

Farewell to Dr. C.L. Acharya



Dr. C.L. Acharya, outgoing Director, IISS being presented a memento by Dr. D.L.N. Rao, Director (Officiating), IISS, Bhopal

Dr. C.L. Acharya after completing a distinguished tenure as Director on 14th May, 2003, joined back his parent department HPKV, Palampur. Dr. Acharya's tenure witnessed significant growth of the Institute in terms of infrastructural development, externally funded projects, out-reach researches, awards and recognitions to the scientists. Dr. D.L.N. Rao, Project Coordinator (BNF) took the acting charge of Director, IISS on 14th May, 2003 (AN). Dr. C.L. Acharya was accorded a warm farewell by the Institute staff who recounted the valuable contributions made by him and gave best wishes to him and his family.

Sixth Agricultural Science Congress of NAAS

The 6th Agricultural Science Congress of the National Academy of Agricultural Sciences was organized at Bhopal during 13-15 February 2003 by the Indian Institute of Soil Science, Bhopal in collaboration with Jawaharlal Nehru Krishi Viswavidyalaya, Jabalpur and the Government of Madhya Pradesh on the theme 'Multi-enterprise Systems for Viable Agriculture'. The venue of the Congress was CIAE and IISS. The Congress was inaugurated by Shri Digvijay Singh, Hon'ble Chief Minister, Govt. of Madhya Pradesh and presided over by Prof.V.L.Chopra, President of the National Academy of Agricultural Sciences. Shri Mahendra Singh, Hon'ble Minister of Agriculture, Govt. of MP, Dr. Mangala Rai, Secretary, DARE



Inaugural session of 6th Agricultural Science Congress of NAAS

and Director General of the ICAR, Dr. R.S.Paroda, Former Secretary DARE and DG, ICAR, Dr. Panjab Singh, Former Secretary DARE and DG ICAR, Dr. D.P. Singh, VC, JNKVV, Jabalpur and Shri A.V. Singh, Chief Secretary, Govt. of M.P. also graced the occasion. Dr. C.L. Acharya, the then Director, Indian Institute of Soil Science, Bhopal was the Convenor, Dr. R.K. Gupta, Director, Research Services, JNKVV was the co-convenor and Dr. D.L.N. Rao, Director (Officiating), IISS was the organising secretary of the congress.

The Congress covered all aspects of production, processing and marketing of field and horticultural crops, animals, fisheries, etc. Six technical sessions dealing with natural resource management, biotechnological interventions, food processing and value addition, multi-enterprise system

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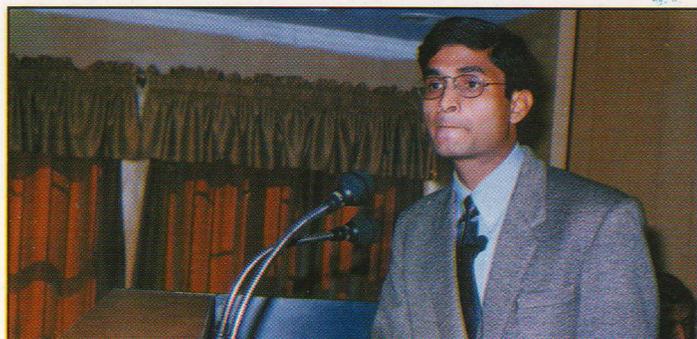
for major agro-ecoregions, socio-economic issues and organic farming were organised during the congress. An exhibition



Students visit IISS stall in Agri-Exhibition during 6th Agricultural Science Congress

depicting major developments in the fields of agriculture, horticulture, animal husbandry, fisheries, poultry and farm implements was also put up during the Congress.

Three categories of Academy Awards, namely, the Memorial Awards, Recognition Awards and the Young Scientists' Awards were presented by the Chief Guest at the inaugural function for outstanding contributions in various branches of agricultural sciences. An All India Inter-zonal Elocution Competition was organized on the theme of the Congress and the three top performers were awarded prizes. About 500 delegates across the country participated in the deliberations and presented their research works through posters. Three best posters were also awarded prizes.



Mr. Aditya Pratap, student of HPKVV, Palampur won first prize in All India Inter-zonal Elocution Competition held at IISS, Bhopal during the congress



Dr. T.R. Rupa, IISS Scientist receiving young Scientist Award of the NAAS for 2001-2002 from Sh. Digvijay Singh, Hon'ble Chief Minister, M.P.

Research Highlights

Biodiversity of soybean rhizobia in Madhya Pradesh

In a collaborative effort between IARI and Jabalpur centers of the AICRP on BNF, studies on diversity of soybean rhizobia were initiated in Madhya Pradesh. Eleven districts were surveyed in Phase -1 during *Kharif* 2002 (Jabalpur, Narsinghpur, Sagar, Damoh, Katni, Satna, Rewa, and Sidhi, Seoni, Chhindwara, Betul) and 200 isolations were made, and 16s rDNA diversity was studied in 160 isolates. Gene amplifications were done using PCR and amplified products were run on agarose gel electrophoresis. All the isolates gave a single amplified product of about 1500 base pairs.

Efficient use of limited available water for wheat through sprinkler system

In a 2-year field trial, dry sowing of wheat followed by 8 cm irrigation through micro-sprinkler significantly improved crop stand, yield and water use efficiency of wheat over 8 cm pre-sowing irrigation through flooding.

Subsoiling during kharif benefits rabi linseed

Subsoiling during *kharif* season to a depth 35 ± 5 cm at 50 cm interval followed by conventional tillage significantly improved yield and water use efficiency of *rabi* linseed over conventional tillage.

Reduced tillage with land and residue management improves cotton yield

Reduced tillage with broad bed and furrows and location specific recommended dose of fertilizers with green manuring gave highest seed cotton yield and monetary benefits to farmers besides improving soil health.

Fertiliser responses

Long-term fertilizer experiments at Ludhiana showed a marked response to the application of N, P and K for maize, wheat and cowpea (fodder). However, no enhanced response to higher levels of N, P and K application (150% NPK) was obtained over application of 100% NPK. The use of FYM along with NPK significantly lowered the $\text{NO}_3\text{-N}$ accumulation in the soil profile and led to its better utilization by the crops. There was a considerable build up of available P with all rates of P application. Most of the applied P was fixed in Ca and in Fe fractions.

Soybean leaf litter helps in mobilizing P from low-grade rockphosphates

The natural phenomenon of leaf fall in soybean adds considerable amount of easily decomposable organic matter on the soil surface. This decomposing organic matter was found effective in solubilizing otherwise insoluble P to the extent of 20% of total P in Jhabua rockphosphate and 11.4% in Hirapur rockphosphate within a period of 2 months. Amending rockphosphates with pyrite (1:2 P to S ratio) further enhanced P solubilization to 26.5% and 16.5% in Jhabua and Hirapur rockphosphates, respectively. The soybean leaf litter thus plays an important role in promoting efficacy of direct applied low-grade rock phosphates.

Efficient soil test method for zinc availability and its critical values in cotton growing soils and plants

Among the seven extraction techniques used for estimating available Zn in cotton growing soils and plants, DTPA and AB-DTPA methods were found most efficient. The critical levels of available Zn in soils ranged from 0.72 to 0.82 mg kg⁻¹ in DTPA and from 0.71 to 0.90 mg kg⁻¹ in AB-DTPA extractants. The critical level of Zn in 60 days old cotton plants was 24 to 28 ppm.

Soil and Foliar application of Micronutrients

Testing of five grades of four micronutrients mixtures in four ecological zones of Gujarat showed marked response to foliar sprays in vegetables (12-13 q ha⁻¹). Soil application showed response of only 5-6 q ha⁻¹. However, in oilseeds foliar sprays produced no benefit; soil application gave response of 1.6 to 1.7 q ha⁻¹; whereas cereals responded positively to both foliar and soil formulations (4.1- 6.3 q ha⁻¹). Other crops like forages, pulses, and fruits showed variable response. In general soil application had an edge over supplementation of micronutrients through foliar application.

Economics of Compost Production

The cost of vermicompost production, where farm produced worms are used for successive vermicompost production, is at par with that of other composts viz. conventional compost, phosphocompost and nitro-phospho-sulfo compost.

Biosorption of heavy metals by *Aspergillus* species

A species of *Aspergillus* which grows well at high concentration of heavy metals like lead, cadmium etc. was isolated from a sewage-polluted site in Bhopal. The fungal mycelium removed roughly 95% of the lead from the medium having 2000 mg/litre lead concentration within 3 days of growth through adsorption. The fungus was also capable of adsorbing cadmium, zinc and copper on its cell wall.

Sewage water- a potential source of nutrients

Continuous use of raw sewage water as irrigation for a long period in the sewage irrigated area of Bhopal city resulted in a significant increase in total N (88%), total P (376%) and total K (9.2%), water soluble chloride, nitrate and phosphate as well as soil dehydrogenase activity (193%) as compared to irrigation with ground water in Vertisols. Application of raw sewage water also significantly increased grain and straw yield of wheat compared to irrigation with ground water.

Group Discussion meetings

ICAR-ACIAR Manure Management Workshop

The ICAR-ACIAR workshop was organised at IISS Bhopal on "Farmyard manure: Life cycle analysis and management" during February 18-20, 2003 to summarize the R&D status and spot research gaps associated with FYM use for maximizing the plant nutrients and biophysical benefits and minimizing the environmental pollution at each stage of FYM production in India. Further research programmes based on the outputs of the current ACIAR research project were also discussed. Apart from project scientists from India and

Australia, Dr Tony Fischer, Research Program Manager, ACIAR and invited speakers viz, Drs R.K. Gupta, R.P.S. Baghel, R.P. Rajput, JNKVV, Jabalpur; A. Subba Rao, Muneshwar Singh, T.K. Ganguly, M.C. Manna, T.R. Rupa, M. Mohanty, IISS, Bhopal and Dr. A.B. Pandey, BAIF participated in the workshop.

NATP workshop

NATP workshop was organized at IISS Bhopal for the project "Development and validation of simulation model to predict the long-term consequences of different tillage and residue management strategies" (NATP, PSR 31) during March 28-29, 2003.

NATP Annual Review Workshop on "Impact of tillage, land treatment and organic residue management on soil health, drainage and productivity of rain fed cotton based systems" was organised at IISS, Bhopal on 9-10th April, 2003.

Staff Research Council

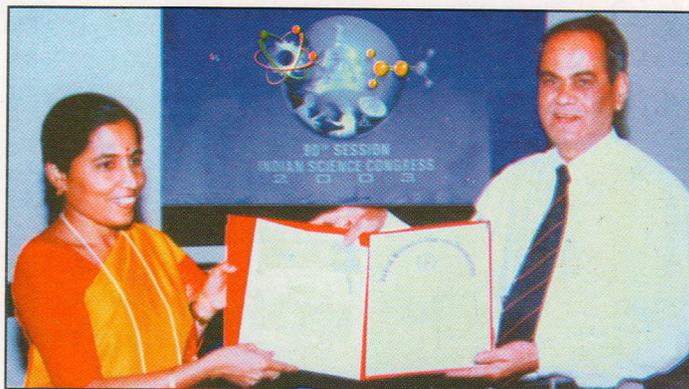
The SRC meetings were held on 20-21 and 25-27 March, 2003 to review the progress of 38 research projects. Another SRC meeting was also held on 10th June, 2003 to review the new projects for *kharif* 2003.

Institute Management Committee

The IMC meeting was held on 9th May, 2003.

Awards and Honours

- Dr D.L.N. Rao was nominated as the Vice-President, of the Indian Society of Agricultural Resource Management, Coimbatore for the year 2003-04.
- Dr. D.L.N. Rao was re-nominated to the editorial board of the Journal of the Indian Society of Soil Science for the years 2003-04.
- Dr. T.R. Rupa, Scientist (SS) was awarded with "Young Scientist Award of the National Academy of Agricultural Sciences (NAAS), New Delhi" for the biennium 2001-2002 in recognition of the outstanding contributions to soil, water and environmental sciences
- Dr. T.R. Rupa, Scientist (SS) was awarded with "Pran Vohra Award of the Indian Science Congress Association (ISCA), Calcutta" for the year 2002-2003 in recognition of outstanding contributions in Agricultural Sciences.



In the best posters competition of the 6th Agricultural Science Congress, AICRP (BNF) team led by Dr. D.L.N. Rao won the

first prize and Dr. T.R. Rupa won the second prize in the INM session. Drs. A.K. Biswas, J.K. Saha, Mohan Singh and B. Maji won the second prize in the Soil pollution and remediation session.

Visits abroad

Dr. K. Sammi Reddy, Sr. Scientist participated as reviewer in review workshop of ACIAR project LWR2/1999/03 entitled "Integrated Nutrient Management in Tropical Cropping Systems: Improved Capabilities in Modeling and Recommendations" at TSBF, Nairobi, Kenya, 19-24 January 2003.

Sports

The Institute won ICAR Championship in Badminton and stood second in 400 m race (men) and third in cycling in ICAR Inter-zonal sports meet held at Central Inland Fisheries Research Institute, Barrackpore during 28th April-1st May, 2003.

Staff News

- Dr. Sanjay Srivastava Scientist (SS) joined the institute as Senior Scientist on 10.3.2003.
- Dr. T.K.Ganguly (PS), joined as Head of Division of Soil Biology on 13.3.2003.
- Smt. K. Alivelu, Scientist left the Institute on 20.01.2003 on transfer to DOR, Hyderabad.
- Sh. A.K. Singh, Administrative Officer left on transfer to NDRI, Karnal on 05.04.2003.
- Sh. Kadar Nawaz Khan joined as Administrative Officer on 24.04.2003 on transfer from CPCRI, Kasargod.

Events

A training was given on Soil texture determination to the students of M.P. Academy of Administration, Bhopal on 10th April, 2003.

A 2-day orientation course on Soil testing was organized during 20-21 May, 2003 for graduates under agribusiness program sponsored by MP Academy of Administration, Bhopal.

Republic Day

All the staff members and their families celebrated Republic Day (26.1.2003) with great enthusiasm.

Farmers' Meet

Under ICAR-ACIAR project a Farmers' Meet was organized at Rangai village of Vidisha district on 19 February 2003 to discuss about constraints of FYM use for crop production. Project scientists from India and Australia interacted with farmers about FYM management on their farm.



Quinquennial Review Team

The members of QRT of the Institute, Dr. N.N. Goswami (Chairman), Prof. N. Panda, Dr. K.V.B.R. Tilak, Prof. S.K.Gupta, Dr. S.N. Saha, Dr. G.S. Hira, Dr. A. Subba Rao (Member secretary) visited Barrackpore and Kalyani (8-11 January, 2003), Bhubaneswar (11-13 January), Coimbatore (26-27 February), Bangalore (27February-1st March), Hyderabad (1-3 March) and Bhopal (5-9May). The team again visited IISS, Bhopal during 17-20 June 2003 and finalized the report for submission to the Indian Council of Agricultural Research, New Delhi.

Distinguished visitors

A number of distinguished persona which included current and former DG's, VC's, DDG's, Directors of ICAR Institutes visited IISS during the 6th Agricultural Science Congress on 12th February, 2003.

Dr. P.D. Sharma, ADG (Soils) visited IISS on 10-11 June, 2003 to attend the SRC meeting.

Dr Dillip K. Arora, Director, National Bureau of Agriculturally Important Microorganisms, New Delhi visited IISS, Bhopal on 12th June, 2003 and interacted with the scientists of the Institute for possible collaborative projects between the two Institutes.

Scientists participation in Conference/ Seminar/Training/Group Discussion

- Dr. Ajay attended 2nd International Congress of Plant Physiology at New Delhi during 8-12, January, 2003.
- Dr. M.V.Singh delivered a key note address on 'Issues and Strategies of Micronutrients Research in New Millennium' at Workshop on Micronutrients among Interface researchers- extension agencies and industrialists, MCAST, Pune Jan.17-18, 2003.
- Dr D.L.N. Rao delivered an invited lecture on "Biofertilizers for Oilseeds production" at the National Seminar on "Stress management in Oilseeds for attaining self reliance in vegetable oils" at DOR, Hyderabad, 28-30 January 2003.
- Dr. T.R Rupa delivered the Dr. Pran Vohra award lecture on Enhancing Available Zinc Pools in Soils for Efficient Utilization by Plants in 90th Indian Science Congress, Bangalore during 3-7 January 2003

All the scientists of IISS participated and presented papers in the 6th Agricultural Science Congress of the National Academy of Agricultural Sciences, at the Indian Institute of Soil Science, Bhopal during 13-15 February 2003.

- Drs. M.C.Manna and R.S. Chaudhary attended annual review workshop of rain fed cotton production systems at CICR, Nagpur during 18-19 April 2003.
- Dr. A.B.Singh attended the review workshop on oil seeds, pulses and rainfed rice based PSR at CRIDA, Hyderabad during 23-25 April 2003.
- Drs. D.K. Painuli, K.M. Hati, K.K. Bandyopadhyay and R.K. Singh attended the National Symposium on Emerging trends in Agricultural Physics organised by Indian Society of Agricultural Physics at Indian Agricultural Research Institute, New Delhi during 22-24 April 2003.
- Drs M.C. Manna, K.K. Bandyopadhyay and T.R. Rupa attended the Review and Planning Meeting of the NATP (RNPS-25)

"Identifying Systems for Carbon Sequestration and Increased productivity in Semi Arid Tropical Environment" at ICRISAT, Patancheru, Hyderabad during 13-14 May 2003.

Drs. A. K. Misra and D. K. Painuli attended group discussion for the project: Development and validation of simulation

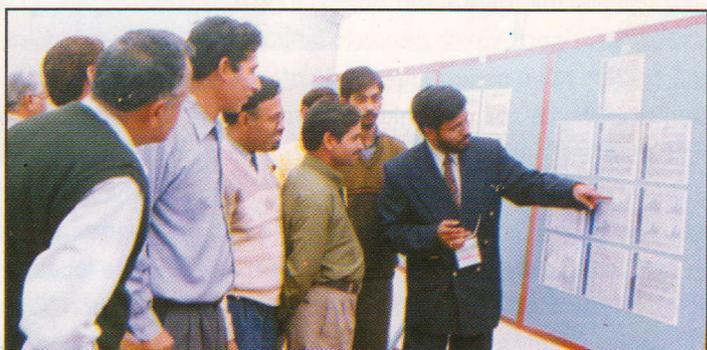
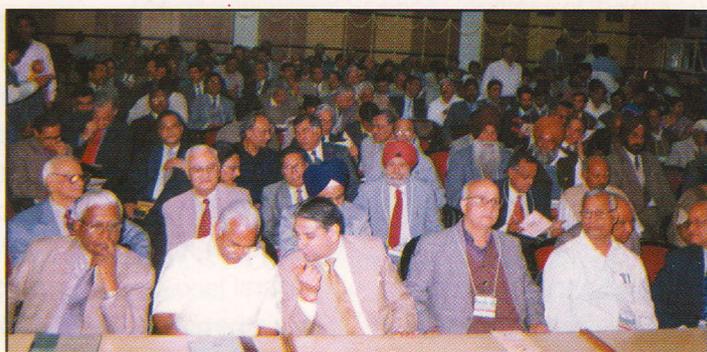
model to predict the long-term consequences of different tillage and residue management strategies at IIT, Kharagpur during 30-31 May 2003.

Dr A. Subba Rao attended the Southern Regional Workshop on Soil Testing at TNAU, Coimbatore during 30-31, May 2003

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES

6th Agricultural Science Congress, 13-15 February, 2003, Bhopal

Memorable Moments



From the Director's Desk...

Towards Ecological Agriculture and Soil Biotechnology

After three decades of successful green revolution using high yielding varieties of cereals responsive to increased inputs of chemical fertilizers and pesticides, farmers are now experiencing difficulty in maintaining high yields, even with increasing levels of inputs. Continuous cropping leads to decline in organic C levels by 50 –70% to equilibrium levels dictated by climate and precipitation. Second-generation problems associated with soil quality, sustainability and environmental degradation have firmly come to the fore and complaints on soil production potential getting slowly diminished are increasing. The effects of physical degradation of soils like erosion or chemical degradation due to salinity, acidity etc., are readily apparent. The effects of biological degradation caused due to the loss of soil organic carbon and specific microbial communities are more 'subtle' and hence more difficult to study. It would be useful to ascertain the proportion of India's net cultivated area that has become so degraded and hence unfit for agricultural land use. This is so crucial a priority that some visionaries have been talking for decades of concentrating agriculture on the good lands and taking several million hectares out of agriculture for forestry/agro-forestry land use.

Even good agricultural practices like residues incorporation and green manuring can at best arrest the further decline in soil C levels. Only incorporation of animal manure can result in building up organic carbon levels and improving the biological activity of soils. A new approach to agriculture-Ecological Agriculture, called the second paradigm has been proposed a decade ago: Rely more on biological processes by adapting germplasm to adverse soil conditions, enhancing soil biological activity, and optimizing nutrient cycling to minimize external inputs and maximize the efficiency of their use. Though belated, the country has now realized the absolute necessity of integrated plant nutrient management systems involving a sensible blend of chemical fertilizers along with composts, vermi-composts, green manures, biofertilizers, biopesticides, etc. which are now almost universally advocated along with recommendations on judicious use of irrigation water. While this has led to a greater focus on soil microflora and Soil Biology and Biochemistry in recent past, yet the continued neglect of studies on soil fauna is a serious concern, which needs to be addressed. Protozoa, nematodes, springtails, mites, ants, termites, beetles, earthworms and spiders have several functions of which nutrient cycling is only one. Sustainable agricultural practices promote floral and faunal activity in soil, biological control mechanisms and efficient cycling of nutrients. Crop husbandry practices that achieve high yield while maintaining the activity and diversity of soil flora and fauna with low inputs of fertilizers and pesticides are entirely possible. Organic farming practices, wherever relevant are being pursued seriously in several states. We now need requisite policy changes to promote the use of integrated plant nutrient supply systems.

A changed perception of soils from an exclusive focus, as a substrate for food production to its ecological and biodiversity potential has firmly emerged. With newer tools and techniques based on carbon source utilization, fatty acid profiles and 16s r DNA analysis, the incredible diversity of soil microorganisms is finally being unraveled. Less than 1% of the soil microorganisms have been isolated, identified, or named. The phenotypic and genotypic diversity in all the Protists groups is far more than the combined diversity of plant, animal or fungal kingdom. This will lead to the crucial ecological use of soils as a gene bank, for exploitation for industrial, pharmaceutical and other medical uses, with diverse applications of far more value than being realised at present. Due to the enormous reserves of genes in soil, the next 2 decades would see an explosion of such applications and make soil biotechnology an exciting field to pursue.

D.L.N. Rao