



Krishi Shakti, a 10 hp Tractor dedicated to the Nation

IT is quite difficult for an average Indian farmer to afford mechanized farming utilizing standard tractors of 20 hp and above ratings, which, in turn, tells upon the productivity and per unit yield. There has been a tremendous demand for developing small, compact and easily maneuverable tractors of rating 10 hp or less, which are deemed fittest for the small and fragmented land holdings.

It is in response to this necessity that the Central Mechanical Engineering Research Institute (CMERI), Durgapur, undertook the development of a small 10 hp tractor for affording farm mechanization and increasing the yield. CMERI had done the nation proud when in 1970 it designed and developed the 20 hp *Swaraj* tractor, the first indigenous tractor of the country. Thereafter, CMERI designed the 35 hp *Sonalika* tractor, which has gone into major production.

The project undertaken at CMERI aimed at development of the small tractor (10-12 hp) and its matching implements, based on available diesel engine and tractor parts in the market. It was decided that the first prototype, along with a rotavator or cultivator as its matching implement would be designed, manufactured and tested at CMERI.

Dr R.A. Mashelkar, Director General, CSIR and Secretary, DSIR, dedicated to the nation the first prototype of the 10 hp tractor recently, at the Automobile Industry Get-together organized at the Structural Engineering Research Centre at Chennai. Dr Mashelkar aptly christened the tractor as



Krishi Shakti, a 10 hp tractor designed and developed by CMERI





Krishi Shakti, which he felt, was a reflection of CSIR's efforts to empower the Indian farmers. He further added that empowerment of farmers is critical to sustain the economic growth trajectory of the nation. At an appropriate scale of production, this will be the lowest cost tractor in the world – the unit manufacturing cost of the tractor is estimated to be rupees one lakh. It is believed that once commercialized, this tractor will revolutionize the rural India. The unique features of this tractor are:

- Minimum turning radius (2 m)
- Ground clearance is comparable with other high hp tractors
- Uncultivated land remaining is the least, as compared to other tractors
- Same gear oil is used for hydraulic system
- Specific fuel consumption is minimum
- Transmission: 6 forward, 3 reverse speed
- Hydraulic: Position control, automatic draft control, lifting capacity – 450 kg
- PTO: 21 Spline, 1000 rpm
- Tyres: Front – 5.20 × 14, Rear – 8.0 × 18
- Weight: Approximately 700 kg
- Other Features: Category-I (N) Linkages, Track Width – 950 mm, Wheel Base – 1400 mm, Ground clearance – 300 mm, Turning radius – 2 m, Drawbar pull – 6 KN

Some other specifications of the 10 hp *Krishi Shakti* tractor are as follows:

- Engine: Single cylinder, water cooled, 10 hp diesel engine
- Clutch: Medium duty, single dry plate

Technical Specifications of *Krishi Shakti* developed by CSIR (CMERI)

ENGINE

Model
 HP Category
 Type
 No. of cylinders: 1
 Rated engine speed: 3000 RPM
 Air cleaner
 Cooling system
 Clutch
 Transmission

SPECIFICATION

4510 W
 10 hp Range
 4 Stroke, direct injection, water cooled, diesel engine
 Bore & Stroke: 85/90 mm Displacement: 510 cc
 Compression ratio: 17.5
 Oil bath for working in dusty environment
 Forced water circulation
 Single dry, disc type
 6 forward, 3 reverse speeds with high and low selector levers

1-L - 1.6 kmph
 2-L - 2.6 kmph
 3-L - 3.9 kmph
 Type: 21 Spline Involutes

Gear Speeds

1-H - 6.9 kmph
 2-H - 12 kmph
 3-H - 17 kmph
 RPM: 1000 rpm standard
 1-R - 1.6 kmph
 2-R - 2.6 kmph
 3-R - 3.9 kmph

Brakes
 Hydraulic
 a) Position control
 b) Draft control
 c) Feedback control
 Hydraulic pump
 Linkage
 Lifting capacity
 Electrical instruments
 Tyres
 Front tyre: Ribbed 5.2 × 14
 Wheel base
 Dimensions (mm)
 Min. ground clearance
 Weight of tractor

Foot-operated, mechanical, dry drum brakes
 2 Lever, automatic position and draft with feedback control
 To hold lower links at any desired height
 Automatic to maintain uniform draft
 For automatic load sensing at different soil condition
 Positive displacement, Gear type
 3 point linkage category – I N
 450 kg, At ends of lower links
 Battery 12V, Starter motor and 12V Alternator
 Pneumatic
 Rear tyre: Traction 8.00 × 18
 1400 mm
 Length-2400, Width-1200, Height-1500
 300 mm
 830 kg



Novel Clot Busting Therapeutic Protein

IMTECH transfers worldwide licensing rights to Nostrum Pharmaceuticals for clinical development and commercialization

THE Institute of Microbial Technology (IMTECH), Chandigarh, has entered into an agreement with Nostrum Pharmaceuticals Inc., a privately held company based in Edison, New Jersey, USA, on 27 July 2006 to transfer the worldwide licensing rights for clinical development and commercialization of a novel clot busting therapeutic protein to Nostrum Pharmaceuticals. Nostrum will develop this therapeutic protein in association with Symmetrix Pharmaceuticals Inc., an affiliate of Nostrum Pharmaceuticals.

Known as Clot Specific Streptokinase (CSSK), the therapeutic protein developed at IMTECH and licensed to Nostrum, is an engineered protein produced by recombinant DNA technology. The cDNA coding for Streptokinase has been fused with the cDNA of another naturally occurring human blood protein. The resulting hybrid protein has a very high affinity for the blood clot and no plasminogen lysis property. However, upon binding to the blood clot protein fibrin, the hybrid protein is lysed into its individual component proteins. Streptokinase is released and is active only in the vicinity of the blood clot. Therefore, the common problem of blood thinning associated with Streptokinase owing to general and widespread plasminogen lysis in the blood, which can cause severe bleeding

and hence death in some cases, is obviated with the use of CSSK. IMTECH has already obtained a European patent for this molecule, and the Indian and US patents are pending.

Focusing on emerging areas of biotechnology and microbiology and with teams of highly qualified scientists, over one hundred Ph.D. students and several postdoctoral scholars, IMTECH is a highly reputed biotechnology research institute in India that has an enviable infrastructure consisting of a wide array of the latest, state-of-the-art equipment and instruments required for research in the area.

Nostrum Pharmaceuticals is involved in development and commercialization of products using novel drug delivery systems for generic and branded pharmaceuticals in the US. It has recently acquired a large stake in a public company, Synovics Pharmaceuticals, Inc. through which it plans to commercialize various pharmaceutical products.

Symmetrix Pharmaceuticals Inc., a biopharmaceuticals company, also based in New Jersey, was founded by Dr Yatindra Prashar who is a renowned biotechnologist. Dr Prashar was scientific cofounder of Gene Logic, Inc., a Gaithersburg, Maryland based Biotechnology Company.

Speaking on the occasion, the Minister for Science & Technology and Ocean Development and Vice

President, CSIR, Shri Kapil Sibal expressed his happiness on the tie-up and opined that such agreements on new and improved drugs signal the coming of age of India's scientific and technological capabilities. The researches being carried out by many R&D institutions in India are now coming at par with those from globally recognized companies, he added. While congratulating the scientists of IMTECH, the Hon'ble Minister said that IMTECH is one such example of having world-class creative ambience, which is reflective in its achievements, such as the clot specific Streptokinase.

The Hon'ble Minister was particularly happy to note that the tie-up represented a 'brain gain' for India. Both Dr Nirmal Mulye and Dr Yatindra Prashar are India born American citizens who exude a strong love and desire to serve their motherland. He termed it as a happy augury and hoped that many more such tie-ups would follow.

Dr R.A. Mashelkar, Director General, CSIR, complimented the scientists and technical staff responsible for the development of this cutting edge technology. He said that this development represents a paradigm change in the working of government sector Indian R&D labs from primary basic research driven programmes to the ones which can be commercially exciting as well. He expressed his confidence that like earlier successful developments in clot



busters, this too would also prove to be a huge success for IMTECH/CSIR.

“Development of CSSK is the result of remarkably ingenious protein engineering research at IMTECH and we are very excited about taking this therapeutic protein into clinical development. Since CSSK works in a highly clot specific manner, it overcomes the major problem of blood thinning that is otherwise associated with Streptokinase”, said Dr Nirmal Mulye, President and founder of Nostrum Pharmaceuticals Inc. “We are excited and honored to have this relationship with one of the premier research institutes in India with a large pool of highly talented scientists led by Dr Sahni”, he added.

Dr Girish Sahni, Director, IMTECH, in his address observed, ‘Nostrum, a technology-driven company, has the focus and agility of a small company, and access to intellectual and financial resources to pursue clinical development of a molecule that has a huge commercial potential in the market worldwide’. ‘We are highly impressed with these talented scientists turned entrepreneurs, Dr Mulye and Dr Prashar, who recognize the potential of this invention and are capable of spearheading the international development of a molecule of such commercial and medical importance’, he added.

‘JOIDES Resolution’ opens doors for new explorations

THE recent drilling and coring operations carrying out by ‘JOIDES Resolution’, an American drill ship, in the Exclusive Economic Zone (EEZ) of India has opened up doors to new areas of exploration in the field of microbiology, geochemistry and sedimentology of gas hydrate bearing sediments. This ship was flagged off by Shri Murli Deora, Minister of Petroleum and Natural Gas, on 30 April 2006 from the Mumbai Port, which marked the start of its mission for gas hydrate exploration in the Indian EEZ.

What is so important about this ship when we have so many research vessels in India? Dr Aninda Mazumdar, a Scientist at the National Institute of Oceanography (NIO) Goa, who recently returned after participating in two of its legs explains, “We have vessels that can do coring to the depth of maximum 24 m. Whereas, JOIDES is capable of coring down to a depth of more than 1500m below the sea floor — the data we would never get otherwise. This 143m long research vessel can operate over a water depth range of 37.5 to 5980m. Above all, owing to the availability of a large range of state of the art

instrumentation, complete on-board characterization of sediment cores (~ 9m long) is possible which is vital for a successful exploration”.

As part of the ongoing drilling programme of NGHP, the ship has so far collected cores from the west coast of India and is presently working in the Krishna-Godavari Basin. It will also collect cores from the Mahanadi and Andaman Basins. The cores collected in the Krishna-Godavari Basin have given indications of an over 128m thick gas hydrate layer that could serve as an energy resource in upcoming years for India.

The NIO scientist Aninda Mazumdar, fully charged with enthusiasm after his return from the ship, reports, “Methane is available in the form of solid crystalline structures in the organic rich sediments. The methane hydrate structure is composed of methane and water molecules in a cage (clathrate) like pattern. The hydrate structure, which is otherwise stable within the



A typical gas hydrate sample from Krishna Godavari Basin



in situ temperature-pressure conditions, rapidly destabilizes into methane gas and fresh water by the time it is brought on-board. This results in poor core recovery". He also showed some photos of partially hollow cores, and attributed this to possible evaporation of hydrate when the cores were brought to the water column having higher temperature and lower pressure! So the resource exists but we cannot harvest it unless we develop suitable technology! And that is the challenge for the scientists. Of course, the ship used different pressure coring techniques like PCS, FPC, etc. to bring the undisturbed hydrate core samples (~ 1m) to the vessel. The pressure coring techniques help in quantification of methane gas volume by controlled degassing and in unraveling the shape and distribution of the hydrate layers by x-ray imaging technique. Detail estimation of the hydrate reserve will involve integration of chemical and geophysical data which include downhole logging and seismic imaging", Aninda said.

The hydrate samples will help investigate the types of gas hydrate crystal structures, their degassing properties and whether the methane is of biogenic or thermogenic origin — all of great interest to scientists. Of course, the gas, once available for use, would help in resolving the energy requirements of the country in a big way.

Apart from the gas hydrates, the long cores will serve as source material for other scientific studies in microbiology, sedimentology, interstitial water chemistry, solid phase chemistry, stable isotopic studies, etc. One half of each core will be stored at ONGC, Panvel and would help the scientific community in India to sample the same

for different studies in future.

When asked how NIO benefited by participating in this expedition, Aninda said, "To be on board '*JOIDES Resolution*' itself is a unique experience. There are very few research vessels that can drill and core to such depths. He also added that the NIO participants learnt a lot while working on this ship with American experts about pursuing the various activities related to cores that are brought to the laboratory on board — processing, sampling, storing the large cores, reading infra-red camera, etc., are all very important techniques. The development of tools used for contamination free sampling, cutting the core vertically and horizontally, and sub sampling are areas where one can learn and contribute. All these experiences would be used for the coring facility in NIO's upcoming research vessel, though it would have the capacity to collect only about 20-25 m long cores. Apart from learning the tools and techniques, NIO is getting sub-samples in very large quantity from these cores and these would open challenging opportunities in understanding the Nature," he added.

Aninda is not the only scientists on the '*JOIDES Resolution*' from NIO. It is, in fact, a large team - headed by Dr M.V. Ramana. The other participants include D.V. Borole, P.A. Loka Bharathi, M. Judith, P. Dewangan, G.P. Naik, B.R. Rao, K. Muralidhar, P. Aditya, T. Ramprasad, Firoz. K. Badesab, M. Desa, Christabell Fernandes and P. Rane, who are all either deeply involved in further analysis after return from the vessel or preparing themselves for joining the subsequent legs of *JOIDES* with eager anticipation.

NIO's participation in European Commission Project

THE continued contribution made to the areas of coastal ecology, coastal resource assessment and environmental management strategies for sustainable fisheries and aquaculture development has enabled the National Institute of Oceanography (NIO), Goa, to be a partner in an European Commission funded project entitled 'Environmental Management Reform for Sustainable Farming, Fisheries and Aquaculture' under the Sixth Framework Programme for Research and Technological Development. This Coordinated Action Project will run for three years. Thirty institutions/SMEs (26 from Europe and four from India) having complementary skills and expertise are participating in this project. The project is being coordinated by Chalex Research Limited, United Kingdom.

The farming, fishery and aquaculture industries are looking forward to better environmental management



reforms for better sustainability in production. The aspects to be addressed through this project are decreasing the pollution level and the nuisance value of wastes by promoting more efficient waste handling, waste recycling, and lower input systems for better production in line with Best Management Practices (BMPs). The project aims at 'fork-to-farm approach' to provide safer, healthier and high quality food to consumers.

The project relies more on a consultative mode, which involves review of the current problems that are preventing reforms in the farming, fisheries and aquaculture industries, especially in the areas of environmental management and sustainability and those preventing synergy of research in small expert groups. The partners will then formulate joint strategies for the future and make recommendations to major funding bodies for future research directions in the field.

Shri R.A. Sreepada, Technical Officer, will coordinate the project at NIO and represent as a core member in the Steering Committee for the project management

DGH entrusts Mesozoic prospecting in Gulf of Kachchh to NIO and NGRI



Dr K.S. Krishna receiving grant for the project

THE Mesozoic prospects currently hold nearly half of the world's hydrocarbon reserves. The detection and delineation of the Mesozoic sediments under volcanic rocks has always been a challenging task for the oil industry. Such Mesozoic sediments are also supposed to be underlying the Deccan Traps on west coast of India. These have spread over a major part of the western continental shield and continued into the offshore regions, particularly in Gulf of Kachchh. Thus detection and mapping of Mesozoic sediments in Gulf of Kachchh will provide us some clues for hydrocarbon reserves in this region.

The Director General of Hydrocarbons (DGH), Government of India, Dr V.K. Sibal, who was looking for agencies which could carry out suitable geophysical studies such as marine seismic and magnetotellurics in Gulf of Kachchh for delineation of Mesozoic sediments, has entrusted this responsibility to two major Earth Science organizations, both from CSIR: the National Institute of

Oceanography (NIO), Goa and the National Geophysical Research Institute (NGRI), Hyderabad. NIO and NGRI had submitted a joint project proposal on marine seismic and marine magnetotelluric surveys in the Gulf of Kachchh Region

NIO would be surveying this area to acquire 235-line km of marine seismic refraction data by deploying Ocean Bottom Seismometers on the ocean floor. This will be achieved by recording the refracted seismic signals through different geological strata in the Gulf of Kachchh. The seismic signals are basically generated by the high volume air-guns. NGRI would carry out magnetotelluric studies.

DGH recently released part of the project grant to the lead agency — NGRI, which was then handed over to NIO on 3 July 2006 to carry out part of their work.

Dr K.S. Krishna is the Project Leader in NIO and other members of the team include Drs. A.K. Chaubey, G.C. Bhattacharya and K. Srinivas.



US Patents granted to CFTRI

THE Central Food Technological Research Institute (CFTRI), Mysore, has been granted US patents for the development of synergistic pharmaceutical composition for diabetic nephropathy and High protein hydrolysate.

- **Synergistic pharmaceutical composition for diabetic nephropathy (US Patent No. 6884421)**

Diabetic nephropathy is one of the complications of diabetes mellitus involving basement membrane thickening as a result of reduction in heparan sulfate, laminin and increase in type-IV collagen. It is characterized by increased excretion of albumin in the urine as a result of glomerular basement membrane damage. Glomeruli become more porous to passage of macromolecules. During diabetic nephropathy the nephrons are damaged leading to increased filtration rate causing increased protein excretion in urine. The compositions that can modulate the damaged kidney membrane have a tremendous scope in preventing the progression of diabetic nephropathic state.

Diet plays a major role in management of diabetic complications. Dietary fibre in the diet has many beneficial effects including slowing the macromolecular digestion, slow release and absorption of glucose. The dietary fibres are fermented by microbes in the colon into short chain fatty acids and the role of butyric acid on various physiological functions is receiving greater attention recently.

CFTRI has developed and patented a synergistic pharmaceutical composition for diabetic nephropathy. The composition is useful for treating diabetic nephropathy by reducing the glomerular filtration rate and the urinary protein excretion.

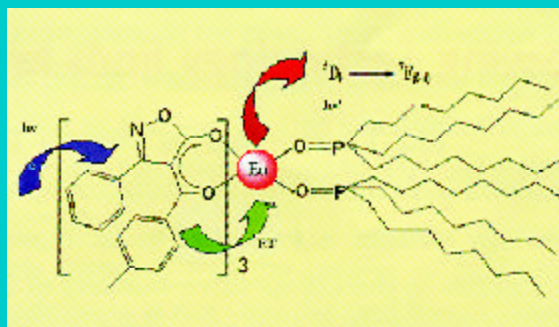
- **High protein hydrolysate (US Patent No. 6420133)**

Oilseeds, such as groundnut, sesame and soyabean contain large amount of high quality proteins. CFTRI has developed and patented a process for the preparation of high protein hydrolysate.

The product can be a good additive without imparting any undesirable off-flavour to the finished product. The process yields quality hydrolysates, which have solubility independent of pH, making these suitable additives in both acidic and alkaline pH.

Europium (III) -*b*-diketone- trioctylphosphine oxide complex as promising light conversion molecular device

DR M.L.P. Reddy and his group at the Regional Research Laboratory (RRL), Thiruvananthapuram, have developed a europium (III) mixed-ligand complex with heterocyclic β -diketone and tri-*n*-octylphosphine oxide as a promising light conversion molecular device. The new complex, tris-(3-phenyl-4-(4-toluoyl)-5-isoxazolone)tri-*n*-octylphosphine oxide) europium (III) shows a remarkable luminescence quantum efficiency at room temperature (75%) upon ligand excitation (294 nm) and a long 5D₀ lifetime (0.980 ms), which makes it a promising light conversion molecular device. This study has been published in the *European Journal of Inorg. Chem.*, 2005, 4129-4137.





More *HANSA* aircraft set to fly away



THREE new *HANSA* aircraft are ready to fly away from the hanger of National Aerospace Laboratories (NAL), Bangalore. These aircraft: VT-HNY, VT-HNZ and VT-HOC are the seventh, eighth

and ninth of the *HANSA* series production (the first *HANSA* of the series was VT-HNS; there after it was VT-HNT, VT-HNU .. etc.).

VT-HNY is headed towards Government Flying Training School

(GFTS), Bangalore's flying club at Jakkur, while VT-HNZ will fly away to the Andhra Pradesh Aviation Academy (APAA) at Hyderabad. VT-HOC is tipped to go to Madras Flying Club (MFC), Chennai, as soon as some procedural formalities are completed.

All *HANSA* series production aircraft are officially ordered, and paid for, by DGCA. DGCA, in turn, offers it to an Indian flying club.

At a brief function held at NAL on 30 June 2006, Mr G Rajashekar, Deputy Director (R&D), DGCA, formally handed over the VT-HNY *HANSA* aircraft (actually, only the manual and the keys) to Shri K C Rama Murthy, IPS, Commissioner for Youth Services and Director Incharge of GFTS, and VT-HNZ to Capt Vivek Agarwal, representing APAA.



Pilots from different Indian flying clubs who attended a three-day *HANSA* familiarization programme of NAL recently



Handing over of the HANSA aircraft
(actually, only the manual and the keys) by NAL

This function was preceded by a brief familiarization programme where the future flying instructors at various flying clubs were introduced to the *HANSA* aircraft's features and capability by Wg Cdr P Ashoka (Retd), the ace IAF test pilot who has been associated with the *HANSA* programme since its inception almost 20 years ago, and Capt Yogendra Urs, NAL's *HANSA* pilot.

Welcoming the gathering Dr K Yegna Narayan, Head, C-CADD, expressed his joy that the *HANSA* aircraft were ready to fly away ("an aircraft's rightful place is in the skies") and promised the flying club officials that "NAL will always stand behind its aircraft".

Dr A R Upadhyya, Director, NAL spoke of how every *HANSA* delivery (*HANSA* aircraft have now logged in over 2500 flying hours) is a matter of pride and satisfaction for NAL and its designers and specifically requested the pilots to convey all feedback ("especially bad feedback") about the aircraft's performance.

Wg Cdr Ashoka, who surely knows *HANSA* better than anyone else, advised the future *HANSA* pilots to meticulously follow all the flying rules: "these rules are sacrosanct; it's a pilot's religious duty to follow them". He also told them that it might take 6-10 flights to get completely used to the *HANSA*: "after that, there'll be a lot of happy flying and happy landings ... you'll really like this little plane!".

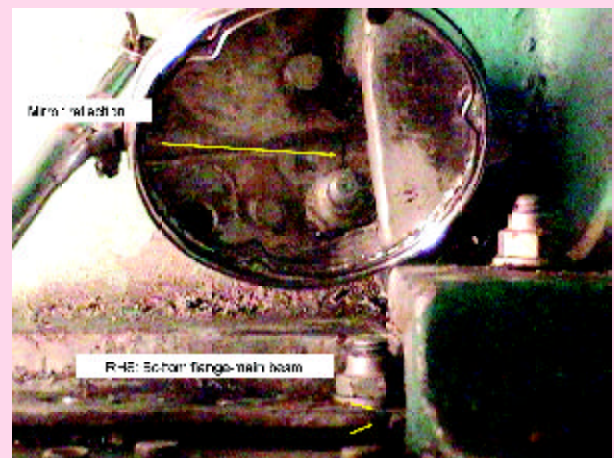
TTLE programme of MiG-21bis completed

THE full scale fatigue testing (FSFT) on the MiG-21bis airframe C-2090 has been successfully completed at National Aerospace Laboratories (NAL), Bangalore. With this, a major Indian Air Force (IAF) project on the total technical life enhancement (TTLE) of the MiG-21bis fleet came to an end. A life enhancement of 1000 flying hours for the fleet has been given based on NAL's FSFT results.



A close up of the crack initiation site

During the testing, the port wing suffered a structural fatigue failure of the main beam; the fatigue crack got initiated at the first bolt hole on the main beam bottom flange.



A fatigue crack also initiated from the same bolt hole on the starboard side



Workshop on Aggregates' Flakiness and Elongation Indices

THE Central Road Research Institute (CRRI), New Delhi, organized a workshop on 'Aggregates' Flakiness and Elongation Indices' on 13 June 2006.

At the outset, Dr P.K. Nanda, Director, CRRI, in his welcome address, emphasized the need of material conservation to maintain environmental equilibrium and save precious natural resources.

Prof. V.S. Raju, Chairman, CRRI Research Council, was the Chief Guest, who in his opening remarks deliberated on the Indian specifications and emphasized the need to closely study the various parameters of different specifications, which are easily achievable without compromising on the quality of construction. Dr B.P. Chandra Shekhar, Director, National Rural Road Development Agency (NRRDA) and Guest of Honour, sharing his experiences pointed out that the shape and size of the aggregates change drastically during compaction. Minimization of the voids should be tried and more emphasis should be given on the use of locally available materials.

A number of technical presentations were made during the two technical sessions on:

- I. Flakiness Index & Elongation Index of Aggregates – National and International Practices:
- II. Experiences on Crushers and Other Equipments:

The technical session-I was chaired by Dr S.K. Rao (M/s Lee Associates) and co-chaired by Dr S.A. Reddy (M/s Gammon India Ltd.) and Shri R.K. Jain (Retd. CE



Dr P. K. Nanda, Director, CRRI delivering the welcome address during the workshop. Seated (from left) are: Prof. V. S. Raju, former Director IIT, Delhi and RC Chairman, CRRI; Dr B. P. Chandrasekhar, Director, National Rural Road Development Agency (NRRDA) and Shri Satander Kumar, Scientist, CRRI

of Haryana PWD). The technical session-II was chaired by Shri D.P. Gupta (ex-DGRD, MOSRTH) and co-chaired by Shri B.P. Kukreti (CGM, NHAI) and Shri V.K. Mehrotra (CE, MCD). Eminent experts delivered eight presentations in the technical session-I and five presentations in the technical session-II, demonstrating the results of their R&D work.

The panel discussion on the occasion was chaired by Shri R.S. Sharma (Secretary General, IRC), and had Dr P.K. Nanda (Director, CRRI), Shri K.B. Chander Shekhar Reddy (Director, TITI, NAC, Hyderabad), Shri S.C. Sharma (ex-DGRD, MOSRTH), Shri B.P. Kukrety (CGM, NHAI), Shri P.K.

Jain (retired Chief Engineer, Haryana PWD) and Shri V. Velayuthan (ADG, MOSRTH) as the panelists. Summing up the panel discussion, Shri R.S. Sharma, emphasized that the value of indices should be based on road type/category. He opined that changes in crusher technology from jaw crusher to impact/ VSI crushers were not feasible/ economically because these may lead to high material cost/wastage of stone aggregates. The method of determination of indices should be reviewed. He informed that MOSRTH Specifications 2001 are under revision and outcome of this workshop will go in a long way to incorporate the necessary changes needed in the specifications. After



the views of panelists, the floor was thrown open for general discussions. The workshop ended with vote of thanks by Shri Satander Kumar, Organising Secretary and Scientist, CRRI.

The major recommendations that emerged from the workshop are:

1. Enough data are available from laboratory study, which show that with the variation in combined indices values from 30 to 50%, there is considerable variation in the mix properties. Observed variation in mix properties is within the permissible range for combined indices values up to 35%;
2. Detailed R&D is required to assess the effects of combined indices values beyond 35% in actual field conditions;
3. There is a need for optimization of crushing technology, i.e. selection of type of crushers, depending upon the geology of rocks to be crushed;
4. There is urgent need to change the combined indices values. The combined indices values should be based on type of layer/type of road/traffic volume etc. in order to avoid wastage of precious stone matter; and
5. Use of present flaky and elongation indices gauge should be discontinued. Gauge system working on the principle of maximum to minimum size, say 2:1 or 5:1, may be used in the Indian context. Use of Digital Image processing techniques should be explored in detail.

CIMAP celebrates Annual Day



Dr S.P.S. Khanuja, Director, CIMAP, welcoming the guests and audience

THE Annual Day function of Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, depicted close linkage between science industry and society as it was attended by farmers, entrepreneurs, invited guests and scientists and employees of CIMAP.

Dr S.P.S. Khanuja, Director, CIMAP, welcomed the Chief Guest Dr S.S. Handa, ex-Director of RRL-Jammu, and other dignitaries. Highlighting the various R&D accomplishments during the current fiscal year (2005-06), Dr Khanuja tagged CIMAP as 'Bold and Determined' for challenges in 'Science for Society'. He told that CIMAP during the year had developed and released four new medicinal plant varieties for agrobusiness. These include the first genetically uniform high yielding tolerant

variety of Safed Musali (CIM-Oj), a high leaf and sap yielding variety of *Aloe vera* for rainfed condition (CIM-Sheetal), improved variety of pachouli with faster regeneration capability (CIM-Samarth) and a genetically improved uniform variety of Sarpagandha with high alkaloid and biomass yield and which is equally compatible to shade and open plantation (CIM-Sheel). Besides, several products for mosquito repellence and health care and improved distillation unit CIM-Asvika and twin wheel hoe for weed control, CIM Krishak Sathi, were developed and made available to users and entrepreneurs.

The biovillage mission programme on antimalarial drug plant *Artemisia annua* Dr Khanuja informed, had been very successful in U.P. and Uttaranchal. Currently it involved two pharma



Annual Day Celebrations

companies and more than 1000 farmers. It is envisaged that area under *A. annua* would increase to about 20,000 hectares within next couple of years.

Dr Khanuja further said that on business development front, CIMAP had signed unprecedented ten technology licensing agreements in a single year with companies across the country, in areas of antimalarial drug

plant *A. annua*, herbal based products and formulations developed at CIMAP.

On this occasion, CIMAP signed three agreements with Gujarat State Fertilizers and Chemicals (GSFC) Ltd, Vadodara, for transfer of technology packages of *Artemisia annua*, silybum and geranium. GSFC was represented by Shri A.K. Kumar, Executive Director.

Dr S. S. Handa, delivered the Annual Day Lecture on 'MAPs' — A Rich Repository of Challenges and Opportunities for Scientific and Economic Growth'. Dr Handa in his address emphasized that the economic value and future potential of the biological resources of a country are getting redefined in the wake of the newly emerging international trade regulations. From a system, where these resources were viewed as global heritages, they are now being treated as invaluable reserves for



Dr S.S. Handa, former Director of RRL-Jammu, delivering the Annual Day Lecture

the future of the country with an untapped economic potential. Unlike that for physical resources, we do not have yet a system of defining 'biological resource holdings' of a country and consequently there is a greater change of these resources leaking out to other countries even before their potentiality is realized by the host country. Thus there is an urgent need for developing inventory systems (qualitative and quantitative) that would help define the biological resources of a country, and would be useful in conservation, commercialization and in establishing the patent rights. The Government of India has taken timely initiatives in establishing National Bioresource Development Board (NBDB) which is taking requisite measures to take care of our bioresources and CIMAP has been playing a very active role with respect to MAPs by not only maintaining gene banks but making

appropriate selection of rich strains for commercial exploitation.

Dr Handa further said that medicinal plants are the richest resource of our traditional medicines, phytopharmaceuticals, modern allopathic drugs, household remedies and nutraceuticals. The use of phytopharmaceuticals is increasing at the rate of 15% annually. Global market is booming for MAPs and their

products. But, still our share in the world market is not significant. Therefore, we need to look seriously on various issues, problems and technologies. The issues which need to be addressed include regulatory especially registration of herbal products, non-existent nutraceutical regulations, unregulated medicinal plant extract industry, safety aspects etc. We need to strengthen agro, post harvest, grinding, extraction of plants, isolation of phytoconstituents, formulation technologies. Extensive use of qualitative and quantitative techniques for quality assurance is also essential, Dr Handa added.

On this occasion, Dr Handa also honoured the CIMAP employees for their outstanding contribution in various fields. The winners of previously held sports meet were also awarded. The 'Manav' herbal garden at CIMAP was kept open for the public from 5 to 7 pm and was visited by the people from all walks of life.



Multilateral Environmental Agreements (MEAs) and their contribution to meet Millennium Development Goals

Lecture by Shri Rajendra Shende

SHRI Rajendra Shende, Head, DTIE Energy and Ozone Action Branch, UNEP, Division of Technology, Industry and Economics Paris, France, delivered a lecture on 'Multilateral Environmental Agreements (MEAs) and their contribution to meet Millennium Development Goals (MDGs)' at the National Environmental Engineering Research Institute (NEERI), Nagpur.

With wide experience in the development of clean and alternative technologies and environmental policies, Shri Shende is an expert on international 'policy and technology, and is involved in developing inter-linkages between MEAs and MDG's particularly in the field of ozone layer protection and climate change.

In his lecture, Shri Shende described the significance of MEAs and MDGs and their likely impact on the economy and elaborated the Millennium Development Goal No. 7, which is related to environment. He said that by interlinking MEAs and MDGs, the world is slowly rectifying the damage caused by the industrial revolution to the environment. The MEAs and MDGs have led to a shift from a technology-fostering trend to a technology forcing one, it means



Shri R. Shende, Head, DTIE Energy and Ozone Action Branch, UNEP, Division of Technology, Industry and Economics Paris, (France), delivering the lecture on MEAs and MDGs

that the MEAs and MDGs have forced the users to exclusively use the environment-friendly technologies, Shri Shende said.

Shri Shende dwelt upon the Montreal and Kyoto Protocols and explained how over 400 MEAs under the UNEP have been instrumental in providing a better environment worldwide. He cited the examples of refrigeration and foam industries and informed how the Montreal Protocol has explicated the use of hydrofluorocarbons (HFCs) and hydrocarbons in various countries because these are more energy efficient and cost-effective compared to chlorofluorocarbons (CFCs). The Montreal Protocol, Shri Shende said, has led to more public-private partnerships in

combating illegal trade, generation of natural refrigerants and solar chillers.

Dwelling on the MDGs, Shri Shende said that majority of the people in India, including the planners, are unaware of these goals even though the country is expected to meet these goals by 2015. He stressed on the need for a nation-wide awareness campaign at all levels on MDGs with everybody's participation at this juncture to achieve MDGs. He informed that eradication of poverty and hunger, primary

education for all, promotion of gender equity, empowerment of women, reduction in child mortality rate, improvement in overall health and combating diseases like AIDS and cancer through technological development are among some of the MDGs. To make the MEAs and MDGs more effective, planners, prosecutors, judges and government officials should fully understand the MEAs and MDGs, he opined.

Earlier, Dr Sukumar Devotta, Director, NEERI, in his welcome address, briefed about the Millennium Development Goals and how NEERI can strive to achieve these goals in the coming years. Dr N.K. Labhshetwar, Scientist, NEERI, compered the programme and proposed the vote of thanks.



NML participates in Hannover Messe 2006

THE National Metallurgical Laboratory (NML), Jamshedpur, showcased its programmes and accomplishments at the Indian pavillion at the Hannover Messe 2006, Germany, under the umbrella of Department of Scientific and Industrial Research through the Engineering Export Promotion Councils, Government of India. NML's expertise in the R&D areas like mineral research, alternative routes for metal extraction, combating corrosion, futuristic materials, structural characterization, life assessment of engineering components, certified reference materials, international collaborations and services were showcased through posters, multimedia presentation and a film on NML.

Representatives from a number of foreign industrial firms and academic institutions visited the NML stall. About 80 foreign firms expressed interest and registered their needs for collaboration with NML in different R&D areas. About 120 Indian based multinational companies also came forward expressing their needs and interest.

The booming Indian economy is becoming increasingly attractive to German businesses. India participated with great enthusiasm as the Partner Country in the Hannover Messe, with over 330 companies showcasing the vast



Dr N.G. Goswami, Scientist, NML, interacting with one of the visitors to Hannover Messe 2006

potential for partnerships for trade, investment and technology development for mutual benefit, at this world's largest technology exhibition.

There has been a significant transformation in the Indian economy since India participated as the Partner Country during the last time in the Hannover Messe, 22 years ago. Today, India is among the most attractive destinations globally for doing business. Ongoing and wide-ranging reforms have enabled high and sustained economic growth rates. The successful globalization of India's economy is also indicated by the fact that several Indian companies have expanded their global presence in various sectors worldwide, including Germany.

Federal Chancellor of the Federal Republic of Germany, Dr Angela Merkel, in her opening

address remarked, "There is a strong strategic partnership between India and Germany and there is a need to enhance this co-operation. Both the governments are working on a common agenda of energy security and supply and science and technology. India offers enormous growth potential which the German companies must take advantage of."

Indian Prime Minister Dr Manmohan Singh, while making his inaugural address mentioned, "Today, corporations from all over the world are establishing themselves in India. There is

immense scope for Indo-German co-operation based on the triad of infrastructure development, manufacturing and high technology. The Indian pavillion at the Hannover Messe is a good representative sample of Indian skills today. German companies are planning to expand their operations in India to make it their manufacturing hub for the region. This is a smart strategic planning." "Germany is one of India's most important business partners. Our bilateral trade has grown rapidly, at over 20% in the last couple of years. Germany is among the major foreign investors in India. Indo-Germany joint venture companies have performed well and are among the market leaders in a large number of product groups in India" Dr Manmohan Singh added.



Ms Ranjita Harji receives French Fellowship

Ms Ranjita R. Harji, research fellow at the National Institute of Oceanography (NIO), Goa, has received the French embassy fellowship for the year 2006-07. The Science and Technology Service of the Embassy of France in India offers these fellowships for the students involved in the doctoral studies. Ms Ranjita will be working with Dr Jean-Francois Rontani, a Senior Researcher at the Laboratoire de Microbiologie, de Geochimie et d'Ecologie Marine - LMGEM UMR, Marseille, France. Her topic of research will be 'Microbial degradation of alkenones: Implications for paleo temperature reconstruction'.

Presently Ms Ranjita is working for her Ph. D. thesis 'Lipid biomarkers in marine environment' with Dr N. B. Bhosle. Lipid biomarkers are extensively used in identifying sources of organic matter, community structure, pollution aspect, paleo-oceanographic studies, etc. They are considered to be more resistant to degradation processes and hence remain unaltered in the sediments for a long time.

Dr Dileep Kumar gets B.M. Das Memorial Science Award

DR Dileep Kumar B S, Scientist, Biotechnology Division, Regional Research Laboratory, Jorhat, has been awarded the Dr Biraj Mohan Das Memorial Award (Life Sciences) of the Assam Science Society for his significant contribution to the area of Biological Science in general and Soil Microbiology in particular. Dr Dileep Kumar's work pertains to Plant Growth Promoting Rhizobacteria (PGPR) mediated development of induced systemic resistance, PGPR-Rhizobium interaction, isolation, identification and structure elucidation of bioactive metabolites produced by beneficial rhizobacteria, with special reference to siderophores and antibiotics, their exploitation in disease management and productivity improvement in several economically important cash crops.



Instituted in the memory of Late Dr Biraj Mohan Das, a noted mathematician and computer scientist, this award is given to a young scientist once in two years.

Dr V. Balaram gets Mass Spectroscopist Award

DR V. Balaram, Scientist, National Geophysical Research Institute (NGRI), Hyderabad, has been awarded the 'Eminent Mass Spectroscopist Award-2006' by the Indian Society for Mass Spectrometry (ISMAS) for his outstanding contributions in the area, in particular his inductively



Dr V. Balaram receiving the Eminent Mass Spectroscopist Award and the Gold Medal from Prof. William Compston of the Australian National University during 10th ISMAS Triennial International Symposium on Mass Spectrometry at Munnar, Kerala

coupled plasma mass spectrometry (ICP-MS) studies in the field of geochemistry, mineral exploration and environmental sciences are noteworthy.

Dr Balaram has carried out extensive work on various aspects related to trace element geochemistry, analytical geochemistry, gold, platinum group



Honours & Awards

elements (PGE) and basemetal exploration studies in a few Precambrian terrains of India and Madagascar, using ICP-MS.

Dr Balaram was awarded the prestigious National Mineral Award-2000 by the Ministry of Coal and Mines, Government of India for his significant contributions in the field of mineral exploration. He is also a recipient of several academic merit awards, such as Best Paper Award, Best Presentation Awards, etc. from prestigious scientific organizations/professional bodies such as UGC, CSIR, ISAS, ISAG and ISMAS.

Ms Swarnalee Dutta gets Prof. M. J. Narasimhan Merit Academy Award

MS Swarnalee Dutta, Project Fellow, Biotechnology Division, Regional Research Laboratory, Jorhat, has won the Prof M J Narasimhan Merit Academy Award for the year 2005. Instituted by the Indian Phytopathological Society, New Delhi, the award is given to young researchers below the age of 35 years for their outstanding contribution to the area of phytopathology.

Dr A. R. Upadhyaya's distinctions



DR A. R. Upadhyaya, Director, National Aerospace Laboratories (NAL), Bangalore, recently received the Distinguished Alumnus Award 2006 from Indian Institute of Technology, Kharagpur. Dr Upadhyaya has also been nominated as a member of the Defence R&D Board and as a member of the Engineering Council of India.

Dr S. W. A. Naqvi appointed Adjunct Scientist in WHOI

DR S. W. A. Naqvi, Scientist, National Institute of Oceanography (NIO), Goa, has been appointed as an Adjunct Scientist in the Marine Chemistry and Geochemistry Department at the Woods Hole Oceanographic Institution (WHOI), USA, for a period of four years from 1 March 2006. This honorary position is offered to a collaborating researcher who is making or can make a sustained contribution to the success of a research project or programme at WHOI. He/She not only contributes to the research programmes but also entitled to submit project proposals to the National Science Foundation (NSF) for grants. Dr Naqvi would shortly be submitting a proposal on 'Carbon Cycling in the Indian Ocean' along with other experts in the US to NSF. This appointment is therefore likely to lead to greater collaboration between NIO and WHOI.



Dr Naqvi, during his career at NIO, has published over 80 research papers and won number of honours and awards.

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