भाकृअनुप
ICAR

IISS Newsletter

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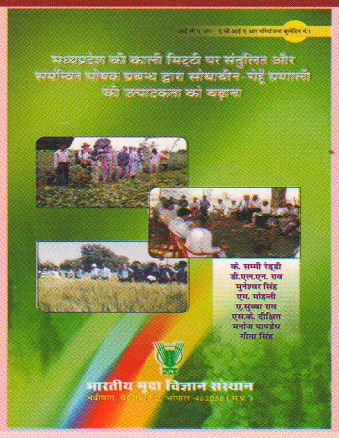
New Publications



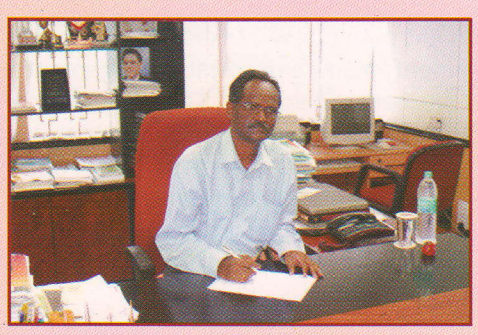
In This Issue

Forth Coming Events

- National seminar on standards and technology of value added / fortified / customized fertilizers as a source of plant nutrients will be held during 26th to 27th September 2007 at IISS, Bhopal.
- National workshop of AICRP STCR will be organized during 28th to 29th September, 2007 at IISS, Bhopal

From the Director's Desk...

Nutrient Management Plan



Efficient, balanced and integrated nutrient management is the key to sustainable food, feed and fibre production, nutritional quality and for maintenance of soil health. After achieving a record consumption level of 18.1 mt of NPK in 1999-2000, the NPK consumption is hovering around 16-18 mt during the last 3 years. At the present level of crop production, crops remove 27 mt of NPK against application of 16.8 mt, which leaves a gap of 10.2 mt. The projected food grain production removes about 31.7 mt of NPK in 2011 and 40 mt in 2025. The fertilizer consumption may increase to 21 mt by 2010 and around 26.7 mt by 2025. Therefore, the gap between NPK fertilizer consumption and nutrient removal by crops may increase to 11 mt of NPK by 2010 and 13.3 mt by the year 2025 which may be a potential threat to the soil quality and sustainable agriculture. To bridge the gap, the present contribution (year 2005) of organic inputs towards nutrient additions is around 7.0 million tonnes and it may increase to 9.25 million tonnes in 2025. Negative balance of 3-4 million tonnes of NPK may still persist over the period. So it is desired that all the available sources of nutrients including external sources are very efficiently planned and used in crop production.

A nutrient management plan is defined in the United States Department of Agriculture (USDA) Natural resources Conservation service (NRCS) Standard (590) as, "Managing the amount, source, placement, form and timing of the application of nutrients and soil amendments". The purpose of the 590 standard is to adequately meet the nutrient needs of the crop to be grown, while minimizing the loss of nutrients to surface and ground water. The purposes of a nutrient management plan are: adequate supply of nutrients for crop production, proper utilization of manure or organic by-products, minimization of agricultural non-point source pollution of surface and ground water resources, and maintenance or improvement of the physical, chemical and biological condition of soil. A nutrient management plan helps the farmers to manage cost-effectively the commercial fertilizer and animal manure inputs and improve the surface and ground water quality of farm and adjoining areas. A nutrient management plan should consider all possible sources of nutrients including, N contributions from legumes and crop rotations, animal manure and organic by-products, commercial fertilizer, soil nutrient availability, waste water, and irrigation water. The following components are normally included in a typical nutrient management plan:

- An aerial photograph or map, and a soil map of the field.
- A current and/or planned crop production sequence or crop rotation.
- Analytical results of soil, plant, water, manure or organic by-product sample analysis and recommended nutrient application rates.

- Realistic estimate of yield potentials for crops in the rotation.
- A quantification of all important nutrient sources.
- Recommended plant nutrient rates, timing, form and method of application.
- Location of sensitive areas like surface water bodies and the associated nutrient management restriction.
- Record keeping and complete field-by-field nutrient budget for N, P and K for the crop rotation.

Some agricultural practices have the potential to cause harm to environment which may affect both rural and urban areas. Best management Practices (BMPs) offer the most effective and practical means available to reduce or prevent soil and water pollution from agricultural operations. Nutrient management planning is the best management practice that aims to optimize crop yield and quality, minimize fertilizer input costs and protect soil and water quality. The principles of this include: applying fertilizer only to make up the difference between what is there in soil and what is required to be added to achieve the target yield, which also ensures cost-effectiveness for the producer, and ensuring that the added nutrient is available to the crop. When fertilizer efficiency is increased, the chances for unwanted movement of plant nutrients to surface and ground water are reduced.

Implementation of a comprehensive nutrient management plan (CNMP) takes care of the nutrient, sediment, or pathogen discharges with reference to manure nutrient management. Manure nutrient management plan has six components. Four are necessary and two depend upon the individual farmer's operation. They are: (1) Proper storage of manure and maintenance of the storage structure (2) Proper application of the manure to the land (3) Appropriate site management that looks at the risks on a particular field such as streams running through the field, shallow groundwater, and (4) Record keeping that documents land management practices. The two optional components are: (5) Feed management to improve feed efficiency so that nutrient content of manure is reduced and (6) Alternative uses for the manure for producers whose operations generate more manure than can be applied on their own land and need for selling to others.

The nutrient plans are especially important for the farmers who purchase more external inputs and those with large stock of animals and also for the poultry and piggery managers located in peri-urban areas who have surplus nutrients to dispose off in environmentally safe way. There is a need for formulating the guidelines for nutrient management plans under Indian conditions and training the extension personnel especially in the soil testing laboratories, Krishi Vigyana Kendras (KVKs) and transfer of technology cells or units with research institutes/agricultural universities to help the farmers in preparing nutrient management plans for their farms. In large contractual Farms or contractual farming areas, the nutrient management plans together with the BMPs help to save costs on commercial fertilizers, efficient use of available on-farm resources and safeguard the environment.

A. Subba Rao

Research Highlights

Follow-up trials and front-line demonstrations of STCR on farmers' fields

The All India Coordinated Research project for investigations on Soil Test Crop Response (AICRP on STCR) has generated several fertilizer prescription equations to compute fertilizer requirement of crops for obtaining target yields. These equations were tested in the follow-up and frontline demonstrations trials. In these trials, higher net returns and higher B/C ratios were obtained in STCR based treatments than General Recommended Dose (GRD) or farmers' practice. At Hyderabad, higher response and higher cost benefit ratios were observed in Tomato, Ragi, Chickpea, and Groundnut with fertilizer prescription doses. Similarly at PAU, Ludhiana results of follow-up trials on Rice and Wheat revealed that yield targets were achieved within a variation of less than 10%. The economic analysis revealed that the net profit was higher in STCR prescription than in GRD and farmers' practice. At New Delhi, similar observation has been made in case of Wheat and Pearl Millet. The verification trials conducted at Pantnagar, Rahuri and Raipur on Garlic, Onion, Wheat, Cauliflower, Chilli, Rice, Soybean, Chickpea, Brinjal and Okra revealed that the adoption of STCR IPNS recommendations resulted in 90% of target yield achievements. The front-line demonstrations carried out on farmers' field at Jabalpur on Wheat, Paddy and Urad crops revealed that the cost-benefit ratio was found to be better with the STCR IPNS recommendations than the farmers' practice and GRD. Similarly the demonstrations on Groundnut and Sunflower showed that soil test based treatment exhibited superiority over farmers' practice and GRD.

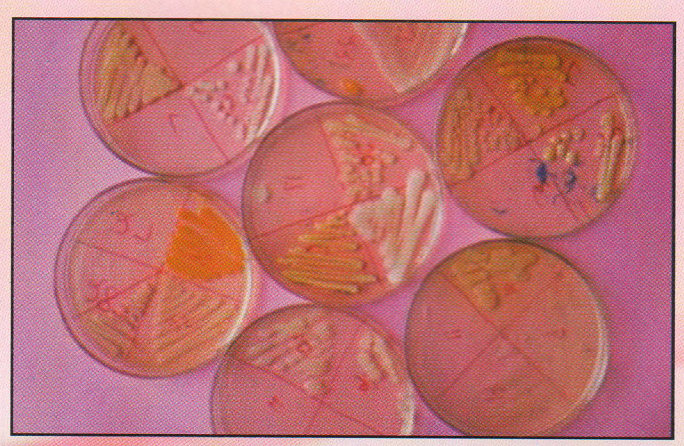
Sustainability of soybean-wheat system under Long-term cropping

Evaluation of 35 years yield data of soybean-wheat system at Jabalpur under Long Term Fertilizer Experiment (LTFE) revealed that application of 100% NPK (+S) sustained the seed yield of soybean (1678 kg ha^{-1} to 2389 kg ha^{-1} with an average of 1978 kg ha^{-1}) and

integrated use of NPK and farm yard manure (FYM) sustained the yield at a little higher level (2096 kg ha^{-1}). Though increase in soybean yield on application of FYM was not very large but a sufficiently large increase in the wheat yield was recorded. The average of 35 years wheat yield data revealed that application of 100% NPK (+S) led to production of 4088 kg ha^{-1}, however, integrated use of FYM and chemical fertilizer boosted the wheat yield from 4088 to 4504 kg ha^{-1}. This means that application of FYM during kharif in soybean sustained the both soybean and wheat yields at higher level all through 35 years. It is interesting to note that growing of soybean and wheat in sequence without any fertilizer continuously for the last 35 years indicated an improvement in wheat yield by 300 to 400 kg ha^{-1}. The increase in wheat yield even after 35 years in control plot is due to supply of biological fixed N by soybean to soil indicating that growing of soybean has beneficial effect on subsequent wheat yield. The maintenance of soil organic carbon in control plot at almost initial level further supports the finding.

Improving yields and nutrient uptake of crops through microbial inoculants in Vertisols

The microbial diversity in the soybean, chickpea and wheat rhizosphere was assessed in various culture media in vertisol sites located at IISS, Bhopal; JNKVV, Sehore, Powarkheda, Jabalpur, IARI center, Indore and farmers' fields located at Geelakhedi, Dt. Rajgarh; Narsinghpur; and Kalmeta in Dt. Narsinghpur. 63 *Rhizobium* isolates were obtained from soybean and chickpea (7 and 56 respectively). Best nodulation was observed at sites which were under submergence during monsoon and cultivated in rabi season ('havelis') utilizing the residual moisture. All the soybean and chickpea rhizobial isolates obtained were fast growing. Plant growth promoting rhizobacteria (PGPR) were isolated from the rhizospheric soils of soybean, chickpea and wheat on various media based on differences in morphotypes. A total of 74 isolates of PGPR (plant growth promoting rhizobacteria)



High muco-polysaccharide production by some isolates from wheat on Pseudomonas agar.

were made from soybean rhizosphere, 75 from chickpea rhizosphere, 240 from wheat rhizosphere soils, 68 from vermicompost and 53 from vermicast. Altogether, a total of 301 isolates in standard and 209 in **minimal** media were made. Taken together with the 63 rhizobial isolates, a total of 573 microbial isolates have thus been cultured.

Nitrate contamination in groundwater samples of Hoshangabad district

500 water samples collected from different sources (open well, tube well and hand pump) and various locations (crop field, habitation, community, dairy/poultry) during pre-monsoon of 2006 were analyzed for different parameters, namely, EC, pH, organic C, total, ammoniacal and nitrate-N. From the results of the first sampling the following inferences can be made:

- Nitrates in 4.8% samples were not detectable, whereas 8% were polluted, although the majority (63.3%) was in the safe zone (1-5 ppm) with regard to nitrate contamination in groundwater samples.
- While 10.4% of open well samples were polluted, the figures for hand pump and tube well were 7.7 and 1.9%, respectively.
- Highest percentage of samples from habitation was polluted (12.8%), followed by those from crop fields (9.6%), dairy (6.5%) and community (5.9%).

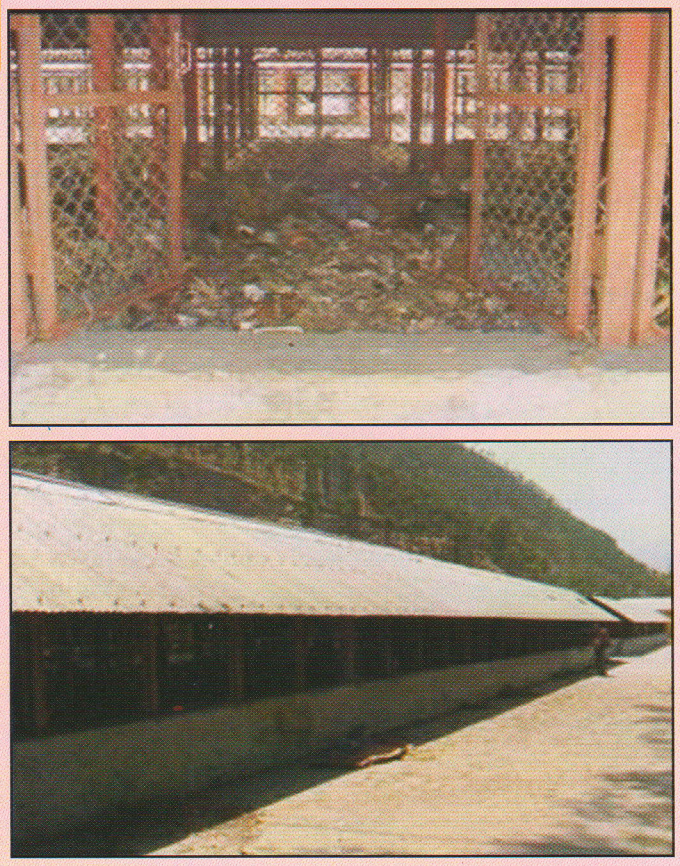
Sewage irrigation changed biological and biochemical activity in soil

In a field experiment at IISS, sewage irrigation for 5 years caused about 45% increase in soil microbial biomass C during maximum tillering stage of wheat. This also resulted significant increase in CO_2 evolution from soil surface during 13 day period after irrigation at this physiological stage, which may be due to incorporation of C substrate and increase in metabolic activity of soil microorganisms. Dehydrogenase enzyme activity (which play significant role in oxidation of soil organic matter) was about 8.2% higher in sewage irrigated soil as compared to groundwater irrigated soil. Activity of alkaline phosphatase enzyme and urease enzyme in soil during maximum tillering stage of crop was not significantly influenced by the application of sewage irrigation.

Chemical and nutritional characteristics of municipal solid waste compost

Composts generated from municipal solid waste (MSW) collected from 28 cities covering 12 states were evaluated for chemical and nutritional quality parameters. Results of analysis of 34 MSW compost

samples indicated that 35 % samples were having higher pH (i.e. >7.5) and 12 % samples were having higher EC (i.e. >4 dS m^{-1}). Of these samples, 29 samples had total organic carbon below the expected value of 16 %. Only 38, 20 and 9 % samples contained minimum expected concentration of total N, P and K (i.e. 0.8 % N, 0.22 % P & 0.83 % K), respectively. It has been observed that organic matter content as well as nutritional quality of MSW composts was better wherever segregation for decomposable raw material was practiced before composting. Municipal solid waste compost from Kullu, Manali and Kolkata had the total coli form population more than 103 CFU/g (the limit set by BIS).



Composting of municipal solid waste in pit at Kullu, Himachal Pradesh

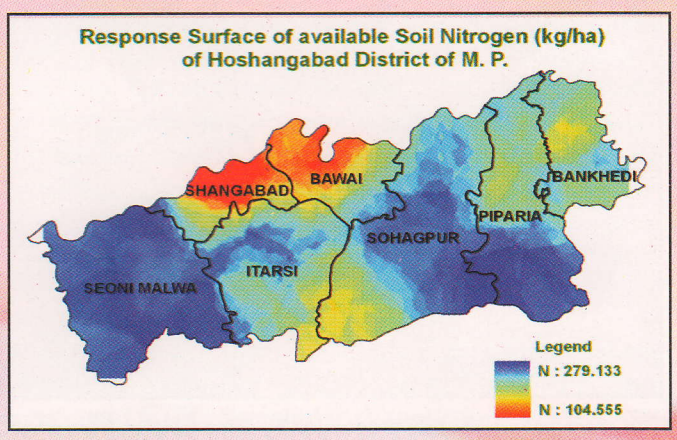
Lead toxicity in vertisols and alfisols

Lead is widely disposed off into the soil. Since toxicity of heavy metals is dependent not only on level of metals contamination but also on interactions with several other metals matrix, nature of soil, organic matter supply and type of crop. Studies were therefore, carried out in pot experiments to evaluate the toxicity of lead in Vertisol and Alfisol with and without contamination of other heavy metals like Cd, Ni, Zn and organic manure under AICRP Micronutrients. French bean growth was not affected with Pb contamination upto 450 ppm Pb in Vertisol and 300 ppm Pb in Alfisol. Lead toxicity was more in alfisol than vertisol as plant growth was more affected even at same level of lead contamination. Further, the nature of heavy metal also influenced the growth irrespective of soil type. Cd superimposed at 25 ppm on lead treatment caused drastic reduction in growth and yield of crop. Further superimposition of Ni and Zn at 25 ppm over Pb and Cd treatment did not influence the crop growth. Thus soils loaded with 300-450 ppm though did not affect the visual growth but may pose food contamination problems as their lead uptake increased with levels of Pb contamination. Similarly Cd and Ni addition increased the Ni and Cd content in plants in both Vertisol and Alfisol.

Effect of lead toxicity (600 ppm) on French bean in red and black soils

Methodology to estimate the soil nutrients at field level using GIS & GPS tools

To develop methodology for soil fertility mapping using Geographic Information System (GIS) and Global Positioning System (GPS) tools for precise fertilizer recommendations based on spatial variability, actual soil sampling of 8% villages of Hoshangabad districts was carried out. All the samples were analysed for different nutrients. Georeferenced maps using ARC-INFO and different kriging methods (for different nutrients) have been prepared. The developed maps provided estimated



Available Soil N (kg/ha) of Hoshangabad district

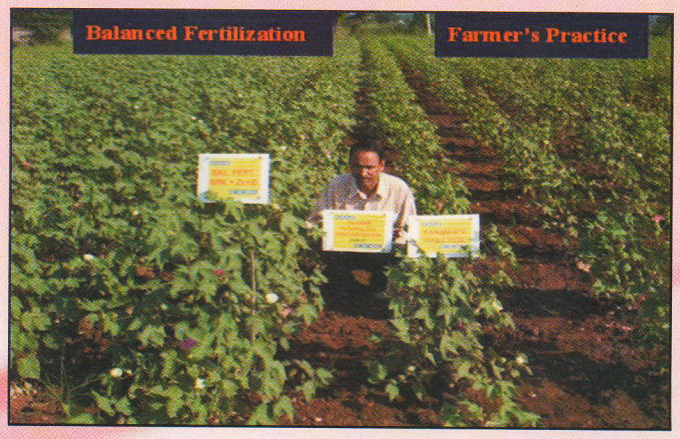
nutrients values at each point. Any farmer of that area can get his field's available nutrient status in case he gets the latitude and longitude of that fileld. The system can be used for recommending optimum inputs use for the targeted yield. Estimated response surface (kriging) using Gaussian method clearly showed that in Hoshangabad District one can get available soil nitrogen in the range of 104 to 279 kg/ha. With the help of this, out put of all the ground points (pixel) has been assigned with unique estimated value of nitrogen, which has been interlinked with the STCR recommendations.

Nutrient input, output and balance in farmyard manure production by farmers

Under the ACIAR project, simple mass balance studies have been conducted by selecting a FYM pit of Mr. Hukum Singh, Geelakhedi village, Rajgarh district in Madhya Pradesh. The depth of this pit was about 1.2 mt. In each month dried samples of each type of organic materials were pooled together to obtain a composite sample which were ground and analyzed for total N, P, K, and C. At the end of the 9th month, based on the nutrient concentrations of different types of materials, total amount of each nutrient input into the FYM pit was computed to workout the nutrient recovery in FYM and apparent loss. Results revealed that the cattle dung was the main component of the FYM (66.9%) followed by cattle shed wastes (20.4%). About 40% of N, 23% of P and 36% of K put into the FYM pit through different organic materials was lost during the FYM production through conventional method by followed farmers. There is a scope to improve the quality of FYM by reducing the losses from FYM pits by introducing simple and farmers' friendly modifications such as hybrid pit (between heap and deep pit) , thatched roofs etc in the Farmers' Practice of FYM production.

On-farm demonstration of balanced fertilization technology for cotton

A balanced fertilization technology (BF) for cotton (80-40-20 kg N-P_2O_5-K_2O ha^{-1} + Zn @ 25 kg $ZnSO_4$ ha^{-1} + B @ 1 kg



On-farm Demonstration of Balanced Fertilization Technology for Cotton at Balwada village, Khargone district, M.P.

ha^{-1} as 0.1% B foliar spray twice), developed in the TMC-MM 2.1project, was demonstrated on 10 farmers' fields in Balwada village of Khargone district, M.P. The BF consistently resulted in distinctly higher cotton yields over Farmers' Practice. The yield gains due to balanced fertilization ranged from 13% to 41%, with the mean yield increase across all farms being 28%. Both participating and some non-participating farmers of village are now convinced about the benefits accruing from balanced fertilization and expressed their willingness to adopt it for their respective cotton crops on a large scale.

Improving Soil biological health and Produce quality under Horticultural crops

During the year 2006 in pomegranate orchard, the fruit yield was recorded maximum in integrated nutrient management (INM) (7.63 kg $plant^{-1}$) treatment followed by organic and inorganic treatments, which were at par and yield was the lowest in absolute control (4.17 kg $plant^{-1}$). Fruit quality parameters such as sugars, TSS and ascorbic acid content increased significantly on the application of organic, organic + inorganic and inorganic alone, whereas, carotenoids content was influenced significantly due to application of various nutrient sources. Fruit juice acidity, tannin and oxalate content adversely affected the quality and they were slightly reduced due to application of various nutrient sources over absolute control. Soil biological parameters such as microbial biomass carbon, nitrogen and phosphorus content increased significantly and were the highest with organic nutrient sources followed by integrated nutrient management and inorganic alone and were least in unfertilized control.

Development of composting techniques for recycling of municipal solid wastes

A survey of the quality of mechanical solid waste compost in six municipalities (Bhopal, Bangalore, Delhi, Kolkata,

Mumbai and Nagpur) of India was done as a part of the study to develop techniques for rapid composting of urban solid wastes and reduce production cost. The hot water soluble carbon and carbohydrates content of decomposed compost was 0.17 to 0.68% and 0.07 to 0.12% and it was maximum in Nagpur municipal compost. The NO_3-N content ranged from 149 to 216 mg kg^{-1}, whereas NH_4-N ranged from 23 to 27 mg kg^{-1}, in these six cities. The lignin/cellulose ratio varied from 1 to 5.0, the CEC ranged from 84 to 153.9 c mole (p+) kg^{-1} and it was Maximum in Nagpur municipal solid waste compost.

Awards and Honours

Dr. Tapan Adhikari, receiving award

Dr. Tapan Adhikari, Senior Scientist, received Associate Fellowship of NAAS, from honourable Dr. M.S. Swaminathan, President NAAS for the period from 1st January 2007 to 31st December 2011 at New Delhi.

Events

Project Workshop of Nitrate Contamination is Soil and Water

The third mid-term workshop of the project entitled "Delineation and mapping of nitrate contamination in soil and water in heavily fertilized and intensively cultivated districts of the country" was held at Dr. PDKV, Akola during May 10-11, 2007 to deliberate upon the results of nitrate contamination in water samples collected during post-monsoon of 2006. Apart from the research team of IISS, Bhopal, scientists from other centers, namely, PAU, Ludhiana; Dr. PDKV, Akola; ANGRAU, Bapatla; BCKV, Kalyani and TNAU, Coimbatore participated in the meeting. Dr. A. Subba Rao, Director, IISS was the Chief Guest of the workshop.

A view of midterm workshop

Training programmes

Training programme on Soil Testing

- The Division of Soil Chemistry & Fertility has organized a training programme on Soil Testing for the trainees of M.P. State Agricultural Extension and Training Institute during 19-20 January 2007.
- The Division of Soil Chemistry & Fertility has organized a "Short-Term Training Programme on Soil Testing" for B. Sc (Ag) students of Allahabad Agriculture Institute, Allahabad during 5-16 June 2007.

International Women's Day

International Women's day was celebrated on March 8, 2007 with great enthusiasm. All the members of the

Various moments of international Women's Day

institute with their families actively participated in the programme. A debate on "*Equal Participation of Women and Men in the Society*", *Rangoli* and flower decoration competition was organized on the occasion. Dr. Anita Srivastava, Gynecologist *Chirayu Hospital* was the chief guest of the function.

ICAR Central Zone Sports Meet

IISS Sports contingent at IARI, New Delhi

The sports contingent of 48 members from Indian Institute of Soil Science, Bhopal participated in ICAR Central Zone Sports Meet held at IARI, New Delhi from 22.04.2007 to 29.04.2007. Sports contingent from Indian Institute of Soil Science won one silver medal in 100 meter race, one bronze medal in 800 meter race and one bronze medal in discuss-throw. Silver medal was won by Mr. Darash Ram and bronze medals were won by Mr. Sanjay Katenga and Mr. Anurag.

Group Meeting of AICRP on LTFE

A group meeting of scientists from all the centres of AICRP on Long-term fertilizer experiments (LTFE) was organized at Indian Institute of Soil Science, Bhopal on January 17-18, 2007 to sensitize about methodology for identification of soil indicators which are sensitive to management practices for developing soil quality index using data generated at different locations of AICRP LTFE. Also the purpose was to discuss future technical programme, satellite experimentation, QRT action taken report, background information and guidelines. Dr. A. Subba Rao, Director, IISS was the chief guest for this function. Dr. Muneshwar Singh, Project Coordinator (LTFE) presented the state of the art on soil quality and methodology steps to be used for identification of soil quality indicators. The presentations were made by the Centre in-charges of all the cooperating centres of AICRP on LTFE.

Plenary Session of Group Meeting of AICRP on LTFE at IISS

Group Meeting of AICRP on MN

A group meeting of scientists of All India Coordinated Research Project on Micronutrient was organized at Indian Institute of Soil Science, Bhopal on May 7-8, 2007 to review the progress of research. scientists in-charge presented the salient achievements in brief and action plan for XI plan. The progress of contractual research project on efficiency of Gromor Bentonite Sulphur for correcting sulphur deficiency in different agro-ecological zones was discussed. Technical programme for evaluating efficiency of Granubor for correcting boron deficiency was also finalized. Emphasis was given to initiate micronutrient and pollutant element research on soil-plant-animal continuum.

STCR Regional Workshops

1. Western regional workshop at AAU, Anand held at 8-9, February, 2007
2. Southern regional workshop at UAS, Bangalore held at 1-2 March, 2007
3. Eastern regional workshop at OUAT, Bhubaneswar held at 15-16, March 2007
4. Northern regional workshop at HAU, Hisar held at 23-24, March 2007

STCR Western regional workshop on soil testing at AAU, Anand during, February, 2007

STCR Eastern regional workshop on soil testing at OUAT, Bhubaneswar during March 2007

Winter School

Dr. A.K. Misra, in-charge HOD, Soil Physics Division acted as Course Director, Winter School on "Soil organic carbon stocks and soil organic matter management in relation to soil quality and climate change" organized at the Indian Institute of Soil Science, Bhopal during January 23 February 12, 2007.

Distinguished Visitors

- Dr. Neal Menzies, Associate Professor, UQ, Australia: Visited IISS, Bhopal during 21 25 May 2007 to review the progress of the ACIAR project.

New appointments

- Dr. B. L. Lakaria joined the institute as Senior Scientist on 15th January, 2007. Earlier he served as Scientist (Sr. Scale) at CSWCRTI, Research Centre, Datia.
- Dr. Sanjib Kumar Behera, Scientist joined the AICRP (Micronutrient) unit of Indian Institute of Soil Science, Bhopal on 18th May 2007.
- Dr. (Mrs) Sangeeta Mohanty joined Soil Physics Division as Scientist on 18th May, 2007.
- Dr. R.S. Chaudhary, Senior Scientist, Soil Physics Division has been selected as Principal Scientist and joined Soil Physics Division on 8th June, 2007.
- Dr. D. Damodar Reddy, Senior Scientist, Soil Chemistry & Fertility Division has been selected as Principal Scientist and joined Soil Chemistry & Fertility Division on 11th June, 2007.

Scientists' Participation in Conference/Seminar/Training/Group Discussion

Name	Programme	Venue	Period
Dr. Y. Muralidharudu Dr. A. Subba Rao Dr. A. Sammi Reddy	Invited Paper in National Seminar on Global Scenario Vegetable Oils and Oil Seeds	DOR, Hyderabad	28th -30th January, 2007
Dr. Y. Muralidharudu	Invited Paper in International Conference on Sustainable Agriculture for Food, Bio-energy And Livelihood Security	JNKVV, Jabalpur	14th -16th February, 2007
Dr. P. Ramesh	Invited Paper in International Conference on Sustainable Agriculture for Food, Bio-energy And Livelihood Security	JNKVV, Jabalpur	14th -16th February, 2007
Dr. K. Sammi Reddy	Group Meeting of ICAR-AICRP (MSN) and Contractual Network Project on Gromor Bentonite Sulphur Pastilles	Indian Institute of Soil Science, Bhopal	7th-8th May 2007
Dr. K. Sammi Reddy Dr. A. Subba Rao	14th General Body Meeting and the Foundation Day Programme of the NAAS	NASC, New Delhi	4th-5th June 2007
Dr. B.L. Lakaria Dr. R.H. Wanjari	Winter School on Soil Organic Carbon Stocks and Soil Organic Matter Management in Relation to Soil Quality and Climate Change	Indian Institute of Soil Science, Bhopal	23rd January 12th February, 2007
Dr. B.L.Lakaria	Workshop on Climate Change and its impact on Farming Systems and Natural Resources	Dr. Y.S. Parmar University of Horticulture and Forestry	2nd-3rd March, 2007
Dr. A.B. Singh Dr. A.K. Tripathi	Participated in 8th Agriculture Science Congress 2007	TNAU, Coimbatore.	15th -17th February, 2007
Dr. A.B. Singh	Participated in the Pusa Kisan Mela	IARI, New Delhi	24th-26th February,2007
Dr. R.H. Wanjari	Participated 21 days Winter School on Soil Organic Carbon Stocks and Soil Organic Matter Management in Relation to Soil Quality and Climate Change	Indian Institute of Soil Science, Bhopal	23rd January - 12th February, 2007
Dr. Abhishek Rathore	Participated in 21 days Winter School on Advances in Data Analytical Techniques	IASRI, New Delhi	08th-28th February 2007

Staff News

Sh. Rajesh Mandloi, T-6 (Technical Officer), Soil Physics Division, attended Refresher Course on "Computer-based Multimedia Presentation" at NAARM from 20th February to 12th March, 2007.

Editors: Dr. Y. Muralidharudu and Dr. Abhishek Rathore

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