



CPPRI

CENTRAL PULP & PAPER RESEARCH INSTITUTE, SAHARANPUR (U.P.)



Portable Dynamic Water Retention



Porosity Analyzer



Microwave Reaction System

R&D Facilities in CPPRI

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News Bulletin on Pulp &
Paper Research and Development

(For Private Circulation)

Inside

Management News	2
Research Activities	2
Interaction with Industry	5
Technical/Consultancy Services	7
Workshop/Seminar/Training	8
Lectures and Presentations	8
Reports and Publications	9
Patents	9
Staff News	9
Abstracts of Interesting Articles	9

MANAGEMENT NEWS

RESEARCH ADVISORY COMMITTEE MEETING

A meeting of Research Advisory Committee (RAC) was held on June 30, 2010 at CPPRI, Saharanpur. The meeting



RAC Meeting in progress at CPPRI. Shri Talleen Kumar, IAS, Joint Secretary, DIPP ; Shri Shyamal Mishra, IAS, Director DIPP ; Dr. R.M. Mathur Director CPPRI with other Hon'ble member of RAC

was chaired by Shri Talleen Kumar, IAS, Joint Secretary, Ministry of Commerce & Industry, DoIPP to review the progress of on-going research schemes under XI Five year Plan. While welcoming the hon'ble member Dr. R.M. Mathur, Director CPPRI, briefed about the achievement of CPPRI & progress of RAC projects during the period July 2009 to June 2010. The project leaders presented the progress and outcomes of various on-going research schemes. The valuable suggestions made by the members were noted for incorporation in the future work plan.

RESEARCH ACTIVITIES

RAW MATERIAL AND PROCESS RESEARCH

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

Studies were conducted to assess the significance of high brightness in paper made from agro residue pulps by improving the wet end of paper machine. To obtain maximum paper making potential from such pulps, there is a need to avoid excessive degradation of pulps due to overbleaching in attaining high brightness which is considered to be an important optical parameter in paper trading. In agro residue pulps, higher brightness (more than 80%) has shown adverse effect on fiber strength. High brightness pulps were also highly negatively charged which results in poor retention of wet end chemicals and fillers. Further work is in progress.

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

Liquid & paper interactions form the basis for paper production and converting processes - such as coating, printing and gluing. Such liquids may be the real process liquids like coating colours, glues, inks or test liquids like water or oil. In case of coated paper, this interaction is much affected by the pore size and pore size distribution of coating pigments. Experiments are in progress with coating base paper and coated paper with water as a test liquid to study the pore size distribution of coating layer on coated base paper.

Storage and Preservation of Fibrous Raw Materials used in Indian Pulp and Paper Industry

Laboratory experiments were conducted to evaluate the efficacy of green liquor as fungicide on eucalyptus inoculated with identified fungi stored for a period of 15, 30, 45 and 60 days. The results revealed the following:

- The Green Liquor Washings (GLW) treated chip showed substantial preservation of fibrous raw material. The fungal treated chips without GLW treatment showed weight loss of around 6.0-8.0%. Yield loss after pulping also indicated the degradation of fiber from 1.0-3.0% when compared with chips treated with green liquor and fungus.
- No adverse effect of GLW treatment was observed on initial pulp brightness. Results showed that initial brightness of pulp was better in case of pulp obtained from GLW treated Eucalyptus chips than without (GLW) treated chips.
- Intrinsic strength of fiber after pulping dropped in case of fungal treated chips, which was preserved by green liquor washings. After 15 days of storage period the drop in viscosity from 627.13 cc/g (GLW treated) to 578.70 cc/gm (fungal treated) was observed.
- The strength properties of controlled and GLW treated samples were identical. The tear index of only fungus treated pulp dropped after 15 days from 7.40 m.Nm²/g to 6.80 mNm²/g, while other properties were affected marginally.

ENERGY CONSERVATION & ENVIRONMENTAL MANAGEMENT

Integrated Approach for Improving Environmental Status of Pulp & Paper Industry

The project is aimed at performance evaluation, trouble shooting and up gradation of performance of existing effluent treatment plants (ETP) including lignin removal systems. In this context following studies were carried out during the first quarter.

- Performance evaluation of ETP based on diffused

eration system in an agro based mill producing writing & printing grade of paper.

- Laboratory study carried out on Capillary Suction Tank (CST) apparatus using FeCl₃, Alum & Lime indicated an over all reduction in dewatering time of secondary sludge by 40- 50%.
- Collection and analysis of ETP sludge from 3 agro based paper mills and one large pulp & paper mill for evaluation of toxicity potential due to heavy metal content and AOX.

Integrated Approach on Application of Biotechnology in Pulp & Paper Industry

The project aims to develop and promote biotechnological applications in Pulp and Paper Industry as clean & green technology to address problems of environmental pollution. The following activities were carried out :

- Identification, procurement and determination of enzyme activities of xylanases, cellulases and laccases for application of enzyme bleaching and refining of pulps.
- In the area of Enzymatic refining, experiments were conducted on unbleached hardwood pulps with two different commercial enzymes which showed 15% savings in energy during enzymatic refining of pulp. Further, optimization of process conditions in respect of temperature, retention time and consistency were conducted to improve the refining efficiency of the pulps.
- Enzymatic prebleaching studies were continued with both xylanases and laccases enzymes. Prebleaching of hard wood pulp with laccase enzyme produced by lignolytic fungal strain LF-3 isolated by CPPRI showed final pulp brightness improvement of 1-2 % ISO and savings in chlorine dioxide up to 25%.
- Studies on xylanase prebleaching of rayon grade pulp with a new enzyme formulation showed encouraging results in terms of brightness improvement: 1-2 %, savings in chlorine dioxide - 15 %, reduction in pitch - 30 %, reduction in silica, Fe and Ca by 10-20 %.
- In the area of enzymatic deinking, experiments were conducted on laser waste papers with commercial deinking enzyme and cellulase enzyme produced by cellulolytic fungal strain F2 isolated by CPPRI. Results showed that the deinking efficiency of cellulase enzyme produced by isolated fungal strain F2 is better than commercial deinking enzyme in terms of brightness improvement - 1.2 unit and yield improvement - 3%.
- Studies on bioremediation of effluents were conducted on bleach effluent collected from an agro based paper mill. Two bacterial strains selected from secondary

screening were acclimatized in the paper mill effluent with varying nutrient doses. Further studies are in progress.

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

The basic aim of the project is to improve the quality of black liquors so as to improve energy and chemical recovery efficiency. During the project tenure a technology was developed by CPPRI for removal of chlorides and potassium from chemical recovery cycle. A pilot plant is being fabricated to demonstrate the technology on pilot plant level.

Desilication trials using semi pilot plant were conducted in a bamboo based mill black liquor having silica in the range of 1.5-1.7 gpl. Successful trials have confirmed that CPPRI's desilication technology can also be adopted to low silica containing bamboo black liquors. Detailed report was submitted to the mills.

Studies were initiated on incineration process of black liquor generated in small agro based mills producing unbleached variety of paper as an alternative process to achieve zero discharge. Presently these mills are treating their black liquor by adopting LRP process. Studies are under progress to optimize the process parameters and to establish techno-economic viability of the process.

INFRASTRUCTURE & DEVELOPMENT ACTIVITIES

Integrated Approach for Processing of Recycled Fibre (RCF)

For setting up of paper recycling pilot plant, a Detailed Project Report (DPR) was submitted by M/s Chemprojects, New Delhi which proposed to set up the plant in two phases having Phase - I incorporating essential equipments and Phase - II with add-on facilities to make it a state-of-art process. However, during the Research Advisory Committee (RAC) meeting held on June 30, 2010, the RAC members desired that the activities of Phase I & II be clubbed and complete plant should be set up in one phase only. It was proposed that a three members committee should be constituted to review the design, objective and working procedure of the project.

In the area of Paper Recycling, technical & consultancy services were provided to 6 RCF based paper mills & allied industries.

CESS FUNDED PROJECT

Establishment & Demonstration of Wastepaper Collection, Sorting and Grading System in Selected Metropolis in India

In continuation to job order placed to "Waste to Wealth Society", New Delhi for collection of database on waste

paper collection and distribution network in and around Delhi, the preliminary report was submitted to CPPRI.

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 pith, a solid waste biomass generated during depithing process of bagasse through development of a process for production of bio-ethanol and value added lignin products. Studies on saccharification of prehydrolysed bagasse pith was conducted via chemical and enzymatic routes. Enzymatic saccharification with formulated enzyme combination gave better yield of fermentable glucose sugars compared to chemical saccharification process. Further studies are in progress incorporating design and fabrication of a pilot reactor.

SPONSORED PROJECTS

Performance Evaluation of Lignin Recovery Process (LRP) including Effluent Treatment System and its Impact in Achieving Discharge Standards in Agro Based Pulp & Paper Industry (Sponsored by CPCB)

In continuation of the project activities two agro based paper mills in Chattisgarh and two mills in Utrakhand were visited for carrying out performance evaluation of Lignin Recovery Plant (LRP) as well as over all Effluent Treatment Plant (ETP). Effluent samples were collected from various stages of LRP and ETP and analysed for various pollutional parameters in order to evaluate the performance efficiency of systems for achieving discharge norms.

Model Based Study to Evaluate Energy Consumption Parameters and Development of Data sheet format for various Categories of Pulp & Paper Mills (Sponsored by Bureau of Energy Efficiency (BEE), Ministry of Power, Govt. of India, New Delhi)

Under the project a team of CPPRI scientists and engineers visited one agro based mill and one wood based mill to develop model for setting system boundaries for energy consumption. Visit to waste paper based mills is planned in next quarter. The work is under progress and interim report has been submitted to BEE.

Evaluation of Xylanases and Laccases at Pilot and Mill Scale in Pulp & Paper Industry (Sponsored by Department of Biotechnology, Implemented by University of Delhi, CPPRI, Kurukshetra University and M/s Jay Biotech, Pune.)

The project aim is to evaluate the prebleaching efficiency of Xylanase / Laccase enzymes developed by Department of Microbiology, South campus, Delhi University, New Delhi (DUSC) and Kurukshetra University (KUK) on hardwood pulps on both pilot and mill scale. Laboratory experiments at

CPPRI on xylanases & laccases enzyme bleaching of hardwood pulps were carried out in combination with different mediators and oxygen pressure. 20-25% ClO_2 reduction was achieved with 1-2 unit brightness



Dr. R.M. Mathur, Director & Dr. R.K. Jain, Scientist E-II during Pilot plant trials on xylanase and laccase prebleaching of hardwood pulp at CPPRI

improvement without adjusting the pulp pH, i.e at pulp native pH 8.0. Pilot plant trials were conducted at CPPRI on hardwood pulp using xylanases and laccases received from DUSC. Results were encouraging in terms of brightness improvement 3.0 unit, ClO_2 reduction by 25% and AOX reduction around 26%. Studies are in progress.

Technological Improvement of a Process of Biological Reduction of AOX, Colour, COD and BOD of Waste Water Emanated from Large Pulp & Paper Industry. (Sponsored by Department of Biotechnology, Executed by IGIB, CPPRI & Star Paper Mills)



Dr. R.M. Mathur, Director, CPPRI, Shri I.J. Singh, Chief General Manager (Works), M/s. Star Paper Mills Ltd., Dr. R.K. Jain, Scientist E-II during Pilot plant trials on Bacterial effluent treatment process at M/s Star Paper Mills Ltd., Saharanpur

The project aims to develop an effective microbial (bacterial consortium) technology for the reduction of AOX, Colour, COD and BOD of waste water from large Pulp & Paper Industries at Pilot scale. The developed effluent treatment process with bacterial consortium developed by Institute of Genomics and Integrative Biology (IGIB) & CPPRI showed similar or slightly better reduction of pollutional parameters compared to the existing ASP process. Studies on AOX removal with bacterial treatment are under progress. Design of the pilot scale treatment plant was finalized and installed at M/s Star Paper Mills Ltd. Upgradation studies on effluent treatment process are continuing.

Recovery of Lignin & Carbohydrate from Spent Pulping Liquor & their Utilization as a Source of Clean Energy (Sponsored by Petroleum Conservation Research Association, New Delhi)

The objective of the project was to recover & utilize lignin and carbohydrates from agro-residue black liquor as a source of clean energy, so as to conserve natural resources like fossil fuels & also to address environmental problems in agro-based pulp & paper mills. The project was successfully completed and a draft project report, covering details of project findings on thermal decomposition of lignin for its utilization as a source of clean energy and evaluation of lignin based chemicals for various industrial applications and their energy saving potential, was submitted to PCRA.

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

After successful laboratory trials, a pilot plant was designed & fabricated. Batch study on this pilot plant was carried out at CPPRI, encouraging results were obtained. Studies are planned at mill site on pilot plant scale in September 2010.

OVERSEAS PROJECTS

Pilot Scale Pulping Trial of EFB Fiber at CPPRI, Saharanpur

Eko Pulp and Paper Malaysia had sponsored a project on "Feasibility Studies on Pulping & Bleaching of EFB (empty fiber bunch of palm) at Pilot Scale. The objective of project was to introduce EFB (empty fiber bunch of palm) as a potential source of raw material for paper making in Malaysia. The laboratory studies on pulping and bleaching optimization were carried out. The pilot plant trial was conducted in first week of May, 2010. An unbleached pulp of kappa number 18 was prepared with initial viscosity 701 cm³/gm and brightness 31.41% ISO.

MILL SPONSORED PROJECTS

Studies on Technical Feasibility of a Black Liquor Incineration System in Small Agro Based Mill Producing Unbleached Paper

Technical feasibility of a black liquor incineration system

was studied in detail. Black liquor generated after suitable modifications in pulping at small Pulp & Paper mill producing unbleached variety of papers was characterized and combustion experiments were carried out in laboratory. Based on the laboratory studies a technical feasibility report was prepared and submitted to Indian Agro & Recycled Paper Mills Association, U.P. Chapter.

Technical Feasibility for Setting up a New Deinking Plant at M/s Saber Papers Ltd., Distt Una, H.P.

A report was prepared and submitted to mill highlighting the main technical features alongwith the technical feasibility for production of 225 tpd paper

INTERACTION WITH INDUSTRY

Technical Support to the Pulp & Paper Industry

Technical support and consultancy services were extended to the following mills :

- Abhishek Industries Ltd., Ludhiana, Punjab
- Andhra Pradesh Paper Mill, Andhra Pradesh
- Badri Kedar Paper Mill, Nazibabad, Uttar Pradesh
- Bajaj Hindustan Ltd, Meerut, Uttar Pradesh
- Ballarpur Industries Ltd (Unit Shree Gopal), Yamunanagar, Haryana
- Banwari Paper Mills Ltd, Kashipur, Uttrakhand
- Century Pulp & Paper, Lalkuan, Uttrakhand
- Deenbandhu Chhotu Ram Thermal Power Plant, Yamunanagar, Haryana
- Enmas Andritz Pvt. Ltd., Chennai
- Genus Paper Products Ltd, Agwanpur, Uttar Pradesh
- Goraya Straw Board Mills Pvt Ltd, Kashipur, Uttrakhand
- Grasim Industries Ltd., Nagda, Madhya Pradesh
- HPC - Nagaon Paper Mills Ltd, Nagaon, Assam
- Indian Council of Forestry Research & Education, Dehradun
- Central Pulp Mills, Fort Songadh, Gujarat
- JK Paper Ltd, Rayagada, Orissa
- Khatema Fibers Ltd, Khatema, Uttrakhand
- Lignoil Technologies Ltd., Mumbai, Maharashtra
- Naini Papers Ltd, Kashipur, Uttrakhand
- Naini Tissues Ltd, Kashipur, Uttrakhand
- Panipat Thermal Power Station, Panipat, Haryana
- Rama Shyama Papers Ltd., Bareilly, Uttar Pradesh
- Shreyans Industries Ltd, Ahmedgarh, Punjab
- Star Paper Mill, Saharanpur, Uttar Pradesh.
- Tamilnadu Newsprint & Papers Ltd, Karur, Tamilnadu
- Thapar Centre for Industrial Research & Development, Yamunanagar, Haryana
- Uttranchal Institute of Technology, Dehradun, Uttrakhand.
- Vishwakarma Paper & Boards Ltd, Kashipur, Uttrakhand
- West Coast Paper Mill Ltd, Dandeli, Karnataka
- Sapphire Paper Mills Ltd, Vidhanagar, West Bengal

MILL VISITS

Following Pulp and Paper Mills were visited by CPPRI scientists in connection with prefeasibility studies, performance evaluation, environment & energy audit studies, sample collection, hazardous waste audit etc.

S.No.	Name of the Mill / Organization	Purpose
1.	Genus Paper Mills Ltd, Moradabad	Technical Services
2.	Siddharth Papers Ltd, Kashipur	LRP study under CPCB project
3.	Vishwakarma Paper & Boards Ltd, Kashipur	LRP study under CPCB project Hazardous Waste Audit
4.	Madhya Bharat Paper Mills Ltd, Champa	LRP study under CPCB project
5.	Agio Papers Ltd, Bilaspur	LRP study under CPCB project
6.	Naini Tissues Ltd, Kashipur	Hazardous Waste Audit
7.	Naini Papers Ltd, Kashipur	Hazardous Waste Audit
8.	Shreyans Industries Ltd, Ahmedgarh	Callibration of on-line monitor for SPM in Stack Emission
9.	Bajaj Hindustan Ltd, Meerut	Technical Services
10.	Century Pulp & Paper, Lalkuan	Hazardous Waste Audit
11.	BILT, Yamunanagar	Environmental Monitoring
12.	Star Paper Mills Ltd, Saharanpur	Environmental Monitoring
13.	Deen Bandhu Chottu Ram Thermal Power Plant, Yamuna Nagar	Environmental Monitoring on weekly basis
14.	Panipat Thermal Power Station, Panipat	Environmental Monitoring on weekly basis
15.	Star Paper Mill Limited, Saharanpur	Collection of data for preparing a model of system boundaries to evaluate Energy Consumption in major processes / plants/ Auxiliaries equipments for evaluating Process parameters

S.No.	Name of the Mill / Organization	Purpose
16.	Shreyans Paper Mill, Ahmedgarh	Collection of data for preparing a model of system boundaries to evaluate Energy Consumption in major processes / plants/ Auxiliaries equipments for evaluating Process parameters
17.	Servalaxmi Paper Mills Ltd; Trinuvilie	Collection of Newsprint Samples
18.	Star Paper Mill, Saharanpur	Collection of Pulp samples for pilot plant trials of enzymatic prebleaching.
19.	Bindal duplex limited, Muzaffarnagar	For studies on chemical recovery options for small agro based mills
20.	Abhishek industries limited, Barnala	For studies on removal of scales from ODL and Extraction stage press.

VISIT TO OTHER ORGANISATIONS

- Dr. B.P. Thapliyal & Dr. Sanjay Tyagi visited office of Controller, Printing and Stationary, Haryana Govt. Chandigarh.
- Dr. B.P. Thapliyal & Dr. Sanjay Tyagi visited NCERT, New Delhi.
- Dr. B.P. Thapliyal & Dr. Sanjay Tyagi visited IGNOU, New Delhi.
- Dr. B.P. Thapliyal, visited Security Printing & Ministry Cooperation Limited SPMCIL, New Delhi for discussion about collaborative Research Projects.
- Dr. B.P. Thapliyal visited BEE, New Delhi for discussion for implementation of PAT scheme in pulp and paper sector.
- Dr. R.K. Jain and Shri. Diwakar Pandey attended review meeting of the project "Evaluation of xylanases and laccases at pilot and mill scale in Pulp & Paper Industry" (CPPRI/DUSC/KUK/DBT, New Delhi), at CGO-complex, New Delhi.

- Dr. A.K.Dixit & Dr. R.K.Jain visited Indian plywood Industries Research & Training Institute, Bangalore for meeting on lignin utilization and depithing of bagasse.
- Dr. A.K.Dixit and Dr. R.K.jain visited Central Pollution Control board for making presentation of black liquor treatment.
- Dr. A.K.Dixit visited Office of Controller of Patents for filing of Patents.
- Mr. Diwakar Pandey visited Indian Institute of Petroleum, Dehradun, for sugar analysis of hydrolysates and discuss about project activity.
- Dr. R. K. Jain & Dr. Vasanta V Thakur participated in a meeting at Department of Biotechnology (DBT), New Delhi for review of ongoing collaborative R&D project.
- Dr. A. K. Dixit, Dr. B. P. Thapliyal and Dr. R. K. Jain visited Indian Oil Corporation Ltd., R&D Centre, Faridabad for studies on Biomass gasification.
- Dr. A. K. Dixit & Dr. R. K. Jain attended meeting at PCRA, New Delhi & presented findings of PCRA sponsored project & submission of new proposal.
- Dr. R. K. Jain visited Central Glass & Ceramic Research Institute (CGCRI), Khurza in connection with Utilization of Lignosulphonates in Ceramic industry.

VISITS OF EXPERTS / OUTSIDERS DURING THE PERIOD

Dr. R.C Kuhad, professor Delhi University, New Delhi & his team and Mr. Adakar, Jay biotech Ltd, Pune, visited CPPRI for plant trial of enzymatic prebleaching (both xylanase and laccase) of hardwood pulp.

OVERSEAS VISIT

Dr. S.Panwar visited Sweden from May 31-June 24, 2010 as a member of delegation for developing Indo - Swedish



Visit of Indian Delegation to a Swedish Pulp & Paper Mill Under Indo-Swedish Bilateral Cooperation.

Bilateral Cooperation on Environmental Control in Pulp & Paper Industry and exchange of knowledge on cleaner production technologies for Pulp & Paper Industry. The visit was sponsored by SIDA through Swedish EPA.

TECHNICAL/CONSULTANCY SERVICES RENDERED

Consultancy/ Technical Assistance were provided to Paper & Allied Industries through Sponsored Projects

S.No.	Consultancy Services / Technical Assistance	Sponsoring Agency
1.	Technical /feasibility report for expansion and modernization of existing plant	M/s. Jai Durga Paper Mills Limited, Ludhiana
2.	Technical /feasibility report for expansion and modernization of existing plant	M/s. BILT, Ballarshah
3.	Report on Macro Stickies Counts (Four Samples) in sorted office paper & white cuttings	M/s Elof Hansson India Pvt. Limited, Chennai
4.	Evaluation of Wet strength in coated stock and multi-grade paper	M/s Shastri Associates, Brown Group, Mumbai
5.	Evaluation of barrier coating in imported waste paper	M/s NR Aggarwal Industries Ltd; Mumbai
6.	Consultancy services on refining of hardwood pulp	M/s Parason Machinery (India) Pvt. Ltd; Aurangabad
7.	Evaluation of Reed and Matured Eucalyptus	M/s. Emami Paper Mills Ltd, Balasore
8.	Evaluation of Cooking Aid LDA 3600 for Eucalyptus, Bagasse & Wheat Straw	M/s. Aditya Trade, Ahmedabad

Analytical Testing

S.No.	Sample Details	Properties	No. of Samples
1.	Fibre Furnish Analysis of Pulp, Paper & Board Samples	Furnish Analysis	13

S.No.	Sample Details	Properties	No. of Samples
2.	Fibrous Raw Material	Moisture content, Proximate Chemical Analysis	53
3.	Non Fibrous Raw Material (TiO ₂ Liquid Rosin), white liquor analysis	Purity	5
4.	Pulp sample	Shives and dirt count, kappa number, soda loss	20
5.	Drinking water samples	Microbial quality (Total coliform bacteria and Fecal coliform bacteria)	02
6.	Biomass samples	Chemical characterization	04
7.	Black liquor and other chemical recovery related samples	Chemical composition and Physico-chemical properties	14
8.	ESP ash, black liquors, effluents, lime sludge, fly ash, sludges, drinking water, and raw water	Elemental analysis	111
9.	Effluents, solid waste, stack & ambient air.	Pollution parameters & air monitoring studies	45
10.	Paper samples	Optical, strength, surface, printing properties of paper samples	2096

WORKSHOP/SEMINAR/TRAININGS

- Dr. B.P. Thapliyal attended a Training Programme/workshop on energy conservation at New Delhi organized by TERI in the month of June, 2010.
- Dr .S. Panwar and Dr .M.K. Gupta attended workshop organised by IARPMA on "Environmental Management in Pulp & Paper Mills" at Muzaffarnagar on April 10-11, 2010.
- Dr M.K. Gupta attended a two day seminar - Papertech 2010 "Make Paper Industry World Class" organised by Confederation of Indian Industries & Indian Paper

Maker Association at Hyderabad from June 16-17, 2010.

- Dr. R.K.Jain & Dr. A.K. Dixit attended two days Business meet on Biotechnology & Climate, opportunity for closure European & Indian collaboration at Bangalore on May 31st & June 1, 2010.

TRAINING

Training Conducted in CPPRI

- Shri Saurabh Kumar Wantoo and Shri Suresh Singh Kushwaha students of Lucknow University were provided one month training on **Evaluation of Acacia for Paper making Potential** from May 03, 2010.
- Mohd. Anas, Shri Vijay Kumar Singh, Shri Abhay Anand Sinha, Shri Rishikesh Tripathy, Shri Sandeep and Shri Satyado Kumar from Sam Higginbottom Institute of Agriculture Technology & Sciences Deemed University (Allahabad) were provided one month training on **Pulp & Paper Manufacturing** from June 10, 2010.
- Miss Sonal Bhatt from Modern Institute of Technology, Rishikesh, Shri Aditya Tyagi from Baba Farid Institute of Technology, Deheradun and Jyoti Chaudhari from CCS University, Meerut were provided short term training in the area of **Microbiology and Biotechnological Applications in Pulp and Paper Industry**.

LECTURES AND PRESENTATIONS

Shri S.P. Maurya, Former Director, DoIPP, Ministry of Commerce & Industry, Govt. of India, delivered lectures in training programme on "Administrative/Financial Matters" on May 20-21, 2010 at CPPRI, Saharanpur.

Two presentations were made at workshop organised by IARPMA on "Environmental Management in Pulp & Paper Mills" at Muzaffarnagar on April 10-11, 2010.

- "Role of CPPRI on Pollution Control in Pulp & Paper Industry" - by Dr. R. M. Mathur & Dr. B. P. Thapliyal.
- "Status of Pollution Control in Pulp & Paper Industry" - by Dr. S. Panwar.

INTERNAL LECTURES

- Mr. Arvind Kumar Sharma, delivered a lecture on "Chemical Reactions during Alkaline Pulping and Modern Pulping Processes".
- Dr. A. K. Dixit, delivered a lecture on "Build up of Non Process Elements & their Impact on Chemical Recovery Operation".

REPORTS AND PUBLICATIONS

REPORTS

- Adequacy of ETP at Banwari Paper Mills Ltd, Kashipur, Uttarakhand.
- Evaluation of Natural Products in Reducing Pollution Load of Pulp and Paper Mill Effluent (Products Developed by Chemistry Division ICFRE, Dehradun).
- Technical feasibility for setting up a new deinking plant at M/s Saber Papers Ltd., Distt Una, H.P.
- Techno-Economic Feasibility report on Incineration of non-wood black liquor.

PUBLICATIONS

- "Efficient Depithing of Baggse for High Quality Paper", A.K. Dixit, R.K.Jain, B.P.Thapliyal and R.M.Mathur, paper presented in AGM of IPPTA at Chennai.

PATENTS

Following patents were filed:-

- "Sodium based Lignosulphonates for concrete admixtures from Agro based spent pulping liquor"

Inventors: Dr. R. K. Jain, Dr. A. K. Dixit, A.V. Janbade and Dr. R. M. Mathur.

- "A process for manufacturing of sodium lignosulphonates from lignin waste biomass from agro residue based paper mills as additive for improved Rheological & Combustion efficiency of Chemical Recovery systems in wood/non-wood based pulp & paper mills"

Inventors: Dr. R. K. Jain, Dr. A. K. Dixit, Dr. B. P Thapliyal and Dr. R. M. Mathur.

STAFF NEWS

Appointments

Name	Designation	Date of Joining
Mr. Arvind Kumar Sharma	S.S.A.	28-04-2010
Mr. Aash Muni Singh	Scientist - B	03-05-2010

Congratulations

ABSTRACTS OF INTERESTING ARTICLES

Toca-Herrera¹, J. L., Osma, J. F. and Rodríguez Couto, S. "Potential of solid-state fermentation for laccase production", **Communicating Current Research and Educational Topics and Trends in Applied Microbiology. 2007: 391**

Solid-state fermentation (SSF) processes involve the growth of microorganisms (typically fungi) on a solid material in the

absence or near absence of free-flowing water. The former only acts as an attachment place for the fungus, whereas the latter also functions as a source of nutrients, due to which it is called support-substrate. Utilisations of agro-industrial residues as Support-substrates in SSF processes provide an alternative avenue and value-addition to these otherwise under- or non-utilized residues. In the present chapter the production of laccase enzyme by white-rot fungi under SSF is described.

Rita Kumar, Anil Kumar, Deepa Kachroo Tiku "Biological process for color reduction of pulp and paper effluent", **Patent file. IPC8: AC12N120F1, UPSC Class: 432533.**

The present study invention relates to a bacterium strain of accession no. MTCC 5099, a process for the preparation of inoculum of said strain, and a process for the reduction of color from pulp mill effluent with the cell slurry obtained, incubating the mixture at about 37°C at about 100 rpm for time duration ranging between 24-48hrs.

Badal C. S. and Cotta M.A. "Ethanol production from alkaline peroxide pretreated enzymatically saccharified wheat straw" **Biotechnol. Prog. 2006, 22: 449-453.**

The present study deals with the use of wheat straw as a raw material for ethanol production. Alkaline H₂O₂ pretreatment and enzymatic saccharification was evaluated for conversion of wheat straw cellulose and hemi cellulose to fermentable sugars. Alcohol produced from fermentable sugar by recombinant E. coli strain FBR5 at pH 5 and 37°C in 48 h.

Berglin, Niklas., et.al., Pilot-scale Combustion Studies with Kraft Lignin in a Powder Burner and a CFB Boiler, **TAPPI journal, Vol. 9 No. 6, 2010, Pg. 24- 30.**

Abstract: Processes have been developed to produce a solid biofuel with high energy density and low ash content from kraft lignin precipitated from black liquor. Pilot-scale tests of the lignin biofuel were carried out with a 150 kW powder burner and a 12 MW circulating fluidized bed (CFB) boiler. Lignin powder could be fired in a powder burner with good combustion performance after some trimming of the air flows to reduce swirl. Lignin dried to 10% moisture content was easy to feed smoothly and had less bridging tendencies in the feeding system than did wood/ bark powder. In the CFB boiler, lignin was easily handled and cofired together with bark. Although the filter cake was broken into smaller pieces and fines, the combustion was not disturbed. When cofiring lignin with bark, the sulfur emission increased compared with bark firing only, but most of the sulfur was captured by calcium in the bark ash. Conventional sulfur capture also occurred with addition of limestone to the bed. The sulfur content in the lignin had a significantly positive

effect on reducing the alkali chloride content in the deposits, thus reducing the high temperature corrosion risk.

Arias, Maria Enriqueta, et.al., Analysis of Chemical Changes in Picea Abies Wood Decayed by Different Streptomyces Strains Showing Evidence for Biopulping Procedures, **Wood Science & Technology, Vol. 44 No. 2, 2010, Pg. 179-188.**

Abstract: The present study is focused on analysing the suitability of different Streptomyces strains for biomechanical pulping purposes using spruce wood (*Picea abies*) as substrate. After 2 weeks of incubation, no apparent variations in lignin Klason content of treated woods were detected compared with the control. However, the increase in acid-soluble lignin fraction pointed out chemical alterations in lignin moiety. Through Py-GC/MS analysis enrichment in cellulose and lignin molecule modifications were detected in treated woods. The increase in the relative abundance of the most G-type phenol units with a higher oxidation degree suggests that some oxidation occurred in the lignin C3-alkyl chain. In addition, the decrease in the phenylmethane + phenylethane/phenylpropane (pHCl + pH C2/pH C3) ratio would indicate the ability of Streptomyces strains to breakdown the C3-alkyl chain linkages once carbons had been oxidized. From this study it could be concluded that the assayed strains are able to produce a delignification of spruce wood which may improve mechanical pulping processes.

Gorski, Dmitri, et.al., Mg(OH)₂ - based Hydrogen Peroxide Refiner Bleaching: Influence of Extractives Content in Dilution Water on Pulp Properties and Energy Efficiency, **Appita journal, Vol. 63 No. 3, 2010, Pg. 218-225.**

Abstract: Two refiner bleaching trials on TMP and SGW rejects using magnesium hydroxide and hydrogen peroxide were conducted in a reject refiner. Clear filtrate from a disc filter was used as dilution water during the first trial (normal mill operation) and fresh water was used during the second trial. Refiner bleached pulp had approximately nine % ISO higher brightness than reference pulps in both trials using a peroxide charge of 25 kg/t pulp. The brightness gain increased to 12 % ISO after high consistency storage at 75°C for 30 minutes. The bleached pulp from the first trial had 10% lower tensile index compared to reference at similar refining energy. The extractives content on the surfaces of the bleached fibres (surface coverage measured by ESCA) was 20% higher compared to the unbleached reference pulp when clear filtrate was used as dilution water. Within this surface extractives content increase, the increase of triglycerides and steryl esters was largest, almost doubling in value. Acetone extraction of the pulps led to higher apparent sheet strength. The increase was equal for both the

reference and the bleached samples but the bleached pulp still had inferior strength properties compared to the reference pulp. When a second trial was carried out with fresh water as dilution, much less difference in the strength properties of bleached and unbleached pulp was observed.

It is suggested that addition of alkali to the refiner caused extractives in the clear filtrate to destabilise and re-deposit onto fibre surfaces. The fact that removal of extractives with acetone did not bring the strength of bleached pulp up to the level of the reference pulp suggests that extractives may have influenced the fibre development process of the bleached pulp fibres in the refiner.

Skillington, Pauline, et.al., A new Method for Quantifying the Blocking of Coated Paperboard, **TAPPI journal, Vol. 9 No. 5, 2010, Pg. 29-35.**

Abstract: Blocking is undesired adhesion between two surfaces when subjected to pressure and temperature constraints. Blocking between two coated paperboards in contact with each other may be caused by inter-diffusion, adsorption, or electrostatic forces occurring between the respective coating surfaces. These interactions are influenced by factors such as the temperature, pressure, surface roughness, and surface energy. Blocking potentially can be reduced by adjusting these factors, or by using antiblocking additives such as talc, amorphous silica, fatty acid amides, or polymeric waxes. We developed a method of quantifying blocking using a rheometer. Coated surfaces were put in contact with each other with controlled pressure and temperature for a definite period. We then measured the work necessary to pull the two surfaces apart. This was a reproducible way to accurately quantify blocking. The method was applied to determine the effect external factors have on the blocking tendency of coated paperboards, i.e., antiblocking additive concentration, film thickness, temperature, and humidity.

Kendel, Friedrich, et.al., Effect of Pre-coat and Substrate on Conventional Barrier Coatings Performance, **Appita journal, Vol. 63 No. 3, 2010, Pg. 214-217.**

Abstract: The effect of applying a pre-coat containing starch, AKD and kaolin clay on the barrier properties of internally sized, commercial kraft linerboards of basis weight 210 ± 10 g/m² was investigated. A Dow laboratory coater was used to apply barrier coatings to commercial linerboards made from either a mixture of 54% pine and 46% eucalypt pulp, or 100% pine pulp. Handsheets (100% pine at 200 g/m²) were also prepared and coated in the same manner. Water Vapour Transmission Rates (WVTR) and Cobb (30 min) tests were conducted.

The uncoated liner made from the mixed pine and eucalypt pulps exhibited a WVTR of 2365 g/(m² day-1) at 38°C and 90% relative humidity (rh), compared to 1880 g/(m² day-1)

under the same conditions for 100% pine linerboard, a difference of 21%. When a barrier coating was applied, the WVTR of these linerboards was reduced to 200 and 160 g/(m² day⁻¹) respectively. The 100% pine linerboard still showed a 20% lower WVTR, indicating that the substrate was still crucial to the overall WVTR even with a 21 g/m², single-layer barrier coating. Handsheet tests suggested that the lower WVTR for the 100% pine linerboard may have

been related to the level of beating of the pulp furnishes.

WVTR did not change appreciably when a 6 g/m² wheat starch pre-coat was applied. However, adding hydrophobic AKD to the starch in equal ratio on a solids basis improved WVTR by up to 8%. Modifying the pre-coat to include 10% kaolin clay improved both WVTR and Cobb by 10%.

NOTICE FOR SALE OF BLACK LIQUOR DESILICATION PLANT

Offers are invited for the sale of Black Liquor Desilication Plant situated at Hindustan Newsprint Mills, Newsprint Nagar, Distt.Kottayam, Kerala on "As is where is" basis. Shifting of debris and clearing of site shall be in the purchaser's scope. The inspection of the plant will be allowed at HNL, Kerala to the intending purchaser with CPPRI's consent.

Conditions for sale

- Plant will be sold only to paper mills having chemical recovery or going for chemical recovery.
- Plant will be used only for desilication of black liquor.

For further details interested parties may contact, Head, Chemical Recovery Division, Central Pulp & Paper Research Institute, Saharanpur on

e-mail : rkjain@cppri.org.in or phone : 0132-2714056, 2714060 and fax 0132-2714052.

OFFER FOR TRANSFER OF TECHNOLOGY PROCESS KNOW-HOW "EFFICIENT DEPITHING OF BAGASSE"

A process has been developed for efficient depithing of bagasse on semi pilot plant scale at CPPRI wherein it has been possible to reduce the pith content to less than 10%. The studies on utilization of this efficiently depithed bagasse resulted bagasse chemical pulp & paper of improved quality compared to the bagasse depithed by conventional depithing process.

CPPRI is intending to upscale the process for commercial exploitation for the benefit of paper & sugar industry which should help in improving the status of raw materials & fuel availability for the paper & sugar mills respectively.

The institute is looking for interested parties willing to develop the pilot scale depither with improved design & fabricate to operate it on continuous basis so that a large scale commercial depither could be developed for the benefit of paper & sugar industry.

In view of the above, CPPRI will help in providing the process data based on the studies carried out in this regard. The interested parties have to invest their own financial resources for design, development, fabrication & running of the pilot sale depither.

The patent has been filed for the above said process know-how, however any further IPR arising during design & development of pilot/commercial depither shall be the joint property & equally shared between CPPRI & the company.

The institute will charge a technical fee for transferring the process know-how to interested companies.

The interested companies may send their commercial offer for obtaining the proposal latest by 25th October, 2010. Further details can be obtained from-

Head of the Department
Chemical Recovery Division
Central Pulp & Paper Research Institute
P.O. Box. 174, Paper Mill Road,
Himmat Nagar, Saharanpur- 247 001
(U.P), INDIA

राजभाषा समाचार

संस्थान के परिसर में ३०-०६-२०१० को अनुसंधान सलाहकार समिति की गोष्ठी सम्पन्न हुई। इस अवसर पर अनुसंधान सलाहकार समिति के अध्यक्ष श्री तल्लीन कुमार, आई.ए.एस., संयुक्त सचिव श्री श्यामल मिश्रा, आई.ए.एस., निदेशक, भारत सरकार, औद्योगिक नीति एवं संवर्धन विभाग, उद्योग मंत्रालय, भारत सरकार ने गोष्ठी के उपरान्त संस्थान के परिसर में वृक्षारोपण किया। इस अवसर पर उन्होंने संस्थान के कागज़ संग्राहलय का भी निरीक्षण किया और इसकी काफी सराहना की।



श्री तल्लीन कुमार, आई.ए.एस., संयुक्त सचिव, औद्योगिक नीति एवं संवर्धन विभाग (भारत सरकार) संस्थान के परिसर में वृक्षारोपण करते हुए



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