and defatting

The Jute caddies were initially collected from NIRJAFT mill and jute sticks were collected from a market from Balagarh, Hooghly. The Jute caddies were screened initially for further treatment and the jute sticks were ground to particles.The jute caddies were defatted with alcohol: benzene solvent and were chopped into fine particles. The jute sticks were also defatted for further treatment.

Delignification of jute & estimation of alpha cellulose

The jute caddies and sticks were treated with textone solution for delignification. The delignified jute were washed properly and kept for overnight for drying. The holocellulose content of jute caddies and stick were determined on drying the delignified jute. The holocellulose content from jute caddies and sticks were 83 and 62%, respectively and they were subjected to alkali treatment (18% NaOH) to obtain alpha cellulose. The alpha cellulose was washed properly and dried for calculation of yield per percentage. The average alpha cellulose yield from jute caddies and sticks were 60 and 33%, respectively.

Jute caddies *Alpha cellulose*

Figure QEI-19.1: Conversion of jute caddies into alpha cellulose

National Level training Programme on "Production & retting technology of jute / mesta / ramie / sunnhemp including other related aspects" at ICAR-NIRJAFT

Mechanical Processing Division

PRIORITY AREAS OF RESEARCH

- Basic and applied research on mechanical processing, quality control and product development from ligno-cellulosic & long vegetable fibres
- Improvement of process, productivity & product quality; design & development of product, machinery & instrument; quality assessment on geo-textile, agro-textile, apparel, packaging, automotive and industrial textiles
- Skill development on development of jute and allied fibre based products.

ACHIEVEMENTS

- Portable hard fibre strength tester
- Lignin recovery from coconut retting liquor
- Apparel form pineapple leaf fibre
- Identification of class of dye for coconut fibre dyeing

MP -9: Development of expert system for analysis of defects of jute fabrics during inspection.

Mr. S.Das

Jute industry need, automatic real time quality control in order to avoid end products defects in a quick and efficient manner. The detection of faulty fabrics plays an important role in the success of any company. In past, many advances are made in developing automated and computerized systems to reduce cost and time whereas, increasing the efficiency of the process.

Figure MP-9.1: Demonstration of inspection table

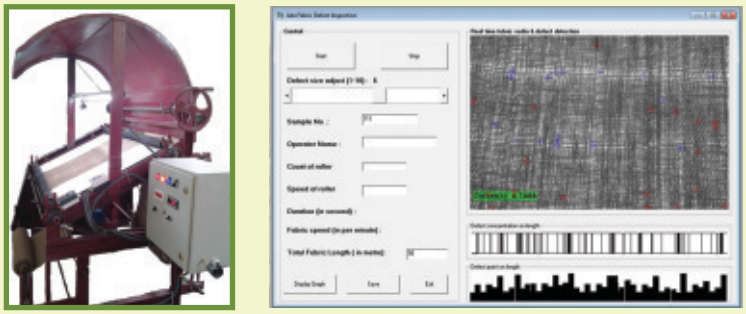


Figure MP-9.2: Inspection table with results display

Automatic inspection systems are designed to increase the accuracy, consistency and speed of the detection of defects in the manufacturing process of fabrics in order to reduce labour costs, improve product quality and increase manufacturing efficiency. The real time fabric defects defection software has been completed as per objective of this project.

Modification of software has been done for more accurate results to detect the defects on inspection table in real time. Modified defect concentration and defect point graph has been displayed for total capture length of fabric. Trial has been done using different type of jute fabric. Image processing and analysis has been done in real time of video for defect detection and calculates the defect percentage. Modified calculation has been done for the total image area, total all defective areas and it calculates the percentage of defective area. Models has been developed for defects for recognize the all defects. It is easy to identify faults on fabric images and process by using this method. This system is capable of detecting fabrics' defects with more accuracy and efficiency.

MP 10: Development of nonwoven fabrics from sunnhemp and banana fibres

Dr. S. Sengupta, Dr. S.Debnath & Sh. K.K. Banerjee

Needle punched nonwoven from sunnhemp and banana fibres and their physical, mechanical and performance properties were studied

.

Sunnhemp fibre (a) after extraction, *(b) after breaker card* *Banana fibre*

Figure MP-10.1: Fibre samples for nonwoven preparat.ion

The breaking energy, stress relaxation , creep , electrical resistance, thermal resistance and sound insulation of sunnhemp / banana nonwoven are increased with increase of GSM of nonwoven, due to better entanglement, while in nonwoven from blend of jute and PP inferred that it increases with addition to jute followed by PP possibly due to difference of breaking strength and elongation of fibre. In case of banana: jute blends it decreases due to earlier breakage of jute.

Sunnhemp nonwoven fabric

Banana nonwoven fabric

Figure MP-10.2: Needle punched nonwoven fabrics

The bending load increases of nonwoven increased with increase in gsm due to higher rigidity; while in comparison with PP blend and jute blend, it is lowest. The air permeability is decreased with increase of gsm while sectional air permeability of sunnhemp fabric decreases with addition of jute and increases with addition of PP. In case of Frictional force, there is no variation with change in gsm. Sunnhemp/PP blend or Sunnhemp/jute blend can be used as filter fabric, electrical insulation, thermal insulation and sound insulation. 100% Sunnhemp can be used as mulching fabric and packaging

MP 14 : Development of yarn from Indian Flax fibre for technical textiles

Dr. S.Debnath & Dr. G. Basu

The flax fibre is being imported from mostly Europe for development of linen-based cloth and fashion textiles. Being one of the largest producers of flax seed oil, the Indian flax fibre has not been explored to greater extent for textile application. This project may cover to some extent the research gap in this area of spinning of yarn from Indian flax fibre.

Dr. Sanjoy Debnath, P.I. of the project visited the Sunnhemp Research Station, Pratapgarh, U.P. during 26-27 July, 2016 and knew the current extraction process of the Indian flax fibre and procured 12 kg of decorticated flax fibre. The decorticated fibre contained lot of broken sticks and adhered with the fibres. These foreign particles need to be cleaned prior to spinning process. A manual

hackling system has been designed, fabricated and perfected and used for manual hackling of Indian flax fibre. These Indian flax fibres are processed through the manual hackling machine and the fibre yield (%) , stick content (%) and mean fibre length (inch) after 1st , 2nd & 3rd hackling are reported as 20, 18& 20; 9.3, 12.1, 80; and 30, 24 & 16 respectively.

Fibre fineness (gravimetric) at three different places i.e. root, middle & crop portion are 6.39, 5.23 & 4.57 tex respectively. The average fibre strength of single & bundle fibre are observed as 30 and 20 cN/tex respectively. Other fibre properties like surface and cross-sectional SEM, X-ray analysis are in progress. Four different flax yarn samples have been prepared in finer range of yarn count (113-114 tex). The yarn strength found to be considerable low (4.8-6.3 cN/tex) and decided to proceed with coarser count spinning in next phase of this project.

MP 15: Development of low area density jute non-woven fabric for carry bags

Dr. S. Sengupta, Sh. KK. Banerjee & Miss. P. Ghosh

Chemical modification of fibre

Five kg of jute fibre was scoured and two Kg of jute fibre was bleached with hydrogen per oxide for the preparation of cross laid pre-needled nonwoven fabric with the following process parameters. 9.5% Jute breaker card dropping; 3% Nonwoven card dropping, 0.28 m/min Feed conveyor speed; 550 GSM Feed in card; 19.9 m/min Card doffer surface speed; 20.6 m/min Cross lapper surface speed; 1 m/min Needling machine feed speed; 1.03 m/min Delivery speed; 220 punches/sq.cm Punch density; 13 mm needle penetration; 80GSM Pre-needled fabric weight; 22% Moisture content in feed material; 0.5% Batching oil and 8% Fabric GSM CV%. The pre-needled fabric has been processed in the adhesive bonded machine with pre-assigned parameters as impregnation-squeezing-drying-curing process

Construction details of samples for optimization

Selection of the useful limits of the variables

The useful limits of the three variables adhesive concentration, squeezing pressure and curing temperature were selected. The limits, actual and coded values of different factors are assigned.

Developing the design matrix

To determine the effects of the factors (variables) on the response parameter, it was decided to use the statistical technique called central composite surface design to develop the design matrix. The matrix so developed was a 20 point central composite design which

consists of a full factorial design 23 (8) plus 6 centre points and 6 star points The 20 experimental runs thus allowed the estimation of the linear, quadratic and two-way interactive effects of the various factors on properties. The design matrix so developed with coded values of the factors is given.

Table MP-15.1: The actual and coded values of different factors

Factors	Symbol	Code				
		-1.682	-1	0	+1	+1.682
Adhesive concentration, %	X_1	8	10.5	14	17.5	20
Squeezing pressure, Kg/cm2	X_2	10	11.6	14	16.4	18
Curing temperature, 0C	X_3	100	110	125	140	150

MP16: Development of interlinear/garment stiffener/filler from sunnhemp and banana nonwoven

Dr. S. Sengupta, Sh. K.K. Banerjee & Miss. P. Ghosh

Sunnhemp and banana fibre were treated with the following treatment in order to soften the fibres.

Treatment 1	-	Boiled in water for 15 minutes,
Treatment 2	-	Boiled in water with 1% nonionic detergent for 15 minutes,
Treatment 3	-	Treated with 1% NaOH solution for 15 minutes,
Treatment 4	-	Treated with 1% HCl solution for 15 minutes
Treatment 5	-	Treated with 0.5% Silicone softener for 15 minutes

All the treated fibres have been processed separately up to finisher card following the standard procedure. The fibre properties show lowest rigidity in treatment 2, fibre strength and elongation reduction in treatment 3 & 4, very low coefficient of friction in treatment 5. It is also found that there is almost no change in properties in boiling only (treatment 1). Therefore, treatment 2 has been selected for further study. It is found that treatment of sunnhemp fibre with 1% nonionic detergent under boil increases mean length by 13 mm, decreases mean fineness by 0.6 Tex and flexural modulus by 36 dynes/cm2.

Preparation of cross laid pre-needled nonwoven fabric and its optimization

Sunnhemp reeds are sprayed with castor oil emulsified in water and it is processed in the jute breaker card and finisher card. These fibres are fed to the conveyor of carding machine of nonwoven preparation and finally a pre-needled fabric has been made. This pre-

needled fabric is stacked in layers followed by needling by 25 gauge needles to get required g/m2 fabric. In this process, following parameters have been optimized individually based on ease in process-ability, waste generated and final quality in terms of irregularity. Cross laid pre-needled fibre sheet (around 100 m) from 65g/m2 has been prepared with 200 punches /cm2, 14 mm needle penetration and 25 gauge needle with optimized parameters.

Table MP-16.1: Particulars of spinning performance	
Jute card dropping, %	3.2
Finisher card sliver irregularity, cv%	1.2
Moisture in finisher card sliver, %	15.7
Average Fibre length (Finisher card sliver), mm	48.1
Fibre length range (Finisher card sliver), mm	11.5-107.2
Nonwoven card dropping, %	0.9
Irregularity in nonwoven card web area density, cv%	24.6
Irregularity in Pre-needled web area density, cv%	6.1

Preparation of Thermal bonded fabric

The statistical design has been made with 5 values of each independent variable namely, Temperature, pressure, blends percent. The significant independent variables of jute based polypropylene blended thermal bonded nonwoven with respect to different properties were identified & those variables are: Calendar roller temperature, Roller pressure and Polypropylene percent. The useful limits of the three variables were selected based on the literatures and from preliminary experiments.

Developing the design matrix

To determine the effects of the factors (variables) on the response parameter, it was decided to use the statistical technique called central composite surface design to develop the design matrix. The matrix so developed was a 20 point central composite design which consists of a full factorial design 23 (8) plus 6 centre points and 6 star points. All factors at the (0) level constitute the center points and combination of each factor either at its highest (+1.682) or lowest (-1.682) level with all other factors at the intermediate level constitutes the star points7. The 20 experimental runs thus allowed the estimation of the linear, quadratic and two-way interactive effects of the various factors on properties. The design matrix so developed with coded values of the factors and three samples has been prepared out of above twenty experiments

Chemical & Biochemical Processing Division

PRIORITY AREAS OF RESEARCH

- Basic and applied research on chemical/ biochemical processing, quality control and product development from ligno-cellulosic fibres
- Research on pulp & paper; bleaching, dyeing & finishing; particle & fibre board; composites from jute and allied fibres
- Nano technology and biomass utilization are also important areas of this division

ACHIEVEMENTS

- Process to prepare pulp for the sanitary napkins
- Methodology to develop tissue paper from jute by ASAM pulping process
- Development of union fabrics from cotton yarn and jute /banana blended yarn
- Functional finishing of cotton/ jute /banana blended fabric
- Technology to develop activated carbon from jute stick
- Process to remove acid and reactive dyes from effluent by activated carbon
- Methodology to develop jute: polyaniline based conductive polymer composite
- Methodology to prepare and apply chitosan: jasmine oil microcapsule for aroma finishing
- Process to develop jute nonwoven: unsaturated polyester resin based rigid composite

CBP-10 : Eco-friendly printing of jute with natural dyes

Dr S.N.Chattopadhyay , Dr. NC.Pan, Mr. A.Khan

Pre-treatment of jute fabric

During the period, grey jute fabric was treated with cellulase-xylanase enzyme combination (4% owf) in presence of non-ionic detergent and mild alkali at 60^0 C for 2 hrs, pH 7-9 followed by boiling for 30 min and souring using acetic acid. The bio sourced jute fabric was subsequently bleached by hot hydrogen peroxide bleaching process. Evaluation of bioscoured-bleached jute fabric revealed that the fabric becomes white and soft accompanied by small reduction of tensile properties.

Extraction , characterisation and printing of natural dyes

Natural dyes were extracted from manjistha, annatto, babool and ratanjot by aqueous

method, filtered, dried in hot sand bath and the yield was 12, 30, 25 & 12% respectively. Bleached jute fabric was mordanted by myrobolan and potash alum separately and also sequentially (double mordanting) as per following code:

A- Bio-scoured – bleached jute fabric; B : Bio-scoured – bleached – potash alum mordanted; C : Bio-scoured – bleached – myrobolan mordanted ; D : Bio-scoured – bleached – double mordanted with myrobolan and potash alum.

The control and mordanted jute fabrics were printed with printing paste from ratanjot and babool using different natural gums like guar gum, sodium alginate, gum arabic and gum indulca. Urea was used as hygroscopic agent in all the cases. Printing was done using substantive screen printing method , dried in air, steamed for 30 min at 1000C followed by soaping and washing. All these samples were evaluated for their K/S and fastness properties.

Table CBP-10.1: K/S value of printed jute fabric with naturals dyes in different thickener

Dye→	Ratanjot				Babool			
Thickener →	Guar gum	Gum indulca	Sodium alginate	Gum arabic	Guar gum	Gum indulca	Sodium alginate	Gum arabic
A	3.4	3.7	2.7	1.6	6.6	1.6	4.3	1.2
B	8.4	8.1	3.9	1.5	7.3	2.3	5.0	1.5
C	7.1	12.5	6.7	6.1	9.5	5.4	5.4	4.3
D	15.7	13.1	11.6	8.5	13.5	6.1	7.9	5.7

Results clearly indicated that colour yield of the print produced by guar gum as thickener is high while it is low in case of gum Arabic. Wash fastness is found to be best in case of prints using sodium alginate as thickener (>4) and rubbing fastness is good (>4) in all the cases. Overall performance of the prints using guar gum is very good.

In all the cases double mordanted fabric shows the best result. This may be attributed to the interaction of natural dyes with mordants resulting in improvement in colour strength and fixation of colour onto the fabric. Both the wash and rubbing fastness is best in case of double mordanted jute fabric.

Pigment printing

Bioscoured-bleached-potash alum mordanted jute fabrics were used for pigment printing. The print paste were prepared using guar gum (12%, owf), urea (4%), Diammonium phosphate (1.2%), Binder (12%), dye (4%). After printing, the fabrics were dried in air and cured at 1200C for 30 min using steamer, washed and soaped. The K/S value of jute fabric printed with manjistha, annatto, babool and ratanjot using pigment printing method are

4.5, 2.0, 2.3 & 7.2 respectively and manjistha & babool and annatto & ratanjot combination gave 4.1 & 7.1 respectively. However, the washing fastnesses (2-3 to 3-4) and rubbing fastness (3-4 to 4) of all printed samples are lower natural thickener based printing.

Conclusion

- Colour yield and fastness properties are better in case of printing on bio-scoured & double mordanted jute fabric than other samples.
- Guar gum based printing paste produces the best printing effect with respect to colour yield as well as fastness characteristics on jute fabric.
- Gum Arabic based printing paste yields poor result
- Wet and dry rubbing fastness are excellent in case of manjista dye printed jute fabric , while it is good in annatto and ratanjot

CBP-11 : Development of jute pulp for making tissue paper and sanitary napkin

Dr SN.Chattopadhyay , Dr RK.Ghosh & Sh S.Bhowmick

During this period, sanitary napkins were produced using the super absorbent pulp produced in the institute with the help of SHG named Sampriti Mahila Mahasangha. Amta, Howrah and Nari-O-Sishu Kalyan Kendra. Panchla, Howrah. Sanitary napkins were then evaluated and compared with the commercial samples available in the market. The samples produced from the jute pulp perform well and better than that obtained from commercial samples. These samples were used for field trial and a survey undertaken using a structured Questionnaire. The samples, along with a questionnaire were distributed in two locations i.e. one set of samples was distributed to 56 adolescent girls in Bauria, Howrah (in Nari O Shishu Shiksha Kendra) and another set of samples were given to 39 students in Bongabari, Purulia II Block, Purulia (in Sathi Production Centre).

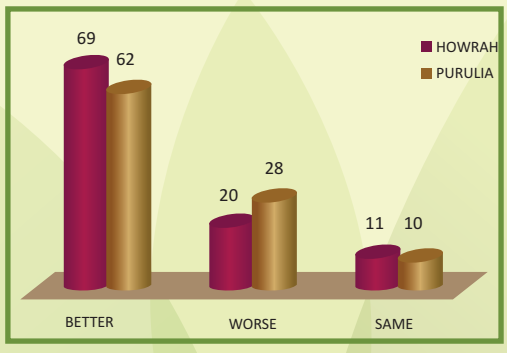


Figure CBP-11.1: Performance of the Sample Napkins vis-à-vis napkins used at present (%)

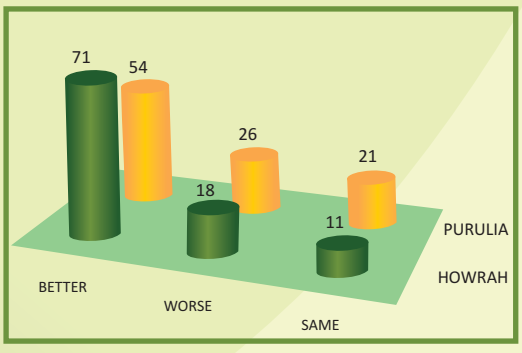


Figure CBP-11.2: Absorbency power of the sample napkins (%)

Regarding performance of the sample napkins as compared to the napkins used at present, the findings bring out almost similar scenario for Howrah and Purulia. While 84% of respondents in Howrah report that the sample napkins are better, this percentage in Purulia is slightly lower. The majority of the respondents felt that the absorbency power of the sample napkins is superior to market napkins and the percentage is marginally lower in Purulia than in Howrah.

In order to produce tissue paper from jute high chemical high temperature alkaline sulphite anthraquinone methanol (ASAM) pulp was produced. The yield of the pulp is 57% , whiteness index is 88 and the proportion of cellulose , holocellulose and lignin are 87.5, 94.4 & 1.45% respectively. After bleaching of the pulp, it is beated and then passed through the firer fractionator. The length (9.4mm) and diameter (0.13mm) of the pulp fibre is homogenized after the process and the pulp with length (6.7mm) and diameter (0.07mm) is used for making tissue paper in the vat and the properties were tabulated

Table CBP-11.1: Properties of tissue paper		
Parameters	**Tissue paper A**	**Tissue paper B**
Areal density (g/m2)	15.9	25.3
Thickness(μ)	76.2	115.8
Tensile Index (Nm/g)	9.66	9.12
BLM (M)	1509	1423
Absorbency (mm/4 min)	76	80
Tear (g)	10.2 / 12.6	4.7 / 5.2
Whiteness Index	73.90	67.23

Conclusions

- A pulp produced by low chemical ASAM process produces quality white pulp after bleaching. Pulping by open digestion following alkaline sulphite- anthraquinone process also produces good yield and white pulp after bleaching.
- The properties of napkins produced from these pulps are good and their performance in the field trial is satisfactory.
- Infrastructural facility for preparation of tissue paper has been created. Tissue papers have been produced from full chemical ASAM pulps.

CBP 12: Preparation of activated carbon from jute sticks by chemical activation

Dr. RK. Ghosh & Dr. DP. Ray

The global demand for activated carbon is expected to rise 10.3% annually through 2016 to 1.9 million metric tons. Due the expanding nature of the global activated carbon market, the source of raw material has gained severe attention. The conventional raw material for activated carbon is wood, however, global concern of deforestation and environmental sustainability has severely affected and the availability of wood is facing a serious challenge. In search of a new source of activated carbon, for the first time, jute stick biomass (JSB) has been explored in the present project.

Activation of HCl treated JSB

Under atmospheric condition for HCl, %C yield varied from 7% (in control) to 25.4%. Whereas, under inert condition, %C yield of ranged from 22-24% with respect to the biomass (dry weight basis). %C yield did not showed significant increase with the increase in the addition of HCl with respect to control.

Activation of $ZnCl_2$ treated JSB

Under inert condition for $ZnCl_2$, addition of chemical agents (from 100:1 to 2:1) increased the %C yield from 46% to 56% with respect to control (22%) and maximum yield of 56.2% was observed at 2:1 amount of chemical agent. The data analysis revealed that $ZnCl_2$ activation in N_2 decreased the loss of biomass from 78% (control) to 43.8% (at 2:1 ratio) which indirectly indicated higher trapping rate of C from loss. The chemically modified JSB was subjected to 1 h combustion at 450 ^{0}C under atmospheric and inert (N_2) condition in a muffle furnace. The product was washed with water till the pH attains neutrality (6.9-7.2), then oven dried at 105°C for 5 hours and stored for further use.

Activation of H_3PO_4 treated JSB visa via other biomass

One treatment of H_3PO_4 (N_2) was applied to other biomasses namely, coconut shell, bamboo, wood (*Mangifera indica*) and JSB. The total carbon content of the biomasses were 46.6, 45.8, 46.4 and 39.8% for coconut shell, bamboo, wood (*Mangifera indica*) and JSB, respectively (Figure CBP-12.1). Whereas, the order of % activated C yield was Coconut shell (54.6%)> wood (53%)> Bamboo (46.9%) ≥ Jute stick (46.7%).

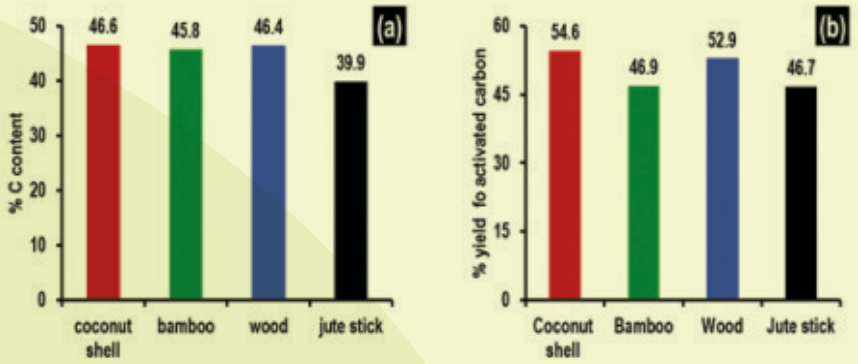


Figure CBP-12.1: Carbon content (a) and %yield of activated carbon (b) from various biomasses

Characterization of activated carbons

Infrared spectroscopy of the powdered samples was tested for functional group analysis by FTIR (Figure CBP-12.2). The pHs of all H_3PO_4 treated samples were in the range of neutrality.

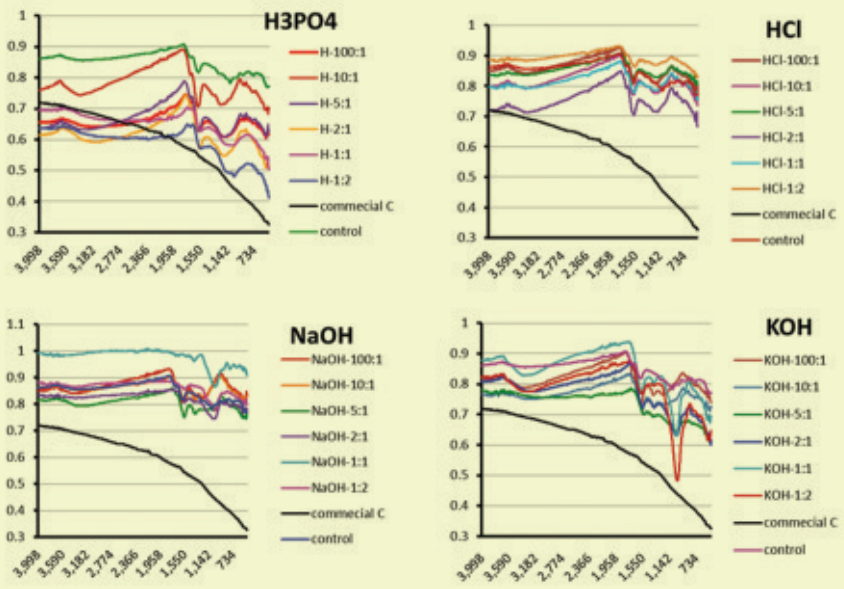


Figure CBP-12.2: FTIR spectra of various activated carbon products

The moisture content varied from 13-32% as compared to the 30% of commercial activated carbon. The EC & ash content experiments are in progress. The BET surface area (m^2/g) varied from 370-1500 for H_3PO_4 treated products as compared to the untreated (90 m^2/g) and commercial activated carbon (1000 m^2/g). The surface area of some products were compared with some reported literature and some commercial products. pH of KOH and NaOH treated samples were in the range of neutrality. The moisture content% varied from 15-29% as compared to the 30% of commercial activated carbon. The EC & ash content experiments are in progress. The BET surface area (m^2/g) varied from 65-500 and 260-390 for KOH and NaOH treated products, respectively, as compared to the untreated (90 m^2/g) and commercial activated carbon (1000 m^2/g).

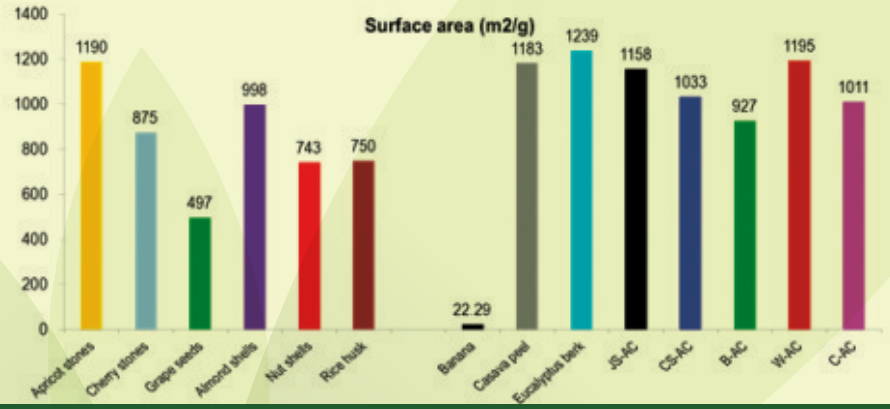


Figure CBP-12.3: BET analysis of various activated carbon products
(coconut shell activated carbon=CS-AC, bamboo activated carbon= B-AC, wood activated carbon= W-AC, jute stick activated carbon= JS-AC, Commercial activated carbon= C-AC)

The BET surface area varied from 250-600 (m^2/g) for HCl treated products as compared to the untreated (90 m^2/g) and commercial activated carbon (1000 m^2/g). The %O contents were 14-69 and 72% for treatments and commercial carbon, respectively

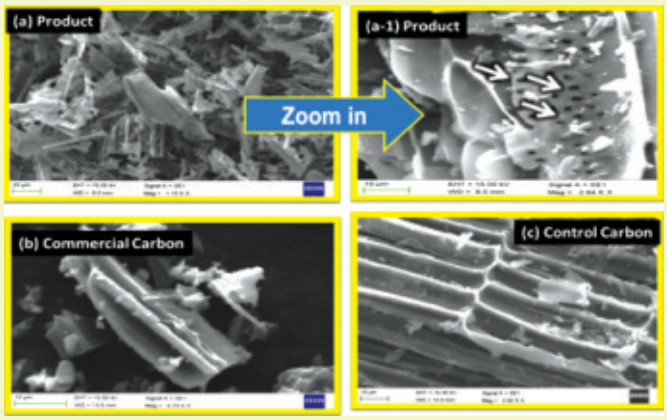


Figure CBP-12.4: SEM images of (a) Product, (a-1) holes in carbon layer, (b) commercial carbon (c) control carbon

Removal of an acid and basic dye from aqueous medium

An acid dye (Acid red 1) and a basic dye (methelene blue) removal capacity was investigated at SRL= 1g/Lt, time= 3h, rpm= 200 at 500 ppm contamination. The matrix was centrifuged at 7000 rpm and supernatant was analysed at 535 / 665 nm for dye concentration. The dye removal varied from 63-78% as compared 51% of a commercial activated carbon. Q_{max} of 395 g/g was observed for a product as compared to 258 g/g of a commercial activated carbon. The basic dye removal varied from 50-85% as compared 60% of a commercial activated carbon. Q_{max} of 420 g/g was observed for a product as compared to 320 g/g of a commercial activated carbon. Methylene Blue (basic dye) removal capacity order: H_3PO_4-Carbon (420 g/g) > Commercial Carbon (320 g/g)> $ZnCl_2$-Carbon (97 g/g). The order of MB removal efficiency of activated carbons derived rom different biomasses was Jute stick carbon (58%)> wood carbon (49) ≥ coconut shell carbon (48)> bamboo carbon (35%).

CBP 13: Jute based conductive polymer composite for electromagnetic shielding

Dr. L.Ammayappan & Dr. G.Roy

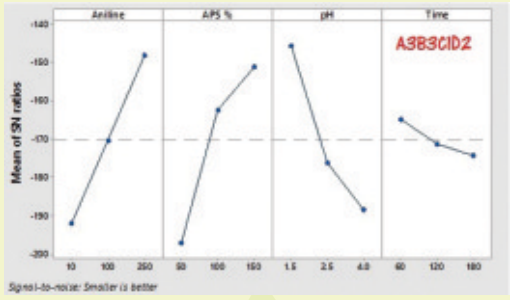
Conductive textiles are produced from metallic fibers and they are difficult to process. Conductive polymer composites (CPC) have been introduced by using Polyaniline (PANI). Smart textile is one of the important technical textile and conductive polymers are widely applied to impart electric functionality. Literature information on development of

jute based PANI polymer composite for electromagnetic shielding is still scanty.

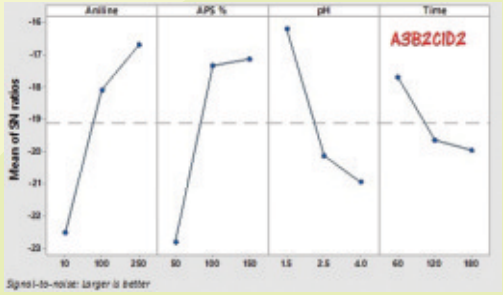
Optimisation of PANI coating on jute fabric

Coating of polyaniline was applied using orthogonal array and optimised by Taguchi model using Mintab 17 statistical software. In this process, freshly distilled 10, 100 & 250 mM aniline (A1, A2 & A3) treated with jute fabric sample at different pH (1.5, 2.5 & 4.0; B1, B2 & B3) at 25°C for 2 hour. 10, 100 & 250 mM ammonium per sulfate (C1, C2 & C3)was then added to initiate the polymerization reaction and polymerization reaction was carried out at 5°C for different duration (60, 120 & 180 minutes; (D1, D2 & D3)). After polymerization, the polyaniline (PANI) coated fabric was taken out and washed in ethanol solution acid and dried at ambient condition. All PANI coated jute fabrics were evaluated for their surface resistivity (MΩ.cm), surface roughness (μ) through AFM and nitrogen content (atomic %) through SEM-EDX.

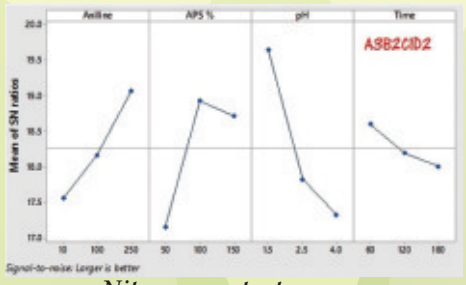
To optimize the coating condition, Sound to Noise (S/N) ratio for each experiment was evaluated according to the condition "higher the better" or "lower the better (surface resistivity)". For each factors, the level corresponding to the highest S/N ratio was chosen as optimum level. The surface resistivity, surface roughness and nitrogen content of the control jute fabric are 456 MΩ.cm, 0.058μ and 0.42% respectively. After coating with polyaniline, the values are improved significantly.



Surface resistivity



Surface roughness



Nitrogen content

Influencing Rank			
Factor	Surface Resistivity	Surface roughness	Nitrogen conten
Aniline Conc	2	1	3
APS (%)	1	2	2
pH	3	3	1
Time	4	4	4

Influencing factors

Figure CBP-13.1. Effect of different variable on the performance of PANI on jute fabric

As per Taguchi model the optimized condition are given below: with respect to surface resistivity, A3B3C1D2; with respect to surface roughness and nitrogen content A3B2C1D2. A3B2C1D2 condition gave surface resistivity, surface roughness and nitrogen content of 2 MΩ.cm, 0.227μ and 11.4% respectively. As per data analysis as per Taguchi model the above values are matched with the predicted values. It is concluded that, the A3B2C1D2 (*250 mM aniline, 250 mM ammonium persulphate, 1.5 pH for 120 minutes*) condition would be optimum condition for in-situ polymerization of aniline on jute fabric

Effect of PANI concentration

Polyaniline was coated on non-ionic treated jute fabric (twill weave construction) in three different concentrations (10, 100 & 250 mM) and their dieletric resistivities were evaluated (kV/mm). It is noted that increase in the concentration of PANI on the jute fabric, there will be decrease in dielectric strength due to conductivity property of PANI from 2.962 to 2.430 kV/mm. The reduction of dielectric strength is in the range from 33 to 45% in comparison with untreated jute fabric (4.453 kV/mm)

Effect of weave pattern

Polyaniline was coated on non-ionic treated jute fabric with plain, twill & satin weave construction in two different concentration and their surface resistivity were evaluated (KΩ.cm) . It is revealed that due to the presence of long floats in twill and satin weaves , the yarn have continuous and more polymer deposition on its surface than plain weave, so these fabrics showed lesser surface resistivity (2.3 & 1.8 KΩ.cm) than plain weave fabric (6.8 KΩ.cm) at 250 mM PANI.

Effect of prior metal nanoparticle coating

Silver nanoparticle in four different concentrations (5, 10, 50 & 100 mM) was coated on the non-ionic treated jute fibre by insitu synthesis method. Subsequently polyaniline was coated in three different concentrations (50, 100 & 250 mM) on the silver nano particle coated jute fabric. After coating, the silver nanoparticle cum PANI coated jute fabrics were evaluated by K/S value, FTIR and surface resistivity (KΩ.cm). It is inferred that silver nanoparticles act as conductive junctions between the PANI chains on the surface of the jute fabric, so that there is reduction in the surface resistivity of the jute fabric. The rate of reduction in surface resistivity is higher in 50 and 100 mM silver nanoparticle coating than <10 mM concentration. Silver nanoparticle coating is further reduced the surface resistivity of the PANI coated jute fabric from $2.1x10^3$ Ohm.cm to $1.4x10^3$ Ohm.cm

CBP 14: Modification of yak fibre for making it suitable for blended yarn production in jute spinning system

Dr. KK. Samanta, Dr AN. Roy, Sh. K. Patra & Sh. K. Mitra

Yak hair, a specialty luxury animal fibre, is mainly produced by the China and Mongolia. The fibre is mostly available in three different fineness namely fine/down, coarser/guard and middle type fibres. The down fibre i.e. the finest fibre with diameter of 16-20 microns and length of 35-50 mm is used for shawl making. The middle type (20-50 μ) fibre naturally strong, but not stronger than the outer layers is mostly utilized in making ropes and tents. The coarse grade fibre (79-90μ) forms the outer coat of long hair and characterizes the appearance of yak animal and mostly used by nomads in tent making. The use of such coarser guard yak fibre for textile application has not been reported. Also the report on blending yak hair fibre (fine or coarser) with jute fibre for the development of fashionable yarn or fabric in jute spinning system has not been reported.

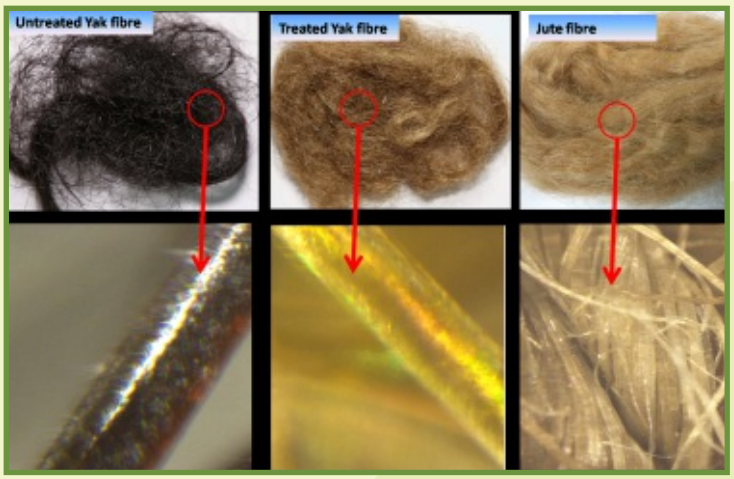


Figure CBP-14.1: Untreated and chemical treated yak fibres and jute fibre

Modification of yak fibres and its colour measurement

The black colour coarser grade (guard) yak fibre was collected from ICAR- National Research Centre on Yak. The fibre was initially scoured with non-ionic soap and sodium carbonate solution at 60°C followed by chemical modification. The scouring loss is 4% mainly due to removal of foreign materials/impurities. It was found that untreated sample has a moisture regain value of 15.6% and it improved marginally to 16.5% after scouring and bleaching. Untreated sample (as received) has linear density of 9.3 tex and there was no change upon scouring.

However, the linear density was found to gradually reduce in successive chemical treatment. As a result of this, linear density reduced from 9.3 to 8.0 Tex. The strength of the fibre was also found to reduce due to chemical treatment. Fibre length was reduced from 18.5 cm to 11.2 cm; however 11.2 cm fibre length is sufficient for production of jute/yak fibres blended yarn in jute spinning machine system. There was approximately 18% reduction in the braking load for chemical modified sample.

Majority of yak fibre is available with natural black colour and other colours of yak fibres are brown (16.9%), blue (8.9%) and white (5.7%). The inherent black colour of yak hair appears due to presence of melanin pigment. In our study, coarser black yak fibre was selected for chemical modification in order to develop desired fibre's surface co-efficient of friction and also to produce colour alike to jute fibre.

Table CBP-14.1: Colour values of different yak and jute fibres

Different colour parameters	Untreated yak fibre	Treated yak fibre	Jute fibre
K/S	24.3	10.3	3.24
L*	25.3	41.4	59.3
a*	1.4	8.0	10.3
b*	0.67	21.4	24.9
C*	1.6	22.8	27.0
H*	24.7	69.4	67.3

Figure CBP-14.1 shows black colour untreated yak fibre after modification in alkaline medium, its colour changed to yellowish brown (golden) similar to colour of raw jute fibre. Spectroscopic reflectance spectrum of the different yak fibres was measured at λmax of 420 nm. The untreated sample produces the least reflectance percentage and after oxidative bleaching, sample reflectance percentage was improved noticeably.

Jute: Yak fibre (50/50) blended yarn *Jute: Yak fibre (50/50) blended yarn based plain weave fabric*

Figure CBP-14.2: Different Jute: Yak fibre blended products

Due to lowest of reflectance value came from the unmodified black hair sample, it showed lowest L* value and highest K/S value of 24.3. Sample after chemical modification, the whiteness/brightness value profoundly increased to 41.4, resulting 64% enhancement in comparison to control sample. More interestingly a* value increased from 1.4 to 8.0 in untreated to treated samples, respectively that is very closer to the a* value of jute fibre. Similarly, b* value was significantly improved with bleaching.

EDX chemical analysis of yak fibres

Yak fibre being a protein polymer is composed of carbon(c), oxygen (O), nitrogen (N), sulphur (S) and hydrogen (H) elements. Untreated sample has 58.3% carbon, which reduced to 51.5 after chemical treatment. It is important to note that the oxygen percentage increased steadily from 20.8% to 31.1% due to hydrophilic nature of yak hair by chemical modification. An untreated yak hair has 2.3% sulphur and it significantly decreased to 1.3 after modification.

Jute/yak fibres blended yarn and fabric

Jute/yak fibres blended yarn of 8 pound was spun from the coarser black colour yak and jute fibres (50:50) in jute spinning system. Similarly blended yarn from jute and chemically modified yak (25:75) fibres was spun in jute yarn spinning system. Tenacity and tensile strain at break of the 50:50 & 25:75 jute/yak fibre blended yarn were 5.1 & 3.4 cN/tex and 1.1 & 1.9%, respectively. The 50:50 jute/yak fibres blended yarn was finally converted into 1×1 plain woven fabric.

CBP 15: Sustainable flame retardant finishing of jute and jute-cotton fabrics using plant extracts

Dr. KK. Samanta, Dr. SN. Chattopadhyay & Sh. K. Patra

Cellulosic and protein fibre based textiles are mostly used in apparels and home-furnishing applications. For apparel textile, natural fibres are preferred, however due to their low limiting oxygen index they catch flame readily and burn vigorously in an open atmosphere. Jute possesses the LOI value of 21 and so its application in upholstery and home furnishing is limited. Works have been carried by using various inorganic salts and commercially available synthetic chemicals to impart flame retardant property in textile. In this direction, applications of banana pseudo stem sap (BPS) for flame retardant finishing of jute fabric is attempted for development as sustainable finishing.

Flame retardant finishing of jute and its thermal analysis

Jute fabric was scoured by conventional method and bleached with hydrogen peroxide. Banana pseudo stem sap (BPS) was extracted from the banana stem using sap extraction machine. Density of banana pseudo stem sap (BPS) was.012 g/cc and it contains 4.5% solid ingredient. BPS was applied on unbleached fabric before and after mordanting process. After application, the limiting oxygen index (LOI) value of fabric increased from 22 to 30 and 34 with respect to only BPS treated and mordanted-BPS treated samples.

Table CBP-15.1: Thermal properties of untreated and BPS treated jute fabrics

Sample	Parameters	Control fabric	Only BPS treated	Mordant + BPS treated
Unbleached Fabric	LOI	22	30	34
	Burning with flame time (s)	62	0	0
	Burning with afterglow time (s)	0	1275	1360
Bleached Fabrics)	LOI	21	29-30	30
	Burning with flame time (s)	57 s	0 s	0 s

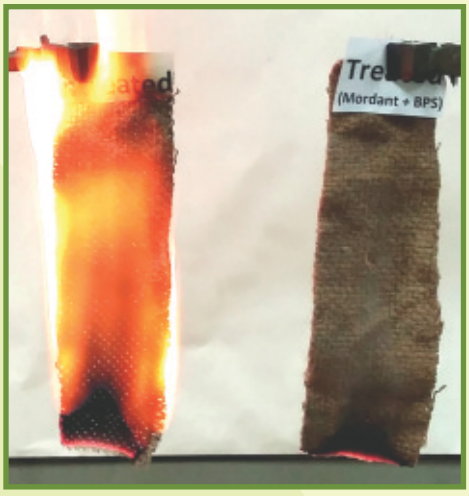


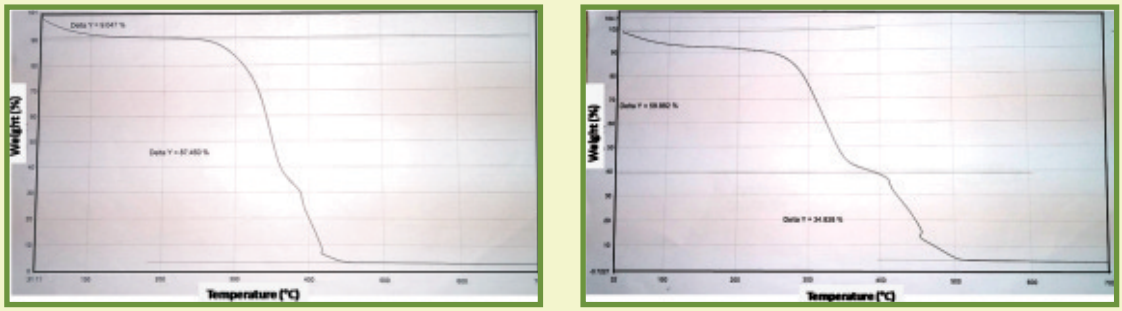
Figure CBP-15.1: Burning behaviour of untreated and BPS treated jute fabrics

Thermogravimetry analysis (TGA)

Thermogravimetry study of the untreated and the BPS-treated jute fabrics were studied as TGA spectra (Figure CBP-15.2). The TGA curve of the control sample depicts three stages of mass loss i.e, initial loss at temperature below 200°C, due to the removal of bound and unbound absorbed moisture. The main pyrolysis occurred in the temperature range 260–500 °C through dehydration and char formation. The BPS-treated jute fabric showed the onset of thermal degradation at 230°C, which is significantly lower than the

degradation temperature of untreated sample.

In the third stage, the treated fabric started char formation and the quantity of char residue was higher than control sample till 500 °C. It is also seen that untreated sample loses its 80% mass within 400°C, whereas the treated sample loses only 60% of mass below 400 °C that signifies the thermal stability of BPS treated jute sample.



Untreated jute fibre *BPS treated jute fibre*

Figure CBP-15.2 : TGA spectra of different jute fibres

Chemical analysis

Inductively-coupled-plasma atomic-emission-spectroscopy (ICP-AES) of the liquid banana sap extracted from its pseudostem was analyzed. It showed the presence of six major metal elements such as Ca (30ppm), K (1376ppm), Mg (106ppm), Na (57ppm), P (59ppm) and Si (11ppm). These metals are present in the BPS as metal oxide/ metal chloride and they are responsible for the improvement in thermal stability of jute fabric. Similar result was also seen in energy dispersive X-ray (EDX) elemental analysis, where the BPS treated jute fabrics showed the presence of magnesium (Mg), silicone (Si), phosphorus (P), iron (Fe), sodium (Na), calcium (Ca) and potassium (K).

CBP 16: Aroma Finishing of Jute Textiles

Dr. NC.Pan, Dr. L.Ammayappan & Mr. A.Khan

Pre-treatment of jute fabric and its evaluation

Grey jute fabric with 260 Tex warp, 250 Tex weft, 60 ends/dm, 52 picks/dm and 250 g/m_2 GSM was used for this study. Raw jute fabric was scoured and then bleached with hydrogen peroxide as per conventional method. It is inferred that raw jute fabric has less than 50 whiteness index with high yellowness index, while after peroxide bleaching, the whiteness index is significantly improved from 49 to 81. It is due to removal of added and natural impurities by the alkaline scouring and subsequent de-colouration of natural

colouring matters. Intermittent acidic treatment can also demineralised the minerals present in the jute fibre. The physical properties of different jute fabrics inferred that scouring and bleaching decrease the GSM of the scoured/ bleached jute fabric and are mainly responsible for the drastic reduction in the bending modulus and flexural rigidity. The reduction of bending modulus due to scouring and bleaching on jute fabric as well as respective flexural rigidity are @ 63, 81% ; 63, 74% respectively. Bleached jute fibre also makes the jute fibre finer than grey state and so the dissipation of tensile load in each ultimate cell is more. This factor is responsible for the reduction in tenacity of the jute fabric after scouring and bleaching @ 6 and 16% respectively. Bleached jute fabric was dyed separately with the following reactive dyes Amactive Orange H2R, Procion Green HE4BD and Procion Golden Yellow HER as per conventional method and they showed K/S value of 19.7, 27.2 & 26.9 respectively.

Aroma finishing of jute fabric by conventional method

Jasmine oil was selected as aroma and 2% Jasmine oil and it was applied on dyed jute fabric by exhaustion method (30°C / 30 minutes) , pad (100% expression) →dry (RT 4 hour) →cure (70°C/5 minutes) method and spraying method. It is found that aroma sustained up to 24-36 hours in an open atmospheric condition and after one hand wash, aroma was removed

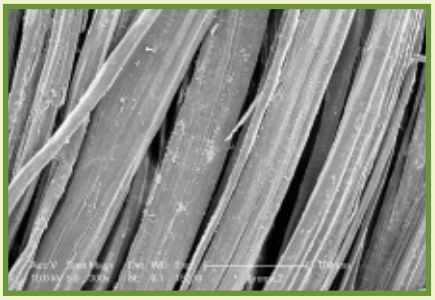
Preparation of microcapsules and its characterization

The preparation of chitosan mediated microcapsules for jasmine oil was carried as per the following procedure. 2 ml of jasmine oil was added in 20 ml of 0.5 wt% chitosan solution along with 0.5 wt% of non-ionic surfactant and the solution was stirred at 700 rpm for 10 minutes. The emulsion was dripped into solutions containing 1% of NaOH solution and stirred at 100 rpm for 10 minutes and kept idle for 30 minutes. The solution was then filtered, washed three times with distilled water and dried at 30°C for a period of 15 hours in order to remove any remaining water.

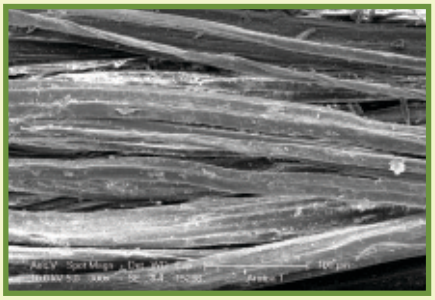
After preparation, it is observed that these microcapsules are in non-spherical shape with a rough surface. Microscope photo shows the presence of small pores in the Chitosan walls which allow the controlled release of the encapsulated jasmine oil. The release kinetics experiments were conducted to measure the release rate of the encapsulated substance in comparison with aroma jasmine oil. As expected, jasmine oil showed higher volatility (82%) than microcapsules (15%). The results inferred that Chitosan can potential to release the jasmine gradually.

Aroma finishing

10 gpl microcapsule stock solutions was applied on bleached and dyed jute fabric by pad (95 ± 5 % expression) → dry (70°C for 10 minutes) method and they were assessed by subjective assessment method, washing durability (AATCC 61(2A)-1996), SEM study and whiteness index (HUNTER). Bleached jute fabric does not have any odour / aroma due to removal of the added and adhered impurities from the jute fabric during alkaline peroxide bleaching process (0.8). After aroma finishing, obviously all judges gave excellent grade to finished jute fabric (8.9), while after 5 washes the aroma grade (1.4) is significantly reduced.



CHT:JO microcapsule applied jute fibre



CHT:JO microcapsule applied jute fibre after five domestic washes

Figure CBP-16.1: SEM photographs of jute fibres

After 5 home laundering washes, judges felt that only residual aroma was available in the jute fabric. Figure CBP-16.1 confirmed that uniform coating of chitosan: jasmine oil (CHT:JO) microcapsules on the surface of the jute fibre. However after home laundering, microcapsules were discharged from the surface of the jute fibre. Results revealed that this aroma finish could sustain in the open atmospheric condition for one week. Since the adsorption of microcapsule on the surface of the jute fibre mainly depends on the interaction between the shell polymer (Chitosan) and the functional groups of the jute fibre

Achievements

- Chitosan: Jasmine oil based microcapsule has been prepared by coacervation method
- Methodology to apply Chitosan: Jasmine oil based microcapsule on bleached and dyed jute fabric has been developed
- Aroma existed on the jute fabric up to five repeated home laundering

CBP 17 Development of jute based composite products

Dr. L.Ammayappan & Sh. K.Patra

Jute fibre has desirable properties for reinforcement like impact strength and specific

strength for the development of composites. Literature information on the development of moulded products from jute non-woven with high fibre load and low void content is still scanty.

Preparation and characterisation of jute nonwoven fabric

Tossa jute of grade TD3 was processed in the jute spinning system to form a sliver and then fed to Dilo nonwoven plant with 100 punches/cm^2 and 10 mm needle penetration and formed cross-laid nonwoven fabrics with area density of 150, 200, 300 and 400 GSM. Bulk density and porosity (%) of the jute nonwoven were evaluated. It is noted that the bulk density of the nonwoven fabric is ranged from 0.106 to 0.181 and is increased with increase in area density and also ultimately reduced the porosity from 89.4% to 81.2%. The porosity may helps to improve the flow and diffusion of viscous resin during preparation of the composite.

Preparation of jute nonwoven fabric based composite

Jute nonwoven fabric of four different area density (150, 200, 300, & 400 GSM) in three different layers (3, 4 & 5) were used to prepare composite sheet with unsaturated polyester resin by hand laying cum compression moulding method. All composite samples were conditioned at standard testing conditions and tensile strength (ASTM D-3039), three-point bending for flexural strength (ASTM D7264 / D7264M-07) , inter-laminar shear strength (ASTM D2344-76) , fibre loading (%), density, void content (%) were evaluated.

Characterisation of jute nonwoven fabric based composite

The tensile strength, tensile modulus and flexural strength of the composite is ranged from 41.5 to 55.2 MPa; 4.10 to 5.15 GPa and 53.4 to 86.3 MPa respectively. Tensile strength results inferred that it is increased with increase in area density of the nonwoven; however it decreased with increase in number of layers with respect to each area density. The same trend is observed in tensile modulus and flexural strength, however inter-laminar shear strength showed different trend. ILSS of composite is ranged from 6.1 to 9.5 N/mm^2 and is increased with increase in number of layer from 3 to 4 layers and then decreased from 4 to 5 layers. It is revealed that increase in the number of layers will increase the fibre to fibre contacts and so it may reduced the contact points for the efficient stress transfer between matrix resin and fibre reinforcement.

Optimisation

From mechanical properties and amount of void content, jute nonwoven fabric based composite made from 300 GSM area density with three layers has been selected as

optimum level since it showed better mechanical properties than other composites. It showed 22.8 % fibre loading, 53 MPa Tensile Strength, 85 MPa Flexural Strength, 8 N/mm^2 ILSS, 1.263 g/cm^3 density and 8.2% void content and theses values are higher than the respective values of other composite samples

Nanoparticle finished jute based home textiles

Demonstration on pulping to farmers

Demonstration of biocomposite preparation to trainees

Transfer of Technology Division

PRIORITY AREAS OF RESEARCH

- To transfer institute's technologies, develop entrepreneurship providing technical training and capacity building, arrange front line demonstrations and participate in different exhibitions, fairs and mela for promoting the developed technologies.
- To develop the project profile of viable technologies and rendering technical assistance for incubators.

ACHIEVEMENTS

- Field level demonstrations =17
- Participatory technology development cum training programs =2
- NFSM sponsored training programs =3
- Self-sponsored training programs =4
- Training programs under NEH component =1
- Scientists-Farmers interface =2
- Training programs on JDP =5
- Participation in exhibition =14

TOT 8 :Design, development and dissemination of jute based decorative fabric

Dr. AN.Roy, Dr. SB.Roy & Shri K. Mitra

During this year, a bulk scale production of jute based fancy decorative fabric has been made. Weight of these fabrics ranged between 100 and 150 GSM. Jute fibre content in all these fabrics ranged between 60% and 80%. Cost of these fabrics ranged between Rs.103/= (Power-loom) to Rs. 170/= (Hand-loom) per linear meter of 48 inches width. The above cost is true in case of powerloom fabrics of check of stripe design and handloom fabric of weft or extra weft of one colour only.

10 different products have been developed out of these fabrics. Costing of these products was made in consultation with the JDP manufacturers and weavers. Out of these, three products have been selected for bulk production. Cost analysis of these products has been made. Test marketing has also been made through Institute 'Sales cum Product Display Counter' and entrepreneurs/JDP manufacturers. Two MOA has been signed for transfer of

these technologies– one for commercialization of 'Jute/Matt stick fabric woven in handloom' and another on 'Jute union fabric for garments'.

Shawls made from jute yarn

Jute-matt stick products

Figure TOT-8.1: Products from jute based decorative fabrics

TOT 9: Comparative evaluation of available ribboners

Dr. VB. Shambhu, Dr. LK.Nayak, Mr. S.Das and Mr. P. Sanyal

Jute and Mesta are the principal bast fibre crop and a matter of pride for India and Bangladesh. These two countries produce over 92% of the total jute fibre of the world. Jute is mainly grown in eastern and north eastern states while Mesta is grown almost throughout India. Conventionally fibres are extracted by laborious manual process from the bark or bast of the plants after retting the harvested whole plants. Retting is the most important parameter contributing largely to the quality of the fibre.

The newly developed NIRJAFT Power Ribboner was modified/ improved by incorporation of spring pressure to rubber rollers and re-fabricated gears fitted in the ribboner machine for smooth passing of peeled ribbons on conveying system. Proper alignment of shaft and gears was also made for smooth running of the ribboner machine.

Studies were carried out for ribbons and whole plants retting as a better method/ technique as well as retting duration in farmer's field. It was observed that horizontal steeping of machine-extracted ribbons-in-layers in water may not result in uniform retting or sometimes ribbons may not ret properly. To overcome the problem, an improved technique/method of vertical steeping of ribbons-in-bundles in water has been developed to get fibre of improved quality in less time and with the requirement of low volume water as well as space. The ribbons obtained from the ribboner were retted in pond and ditch by holding it in vertical position with the help of bamboo or bamboo grid.


Figure ToT-9.1: Demonstration of Power Ribboner Machine in farmers' field

This vertical steeping method of ribbons retting required low volume of water as well as less space compared to conventional method. It was observed that retting period for ribbons reduced to 6-8 days as compared to 16-18 days for conventional retting of whole jute plants. This is due to the fact that the contact surface area of ribbons/ barks with that of water and also microbial activities becomes more than double.

The quality of fibre obtained by improved retting technology (i.e. mechano-microbial retting) and conventional whole plants retting method was studied. It was found that the fibre obtained after mechano-microbial /improved retting technology was one/two grade higher as compared to the fibre obtained from convention retting. It was also found that the fibre recovery was higher by one to two percent in case of improved technology as compared to conventional retting process. Improved power ribboner was demonstrated for farmers at KVK Hooghly, Chinchura and Fulkalmi, Chapra, for its popularization and awareness. Jute/mesta growing farmers were actively participated during deliberation and they were satisfied with the performance of the power ribboner machine.

Chief findings

- The quality of jute fibre obtained from mechano-microbial / improved retting technology was one/two grade higher than convention retting method.
- The extraction of recovery from mechano-microbial /improved retting technology was one to two percent higher than convention retting method.
- The duration of retting for ribbons by improved technology was reduced from 16-18 (conventional retting with whole plants in farmers' fields) to 6-8 days.
- Vertical steeping technique of ribbons retting required low volume , less space & less time to get quality fibre as compared to conventional method.

TOT 10: Developing and undertaking of extension services for effective dissemination of institute technologies

Dr. SB. Roy, Dr. A. Das, Dr. LK. Nayak, Dr. DP. Ray, Dr. VB. Shambhu, Dr. SC. Saha & Mr.K. Mitra

Participation of institute in exhibition/ seminar/mela

Institute participated in various programs and displayed the products & technologies of the institute. Officers from the institute had actively disseminated the technologies to different stakeholder attended the programs and made an awareness on jute & allied fibre and their products.

Figure ToT-10.1: Details of exhibition

Program	Organized by	Venue	Duration
Technology and Machinery Demonstration Mela	ICAR-NIRJAFT & KVK, Howrah	Jagatballavpur, Howrah, West Bengal	May 27, 2016
All India Seminar on Post Harvest Management of Fruits and Vegetables	Agricultural Engineering Division, West Bengal State Centre	The Institution of Engineers (India), Kolkata	June 1-2, 2016
Poorvanchal Krishi Pradarshani evam Kisan Ghosti	ATARI, Kanpur, UP	Chaukmmafi Village, Gorakhpur district, UP	October 23-24, 2016
MSME in Jute sector	The Indian Natural Fibre Society	Rabindra Tirtha, Rajarhat, Kolkata	November 25-26, 2016
Kisan Mela-cum-Technology Demonstration	Ramkrishna Mission and IVRI- Kalyani	Sasya Shyamla KVK, Arapanch, Sonarpur, West Bengal	December 14, 2016
Aspiration 2016	Sri Aurobindo Institute of Culture	Sri Aurobindo Institute of Culture, Kolkata	December 15-24, 2016
4th Assam International Agriculture & Horticulture show 2016	Department of Agri., Hort., & Fruit Processing, Govt. of Assam, Indian Chamber of Commerce & Assam Agriculture University	Guwahati, Assam	January 6-9, 2017
Technology week cum Rabi Kisan Sammelan	KVK, Howrah	Jagatballavpur, Howrah, West Bengal	January 17–19, 2017
Krishi-cum-Dairy Mela and Technology Demonstration under TSP Project of ICAR	ICAR-NDRI , Regional Centre, Kolkata	Ghosaldanga village, Birbhum District, West Bengal	January 28, 2017
11th all India Peoples' Technology Congress	Forum of Scientist, Engineers & Technology (FOSET)	NITTTR, Salt Lake, Kolkata	February 5, 2017.

Figure ToT-10.1: Details of exhibition			
Program	**Organized by**	**Venue**	**Duration**
Technology week 2017 -cum-Pre Rabi Kishan Sammelan	KVK-Hooghly	Chinsura, Hooghly	February 8-10, 2017
Technology and Machinery Demonstration Mela	ICAR-NIRJAFT	KVK-Hooghly, Chinsura, Hooghly	February 10, 2017
Foundation stone of new KVK in North 24 Parganas district of West Bengal.	ICAR-Central Research Institute for Jute & Allied Fibres	ICAR-CRIJAF, Barrackpore	February 13, 2017
Krishi Unnati Mela 2017	ICAR and Ministry of Agriculture & Farmers Welfare	IARI, New Delhi	March 15-17, 2017

Figure ToT-10.1: Shri. Radha Mohan Singh, Union Minister of Agriculture and Farmer's Welfare & Shri. Yogi Adityanath, MP, Gorakhpur visited the ICAR-NIRJAFT Stall

Figure ToT-10.2: ICAR-NIRJAFT stall at Rabindra Tirtha, Kolkata

Figure ToT-10.3: ICAR-NIRJAFT stall at Sri Aurobindo Institute of Culture, Kolkata

Figure ToT-10.4: ICAR-NIRJAFT stall at Sasya Shyamla KVK, Arapanch, Sonarpur

Figure ToT-10.5: ICAR-NIRJAFT stall at 4th Assam International Agri-Horticultural Show- 2017 in Guwahati

Figure ToT-10.6: Shri Purnendu Basu, State Agriculture minister visited the stall at KVK, Howrah

Figure ToT-10.7: Sh. S.Das addressed at Technology Week cum Rabi Kisan Sammelan 2017 in KVK, Howrah

Figure ToT-10.8: ICAR-NIRJAFT stall at Ghosaldanga village

Figure ToT-10.9: ICAR-NIRJAFT stall at NITTTR, Kolkata

Figure ToT-10.10: ICAR-NIRJAFT stall in Chinsura

Figure ToT-10.11: Experts visit at stall in KVK-Hooghly, Chinsura

Figure ToT-10.12: ICAR-NIRJAFT stall in CRIJAF, Barrackpore

Figure ToT-10.13: ICAR-NIRJAFT stall in IARI, New Delhi

Training program

Self-sponsored skill development training programs on jute handicrafts, jute handbags, bleaching & dyeing of jute and Jute Jewellery have been organized at ICAR-NIRJAFT. Also under NEH component of ICAR-NIRJAFT, a training program has been conducted at NRC on Yak, Dirang.

Table ToT-10.1: Details of the training programs organised			
Program	**Details**	**Duration**	**No of participants**
Jute Handicrafts and Jute Jewellery	Self-Sponsor Training Program at ICAR-NIRJAFT	July 18-30, 2016	10
Jute Hand Bags / Shopping Bags	Self-Sponsor Training Program at ICAR-NIRJAFT	August 22, 2016 – September 3, 2016	30
Bleaching & Dyeing of Jute	Self-Sponsor Training Program at ICAR-NIRJAFT	September 27-October 1, 2016	5
Jute Handicrafts and Jute Jewellery	Self-Sponsor Training Program at ICAR-NIRJAFT	Feb 6-20, 2017	15
Garments from Jute-yak blended fabric	NEH component of ICAR-NIRJAFT at NRC on Yak, Dirang	January 07-12, 2017	9

Training Program under Natural Fibre Mission

An one month training program in skill development on jute diversified products under Natural Fibre Mission with the aegis of Special BRGF fund for the batch of twenty women from three different areas i.e. Gopalganj, Kushmandi and Balurghat of Dakshin Dinajpur, West Bengal on jute fabric bags/ jute handicrafts have been successfully organized by ICAR-NIRJAFT, Kolkata in association with Office of the General Manager, District Industries Centre, Dakshin Dinajpur, Balurghat, West Bengal at Dakshin Dinajpur District, West Bengal from April 1-30, 2016.

Figure ToT-10.14: Training program on jute diversified products

Figure ToT-10.15:Jute handicrafts developed by self-sponsored participants

Figure ToT-10.16: Training for self-sponsored participants

Figure ToT-10.17:Certificate distribution to self-sponsored participants

Figure ToT-10.18:Display of jute based jewellery developed by self-sponsored participants

Figure ToT-10.19:Training for self-sponsored participants

Figure ToT-10.20:Lecture for self-sponsored participants

Figure ToT-10.21: Inauguration of a training program at Dirang

Figure ToT-10.22:Training on garment manufactruring from jute:yak blended yarn

Front line demonstration on Accelerated retting technology

Front line demonstrations of ICAR-NIRJAFT under National Food Security Mission for dissemination of accelerated retting technology of jute/mesta plants were conducted. Jute/mesta growing farmers were actively participated and shown keen interest in this technology. Their queries on retting and fibre quality were answered satisfactorily and the details of the retting demonstration are given in the Table ToT-10.3.

Table ToT-10.3: Details of the FLD on accelerated retting technology

Date	Collaboration with	No of participants
July 14, 2016	Nuziveedu seed company	20
July 19, 2016	Government of West Bengal	20
July 20, 2016	NGO, Hooghly vegetable grower producer company	20
July 27-30, 2016	CTRI, Regional Station, Dinhata	20
August 8, 2016	ICAR-NIRJAFT	20
August 13, 2016	NGO, Hooghly vegetable grower producer company	20
August 22, 2016	Nuziveedu seed company	30
August 24, 2016	Hooghly Krishi Vigyan Kendra	65
August 30, to September 1, 2016	Regional Research Station, Nagaon	220
September 7, 2016	Nuziveedu seed company	9
September 16, 2016	Hooghly Progressive vegetable growers' association	112

Front line demonstration of Power Ribboner for Improved Jute Retting Technology

Front line demonstration of ICAR-NIRJAFT under National Food Security Mission for dissemination of improved jute retting technology through extraction of ribbons/barks by power ribboner from jute/mesta plants were conducted in two places i.e. at KVK Hooghly, Chinchura, District Hooghly, West Bengal from August 23-31, 2016 in collaboration with KVK Hooghly, Chinchura and another at Fulkalmi, P.O. - Pasmamala, P.S. - Chapra, Dist on September 16, 2016. Nadia, West Bengal.

Table ToT-10.2: Details of the FLD on jute ribboner		
Date of Demonstration	**Farmers' Village covered**	**No. of Participants**
23.08.2016	Ichapur, Balagarh Block, Hooghly District	25
24.08.2016	Damorgacha, Balagarh Block, Hooghly District	20
25.08.2016	Kolyanshree, Balagarh Block, Hooghly District	20
26.08.2016	Inchura, Balagarh Block, Hooghly District	20
30.08.2016	Basan & Kabura, Balagarh Block, Hooghly District	25
16.09.2016	Fulkalm, Chapra Block, Nadia District	40

About 150 jute/mesta growing farmers were actively participated during deliberation of a lecture and they themselves have operated the machine for extraction of ribbons from green jute/ Mesta plant. The ribbon retting was conducted in vertical hanging on bamboo in open ditch and pond. The ribbon retting was completed within 6-8 days whereas convention whole plant was retted in 16-18 days. Farmers have taken keen interest in operation of machine. Their queries on ribboning capacity, fibre quality, cost of machine, labour requirement, power consumption, weight of the machine etc were answered satisfactorily.

Figure ToT-10.23: Field level demonstration on power ribboner

Revenue generation

Under self-sponsored training program an amount of Rs. 66,000/= revenue has been generated (Jute Handicraft training program: Rs.12,000/=; Jute Hand Bags training program : Rs. 36,000/= and Jute Handicrafts and Jute Jewelry training program : Rs. 18,000/=) . Under externally funded training programs an amount of Rs. 16,10,950/= revenue has been generated (DIC Dakshin Dinajpur Rs. 4,67,500/=; Department of Sundarban Affairs: Rs. 11,43,450/=)

NASF-ME-5016: Investigation of effect of structure of jute and allied fibre products on sound insulation property

Dr. G. Bose, Dr. S.Sengupta, Dr. KK.Samanta, Mr. S. Jose, Mr. S.Debnath, Mr. S. Middya

Cross-section of jute and sisal fibre was investigated by Optical Microscopy, SEM, X-Ray Diffraction and FTIR. Jute yarn of 6 lbs (206 tex), 10 lbs (344 tex), 12 lbs (413 tex) were made for fabric preparation. Yarn of 8 lbs (275 tex), with and without tracer fibre were prepared in order to study the yarn structure and fibre disposition behavior in yarn cross section. Jute fabrics were prepared by varying areal density targeting above 450 gm/m2 in plain, twill and weft pile structure.

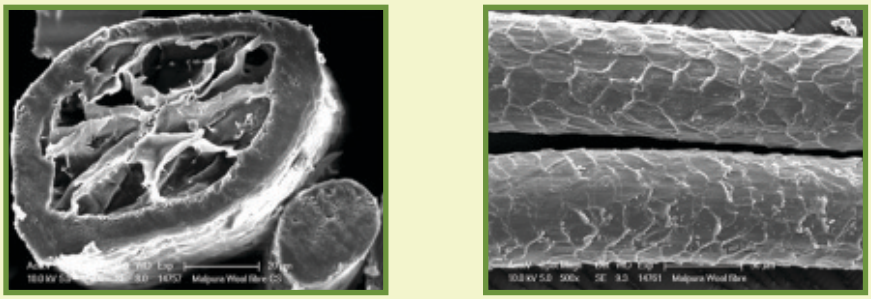


Figure NASF-ME-5016.1: Longitudinal and cross-sectional SEM view of Malpura wool

Malpura wool of the following specification i.e. 48 ◎ fineness with 71% Medullation was procured from ICAR-CSWRI, Avikanagar SEM study (Cross sectional and longitudinal) of Malpura wool was also carried out and three non woven samples were made using Malpura wool and jute-Malpura wool blend. The porosity or void area percentage of jute yarn was calculated by subjecting the image to make a binary image with grids within it. By counting the numbers of total grid blocks that fall under the two colours, the hollowness or porosity was estimated by using the following formula and it was 44%.

$$\text{Porosity} = \frac{\text{(Total No of white blocks)}}{\text{(Total no of grey and white blocks)}}$$

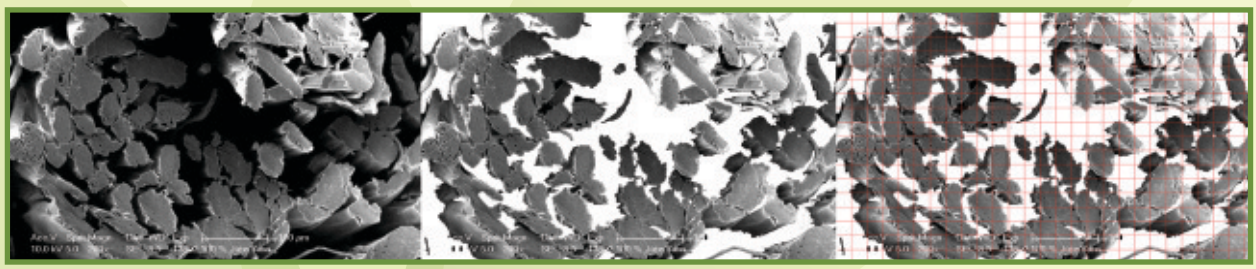


Figure NASF-ME-5016.2:Original image, processed image, and image with inserted grids of jute yarn cross section

CRP/NIRJAFT- 01: Development of machineries for extraction of fibre from sisal, flax and pineapple

Dr. LK. Nayak, Dr. S.Debnath and Dr. VB. Shambhu

Survey on the existing sisal, pineapple and flax fibre extractors has been made. Based on these observations, new extractors were designed and developed. In case of existing sisal fibre extractor, it was observed that the separation of fibre by the beating action of the roller needs human drudgery during feeding of green leaves into the machine and also the backward dragging. Hence, the output from the extractor got affected due to this human labour. To avoid human drudgery involved during feeding, a new extractor was designed & fabricated (Figure CRP/NIRJAFT-01.1) with the provision of multi-leaf, automatic feeding mechanism. Trial run on this extractor is in progress.

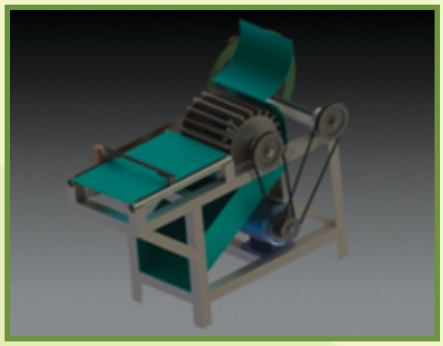


Figure CRP/NIRJAFT-01.1:Sisal fibre extractor with automatic feeding system

Figure CRP/NIRJAFT-01.2: Pineapple leaf fibre extractor

In case of pineapple leaf fibre extractor, it was observed that the scrapping & serration action on green pineapple leaf surface is a basic requirement before subjecting it into the retting operation. The scrapping & serration action on green leaves facilitates easy penetration of microbes thus reducing the time of retting along with the production of uniform and quality fibre.

Figure CRP/NIRJAFT- 01.3: Flax fibre extractor

The retting may be carried out in microbial condition or with the application of urea to the retting medium. A new extractor with the provision of scrapping & serration roller was designed & fabricated. Trial run on this extractor is in progress.

In case of existing flax fibre extractor, it was observed

that the scutching action on the dried stems was not sufficient for breaking and removal of sticks. To increase the points of contact of the feed material with that of the scutching roller, a new extractor was designed and developed (Figure CRP/NIRJAFT-01.3). Trial run on this extractor is in progress.

CRP/NIRJAFT 02: Development of Grading system and instruments for jute & allied fibres

Dr. G. Roy & Dr. S.C. Saha

Beside jute, there are other important natural fibres like Sunnhemp, Sisal, Ramie, Pineapple leaf fibre, linseed fibre and Ramie fibres are available, which can be used in many applications and products. In India, there is no specific grading system and grading instruments available for Sunnhemp, Sisal, Ramie and linseed fibre. Being the leading research institute, ICAR-NIRJAFT undertakes on grading and instrument development domain.

The main objective of this project was to design & development of the instruments like, Fibre Bundle Strength Tester for Sunnhemp fibre, Ramie fibre, Fibre Fineness Tester for Sunhemp& Ramie fibre. Consequently after getting suggestions from Hon'ble DDG, instruments for multiple fibres were also successfully developed i.e. Electronic Fibre Bundle Strength Tester, Digital Fibre Fineness Meter and Digital Colour & Lustre Meter for ramie, sunhemp and Multiple Fibres (Ramie, Sunhemp, Sisal & Flax fibre). Simultaneously grading systems of Ramie, Flax, Sunhemp and Sisal fibres were successfully developed. The corresponding tables and photographs of the newly developed instruments are given below.

Two memorandum of understanding have been signed with the fabricators and the developed instruments were also being sold to the stakeholders

Table CRP/NIRJAFT 02.1: Sub-groups of parameters and score marks of Ramie Fibre

Parameters	Sub-groups of parameters and score marks in parenthesis			
Length (cm)	**Excellent** ⩾ 120 (20)	**Very Good** < 120 to 90 (15)	**Good** < 90 to 60 (10)	**Average** < 60 (5)
Strength (g/tex)	**High ⩾ 28** (30)	**Medium < 28-22** (20)	**Average <22-16** (13)	**Weak < 16** (7)
Defects	Less (15)	Medium (10)	More (5)	-
Fineness (tex)	Very Fine ⩽ 1 (15)	Fine > 1-1.5 (10)	Coarse > 1.5 (5)	-
Colour	Good (10)	Average (7)	Poor (3)	-
Softness	Soft (10)	Hard (5)	-	-

Table CRP/NIRJAFT 02.2:Ramie grading score and grade							
Parameters		**Sub-groups of parameters and score marks in parenthesis**					
Grade	Fibre length(cm)	Strength (g/tex)	No of Defects	Fineness (tex)	Colour	Softness	Grade Score
Special	20 ≥ 120	30 High	15 Less	15 V. Fine	10 Good	10 Soft	100
R-1	15 < 120 to 90	20 Medium	10 Medium	10 Fine	10 Good	10 Soft	75
R-2	10 < 90 to 60	13 Average	10 Medium	5 Coarse	7 Average	5 Hard	50
R-3	5 < 60	7 Poor	5 High	5 Coarse	3 Poor	5 Hard	30

Table CRP/NIRJAFT 02.3:Sub-groups of parameters and score marks of Flax Fibre				
Parameters	**Sub-groups of parameters and score marks in parenthesis**			
Length (cm)	V. Good ≥ 100 (20)	Good < 100 to 80 (15)	Average < 80to 60 (10)	Poor < 60(5)
Strength (g/tex)	High (30) ≥ 28	Medium (20) <28 - 22	Average (13) < 22 - 16	Poor (5) < 16
Defects	Minimum(15)	Medium (10)	Maximum (5)	-
Fineness (tex)	Very Fine (15) ≥ 2.5	Fine (10) > 2.5 – 3.5	Coarse (5) > 3.5	-
Colour	Good (10)	Average (7)	Poor (3)	-
Stick (%)	20% (10)	30% (5)	> 30% (2)	-

Table CRP/NIRJAFT 02.4:Flax grading score and grade							
Grade	**Fibre length(cm)**	**Strength (g/tex)**	**No of Defects**	**Fineness (tex)**	**Colour**	**Softness**	**Grade Score**
F-1	20 ⩾ 100	30 High	15 Less	15 V. Fine	10 Good	10 Soft	100
F-2	15 < 100 to 80	20 Medium	10 Medium	10 Fine	10 Good	10 Soft	75
F-3	10 < 80 to 60	13 Average	10 Medium	5 Coarse	7 Average	5 Hard	50
F-4	5 < 60	7 Poor	5 High	5 Coarse	3 Poor	5 Hard	30

Table CRP/NIRJAFT 02.5: Sunnhemp grading score and grade						
Grade	**Fibre length(cm)**	**Strength (g/tex)**	**No of Defects**	**Fineness (tex)**	**Colour**	**Total**
S-1	≥ 100 (25)	≥ 25 (25)	≤ 4.0 (15)	Yellowish White (15)	Minimum (20)	100
S-2	< 100 – 80 (18)	< 25 - 20 (17)	> 4.0 – 7.0 (10)	Yellowish White (15)	Minimum (20)	80
S-3	< 100 – 80 (18)	< 25 - 20 (17)	> 7.0 (5)	Creamy to pale greenish (10)	Medium (10)	60
S-4	< 80 – 65 (10)	< 20 -15 (10)	> 7.0 (5)	Grayish to light brown (5)	Medium (10)	40
S-5	< 65 (5)	< 15 (5)	> 7.0 (5)	Grayish to light brown (5)	Maximum (2)	20

Table CRP/NIRJAFT 02.6:Sisal grading score and grade						
Grade	**Fibre length(cm)**	**Strength (g/tex)**	**No of Defects**	**Fineness (tex)**	**Colour**	**Total**
S-1	≥ 90 (20)	≥ 25 (30)	≤ 10.0 (15)	Creamy White (15)	Minimum (20)	100
S-2	< 90 - 75 (15)	< 25 - 20 (20)	> 10.0 – 15.0 (10)	Yellowish White (10)	Medium (15)	70
S-3	< 75 (10)	< 20 (15)	> 15.0 (5)	Creamy to pale greenish (5)	Maximum (10)	45

Figure CRP/NIRJAFT 02.1:Digital Fineness meter for Sunhemp fibre

Figure CRP/NIRJAFT 02.2:Digital fibre bundle strength tester for Sunhemp fibre

Figure CRP/NIRJAFT 02.3:Digital fibre bundle strength tester for Ramie fibre

Figure CRP/NIRJAFT 02.4:Digital fibre fineness tester for Ramie fibre

Figure CRP/NIRJAFT 02.5:Digital colour lustre meter for Ramie fibre

Figure CRP/NIRJAFT 02.6:Digital colour lustre meter for multiple fibre

Figure CRP/NIRJAFT 02.7:Digital Fineness meter for multiple fibre

Figure CRP/NIRJAFT 02.8:Digital fibre bundle strength tester for multiple fibre

CRP / NIRJAFT-03: Eco-friendly chemical processing of lignocellulosic fibres for the preparation of home textiles

Dr SN.Chattopadhyay , Dr. NC.Pan, Dr. AN.Roy & Dr KK.Samanta

During the period under report raw jute and banana fibres was blended in three different proportions like 50:50 (A), 75:25 (B), and 25:75 (C) and 8 pound yarn was produced. These yarns have been bio-scoured using 2% Texbio M + 2% Texzyme J (60oC/8.5 pH/ 1:10 MLR/120 minutes) and then bleached using hydrogen peroxide. Optical and physical properies of the bleached yarns were evaluated and tabulated. Results inferred that blending of jute and banana in the ratio 3:1 produces yarn with good tensile properties and whiteness index.

Table CRP / NIRJAFT-03.1: Optical and physical properies of Jute / banana blended yarns

Sample	Whiteness Index	Yellowness Index	Brightness Index	Tenacity (cN/tex)	Strain (%)	Breaking modulus (cN/tex)
A	72	34	45	3.8	1.5	261
B	77	33	52	6.5	1.6	397
C	73	35	46	4.0	2.0	201

Union fabrics were produced using different jute / banana blended yarns as weft and cotton yarn as warp. Three different blended yarns were used A-50: 50 Jute / Banana, B-75:25 Jute / Banana & C- 25:75 Jute / Banana. The fabrics were first bio-scoured then bleached by hydrogen peroxide method and their optical properties were evaluation. It is found that the grey fabric produced from jute / banana blended yarn using 25:75 blend ratio shows better whiteness as well as brightness. This may be due to better whiteness of the raw banana fibres. But the fabrics achieve equal whiteness of 82 in the HUNTER scale after bio-scouring followed by bleaching irrespective of the blend ratios of the yarns. All the blended yarns were bleached and dyed with 4% Direct Green dye and 4% Procion Yellow HER respectively of 4% shade and their K/S values (ranged from 23.7 to 25.7) is almost same in all the blends, that indicating very good solid shades may be obtained in all types of blends.

Table CRP / NIRJAFT-03.2: Optical properties of jute / banana / cotton blended fabric				
Sample	**Treatment**	**Whiteness Index**	**Yellowness Index**	**Brightness Index**
A	Raw	61.3	32.2	32.7
	Bioscoured	66.6	27.9	32.8
	Bioscoured-bleached	82.4	19.2	63.1
B	Raw	60.7	33.0	31.8
	Bioscoured	-	-	-
	Bioscoured-bleached	82.5	16.6	63.9
C	Raw	65.5	31.5	37.4
	Bioscoured	62.9	27.4	35.4

Washing fastness of dyed samples found to be better in reactive dyed samples (4 to 4-5). The dyed yarns were used to produce fabrics in handloom for the development of different home textile items. Physical properties of grey and bleached fabrics were evaluated with respect to their tensile properties and handle behaviour. The above results revealed that the tenacity of the fabric prepared from yarn with high jute content is more and they also retain strength after scouring and bleaching. This may be due to higher tenacity of the 25:75(BB:BJ) blended yarn. Similarly, the fabric handle is better in jute rich fabric as bending length as well as bending modulus is low in this case.

Table CRP / NIRJAFT-03.3: Physical properties of grey and bleached jute blended fabrics								
Parameter	**Tenacity (C.N/Tex)**		**Extension (mm)**		**Bending length(cm)**		**Bending modulus**	
Sample	**Warp**	**Weft**	**Warp**	**Weft**	**Warp**	**Weft**	**Warp**	**Weft**
A_G	3.9	6.3	16.7	2.1	1.6	6.2	1.1	60.0
A_b	3.3	5.4	18.6	3.5	1.3	4.1	0.4	18.5
B_G	3.9	6.4	19.6	2.5	1.6	6.2	1.2	56.6
B_b	3.2	6.2	20.0	3.7	1.2	4.0	0.5	18.4
C_G	3.8	4.9	23.0	2.0	1.6	6.3	1.1	74.8
C_b	3.6	4.4	20.0	2.7	1.3	4.8	0.5	27.2
G – Grey fabric b- bleached fabric								

Functional finishing of union fabrics

In order to improve the functional properties of jute /banana blended fabric they were subjected to eco-friendly chemical treatments for improvement of UV- Protection, Fire retardation and Crease recovery properties. The blended fabrics were treated with commercial eco-friendly finishing agent ECOFINISH UV 500 (a Benzotriazole based emulsion) in different concentrations (20, 40, 50, 60 g/L) by pad-dry-cure process at pH 6

to impart UV Protection properties and their functional properties were evaluated. Results revealed that UV protection property of jute / banana union fabrics are very good and it improves with increase in proportion of banana component in the fabric. Treatment with UV protection agent (ECOFINISH 500 UV) further increases the UV protection property with increase in concentration of the agent and reaches maximum at 40 g/L, when the fabric achieves excellent UV protection property. UPF is maximum in 75:25 banana: jute blended yarn.

Table CRP / NIRJAFT-03.4: UPF values of jute / banana blended fabric

Sample	Ecofinish UV-500 (g/L)	UPF Rating	UVA Transmittance %	UVB Transmittance %
A	-	30	4.3	2.5
	20	35	2.5	2.1
	40	45	2.1	1.7
	60	45	2.1	0.4
B	-	30	4.5	2.6
	40	50	1.9	1.7
C	-	35	3.6	2.1
	40	60	1.7	1.4

The blended fabrics were treated with ECOFLAME CT-6 in different concentrations (50, 100, 200, 300, and 400 gpl) by pad◎dry◎cure process on Jute/ Banana blended fabrics and their LOI values were evaluated. All the untreated fabric shows poor flame resistance. The flame retardancy is increased with increase in concentration of finishing chemical and produces excellent retardancy at 200 g/L concentration in all fabrics. It is concluded that 200 g/L may be used to obtain desired flame proof property.

Table CRP / NIRJAFT-03.5: LOI value of Jute/Banana blended fabrics

Sample	Ecoflam CT-6	LOI value
A	-	24
	50 gpl	26
	100 gpl	28
	200 gpl	38
	300 gpl	50
	400 gpl	52
B	–	20
	200gpl	33
C	–	24
	200 gpl	40

All blended fabrics were treated with ECOFIN 480 (eco-friendly modified DMDHEU finishing agent) in order to impart crease resistance property in three different concentrations (40 ,50 , 60 g/L) by pad –dry – cure process and their crease recovery angles were measured.

A study was also made to bleach the individual jute and banana fibres using eco-friendly hydrogen peroxide bleaching process and then blended in different proportions to produce yarn. The optical and physical properties of different yarns were evaluated. The weight losses of the jute and banana fibres during bleaching are 13.3% and 14.7% respectively. Tensile properties revealed that the tenacity of jute/ banana blended yarn produced from bleached fibres are much higher than that produced from grey fibres irrespective of blend ratio. Bleaching of fibres improved the regularity fineness and pliability of individual fibres which in turn produced yarn of higher regularity and strength. Jute rich yarns show better tenacity.

Table CRP / NIRJAFT-03.6: Optical and tensile properties of blended yarns produced from bleached fibres

Yarn Sample	Whiteness Index	Yellowness Index	Brightness Index	Count (Tex)	Tenacity (cN/tex)	Elongation at break(%)
Bleached Jute-BJ(100)	80.20	24.98	58.05	–	–	–
Bleached Banana-BB(100)	78.11	31.72	54.13	–	–	–
BJ:BB (50:50)	67.72	27.96	40.86	269	7.62	1.54
BJ:BB (75:25)	67.64	26.74	41.05	266	10.64	1.77
BJ:BB(25:75)	62.44	32.00	34.11	279	7.94	1.47

Whiteness Index by HUNTER; Yellowness Index by ASTM D 1925 & Brightness Index (TAPPI 452)

Conclusions

- Jute and banana fibres were blended in different proportions like 75:25, 50:50 and 25: 75 and produced 8 lb yarn.
- Union fabrics have been produced using cotton yarn as warp and jute /banana blended yarn as weft.
- Good whiteness (82 in the HUNTER scale) is achieved in case of all the blended yarns after bioscouring & bleaching irrespective of the blend ratio.
- Solid shades with good washing fastness properties were obtained in all types of blends. The dyed yarns

Figure CRP / NIRJAFT-03.1: Grey Jute/banana blended fabric

were used to produce handloom fabrics for the development of different home textile items.

- The tenacity of bleached jute/ banana blended yarn produced is higher than grey jute/ banana blended irrespective of blend ratio.
- 40 g/L UV protective agent (Ecofinish 500UV) imparted very good UV protection property (> 35 UPF rating). Banana rich fabric shows better performance.
- Fire resistance property of jute / banana blended fabric improves with increase in proportion of banana fibre (LOI value > 20-24). Treatment with 200 g/L flame retardant agent (Ecoflame CT-6) produces excellent flame resistance property (LOI value 33-40)

Figure CRP / NIRJAFT -03.2: Bleached jute/banana blended fabric

Figure CRP / NIRJAFT-03.3: Handloom Jute/banana blended fabric

DMCC (1008269) : Development of microcrystalline cellulose from jute caddies/sticks

Dr. RK. Ghosh, Dr. SN. Chattopadhyay & Dr. DP. Ray

Microcrystalline cellulose (MCC) is a partially depolymerised cellulose prepared by treating α-cellulose, obtained as a pulp from fibrous plant with mineral acids. Microcrystalline cellulose is used as a texturizer, an anti-caking agent, a fat substitute, an emulsifier, an extender, and a bulking agent in food production. The most common form is used in vitamin supplements or tablets for pharmaceutical application. The global demand of MCC was around 50,000 T in. Out of which 40 and 60% were shared by the food and pharmaceutical industries, respectively.

Presently around 50, 25 and 25% of global MCC demand is from North America, Europe, and, Asia-Africa-others, respectively. The global demand for MCC is growing spontaneously. In India, a huge quantity of jute caddies, 40000 tonnes as processing waste and jute stick, around 4 Mt per annum as primary by-product of jute fibre cultivation, are produced. However, the common practice in vogue is to burn such waste materials/residues as firewood for domestic energy purposes. Hence, jute caddies and sticks can be explored as a source of raw material for preparation of MCC.

Literature survey and compilation of reports for comparative analysis had been completed. Procurement of caddies from jute industry and collection of jute stick from field were completed. Procurement of instruments is in process. Physicochemical

characterization of raw materials is under process. The fat-wax, lignin, holo-cellulose, alpha-cellulose, moisture and ash contents of caddies and sticks are under progress.

FQ-3030: Understanding genetics and biosynthesis of gum in ramie (Boehmeria nivea L. Gaud.) for developing low-gum-genotypes

Dr. D P. Ray and Dr. P. Satya

The basic understanding of gum from Ramie (Boehmeria nivea L. Gaud.) is the major criteria for exploration of this fibre. In this project the genetics and gum biosynthesis pathway in Ramie plant was unravelled. The degumming methodology has been optimized for gum removal for achieving textile grade ramie fibre. The gummy substance has been characterized and the pectin /hemicelluloses were identified. The distribution pattern of ramie gum has also been elucidated.

Chief findings of the project

- Gum profiling of available ramie lines in India
- Optimization of degumming methodology
- Isolation of pectin and estimation of galacturonic acid in pectin component of ramie genotypes
- Chemical profiling of Ramie gum in high gum and low gum lines

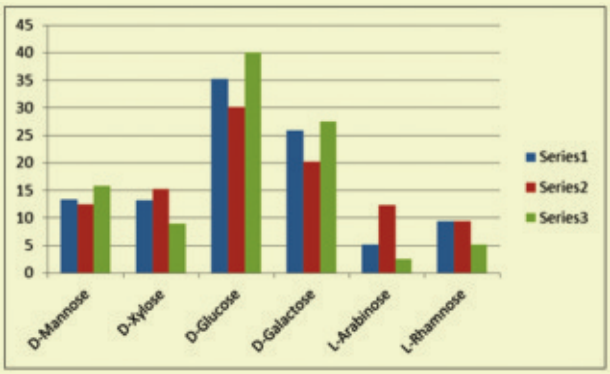


Figure FQ3030.1: Relative abundance of sugar constituents at 1, 2, 5% alkali treated fraction

- Component analysis of hemicellulose and gum
- Study on variation in gum formation in cultivated and wild species

Agri Business Incubation

Dr. AN.Roy, Dr. SB.Roy , Dr. S.Debnath & Dr LK.Nayak

Under this project, procurement of different equipments was completed. Forty new entrepreneurs were admitted for incubation and seven new products which includes light weight shawl from fine jute yarn, bags, file folders, prayer mats from jute-mat stick fabric etc were developed for commercialization. Four license agreements were signed on different institute technologies. Five training programs on development of jute handicrafts in different jute growing districts of West Bengal and Orissa, one farmers' meet and one inaugural workshop were successfully organized.

Figure ABI.1: Inauguration of the training program at Bhubaneswar

Figure ABI.2:Training for women on agro-based craft works in Bhubaneswar

Figure ABI.3:Inauguration of a training program at Behala Bodhayan, Sarsuna, Kolkata

Figure ABI.4:Training for mental retarded participants at Behala Bodhayan, Sarsuna, Kolkata

Figure ABI.5:Dr. AN.Roy briefed the marketing of training products at KVK, Kendrapara (OUAT)

Figure ABI.6: Participants of the training program

Figure ABI.7:Inauguration of a training program at KVK , Bhadrak, Odisha

Figure ABI.8:Inauguration of the training program at KVK Hooghly, Chinsura

Transfer of technologies

Under this project in association with KVK, Hooghly, jute plants were cultivated in one bigha land and assessed the productivity of NIRJAFT developed power ribboner and the accelerated retting of the ribbons vis-à-vis whole jute plants for comparison. Strengthened the production of garments from jute/yak fibre based fabrics with the installation of some more modern stitching machines and conducting advanced training on garment manufacture from jute/yak fibre blended fabrics at ICAR-NRC on Yak, Dirang, Arunachal Pradesh.

Table ABI.1: Training program details

Program	Venue	Duration	Participants
6 days training on "Manufacture of Jute Handicrafts"	KVK Hooghly, Chinsurah	June 20-25, 2016	15
6 days training on "Manufacture of Jute Handicrafts"	KVK, Bhadrak, Odisha	August 25-30, 2016	15
6 days training on "Manufacture of Jute Handicrafts"	ICAR-CIWA, Bhubaneswar, Odisha	October 17-22, 2016	15
6 days training on "Manufacture of Jute Handicrafts"	Behala Bodhayana, Kolkata	November 21-26, 2016	21
6 days training on "Manufacture of Jute Handicrafts"	KVK, Kendrapara, Odisha	February 22-27, 2017	21
Farmers-Scientists interface	ICAR-NIRJAFT, Kolkata	September 08, 2016	20

Facilitated the field trial on the application of jute nonwoven agricultural mulching fabric for high value horticulture crops in the field of Regional Research Station (Under AAU), Naogaon, Assam and adjoining farmers' field in two villages. Facilitated the field trial on the application of jute nonwoven agricultural mulching fabric for summer tomato in the field of KVK, Hooghly, West Bengal. In both the field trial of application of agricultural mulch, positive results were found so far the yield is concerned. Bulk trial has been made for the manufacture of Jute/cotton, Jute/silk and jute/silk cotton blended shawls with full jacquard design and 'Batique' effect in the weavers' loom shed in Fulia, Nadia, West Bengal.

Scientists-Farmers Interface

Scientists – Farmers Interface was organized under Agri-Business Incubation Project on September 08, 2016 at the Institute in which twenty five progressive farmers from Jhingra Farmer's Club, Jagatballavpur, Howrah Dist. West Bengal have participated. Farmers interacted with the Scientists on different activities related to jute & allied fibres. A Video Film on R&D Activities of ICAR-NIRJAFT was showed to the farmers and then they visited all laboratories & other facilities of the Institute.

(DRAFT) RESULTS-FRAMEWORK DOCUMENT (RFD) FOR ICAR - NATIONAL INSTITUTE OF RESEARCH ON JUTE & ALLIED FIBRE TECHNOLOGY (2016–2017)

Section 1: Vision, Mission, Objectives and Functions

Vision:

To uphold the cause of jute and allied fibres in favour of farmers, trade and industry keeping in view the prevalent global scenario and bring back the glory of the golden fibre with socio-economic uplift.

Mission:

To utilize jute and allied fibres in wide and diverse areas by exploiting the intrinsic and advantageous properties of the fibres and converting the demerits whatsoever into merits by application of scientific tools through development of technologies, products and processes for the benefit of farmers and industries of both large and small scales.

Objectives:

1. Technological support for quality improvement and assurance of Jute, Mesta and other allied fibres.
2. Development of technologies for diversified uses of plant fibres, by-products & industrial wastes, transfer of technology and capacity building.

Functions:

- Working on jute as well as allied fibres and their agro and industrial residues
- Post harvest aspects and development of products out of jute as well as from allied fibres
- Research and development (R & D) activities on both woven and non-woven products to be used as domestic goods, disposable bags, floor coverings, geo-textiles, agro-textiles, other technical textiles and composites
- To deal with the problems of both large and small scale industries, organized and decentralized sectors and the farming community
- To function in close collaboration with industries and entrepreneurs on one hand and academic institutions on the other

SECTION 2: INTER SE PRIORITIES AMONG KEY OBJECTIVES, SUCCESS INDICATORS AND TARGETS

S. No.	Objectives	Weight	Actions	Success Indicators	Unit	Target/Criteria Value					
						Weight	Excellent	Very good	Good	Fair	Poor
							100%	90%	80%	70%	60%
1.	Technological support for quality improvement and assurance of jute, mesta and other allied fibres	**30**	Technology support to jute breeders, industries & jute export houses	Breeder and commercial samples (fibre, yarn, fabric etc.) tested for quality evaluation	Number	**28**	450	405	360	315	270
			To fabricate instruments and equipment for farmers, industries and stake holders	New equipment fabricated for supply to stake holders	Number	**2**	7	6	5	4	3
2.	Development of technologies for diversified uses of plant fibres, by-products & industrial wastes, transfer of technology and capacity building	**50**	Development of new product/ machinery / instrument / technology	New product/ machine/instrument/ technology developed	Number	**25**	8	7	6	5	4
			Up-gradation / refinement of instruments / technology	Instruments / Technology refined / upgraded	Number	**4**	5	4	3	2	1
			Entrepreneurship development and training	Programmes organised	Number	**15**	20	18	16	14	12
			Front Line Demonstration (FLD)	Demonstration in farmers field	Number	6	6	5	4	3	2
*	Publication/ Documentation	**5**	Publication of the research articles in the journals having the NAAS rating of 6.0 and above	Research articles published	Number	**3**	8	7	6	5	4
			Timely publication of the Institute Annual Report (2015-2016)	Annual Report published	Date	**2**	June 30, 2016	July 2, 2016	July 4, 2016	July 7, 2016	July 9, 2016

SECTION 2: INTER SE PRIORITIES AMONG KEY OBJECTIVES, SUCCESS INDICATORS AND TARGETS

S. No.	Objectives	Weight	Actions	Success Indicators	Unit	Target/Criteria Value					
						Weight	Excellent	Very good	Good	Fair	Poor
							100%	90%	80%	70%	60%
*	Fiscal resource management	**2**	Utilization of released plan fund	Plan fund utilized	%	**2**	98	96	94	92	90
*	Efficient Functioning of the RFD System	**3**	Timely submission of Draft RFD for Approval	On-time submission	Date	**2**	-	-	-	-	-
			Timely submission of Results for 2015-2016	On-time submission	Date	**1**	May 5, 2016	May 10, 2016	May 15, 2016	May 20, 2016	May 25, 2016
*	Enhanced Transparency /Improved Service delivery of Ministry/ Department	**3**	Rating from Independent Audit of implementation of Citizens'/ Clients' Charter (CCC)	Degree of implementation of commitments in CCC	%	**2**	100	95	90	85	80
			Independent Audit of implementation of Grievance Redress Management (GRM) system	Degree of success in implementing GRM	%	**1**	100	95	90	85	80
*	Administrative Reforms	**7**	Update organizational strategy to align with revised priorities	Date	Date	**2**	Nov 01, 2016	Nov 02, 2016	Nov 03, 2016	Nov 04, 2016	Nov 05, 2016
			Implementation of agreed milestones of approved Mitigating Strategies for Reduction of potential risk of corruption (MSC)	% of implementation	%	**1**	100	95	90	85	80
			Implementation of agreed milestones for ISO 9001	% of implementation	%	**2**	100	95	90	85	80
			Implementation of agreed milestones of approved Innovation Action Plans (IAPs)	% of implementation	%	**2**	100	80	80	70	60

SECTION 3: TREND VALUES OF THE SUCCESS INDICATORS

S. No	Objectives	Actions	Success Indicators	Unit	Actual Value for FY14/15	Actual Value for FY15/16	Projected Value for FY16/17	Projected Value for FY17/18	Projected Value for FY18/19
1.	Technological support for quality improvement and assurance of jute, mesta and other allied fibres	Technology support to jute breeders, industries & jute export houses	Breeder & commercial samples (fibre, yarn, fabric etc.) tested for quality evaluation	Number	415	466	405	445	490
		To fabricate grading aid instruments for farmers, industries and stakeholders	New equipment fabricated for supply to stake holders	Number	6	5	7	8	8
2.	Development of technologies for diversified uses of plant fibres, by-products & industrial wastes, transfer of technology and capacity building	Development of new product/ machinery / instrument / technology	New product/ machine/instrument/ technology developed	Number	6	7	7	7	8
		Up-gradation/refinement of instruments/technology	Number of Instruments/ technology refined/ upgraded under different projects	Number	4	4	4	5	5
		Entrepreneurship development and training	Programmes organised	Number	22	18	18	20	22
		Front Line Demonstration (FLD)	Demonstration in farmers field	Number	-	6	6	7	7
*	Publication/ Documentation	Publication of the research articles in the journals having the NAAS rating of 6.0 and above	Research articles published	Number	6	9	8	9	10
		Timely publication of the Institute Annual Report (2014-2015)	Annual Report published	Date	June 30, 2015	June 30, 2016	--	–	–

SECTION 3: TREND VALUES OF THE SUCCESS INDICATORS

S. No	Objectives	Actions	Success Indicators	Unit	Actual Value for FY14/15	Actual Value for FY15/16	Projected Value for FY16/17	Projected Value for FY17/18	Projected Value for FY18/19
*	Fiscal resource management	Utilization of released plan fund	Plan fund utilized	%	99.91	82.34	96.00	96.00	96.00
*	Efficient Functioning of the RFD System	Timely submission of Draft RFD for 2015-2016 for approval	On-time submission	Date	April 11, 2014	June 09, 2015	-	-	-
		Timely submission of Results of RFD Year-wise	On-time submission	Date	April 21, 2014	April 24, 2015	April 29, 2016	-	-
*	Enhanced Transparency /Improved Service delivery of Ministry/ Department	Rating from Independent Audit of implementation of Citizens'/ Clients' Charter (CCC)	Degree of implementation of commitments in CCC	%	100	100	95	95	95
		Independent Audit of implementation of Grievance Redress Management (GRM) system	Degree of success in implementing GRM	%	100	100	95	95	95
*	Administrative Reforms	Update organizational strategy to align with revised priorities	Date	Date	Oct 27, 2014	Oct 27, 2015	–	–	–
		Implementation of agreed milestones of approved Mitigating Strategies for Reduction of potential risk of corruption (MSC)	% of implementation	%	100	100	95	95	95
		Implementation of agreed milestones for ISO 9001	% Implementation	%	100	100	95	95	95
		Implementation of agreed milestones of approved Innovation Action Plans (IAPs)	% Implementation	%	70	100	–	–	–

Success indicators added this year onward

Section 4(a): Acronyms		
S.No.	**Acronym**	**Description**
1.	R & D	Research and Development
2.	NIRJAFT	National Institute of Research on Jute & Allied Fibre Technology
3.	EDP	Entrepreneurship Development Programme
4.	CRIJAF	Central Research Institute for Jute and Allied Fibres
5.	JCI	Jute Corporation of India
6.	NABARD	National Bank for Agriculture and Rural Development
7.	NGO	Non Government Organization

Section 4(b): Description and definition of success indicators and proposed measurement methodology					
S. No	**Success indicator**	**Description**	**Definition**	**Measure ment**	**General Comments**
1.	Breeder and commercial samples (fibre, yarn, fabric etc.) tested for quality evaluation	Quality evaluation of jute and allied fibres under various agricultural trials under "All India Network Research Project on Jute & Allied Fibres" finally aims to select varieties and treatments which produce fibres of good quality and also have good yield for variety release and treatment recommendation to the farmers. Commercial samples received from industries and export houses are also tested	Evaluation of physical and chemical parameters of fibre, yarn, fabric, composites, paper etc. for quality assessment	Number of samples	All the tests/evaluatio ns are done as per the requirement of stakeholders following standard methods
2.	New equipment fabricated for supply to stake holders	Jute grading instruments viz. Strength tester, fineness tester, colour and lustre meter, bulk density tester, yarn hairiness counter, thermal insulation tester etc. developed by ICAR-NIRJAFT are fabricated against supply order	Instruments for determination of strength, fineness, colour, bulk density, hairiness, thermal insulation value etc. of fibre and fibrous structures (yarns, fabrics etc.)	Number of Equipments/ Instruments fabricated	Instruments developed at ICAR-NIRJAFT are fabricated and supplied against order

Section 4(b): Description and definition of success indicators and proposed measurement methodology					
S. No	**Success indicator**	**Description**	**Definition**	**Measure ment**	**General Comments**
3.	New product/ machine/instrume nt/ technology developed	Technology/process development for new products from jute/allied fibres and their blends with fibres of natural and man-made origin using cutting edge technologies e.g., nano and bio technology, compact spinning etc. Designing of suitable textile structures for biocomposite geo/agro textile applications; machinery and instrument development for better process control	To diversify application of jute and allied fibres in value added applications and improvement of existing product range in terms of quality and production efficiency; upgradation of machineries and instrumentations for process control leading to superior products at higher efficiency	Number of technologies	To utilize jute and allied fibres in wide and diverse areas by exploiting the intrinsic and advantageous properties of the fibres and converting the demerits whatsoever into merits by application of scientific tools through development of technologies, products and processes for the benefit of farmers, artisans and industries of both large and small scales
4.	Number of Instruments/Tech no-logy refined/ upgraded under different project	Institute has developed many instruments viz. Fibre Bundle Strength Tester, Fibre Fineness Tester, Moisture Metre, Jute Ribboner and these instruments are upgraded by interfacing with computers Institute has also developed many technologies in the field of jute & allied fibres. These technologies are refined/modified after certain duration	ICAR-NIRJAFT instruments are upgraded for determination of different quality parameters of fibres ICAR-NIRJAFT technologies are refined for preparation of quality products	Number of instruments & technologies upgraded or refined	ICAR-NIRJAFT has upgraded/ refined number of instruments/ technologies

Section 4(b): Description and definition of success indicators and proposed measurement methodology					
S. No	Success indicator	Description	Definition	Measure ment	General Comments
5.	Programmes organised	Frontline demonstration, field and industrial trial, training programmes, workshops, talk delivered, seminars, EDP	To commercialize the technologies, entrepreneurship development and to promote public-private partnership; it is envisaged to make awareness through training, demonstration, entrepreneurship development programme	Number of programs organised	These programmes are based on different technologies developed at the institute and are conducted for transferring technologies

Section 5: Specific performance requirements from other departments that are critical for delivering agreed results		
Location Type	**Urban**	**Urban**
State	Delhi	West Bengal
Organisation Type	Government	Government.
Organisation Name	Department of science and technology	Development Commissioner for Handicrafts
Relevant Success Indicator	New product/ machine/instru-ment/ technology developed	Programmes organised
What is your requirement from this organisation	Project sponsorship	Programme sponsorship and identification of trainees
Justification for this requirement	Broadening of our research areas	For identification of proper /appropriate participants
Please quantify your requirement from this Organisation	Two R&D projects	Sponsorship of eight (8) programmes per year
What happens if your requirement is not met?	Have to search for alternative sponsors.	To search for alternate organisations

Section 6: Outcome / Impact of activities of Department /Ministry									
S. No.	Outcome /Impact	Jointly responsible for influencing this outcome / impact with the following organization(s)/ department(s) / Ministry(ies)	Success indicator(s)	Unit	2014 - 2015	2015 - 2016	2016 - 2017	2017 - 2018	2018 - 2019
1	Scientific grading of jute fibre	Ministry of textiles, Jute Industry, ICAR-CRIJAF, JCI	Share of total jute fibre produced which is graded scientifically	%	5	5	5	5	5
2	Alternative products for jute /other industries	Jute Industry, National Jute Board, Cottage and Small Scale Industry	Enhancement of production of jute crop based diversified products	%	2.2	2.4	2.4	2.5	2.5
3	Human resource development	Ministry of Textiles, NABARD, NGOs	Skilled/Trained manpower developed	Number	300	400	500	600	700

Target setting								
S. No.	Success Indicators	Past achievements of the success indicators					Average	Projected value of the success indicator for 2016-17 as per the RFD 2015-16
		V 2011-12	IV 2012-13	III 2013-14	II 2014-15	I 2015-16		
1.	Breeder and commercial samples (fibre, yarn, fabric etc.) tested for quality evaluation	344	200	382	415	466	361	405
2.	New equipment fabricated for supply to stake holders	4	4	4	6	5	5	7
3.	New product/ machine/ instrument/ technology developed	4	5	6	6	7	7	7
4.	Instruments/technology refined/ upgraded	4	5	6	1	4	4	4
5.	Programmes organised	20	10	10	22	24	17	18

Classification of the success indicator according to its category							
S. No.	Success Indicator	Input	Activity	Internal Output	External Output	Outcome	Measures Qualitative Aspects
1.	Breeder and commercial samples (fibre, yarn, fabric etc.) tested for quality evaluation	False	False	False	True	False	False
2.	New equipment fabricated for supply to stake holders	False	False	False	True	False	False
3.	New product/ machine/instrument/ technology developed	False	False	True	False	False	False
4.	Instruments/technology refined/ upgraded	False	False	True	False	False	False
5.	Programmes organised	False	False	True	False	False	False

Institutional Activities





Visit of Union Minister of Agriculture and Farmers Welfare

Shri Radha Mohan Singh, Hon'ble Union Minister of Agriculture and Farmers' Welfare, Government of India, visited the institute on June 21, 2016. He visited the institute's facilities, pilot plants and diversified products developed by the institute especially on home

textiles and technical textiles He appreciated the efforts taken by the institute and emphasized on marketing of jute diversified products both at national and international level. He also has keen interest in products displayed in the institute's Display-cum-Sales Counter. Also the Hon'ble Minister addressed the staff members. During his address, the minister highlighted that institute should maintain a harmonious environment and employees can work together and punctually. Then he addressed a press conference and elicited his views on increasing awareness on jute and its products among the people

ABI Inaugural workshop

Agri Business Incubation Centre of ICAR-National Institute of Research on Jute and Allied Fibre Technology organized a workshop on "Agri-Business Incubation" on 15th June 2016. Dr. Trilochan Mahapatra, Secretary DARE & Director General, ICAR was the Chief Guest and Dr. Joykrushna Jena, DDG, Fisheries, ICAR, Dr. S.Saxena, ADG (IPTM), ICAR and Swami Vishwamayananda, Secretary, Ramakrishna Mission Ashram, Sargachi were the Guest of Honour . About 25 jute diversified product manufacturers were participated. Four MOU and Four MOA were signed between ICAR-NIRJAFT and different jute diversified product manufacturers. The ABI unit at ICAR-NIRJAFT was giving thrust to provide facilities like office infrastructure, laboratory, pilot plant, and other Commercial facilities. This satisfied the need of the

entrepreneurs that stays in incubation for a period sufficient to overcome risk and instill confidence among them. Two books entitled "Jute Card Design" authored by Dr.PK.Das and Dr. D.Nag and "Book on Technology Profile" authored by Agri-Business Incubation were released. There are four MoUs and MoAs between Kamala Multi-Purpose Farming Marketing & Producer Society, Paschim Medinipur, Milltex Ecofibres P. Ltd, Joy Maa Tara Enterprise and Mr. Sourav Chowdhury regarding various technologies exchanged. Dr. T. Mohapatra, Secretary DARE & DG-ICAR launched ABI website and was launched and visited the incubation centers. Dr. A.N. Roy, PI, ABI and Head-ToT welcomed all dignitaries.

Scientists-Farmers Interface

A Scientists - farmers interface was organized under CRP-01 Project on March 2, 2017 and twenty one farmers from Pukhuria Village, Chapra Block, Nadia District, West Bengal have attended. Dr. S.Debnath, welcomed the farmers, elaborated the R&D works of this institute and the objectives of this interface. Dr.G. Roy, Director (Acting), stressed upon the importance of processing & value addition in jute & allied fibres. Dr. AN. Roy, Head-ToT has briefed the various training programmes on jute handicrafts & other value added products given by the institute. Dr. DP. Ray, Senior Scientist highlighted upon the accelerated retting technology and urged the farmers to adopt this new technology for getting quality fibres. Dr. SC. Saha, Senior Scientist explained the new grading system for jute fibre. Scientists discussed with farmers on the issues related to extraction, retting, grading, chemical processing & mechanization in jute & allied fibres. Farmers have keen interest in the latest developments in extractors, improved retting technologies & grading instruments. Dr.LK.Nayak, Senior Scientist & PI-CRP-01 coordinated the programme and Dr.VB. Shambhu, Senior Scientist offered a hearty vote of thanks to all the participants.

Participatory technology development on PALF

A two days participatory technology development-cum-training programme on Extraction, processing and product development from pineapple leaf fibre sponsored by Meghalaya Institute of Entrepreneurship, Government of Meghalaya was organized on May 3-4, 2016. Ten women from a Self Help Group and two officials from Meghalaya Institute of Entrepreneurship, Government of Meghalaya have participated.

Dr. AN. Roy, Head-ToT & Course Director welcomed the participants and briefed about the training programme. Important aspects of pineapple leaf fibre extraction, mechanization in fibre extraction, improved retting methods, scouring & bleaching of fibre and product development were taught through lecture class and demonstration. Participants visited different laboratories of the institute. An interaction on R&D activities on pineapple lead fibre was held between trainees and scientists under the chairmanship of Dr. D. Nag, Director and he also distributed certificates to the participants for their successful completion. Dr. LK. Nayak, Senior Scientist coordinated the training programme.

Participatory technology development program on Power Ribboner

A Participatory Technology development programme for Improvement in Power Ribboner in collaboration with KVK Hooghly, West Bengal was organized at KVK Hooghly, Chinsura, Hooghly on August 31, 2016. A total of 25 jute growing progressive farmers from Ichapur, Balagarh, Kolyan shree, Inchura, Basna, Kabura, Tildanga, Damargachha, Baksagarh and Bakulia of Balagrh block have participated and actively interacted in this program. Dr.AK.Chowdhury, In-Charge, KVK Hooghly welcomed the participants , Dr. AN. Roy, Head-ToT, ICAR-NIRJAFT briefed about the program, Dr. VB.Shambhu described the features of the power ribboner. Dr. VB.Shambhu, Senior Scientist & Dr. RK.Ghosh, Scientist coordinated the program.

Training on handicrafts

A training program on "Manufacture of Jute Handicrafts" was successfully organized by ICAR-NIRJAFT in collaboration with District Industries Centre, Raiganj, Uttar Dinajpur at DIC, Raiganj during March 20-25, 2017. The training program was inaugurated by General Manager, DIC, Raiganj. He welcomed all the participants and complemented the effort of ICAR-NIRJAFT, Kolkata. Dr. AN. Roy, Principal Scientist & Head ToT, has briefed the Institute activities and the training program. Twenty participants associated with agro-based craft works of Uttar Dinajpur district have participated in this programme.

Capacity building program

ICAR-National Institute of Research on Jute and Allied Fibre Technology, Kolkata successfully conducted a winter school on "Value addition in jute and allied fibres through product diversification & waste utilization" from 15th September to 5th October 2016. Prof. Purnendu Biswas, Vice-Chancellor, West Bengal University of Animal and Fishery Sciences, Kolkata was Chief Guest for the Inaugural Function of the winter school. Prof. Biswas emphasized that successful dissemination of technologies on value addition of jute and allied fibres could improve their utilisation and it leads to more revenue generation of farmers in the country for their sustainability.

There are 23 participants (17 male and 6 Female) from five states of the country participated in the Winter School. They belonged to the disciplines of Textile Manufacture, Textile Chemistry, Textile Clothing, Agricultural Engineering,

Mechanical Engineering, Agronomy, Seed Technology, Plant Genetics & Breeding. This winter school covered different aspects on value addition and waste utilisation of jute and allied fibres like jute cultivation, jute retting, jute ribboner, IPM, jute grading, products development through spinning, weaving and knitting, jute agro-textiles, jute based biocomposite, natural dye application, pulp & paper, allied fibre extractors, handloom designing, Intellectual property rights, business incubation and economics of jute diversified products manufacturing.

There are 34 lectures by experts in different aspects of value addition & waste utilisation on jute and allied fibres, three field visits related to jute spinning, jute diversified production and cultivation of jute and allied fibres in Kolkata and Barrackpore, and nine demonstrations conducted in the Winter School.

Lecture delivered by expert

Jute Mill Visit

Valedictory function

Certificate distribution

An objective type examination related to jute and allied fibres was conducted for participant trainees. Trainee participants made into groups and presented their presentation related to the theme of the winter school. Dr. Asit Kumar Chakravarti, Ex-Vice Chancellor, Bidhan Chandra Krishi Viswa Vidyalaya, West Bengal was distributed certificates to the participants of the winter school as Chief Guest in the valedictory function

Technology and Machinery Demonstration Mela

ICAR-NIRJAFT organized "Technology and Machinery Demonstration Mela" at Krishi Vigyan Kendra (KVK), Jagatballavpur, Howrah, West Bengal on May 27, 2016. Prof.AK.Ray, Director, Indian Institute of Engineering, Science and Technology (IIEST), Shibpur, Howrah, graced the occasion as Chief Guest and Dr. S.K. Roy, Director, Agricultural Technology Application Research Institutes (ATARI), Zone-II, Kolkata, Dr. T. K. Dutta, Principal Scientist & Head, NDRI Regional Centre, Kalyani, Dr. K.K. Satapathy, former Director, ICAR-NIRJAFT, Dy. Director of Agriculture, Howrah and local Block Development Officer (BDO) were graced the program as Guests of Honour. Dr. D.Nag, Director, ICAR-NIRJAFT welcomed the guests and farmers and described the different technologies available for demonstration. The guests appreciated the efforts made by ICAR-NIRJAFT for organization this event and it would directly benefit the farmers in this region and provide them information about different machines and technologies developed for entrepreneurship development. A quiz competition specifically on Agriculture and allied activities was also arranged in the afternoon session and 50 successful participants were rewarded to create awareness among the farming families. The programme ended with a cultural programme staged by the staff of KVK, Jagatballavpur, Howrah.

79th Foundation day celebration & 4th CR.Nodder memorial lecture

Institute celebrated the 79th Foundation Day on January 3, 2017 and the function was inaugurated by Hon'ble Shri Sudarshan Bhagat, Minister of State for Agriculture and Farmer's Welfare, Government of India. Dr. G. Roy, Director, welcomed all the delegates and described briefly the salient achievements of the institute infrastructural developments. The foundation day lecture was delivered by Dr. K.K. Satapathy, Former Director, ICAR-NIRJAFT and he elaborated the growth of the institute from Indian Central Jute Committee to National Institute. Also he presented the current of jute fibre utilisation and its future trends. Shri Sudarshan Bhagat congratulated all staff of NIRJAFT for their contribution in achievements of the institute. A scientific Hindi journal "DEWANJALI" was released by the Hon'ble Minister in this occasion.

The 4th C.R. Nodder memorial lecture was delivered by Dr. S. Sreenivasan, Former Director, ICAR-CIRCOT, Mumbai and he focussed the newer pathways for lignocellulosic natural fibres to contribute to energy & environment. He emphasised the eco-friendliness of different lignocellulosic fibre and its utilization for production of bio-energy. In the presidential address Dr. R.P. Kachru, Former- ADG (PE), ICAR, New Delhi elaborated the need for natural fibres and alternative sources of energy in jute processing. A brief cultural programme was organized by staff members of the institute. Representatives from nearby ICAR Institutes, a large numbers of retired employees and all the present staff of the institute were present in the celebration. The programme was ended by hearty vote of thanks by Dr. SN.Chattopadhyay, Principal Scientist & Chairman of the Organizing Committee.

Lighting by Hon'ble Shri Sudarshan Bhagat

Guest at Dias in 79th foundation day

Speech by
Hon'ble Shri Sudarshan Bhagat

Memento to Dr. KK.Satapathy

Speech by Dr. S.Sreenevasan

Guest at Dias in
4th CR.Nodder memorial lecture

Awards for stall

After successful exhibiting the institute' stalls and disseminating the products & technologies of the institute in various programs, it was appreciated by the organiser and awarded with prize in different occasions

3rd Prize for NIRJAFT stall at Sasya Shyamla Krishi Vigyan Kendra, Sonarpur

3rd prize for NIRJAFT stall at
Ghosaldanga village, Santinekaten, Birbhum

2nd Prize for NIRJAFT stall at KVK Hooghly, Chinsura

Demonstration of technologies to stakeholders by Shri. S.Das, Scientist

Vigilance Awareness Week

ICAR-NIRJAFT is observed "Vigilance Awareness Week" program in the institute from 31st October to 5th November 2016. On October 31, 2016 all staff members took pledge to eradicate the corruption. Also a week long program like debate competition, quiz competition, essay writing competition was organised in the institute for the staff members as well as in a nearby school for school children to give awareness on corruption. On November 5, 2016, closing ceremony for vigilance awareness week was held in which Dr. NC. Pan, Vigilance Officer has given welcome address; Dr. G.Roy, Director (Acting) elaborated the importance of vigilance on corruption. The chief guest Mr. B.B. Chakraborty, Deputy Superintendent of Police, Crime Branch, CBI has given the overview Government Rules and regulation on vigilance. He explained that the initiative to eradicate corruption should be started from school level and issued awards to winners of the competition. Dr. L.K. Nayak, Senior Scientist proposed vote of thanks.

Visit of Shri Chhabilendra Roul, Additional Secretary, DARE & Secretary ICAR

Shri Chhabilendra Roul, Additional Secretary, DARE & Secretary ICAR, visited ICAR-NIRJAFT, Kolkata on 2nd April, 2016. Dr D.Nag, Director welcomed the Secretary and mentioned his active association with Jute. He addressed the staff members and stressed them to follow FR-SR and GFR rules & provisions in official activities. He advised to make more transparency in procurement and recruitment.

Shri Roul visited the laboratories and he also took keen interact in the technologies developed and congratulated the concerned scientists. Simultaneously he urged all scientists to disseminate their technologies more aggressively and he assured that he would extend all supports to our institute. Mr. Rajeev Lal, CAO proposed the vote of thanks

Panel discussion on Natural fibre based diversified products: Imperatives for growth

ICAR-NIRJAFT has organized a panel discussion on "Natural Fibre based Diversified Products-Imperatives for Growth" in collaboration with The Indian Natural Fibre Society (TINFS) at institute auditorium on April 2, 2016. Dr D Nag, Director welcomed all the delegates. The programme was chaired by Shri. Chhabilendra Roul, IAS, Additional Secretary, DARE & Secretary ICAR, GOI; Prof. (Dr.) Sabu Thomas, International & Inter University Centre for Nanoscience & Nanotechnology (IIUCNN) & International Unit on

Macromolecular Science & Engineering (IUMSE), Mahatma Gandhi university, Kerala; Shri Arvind Kumar M, Secretary, National Jute Board, Ministry of Textiles, GOI; Shri O.P. Prahaladka, Director & National Convenor (ER), Export Promotion Council for Handicrafts, Dr. D.Sur acted as a moderator of the Panel discussion.

Shri C. Roul, IAS, delivered a lecture on sustainability of jute diversified products (JDP) with special attention on paper and pulp sector, geo-textiles and composites. Prof. (Dr.) S. Thomas discussed the use of natural fibres in composites and immense potential of nanocellulose in frontier applications. Shri M.Arvind Kumar discussed the futuristic approaches/policies for jute geotextiles (JGT) in road constructions and outreach programmes for promotion of natural fibres. Shri OP.Prahaladka emphasized that jute could be used as life style products through proper value additions. Important issues like agro textiles, geo-textiles, quality jute products for diversified sector, long term training instead of short term training for capacity building, new entrepreneur development and finally, industry-trade-institute joint actions to overcome the constraints in JDPs were discussed. About 130 participants from different organizations like ICAR-NIRJAFT, Kolkata; ICAR-CRIJAF, Barrackpore; Government College of Engineering & Textile Technology, Serampore; Department of Jute & Fibre Technology, Calcutta University; National Jute Board, GOI and members of TINFS were participated.

Innovation Cell activities

Innovation Cell of ICAR-NIRJAFT organized three brainstorming lectures in this year. The first lecture on "Innovations in engineering technology design, dissemination and commercialization" was delivered by Dr. Indra Mani Mishra, Head, Division of Agricultural Engineering, IARI, New Delhi on August 17, 2016. He briefly described that an innovation is characterized by newness, economical, low cost and meant for solving a specific problem and it might come from anyone –Irrespective of age/qualification. He also highlighted that our government initiated to establish Design Innovation Centres to

promote a culture of innovation and creative problem solving, to promote knowledge sharing, and to enhance interdisciplinary design-focussed education, research & entrepreneurial activities. Such a centre is being established at IARI with the hand holding of IIT-Kanpur.

Dr. G. Roy felicitated
Dr. Indra Mani Mishra

Dr. Raj Kachru delivered the lecture

The second brainstorming lecture on "Innovation thru' Matrix R&D Approach in Jute Sector" was delivered by Dr. Raj Kachru, Ex-Assistant Director General (Process Engg. & ARIS), ICAR and Former Member (AGM, ICAR) on November 4, 2016. He briefly mentioned the importance of jute sector in Indian economy and in future jute diversified products would be focused in different application over the mandatory packaging material. He emerged that there is a need of entrepreneurial support & greater synergy with Govt. vis-a-vis technology up gradation & modernization. Indeed emphasis was given on developing new and non-traditional markets by exploiting the versatility of Jute & Allied Fibres through multidimensional and multi-fibres research approach.

The third brain-storming lecture was delivered by Dr. Nabarun Bhattacharyya, Director, C-DAC, Kolkata on Electronics and ICT Applications for Agriculture on March 24, 2017. He disseminated the important technologies developed from Centre for Development of Advanced Computing (C-DAC) is the area of textiles and chemistry. He also focussed on future R&D projects collaboration between C-DAC and ICAR-NIRJAFT.

Swachh Bharat Abhiyan

Weekly sanitation and cleanliness drive being carried out by the officials under "Swachh Bharat Abhiyan" every Tuesday and the staff members of one division/section/cell of the Institute came forward to take up cleaning of their working place/rooms in that division/ section/ cell. DDM arranged two different colored dustbin baskets in different rooms of

each Division/Section/cell for collection of bio-degradable (paper, jute waste etc.) and non-bio-degradable waste. The bio-degradable waste then be recycled and put to use.

Swachh Bharat Pakhwara

First Swachh Bharat Pakhwara was celebrated in this institute from 16th to 31st May, 2016 and all staff members of Institute get together and took Pledge at the Institute lawn on May 16, 2016. After pledge, staff members cleaned the Institute premises and outside periphery of Institute. Special focus has been given that organic wastes will be disposed in the compost pit to utilize for fertilizers and applied it in the garden and achieved the result successfully. Extensive cleaning of NIRJAFT office and work place all the staff of Instituted devoted for cleaning of 30 minutes during "Swachhta Pakhwara from 16th to 31st May, 2016. Employees of NIRJAFT participated in the competition and contributed slogan, poem, drawing, painting and banner on theme Swachh bharat Pakhwara. One day Yoga class under guidance learned teacher with his team was organised for staff of the Institute on June 21st,2016 .

Second Swachh bharat Pakhwara was celebrated in this institute from 16th to 31st October, 2016. A medical camp organized in collaboration with Apollo Clinic was organised in the Institute to check up health of individual staff by checking health. Institute organized extempore competition of all the staff on life and teachings of Mahatma Gandhi at

Institute auditorium and winners have been awarded on that day. Employees of NIRJAFT participated in the competition and contributed slogan, poem, drawing, painting and banner on theme Swachh bharat Pakhwara and best three performers of individual item won the prizes

Mera Gaon Mera Gaurav program

Under MGMG program, ICAR-NIRJAFT has adopted 25 villages belongs to Howrah, Hooghly, Nadia, North 24 Parganas and South 24 Parganas and each village has been allotted to a scientist of the institute for adoption by disseminating required information , guidance and awareness through lectures, demonstration and training. The following activities have carried during this year under the guidance of Dr. S.Debnath, Principal Scientist & Nodal Officer, MGMG and the details of different programs are given in the table

Program	Village / Block covered	Venue	Duration	Participants
Training program on Jute Handicrafts	Ayda, Jhurul Ruprajpur, Siyakhala, Uttar Simla & Kantul	KVK Hooghly, Chinsura	June 20-25, 2016	20 female participants
Training program on Jute Handicrafts	Bhawanipur, Satyapal & Panchakanya under KVK, Nadia	Bhawanipur Horticulture Development Co-operative Society Ltd., Bhawanipur, Nadia, West Bengal	August 08-13, 2016	15 female participants
Demonstration on Jute power ribboner	Damorgacha, Icchapur, Guptipara Polba villages of Hooghly district	KVK-Hooghly, Chinsura	August 22-27, 2016	135 farmers
Scientist-farmer discussion on post harvest processing of jute	Damorgacha, Icchapur, Guptipara Polba villages of Hooghly district	KVK-Hooghly, Chinsura	August 29, 2016	50 farmers
Awareness program of Jute diversification	Bhawanipur, Satyapal & Panchakanya under KVK, Nadia	Bhawanipur Horticulture Development Co-operative Society Ltd., Bhawanipur, Nadia, West Bengal	November 15, 2016	15 female participants
Awareness program on Extraction and utilisation of banana fibre and prospects in handicrafts	Talpukur under KVK, Nadia	Talpukur, Barragachi, Sonarpur, South 24 Parganas	December 31, 2016	25 female farmers

Program	Village / Block covered	Venue	Duration	Participants
Awareness program on Extraction and utilisation of banana fibre and prospects in handicrafts	Talpukur under KVK, Nadia	Talpukur, Barragachi, Sonarpur, South 24 Parganas	December 31, 2016	25 female farmers
World soil day	Bhawanipur, Satyapal & Panchakanya under KVK, Nadia	Bhawanipur Horticulture Development Co-operative Society Ltd., Bhawanipur, Nadia, West Bengal	December 05, 2016	31 farmers
Jute geo textile mulching field trial on summer tomato	Ayda, Jhurul, Ruprajpur, Siyakhala Uttar Simla villages of Hooghly district	KVK-Hooghly, Chinsura	February 12, 2017	30 farmers
Awareness program on Value added jute handicraft products	Bhawanipur, Satyapal & Panchakanya under KVK, Nadia	Bhawanipur Horticulture Development Co-operative Society Ltd., Bhawanipur, Nadia, West Bengal	March 25, 2017	20 progressive farmers (14 female and 6 male)

Agro Textiles Demonstration at KVK, Chinsura

Awareness on jute at Talpukur

Jute handicraft training at Bhawanipur

Awareness on jute handicraft products

World soil day at Bhawanipur

Awareness programme on Jute at Bhawanipur


হুগলি জেলায় পাটজাত দ্রব্যের বিক্রয়কেন্দ্র
নির্মাণ ও স্বনির্ভর গোষ্ঠীদের ভাতা প্রদানের দাবি

MGMG Information in local newspaper

Brainstorming workshop on Production and Grading of Ramie

A Brainstorming workshop on Production and Grading of Ramie Fibre was held at Biswanath College of Agriculture on 30.11.2016 under the Chairmanship of Dr. P. K. Das, Principal Scientist, Regional Agricultural Research Station, AAU, Shillangani, Nagaon, Assam in association with ICAR-NIRJAFT and Biswanath College of Agriculture, Assam Agricultural University. Three scientific lectures were delivered on different aspects of production, grading and instrumentation by Dr. H. C. Bayan, Professor Agronomy of BNCA followed by Dr. S. C. Saha, Senior Scientist of NIRJAFT, Kolkata and by Dr. G. Roy, Director, NIRJAFT, Kolkata respectively. Stakeholders from various RARS, KVKs, Institutions under Assam Agricultural University and Officials from State Department of Agriculture, NGOs and Progressive Farmers were actively participated.

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- Roy G, Ray DP, Saha SC, & Sarkar A, *Accelerated retting of Mesta for Economic Fibre Yield*, Workshop on Comprehensive Mesta and Bimli Grading System , ICAR-NIRJAFT & ARS, Viziangaram Farmers Training Centre at Viziangaram on 28-30 January 30, 2017
- Roy G, Saha SC, Sarkar A, & Sardar G, *Development of grading system and automated grading instruments for mesta (Hibiscuc sp.) fibre*, 30th National Convention on Textile Engineers & National seminar on Intervention of frontier technologies in textile and jute sector , organized by The Institution of Engineers (India). West Bengal State Centre at Kolkata, March 3-5, 2017.
- Roy G, Saha SC, Sarkar A, Sardar G and Ray DP, *Grading and Instrumentation of Ramie Fibre*, All India Seminar on Post Harvest Management of Fruits and Vegetables at Kolkata organized by Agricultural Engineering Division, West Bengal State Centre, The Institution of Engineers (India) at Kolkata on June 1-2, 2016
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- Samanta KK, & Pan NC, *Nano-finishing of Cellulosic and Lignocellulosic Textiles*, 30th National Convention on Intervention of Frontier Technologies in Textile and Jute Sector organized by The Institution of Engineers (India). Kolkata, March 3-5, 2017.
- Samanta KK, Teli MD, Pandit P, & Pan NC, *Sustainable Dyeing and Finishing of Textile*

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- Shambhu VB, *Improved Technology for extraction of fibres from Jute & mesta plants in low volume of water*, Academia-Industry Interaction meet for Eastern Region organised by ICAR-CIAE, Bhopal at ICAR- RCER, Patna on 28th June 28, 2016
- Shambhu VB, Nayak LK, Das S, & Sanyal P, *Comparative performance study of different jute fibre extractors*, International Symposium on Eco-Efficiency in Agriculture & Allied Research (EEAAAR'2017) organised by Crop & Weed Science Society (CWSS), Bidhan Chandra Krishi Viswavidyalaya (BCKV)in collaboration with Farmers Academy & Convention Centre (FACC) at BCKV, Kalyani on 20-23 January, 2017
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- Shambhu VB, Nayak LK, Das S, & Sanyal P, *Quality Fibre Production from Jute & Mesta through Mechanical Intervention*, International Conference on Textile and Clothing:

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- Shambhu VB, Nayak LK, Das S, and Sanyal P, *Development of Ribboner Machine for Quality Fibre Production from Jute & Mesta Plants*, 11th All India People's Technology Congress Forum of Scientists, Engineers and Technologists (FOSET) at National Institute of Technical Teachers Training & Research, Kolkata on 3 February, 2017

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- Ammayappan L, Seiko Jose, Chakraborty S, and Pan NC, *An overview on functional finishing of woollen textiles*, National Seminar on "Improvement of Small Ruminant Production System for Livelihood Security" at ICAR-Central Sheep and Wool Research Institute (CSWRI), Avikanagar on March 10, 2017
- Basu G, *Indian Wool: Future Perspective*, National Seminar on "Improvement of Small Ruminant Production System for Livelihood Security" at ICAR-Central Sheep and Wool Research Institute (CSWRI), Avikanagar on March 10, 2017
- Basu G, *Use of jute agrotextiles field of agriculture and forestry*, Indian Jute Mills Association and National Jute Board at Hotel Green Park, Chennai, 20th January, 2017
- Nayak LK, *Value addition to banana pseudo-stem through extraction of fibre*, Workshop on process utilisation and value addition of underutilised fruits & vegetables (PSVAUFV), Technical Education Quality Improvement Program (TEQIP-II), Department of Agricultural Engineering, Triguna Sen School of Technology, Assam University, Silchar, September 9-11, 2016.
- Nayak LK, *Value addition to pineapple through extraction of fibre*, Workshop on process utilisation and value addition of underutilised fruits & vegetables (PSVAUFV), Technical Education Quality Improvement Program (TEQIP-II), Department of Agricultural Engineering, Triguna Sen School of Technology, Assam University, Silchar, September 9-11, 2016.
- Ray DP, *Conversion of jute biomass into energy and value added products, Faculty Development Programme*, Department of Chemical Engineering, C.V.Raman College of Engineering at Bhubaneswar on 8 December, 2016

- Ray DP, *Sustainable management of jute-agrowaste for development of value added products*, International Conference on Sustainable Natural Resource Management: from Science to Practice (SNRMSP), Organized by Varanasi Chapter of Indian Society of Agricultural Engineers, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi on January 12-13, 2017
- Roy G, *Development of electronic instruments field of jute & allied fibres*, National Symposium on Recent Trends in Biopolymers , organised by ICAR-Indian Institute of Natural Resins and Gums at Ranchi , February 17-18, 2017

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- Roy AN, Nayak LK, and Ammayappan L, Training Manual of ICAR sponsored Winter School on *"Value addition in Jute & Allied Fibres through product Diversification & Waste Utilization"* organized at ICAR-National Institute of Research on Jute & Allied Fibre Technology, Kolkata during 15th September to 5th October, 2016, pp.415

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- Saha S. C. & Debnath S, *Jute Handicrafts*, ICAR-NIRJAFT, Kolkata, August, 2016.
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- Shambhu VB, 2017. *Gunavatta Resha Utpatdnarth NIRJAFT Power Ribboner*, Agri-Business Incubation, ICAR-NIRJAFT, Kolkata.
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PATENT(S) GRANTED

- Patent entitled *"A method of reactive dyeing of jute fabric by two-step two-bath operation"* by Dr S N Chattopadhyay, Dr. N C Pan & Dr A Day was granted by The Patent Office, New Delhi on 21.04.2016. Patent Number – 272713

PATENT(S) FILED

- Patent entitled *"Pig hair based biocomposite and a method for its preparation"* by Mohan NH, Ammayappan L, Dilip Kumar, S and Nag D with patent number KOL 12856/2016 was e-filed on 04.08.2016
- Patent entitled *"A Double Roller Banana Pseudo-Stem Fibre Extractor"* by Nayak LK, Sambhu Vb, and Saha SC with patent number KOL 201631031921 was e-filed on 19.09.2016

PARTICIPATION IN MEETING / WORKSHOP/ CONFERENCE

Program	Organized by	Date	Participants
Panel discussion on Natural Fibre Based Diversified Products-Imperatives for Growth	ICAR-NIRJAFT at Kolkata	April 02, 2016	All Scientists & Technical Officers
Meeting on Ramie extraction and degumming	ICAR NIRJAFT at Sarbhog, Assam	April 5-8, 2016	D P Ray
12th Board meeting of National Jute board	NJB at Udyog Bhavan, New Delhi	April 11, 2016	A N Roy
Zonal Workshop cum Interaction Meet on ICAR-NAIF Innovation & Incubation Projects for SMD Engg. Institute of ICAR	ICAR-CAIE at Bhopal	April 11-12, 2016	S Debnath
3rd Meeting of the Indian grain storage working group on Grain Storage and Preventing Post Harvest Losses	Indian grain storage working group, AE Division, ICAR , CCF of India and Centre for Environment & Agriculture at New Delhi	April 22- 23, 2016	D Nag G Basu

Program	Organized by	Date	Participants
1st Workshop on Agri Business Incubation (ABI)	ICAR-NIRJAFT at Kolkata	April 28, 2016	A N Roy S Debnath S N Chattopadhyay
Participatory Technology Development- Cum – Training Programme on Extraction, processing and product development from pineapple fibre	ICAR-NIRJAFT at Kolkata	May 3-4, 2016	All Scientists
Meeting of the Indian Society of Agricultural Engineers (ISAE) - Kolkata Chapter	ISAE-Kolkata Chapter at Faculty of Agricultural Engineering, BCKV, Mohanpur	May 06, 2016	L K Nayak V B Shambhu
Meeting with the Members, Project Implantations Unit (PIU) of CRP on Natural Fibres and DDG (Engineering)	SMD (Engineering), ICAR, New Delhi at Krishi Anusandhan Bhavan, ICAR, New Delhi	May 09, 2016	L K Nayak
2nd Meeting of Raw Jute Price Fixation Committee	JCI at Kolkata	May 09, 2016	G Basu
The Millennium – 2016	FICCI at Bengal Chamber of commerce at Kolkata	May 10, 2016	S Das
Review Meeting of CRP projects	SMD (Engg), at KAB-II, ICAR, New Delhi	May 10, 2016	S N Chattopadhyay
Machinery-Cum–Technology Demonstration Mela	ICAR-NIRJAFT, Kolkata at KVK Howrah, Jagatballavpur, Howrah, WB	May 27, 2016	All Scientists & Technical Officers
All India Seminar on Post Harvest Management of Fruits & Vegetables	Agricultural Engineering Division of The West Bengal State Centre, The Institution of Engineers (India) at Gokhale Road, Kolkata	June 01-02, 2016	L K Nayak D Nag V B Shambhu L Ammayappan S Das
Brainstorming Workshop on Bridging the gaps in Gender Research	ICAR-Central Institute of Women in Agriculture at Bhubaneswar	June 01-02, 2016	S Debnath

Program	Organized by	Date	Participants
Launching Workshop on Agri-Business Incubation	ICAR-NIRJAFT at Kolkata	June 15,2016	All Scientists & Technical Officers
163rd Birthday celebration of Sir R.N. Mookerjee, the founder president of The Institution of Engineers (India)	West Bengal State Centre, The Institution of Engineers (India) at Gokhale Road, Kolkata – 700020	June 23,2016.	L K Nayak
31st Meeting of Jute and Jute Products Sectional Committee (TXD 03)	Kolkata	July 04,2016	G Basu
10th Meeting of Technical Textiles for Agro-tech Sectional Committee, TX 35 of Bureau of Indian Standards	BIS, New Delhi at SASMIRA, Mumbai	July 21,2016	S Debnath
29th Annual General Meeting of Forum of Scientists, Engineers and Technologists (FOSET)	FOSET at Institute of Cooperative Management for Agriculture & Rural Development (ICMARD), Kolkata	July 24, 2016	N C Pan
Training Programme on Manufacture of Jute Handicrafts	Agri Business Project of ICAR-NIRJAFT at KVK Hooghly at Chinsura, Hooghly	July 25, 2016	L K Nayak
Training programme on Agricultural Innovation Systems (AIS): Looking beyond ATMA Convergence	National Institute of Agricultural Extension Management, Hyderabad	June 27 to July 2, 2016	K K Samanta
Academia-Industry Interaction Meet for Eastern Region	Jointly organized by ICAR-CIAE, Bhopal and ICAR-RCER, Patna at Patna	June 28, 2016	L K Nayak V B Shambhu
Innovation Cell on Innovations in engineering technology design, dissemination and commercialization	ICAR-NIRJAFT at Kolkata	August 17, 2016	All Scientists & Technical Officers

Program	Organized by	Date	Participants
Lecture delivered by HE Mr.Alexandre Ziegler, Ambassador of France to India on Doing business with France	Confederation of Indian Industry at The Oberoi Grand, Kolkata	August 19, 2016	N C Pan G Basu
Meeting of Town Official Language Implementation Committee, Kolkata (Karyalay-2)	CSIR-Central Glass and Ceramic Research Institute, Kolkata	August 30, 2016	R D Sharma
Training Programme on Manufacture of Jute Handicrafts	Agri Business Project of ICAR-NIRJAFT, Kolkata at KVK Bhadrak at Bhadrak, Odisha	August 25, & August 30, 2016	A N Roy L K Nayak
International conference on Industrial Textiles – Products, Applications and Prospects	PSG College of Technology at Coimbatore	August 26-27, 2016	L Ammayappan
Institute Management Committee (IMC) meeting of ICAR-IINRG	ICAR-IINRG, Ranchi	August 30, 2016	S N Chattopadhyay
Participatory Technology development programme	ICAR-NIRJAFT & KVK Hooghly at Chinsura	August 31, 2016	A N Roy V B Shambhu R K Ghosh
Governing Body meeting of National Jute Board	NJB at TAJ Bengal, Kolkata	September 06, 2016	G Roy
Farmers – Scientists Interface	Agri Business Project of ICAR-NIRJAFT at Kolkata	September 08, 2016	All Scientists
Workshop on Process Standardization and Value Addition of Underutilized Fruits & Vegetables	Department of Agricultural Engineering, Triguna Sen School of Technology, Assam University at Silchar	September 11, 2016	L K Nayak
Workshop on ISO: 9001:2008	ICAR-NIRJAFT at Kolkata	September 14, 2016	K K Samanta V B Shambhu

Program	Organized by	Date	Participants
Winter school on Value addition in jute and allied fibres through product diversification & waste utilization	ICAR-National Institute of Research on Jute and Allied Fibre Technology, Kolkata	September 15 to October 5, 2016	K K Samanta R K Ghosh
National Workshop on Natural dyeing of textiles in batik and shibori style	TEIQIP Cell of University of Calcutta and DJFT, IJT, University of Calcutta at Kolkata	September 16-17, 2016	S N Chattopadhyay
Meeting on price policy for raw jute for the year 2017-18	JCI at Kolkata	September 19, 2016	S C Saha
Short Course on Synthesis and characterization of nanoparticles for agricultural Applications	ICAR-Central Institute of Cotton Research Technology at Mumbai	September 19-28, 2016	D P Ray
1st Half-yearly meeting of Town Official Language Implementation Committee, Kolkata (Karyalay-2)	CSIR-Central Glass and Ceramic Research Institute, Kolkata	September 28, 2016	R D Sharma
20th meeting of Geo-synthetics Sectional Committee (TX 30) in joint session with 9th meeting of Industrial Fabrics Sectional Committee (TX33)	Textile Committee, Mumbai	October 4, 2016	G Basu
Training Programme on Manufacture of Jute Handicrafts	Agri Business Project of ICAR-NIRJAFT, Kolkata at ICAR-CIWA, Bhubaneswar	October 17 & 22, 2016	A N Roy L K Nayak
One day workshop on Right to Information Management Information System	ICAR in collaboration with RTI-PMU Unit, DoPT at NASC Complex, New Delhi	October 21, 2016	L Ammayappan
Poorvanchal Krishi Pradarshani evam Kisan Ghosti	ATARI, Kanpur, UP at Chaukmmafi Village, Gorakhpur district, UP	October 23-24, 2016	S Das

Program	Organized by	Date	Participants
Innovation Cell Lecture on Innovations through Matrix R & D Approach in Jute Sector	ICAR-NIRJAFT at Kolkata	November 04, 2016	All Scientists & Technical Officers
Vigilance Awareness Program	ICAR-NIRJAFT at Kolkata	November 05, 2016	All Scientists & Technical Officers
10th International Conference on Controlled Atmosphere and Fumigation in stored products	CAF permanent committee in collaboration with ICAR, ISAE & ESI at Hotel The Ashok, New Delhi	November 06-10, 2016	G Roy A N Roy G Basu B Saha L K Nayak
Training Programme on Manufacture of Jute Handicrafts for mentally retarded children	Agri Business Project of ICAR-NIRJAFT, Kolkata at Behala Bodhayana, An association of parents of mentally retarded children Kolkata	November 21 & 26, 2016	A N Roy L K Nayak
Brainstorming Workshop on Ramie production & Grading	ICAR-NIRJAFT at Biswanath Chariyali Agricultural College of Assam Agricultural University, Assam	November 29, 2016	G Roy S C Saha D P Ray
National Seminar on MSME in Jute Sector	The Indian Natural Fibre Society (TINFS) at Rabindra Tirtha, Kolkata	November 25-26, 2016	All Scientists & Technical Officers
SERB Interaction Meeting on Developments in Atmospheric Pressure Non-thermal Plasmas & their Applications-2016	Utkal University at Puri	December 1-3, 2016	K K Samanta
Texsummit 2016 on Frontiers in fibres, textile and apparel processing	DFTPT, ICT, Mumbai at Exhibition Centre, Goregaon (E), Mumbai	December 5, 2016	N C Pan S N Chattopadhyay
Institute Management Committee Meeting (IMC) of CIRCOT	ICAR- CIRCOT, Mumbai	December 6, 2016	S N Chattopadhyay
International Textile Machinery Exhibition (ITME-2016)	ITME, Mumbai at Exhibition Centre, Goregaon (E), Mumbai	December 5-8, 2016	G Basu A N Roy N C Pan S N Chattopadhyay

Program	Organized by	Date	Participants
Kisan Mela - cum - Technology Demonstration	Sasya Shyamala Krishi Vigyan Kendra, Sonarpur at Arapanch, Sonarpur	December 14, 2016	L K Nayak S Das
One day national seminar on Recent developments in Textile Finishing	ICAR-Central Institute for Research on Cotton Technology & Indian Fibre Society at Mumbai	December 17, 2016	L Ammayappan
31st Indian Engineering Congress on SMART Technologies for Natural Resource Conservation and Sustainable Development	The Institution of Engineers (India) at Hotel J W Marriott, Kolkata	December 16-18, 2016	N C Pan S N Chattopadhyay S Sengupta
Aspiration 2016	Sri Aurobindo Institute of Culture at Kolkata	December 15-24, 2016	S Das
Hindi Computer Training	Hindi Language Training Centre, Fairly Place, Kolkata	December 19-23, 2016	P K Nath
4th PAC meeting	Ministry of Textiles, GoI at New Delhi	December 20, 2016	R K Ghosh
Workshop on Complementary nature of conventional and digital library in modern information dissemination system	ICAR-NIRJAFT at Kolkata	December 22, 2016	All Staff
Hindi Computer Training	Hindi Language Training Centre, Fairly Place, Kolkata	December 26-30, 2016	Satish Kumar
International Conference on Emerging Technologies in Agricultural & Food Engineering (ETAE-2016)	Department of Agricultural Engineering, IITK at Kharagpur	December 27-30, 2016	L K Nayak V B Shambhu
79th Foundation Day Lecture and 4th Dr. C. R. Nodder Memorial Lecture	ICAR-NIRJAFT at Kolkata	January 03, 2017	All Staff

Program	Organized by	Date	Participants
International Conference on Textile and Clothing: Present and Future Trends	Organised by DJFT, CU at Calcutta University, Kolkata	January 3-5, 2017	N C Pan, G Basu S N Chattopadhyay K K Samanta S Sengupta V B Shambhu L Ammayappan D P Ray, S Das
4th Assam International Agriculture & Horticulture show 2016	Department of Agri., Hort., & Fruit Processing, Govt. of Assam, Indian Chamber of Commerce & Assam Agriculture University at Guwahati	January 6-9, 2017	S Das
Intensive training program on "पारिंगत"	ICAR-NIRJAFT, Kolkata	January 9, to February 2, 2017	31 Staff members
Agribusiness Development Meet	ICAR-NRC at Dirang	January 12, 2017	A N Roy
Technology week cum Rabi Kisan Sammelan	KVK, Howrah at Jagatballavpur, Howrah	January 17–19, 2017	S Das
Workshop on Agri-Tech Innovation & Entrepreneurs for Identifying Commercially Viable Projects	Indian Institute of Corporate Affairs, Ministry of Corporate Affairs, Govt of India at NASC Complex, New Delhi	January 18-20, 2017	L K Nayak
Eco-Efficiency in Agriculture & Allied Research (EEAAAR'2017)	Crop & Weed Science Society, in collaboration with Farmers Academy & Convention Centre at BCKV, West Bengal	January 20-23, 2017	V B Shambhu
Workshop on Comprehensive Mesta and Bimli Grading System	ICAR-NIRJAFT at Training Centre, Vizianagaram, Andhra Pradesh	January 28-30, 2017	G Roy
Krishi-cum-Dairy Mela and Technology Demonstration under TSP Project of ICAR	ICAR-NDRI , Regional Centre, Kolkata at Ghosaldanga village	January 28, 2017	S Das
14th Board meeting of National Jute board	NJB at Udyog Bhavan, New Delhi	February 03, 2016	A N Roy

Program	Organized by	Date	Participants
11th All India Peoples Technology Congress by Forum of Scientists, Engineers & Technologists (FOSET)	FOSET, Kolkata in collaboration with SERB, DST at National Institute of Technical Teachers Training & Research, Kolkata	February 4-5, 2016	N C Pan S N Chattopadhyay S Das V B Shambhu
International Workshop on Development of productive rural communities through social enterprises	Asian Productivity Organization (APO) & The National Productive Centre of Cambodia (NPCC) at Phnom Penh, Cambodia	February 6-10, 2017	L K Nayak
Usage of Jute Geotextiles	Jute Commissioner's office at Kolkata	February 2, 2017	G Basu
Brainstorming workshop on Challenges facing on cotton textiles sector road ahead	ICAR-CIRCOT at Mumbai	February 8, 2017	G Roy
Machinery cum Engineering Technology Mela	ICAR-NIRJAFT, Kolkata at Hooghly KVK, West Bengal	February 10, 2017	All Scientists and technical officers
Foundation stone of new KVK in North 24 Parganas district of West Bengal.	ICAR-Central Research Institute for Jute & Allied Fibres at Barrackpore	February 13, 2017	S.Das
Directors Conference	ICAR at A.P.Shindey Hall , New Delhi	February 14-15, 2017	G.Roy
Krishi Unnati Mela 2017	ICAR and Ministry of Agriculture & Farmers Welfare at IARI, New Delhi	March 15-17, 2017	S.Das
51st Annual Convention of Indian Society of Agricultural Engineers & National symposium on Agricultural Engineering for sustainable and climate smart agriculture	Indian Society of Agricultural Engineers at CCSHAU, Hisar	February 16-18, 2017	VB.Shambhu

Program	Organized by	Date	Participants
Panel discussion on Recycling and waste utilization of fibre crops	ICAR-CRIJAF at Barrackpore	February 18, 2017	SN.Chattopadhyay
National conference on Eco textiles and green consumerism	Avinashilingam University at Coimbatore	February 24, 2017	L.Ammayappan
Training Programme on Manufacture of Jute Handicrafts	Agri Business Project of ICAR-NIRJAFT, Kolkata at KVK Kendrapara at Kendrapara, Odisha	February 22, 2017 & February 27, 2017	LK.Nayak
Farmers – Scientists Interface	ICAR-NIRJAFT at Kolkata	March 02, 2017	All Scientists
30th National Convention of Textile Engineers & National Seminar on Intervention of Frontier Technologies in Textile and Jute Sector	Textile Engineering Division of The West Bengal State Centre, at The Institution of Engineers (India), Kolkata	March 3-5, 2017	G.Roy, AN.Roy LK.Nayak S.Debnath L.Ammayappan DP.Ray SC.Saha RK.Ghosh KK.Samantha
National seminar on Improvement of small ruminant production system for livelihood security	ICAR-Central Sheep and Wool Research Institute at Avikanagar	March 9-10, 2017	G.Basu L.Ammayappan
Annual Review Meeting on CRP On Natural Fibres	Project Implementation Unit, CRP on Natural Fibres, ICAR-CIRCOT, at ICAR-CIPHET, Ludhiana	March 9-10, 2017	NC.Pan SN.Chattopadhyay LK.Nayak
All India Network Project on Jute & natural Fibre	ICAR-NIRJAFT at Kolkata	March 10-11, 2017	S.Das G.Roy SC.Saha
Coastal Ecosystem of India – Recent Development and Future Strategies	Indian Society of Coastal Agricultural Research at ICAR-NIRJAFT, Kolkata.	March 18, 2017	G.Roy AN.Roy NC.Pan SN.Chattopadhyay
Food Processing Conclave	Confederation of Indian Industry at Hotel ITC Sonar, Kolkata	March 22, 2017	LK.Nayak

Program	Organized by	Date	Participants
Joint Meeting of Textile Minister & Agriculture Minister on jute cultivation, production & quality improvement	ICAR at Krishi Bhawan, New Delhi	March 22, 2017	SC. Saha G. Basu
Innovation Cell Lecture on Electronics & ICT Applications for Agriculture	ICAR-NIRJAFT at Kolkata	March 24, 2017	All Scientists & Technical Officers
6th PAC meeting	Ministry of Textiles, GoI at Jute Commissioners Office, Kolkata	March 27, 2017	G.Basu RK.Ghosh
15th Board Meeting of National Jute Board	Ministry of Textiles at Udyog Bhawan, New Delhi.	March 29, 2017	G.Basu

TRAINING ORGANISED

Name of the training	Sponsor & venue	Duration	Participants
National Level Training Program on "Production and retting technology of jute/mesta/ramie/sunnhemp including other related aspects"	National Food Security Mission (NFSM)- Commercial Crops, Department of Agriculture, Co-operation & Farmers Welfare, Ministry of Agriculture, at ICAR-NIRJAFT Kolkata	August 9-11, 2016	25
		August 22-24, 2016	25
		September 1-3, 2016	25

Demonstration to farmers

Interaction with farmers

AWARDS & RECOGNITIONS

Dr. Gautam Roy

- Acted as Chief Guest at the Workshop on Coastal Ecosystem of India – Recent Development and Future Strategies conducted by at on 18/03/2017

Dr. Alok Nath Roy

- Nominated as a Member of the Institute Management Committee of ATARI II, Salt Lake, Kolkata by ICAR, New Delhi.
- Acted as a Co-Chairman in the Technical session - "Group Discussion on Crop Improvement & Fibre Quality" of 29th Annual Workshop of "AINP on Jute and Allied Fibres" held at NIRJAFT on 10th March, 2017.
- Acted as the "Course Director" of 21days duration ICAR sponsored winter school on "Value addition in jute & allied fibres through product diversification & waste utilization" held at ICAR-NIRJAFT from September 15 - October 05, 2016.
- Invited by ICAR-CIWA, Bhubaneswar on 27th November 2017 to act as an expert to help in project formulation on natural fibre with the objective of livelihood generation for village women and also act as a Co-Chairman in workshop to present those projects prepared by different Agricultural Universities for AINP.

Dr. Nimai Chandra Pan

- Reviewer for Indian Journal of Fibre & Textile Research
- Acted as External Examiner of M.Tech., in Textile Technology (Technical Textiles) at Department of Jute & Fibre Technology, University of Calcutta in 2016

Dr. Gautam Basu

- Member of the Institute Management Committee of ICAR-CIPHET, Ludhiana since 2013
- Member of Board of Studies for the postgraduate studies in Technical Textiles of the University of Calcutta, India
- Member of the Jute and Jute Products Sectional Committee (TX 03) of Bureau of Indian Standards to formulate Indian Standards for terminology, grading, specifications and packaging for jute, mesta and other related bast fibres and their products
- Member of the Cordage Sectional Committee (TX 09) of Textile Division of BIS
- Member of the Technical Textiles Sectional Committee (TX 30 & TX 33) of Textile Division of Bureau of Indian Standards, from 2013 till this date
- External examiner of the M. Tech (Technical Textiles) course of the University of Calcutta.

Dr. Sambhu Nath Chattopadhyay

- Acted as Reviewer for Indian Journal of Fibre & Textile Research , Fibers and polymer & Sericoligia
- Acted as External Examiner of M.Tech., in Textile Technology (Technical Textiles) at Department of Jute & Fibre Technology, University of Calcutta on 7.01.2016
- Nominated as a Member of Institute Management Committee (IMC) of ICAR-Indian Institute of Natural Resins and Gums, Ranchi
- Nominated as a Member of Institute Management Committee (IMC) of ICAR-Central Institute of Research on Cotton Technology, Mumbai

Dr. Sanjoy Debnath

- Convenor of Textile Engineering Divisional Sub-Committee (Till October 31, 2016) of The Institution of Engineers (India), West Bengal State Centre, 8 Gokhale Road, Kolkata.
- Chaired and acted as Group Leader of Apparel & Textile Section during the Brainstorming Workshop on Bridging the gaps in Gender Research from June 01-02, 2016 at ICAR-Central Institute of Women in Agriculture, Bhubaneswar on March 02, 2016
- Acted as Organizing Committee Member for Conducting 30th National Convention of Textile Engineers and National Seminar on 'Intervention of Frontier Technologies in Textile and Jute Sector', under aegis of Textile Engineering Division, IEI, March 3-5, 2017 at The Institution of Engineers (India), Kolkata
- Acted as Alternate Member of Technical Textiles for Agro-tech Sectional Committee, TX 35 of Bureau of Indian Standards, New Delhi
- Acted as Reviewer for the journals Journal of Industrial Textiles , Indian Journal of Fibre & Textiles Research , Polymer-Plastics Technology and Engineering , Fibers and Polymers Journal, Textile Research Journal , Science & Engineering of Composite Materials , Journal of Polymers and the Environment , Textile and Clothing Sustainability and Journal of Natural Fibres

Dr. Surajit Sengupta

- Acted as a member of examiners/paper setter/moderator of B. Tech course on Jute & Fibre Technology of Calcutta University.
- Acted as a member of examiners/moderator of M. Tech course on Technical Textiles of Calcutta University.

- Acted as the reviewer of Indian J fiber and Textile Research, J of Scientific and Industrial Research. Institute of Engineers (I), Bio-Resources, Textile Research Journal and Journal of Industrial Engineering

Dr. L.Ammayappan

- Chaired a Technical Session in a National conference on "Eco textiles and green consumerism" conducted by Department of Textile & Clothing, Avinashilingam Institute for Home Sciences and Higher Education for Women, Avinashilingam University, Coimbatore, Tamilnadu-641043 on 24.02.2017
- Recognized as an examiner for the PhD thesis for the research scholar Ms. S.Ambika under Alagappa University, Karaikudi, Tamilnadu
- Recognized as a peer reviewer for the following journals: AATCC Journal of Research, Bioprocess and Bio systems Engineering, Carbohydrate Polymers, Colouration Technology, Fibers and Polymers, Indian Journal of Fiber & Textile Research, Industrial Crops and Products, International J of Biological Macromolecules , Journal of Industrial Textiles, Journal of Natural Fibers, The Journal of the Textile Institute, Materials Science, Polymer composites, Textile Research Journal & Textiles and Clothing Sustainability
- Acted as Rapporteur in a Technical Session of All India Seminar on Post Harvest Management of Fruits and Vegetables organized by the Agricultural Engineering Division, West Bengal State Centre, The Institution of Engineers (India) at Kolkata, on June 1-2, 2016

Dr. Deb Prasad Ray

1. Received Best Poster Award for the paper Enzymatic synthesis of microcrystalline cellulose from different agro residues: Its scope and opportunities by Kundu A, Ghosh RK, Ray DP, Chattopadhyay SN, Bhandari Kunal, Tiwari A, Dasgupta S, Ghosh S and Sarkar A presented in the National Symposium on Recent Trends in Biopolymers at ICAR-NINRG, Ranchi on February 17-18, 2017
2. Acted as Rapporteur in Technical Session-IV on Natural Resource Management of International Conference on Sustainable Natural Resource Management: from Science to Practice (SNRMSP) at Banaras Hindu University, Varanasi on January 12-13, 2017.
3. Received Bharat Seva Ratan Gold medal Award for outstanding Individual Achievement in Science on 35th National Unity Conference organized by Global Economic Progress & Research Association held at Chennai on July 9, 2016

4. Acted as Rapporteur in a Technical Session of All India Seminar on Post Harvest Management of Fruits and Vegetables during June 1-2, 2016 at Kolkata
5. Acted as Councillor of the Society of Plant Protection Sciences, Division of Nematology, IARI, LBS Centre, New Delhi-110 012
6. Received Letter of Commendation in appreciation for participation in ICAR-Short Course on "Synthesis and characterization of Nanomaterials for Agricultural Applications" held at ICAR-CIRCOT, Mumbai on September 19-28, 2016.
7. Acted as an External Examiner for the thesis viva voce of M.Sc. (Ag.) Hons. Student in Institute of Agricultural Sciences of Benaras Hindu University held on July 25, 2016.
8. Acted as Joint Supervisor for the thesis entiltled "Studies on Yield and quality parameters of textile grade ramie (Boehmeria nivea L. Gaud.) fibre grown in two agro-climatic zones of India" and submitted to Visva-Bharati for Awarding Ph.D.degree on 09.02.2017.
9. Associated Chief Editor of the Journal, International Journal of Agriculture, Environment and Biotechnology (Print ISSN: 0974-1712 online ISSN: 2230-732X, NAAS rating 4.69).
10. Acted as Chief Editor of the Journal, International Journal of Bioresource Science (ISSN: 2347 9655) during 2016-17
11. Acted as Mukhya Sampadak of the Bengali Magazine Krishi Samachar (ISSN: 2347 9663) during 2016-17

Dr. Laxmikanta Nayak

- Joint organizing secretary for the All India Seminar on "Post Harvest Management of Fruits & Vegetables" during June 01-02, 2016 by Agricultural Engineering Division, West Bengal State Centre, The institution of Engineers (India).
- Nominated as a Member, Editorial Board of the Journal of the Indian Society of Coastal Agricultural Research (A NAAS rated Journal – JrnID: J259, ISSN: 0962-1584, Rating: 4.00) published by The Indian Society of Coastal Agricultural Research.
- Nominated as The Convenor, Agricultural Engineering Divisional Sub-Committee of West Bengal State Centre, IEI for the Sessions 2016-17 and 2017-18.
- Convenor, World Water Day - 2017 Programme organized by the West Bengal State Centre of The Institutions of Engineers India (IEI) at Gokhale Road, Kolkata on March 22, 2017.
- Acted as Reviewer for The Journal of the Indian Society of Coastal Agricultural Research

- Acted as the "Co-Course Director" of 21days ICAR sponsored winter school on "Value addition in jute & allied fibres through product diversification & waste utilization" held at ICAR-NIRJAFT from September 15 - October 05, 2016.

Dr. Subash Chandra Saha

- Member of Variety release Committee, All India Network Project (AINP) on Jute and Allied Fibres, CRIJAF, Barrackpore, West Bengal
- Member of Student outreach programme under the Chairmanship of secretary, NJB.
- Member of Assessment Committee of Technical Category-III nominated by Hon'ble Chairman, ASRB
- Acted as Jugma Sampadak of the Bengali Magazine Krishi Samachar (ISSN:23479663) during 2016-17

Sh. Sujai Das

- Co-ordinated & received third prize for institute stall in the exhibition "Kisan Mela-cum-Technology Demonstration" at Sasya Shyamla Krishi Vigyan Kendra, Arapanch on December 14, 2016
- Co-ordinated & received third prize for institute stall in the exhibition "Krishi-cum-Dairy Mela and Technology Demonstration under TSP Project of ICAR" at Ghosaldanga village on 28th January, 2017.
- Co-ordinated & received second prize for institute stall in the exhibition "Technology week 2017-cum-Pre Rabi Kishan Sammelan" at KVK-Hooghly, Chuchura on February 8-10, 2017.

Dr. Kartick Kumar Samanta

- External Evaluator for Ph.D. thesis on Studies in Synthetic Polymers for Sports Textile Applications from Institute of Chemical Technology, 2016-17.
- External examiner for M.Tech, (Technical Textiles) of Institute of Jute Technology, Kolkata on 11th January 2017.
- External examiner for B.Tech., Course-JFT-702 (Jute & Fibre Tech.) of Institute of Jute Technology, Kolkata on 19th January 2017
- Core committee member for National Seminar on "MSME in Natural Fibre Sector" organized by TINFS on 25-26th November 2016, Kolkata.
- Organizing committee member for International Conference on Textile and Clothing: Present and Future Trends (TCPFT-2017), 3-5th January 2017, Kolkata.

Dr. Rakesh Kumar Ghosh

- Best poster award for "Microcrystalline cellulose from Jute Caddies: A journey from waste to pharma" in National Symposium on Recent Trends in Biopolymers by ICAR-IINRG, Ranchi on February 17-18, 2017.

IN-HOUSE SEMINAR

Date	Presenter	Topic
22.04.2016	Miss. P. Ghosh	Studies on anisotropy nature of tensile properties and fibre orientation in cross laid needle punched non woven fabrics
24.06.2016	Dr. V.B. Shambhu	A Jute and Mesta Barks/Ribbons Stripping Power Ribboner Machine
24.06.2016	Dr. L.K.Nayak	A double roller banana pseudo-stem fibre extractor
15.07.2016	Mr. S. Middya	Prediction of warp breakages due to stretch during weaving by analyzing shed geometry
23.07.2016	Dr. G. Basu	Fumigation for storing of food grains
23.07.2016	Dr. L.K.Nayak	Prospects of using jute bags in storage systems
29.07.2016	Shri. S. Das	Mobile advisory system for farmers
06.08.2016	Dr. L.Ammayappan	Effect of dry heat treatment on jute fabric for improvement in mechanical properties of jute: unsaturated polyester resin based biocomposite
30.09.2016	Dr. V.B.Shambhu	Improved technology for extraction of fibres from Jute and Mesta plants
11.11.2016	Dr. S.N.Chattopadhyay	Development of sanitary napkins from jute pulp
11.11.2016	Dr. S.C.Saha	Automated integrated jute grading instrument
24.11.2016	Dr. L.Ammayappan	Nanocomposite Application on Jute Fabric for Flame Retardant Finishing
24.11.2016	Shri. S. Das	Real Time Jute Fabric Defect Detection using machine vision
02.12.2016	Smt. L.Mishra	A complete package of accelerated retting of coconut fibre
02.12.2016	Shri. K.G.Nath	E-Procurement
09.12.2016	Dr. L.K.Nayak	Design of a flax scutcher for extraction of fibre from retted & sun-dried flax straw
09.12.2016	Dr. V.B. Shambhu	Quality Fibre Production from Jute & Mesta through Mechanical Intervention
09.12.2016	Dr. S.N.Chattopadhyay	Ecofriendly Printing of Jute Fabric With Natural Dyes and Thickener

Date	Presenter	Topic
23.12.2016	Dr. N.C.Pan	Performance of a fragrance finishing based on Chitosan: Jasmine microcapsules on jute textiles
23.12.2016	Dr. L.Ammayappan	Nanocomposite application on jute textile for Semi-durable water repellent finishing
23.12.2016	Miss. P. Ghosh	Engineered jute nonwoven as soil cover for better and eco-friendly agriculture
13.01.2017	Dr. V.B.Shambhu	Comparative performance study of different Jute fibre extractors
03.02.2017	Dr. V.B.Shambhu	Performance evaluation of different types of Jute fibre extractors
06.03.2017	Dr. D.P.Ray	Prospects of Indian ramie for production of quality fibre and basic understanding of its degumming
06.03.2017	Dr. S.C.Saha	New grading system of ramie fibre

In house Seminar presentation by scientists

RESEARCH SUPPORTING SERVICES

Quality Assurance Section (QAS)

Quality Assurance Section (under Quality Evaluation & Improvement Division) associates with the quality evaluation of fibres from different breeding, agronomical and quality trials on jute, mesta, sunnhemp, flax and ramie fibre under All India Network Project (AINP) headed by CRIJAF and NIRJAFT. This section has also works on grading of Jute, Mesta & Bimli fibre. It has good infrastructure for short training program on jute grading and will be provided on demand basis. This training course is conducted to acquaint marketing personnel and other people from different organizations and agencies with the BIS specifications on raw jute grading.

These trials were conducted for commercial recommendation with a view to selecting varieties which produced fibres of good quality and high yield. Recently this section has developed a new user-friendly jute grading system and it is with BIS for confirmation. Different jute grading instruments developed by the institute like Fibre Bundle Strength Tester, Air-flow Fineness tester, Colour & Lustre Meter and Bulk Density Meter has been calibrated by this section.

Fibre sample	No of samples tested
Capsularis jute	130
Olitorius jute	144
Roselle (Bimli)	101
Kenaf	88
Sunnhemp	45
Flax	36
Total	544

Evaluation of fibre properties from outside agencies on payment basis has been done regularly and earned as revenue of Rs.4,63,000/= in 2016-17 financial year and total numbers of samples tested were 544. Physical parameters like, strength, root content, defects percentage, fineness, colour and bulk density values were evaluated for Jute, Kenaf, Roselle, Sunnhemp and Flax fibres.

ARIS Cell

Institute ARIS cell take care of establishment of IT facility, development and maintenance. During this period, ARIS cell has responsibility for institute computer maintenance, LAN connection, Internet connectivity to all staff members, National Knowledge Network, Unified Thread Management, Videoconference, conversion of IPv6, etc. for keep smooth function of the IT infrastructure in the Institute. Frequently monitoring of the user account has been done for provide smooth internet facility and monitor any threat. Clientless and login & password based user account has been provided for Wi-Fi users. Six aadhar based biometric attendance machine has been installed in different location in institute campus.

To enhance the internet connectivity, five Access Point has been installed to this device. Biometric device and AP has been configured and connect Internet using static IP. Videoconferencing facility has been started in the Director's committee room and video conference has been done with Dr. Trilochan Mahapatra, Honourable DG, ICAR & Secretary DARE on March 7, 2017. Social media application like Whatsapp, www.youtube.com and www.facebook.com page for the Institute has been started and frequently updated. Wi-Fi facility with 300 mbps internet speed it was inaugurated by Dr. Nabrarun Bhattacharya, Director, CDAC, Kolkata on March 24, 2017 for the Institute campus has been successfully implemented and maintained by installing thirty Access Point in different location of the institute campus. Institute LAN has been reorganize by more structured cabling using twenty gigabyte switch and twenty racks which installed in different location in institute campus.

Inauguration of Wi-Fi facility by Dr. Nabrarun Bhattacharya, Director, CDAC, Kolkata.

Video Conference with honourable DG, ICAR on 7th March 2017 at Director's committee room.

Design, Development and Maintenance (DDM) Section

The Design, Development & Maintenance Section (DDM Section) of the Institute is entrusted with the responsibility of Infrastructure development along with estate

management which are the basic necessities for smooth flow of R&D works. The section executes co-ordinates and monitors all forms of civil, electrical, mechanical, sanitary, plumbing, repair and maintenance services essential for the day to day smooth functioning of all Divisions, Sections, Training Hostels, Laboratories, Residences, Guest Houses, Farmers' Hostel of the Institute. Coordinating vehicle movement and others support services like watch and ward and fire fighting are among the other functions of this section. Planning, coordinating & execution of major infrastructure development works of the Institute through external agencies like CPWD, is also undertaken by this section. Regularization and digitization of land records, uploading of institute map on Google earth (Latitude: 22° 28' 52.92" N, Longitude: 88° 21' 08.73" E), institute master plan & land utilization related information is taken care. This section is instrumental in implementation of the important central schemes like "Swatch Bharat Abhiyan" by monitoring supply of sanitary consumables to all Divisions/Sections for cleanliness drive.

The briquetting machine and gasifier Plant are maintained and serviced by this for the supply of to the oven for bleaching and dyeing works of C&BP section and saved valuable energy & cost. This section is responsible for fabrication, assembly and supply of different NIRJAFT developed jute grading instruments like Bundle Strength Tester, Air Flow Fineness Tester, Colour & Lustre Metre & Bulk Density Metre fabricated in the DDM Section. These instruments are supplied on order basis to different national & international organizations as per requisition from stake holders. The DDM section provides all technical support to ongoing research projects like design modifications in the Power Ribboner & for fabrication of the drape meter. Important public safety issues like, coordinating with Public Health Engineering Department of the State Govt. for water sampling, testing and undertaking efforts for supply of safe drinking water to the Institute under guidance of the Task Force Committee, coordinating with CPWD for Special Repair to severe structural damage to Adm. Bldg. & CT Bldg. and liaison with Kolkata Municipal Corporation (KMC) for treated water supply, Land Records, better drainage etc. is also undertaken by this section.

Library

ICAR-NIRJAFT Library holds of about 18,670 books in the different subjects and subscribes to 65 Indian journals and 14 international journals. It is a member of CeRA (Consortium e-resources in agriculture) and subscribes under this 2000 e-journals in agricultural sciences. Library renders reference services, photocopy services, current awareness services and abstracting services (Jute & allied fibre abstract) to fulfill the user's

requirements. Library keeps contact with reputed Institutes/organizations for exchange of articles and information through internet. Library section interacts with different Institutes/organizations by mailing annual reports, newsletters and Institute's publications at a regular frequency and receives the same from different Institutes.

Partial digitization of valuable old, rare and damaged books along with tissue paper lamination have been completed for preservation permanently and which also act as e-book. Visitors from different Institutes/organizations enjoy facilities of reading, consulting CeRA (consortium e-resource in agriculture) and photocopy services. At present, staff of ICAR-NIRJAFT can access to e-resources of different ICAR research Institutes and universities through local server available in the library and connected with central server at IARI, New Delhi to fulfil their required information

Library also provides current awareness services on new arrival books in the library by preparing list of contents of new arrival books and rendered Current awareness services on new arrival books Vol-1 No.1, 2016 through On-line Public Access Catalogue (OPAC) and rendered abstracting services by publishing "Jute and allied fibre abstract", and disseminated soft copies to researchers, scientific community, technical staff for their required information

In continuation of "List of publications (NIRJAFT) inception to 2012" published from library compiled and prepared "List of publications (ICAR-NIRJAFT): 2013-2015".

List of publications categorized published papers of scientific and technical staff in different parts viz., publication in the journals, books/books chapters, paper presented in seminar/conferences/workshop, popular articles and technical bulletin/ manual etc including "Author and Keywords indexes" to aware users latest publications of ICAR-NIRJAFT and disseminated same to all users.

Shri Radha Mohan Singh, Honourable Union Minister of Agriculture and Farmers Welfare visited library on 21 6 2016. He was happy seeing the systematic arrangement of library. He made comments encouraging library automation system.

One-day library workshop

Library arranged a one-day workshop on Complementary nature of conventional and digital library in modern information dissemination system on 22.12.2016 to aware scientific community, technical staff and other users with changing technology and how to use the library in the better way. Sri Satyabrata Roy, Ex Librarian, Indian Association for Cultivation of Science was the chief guest and key note address delivered by Sri Satyabrata Roy. Dr.Sabuj Kumar Chaudhury, Asstt. Professor, Department of Library and Information Sciences, Calcutta University and Dr.N C. Ghosh, Librarian, CSIR-Indian Institute of Chemical Biology, Kolkata delivered their presentation. Technical session chaired by Dr. Chaitali Dutta, Ex Professor, Department of Library Information Science, Jadapur University. Librarians of local and ICAR, CSIR, National Library, British Library and other Institutes were attended this workshop. There was interactive session with all invitee librarians at the end of technical session.

Hindi Section

Meeting

The meeting of Official Language Implementation Committee for the each quarter were held on June 25, 2016, August 23, 2016, December 9, 2016 and March 17, 2017 respectively at the Director's room under the chairmanship Director. In each meeting agenda items of the previous meeting were confirmed and new agenda were discussed to increase the original correspondence in Hindi for achieving the required target given in Annual Programme 2016-17.

Hindi Workshop

First Hindi workshop on ***Official Language Hindi and Noting & Drafting was*** held on June 27, 2016 under the Chairmanship of Mr RD Sharma, Assistant Director (OL) and In-charge, Hindi Section. The workshop was participated by 21 participants (03 Officers and 18 staff members). Smt. Rita Bhattacharya, Ex-Chief Manager (Official Language), UBI, discussed about the Official Language policy as well as explains noting and drafting in detail. She described about gender, tense, factor of Hindi. The participants eagerly acquired the knowledge.

Second hindi workshop on ***Noting and Drafting in Hindi*** was held on August 20, 2016 and a Hindi Expert, Smt. Arpita Roy, Hindi Pradhyapak, Hindi Teaching Scheme, Department of Official Language, Ministry of Home Affairs, Government of India delivered official Language policy of the Govt of India and tought different types of Hindi Noting with example as well as highlighted on drafting. She described about grammatical mistakes which is often done by the people.

Third Hindi workshop on ***Noting and Drafting in Hindi*** was held on December 17, 2016 and 20 participants (01 Officers and 19 staff members) were participated. A Hindi Expert, Smt. Manju Sireen, Assistant Director, Hindi Teaching Scheme, Department of Official Language, Ministry of Home Affairs, Government of India delivered lecture on the status of Official Language in the Constitution of India and appreciated the efforts made by Official Language Department for the same. She also tought Hindi Noting & Drafting.

Fourth Hindi workshop on ***Noting & Drafting in Hindi and Official Language Implementation*** was held on February 25, 2017 and 23 participants (04 Officers and 19 staff members) were participated. A Hindi expert, Smt. Amrita Veena Minj, Hindi Pradhyapak, Hindi Teaching Scheme, Department of Official Language, Ministry of Home Affairs, Government of India delivered lecture on Official Language Policy and described about Hindi grammar and routine notes to be used in daily administrative works and tought Hindi Noting & Drafting. Mr. RD Sharma, Assistant Director (OL) ICAR-NIRJAFT, delivered a lecture on Official Language Implementation and described about Rajbhasha Niyam, Adhiniyam, Sankalp as well as article 343 to 351 in detail. He explained all 14 documents of section 3(3) which is issued in bilingual form in all central government offices in India.

Hindi Fortnight Celebration, 2016

Hindi fortnight Celebration was observed in the Institute during 14-29 September, 2016. During this period an extempore competition, debate competition, kabita path competition, Hindi noting-drafting competition and maximum work in Hindi competition were organized on September 14, September 16, September 20, September 22, September 24, 2016 respectively among the staff members of the Institute. Hindi fortnight closing celebration was organized on 29th September, 2016 under the chairmanship of Dr. G. Roy, Director, NIRJAFT. Mr. Daulal Kothari, Founder of Rabindra Sudha graced the occasion as Chief Guest. Sri R.D. Sharma, Asstt. Director (OL) welcomed all participants and Mr. Kothari suggested using Hindi frequently in all official works. He appreciated the enthusiasm of the staff members for participating in different competitions during Hindi Fortnight Celebration. Dr. G. Roy expressed that it is a constitutional responsibility of each employee to render their official works originally in Hindi to the maximum extend.

Training

Seven staff members of the institute were deputed to attend Basic Training Program for working in Hindi on computer which was organized by Department of Official Language, Ministry of Home Affairs during December, 2016. An intensive "Parangat" training under Hindi Teaching Scheme, Department of Official Language, Ministry of Home Affairs was organized in the Institute from 06.01.2017 to 06.02.2017 and 31 staff members of the Institute were trained.

Inspection

Dr. Puran Singh, Assistant Director (Official Language), DARE, Dept of Agriculture and Farmers Welfare visited the institute and inspected the use of Hindi in official work and Implementation of Official Language from 16th to 17th February, 2017 respectively.

Institute Technology Management Unit (ITMU)

ITMU of this institute is maintaining liaison between Patent Office, GOI, Patent attorney in the process of new patent filing and follow up old cases etc. It is also facilitate the documentation process of IP assets for patentable / non-patentable technologies of the

institute and the process of patent /commercialization of the technology. It is assisting in the scientist for developing a project in the light of IPR and organized various meetings in connection with Institute patent related decisions and policy formulation. ITMU conducted four ITMC meetings in the following dates 07.05.2016, 14.09.2016, 30.12.2016 & 06.03.2017. There are four technologies commercialized during this year and one patent is granted and one patent was e-filed.

Priority setting, Monitoring & Evaluation (PME) Cell

Prioritization Monitoring & Evaluation (PME) concept is an executive tool in R&D system to augment the scientific productivity and is the prerequisite of most of the projects. It helps in setting an integrated priority and monitoring of all the in-house projects. PME cell at ICAR-NIRJAFT coordinate and blend the recommendations of QRT, RAC and IRC of institute and to recommend research priorities of the institution for short, medium and long term listing priority researchable problems on all lignocellulosic fibres. PME cell coordinates and assemble for annual monitoring of each on-going project and evaluation of completed projects through internal and external experts. In addition to these, replies to the parliamentary questions on technical and scientific matter addressed to the institute by ICAR. Recently PME Cell also embark more meaningful training program for skilled support staff during November 17-19, 2016 and February 8-10, 2017. The program was organized by Dr.SB. Roy, Nodal officer, HRD & PME Cell, In-charge, and coordinated by Dr. U. Sen, Dr.D. Das and Sh. KG. Nath. The program comprised of lectures and demonstration covering the subject areas of laboratory safety, general administration, biometric, finance, account, record keeping and office space management etc. This training will help in improving the work efficiency and improve employee productivity.

IRC Meeting on September 26, 2016

IRC Meeting on March 27-28, 2016

DISTINGUISHED VISITORS

DATE	VISITOR(s)
April 2, 2016	Shri Chhabilendra Roul, Additional Secretary, DARE & Secretary ICAR Shri Arvind Kumar M, Secretary, National Jute Board, Ministry of Textiles, GOI Shri O.P. Prahaladka, Director & National Convenor (ER), Export Promotion Council for Handicrafts, Dr. Sabu Thomas, International & Inter University Centre for Nano-science & Nanotechnology (IIUCNN) & International Unit on Macro-molecular Science & Engineering (IUMSE), Mahatma Gandhi university, Kerala
June 15, 2016	Dr. Trilochan Mohapatra, Secretary DARE & Director General, ICAR Dr. J.Jena, DDG (Fisheries), ICAR Dr. S.Saxena, ADG (IPTM), ICAR Swami Vishwamayananda, Secretary, Ramakrishna Mission Ashram, Sargachi
June 17, 2016	Parliamentary Standing Committee on Agriculture
June 21, 2016	Shri Radha Mohan Singh, Hon'ble Union Minister of Agriculture and Farmers' Welfare, Government of India
August 17, 2016	Dr. Indra Mani Mishra, Head, Division of Agricultural Engineering, IARI, New Delhi
September 15, 2016	Prof. Purnendu Biswas, Vice-Chancellor, West Bengal University of Animal and Fishery Sciences, Kolkata
October 5, 2016	Dr. Asit Kumar Chakravarti, Ex-Vice Chancellor, Bidhan Chandra Krishi Viswa Vidyalaya,West Bengal
October 31, 2016	Mr. B.B. Chakraborty, Deputy Superintendent of Police, Crime Branch, CBI, Kolkata
November 4, 2016	Dr. Raj Kachru, Ex-Assistant Director General (Process Engg. & ARIS), ICAR and Former Member (AGM)
December 22, 2016	Dr. SK. Chaudhury, Asstt. Professor, Department of Library and Information Sciences, Calcutta University Dr. NC. Ghosh, Librarian, CSIR-Indian Institute of Chemical Biology, Kolkata
January 3, 2017	Hon'ble Shri Sudarshan Bhagat, Minister of State for Agriculture and Farmer's Welfare, Government of India Dr. Raj Kachru, Ex-Assistant Director General (Process Engg. & ARIS), ICAR and Former Member (AGM) Dr. S. Sreenivasan, Former Director, ICAR-CIRCOT, Mumbai Dr. PG.Patil, Director, ICAR-CIRCOT, Mumbai
February 17, 2017	Dr. Puran Singh, Assistant Director (Official Language), DARE, Dept of Agriculture and Farmers Welfare
March 24, 2017	Dr. Nabarun Bhattacharyya, Director, C-DAC, Kolkata on Electronics

Shri. Radha Mohan Singh, Hon'ble Union Minister for Agriculture & Farmer's Welfare

Shri Sudarshan Bhagat, Hon'ble Minister of State for Agriculture and Farmer's Welfare

Dr. Trilochan Mohapatra, Secretary DARE & Director General, ICAR

Shri Chhabilendra Roul, Additional Secretary, DARE & Secretary ICAR

Shri. Arvind Kumar M, Secretary, National Jute Board, Kolkata

Shri O.P. Prahaladka, Director & National Convenor (ER), Export Promotion Council for Handicrafts

Dr. P.G.Patil, Director, ICAR-CIRCOT, Mumbai

Dr. Sabu Thomas, Professor, Mahatma Gandhi University, Kerala

Dr. Debasis Nag M.Tech., Ph.D.,	Director (*Retired on 30.06.2016*)
Dr. Gautam Roy, M.E., Ph.D.,	Director (*Acting) w.e.f 01.07.2016*)

QUALITY EVALUATION & IMPROVEMENT DIVISION

Scientists

Dr. Gautam Roy, M.E., Ph.D.	Principal Scientist & Head
Dr. Biplab Saha, M.Sc., Ph.D	Principal Scientist
Dr. Avijit Das, M.Sc., Ph.D	Principal Scientist
Dr. Deb Prasad Ray, M.Sc. Ph.D,	Senior Scientist
Dr. Subhas Chandra Saha, M.Sc., Ph.D,	Senior Scientist

Technical Officers

Sh. Koushik Manna, M.Sc, B.Ed.	Technical Officer
Sh. Tapash Kanti Ghosh, B.Sc.,	Technical Officer (*Retired on 30.11.2016*)

CHEMICAL & BIO-CHEMICAL PROCESSING DIVISION

Scientists

Dr. Nimai Chandra Pan, M.Tech., Ph.D., FIE(I), FTA	Principal Scientist & Head *(w.e.f.13.6.2016)*
Dr. Sambhu Nath Chattopadhyay, M.Tech., Ph.D. FIE(I), FTA	Principal Scientist
Dr. Ammayappan Lakshmanan, M.Sc., Ph.D, PGDCA.,	Senior Scientist
Dr. Rakesh Kumar Ghosh, M.Sc., Ph.D,	Scientist (Sr. Scale)
Dr Kartick Kumar Samanta, M.Tech., Ph.D,	Scientist (Sr. Scale)

Technical Officers

Sh.Amalesh Khan, B.Sc.,	Senior Technical Officer
Sh.Karunamoy Patra, D.E.E.,	Technical Officer
Sh. Basudev Chakraborty, ITI	Technical Officer

MECHANICAL PROCESSING DIVISION

Scientists

Dr. Gautam Basu, M.Tech., Ph.D, FIE (I), DJT	Principal Scientist & I/c Head
Dr. Surajit Sengupta, M.Tech., Ph.D, FIE (I), C.Engg, PGDFM	Principal Scientist
Dr. Sanjoy Debnath, M.Tech., Ph.D, FIE (I)	Principal Scientist
Mr. Manik Bhowmik, M.Tech.,	Scientist *(Joined on 16.05.2016 from ICAR-CIRCOT, Mumbai)*

Technical Officers

Sh.Kamal Kumar Banerjee,	Technical Officer *(Retired on 31.3.2017)*

TRANSFER OF TECHNOLOGY DIVISION

Scientists

Dr. Alok Nath Roy, M.Tech., Ph.D,	Principal Scientist & Head
Dr. Samir Baran Roy, M.Sc., Ph.D,	Principal Scientist
Dr. Abhay Kumar Thakur, M.Tech., Ph.D,	Principal Scientist *(Joined on 22.03.2017 from ICAR-RCP)*
Dr. Laxmikanta Nayak, M.Tech., Ph.D,	Senior Scientist
Dr.Vidya Bhushan Shambhu, M.Tech., Ph.D,	Senior Scientist
Sh. Sujai Das, M.Sc.,	Scientist (Sr. Scale)

Technical Officers

Sh. Koushik Mitra, B.A.,	Technical Officer
Smt. Chandra Karmakar,	Technical Officer

DEVELOPMENT, DESIGN & MAINTENANCE SECTION

Dr. Surajit Sengupta, M.Tech., Ph.D,	Principal Scientist & I/c *(up to November 2016)*
Dr. Gautam Basu, M.Tech., Ph.D,	Principal Scientist & I/c *(wef December 2016)*
Sh. Prosenjit Sanyal, B.Sc.,	Assistant Chief Technical Officer
Sh. Lilamoy Patra, D.E.E.,	Assistant Chief Technical Officer
Sh. Chanchal Kundu, D.M.E.,	Technical Officer

PME CELL

Dr. Samir Baran Roy, M.Sc., Ph.D,	Principal Scientist & I/c
Dr. Utpal Sen, M.Sc., Ph.D,	Chief Technical Officer
Smt. P.R. Ghatak, B.Sc.,	Assistant Chief Technical Officer (*Retired on 31.01.2017*)
Dr. Debabrata Das, M.Sc., Ph.D,	Senior Technical Officer
Sh. Krishna Gopal Nath M.C.A.,	Technical Officer

LIBRARY

Dr. (Smt). Rina Naiya, B.Sc., B.Lib., Ph.D,	Senior Technical Officer & I/c Library
Sh. Srikumar Chowdhuri	Technical Officer

HINDI SECTION

Sh. Ramdayal Sharma, M.A., DHT, PGDT	Assistant Director (Office Language) & I/c
Sh. Kishun Lal Ahirwar, M.A,	Senior Technical Officer

ARIS CELL

Sh. Sujai Das, M.Sc.,	Scientist (Sr. Scale) & I/c

ADMINISTRATION

Dr. Biplab Saha, M.Sc., Ph.D	Principal Scientist & I/c Adm *(wef 25.6.2016)*
Sh. Rajeev Lal, B.Sc.,	Chief Administrative Officer *(Transferred to CIFRI on 08.03.2017)*
Sh. Amitabh Singh, M.A.,	Finance &Account Officer (*Joined on 05.12.16*)
Mrs. Anasua Majumder, M.Sc.,	Assistant Finance &Account Officer
Sh. Swapan Kumar Sinha, B.Com,	Assistant Administrative Officer & DDO *(Retired on 31.01.2017)*
Sh. Sanatan Sardar, B.A.,	Assistant Administrative Officer & DDO
Smt. Jayashree Nath, B.A.,	Assistant Administrative Officer - Adm.I
Sh. Ratan Roy, B.Com,	Assistant Administrative Officer - Adm.II
Miss. Swarnali Mukherjee, M.Sc.,	Assistant Administrative Officer - Adm.III
Sh. Balaram Chatterjee, B.Com,	Personal Secretary to Director

Retirement on Superannuation

1. Sh. Tapan Kumar Mallick, Senior Technician (On 30.04.2016)
2. Dr. Debasis Nag, Director (On 30.06.2016)
3. Sh. Mohammad Ershadullah, Senior Technician (On 31.07.2016)
4. Sh. Sushil Kumar Kundu, Bearer-cum-Assistant Cook (On 30.11.2016)
5. Sh. Tapash Kanti Ghosh, B.Sc., Technical Officer (On 30.11.2016)
6. Sh. Ganesh Chandra Das, Senior Technician (On 31.01.2017)
7. Sh. Ratan Das, SS Staff (On 31.01.2017)
8. Sh. Paarimal Das, SS Staff (On 28.02.2017)

FINANCIAL

BALANCE SHEET AS ON 31st MARCH, 2017

Corpus/Capital Fund & Liabilities	Schedule	2016-17 (₹)	2015-16(₹)
Capital Fund	1	19,39,04,828	18,35,69,778
Reserves	2	0	0
Earmarked/Endowment Fund	3	0	0
Current Liabilities & Provisions	4	2,32,13,397	3,76,91,479
	Total	**21,71,18,225**	**22,12,61,257**
Assets			
Fixed Assets	5	17,76,25,855	18,11,07,944
Investments-Earmarked/Endowment Funds	6	0	0
Current Assets, Loans & Advances	7	3,94,92,370	4,01,53,313
	Total	**21,71,18,225**	**2,21,26,1257**

A. The budget provision and actual utilization under Plan, Non Plan, NAIP & Plan schemes during 2016-17

S.No	Name of Heads	Opening Balance (₹)	Fund Received (₹)	Actual Utilization (₹)	Closing Balance(₹)
1	Non-Plan	39,83,364	16,68,00,000	16,40,04,592	27,95,408
2	Plan	55,88,131	2,74,72,000	1,97,22,236	49,764
3	Plan Schemes (ITMU & ZTMC,ABI)	6,85,283	49,60,000	50,33,672	3,31,423

B. Sub-head wise budget provision and actual utilization under Institute Plan and Non-plan Schemes during 2016-17

S. No	Sub-Head	Plan (₹)		Non Plan (₹)	
		Budget Provision	Actual Utilization	Budget Provision	Budget Utilization
	A) Revenue Expenditure				
1	Establishment Expenses	NA	NA	9,50,00,000	9,46,76,865
2	Pension & Other Retirement Benefits	NA	NA	4,00,00,000	3,88,22,495
3	Travelling Allowances	11,90,000	11,88,740	6,00,000	4,99,706
4	Research & Operational Expenses	26,82,000	26,78,957	14,00,000	11,57,204
5	Administrative Expenses	87,57,800	8728402	2,64,00,000	2,60,34,010
6	Miscellaneous Expenses	9,20,200	917884	27,77,000	21,18,239
	Total of A	**1,35,50,000**	**1,35,13,983**	**16,61,77,000**	**16,33,08,519**
	B) Capital Expenditure				
1	Equipment	36,85,300	36,85,285	5,00,000	4,96,979
2	Library Books & Journals	1,93,000	1,92,977		
3	Furniture & Fixture	5,96,200	5,96,117	2,00,000	1,99,094
4	Information Technology	9,75,500	9,75,058		
	Total of B	**54,50,000**	**54,49,437**	**7,00,000**	**696073**
	Total (A+B)	**1,90,00,000**	**1,89,63,420**	**16,68,77,000**	**16,40,04,592**

Income & Expenditure account for the year ended 31st March2017

A. Income			
	Schedule	**2016-17 (₹)**	2015-16 (₹)
Income from Sales/Service	8	13,31,970	13,80,822
Grants in aid/subsidies	9	18,45,03,842	16,21,05,969
Fees/Subscriptions	10	0	0
Income from Investments	11	0	0
Income from Royalty, Publications	12	0	0
Interest earned	13	1,71,270	1,69,226
Other Income	14	5,76,144	14,64,445
Prior Period Income	15	0	0
	Total (A)	**18,65,83,226**	**16,51,20,462**
B. Expenditure			
Establishment expenses	16	13,42,78,775	12,69,49,192
Research & Operational Expenses	17	83,00,456	85,86,858
Administrative expenses	18	2,89,27,872	2,18,40,116
Grants and subsidies	19	0	0
Miscellaneous expenses	20	30,36,123	32,59,831
Depreciation	5	99,86,943	1,74,59,583
Prior period expenditure	21	0	0
	Total (B)	**18,45,30,169**	**17,80,95,580**
Balance being surplus/(Deficit) carried to corpus/Capital Fund		**20,53,057**	**-1,29,75,118**

Abstract of 'Other receipts' for the year 2016-17

S.no	Head of account	Amount (₹)
1	Sale of farm produce	2,94,570
2	Sale of vehicle, other machine tools	0
3	Licence fee	47,383
4	Interest earned on loans & advances	4,59,744
5	Analytical and testing fee	6,09,000
6	Income from service	2,65,000
7	Application fee from candidates	3,000
8	Receipts from services rendered	0
9	Interest earned on short term deposits	45,142
10	Income generated from Internal Resource Generation Schemes	
	a) Training	20,900
	b) Consultancy	10,000
	b) Sale of technology	1,32,500
11	Recoveries of Loans & Advances(including the refund of S-Advance)	7,99,278
12	Miscellaneous Receipts	5,25,761
	TOTAL	**32,12,278**


DIRECTOR's
OFFICE
nirjafi

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