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CSIR NEWS

Progress, Promise and Prospects

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C O N T E N T S

Hon'ble Minister of State for Environment and Forests, visits NEERI



ISO Recognition for RAB, CSIR



AMPRI, Bhopal-Industry Meet



Farmers Fair at NBRI



Training Course on Underground Engineering



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its Readers a Very
Happy New Year 2010*

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CSIR's Breakthrough in Baby Food

Dr. P Cheena Chawla



As a newborn steps into this world with its first cry, the mother's pivotal role in satisfying her baby's need for sustenance becomes all too clear. It is breast milk – a nectar for infants – that is the best first food as it naturally contains all the components of healthy infant nutrition in correct proportions. It is not only easily digestible but even has properties to promote the development of intestines and brain. A complete food nutritionally, breast milk also equips a baby to fight off infections, which is why there can be no substitute for this unique gift of Nature.

Nonetheless, there are women who are unable to breast feed due to reasons such as lactation failure, insufficient milk secretion, or they suffer from infectious diseases. Such infants have to depend upon ready-foods, available in the market, specially designed for them. Thanks to CSIR scientists at the Central

Food Technological Research Institute (CFTRI), Mysore, India today has a flourishing infant food manufacturing industry and does not depend upon the import of foreign infant food brands as it did five decades ago. Prior to 1960, the supply of infant foods meant a heavy burden on our foreign exchange reserves.

Although hundreds of thousands of parents rely on commercially sold infant foods, most of them are oblivious to the scientific innovation that has gone into designing these baby-friendly products in India. *Amulspray*, a baby food based on the CFTRI technology, is a household name in India but alas, not many people are aware of the genesis of this tasty and healthy infant formulation.

Many developed countries produced infant food from cow's milk, for which standardized production protocols were known. However, as buffalo milk is more readily available in

India than cow's milk, scientists at CFTRI developed a process in late 1950s for the production of infant food from buffalo milk. Later, in 1961, the National Research Development Corporation (NRDC) licensed the process of this indigenous infant food formula to the Kaira District Milk Producers' Union at Anand, Gujarat, which produced infant food under the brand name *Amulspray*. It was the first time anywhere in the world that baby food was made from buffalo milk on a commercial scale.

Earlier to the development of CFTRI's formulation, buffalo's milk, was considered unsuitable for easy digestion by a baby. However, CFTRI technology proved that buffalo's milk could be turned into a nourishing infant food. This achievement gave a significant boost to the Indian dairy industry, while fulfilling the country's requirement of having indigenous technology to manufacture infant foods.

The WHO/Food and Agricultural Organization of the United Nations (FAO) Codex Alimentarius Commission, defines infant food as “a product specially manufactured to satisfy the nutritional requirements of infants during the first months of



Having come to the rescue of millions of infants in the last five decades, *Amulspray*— an infant food made from buffalo milk, based on CFTRI technology — has really stood the test of time



A classic advertisement (above) advocating the goodness of Amulspray.
The different packaged forms of Amul spray

life up to the introduction of appropriate complementary feeding”, and is “a product based on milk of cows or other animals or a mixture thereof and/or other ingredients which have been proven to be suitable for infant feeding.”

The nutritive value of infant foods, prepared from buffalo milk containing 10%, 12.5% and 15% protein and fortified with DL-methionine has been studied in experiments with albino rats. The average weekly growth rate of rats receiving milk food containing 10% protein, 20% fat and fortified with DL-methionine was of the same order as those obtained with milk foods containing higher percentage of protein. This formula of infant food, prepared from buffalo milk, was considered suitable for feeding infants in place of full cream milk powder in developing countries, at a reasonable cost. It was also found that milk food containing

10% protein but not fortified with DL-methionine promoted significantly less growth.

Normally, the nutrients contained in baby foods provide 400-600 calories and are mostly fortified with appropriate doses of calcium, iron, and vitamins A, D, C, E, B₁, B₂, B₆ and B₁₂ along with folic acid, niacinamide, and calcium pantothenate. In addition to infant foods meant for healthy babies, products have also been designed for those with special nutritional requirements, such as babies born prematurely or suffering from allergies. This includes soya-based, hypoallergenic, or lactose-free infant food formulations.

Lactose is the sugar contained in milk, which is broken down to simpler sugars, glucose and galactose, in the body by an enzyme called lactase, which is produced by the cells lining the small intestine. This enzyme, needed to

digest lactose, is normally present in children and even adults who consume milk regularly. However, in some persons there is a deficiency of the enzyme lactase that makes them lactose intolerant. A high incidence of lactose intolerance is also observed in older adults. There is a possible genetic link to lactase deficiency, which is why many children are lactose intolerant. Infants born prematurely are more likely to have lactase deficiency because an infant's lactase levels do not increase until the third trimester of pregnancy. Lactose intolerance makes an infant or adult quite uncomfortable after consuming milk and milk products. The common symptoms include abdominal pain and bloating, gas, diarrhea, and nausea.

Suiting the needs of infants who cannot digest milk easily due to lactose intolerance, CFTRI has developed the technology for the production of low lactose milk by using permeabilized yeast cells or specific enzymes that hydrolyze lactose to glucose and galactose. ‘Lactulose’ containing infant formula has also been developed, which is specially for babies fed on artificial baby foods, as they lack adequate growth of beneficial microflora, which is found in babies fed on mother's milk.

Not just that. As the baby grows, the nutritional requirements also increase, which at about three months of age need to be supplemented with semi-solid foods. Novel CFTRI technologies have again proved that healthy weaning foods for infants can be manufactured in India. CFTRI has developed novel weaning foods based



The Amul Baby Growth Plan

START RIGHT WITH AMULSPRAY
Remember, mother's milk is by far the best for baby. It is extremely difficult to substitute for breast milk, even in our day and age. Nature cannot be improved upon. All mothers, therefore, should feed their infants at the breast as long as the quantity of milk remains adequate. However, if your breast milk is not sufficient for baby, start him on Amulspray.

Why Amulspray?

- delicious
- easy-to-digest
- vitamin-enriched
- perfectly balanced
- dissolves easily

CONTINUE RIGHT WITH BALAMUL Cereal with Milk
(Baby's first solid food after 3 months along with Amulspray)
Delicious Balamul has everything baby needs to grow on and MORE

- at least 25% more protein than other branded cereal foods
- more calcium, Vitamin A and C
- pre-cooked in milk
- Easy-to-digest
- mixes easily with other foods too: dal, mashed fruits, puddings
- Balamul gives TWICE the value for your money than other branded cereal foods.

That's why more doctors prefer Balamul for baby's nutritional needs!

Amulspray
More mothers prefer it to any other baby food

Balamul
growth is growth you can see

Marketed by: Gujarat Cooperative Milk Marketing Federation Limited, Anand

Just as *Amulspray* was the first infant food formula developed indigenously, *Bal-Amul* was the first weaning food based on CFTRI technology

have developed weaning food formulations that are based on malting of sorghum and cowpea. Malting – the controlled germinating and drying of a seed – has been a popular technology for designing supplementary food for babies in the weaning period. For this, the sorghum and cowpea seeds are first soaked in water and then allowed to germinate. The so formed sorghum sprouts are dried to about 14% moisture and kilned at 70°C, and later milled and sieved to obtain the malt flour. Cowpea sprouts are split, dehusked, and similarly kilned and milled. To prepare the malted weaning food (MWF), the malted sorghum and cowpea flours are blended in the proportion of 70:30. Scientists have also formulated a precooked weaning food by roller drying a cold water slurry consisting of 70% sorghum flour and 30% cowpea flour.

on malted cereals/millets and germinated green grams.

CFTRI's pioneering efforts for developing technologies to produce cheap yet nutritionally rich weaning foods, based on protein isolated from edible oilseed meals is commendable. It was way back in 1965 when Shurpalekar and co-workers at CFTRI published a study on the preparation of a weaning food based on whole soy flour, that contained the spray-dried soy protein. This product was fortified with methionine, vitamins and minerals, contained 26% protein and 18% fat. In 1966 *Bal-Amul*, the first weaning food developed and manufactured in Asia, was launched in India. This soy-fortified weaning food became very popular at that time. Similarly, in early 1970s Narayanaswamy and co-workers at CFTRI developed a

method for making whole soy flour in India and created low-cost protein food that was a blend of wheat and soy flours (70:30).

Another product, *Bal-Ahar*, was a soy-fortified dietary supplement that contained soy flour, cottonseed or peanut flour and dry milk. Designed to replace soy based imported weaning foods, *Bal-Ahar* was developed as part of a UNESCO project. Many energy foods that are nutritional supplements, developed by CFTRI, have been distributed to the needy in various social welfare projects including disaster relief activities and many nutrition intervention programmes of different States.

In yet another achievement, scientists at CFTRI along with their counterparts at the Federal Institute of Industrial Research, Lagos, Nigeria

Formulating weaning foods based on germinated cereals and legumes has a significant nutritional importance as during germination the insoluble protein is transformed into soluble components, and many vitamins and essential amino acids like lysine and tryptophan are known to increase. Besides providing sufficient nutrition to the growing child, such weaning foods are low cost.

Whether it is food for newborns or those with special nutritional needs including infants in the weaning phase who require supplementary food, CFTRI technologies have touched the Indian household in many ways and it shall continue to do so as the baby food industry marches ahead to serve the nation.



Hon'ble Minister of State for Environment and Forests, Visits NEERI, Nagpur

Hon'ble Minister of State (Independent Charge) for Environment and Forests, Shri Jairam Ramesh, visited the National Environmental Engineering Research Institute (NEERI), Nagpur in the recent past. He was accompanied by Hon'ble Minister of Forests, Govt. of Maharashtra, Dr. Patangrao Kadam.

While addressing the NEERI scientists, the Hon'ble Minister Shri Jairam Ramesh informed about the National Environmental Sciences Fellow Programme. He said that this new Programme will provide our most promising young scientists the opportunity to do cutting-edge research on critical environmental issues in collaboration with leading institutes and scientists in India, and the world. "This programme will allow young Indian scientists to enhance their areas of expertise under the mentorship of the leading scientists in the world today, and will help create a cadre of top class Indian environmental scientists for the future", he added. He stated that the knowledge emerging from the research work under this programme will help inform our environmental policy agenda, ensuring that it is based on rigorous science.

Briefing about the National Action Plan on climate change, the Hon'ble Minister Shri Ramesh informed that India has taken up various initiatives related to Climate Change, such as establishment of Indian Network for Climate Change

Assessment, Himalayan Glaciers Monitoring Programme, launching of Indian satellite to monitor green house gases (GHG) and study of India's GHG emissions profile. He also stated that an International Centre on Climate Change will be created in the country where 10-12 top scientists of Indian origin, who are working in advanced countries in frontline research areas, will be deputed to work in the area of climate change.

The Hon'ble Minister Shri Ramesh informed about organizing a "Pan IIT Meet" this year in which all research groups working on various environmental issues in various IITs, industries, organizations, etc., will be brought under one umbrella where they can share their experiences and views to reach on one consensus. He proposed to create an Indian Academy of Environmental Sciences to bring together all national laboratories in India working in the area of environmental science and engineering. He also urged NEERI scientists to develop and



Hon'ble Minister of State for Environment and Forests, Shri Jairam Ramesh, addressing the NEERI scientists

propagate technologies for the common people. He drew attention towards the fourth most polluted city in India – Chandrapur — and sought NEERI's active role in formulating a strategy to combat the grave environmental threat in Chandrapur.

The Hon'ble Minister, Shri Ramesh, further emphasized to promote bioremediation techniques for restoration of environmental qualities in India. He stressed on the need for induction of young scientists in the age group of 30-35 years. He praised the R&D activities being carried out at NEERI and interacted with the scientists on various environmental issues. Also present was Dr. Patangrao Kadam, Hon'ble Minister of Forests, Government of Maharashtra who also discussed various environmental issues with the NEERI scientists.

Earlier, in his audio-visual presentation, Dr. Tapan Chakrabarti, Acting Director, NEERI briefed about the ongoing R&D activities at NEERI and various significant achievements that the Institute has witnessed in the recent past.



Hon'ble Ministers Shri Jairam Ramesh and Dr. Patangrao Kadam being escorted to the Institute



Members, Planning Commission, Visit NEERI, Nagpur

Dr. Saumitra Chaudhuri, Member, Planning Commission, Govt. of India and Member of the Economic Advisory Council to the Prime Minister of India, and Dr. K. Kasturirangan, Member, Planning Commission, Govt. of India visited the National Environmental Engineering Research Institute (NEERI), Nagpur in the recent past.

While addressing the NEERI staff, Dr. Chaudhuri briefed about the importance of economic growth and productivity. He said that these two components are very vital for any country. He remarked that India is an emerging economic power with vast human and natural resources, and has a huge knowledgebase. “Economists predict that by 2020, India will be among the leading economies of the world”, he pointed out.

Dr. Chaudhuri stated that our concern for environmental issues is growing along the lines of global concern. “While in the short run there may seem to be a trade-off between environmental sustainability and economic growth, we must in the longer run, take recourse to the complementarities between environmental sustainability and human wellbeing”, he advocated.

Dr. Chaudhuri remarked that we have already seen that profligate use of water or deforestation has devastating



Dr. Saumitra Chaudhuri, Member, Planning Commission and Member of the Economic Advisory Council to the Prime Minister of India addressing the audience; Seated on the dais (from left): Dr. Tapan Chakrabarti and Dr. K. Kasturirangan

effects, and the threat of climate change poses a real challenge to future generations. Our development strategy, therefore, has to be sensitive to these concerns and should ensure that threats and trade-offs are appropriately evaluated, he added. He urged scientists to ensure the application of technologies to the field, along with the best practices. “Technologies play a major role in economic growth and productivity”, he said. Dr. Chaudhuri also pointed out that any developmental projects and plans should be within legal, regulatory and financial incentive framework.

Dr. Kasturirangan, in his address, praised the R&D activities being carried out at NEERI. He said that according to the present need, NEERI is working in diverse areas, covering various environmental aspects, from waste management to environmental genomics, and environmental materials to dioxins and furans studies. He expressed satisfaction that NEERI is providing engineering solutions to protect

our environment. “But every organization needs some change, as it is a part of evolution and growth”, he added.

Dr. Kasturirangan said that CSIR has done well in the past and is doing well in the present too as the CSIR transformation initiative has already been undertaken. He urged scientists to carry out R&D activities linked directly to the industries and society of our country. He

informed that the Planning Commission has always taken care of more investment in R&D activities related to environmental science and engineering.



Dr. K. Kasturirangan, Member, Planning Commission, Govt. of India advocating the need for effective environment monitoring in India

Highlighting various problems related to air, water, and soil pollution in the country, Dr. Kasturirangan said that soil degradation has become a major issue for India, due to which wasteland is increasing. Scientists need to do much



more in this direction, he opined. Describing about the ‘National Mission for Sustaining the Himalayan Ecosystem’, Dr. Kasturirangan expressed satisfaction that NEERI is working in this area. He remarked that NEERI will play a major role in XIIth Five Year Plan since it is expected to focus more on research and education for the environment sector. He stated that we need a highly efficient environmental monitoring system in the country for which advanced instruments are required, and Planning Commission has taken this aspect into consideration.

“NEERI should also try to procure advanced instruments, since it plays an important role in giving scientific inputs to the judiciary”, said Dr. Kasturirangan. He mentioned that XIIth Five Year Plan will have multi-institutional projects. He pointed out that ISRO will play a major role in environmental monitoring in the country by developing various satellites. “We need such satellites which can keep a check on the overall environmental degradation related to air, water and soil pollution”, he added. He stated that ISRO will develop a satellite to monitor CO₂, SO₂ and NO₂ gases in the atmosphere. But still in the present situation, environmental monitoring is a big challenge for the country, Dr. Kasturirangan reiterated.

Earlier, in his Welcome Address, Dr. Tapan Chakrabarti, Acting Director, NEERI briefed about R&D contributions of NEERI. He also described about the ongoing R&D activities, significant achievements, NEERI’s role in XIth Five Year Plan and the future plans of the Institute.

Dr. Saumitra Chaudhuri and Dr. K. Kasturirangan, Members of the Planning Commission, Govt. of India also visited Environmental Biotechnology Division, Environmental Genomics Unit and Environmental Systems Design Modelling Division of the Institute.

Significant R&D Achievements at NIO, Goa

The scientists working at the National Institute of Oceanography (NIO), Goa, have reported the following R&D activities pursued at the Institute:

Climatology of the Eastern Arabian Sea During the Last Glacial Cycle Reconstructed

Paired measurements of Mg/Ca and delta sup(18)O of *Globigerinoides sacculifer* from an Eastern Arabian Sea (EAS) sediment core indicate that sea-surface temperature (SST) varied within 2°C and sea-surface salinity within 2 psu during the last 100 ka. SST was coldest (approx. 27°C) during Marine Isotope Stage (MIS) 4 and 2. Sea-surface salinity was highest (approx. 37.5 psu) during most of the last glacial period (approx. 60-18 ka), concurrent with increased delta sup (18)O sub (G. sacculifer) and C/N ratios of organic matter and indicative of sustained intense winter monsoons.

SST time series are influenced by both Greenland and Antarctic climates. However, the sea surface salinity time series and the deglacial warming in the SST record (beginning at approx. 18 ka) compare well with the LR04 benthic delta sup (18)O-stack and Antarctic temperatures. This suggests a teleconnection between the climate in the Southern Hemisphere and the EAS.

Therefore, the last 100-ka variability in EAS climatology appears to have evolved in response to a combination of global climatic forcings and regional monsoons. The most intense summer monsoons within the Holocene occurred at approx. 8 ka and are marked by SST cooling of approx. 1°C, sea-surface salinity decrease of 0.5 psu, and delta sup (18)O sub(G. sacculifer) decrease of 0.2 ppt.

Authors: Banakar, V. K.; Mahesh, B. S.; Burr, G.; Chodankar, A. R.

Citation: *Quaternary Research*, vol.73(3); 535-540

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URI: <http://hdl.handle.net/2264/3592>



Detection of DNA Damage in fish, *Oreochromis mossambicus* Induced by Co-exposure to Phenanthrene and Nitrite

Mutagenic nitrated polycyclic aromatic hydrocarbons (nitro-PAHs) have been known to arise in the environment through direct emissions from combustion sources and nitration of PAHs, primarily in the atmosphere.

In the marine environment, PAHs are one of the classic anthropogenic organic pollutants, while nitrite (NO₂⁻) is produced naturally via various biological processes like imbalance in denitrification or eutrophication and subsequent oxygen depletion from an over supply of nutrients.

Scientists have reported the formation of PAH-DNA adducts in fish contaminated with PAHs and exposed to NO₂⁻ in the ambient water. Electrospray ionization tandem mass spectrometric (ESI-MS/MS) analysis of the bile of the euryhaline fish *Oreochromis mossambicus* exposed simultaneously to field relevant sub-lethal concentrations of phenanthrene and NO₂⁻ and collision-induced dissociation of selected ions revealed the presence of DNA-PAH adducts.

The present study indicates that

although several high sensitivity techniques have been developed for the analysis of PAH derived DNA adducts, MS/MS has emerged as a powerful tool in the detection and structure elucidation of DNA adducts.

Authors: Wahidullah, S.; Rajamanickam, Y. R.;

Citation: *Environmental Science and Pollution Research*, Vol.17 (2); 441-452

Copyright: An edited version of this paper was published by Springer; [2009]

URI: <http://hdl.handle.net/2264/3546>.

Dynamics of Formation of Ferromanganese Nodules in the Indian Ocean

The ferromanganese nodule resources of the Indian Ocean Nodule Field (IONF) are second only in the world in terms of metal content and abundance. Since it was made known by Mero (1965) that several trillion tonnes of manganese nodules lay in the world oceans, extensive exploration for nodules has been undertaken during the last four decades.

The possibility of harvesting an inexhaustible supply of nodules from oceans has resulted in the formulation of several national and international programmes. India started her search for ferromanganese nodules in 1982. The investigations have resulted in a comprehensive assessment of

manganese nodule resources at the ocean-level, and on inter-basin model for nodule growth, albeit with several inaccuracies.

Some of the essential requirements for the formation of nodules include the availability of nucleating materials, presence of metals in water column and sediment, favourable tectonic and physiographic features, helpful acoustically transparent sediment-water interface, low rate of sedimentation, presence of nutrient-rich bottom water mass and an oxidizing environment.

An integrated assessment of the process of the formation of ferromanganese nodules from the

IONF, which are variable even on scale of metres has been done. This assessment would help to evaluate the metal potential of these nodules more realistically, and the model should bring about a predictive estimate of other nodule-bearing areas in the world oceans.

Authors: Mukhopadhyay, R.; Ghosh, A. K.;

Citation: *Journal of Asian Earth Sciences*, Vol.37 (4); 394-398

Copyright: An edited version of this paper was published by Elsevier [2009]

URI: <http://hdl.handle.net/2264/3540>



The Nature and Distribution of Particulate Matter in the Mandovi Estuary

Systematic seasonal variations of suspended particulate matter (SPM) along a 44-km transect of the Mandovi estuary reveal that the concentrations of SPM are low at river-end stations, increase generally seaward, and are highest at sea-end stations of the estuary. An estuarine turbidity maximum (ETM) occurs at sea-end stations during June-September when river discharge is high and also in February-May when river discharge is low. These are the two windiest times of year, the former associated with the southwest monsoon and the latter characterized by a persistent sea

breeze.

The salinity vs. SPM plot shows that high SPM is a seaward deposit and skewed landward. Suspended matter comprises floccules, fecal pellets, and aggregates that consist of clay and biogenic particles. Diatoms are most common and are of marine type at the sea-end and freshwater dominated at river-end stations of the estuary. SPM is characterized by kaolinite- and smectite-rich clay mineral suites at the river-and sea-end stations, respectively.

Smectite concentrations increase seawards with the increase in SPM

content and are not influenced by salinity. Wind-driven waves and currents, besides the biogeochemical processes at the mouth of estuary play an important role in the formation of ETM in resuspension and transformation of SPM into floccules and aggregates.

Authors: Kessarkar, P. M.; Rao, V. P.; Shynu, R.; Mehra, P.; Viegas, B. E.;
Citation: *Estuaries and Coasts*, Vol. 33 (1); 30-44

Copyright: An edited version of this paper was published by Coastal and Estuarine Research Federation;
URI: <http://hdl.handle.net/2264/3535>

Study of Cadmium-Humic Interactions by Scanned Stripping Voltammetry and Dynamic Light Scattering Techniques

Diffusion coefficients of Cd-humate complexes are dependent on pH and [Cd]/[Humic Acid (HA)] ratio in a Cd-HA system. These two factors mainly control the mass transport and complexation kinetics of Cd that may influence bioavailability and toxicity of Cd species in environmental systems.

Determination of diffusion coefficients of Cd-HA systems by scanned stripping voltammetry and dynamic light scattering techniques can provide a better understanding of the systems and can be very useful for extracting other speciation parameters of the systems. This study revealed

that Cd sup(2+) ion along with small dynamic Cd complexes was predominantly present in a Cd-HA system at pH 5 with high diffusion coefficients. HA molecules were in aggregated form at pH 5. However, HA molecules were in disaggregated form at pH 6 and concentrations of Cd sup(2+) ion and small Cd-dynamic complexes decreased with a decrease in diffusion coefficients of Cd complexes at this pH due to formation of Cd-humate complexes.

No further decrease in the hydrodynamic radii of HA was observed with the increase of pH from

6 to 7. The Cd-humate system partially lost its lability at pH 7. Conditional stability constants were calculated for Cd-humate complexes by combining the diffusion coefficient data obtained by the two techniques. The log K values calculated in this study are in good agreement with the data available from literature.

Author: Chakraborty, P.
Citation: *Analytica Chimica Acta*, Vol. 659 (1-2); 137-143
Copyright: An edited version of this paper was published by Elsevier. [2009]
URI: <http://hdl.handle.net/2264/3535>



On-Going Projects at NBRI, Lucknow during 2010-2011

Some of the Projects being pursued at the National Botanical Research Institute (NBRI), Lucknow, during 2010-2011 include:

Project	Code	Title of the Project	PI	Funding Agency	Start date	Completion date	Total Cost (Lakhs)
NWP	003	Transgenic crop plant and genes for resistance to insect pests	Dr. D.V. Amla	CSIR	Apr-07	Mar-12	775.00
NWP	006	Exploitation of India's rich microbial diversity	Dr. C. S. Nautiyal	CSIR	Apr-07	Mar-12	150.000
NWP	008	Pathway engineering and system biology approach towards homologous and heterologous expression of high value phytochemicals (artemisinin, picrosides, morphine, withanolides podophyllotoxin)	Dr. P. K. Trivedi	CSIR	Apr-07	Mar-12	271.000
NWP	017	Environmental contaminants - New screening technologies and effect on human health	Dr. R. D. Tripathi	CSIR	Apr-07	Mar-12	227.000
NWP	019	Remediation, eco-restoration & clean-up of contaminated ground and water resources	Dr. R. D. Tripathi	CSIR	Apr-07	Mar-12	345.000
NWP	020	Exploratory studies on climate change and adaptation of species complexes	Dr. Soumit K. Behera	CSIR	Apr-08	Mar-12	601.00
NWP	037	Discovery and preclinical studies of new bioactive molecules (natural and semi-synthetic) & traditional preparations	Dr. A. K. S. Rawat	CSIR	Apr-08	Mar-12	12.00
NWP	040	Comprehensive Traditional Knowledge Digital Library	Dr. Tariq Hussain	CSIR	Nov-09	Mar-12	91.520
NWP	045	Advancement in Metrology	Dr. Alok Lehri	CSIR	Apr-08	Mar-12	15.000
RSP	0031	Rural development programmes: (i) Sustainable development and utilization	Dr. S. K. Tewari	CSIR	Apr-07	Mar-12	350.000



Project	Code	Title of the Project	PI	Funding Agency	Start date	Completion date	Total Cost (Lakhs)
SIP	005	of sodic wastelands, adopting green technologies, using schools as knowledge dissemination centres (ii) Dissemination of dry flower/cut flower technologies and (iii) Remediation of Biodiversity assessment, prospection and conservation of plant resources of India	Dr. K. N. Nair	CSIR	Apr-07	Mar-12	1729.000
SIP	009	Enhancing water utilization efficiency in crop plants: prospecting plant diversity for genes and systems biology for drought tolerance	Dr. U. V. Pathre	CSIR	Apr-07	Mar-12	1000.00
TLP	4007	Genetic improvement of <i>Jatropha curcas</i> for drought tolerance and oil yield	Dr. Uday Pathre	CSIR Under NMITLI	Jul-05	Jun-10	172.56
TLP	4009	Development of high through-out marker assisted selection systems for improvement of drought tolerance and fibre quality related traits in cotton	Dr. Samir V. Sawant	CSIR NMITLI	Apr-07	Mar-12	496.500
TLP	4010	Novel approaches for production of hybrid seeds with characteristics of improved insect resistance and higher yield - Cotton Component	Dr. P. K. Singh	CSIR Under NMITLI	Mar-08	Feb-11	254.200
TLP	4011	Leads based drug development and genetic improvement of <i>Ashwagandha</i> (<i>Withania somnifera</i>)	Dr. P. K. Trivedi	CSIR Under NMITLI	Apr-10	Mar-13	126.500
CLP	2448	Collaborative research between NBRI, NAU and GSSC for the development of insect resistant transgenic cotton.	Dr. P. K. Singh	NAU, Gujarat	Jul-05	Jun-10	50.000
GAP	2151	Studies on diversity and distribution of pteridophytic flora of Pachmarhi Biosphere Reserve	Dr. P. B. Khare	MEn&F New Delhi	Apr-08	Mar-11	17.129



CSIR-NAL

Civil Aircraft Project in the Offing

A high-power Committee on National Civilian Aircraft Development met at the National Aerospace Laboratories (NAL), Bangalore, on 8 May 2010 to kick-start the project of building India's indigenous civil aircraft. The programme is aimed at providing to the country's need of having a series of aircraft for feeder services connecting towns and two-tier cities to propel the civil aviation industry in India. The Committee was chaired by former Chairman of Indian Space Research Organisation (ISRO), Dr G. Madhavan Nair. The 14-member panel also comprises Director General, CSIR, Prof. Samir K. Brahmachari as co-Chairman.

The other members present at the meeting were :

Mr K. M. Chandrasekhar, Cabinet Secretary; Dr. K. Radhakrishnan, Chairman, ISRO; Prof. R. Narasimha, FRS, JNCASR; Mr Ashok Nayak, Chairman, HAL; Mr S. V. Ranganath, Chief Secretary, Government of Karnataka; Dr. V. Sumantran, Executive Vice Chairman, Hinduja Automotive, Chennai; Dr. A. R. Upadhyaya, Director, NAL; Mr Y. P. Kumar, Sr Adv(BDC), ISTAD; Mr Soundararjan, Director, CP, HAL; Mr N. C. Agarwal, Director, D&D, HAL; Mr M. S. Chindananda, Head, C-CADD; Dr Satish Chandra, Scientist, NAL; Dr. V. K. Aatre, Former SA to RM.

The Committee recommended to begin a feasibility study for designing and developing a prototype of the civil transport aircraft at a cost of Rs 5,000 crore for a 90/100 seat aircraft. The civilian transport aircraft will be designed and developed under Public Private Partnership (PPP) to meet the national requirements with support from the Centre. The first prototype could roll out within four to five years after completion of the Project Report. The NAL will implement the Project in association with Hindustan Aeronautics Ltd (HAL), Aeronautical Development Agency (ADA), Defence Research and Development Organisation (DRDO) and Indian Space Research Organisation.

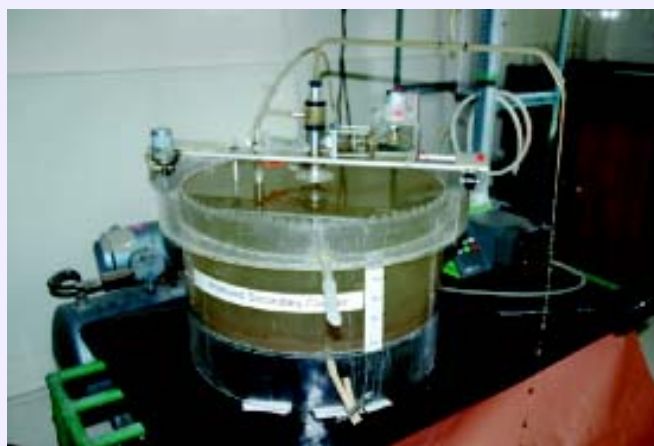
NEERI Scientists Get U.S. Patent

NEERI scientists, Dr. G. R. Pophali, Dr. Tapas Nandy, Dr. S. N. Kaul and Dr. Sukumar Devotta, have been granted U.S Patent (No. 7, 637, 379 dated 29 December, 2009) for their invention "*Circular Secondary Clarifier for Wastewater Treatment and an Improved Solids-Liquid Separation Process Thereof*".

The abstract of the invention reads as follows:

"The improved circular secondary clarifier of the present invention requires less surface area and low HRT and provides efficient solids-liquid separation. The improved clarifier has better SS and BOD reduction and provides high under flow solids concentrations, as compared to conventional secondary clarifiers. The improved clarifier is even capable of treating wastewaters containing low MLSS concentration. One of the biggest advantages of improved clarifier is that it does not require a separate sump-cum-pump house as it removes the settled sludge using suction mechanism thereby reduces capital and recurring cost. Further, it provides natural flocculation, which is essential for agglomeration of solids and increases particle size referred to as 'floc' and eliminates provision for a separate flocculation facility thereby reduces capital and recurring costs."

Dr. G. R. Pophali is Scientist at Wastewater Technology Division (WWT), NEERI and Dr. Tapas Nandy is Scientist & Head of WWT Division. Dr. S. N. Kaul is a retired scientist, who was earlier Scientist & Head of WWT Division at NEERI. Dr. Sukumar Devotta is Former Director of NEERI.



Improved clarifier



ISO Recognition for RAB, CSIR

Recruitment & Assessment Board (RAB) has been accredited with IS/ISO 9001:2008 Certificate by the Bureau of Indian Standards (BIS) valid from 3 May 2010 to 2 May 2013. RAB is the 17th in the list of CSIR family awarded with ISO certification and is the first to get this recognition in CSIR headquarters.

RAB was established in mid 2002 and came into operation from January 2003 after setting up of the framework for centralized implementation of assessment & recruitment. However, a full-fledged multi-member Board with adequate functions & powers was approved by the Governing Body during its 168th meeting held on 8 December 2006. RAB's foremost challenge was to clear the past accumulated backlog. RAB successfully cleared a majority of the backlog of assessments up to 2008-09. Total cases assessed under the CSIR Scientists Recruitment Rules, 2001 till date is around 10000, including 2100 cases of assessments of scientists 'F' to 'G'. Besides, RAB facilitated recruitment of average 250 scientists in a year, at entry as well as lateral levels.

It was the foresight of Professor V. S. Ramamurthy, Chairman, RAB who first suggested that RAB should strive for ISO recognition, in appreciation of the quality work rendered by RAB. Accordingly a proposal was made by RAB for ISO certification in March 2008 and the job was assigned to Consultancy Development Center (CDC).

designated a consultant for the following tasks:

- Study the RAB system and processes involved
- Design, develop and implement the quality system.
- Facilitate system evaluation through Internal audits & Management Reviews.
- Assist during certification audit by certifying agency.

Training was imparted to all the staff members regarding the Quality Management System. A Management Representative was designated internally and a Task Force comprising all the officers of RAB was formed. RAB perfected its documentation under Assessment, Recruitment, Administration and IT Database activities. Subsequently, some officials were trained as internal auditors and an internal audit was done for the above mentioned four major activities. The Quality policy was appropriately formulated and got approved.

The first Management Review meeting was held on 9 November 2009 and the outcome of this meeting is summarized below:

- The Quality Management System was found to be fully established
- Internal Audit had been done as per the procedure.
- Customer feedback (CSIR Labs) was above 85% (based on 46% response).
- The selection process of Scientist G had to be continued.



- A yearly time- table for assessment is to be envisaged.
- The process of campus selection at the entry level is to be streamlined.
- A manual for good practices for Assessment and Recruitment is to be prepared and followed.

The BIS carried out the final certification audit on the 15 April 2010 recommending RAB for ISO certification.

The quality certification has established the process being followed at RAB besides its consistency. Further, RAB has not only earned quality recognition for itself but has also increased its credibility towards its stakeholders and customers. Now, as a fallout, RAB is framing “*Good Assessment Practice*” and “*Good Recruitment Practice*”.



Doon University Signed MoUs with IIP, Dehra Dun and Wadia Institute of Himalayan Geology (WIHG), Dehra Dun

The Directors of the two most prestigious scientific Institutes of the Doon Valley, i.e. Indian Institute of Petroleum (IIP), and Wadia Institute of Himalayan Geology (WIHG), Dehra Dun were excited at the prospectus of getting ‘Young Blood’ from the Doon University in the field of research under the MoUs signed.

On behalf of Doon University, Vice Chancellor Prof. Girijesh Pant signed the MoUs while WIHG Director, Dr. A. K. Dubey and IIP Director, Dr. M. O. Garg signed the MoUs on behalf of their respective Institutions. All the three expressed great satisfaction and hope on the occasion. Dr. Garg said that the MoU for collaborative research and Doctoral programmes between IIP and Doon University would get ‘young blood’ from the University to IIP, while the students and researchers from the

University would get an opportunity to work on actual Scientific Projects rather than devised ones.

“The faculty from the IIP can also come to the University to deliver lectures on special themes. We have 11 Ph.D. students at the moment while we can accommodate a total of 50. The University is starting its Ph.D. programme and can send its students to us,” said Dr. Garg, adding that research Institutions like the IIP were a bridge between academics and industry. “We know both languages: that of the academicians and the industry. Teaching helps research and this MoU will help us in this direction” said the IIP Director. Dr Garg also emphasized the importance of petroleum research. “We always think of finding more crude oil, improving energy efficiency and developing alternative fuels. All this

requires cutting edge research,” he said.

Prof. Girijesh Pant said that the University, with its mandate of working towards expanding the frontiers of knowledge, was looking towards research organizations to seek their support for building its research agenda. “No organization can meet the challenges and demands of the time in isolation”, he said, and added that “collective endeavour is the need of the hour.” He said that the University till now had no research identity. “These MoUs are the first step towards getting our research identity”, said the VC.

Dr. A. K. Dubey said that the Wadia Institute, which had 40% of its scientists in the 50-plus age group, would welcome the ‘younger blood’ from the University. “In our research projects of glaciology, we need younger people to accompany our older scientists to the research sites.”



The signing of the MoUs in progress for ushering in an era of collaborative research



He said that the MoU would lead to mutual gain as the students from the University would get the benefit of the Institute's faculty as well as the well-equipped laboratories at Wadia Institute. "Our Institute is unique as 65 scientists are working under one roof to study the evolution of the Himalayas. The combined efforts of IIP, WIHG and DU

will soon be visible," added the WIHG Director. He said that the Wadia Institute has 23 junior research fellows and some of them could be attached to the Doon University which would start Ph.D. programmes in environmental studies and natural resources management soon.

The MoUs were signed at the

Senate hall of the University after which the three signatories addressed the media persons. The University's Registrar, T. C. Nautiyal and J. K. Sharma, Head of the School of Environment and Natural Resources at the Doon University, were also present at the signing ceremony.

AMPRI, Bhopal Industry Meet on *Light-Weight Material Development for Automobiles and Aerospace*

Light-weight materials are preferred substitutes for traditional materials. These novel materials help automotive manufacturers increase fuel efficiency and reduce the emission of harmful pollutants, without compromising on performance, size, and utility.

AMPRI, Bhopal is committed to the development of advanced materials and processes that offer advantages of being cost-effective, environmental-friendly and energy efficient. AMPRI has developed a commendable expertise in the areas of Material Characterization, Processing, Simulation and Modeling.

In the Eleventh Five-Year Plan the Institute is leading and implementing a CSIR network project on, *Light Weight*



A view of the deliberations in progress

Metallic Materials for Advanced Engineering Applications. With a view to bring together industry, user agencies from automobile and aerospace sector to map technological opportunities in light weight materials, AMPRI organized an Institute-Industry meet on March 18, 2010.

Senior executives from automobile and aerospace sector were invited to attend this meeting. Dr. Arun Jaura,

Eaton Corporation; Mr. Neeraj Munjal, M/s. Shivam Autotech Ltd., Hero Group of India; Dr. Arun Kumar, General Motors Pvt. Ltd; Dr. K. Vijaya Raju, Aeronautical Development Agency (ADA); Dr. M. Sathya Prasad, Ashok Leyland; Mr. Udayan Pathak, Tata Motors and Mr. Ganapathy Subramaniam and Mr. S. S. Manral of

Eicher Motors participated in the deliberations.

Dr. Anil K. Gupta, Director, AMPRI, Bhopal welcomed the delegates and said that the objective of the meet was to initiate sustainable interactions with the industry and carry forward earlier interactions with General Motors and Hero Group. He expressed confidence that the interaction meet would eventually facilitate preparation of a



national road map for light weight materials research. He informed that new initiatives through CSIR Engineering cluster to be implemented during XII Plan would also be identified.

In his detailed presentation, Dr. Gupta gave a panoramic view of R&D capabilities and achievements of AMPRI in the area of light-weight materials particularly, metal matrix composites, metallic foams, natural fibres and polymer composites. He informed that AMPRI possessed processing capabilities such as pressure die casting and rolling of aluminum alloys and would soon develop similar expertise in magnesium alloys. The processing capabilities are backed with a strong computer simulation and modeling capability. He hoped that the present industry interaction meet would help to identify opportunities in component development based on pressure die casting, sheet forming, extrusion, hydro-forming in consultation with user agencies i.e., automobile and aerospace sectors.

Dr. Arun Jaura, Vice President, Eaton Engineering, Pune, made a presentation on the activities of Eaton Engineering Corporation, Pune and desired that Institute-Industry together should develop IPRs and benchmark the interactions for developing low-cost and market-friendly solutions.

Dr. K. Vijaya Raju of Aeronautical Development Agency (ADA) made a detailed presentation on, *Materials for Fighter Aircraft: Present and*

Future. He discussed about various aircraft materials and said the aerospace sector was constantly on the lookout for applications of light-weight materials and emphasized the role of composites and light-weight materials in aircraft industry. In this regard, Dr. Raju apprised the audience that ADA will be looking towards the development of Metallic Materials and SMART Materials for improved performance and efficiency with respect to Al, Ti alloys, MMCs and Metallic Foam.

Dr. Arun Kumar of General Motors, Bangalore spoke on, *Light Metals—Opportunities and Challenges*. He informed that light-weight material usage in automobile industry was growing at a fast pace because of safety and fuel economy issues and the timeline is with respect to magnesium and aluminum.

Mr. Udayan Pathak, TATA Motors, Pune made a presentation on, *Vision and Road Map for Light-Weight Materials*. He dwelt upon their potential for global automotive industry and mentioned that India was emerging as a low-cost manufacturing hub and the automobile world at present needed everything (enhanced reliability, safety, rider comfort, higher speeds, better fuel efficiency, CO₂ reduction and being environmental-friendly) at low cost.

Mr. Neeraj Munjal of M/s. Shivam Autotech, a Hero Group Company, cited about the Hero group association with NPL and Dr. Anil K. Gupta over 12 years. He mentioned the successful technologies provided by the NPL to

their group leading to enhanced performance in forging processes that lead to high productivity and yields. He further mentioned that through forging technology no single rejection from the market had occurred.

Dr. M. Sathya Prasad of Ashok Leyland, Chennai made a presentation on, *Light Weighting of Commercial Vehicles – Challenges and Opportunities*. He informed that the indigenous technologies should offer assurance to reduce weight of commercial vehicles and lauded AMPRI's initiative in holding interaction meet on this aspect. He told that the collaboration should be immediate, medium-term and long-term. AMPRI should map out its strength in natural fibers, Al foams and make a road map for future research activities.

Mr. Ganapathy Subramaniam of Eicher Tractors gave an overview of tractor industry in the Indian scenario and informed about the advancements in light-weight materials that will be of use to Eicher. He was particular about replacing sheet metal of mud guard, bonnet with light-weight/composite material to withstand corrosion problems to achieve the desired performance.

In the ensuing discussions, broad outlines and opportunities of joint work were identified in the areas of MMC brake drums, natural fiber panels, metallic foams (ferrous and non-ferrous), magnesium housing and cylinder blocks, aluminum and magnesium components for engine valve trains.



AMPRI, Bhopal Industry Meet on *Wood Substitute Technology*

Advanced Materials and Processes Research Institute (AMPRI) has developed a wood substitute technology. In this aspect, a one-day programme on Institute-Industry Meet on, *Wood Substitute Technology* was organized on February 22, 2010 at AMPRI, Bhopal to explore the possibility for technology transfer and commercialization of wood substitutes developed by the Institute. Around 50 delegates attended the programme. The participants were from different industries, agencies including promoters involved in building materials, policy making authorities and officials from different organizations like CPWD, Housing Board and Bhopal Development Authorities.

At the outset, Dr. Anil K. Gupta, Director AMPRI addressed the gathering and highlighted the significance of the wood substitute products

developed at AMPRI, Bhopal. He informed that AMPRI would conduct a series of Institute-Industry interaction meetings to promote awareness on available technologies and the current meeting was the first in the series. He briefly described the R&D activities of AMPRI, particularly those in the areas of alternate building materials and components based on natural fibres and industrial wastes such as fly ash and red mud.

Dr. Shailesh Kr. Agrawal, Executive Director, BMTPC, Ministry of Urban Affairs and Poverty Alleviation, Government of India, New Delhi briefly highlighted the demand of wood in construction industry in India and the importance of manufacturing alternatives for wood so that deforestation and various environmental problems can be resolved. He opined

that the wood substitute technology developed by AMPRI Bhopal had potential applications in the building industry.

Dr. Mohini Saxena, Scientist F, AMPRI presented the technical details of the wood substitute technology including comparative quality of wood substitute products developed at AMPRI, Bhopal over the commercially available products like teak, medium density fibre (MDF) board, rice husk board, extended polystyrene board etc. She mentioned that the wood substitute products are stronger, durable and better than the commercial products, besides being environmental-friendly, versatile and cost-effective.

In addition, an exhibition was arranged in which various wood substitute products developed at AMPRI were displayed. All the participants

visited the exhibits stalls and had detailed discussion with AMPRI scientists on various aspects of product quality and related applications. A visit to the Technology Enabling Centre (TEC) was also arranged where the details of making of wood substitute products and required machineries were explained to all the participants. The participants evinced keen interest in the wood substitute technology and various R&D activities of AMPRI, Bhopal.



Glimpses of the
AMPRI-Industry Meet on,
*Wood Substitute
Technology*



IICT and NEIST organize Workshop-cum-Training Programme on *Sericulture for Production of Muga Silk*

A three-day 'Workshop-cum-Training Programme on *Sericulture for Healthy Larvae and Production of Quality Muga Silk* was organized by Indian Institute of Chemical Technology (IICT), Hyderabad, in collaboration with North East Institute of Science and Technology (NEIST), Jorhat, at Hotel Brindavan in Sivasagar, Assam during 4-6 May 2010.

The Training Programme sponsored by IICT and coordinated by NEIST under the CSIR Rural Development Programme was attended by muga sericulture farmers from Sivasagar District for their socio-economic development.

The Inaugural Programme was chaired by Dr. P. G. Rao, Director of NEIST and Welcome Address was delivered by Dr. B. G. Unni, Scientist G and Area Coordinator (Biotechnology/Biological Sciences) of NEIST. Dr. U. S. N. Murty, Scientist G, Head, Biology Division, IICT, Principal coordinator of the Project gave an overview of the programme and its forthcoming activities. The other dignitaries who were present and delivered talks were Mr. P. C. Bhattacharya, ADC of Sivasagar District; Dr. K. Das of Central Muga Eri Research & Training Institute, Lahdoigarh, Jorhat and Dr. Shilpa Reddy of M/s Vinsys Tech Pvt.



A dais view of the Inaugural Function of the Workshop. Seated from left are: Mr. P. C. Bhattacharya, ADC of Sivasagar District; Dr. U. S. N. Murty, Head, Biology Division, IICT; Dr. P. G. Rao, Director and Dr. B. G. Unni, Area Coordinator, Biotechnology/Biological Sciences, NEIST

Ltd., Chennai.

The resource persons who imparted the Training Programme to farmers were Dr. B. G. Unni of NEIST, Dr. U. S. N. Murty and Dr. Sunil Mishra, scientists of IICT, Hyderabad; Mr. Kartik Neog and Mr. P. K. Handique, scientists of CMER&TI, Lahdoigarh, Jorhat and Mr. Shankar Das of NABARD, Sivasagar.

Terminalia chebula (Helica) based product called "*Muga Heal I*", for the control of 'flacherie' disease in muga silkworm and enhanced silk production, was also released to muga farmers who attended the Training Programme, by the dignitaries, for field level application. The technology of "*Muga Heal I*" developed by NEIST, CSIR, Jorhat has already been taken by a firm, M/s Vinsys Tech Pvt. Ltd., Chennai for large scale commercial production. The Director of the firm, Dr. K. Shilpa Reddy attended

the Training Programme/ Workshop and interacted with the farmers and other NGOs.

The topics discussed in the Training Programme were on seed production, rearing technologies of silkworms, disease and pest management, eco-friendly technologies, self employment through sericulture for rural development in North Eastern region of India, pupal oil production from pupae of silkworms and availability of loans for Self Help Groups, and NGOs from NABARD.

A farmers' interactive session with the resource persons was also held in the Training Programme. The NGOs and Self Help Groups showed keen interest to undertake the technology of pupal oil production which was developed by IICT, Hyderabad and they decided to place their demands to the concerned authorities to set up the unit in Sivasagar District.

A field visit was also arranged to a sericulture farm at CMER&TI, Lahdoigarh for a live demonstration. This Training Programme-cum-Workshop for the sericulture farmers was under the "*Interactive Meet with Self Help Groups/ NGOs/ Farmers*" of the Calender of Events in Golden Jubilee Celebration (2010-2011) of NEIST, Jorhat. The Programme was coordinated by Dr. B. G. Unni, Scientist G from NEIST, Jorhat.



Farmers Interaction Programme at NBRI, Lucknow

NBRI, Lucknow organized a Farmers Interaction Programme (Farmers Fair, *Kisan Mela*) on March 30, 2010 at Banthra Research Station of NBRI for approximately 250 selected farmers of Lucknow and Sultanpur districts. The programme was meant for disseminating the NBRI Green Technologies among the farmers. The full day programme was inaugurated by Dr. K. C. Gupta, Director, NBRI in the presence of Dr. P. Nath, Dr. D. V. Amla, Dr C. S. Nautiyal, Dr Bajarang Singh, and Dr. S. K. Tewari, Nodal Officer besides scientists and other members of the Rural Development Project team.

In the Farmers Fair, 10 activities, relating to NBRI Green Technologies were displayed and extended through charts/posters, models and extension

bulletins (printed in Hindi). The participating farmers brought their soil samples for analysis. The quick soil testing (pH, EC, OC) was done during the fair and the advice on their nutrition management and amelioration requirements were provided to the participating farmers before conclusion of the fair.

During this event, the visiting farmers had the opportunity to interact with scientists dealing with several NBRI technologies, understand the technological details, visit the field demonstrations and get their soil samples tested on the spot along with advice/recommendation on reclamation and management of soil. The registered farmers were provided biofertilizers (*Trichoderma* and PSB), seeds/

seedlings/planting materials of identified crops like, Tuberose, Marigold, Gladiolus, Turmeric, Shatavari, Ashwagandha (variety NMITLI118), and vermicompost etc.

The process of preparing simple Ayurvedic and nutraceutical formulations like *Giloe Satva*, *Vasavaleha* etc., was demonstrated for one's own healthcare and for income generation. The entire activity of technology dissemination was completed in four parts; Inaugural Session, stall visit by the participants, demonstration at the stalls and/or in field and lecture(s) in the training hall. At the conclusion of the fair, a quiz was conducted for the farmers and successful participants were felicitated.



**Glimpses of the
Kisan Sampark
Diwas**



Training Course on *Underground Engineering* organized by Regional Centre, CIMFR, Roorkee

Utilization of underground space has become a special need of present generation for various unavoidable reasons. The underground space is being used for road and rail transportation, hydroelectric projects, storage of arms and ammunition, war-time shelters, bunkers and for various other facilities. With increased activities of underground construction and challenges related to it, there is a demand of trained manpower for planning, design and construction of underground openings.

In view of the above, Central Institute of Mining and Fuel Research (erstwhile CMRI), Regional Centre, Roorkee, in association with Institution of Engineers (India) Roorkee Local Centre and Indian Society for Rock Mechanics and Tunnelling Technology (ISRMTT) Roorkee Local Centre organized a short-term course on *Underground Engineering* in the recent past at IEI Roorkee. Er. R. D. Dwivedi and Dr. R. K. Goel, Scientists, CIMFR Regional Centre, Roorkee were the Course Coordinator and Course Advisor respectively.

The Course was inaugurated by the Chief Guest, Dr. Amalendu Sinha, Director, CIMFR, Dhanbad. Prof. Sriman Kumar Bhattacharyya, Director, CBRI Roorkee was the 'Guest of



Sitting on dais (from left) Er R. D. Dwivedi, Course Coordinator; Prof. V.K. Agarwal, Chairman IEI RLC; Dr. Amalendu Sinha, Chief Guest & Director CIMFR; Prof. S.K. Bhattacharyya, Guest of Honour & Director CBRI; Er. S.K. Singh, Honorary Secretary; IEI RLC; Dr. R. K. Goel, Course Advisor briefing about the Course at the Inaugural Function

Honour' at the Inaugural Function.

In his Inaugural Address, Dr. Amalendu Sinha stressed upon the use of underground space. He mentioned that many activities are now concentrated on the development of underground infrastructure. People are now aware of the benefits of going underground, because of inherent advantages of a natural camouflage, moderate thermal variation and less seismic vulnerability. This is particularly relevant for big cities where congestion and environmental pollution is threatening the ecological balance. Therefore, there is added responsibility on the research and academic institutions to deal with this subject in greater detail.

Uttarakhand being the hill state has lot of potential and scope of utilizing underground space for various purposes.

Dr. Sinha also emphasized to study the physiological and psychological problems related to the use of underground space. He suggested the participants to make full use of this Course and clear their queries and doubts on the subject. He also hoped that the knowledge gained during the Course would be useful to the participants who were mainly the practicing engineers and geologists engaged in various underground engineering projects.

Prof. Sriman Kumar Bhattacharyya said that since the beginning of civilization, man has sought shelter, security and

comfort by going underground. Using caves for storage and living quarters was a highly effective way of making use of the environment in those times, just as it is today. Underground space offers a stable and safe place for many types of human activities. He also mentioned that the underground construction is a specialized activity, as it differs from other building works mainly in its dependence on geological factors as the rock forms the construction material.

On this occasion, Institution of Engineers (India), Roorkee Local Centre, also felicitated Dr. Amalendu Sinha for his outstanding contributions in the field of underground engineering.

A wide spectrum of topics were covered during the course. These included geological, geotechnical & geophysical investigations for tunnelling



and other underground structures, rock mass classifications for design of underground openings, prediction of ground conditions for tunnels and underground openings, stability analysis of wedges in slopes and underground openings using stereographic projection method, numerical modelling for underground excavations with FLAC^{3D}, determination of support pressure for preliminary design of underground openings by block theory, stress distribution around underground tunnels, rock mass–tunnel support interaction analysis, engineering behaviour of rocks and rock masses, tunnelling with TBM and NATM & NMT techniques, drilling and blasting techniques for underground excavations, finite element analysis of a powerhouse cavern, instrumentation in underground openings and stability analysis of slope using GALENA software.

Case histories discussing problems were encountered and tackled during the tunnelling at Tala hydroelectric project and support pressures in the powerhouse cavern in weak rocks were also discussed. In addition, BIS code on Tunnelling methodology was also dealt with.

When an underground opening is created, redistribution of stresses around the opening takes place. The quantity and direction of these induced stresses depend upon the rock mass quality and value of *in situ* stresses. Many examples of various tunnelling projects are there where unforeseen problems were encountered while unnecessary delays had occurred due to improper exploration of the area. It was, therefore, emphasized during the Course that proper geological and geotechnical

investigations all along the tunnel alignment should be carried out and *in situ* stresses should also be measured prior to starting the project.

Continuous monitoring of the tunnel (especially in poor rock masses) was also recommended while tunneling, so that the support requirements could be revised, if felt necessary. It was suggested to go for optimum supports (economical) rather than conservative one. Some lectures threw light on the numerical techniques for stability analysis of tunnels and caverns.

Scientists from CIMFR, Regional Centre, Roorkee, four professors from IIT Roorkee, one Superintending Engineer from Irrigation Research Institute and one scientist from CSMRS delivered lectures during the Course. A Question-Answer Session was also organized on the last day of the Course, to reply to various queries/doubts of the participants.

Participants were satisfied and many of them requested to increase the duration of the Course. Some of them were of the view that such a useful Course should be of at least 15 days duration and it should include field training also. Mr. Pankaj Kumar, scientist from CSMRS asserted that the Course was so interesting that he himself developed interest in the subject of rock mechanics whereas he found the subject boring earlier. Mr. K. D. Rhal, Chief Engineer, Konkan Railway Corporation Limited complimented the organizers and opined that all the objectives of the participants might have been achieved because of proper dissemination of knowledge during the lectures and by discussion with the experts. He also emphasized that such type of Courses

should be organized more frequently so that the maximum field problems could be discussed and solved. Mr. Lachu Man Dhungyel, Asst Engineer (Civil), DPHC (Bhutan) also appreciated the Course. Some of the participants also suggested for organizing such a Course at International level.

The Chief Guest of the Valedictory Function was Prof. B. B. Dhar, Sr. Vice President, Ritnand Balved Education Foundation (Amity University) and former Director, CMRI (now CIMFR) Dhanbad. During his Valedictory Address he gave some tips to the participants for professional building. The Guest of Honour, Prof. Bhawani Singh, former Professor, IIT, Roorkee highlighted some salient features of BIS codes being used in tunnelling. Later, the Function was followed by distribution of Certificates to the participants by the Chief Guest and the Guest of Honor.

A total 92 delegates from various organizations had registered for the Course. Thirty organizations from India and Bhutan nominated their engineers, geologists and planners for this Training Course. Some of the main organizations were NHPC, NHDC, THDC, NTPC, UJVNL, RITES Ltd, MES, Northern Railway, Konkan Railways, Rail Vikas Nigam Ltd, Northern Frontier Railway, Bumi Engineering, Soma Enterprises, Jindal Steels, Noble Geo-Structs, HCC, MACCAFERRI, BASF, ISPRL, Indian Oil Corporation, NEEPCO, Engineers Ltd., CSMRS, ISM, IIT Roorkee, DPHC (Bhutan), and DGPC (Bhutan).

The Course was sponsored by the Ministry of Earth Sciences and CSIR and co-sponsored by MACCAFERRI and BASF Construction Chemicals Pvt. Ltd.



Annual Day Function at CIMAP, Lucknow

The Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, celebrated the Annual Day in the recent past by organizing a Function at its campus. Prof. P. K. Seth, CEO, Biotech Park, Lucknow, and ex-scientists of CIMAP were also present on the occasion. Prof. M. K. Mishra, Vice Chancellor, Lucknow University was the Chief Guest who presided over the Function. On this occasion, Director, CIMAP, Prof. Ram Rajasekharan briefed about the Institute's last year progress.

Delivering the Presidential Address, Prof. Mishra congratulated the CIMAP Director and scientists for achieving significant progress during the last year both in the area of basic and applied research in medicinal and aromatic plants. Prof. Mishra said that from time immemorial, the plant wealth has been worshipped in our country. Presently, this wealth needs to be conserved and further propagated for the welfare of the mankind, he added. "CIMAP has a major role to play in developing the technologies for cultivating such high value plants and making these technologies available to the farmers," said Prof. Mishra.

Speaking further on the development of S&T, in the country, Prof. Mishra said that science in India has progressed at a faster pace in recent years and now scientists can have world class facilities available in various Indian Institutes. Prof. Mishra said that we



Address by the Chief Guest, Prof. M. K. Mishra, Vice Chancellor, Lucknow University

can foresee significant progress in the country based on the scientific invention in near future.

Earlier, at the outset, Director, CIMAP, Prof. Ram Rajasekharan informed that last year had been a reasonably productive year for CIMAP as the Institute had developed improved plant varieties, published good research papers, won awards at different fora and empowered women and farmers through S&T interventions in the area of medicinal and aromatic plants. On this occasion, four scientists (Dr. S. P. Singh, Dr. R. K. Ral, Dr. Birender Kumar and Dr. R. S. Sangwan) who led the team of plants' variety development were felicitated by the Chief Guest.

Prof. Ram Rajasekharan further

told that CIMAP has worked in the area of germplasm conservation, domestication of medicinal and aromatic plants (MAPs), developing new analytical methods and making studies in the area of stress response, besides other areas of research. He further also said that CIMAP will now focus to strengthen its research programmes by inducting more researchers and students, besides mobilizing funds and improving infrastructural and instrumentation facilities at CIMAP.



Prof. Ram Rajasekharan, Director, CIMAP presenting CIMAP Progress Report (2009-2010)



A view of the audience



Felicitation of CIMAP Scientists



NINTH CSIR DIAMOND JUBILEE INVENTION AWARD FOR SCHOOL CHILDREN (CDJIA-2010)

Council of Scientific & Industrial Research (CSIR) is the premier industrial R&D Organisation in India. On the occasion of its Diamond Jubilee in 2002, CSIR initiated invention Awards for school children to create awareness, interest and motivation for intellectual Property amongst children.

On the occasion of the World Intellectual Property Day which is celebrated throughout the world on 26th April, CSIR invites applications for the '**Ninth CSIR Diamond Jubilee Invention Award (CDJIA) for School Children-2010**'. The first prize winner would also become eligible for WIPO's Young inventor Award carrying a medal and a certificate.

Applicant must provide the details of the invention submitted for the award in not more than 5000 words in English/Hindi including an abstract (in not more than 100 words), authenticated (by giving seal and date) and sent through the Principal/Head of the School where the student is enrolled and personal details on a separate page as follows:

Title of the Invention, Name, date of birth, school and residential address, class, telephone no. (residence/school), e-mail address.

In case of proposals already selected for state, national, international or equivalent Awards, only the subject matter covering the improvements need to be submitted for consideration of CDJIA-2010. Published inventions would be considered as per the provisions of the Indian Patents Act.

The applications for the award not exceeding 5000 words in **English/Hindi** with requisite drawings will be considered. The write-up must describe the subject matter in a problem-solution mode and highlighting the novel and non-obviousness feature of the invention and its advantages.

Any Indian student enrolled in an Indian school below the age of 18 years as on 31st July 2010 can apply.

The invention submitted should be one that is globally novel, non-obvious and utilitarian. It could be a new concept or idea or a solution to an existing problem or completely a new method/process/device/utility. It is not essential/necessary that the invention should have been worked, only the concept of the invention should have been proved through a model, a prototype or experimental data. Details of any assistance/guidance provided by teachers/parents/friends or others must be appropriately mentioned and acknowledged.

Typed applications to be sent by Registered post/Courier to: Head, Intellectual Property Management Division, CSIR, NISCAIR Building, 14 Satsang Vihar Marg, Special Institutional Area, New Delhi-110 067 with the enveloped marked on top left hand corner 'CDJIA-2010'.

You may also send application through email addressed to head.ipmd@niscair.res.in. **However, a hard copy should also follow through post with Principal's authentication.**

The awardees will be selected by a high level Award Selection Committee. If required, the short listed candidates may be called for Interview at Delhi or at any other appropriate place. **The decision of the Awards Selection Committee/CSIR will be final and binding on the applicants and no enquiries/correspondence in this regard will be entertained.**

Applications received
on or before
31st October 2010
will be considered
for the Award

Prizes

There are in all 60 prizes. Besides a certificate, the cash awards are:

First Prize	(1 No)
Rs. 50,000/-	
Second Prize	(2 Nos)
Rs. 25,000/- each	
Third Prize	(3 Nos)
Rs. 15,000/- each	
Fourth Prize	(4 Nos)
Rs. 10,000/- each	
Fifth Prize	(50 Nos)
Rs. 5,000/- each	

**The Awards will be announced on January 1, 2011
at New Delhi and would be communicated to the Awardees only**



ANNOUNCEMENTS/HONOURS & AWARDS



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e-mail: st@cecri.res.in

AFST (I) Fellowship to Dr. Muralikrishna, Scientist, CFTRI, Mysore



Dr. G. Muralikrishna, Senior Scientist in the Biochemistry and Nutrition Department of the Central Food Technological Research Institute, Mysore, has been conferred with the prestigious *Association of Food Scientists and Technologists, India, Fellowship [AFST(I) Fellowship]* for the year 2008 for his significant contributions in the area of food carbohydrates and their degrading enzymes. He received the Award from His Excellency, Shri H. K. Bharadwaj, Governor of Karnataka, at a Function held recently in Bangalore.

Errata

The correct title of the R&D News published on Page 57 in March 2010 issue of *CSIR News* is 'CSIR Technology for Production of DHA Transferred to M/s Avestha Gengraine Technology Pvt. Ltd., Bangalore', instead of 'NIO's Technology for Production of DHA Transferred to M/s Avestha Gengraine Technology Pvt. Ltd., Bangalore'. The error is deeply regretted.

IMPORTANT

As we are bringing out *CSIR News* monthly, by combining the fortnightly issues, **from November 2009 onwards, the cost of single, monthly issue is Rs 30/- instead of Rs 15/-**. The annual subscription, however, remains to be Rs 300/-



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