



CPPRI

केन्द्रीय लुग्दी एवं
कागज़ अनुसंधान संस्थान, सहारनपुर

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RESEARCH AND DEVELOPMENT ACTIVITIES

Plan Projects

Raw Material and Product Development

An Integrated Approach on Application of Biotechnology in Pulp and Paper Industry

The project objective is to promote the biotechnological applications in Pulp and Paper Industry to pursue the clean and green technology, to address the issues related to energy conservation, quality up gradation and environmental improvement in Indian Paper Industry.

❖ Commercial Mill Scale Trial on Enzymatic Prebleaching of Pulps :

Mill scale trial of Enzymatic prebleaching was conducted at Delta Paper Mills Ltd., Bhimavaram, Andhra Pradesh on mixed hardwood pulp (12-14 kappa number) with commercial xylanase enzyme. Trial was conducted over a period of two weeks. The results were highly encouraging and it was possible to achieve brightness improvement by 2 - 3% ISO (81% - 84%) with nearly 30-35% reduction in post color number (PC).



CPPRI project staff during mill trial on enzymatic prebleaching at M/s Delta Paper Mills Ltd., Bhimavaram, A.P.

Further, enzymatic prebleaching studies were carried out on oxygen delignified hardwood

pulp at Abhishek Paper Mill, Punjab with commercial xylanase enzyme. Results of the lab studies conducted at the Mill site were encouraging i.e. 2.0 unit gain in final brightness of the pulp. However, the enzyme trial could not be continued due to some technical problem in mill.

❖ Enzymatic Refining of Pulps :

Biorefining experiments were continued with cellulase enzymes identified for refining. Commercial refining enzymes were evaluated for their cellulase enzyme activity to further optimize the process conditions like enzyme dose, retention time & pH etc. Studies on enzymatic refining of hardwood pulp were conducted with two commercial Cellulase enzymes. Results were encouraging in respect of improvement in strength properties with reduction in the requirement of refining energy. Further studies are continued.

❖ Bioremediation of Paper Mill Effluent:

Studies were continued with screened lignolytic bacterial isolates to develop consortia of microbes to reduce the pollution load in respect of colour, lignin and Phenolics in the paper mill effluents. Around 20-25% reduction in colour and lignin from effluent was observed with few of the isolated microbial strains. Further, isolation of microbial strains from effluent and sludge are under progress in order to find the more effective strains for effluent treatment.

Improving the Rheological and Combustion Behaviour of Non-wood Black Liquor for Enhanced efficiency of Energy and Chemical Recovery

The activities under the project were successfully accomplished. As outcome of the project activities CPPRI has been able to develop process know-how for removal of potassium (K) and chlorides (Cl) from chemical recovery cycle wherein it has been possible to remove more than 60% potassium and 80% chlorides from the chemical recovery cycle this should help in improving the efficiency of the chemical recovery operations in the paper mills

using hardwoods & non-hardwood raw materials. The technology has been scaled up to the pilot plant level. A pilot plant has been successfully commissioned at CPPRI. Pilot plant at CPPRI will be able to address the mills specific problems as sponsored project activities.

However, institute has been regularly conducting studies on build up and removal of chlorides and potassium from chemical recovery cycle as part of sponsored activities.

Optimization of Wet end Operation of Paper Making to Improve the Quality of Paper

Wet-end characterization of an agro based mill was carried out. The mill is using blend of baggase (75%) and recycled fiber (25%) to produce 60 gsm writing/printing grade of paper using alkaline sizing chemistry. Sample collected over five consecutive days were evaluated at CPPRI for process variables and electrokinetic properties. The study reveals that system is running on negative charge at a pH of around 8-9. The electrokinetic properties reveal that although the surface charge variation is between -12.5 mV to -17.7 mV, the variation in Cationic demand (CD) is high. It was observed that at high levels of Cationic demand (CD), the First Pass Ash Retention (FPAR) is low and fines retention is zero which indicates that there is a deficiency of retention aid in the system due to which the system is less effective in retaining fines.

Printing Quality Evaluation - Assessment and Improvement Possibilities for Indigenous Coated Paper and Paperboard

There are number of parameters involved in calendering process of coated paper. These parameters are interactive in nature. In dynamic process of calendering, it is extremely difficult to evaluate some of the design and process parameters and their interactions. Attempt has been made to analyze the interactions between different parameters, using various mathematical and statistical models. Model studied were nip mechanics, steady and unsteady state heat transfer modeling and models correlated to stress- strain

behaviour for various types of calenders. Since most of the work on the validation of these models has reported on the newsprint furnish and very little work has been done on coated paper from chemical pulp. Therefore, experiments were planned for studying and to validate these models for paper coated on the base paper made from the furnish of agricultural residue pulps and hardwood pulps in the ratio of 75: 25. A very good correlation was observed between gloss, bulk and PPS smoothness for coated grade paper.

Energy Conservation and Environmental Management

Integrated Approach for Improving Environmental Status of Pulp and Paper Industry

Under the project, studies were carried out in following areas:

- ❖ Adequacy Assessment of existing effluent treatment plant at RCF based kraft paper mills (6) in meeting the discharge norms.
- ❖ Water Audit of a RCF based Kraft Mill
- ❖ Water audit of a wood based mill producing bleached and unbleached grade of paper and exploration of potential of utilization of treated effluent to reduce overall fresh water consumption.
- ❖ Evaluation of Toxicity potential of ETP sludge and boards manufactured from ETP sludge of two agro based writing and printing mills through TCLP Test

The project is nearing completion and report preparation is under progress.

Infrastructure and Development Activities

Strengthening of Training Programme on "Fibre Extraction through Enzymatic Retting and Quality Aspects of Paper Testing of Handmade Paper"

Successfully completed five days Training Programme for 49 officials of Khadi and Village Industries Commission (KVIC), Mumbai (Maharashtra) and Kumarappa National Handmade Paper Institute (KNHPI), Jaipur (Rajasthan) in two

batches from January 16 - 20 and February 06 - 10, 2012 in the area of "Fiber Extraction through Enzymatic Retting and Quality Aspect of Handmade Paper." Following lectures were covered under the training programme:



Dr. R. M. Mathur, Director and Senior Scientists with Trainees at CPPRI, Saharanpur

- ❖ Status of Indian Handmade Paper Industry - Dr. R. K. Jain, Sc. 'F'.
- ❖ Availability and Composition of Fibrous Raw Materials and their Relevance for Handmade Paper and products - Dr. R. K. Jain, Sc. 'F'
- ❖ Biotechnical Extraction of Fibers - Bio/Enzymatic Retting of bast fibres - Dr. Vasanta V. Thakur, Sc. 'B'
- ❖ Enzymatic Refining / Beating - Dr. Vasanta V. Thakur, Sc. 'B'
- ❖ Enzymatic Application in Paper Making - Enzymatic Pulping and Enzymatic Bleaching -

Dr. Vasanta V. Thakur, 'B'

- ❖ Concept of Refining and Beating and its Importance in Paper Making - Dr. Sanjay Tyagi, Sc. 'C'
- ❖ Coating Colour Ingredients and Coating Formulations - Dr. Sanjay Tyagi, Sc. 'C'
- ❖ Surface Sizing - Dr. Sanjay Tyagi, Sc. 'C'
- ❖ Important Physical Properties of Paper - Ms. Prachi Kaushik, JRF.
- ❖ Optical Properties of Pulp and Paper and their Measurement - Dr. Poonam Rani, JRF.



Personnel's and officials from Directorate of Handmade Paper and Fibre Industries, Khadi and Village Industries Commission during the training programme on " Fibre Extraction through Enzymatic Retting " held at CPPRI , Saharanpur from January 15-19, 2012 and February 6-10, 2012.

Strengthening of Training and Human Resource Development (HRD) Infrastructure in Pulp, Paper and Allied Industries

Following Training Programmes were conducted in different areas as a part of the project activities:

Biotechnology

- ❖ Ms. Akanksha Karnwal, Ms. Swati Tyagi, Ms. Nisha Baliyan and Ms. Sukhbir Kaur M.Sc. (Microbiology) from Deptt. Of Microbiology, Kurukshetra University, Kurukshetra were imparted training in the area of "Microbiological and Biotechnological applications in the Pulp and Paper Making from January - March, 2012.
- ❖ Mr. Kishan Kumar Singh, M.Sc. (Microbiology) from Deptt. Of Microbiology, Kurukshetra University, Kurukshetra were imparted training in the area of "Microbiological and Biotechnological applications in the Pulp and

Paper Making from February - May, 2012.

Environment

- ❖ Five day training from February 13 - 17, 2012 was rendered to Mr. Krishna Nand Tiwari of Devpriya Products Ltd. on "Waste Water Analysis for various polluttional parameters".

Paper Making

- ❖ Mr. Jahid from Pune University, Pune (Maharashtra) was imparted training in the area of "Pulp and Paper Manufacturing" from September 08 to March 08, 2012.
- ❖ Mr. Kunal Sharma, Mr. Sukhpal and Mr. Ankush, M. Tech (Chemical) from Deenbandhu Chhotu Ram University of Science and Technology, Murthal, Sonipat (Haryana) were imparted training in the area of "Pulp and Paper Making" from January 23 to July 23, 2012.
- ❖ Mr. Nilay Kadakiya from PD Pandya College Road, Ahmadabad (Gujarat) was imparted training in the area of "Paper and Pulp Technology" from February 21 to March 21, 2012.

Infrastructure Development for Extension of Library and Documentation Service to the Indian Paper Industry

Current Awareness Service (CAS) and Selective Dissemination of Information (SDI) from the current journals related to Pulp and Paper were provided to 44 member mills of CPPRI as well as to Institute Scientists.

Rendered Reference/Referral/Reprographic Service to the Indian Pulp Paper and Allied Industries, R & D Centre, member mills and other organisation.

Thirty Seven Visitors from different organizations visited the Library and Documentation Centre to fulfil their information requirements during the period from January - March, 2012.

CESS Funded Projects

An Integrated Approach for Utilization of Bagasse Pith for Production of Bio-ethanol and Value

Added Lignin Products (CPPRI/IIP, Dehradun)

The objective of the project involves efficient utilization of bagasse pith through development of a process for production of bio-ethanol and value added lignin products. During the period, studies were continued with prehydrolysis of bagasse pith followed by enzymatic saccharification of prehydrolysed pith with optimized dose of commercial enzymes (Cellulase + β -glucosidase) to recover maximum amount of fermentable sugars. After enzymatic saccharification, 30g/l sugars were observed. Proximate analysis of residual biomass of each stage after prehydrolysis and enzymatic saccharification was done for different parameters like Klason lignin, pentosan, holocellulose and ash.

Studies on conversion of xylose sugars of xylose rich prehydrolysate to furfuryl were continued and the results showed 30% conversion was achieved the overall performance of the process. Further studies to improve the conversion rate are under progress.

Development of Environmentally safe Biological Process to Bleach the Bamboo and Wood Pulp using Potential Bacteria (CPPRI/IGIB, New Delhi)

The aim of the project is to develop the process of biobleaching of bamboo and wood pulp using ligninolytic bacteria for the reduction of chlorinated bleaching chemicals and improvement in pulp quality and its evaluation and validation in an identified paper mill. Studies on isolation of lignolytic bacteria are initiated by IGIB. Preliminary studies of the pulp treatment with developed bacteria followed by alkali extraction of the unbleached hardwood pulp showed that 6-8 unit brightness improvement when compared to the untreated pulp. Studies are continued to develop the bacterial treatment process alternate to the existing first stage (chlorine) of the conventional bleaching process.

Fibre modification of enzymes (CPPRI/ TCIRD/ IPMA)

The objective of the project is development of enzyme refining technology for recycled pulps to improve the pulp quality, drainability and to reduce the refining energy if any. Studies on enzymatic

refining of recycled pulp were conducted with two commercial Cellulase enzymes. Studies on optimisation of process conditions like treatment time and enzyme dose were continued with the identified enzymes to improve the pulp quality by reducing refining energy if any. Results were encouraging in respect of better strength properties and the drainability of the pulp.

Studies on Ozone Treatment of Indigenous Raw Material Pulp for Better Bleachability

The project objective is to improve bleaching pulp quality in terms of optical and strength properties and reduction / removal of elemental chlorine bleaching process for improved quality of liquid discharges. Under the project, studies were carried out in following areas:

- ❖ Project activities were taken up during 2011-12 and focused on ozone treatment of eucalyptus pulp. Eucalyptus pulp of medium range kappa number i.e. 17 was prepared in the laboratory and was then bleached employing following bleaching sequences incorporating ozone in each sequence viz.
- ❖ OZDEpD
- ❖ OAZDEpD
- ❖ AZDEpD
- ❖ DEpD and ODEpD bleaching of eucalyptus pulp were also carried out to study the behaviour of Eucalyptus pulp during Elemental Chlorine Free (ECF) bleaching in absence of Ozone. Bleached pulps obtained after each bleaching sequence were characterized for physical strength and optical properties.
- ❖ Results indicated that incorporation of ozone stage in A-DEpD sequence before first D stage reduced consumption of Chlorine Dioxide in first D stage from 4.55% to 2.0%. Chlorine Dioxide consumption reduced by almost 55%.
- ❖ Similar studies are in progress on other indigenous raw material pulps like bagasse soda pulp to study the impact of ozone during ECF bleaching.

Sponsored Projects

Base Line Energy Audit of Designated Consumers

The work to conduct base line Energy Audits in the following selected mills was awarded to CPPRI by Energy Efficiency Services Limited (EESL) New Delhi in year 2011.

- ❖ M/s Sangal Paper Mills , Meerut, (U.P.)
- ❖ M/s Sardhana Paper Mills, Meerut, (U.P.)
- ❖ M/s Rana Paper Mills Limited, Muzaffarnagar, (U.P.)
- ❖ M/s Rama Paper Mills, Bijnore, (U.P.)

All the mill were visited during August - October 2011 and draft reports were prepared subsequently CPPRI team visited M/s Sangal Paper Mill and M/s Sardhana Papers (Pvt.) Ltd. in the month of March 2012 for collection of additional data as per the scope of the work assigned by EESL. The report of M/s Sangal Paper Mill and M/s Sardhana Papers (Pvt.) Ltd. has been amended as per new format and submitted to EESL.

Deinking Optimization Studies of Currency Broke - Sponsored by M/s Security Paper Mills, Hosangabad, M.P.

A project has been awarded to CPPRI by M/s Security Paper Mills; Hosangabad with an objective to develop a process technology for Deinking of Currency broke/ cutting so that it could be effectively recycled. Activities have been initiated on optimization of process variables for repulping of currency broke.

Enzymatic Refining of Cotton Comber and Linter Pulps - Sponsored by M/s Security Paper Mill, Hoshangabad, M.P.

The objective of the project is to develop an enzymatic refining technology for cotton comber and linter pulps to improve the pulp quality, drainability and to reduce energy during refining if any. Two identified enzymes procured from a leading enzyme manufacturing company were used for the study. Studies showed encouraging results and indicated the potential to reduce the energy

consumed during refining of pulps and improved strength properties of fibre in respect of tear index and double fold. It was also observed that the morphological characteristics of fibre were also improved indicating better fibrillation after enzymatic refining.

Improved Energy Efficiency through Utilization of Lignin Based Biomass from Agro Based Paper Mills - Sponsored by Petroleum Conservation Research Association, New Delhi

PCRA sponsored the above project to CPPRI for utilization of lignin based biomass from agro based paper mills. Under the successfully completed first phase of the project a Process was developed by CPPRI for manufacturing of Sodium lignosulphonate from waste lignin. In this second phase activities will be concentrated on commercialization of the process.

Pre-feasibility Studies on AKD Sizing of Cotton/Linter Pulp - Sponsored by M/s Security Paper Mills, Hosangabad, M.P.

The above project has been awarded to CPPRI with an objective to study the feasibility of AKD sizing with cotton/linter pulp. Presently the Security Paper mill is producing currency paper using Rosin-Alum sizing chemistry. The mill intends to switch over to alkaline sizing using AKD emulsion. Preliminary studies have been initiated to optimise the AKD demand based on electrokinetic properties of the pulp.

Rendering Services as an Energy Professional under PAT Scheme of Pulp and Paper Sector

EESL has sponsored to CPPRI the evaluation work of 51 Baseline Energy Audit reports of Pulp and Paper Sector conducted by different auditing agencies, to find out the adequacy of work carried out by different auditors in accordance with the BEE/EESL guidelines. 25 reports were collected from EESL and are being evaluated by CPPRI Energy Management team.

Technical Assistance to Hindustan Paper Corporations Limited (Unit: Nagaon and Cachar) in the Area of Chemical Recovery - Sponsored by M/s Hindustan Paper Corporations Limited

HPC sought the assistance of CPPRI to conduct diagnostic study in the various unit operations of these mills with special emphasis to Pulping and Bleaching, Papermaking and Chemical Recovery areas. Subsequently a team of CPPRI Scientists visited both the mills from 30.01.12 to 06.02.12 and held discussion with the mill personnel's to get first hand information on the process details and the constraints in achieving high quality paper in a cost effective manner. During the visit sample collected from different location of the mill were sent to CPPRI for detailed analysis. Based on the analysis a report covering short and long term measures has been submitted to HPC.

Technical assistance to Star Paper Mills Limited in the area of Chemical Recovery sponsored by M/s Star Paper Mills Limited

Studies are continued on efficiency improvement of chemical recovery system. Higher sorbed soda loss has been identified one of the major problem of the mill. Studies are continued to reduce soda loss so that chemical recovery efficiency can be improved.

Technological improvement of a Process of Biological Reduction of AOX, Colour, COD and BOD of Waste Water Emanated from Large Pulp and Paper Industries. (CPPRI/IGIB, Star Paper Mills Ltd., Department of Biotechnology, New Delhi)

After successful completion of the phase-I activities of pilot trial at M/s Star paper mill, Saharanpur, DBT has extended the project activity up scaling the process on continuous basis at M/s Star paper mill, Saharanpur as phase - II of the project. A developed microbial consortium is under preparation for the inoculation of the pilot plant for large scale production of the consortia. Analysis of effluents of the mill existing treatment process is going on regular basis to analyse the pollution loads of the mill effluents without developed bacterial treatment.

Utilization of Fly Ash for Removal of Color from Paper Mill Effluent - Sponsored by Centre for Fly Ash Research and Management (C-FARM), New Delhi

Under this C - FARM sponsored project successful pilot scale studies on removal of color from paper mill effluent using fly ash were carried out in rice straw based mill. Studies are now continued on other agro based mill using bagasse and wheat straw as raw material.

Overseas Projects

A Comparative Pulping and Bleaching Studies on Indian and Australian Bagasse

Queensland University of Technology, Australia has awarded a project entitled "Comparative Pulping and Bleaching Studies on Indian and Australian Bagasse" to the Institute.

The objective of the project is to compare the strength and optical properties of Indian and Australian bagasse pulp produced by Soda AQ pulping process and bleached by DEpD sequence to achieve 85% ISO brightness. Laboratory studies have been completed and compilation of data draft and report preparation is in progress.

TECHNICAL / CONSULTANCY SERVICES

Technical Assistance/Consulting services were rendered to the following Pulp and Paper Mills:

- ❖ Technical services were rendered to the following mills and organizations by analyzing their effluents / solid waste samples or carrying out air monitoring studies for various pollution parameters:
 1. M/s JK Paper Ltd., Rayagada, Orissa.
 2. M/s JK Paper Ltd. (Unit: Central Pulp Mills), Fort Songadh, Gujarat.
 3. M/s Naini Group of Industries Ltd., Kashipur, Uttarakhand.
 4. M/s Star Paper Mills Ltd., Saharanpur, U.P.
 5. M/s Bilt (Unit Shree Gopal), Yamunanagar, Haryana.
 6. M/s Shree Shyam Pulp and Board Mills Ltd., Kashipur, Uttarakhand.
 7. M/s Orient Paper Mills Ltd., Amlai, M.P.

8. M/s Hindutan Paper Corporation Ltd. (Nagaon Paper Mills), Nagaon, Assam.
 9. M/s Seshasayee Paper and Boards Ltd., Erode, Tamilnadu.
 10. M/s North Star Paper Boards Ltd., Kashipur, Uttarakhand.
 11. M/s Bharat Starch Industries, Yamuna Nagar, Haryana.
 12. Kumaon Garhwal Chamber of Commerce and Industry (Paper Unit Chapter), Kashipur, Uttarakhand.
 13. M/s Metso Paper India Pvt. Ltd., Gurgaon, Haryana.
 14. M/s Bahl Paper Mills Ltd., Kashipur, Uttarakhand.
- ❖ ETP Adequacy Assessment / ETP Upgradation were provided to following mills:
 1. M/s North Star Paper Boards Ltd., Kashipur, Uttarakhand.
 2. M/s Devpriya Industries Ltd., Meerut, U.P.
 3. M/s Devpriya Papers Pvt. Ltd., Meerut, U.P.
 4. M/s Devpriya Products Ltd., Meerut, U.P.
 5. M/s Magnum Ventures Ltd., Ghaziabad, U.P.
 6. M/s Devrishi Papers Pvt. Ltd., Kashipur, Uttarakhand
 - ❖ Water Audit were provided to following mills:
 1. M/s Star Paper Mills Ltd., Saharanpur, U.P.
 2. M/s Magnum Ventures Ltd., Ghaziabad, U.P.
 - ❖ Evaluation of Deinking of chemicals for M/s Thermax Ltd.; Pune (Maharashtra).
 - ❖ Repulpability of De-waxed OCC for M/s Sri Guru Extraction Pvt. Ltd.; Coimbatore.
 - ❖ Laboratory Pulping and Bleaching Trial of Canadian Wheat Straw (International) carried out for Prairie Pulp and Paper Inc., Canada
 - ❖ Optimization of Pulping and Bleaching Chemical with respect to Industry Norms and

Best Practice (Nagaon and Cachar Paper Mill) carried out for Hindustan Paper Corporation Limited (HPC), Kolkata.

- ❖ Evaluation of Digester Additive Mys-11 for Pulping of Wheat Straw and Bagasse carried out for M.Y. and Sons, Najibabad (U.P.)
- ❖ Fibre Furnish Analysis was carried out in 16 Nos. of Pulp, Paper and Board Samples.
- ❖ 42 Nos. of different sample of raw materials were analyzed for Moisture Content, Proximate Chemical Analysis.
- ❖ 4 Nos. Non Fibrous Raw Material sample were analyzed for White Liquor.
- ❖ 792 Nos. of Paper and Paper Board samples received from various organizations/ mills were tested for GSM, Thickness, Tensile, Tear, Burst, Opacity, Gloss, (l, a, b values), whiteness, Double Fold, RCT, Smoothness, Porosity, Formation, Bending stiffness, Printing properties and Fibre furnish etc.
- ❖ 9 Nos. of samples of tile received for calibration was also tested during this period.
- ❖ 1 Nos. enzyme sample received from Value Addition, New Delhi was evaluated for Xylanase activity, temperature and pH profile of xylanase activity
- ❖ 34 samples of black liquor, scales, lime mud samples were evaluated for K, Fe, Ca, Mg, lignin and C, H, N, S.

WORKSHOP/SEMINAR/ MEETINGS

Workshop/Conference

- ❖ Dr. B.P. Thapliyal, Sc. 'E-II', Dr. Sanjay Tyagi, Sc. 'C' and Shri Alok Kumar Goel, Sc. 'C' attended the workshop on "solar Initiatives in Pulp and Paper Industry" at GIZ New Delhi from January 9, 2012.
- ❖ Dr. R. M. Mathur, Director and Dr. B.P. Thapliyal, Sc. 'E-II' attended workshop of business opportunity in Energy and Renewable at New Delhi organized by TERI and NEDO, Japan from January 31, 2012.
- ❖ Dr. S. Panwar, Sc. 'F' attended IPPTA Conference on " From Refiner to Reel - Key steps for Production and Quality Excellence " held at Kolkata from March 1 - 2 , 2012



Dr. B. P. Thapliyal during the workshop

Meetings

- ❖ Dr. R. M. Mathur, Director and Dr. B. P. Thapliyal, Sc. 'E-II' attended the meeting of 3rd Task Force Committee in March 2012 constituted by BEE to finalize the methodology of the PAT Scheme.
- ❖ Dr. R. K. Jain, Sc. 'F' participated in the meeting on Green Chemistry Initiatives organized by Prime Minister Office, Govt. of India and made presentation on "Status of Pulp and Paper Industry in India with respect to environmental issues: Institutional Perspective" at IIT Bombay on March 7, 2012.
- ❖ Dr. R.K. Jain, Sc. 'F' and Dr. B.P. Thapliyal, Sc. 'E-II' attended a meeting at BRBNMPL, Bangalore in March 20102 for finalization of the specification of test equipments
- ❖ Dr. R. K. Jain, Sc. 'F' and Dr. A. K. Dixit, Sc. 'E-I' visited National Jute Board, Kolkata for attending meeting on Utilization of Jute in paper industry from January 17 - 19, 2012.
- ❖ Dr. R. K. Jain, Sc. 'F' and Dr. A. K. Dixit, Sc. 'E-I' visited Hindustan Newsprints Limited., Kerala for participating in the meeting of disposal of

desilication plant from February 21 - 23, 2012.

- ❖ Dr. B.P. Thapliyal, Sc. 'E-II', attended the following meeting during the quarter:
 1. Meeting at HPC, H.O Kolkata to discuss the quality issues
 2. To attend a IPPTA , AGM meeting and visit to Triveni Tissues, Kolkata
 3. A meeting with IPMA mill members at Thapar House, New Delhi in connection with technology Modernization Assistance programme Pulp and Paper Industry.
- ❖ Dr. B.P. Thapliyal, Sc. 'E-II' and Dr. S. Tyagi, Sc. 'C' attended the following meetings during the quarter
 1. Alert group meeting of BIS at FRI, Dehradun.
 2. General body meeting of CHD- 15, Bureau of Indian Standards at FRI, Dehradun.

LECTURES AND PRESENTATIONS

- ❖ Dr. B. P. Thapliyal, Sc. 'E-II', made a presentation on "Fiber Fractionation - A unique Technique for making Quality Paper from Indigenous Raw materials" and was awarded the 3rd best paper award in IPPTA Annual Seminar held at Kolkata on March 2, 2012.
- ❖ Dr. B. P. Thapliyal, Sc. 'E-II', made a presentation on "Possibility of solar initiatives in Pulp and Paper Industry" during the workshop on Solar Initiatives at GIZ Office, New Delhi.



Dr. B. P. Thapliyal, awarded the 3rd best paper award and Dr. Suresh Panwar, during the IPPTA Annual Seminar at Kolkata

INTERNAL LECTURES

- ❖ Dr. S. V. Subrahmanyam, General Manager (Research & Development and Quality Control) delivered a lecture on "Water Management at TNPL - A Case Study" as on March 15, 2012.

REPORTS AND PUBLICATIONS

Reports

- ❖ Adequacy of Existing Effluent Treatment Plant For Treatment of Waste Water Generated at M/s North Star Paper Boards Ltd., Kashipur, Uttarakhand.
- ❖ Potential of Utilisation of Final treated Effluent (after ETP) at M/s Star Paper Mills Ltd., Saharanpur.
- ❖ Adequacy of Existing Effluent Treatment Plant For Treatment of Waste Water Generated at M/s Devrishi Papers Pvt. Ltd., Kashipur, Uttarakhand.
- ❖ Adequacy of Existing Effluent Treatment Plant For Treatment of Waste Water Generated at M/s Devpriya Industries Ltd., Meerut.
- ❖ Adequacy of Existing Effluent Treatment Plant For Treatment of Waste Water Generated at M/s Devpriya Papers Pvt. Ltd., Meerut.
- ❖ Adequacy of Existing Effluent Treatment Plant For Treatment of Waste Water Generated at M/s Devpriya Products Ltd., Meerut.



Publications

International

1. Vasanta V. Thakur, R. K. Jain, and R. M. Mathur "Studies On Xylanase And Laccase Enzyme Prebleaching To Reduce Chlorine Based Chemicals During CEH And ECF Bleaching" *Bioresources* 7(2), 2220-2235. (2012)

National

1. Sanjay Tyagi, R. D. Godiyal, Manoj Kumar, B. P. Thapliyal and R. M. Mathur "Fiber Fractionation - a Unique Technique for Making Quality Paper from Indigenous Raw Materials" *IPPTA Journal*. Vol. 24(1), Jan - March, 2012, Pg. 177 - 181.
2. R. K. Jain, A. K. Dixit and Vasanta V. Thakur "Status of Indian Handmade Paper Industry" Proceedings of Training programme on "Fibre extraction through enzymatic retting and quality aspects of paper testing of Handmade Paper" held at CPPRI, Saharanpur from January 15 - 19, 2012 and February 6-10, 2012.
3. R. K. Jain, A. K. Dixit, Vasanta V. Thakur and Chetna Gupta "Availability and composition of Fibrous Raw materials and their relevance for Handmade Paper and Products" Proceedings of Training programme on "Fibre extraction through enzymatic retting and quality aspects of paper testing of Handmade Paper" held at CPPRI, Saharanpur from January 15 - 19, 2012 and February 6-10, 2012.
4. R. K. Jain, Vasanta V. Thakur and Dharmendra Chauhan "Biotechnical extraction of fibers - Bio/enzymatic retting of bast fibres" Proceedings of Training programme on "Fibre extraction through enzymatic retting and quality aspects of paper testing of Handmade Paper" held at CPPRI, Saharanpur from January 15 - 19, 2012 and February 6-10, 2012.
5. R. K. Jain, Vasanta V. Thakur and Chetna Gupta "Enzymatic Refining /Beating" Proceedings of Training programme on "Fibre extraction through enzymatic retting and quality aspects of

paper testing of Handmade Paper" held at CPPRI, Saharanpur from January 15 - 19, 2012 and February 6-10, 2012.

INTERACTION WITH INDUSTRY

- ❖ Interaction with M/s Delta Paper mill, Andhra Pradesh and Trident Group (Abhishek Paper mill), Punjab for mill scale studies of xylanase bleaching.
- ❖ Continuous interaction with M/s Star Paper Mills Ltd., SRE in connection with the pilot trial on developed biological effluent treatment process under DBT sponsored project and in the area of chemical recovery.
- ❖ Continuous interaction with reputed enzyme manufacturers and suppliers viz. Value addition, Novozymes, Natuzyme, M/s Advance Biochem, Mumbai for procurement of enzymes for various enzyme applications in Pulp and Paper making.

Visit of Experts

- ❖ Dr. Adhikari, Scientist-G, IIP Dehradun visited CPPRI to discuss and review the progress of project "An Integrated Approach for utilization of bagasse pith for production of Bio-ethanol And Value Added lignin Products" (CPPRI/IIP, Dehradun) - CESS Funded.
- ❖ Mrs. Rekha Bharti and Mr. Akshilesh Mathur, Ashland Water Technologies, Singapore
- ❖ Mr. S. C. Jena, Orient Paper Mills Ltd., Amlai (M.P.)
- ❖ Dr. Narendra Sharma, ABC Paper Ltd., Sailakhurd Punjab
- ❖ Mr. Mahender Gupta, Dev Priya Industries Ltd., Meerut
- ❖ Mr. Jeff Golfman, President, Ms. Rupinder Sonia, Lead Process Engineer, and Mr. Arun Raj from Prairie Pulp and Paper Inc., Canada visited the Institute on February 02, 2012 in connection with the sponsored project on "Laboratory



Mr. Jeff Golfman, Ms. Rupinder Sonia and Mr. Arun Raj from Canada during the discussion with Dr. R. M. Mathur, Director CPPRI

Pulping and Bleaching Trial of Canadian Wheat Straw".

Visits to Mills and Other Organisations

- ❖ Dr. R. K. Jain, Sc. 'F' and Dr. B. P. Thapliyal, Sc. 'E-II', visited CMTI, Bangalore to study the business model of the Institute in March 2012.
- ❖ Dr. R. K. Jain, Sc. 'F' and Dr. B. P. Thapliyal, Sc. 'E-II', visited in March 2012 Bhartiya Reserve Bank Note Mudran Pvt. Limited, Bangalore to attend the meeting for finalization of technical specifications of paper testing equipments for their laboratory at Mysore.
- ❖ Dr. R. K. Jain, Sc. 'F' and Dr. B. P. Thapliyal, Sc. 'E-II', visited Central Manufacturing Technology Institute, Bangalore to discuss the Business Model of CPPRI and to see the facilities of CMTI for preparation of Business Model of CPPRI on March 12th, 2012.
- ❖ Dr. R. K. Jain, Sc. 'F', and Dr. A. K. Dixit, Sc. 'E-I', visited Petroleum Conservation Research association, New Delhi for attending meeting on PCRA sponsored project.
- ❖ Dr. R. K. Jain, Sc. 'F', and Dr. A. K. Dixit, Sc. 'E-I', visited M/s Star Paper mills limited for studying chemical recovery system and improvement in recovery efficiency .
- ❖ Dr. R. K. Jain, Sc. 'F' and Dr. A. K. Dixit, Sc. 'E-I', visited M/s Satia Paper Mills limited, Punjab for conducting studies on improvement in recovery efficiency and removal of NPE.
- ❖ Dr. R. K. Jain, Sc. 'F' and Dr. A. K. Dixit, Sc. 'E-I', visited M/s Cachar and Nagaon Paper Mills (HPC), Assam for technical consultancy on the area of chemical recovery.
- ❖ Dr. R. K. Jain, Sc. 'F', Dr. Vasanta V Thakur, Sc. 'B' and Mr. Diwakar Pandey, JRF visited Indian Institute of Petroleum, Dehradun, to attend the review meeting of enzymatic hydrolysis of bagasse pith under CESS project.
- ❖ Dr. R. K. Jain, Sc. 'F' and Dr. Vasanta V Thakur, Sc. 'B' visited IGIB, New Delhi, to discuss the project activities and for planning the phase II plant trial under DBT project.
- ❖ Mrs. Rita Tandon, Sc. 'F' and Shri Satya Dev Negi, Sc. 'B', visited Nagaon and Cachar Paper Mill; Assam Units of HPC from 30.01.2012 to 06.02.2012 to conduct process audit of Stock Preparation and Papermaking section.
- ❖ Dr. S. Panwar, Sc. 'F', visited Ministry of Environment and Forests, New Delhi for discussions related to Indo -Swedish Project Proposal on Environmental Management in Pulp and Paper Industry.
- ❖ Dr. S. Panwar, Sc. 'F', visited ITC Ltd. - Paper Boards and Specialty Papers Div (Unit- Tribeni), Chandrahati, West Bengal for Assessment of Water Consumption Bench marks foe Specialty Paper Mills.
- ❖ Dr. S. Panwar, Sc. 'F', visited Devrishi Papers Pvt. Ltd., Kashipur, Utrakhand for ETP adequacy assessment.
- ❖ Dr. S. Panwar, Sc. 'F' and Dr. S. Mishra, Sc. 'E-I', visited following mills for ETP adequacy assessment:
 1. M/Devpriya Industries Ltd., Meerut.
 2. M/s Devpriya Papers Pvt. Ltd., Meerut.
 3. M/s North Star Paper Boards Ltd., Kashipur,

Uttarakhand.

- ❖ Dr. S. Panwar, Sc. 'F' and Dr. S. Mishra, Sc. 'E-I', visited M/s Magnum Ventures Ltd., Ghaziabad, U.P. for Water Audit and ETP Adequacy Assessment.
- ❖ Dr. S. Panwar, Sc. 'F' and Dr. Nitin Endlay, Sc. 'E-I', visited M/s Devpriya Paper Products Ltd., Meerut for ETP adequacy assessment.
- ❖ Dr. B.P. Thapliyal, Sc. 'E-II' visited M/s Triveni Tissues, Kolkata on March 1 - 2, 2012.
- ❖ Dr. B.P. Thapliyal, Sc. 'E-II', visited the EESL and BEE, New Delhi for rendering services on Energy Professional under PAT Scheme.
- ❖ Dr. M. K. Gupta, Sc. 'E-II' and Dr. S. Mishra, Sc. 'E-I', visited M/s Star Paper Mills Ltd., Saharanpur for Water Audit.
- ❖ Dr. S. Mishra, Sc. 'E-I', visited M/s Ganga Pulp and Papers Pvt. Ltd., Varanasi for Newsprint Sample Collection.
- ❖ Shri Alok Kumar Goel, Sc. 'C', visited Punjab State Electricity Board, Shakti Sadan, Patiala
- ❖ Shri N. K. Naik, T. O. 'B' and Shri Akhil Naithani, JRF visited M/s Sangal Paper Mills, Meerut and M/s Sardhan Paper Mills, Meerut on 26.3.12
- ❖ Shri R. P. Singh, T. O. 'A' and Shri M. S. Bhandari, T.G.VI visited M/s Bilt (Unit ShreeGopal), Yamuna Nagar for Environmental monitoring.
- ❖ Shri R. P. Singh, T. O. 'A', Shri M. S. Pundir, T. O. 'A' and Shri J. S. Panwar, T.G.VI visited M/s Star Paper Mills Ltd., Saharanpur for Environmental monitoring.
- ❖ Shri R. P. Singh, T. O. 'A', Shri M. S. Pundir, T. O. 'A', Shri M. S. Bhandari, T.G.VI and Shri J. S. Panwar, T.G.VI visited Deen Bandhu Chottu Ram Thermal Power Plant, Yamuna Nagar, Haryana for Environmental Monitoring on weekly basis.
- ❖ Mr. Vipin Gupta, 'JRF' and Mr. Dhermander Kumar, 'JRF' visited M/s Delta Paper Mill,

Andhra Pradesh for conducting mill trial of xylanase enzymatic bleaching.

- ❖ Mr. Vipin Gupta, 'JRF', Mr. Sandeep Singh, 'JRF' and Mr. Dhermander Kumar, 'JRF' visited Trident group (M/s Abhishek Paper Mill, Barnala, Punjab) for conducting mill trial of xylanase enzymatic bleaching.
- ❖ Mr. Sandeep Singh, 'JRF' and Mr. Dharmendra, 'JRF' visited M/s Star Paper mill, SRE for the collection of effluent samples for II stage plant trial study of DBT project.

STAFF NEWS

Retirement

Name	Designation	DOR
Shri J. P. Joshi	T.G.-VI	31-01-2012

Appointment

Name	Designation	DOJ
M. Saalim	S.S.A.	13-02-2012

ABSTRACTS

Biorefinery

luo, Jie; Genco, Joseph M. and Zou, Haixuan. **Extraction of Hardwood Biomass using Dilute Alkali.** *Tappi journal Vol. 11 (6) 2012 Pg. 19*

Abstract: Near neutral hemicellulose extraction involves extracting wood hemicellulose using green liquor before conventional kraft pulping. The objective of this work was to develop correlations that could be used in process design and economic studies. Experimental data are presented for the extraction of northeast hardwood chips using green liquor. The effect of green liquor application rate, liquor-to-wood ratio, and H-factor on the removal of sugars and organic acids is discussed. Response variables include wood yield, total and soluble lignin, component sugars, acetic acid, lactic acid, formic acid, and furfural. Empirical correlations are developed that embody green liquor application rate, liquor-to-wood ratio, and the H-factor.

Parameters are presented for the response variables after the extraction and hydrolysis processes.

Bleaching

Povoas, tatiana m.; Angelico, Dina A.G.; Egas, Ana P.V.; Loureiro, Pedro E.G.; Gando-Ferreira, Licinio M. and Carvalho, M. Graca V. S. **Prebleaching of Eucalypt Kraft Pulp with OP Stages: Effect of an Acid Pretreatment or Chelation Step.** *Tappi journal Vol. 11 (6) 2012 Pg. 31*

Abstract: We conducted a comparative evaluation of different treatments for the bleaching of eucalypt kraft pulps beginning with OP stages. The treatments tested were (1) an acid chelation stage with DTPA (OQP sequence); (2) a hot acid stage (AOP sequence); and (3) a chelant addition into the alkaline oxygen stage ((OQ)P and A(OQ)P sequences). The latter strategy was also studied for environmental reasons, as it contributes to the closure of the filtrate cycle. The OQP sequence leads to the highest brightness gain and pulp viscosity and the lowest peroxide consumption caused by an efficient metals control. Considering that the low biodegradability of the chelant is a problem, the A(OQ)P sequence is an interesting option because it leads to reduced peroxide consumption (excluding OQP) while still reaching high brightness values and similar brightness reversion to OQP prebleaching, with only a viscosity loss of 160 dm³/kg. Therefore, a hot acid stage could be considered when a separate acid Q stage is absent in a prebleaching sequence of Eucalyptus globulus kraft pulps involving OP stages.

Coating

Dahlvik, Peter; Bluvol, Guillermo; Kagerer, Karl-Heinz; Arnold, Manfred and Varney, Dan. **Influence of Topcoat Pigment Particle Size Distribution on Tail-Edge Pick Resistance in Sheet-Fed Offset Printing.** *Tappi journal Vol. 11 (6) 2012 Pg. 51*

Abstract: This paper describes ground calcium carbonate pigment particle size distribution and its influence on the tail-edge picking of pilot-coated paper as determined in full-scale sheet-fed offset

printing. A tailor-made method was developed using a modified printing plate and high-tack inks to assess surface strength in terms of edge picking. In addition to the type, fineness, and particle size distribution of the ground calcium carbonate pigment, we also evaluated the solids content of the coating color, binder level, clay usage, and calendering. The printing test method provided differentiation relative to the investigated parameters, and it was possible to correlate these results with laboratory test data on ink-coating interaction and mercury intrusion porosimetry. Maximizing the solids content of the formulation to some extent compensated for the loss of pick resistance that followed binder reduction. Other laboratory tests showed poor correlation with the observed degree of edge picking.

Non-Wood Pulping

Dai, Kai and Zhai, Huamin. **Effect of Black Liquor Replacement in Wheat Straw Soda-AQ Cooking and Lignin Structure of Pulps.** *Tappi journal Vol. 11 (5), 2012 Pg. 43*

Abstract: The effects of black liquor replacement cooking (BLRC) on wheat straw soda anthraquinone (AQ) pulps and their lignin structures were investigated by using different black liquor replacement ratios (BLRR) and alkaline nitrobenzene oxidation and ozonation. The residual AQ, alkali, and dissolved lignin, as well as carbohydrates in the wheat straw black liquor, greatly influence wheat straw soda-AQ cooking. The influence could be controlled by different BLRR. The BLRC with around 60% BLRR resulted in superior delignification selectivity. The residual AQ and dissolved carbohydrates in the black liquor are beneficial to delignification selectivity, while the dissolved and degraded lignin can slow the delignification rate. No obvious differences were found in the lignin condensation and ?-O-4 structure degradation by the BLRC at different BLRR compared to control soda-AQ cooking. The BLRC technology has potential application because it reduces chemical charge and chemical recovery load and results in higher yield and quality of pulp.

गणतंत्र दिवस समारोह 2012

गणतंत्र दिवस की 62 वीं वर्षगांठ की पावन बेला पर संस्थान के प्रांगण में निदेशक महोदय डा. आर. एम. माथुर द्वारा ध्वजारोहण किया गया। इस अवसर पर निदेशक महोदय ने सम्बोधित करते हुये कहा कि इस संस्थान का कार्य क्षेत्र देश के लुग्दी एवं कागज उद्योग की समस्याओं को सुलझाने और उन्हें तकनीकी सहायता उपलब्ध कराना है ताकि वे वैश्विक प्रतिस्पर्धा के समकक्ष हो सकें। इसीलिये संस्थान 11वीं पंचवर्षीय योजनाओं में कागज उद्योग की मुख्य समस्याओं पर आधारित परियोजनाओं पर कार्य कर रहा है।

संस्थान कागज एवं लुग्दी उद्योग को अपनी विशिष्ट सेवायें देने के लिये लगातार प्रयत्नशील है। संस्थान को बहुत से सरकारी विभागों व अभिकरणों द्वारा विभिन्न परीक्षण नमूनों के मूल्यांकन/परीक्षण, जिसमें कच्चा माल, रसायन, कागज और पर्यावरण के लिए, मान्यता प्रदान की गई है।

राष्ट्रभाषा हिन्दी को आफिस के दैनिक कार्यों में उपयोग हेतु बढ़ावा दिया जा रहा है। सभी कर्मियों को अपने दिन-प्रतिदिन के कार्य हिन्दी भाषा में प्रतिपादित करने हेतु प्रोत्साहित किया जा रहा है ताकि भारत सरकार द्वारा समय-समय पर जारी दिशा-निर्देशों का पालन सुनिश्चित रूप से हो सके।

इस अवसर पर निदेशक महोदय ने संस्थान के हर कर्मचारी को अपनी भागीदारी को निष्ठापूर्वक निभाने का भी आह्वान किया।





A View of CPPRI Library

Address for Communication

Director

Central Pulp & Paper Research Institute

Post Box No. 174, Paper Mill Road, Himmat Nagar, Saharanpur-247001, U.P., India

Phone: 0132-2714059-62, Fax: 0132-2714052, 54

E-mail : director@cppri.org.in, Website : www.cppri.org.in

We welcome suggestions & comments for further improvement of this New Bulletin.