



IISS

Newsletter

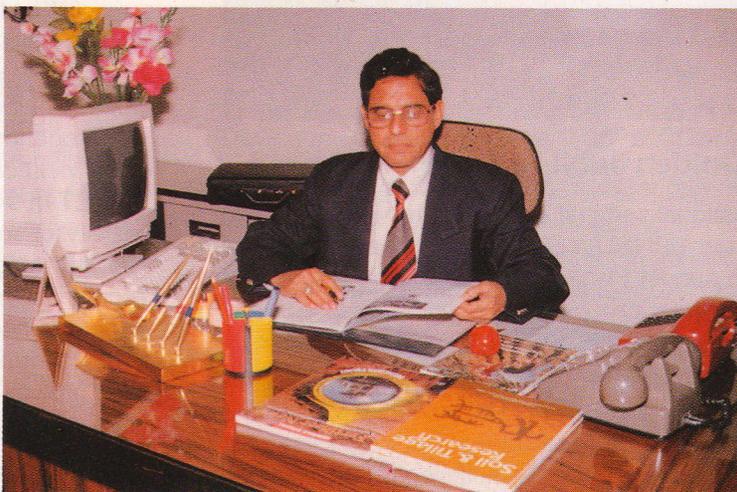
Vol. 1. No.2

July - December 1998

DG, ICAR visits IISS

Dr. R.S.Paroda; Secretary, DARE, Govt. of India and Director General, ICAR visited the Institute on September 21, 1998. He evinced keen interest in the research activities of the Institute. He addressed the scientists and staff of the Institute and ensured full support and cooperation of the Council for the developmental activities of the Institute. He released a publication entitled "Integrated Plant Nutrient Supply System for Sustainable Productivity".

From the Director's Desk...



Managing SOC to improve soil quality and mitigate GHG emissions

Today we are confronted with a challenge to increase the agricultural production in a sustainable way while maintaining soil quality and without accentuating the emissions of greenhouse gases (GHG's). Our land resources are finite and intensively cultivated lands are getting impoverished due to loss of soil organic carbon (SOC). The only possible strategy for increasing food production is through restoring degraded lands and intensifying agricultural production while mitigating the greenhouse effect. It is estimated that about 20% of the greenhouse effect is related to agricultural activities. The CO₂ content in the atmosphere is increasing each year. However, there exists a potential to curtail this effect through carbon sequestration in soils. Soils with an active pool of organic carbon, crop residues and other biomass constituting an important renewable resources, and appropriate tillage methods play an important rôle in the carbon cycle. Incorporation of biomass resources in the soil increases SOC fraction and reduces CO₂ contribution to the atmosphere. The SOC content affects soil quality which has a profound impact on productivity and environmental quality. This is realized through efficient nutrient supplying and recycling, improving soil/plant available water reserves, increasing soil buffer capacity and stabilizing soil structure with the build-up of SOC. Improper use of crop residues (removal, burning or ploughing under) can accelerate erosion, deplete soil fertility, and pollute environment through burning and eutrophication of surface and contamination of ground water. It is, therefore, important that we judiciously manage SOC through improved and science based technology.

Improving soil qualities for sustaining productivity through improving and maintaining carbon stock of soils in different agro-ecoregions is one of the thrust areas of the Indian Institute of Soil Science. Scientists are developing location specific technologies for improving nutrient cycles and soil quality based on various organic resources available with the farmers for recycling.

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Golden Jubilee Seminar on IPNS

A national seminar on 'Integrated Plant Nutrient Supply System (IPNS) for Sustainable Crop Productivity' was held on August 11-12, 1998 to celebrate 50 years of India's Independence.

Dr.G.B.Singh, Deputy Director General (NRM) in his address stressed the importance of IPNS for sustainable crop production. He also highlighted the need for doubling the food production in the next ten years by increasing fertiliser use efficiency and judicious combination of organic and inorganic sources of nutrients.

Dr.N.N.Goswami, former Vice-Chancellor of CSAU&AT, Kanpur, in the key-note address, narrated how balanced nutrition, soil health, improvement in socio-economic status of farmers could be achieved through IPNS. Dr.S.Kannaiyan, Dean (Ag.), TNAU, Coimbatore presided over the function and gave a quantitative assessment of the contribution of different nitrogen fixing systems under different soils, crops environments and problems and prospects in the use of BNF system in crop production.

The delegates participated in the "Brain Storming Sessions" on improving fertiliser use efficiency, synergistic use of organic and inorganic sources of nutrients, and appropriate use of biological nitrogen fixing organisms in different crop production systems.

On this occasion, Dr.G.B.Singh, Deputy Director General (NRM), ICAR, released "A decade of progress" and "Indian Institute of Soil Science: a profile". Dr. R.N.Prasad, Assistant Director General (Soils), ICAR, released "IISS at a Glance" and the first issue of "IISS Newsletter".

Research Highlights

Integrated nutrient management through soil test crop response calibration

Jabalpur (Madhya Pradesh), Pusa (Bihar) and Coimbatore (Tamil Nadu) centres of AICRP on Soil Test Crop Response Correlation (STCR) have developed the technology for integrated nutrient management in sunflower, rice and maize crops. IPNS technology has

been demonstrated in frontline demonstration on farmers' fields in wheat, rice and tapioca crops. By application of 3.5 t ha⁻¹ FYM, 5.0 t ha⁻¹ compost or 6.25 t ha⁻¹ green manure (GM) plus 2 kg phosphate solubilizing bacteria (PSB) considerable (more than 60 kg N + P₂O₅+K₂O) saving in the fertilizers in sunflower, maize and rice crops were achieved. Higher yields and high response ratios under IPNS compared to general recommended dose through fertilizers alone were recorded.

Biological Nitrogen Fixation

Field studies at the Kalyani centre of AICRP on BNF revealed that the inoculation of either *Azotobacter* or *Azospirillum* in combination with half the recommended dose of nitrogenous fertilizer is as effective as full dose of nitrogenous fertilizers in increasing dry matter and grain yield of two high-yielding rice varieties, PNR-381 and IET-4094. Population of diazotrophs and nitrogenase activity of root were higher at flowering than at other growing stages of rice crop. Release of inorganic or organic forms of nitrogen in rhizosphere was related to variety of rice crop. Inorganic form of N is converted to organic form and *vice versa* during the whole period of crop growth.

Frontline demonstration on biofertilisers

In Coimbatore, efficient rhizobial strains suitable for groundnut and soybean were supplied to the farmers and frontline demonstrations (FLD) were laid out by TNAU with two treatments, an uninoculated control and *Rhizobium* inoculation. Yield increase of Soybean (var. CO 1) due to inoculation varied from 5.2 to 20.6 per cent (actual yield ranges 850-1733 kg ha⁻¹) at 6 different locations over control (yield range 750-1610 kg ha⁻¹). In groundnut, yield increase varied from 12.6 to 20.6% at 4 different locations (actual yield range 1480-2038 kg ha⁻¹) over control yield (1235-1729 kg ha⁻¹).

Tillage requirements of crops

In a lateritic sandy loam soil under rice- wheat system, rice responds better to puddling than compaction when the intensity and distribution of rainfall during the cropping period are optimum. The yield is more than the puddled soil and opting for deep tillage is not desirable as it causes more leaching losses of applied fertiliser. On this, degradation of soil structure due to puddling does not appear to cause any serious problem to the following wheat crop.

Kinetics of zinc sorption-desorption

The effect of P application on Zn sorption was slightly more at pH 5.50 than at pH 4.25 in three benchmark soils. At pH>6.75 addition of P did not have any significant effect on either total or loosely held P in any soil. The amount of Zn desorbed with increase in pH from 4.25 to 5.50 increased by 30 per cent in Alfisol and 9 per cent in Vertisol. In contrast, Oxisol exhibited maximum desorption at pH 4.25 which decreased consistently with increase in pH. Increase in P application rate to 20 and 40 mg kg⁻¹ soil decreased Zn desorption by 20-31% and 39-53%, respectively.

Phosphocompost as organophosphatic fertiliser

Phospho-compost produced by charging plant residues and cattle dung with 12.5% and 25.0% mussoorie rock phosphate (MRP) was evaluated as phosphatic fertiliser for wheat crop @ 2.5 & 1.54 t ha⁻¹ respectively in acid clay loam soil at Palampur and compared with the application of 60 kg P₂O₅ through superphosphate. Both sources of raw material yielded equally good phospho-compost and proved as good as phosphatic fertiliser in a two-year field trial.

Boron deficiency in Indian soils

Boron deficiency in noncalcareous soils (Haplustalfs) of Darbhanga and calcareous soils (Calciorthents) of Muzzaffarpur and Samastipur districts of Bihar is most widespread and to the extent of 44, 35 and 29%, respectively. The deficiency of boron was maximum (65.8%) in red and lateritic soils of Kanyakumari.

Of the overall 36,825 surface samples analysed so far, 33 per cent samples found deficient with a range of 2-68 per cent. Boron deficiency is widespread (39-68%) in red and lateritic soils of Karnataka, Orissa, West Bengal, Maharashtra, leached and acidic soils of West Bengal and highly calcareous soils of Bihar.

Sulphur requirements of Soybean-wheat in black soils of Madhya Pradesh

In a deep black clay soil (Vertic Chromustert) of Madhya Pradesh, application of 40 kg S ha⁻¹ either to soybean or to wheat only in the sequence gave 2 and 4 t ha⁻¹ seed yield in two cropping cycles. Agronomic efficiency of 2.5-3.8 kg seed kg⁻¹ S added and benefit of Rs. 11-24 per rupee spent on Sulphur was found.

Plant test methods for potassium

Different plant analysis methods were evaluated for measuring K concentration in the plant materials of variable composition viz., straw and grain samples of cereal, legume and oilseed crops. The precision analysis of different methods of K extraction from plant samples showed that 0.5N HCl with 5 minutes shaking and NH₄OAc methods extracted similar amount of K as compared to standard tri-acid digestion method.

Cadmium pollution in soils and plants

Adsorption behaviour of cadmium, a potential biotoxic heavy metal, was studied in four black and two alluvial soils of India. Sorption of cadmium can be best fitted in rearranged Langmuir equation. Swell-shrink soils sorbed cadmium about 1.5 times more than alluvial soils. Sorption of cadmium was highly dependent upon soil pH and CEC. Multiple linear regression equations have been worked out to predict cadmium sorption in soils. Toxicity symptoms of cadmium have been characterized in cauliflower plant.

Participation in Seminar/Symposium/ Training Programme

Drs.M.C.Manna and J.K.Saha, Scientists attended a training programme on HPLC and Ion Chromatograph, November 2-11 at Indtech Analytical, Sakinaka, Mumbai.

Dr.R.B.R.Yadava, Principal Scientist (Plant Physiology) attended the board of studies meeting in agricultural botany, U.P.College, Varanasi on December 7.

Drs. Anand Swarup, D.L.N.Rao, K.P.Tomar, Ch.Srinivasa Rao, A.K.Biswas, D.Damodar Reddy, Tapan Adhikari, T.R.Rupa, K.M.Hati presented their research papers in the National Seminar on "Development in Soil Science 1998" at CCSHAU, Hisar.

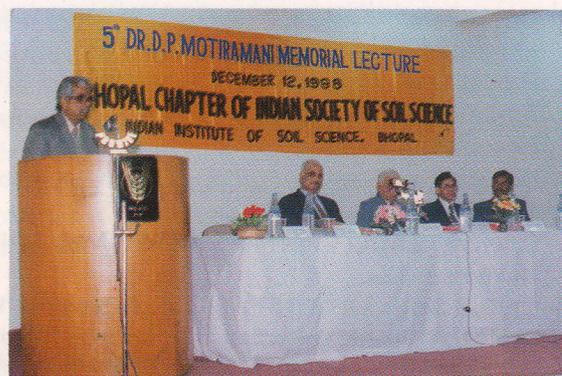
Dr. C.L. Acharya, Director, Drs. T.K.Ganguly, K.P.Tomar and A.K.Misra, attended the meeting for formulating ICAR-ICRISAT collaborative research project proposals on September 17-18 at CRIDA & ICRISAT, Hyderabad.

Dr. C.L.Acharya, Director, participated in the ICAR-ICRISAT partnership project at ICRISAT, Hyderabad on December 16-18.

Dr. Anand Swarup, PC(LTFE) participated in Brain Storming Session on "Organic Farming in India" at IASRI, Delhi on September 7-8.

ISSS Chapter Activity

Bhopal chapter of the Indian Society of Soil Science organized 5th Dr. D.P. Motiramani Memorial Lecture on December 12, 1998 at IISS, Bhopal. Dr. T.P. Ojha, former DDG (Agril. Engineering), ICAR, presided over the function. Dr. G.B. Singh, Deputy Director General (NRM), ICAR delivered the lecture on "Natural Resource Management for Sustainable Agricultural Production". He highlighted the causes for increased stresses on soil, water and other natural resources. He emphasised the need for developing cost-effective technologies for efficient management of natural resources so as to improve their quality and to enhance crop productivity to meet the demand of ever-increasing population.



Awards and Honours

Dr.C.L. Acharya, Director, has been honoured for his notable contributions in the services of HPKV, Palampur on December 18 on the occasion of completion of two decades of HPKV's establishment.

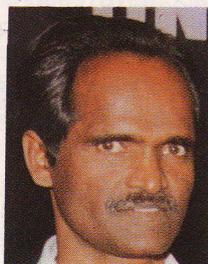
Dr.Ch.Srinivasa Rao, Scientist and Dr. A.Subba Rao, Project Coordinator (STCR) received the IPI-FAI award for 1998 for the work on "Effect of Potash on yield and quality of crops".

Dr.Anand Swarup, Project Coordinator (LTFE) and Dr.A.N.Ganeshamurthy, Sr.Scientist received the third prize from FAI for their article published in Fertiliser News.

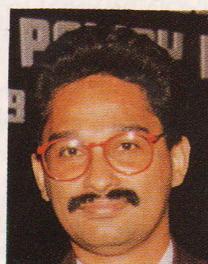
Dr.Ch.Srinivasa Rao, Scientist, won the Young Scientist Award of National Academy of Agricultural Sciences for the biennium 1997-98.



Dr.Anand Swarup



Dr. A.Subba Rao



Dr.Ch.Srinivasa Rao

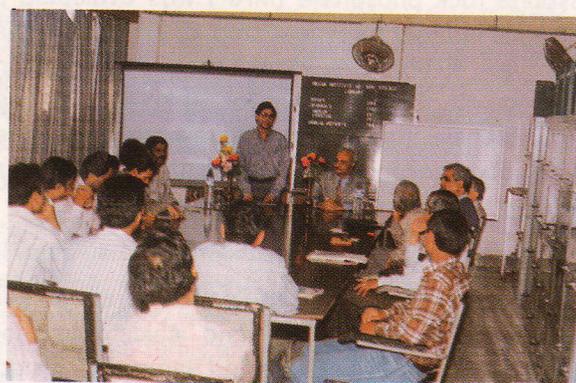
Distinguished Guests/Visitors



Padmabhushan Dr. R.S.Paroda, Director General, ICAR addressing the IISS Staff

1. Dr. Anwar Alam, DDG (Agril Engg), ICAR, September 22.
2. Dr. Keppel Coughlan, Research Programme Manager, Land and Water Resources Programme, Australian Centre for International Agricultural Research (ACIAR), Canberra, November 4.
3. Dr. Mangala Rai, DDG (CS), ICAR, November 11.
4. Dr. Kirti Singh, Chairman, ASRB, New Delhi, November 12.
5. Dr. G.B.Singh, DDG (NRM), ICAR, November 13.
6. IBSRAM Team consisting of Dr.Jean Pierre Bricquet, Dr.Amado & Dr.Thebe, December 16.

7. Dr.K.Gopa Kumar, DDG (Fisheries), ICAR, December 28.
8. Dr.T.K.Shivadas, Head, Div. of Engg., CIFT, Cochin, December 30.



Dr. G.B.Singh, DDG(NRM), being briefed about the Institute's activities by Dr. C.L. Acharya, Director

Staff News

New Staff Joining the Institute

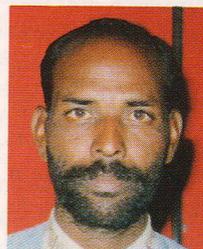
1. Dr.K.G.Mandal, Scientist, July 2.
2. Dr.Mohan Singh, PC(MD), November 17.
3. Dr.K.N.Singh, Sr. Scientist, December 24.
4. Sh.Shabbir Hussain, Assistant, November 2.
5. Sh.Rajesh Dubey, AF&AO, November 26.
6. Sh.Heera Lal Gupta selected as Jr.Clerk, September 26.

Staff left the Institute

1. Smt Sangeeta Yadav, Scientist, July 10.
2. Dr.P.N.Takkar, Former Director, August 4.
3. Smt.Archana Wabhle, Supdt., August 30.
4. Shri R.K. Singh, T-II-3, September 5.
5. Dr. A.K. Bera, Scientist, November 13.
6. Dr. Ch. Srinivasa Rao, Scientist, December 5.

Sports Event

In the ICAR inter-institutional sports meet for zone-II held at N.B.S.S. & L.U.P., Nagpur during October 23-26, 1998, Shri Sukhchain Das secured first position in 500 m cycle race, while Shri Anurag and Shri Sanjay Katenga came second in 100 meter and 200 meter race respectively.



Shri Sukhchain Das



Shri Anurag



Shri Sanjay Katenga