

Forthcoming event



The IISS Bhopal in collaboration with the JNKVV, Jabalpur and Govt of M.P. is all set to host the 6th Agricultural Science Congress at Bhopal from February 13-15, 2003 under the aegis of NAAS, New Delhi. The theme of the Congress is "Multi-Enterprise Systems for Viable Agriculture". About 600 delegates are expected to participate in the Congress. Shri Digvijay Singh, Honourable CM of M.P., has kindly consented to inaugurate the Congress on 13 February, 2003.

Editor

D. Damodar Reddy
Sr. Scientist

Design & Layout

A. K. Sharma
Documentation Officer

Published by

C. L. Acharya
Director

IISS Organizes ICAR-ICRISAT Mega Kisan Mela

The Institute, in collaboration with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, organized a three-day Kisan Mela at IISS campus on 24-26



Farmers-scientists interface

September, 2002. Shri Mahendra Singh Kalukheda, the Hon'ble Minister of Agriculture, Govt. of Madhya Pradesh and Shri Govind Singh Gurjar, Hon'ble Minister of Agriculture, Govt. of Rajasthan participated in the formal function and addressed the farmers on 24th and 26th September, respectively. Over 1500 farmers (about 500 farmers each day) from four states viz., Gujarat, Rajasthan, Chhattisgarh and Madhya Pradesh visited institute campus during the fair. The performance of maize, sorghum, pigeon pea, soybean and pearl millet genotypes grown as sole and intercropping systems on broad bed and furrow was demonstrated to participating farmers. During the Mela, the farmers were also shown the institute's field trials relating to nutrient and water management. A farmers – scientists interface was organized to answer on-the-spot queries raised by the farmers and suggest solutions to their problems. Farmers were also provided with small kits of chickpea and sorghum seeds free of cost. The Kisan Mela proved to be an excellent example of joint effort in which an international institute (ICRISAT), the IISS, the State Agriculture Universities, State Agriculture Departments and several NGOs such as BAIF, CARE, Grameen Vikas Trust, Samaj Pragati Sahyog, UNDP participated.

IISS Honours Farmers on Kisan Diwas

As part of the birth centenary celebrations of former Prime Minister, Late Sh. Choudhary Charan Singh, the Institute celebrated the *KISAN DIWAS* on 23rd December, 2002. On the occasion, ten farmers from the state of Madhya Pradesh, who have been taking keen interest in the participatory on-farm research and extension activities of the Institute, were honoured with *pagris*, shawls and commendation certificates. The ten farmers who received honours from Director of the institute, Dr. C.L. Acharya, included Sh. Harinarayan (Dhankhedi), Sh. Gopal Singh (Gilkhadi), Sh. Gita Prasad and Sh. Lakhani Lal Vishwakarma (Moghaliaghat), Sh. A. N. Pandey (Khajuri), Sh. Makhan Lal (Ratatal), Sh. Wahid Khan (Dobe), Sh. Badam Singh (Kulhadiya), Sh. Shivanarayanaji (Kotari) and Sh. R. Ravi (Pipriya Jhar).



Farmers with Director of IISS

Indian Institute of Soil Science

Nabi Bagh, Berasia Road, Bhopal - 462 038 (M.P.)

Telephone : (0755) 2730946, 2747375, 2730970, 2734221 Fax : (0755) 733310 E-mail : iiss@iiss.mp.nic.in

Visit us at : www.iiss.nic.in

Research Highlights

New computer software for fertilizer recommendations

To facilitate quick and accurate fertilizer prescription based on soil testing, a state-of-the-art user-friendly computer software package has been developed using the existing database of targeted yield equations generated by the AICRP (STCR).

Soil fertility maps prepared

District-wise soil fertility maps for the states of Punjab, WB and Chhattisgarh were prepared using the data from AICRP (STCR), Soil Testing Laboratories and IFFCO.

Soil organic carbon dynamics in an Alfisol under LTFE

In an Alfisol of Bangalore, under long-term fertilizer experiment with finger millet-maize rotational cropping for the past 15 years, the soil organic carbon (SOC) content increased from 0.45% in control to 0.67% in NPK+FYM treatment in surface soil (0-15 cm) and from 0.44 to 0.52% in subsurface layer (15-30 cm). The soil microbial biomass contained 3.0 - 7.0, 1.4 - 1.8, 1.3 - 1.7 and 1.4-1.5% of total C, N, P and S, respectively in surface soil. The passive pools of C such as humic acid and fulvic acid C, which accounted for 16.6 - 20.8 and 34.6 - 44.2% of the total SOC, decreased with depth and increased with addition of NPK or NPK+FYM. Slow pools of C showed increasing trend with decrease in particulate size and helped in sequestering higher amount of C under 100% NPK and NPK+FYM treatments.

Response models evaluated

Different response models viz., quadratic response (QR), quadratic response and plateau (QRP) and modified Mitscherlich-Bray (MB) were evaluated for rice in Periyar district, Tamilnadu using soil test crop response data for nitrogen. All the response models fitted the data equally well. However, the QRP model fitted the data with least systematic bias and the soil test based fertilizer recommendations based on this model were more logical.

Fate of applied zinc in Vertisols under rice-wheat system

The studies on Zn balance and its pools in Vertisols after 8 cycles of rice-wheat system revealed that application of 10 kg Zn ha⁻¹ yr⁻¹ (5 kg ha⁻¹ for rice and 5 kg ha⁻¹ for wheat every year) resulted in a positive balance of 72-78 kg Zn ha⁻¹. Most of the applied Zn has been fixed strongly and was recovered as residual Zn. There was an evidence of downward movement of applied Zn. Irrespective of nutrient management practices, the Zn application to every crop led to a significant increase in available Zn (DTPA extractable Zn). Application of organic manures further favored the build-up of available Zn, thus resulting in the downward movement of Zn in soil profile.

Long-term fertilizer and manure use effects on soil N

The studies on organic C and N fractions in a Typic Haplustert soil after 27-years of soybean-wheat cropping indicated that NPK applied at 50%, 100% and 150% of optimum rate and 100% NPK with FYM increased OC, total N and mineralizable N status of soil. Cropping without fertilizer and FYM use caused a marked depletion in amino acid N (43%), hydrolysable NH₄-N (52%) and hexose amine N (44%), while

the regular fertilizer application increased the status of hydrolysable NH₄-N, amino acid N, hexose amine N and non-hydrolysable N in soil. Integrated use of 100% NPK and FYM significantly improved all organic N fractions except hexose amine N.

Seed treatment with micronutrient improves crop productivity

Seed treatment with concentrated micronutrient formulations, like Teprosyn-Zn F 2498 (600 g Zn/L), Teprosyn -ZnP F 3090 (300 g Zn + 200 g P₂O₅/ha), Teprosyn -Mn F 2157 (500 g Mn/L) applied at the rate of 5-8 mL kg⁻¹ seed, improved the germination and establishment of seedlings of crops. The seed coating of Teprosyn zinc or Teprosyn ZnP appreciably increased the seed yield of maize, rice, sunflower, green gram and soybean, gram over no zinc control in marginally Zn deficient soils but was inferior to soil application of 5 kg Zn ha⁻¹ in highly deficient soils. Seed treatment was, however, more economical than soil application.

No-tillage system for soybean on Vertisols

No-tillage system (direct drilling of seeds through tractor-drawn seed drill without summer or preparatory tillage and retaining residues on the surface) was found as effective as conventional tillage (residue removed + summer tillage by sweep followed by tilling twice by sweep before sowing) or mould board ploughing (residue incorporation by MB plough in summer + 2 tillage by sweep) or reduced tillage (residue retained + 1 tillage by sweep) in terms of biomass production and seed yield of soybean.

Reduction of N-losses from poultry manure

A technology for reduction of NH₃ volatilization losses during composting of poultry litter was developed under AICRP(MD). Co-composting of poultry litter with rice straw (1:4) and addition of pyrite (10% w/w) and rock phosphate (12.0% w/w) and inoculation with cellulolytic microorganisms reduced N losses from 68% to 30% and led to production of nutrient rich manure.

Formulation and testing of BIOMIX consortium

In studies at HAU, Hisar centre, 'BIOMIX' biofertilizer containing a mixture of nitrogen fixing, phosphate solubilizing and plant growth promoting bacteria viz., Azotobacter, Pseudomonas and Azospirillum were marked with lac Z and green fluorescent protein (gfp) and grown in modified YEMA medium. These three bacteria did not affect the growth of other bacteria in the 'Biomix'. Strains in 'Biomix' established better than single inoculation, in the rhizosphere of pearl millet. Inoculation increased the plant growth parameters over uninoculated control as well as individual cultures.

Vermicompost vs vermicast and vermiwash

Studies on chemical and biochemical composition of vermicompost with that of vermicast and vermiwash as by-products revealed that the NPK content was high in vermicompost than in vermicast and vermiwash. The vermiwash, however, was rich in total sugar content. The enzyme activities were relatively high in vermicompost and vermicast than in vermiwash.

Spent wash negates Cd toxicity in Spinach

In a pot culture study with swell-shrink soil of Raichur, spinach exhibited symptoms of toxicity like stunted growth, interveinal chlorosis, etc. at higher level of Cd loading. Dry matter yield of spinach decreased very slightly with Cd levels up to 20 mg kg⁻¹ soil, beyond which it decreased very sharply. The spent wash added along with Cd, however, increased the dry matter yield of spinach and thus negated the adverse effect of higher dose of Cd.

Workshops held

- A workshop on "Integrated Approach for Improvement of Soil" was organized by the Institute in collaboration with the Academy of Science, Engineering and Technology, Bhopal on 17 Aug., 2002.



- A workshop of NATP RRPS -19 "Organic pools and dynamics in relation to land use, tillage and agronomic practices for maintenance of soil fertility" was held on 7-9 Oct., 2002 at IISS, Bhopal.

Trainings attended

- Dr. Ashwani K. Sharma: Entrepreneurship Development and Small Business Management in the Rural Sector, CIAE, Bhopal, 1-12 July, 2002
- Dr. K. Sammi Reddy: Recent Advances in Agricultural Research Project Management, NAARM, Hyderabad, 18 Sept. - 8 Oct., 2002
- Dr. Tapan Adhikari: Use of Isotopes and Radiation in Soil Plant Relationship, NRL, IARI, New Delhi, 3 Oct. - 1 Nov., 2002
- Mr. A.K. Sharma: Information Management Using CDS/ISIS, ICRISAT, Hyderabad, 25-30 Nov., 2002
- Drs. K.G. Mandal and R. H. Wanjari: Information Technology in Agriculture, NAARM, Hyderabad, 3-23 Dec., 2002

Lectures delivered

- Dr. M.V. Singh: Sushila De Memorial lecture on Water Pollution-Issues and Challenges for Sustainable Development, GAU, Anand, 27-28 Nov., 2002
- Dr. C. L. Acharya: The 6th Dr. B.V. Mehta Memorial Lecture on Integrated Input Management for Sustainable Crop Production in Rainfed Agro-ecosystems, College of Agriculture, Indore, 20 Dec., 2002

Awards/Honours

- Dr. M.V. Singh and Associates (AICRP on Micronutrients in Soils and Plants) IISS, Bhopal: First Choudhary Devi Lal

Outstanding All India Coordinated Research Project Award – 2001, ICAR, New Delhi, 16 July, 2002



- Dr. K. Sammi Reddy, Sr. Scientist: The Golden Jubilee Commemoration Young Scientist Award – 2002, ISSS, New Delhi, 11 Nov., 2002



- Dr. D.L.N.Rao, PC (BNF): The FAI Silver Jubilee Award-2002, FAI, New Delhi, Dec., 2002



- Dr. M.V. Singh, PC (M): The FAI Dhuru Morarji Memorial Award-2002 (Second prize), FAI, New Delhi, Dec., 2002

Participation in Seminars/Conferences/Symposia

- Drs. C.L. Acharya, M.V. Singh, D.L.N. Rao, Ashwani K. Sharma and D. Damodar Reddy: Workshop on Valuation Indicators for Natural Resources Research, NISTADS, New Delhi, 12 Sept., 2002
- Drs. C.L. Acharya, M.V. Singh, A. Subba Rao, D.K. Painuli, Muneshwar Singh, B. Maji, M.C. Manna, A.K. Biswas, J.K. Saha, Tapan Adhikari, T. R. Rupa, K.K. Bandyopadhyay, M. Mohanty: The 67th Annual Convention of the ISSS, J.N.K.V.V., Jabalpur, 11-15 Nov., 2002.
- Drs. Dr. C.L. Acharya, M.V. Singh, A. Subba Rao, D. K. Painuli, M.C. Manna, P. Ramesh, A.B. Singh, P.K. Ghosh, A.K. Biswas, J.K. Saha, D. Damodar Reddy, K.G. Mandal, M. Mohanty: The 2nd international Agronomy Congress, I.A.R.I., New Delhi, 26-30 Nov., 2002
- Dr. M.V. Singh: FAI Seminar, New Delhi, 16-18 Dec., 2002

- Drs. A. K. Misra and M. Mohanty: Workshop on Impacts, Adaptation and Vulnerability of Indian Agriculture to Climate Change, CRIDA, Hyderabad, 19-20 Dec., 2002

Visits abroad

- Drs. C. L. Acharya and A. Subba Rao: Basel, Switzerland, 8-10 Oct., 2002.

Distinguished visitors

- Dr. S.N. Dwivedi, Former DG, MPCOST, Bhopal: 17 Aug., 2002
- Dr.M.V. Rao, former Special Director General, ICAR, New Delhi: 23 Aug., 2002
- Shri Mahendra Singh Kalukheda, Minister of Agriculture, Govt. of Madhya Pradesh and Shri Govind Singh Gurjar, Minister of Agriculture, Govt. of Rajasthan, Dr. William Dar, DG, ICRISAT, Hyderabad: 24-26 Sept., 2002
- Dr. H.P. Garg, DG, MPCOST, Bhopal: 30 Sep., 2002
- Dr. S. Nagaraj, Director, IARI, New Delhi: 22 Oct., 2002

Staff news

- Shri R.K.Singh, Scientist (Soil Phy./Soil & Water Conservation) joined Institute on 16 Oct., 2002
- Smt. Sunita Bhusari, Assistant (on deputation) relived from Institute on 12 Nov., 2002
- Shri Abhishek Rathore, Scientist (Agril.Stat.) joined Institute on 16 Dec., 2002



Sh. Sukhchain Das (Winner in cycling)

Sports

The Institute bagged first prize in Badminton and Cycling, second in 400m Race, third in Javelin and Shotput Throw (Women) and Discus Throw (Men) in the ICAR Zonal Sports Meet at NBSS & LUP, Nagpur, 26 - 29 Oct., 2002.



Winning Badminton Team of IISS

Events

- Independence Day Celebrations: 15 Aug., 2002.
- RAC Meeting: Oct., 18-19, 2002.
- Land Resource Conservation Week: 12-20 Nov., 2002

From the Director's Desk.....

Multi-Enterprise Farming Systems:

An entrepreneurial approach to agricultural resource management on small farms

Over 82 million farm holdings (78%) out of the total 105 million farms in India fall in the category of small and marginal farms, with size of land holding being <2 ha/farm. The very size of small farms, coupled with a growing problem of land fragmentation, presents considerable problems for their development. Low crop and animal productivity, inefficient use and often deterioration of resource base, cost/price squeeze, high risk and, low and uncertain farm income leading to perpetual poverty are some of the idiosyncratic consequences of small farms. The strategies in the past have mainly been concerned with a vertical, 'top-down' approach which has tended to focus either on crops or on animals as separate commodities i.e. on a single enterprise, without considering the farm as a whole and the interrelationship of different components (crops, animals, soil and water). Within each of these, disciplinary biases have exerted a great influence, often quite inappropriate to the needs of small farms.

Development of multi-enterprise farming systems, implying enterprise diversification, seems to be the way out of the problems of small farms. The enterprise diversification refers to having a variety of interrelated on- and off-farm enterprises (across crops, livestock, aquaculture, horticulture, agro-forestry, mushrooms cultivation, food processing and value addition) best suited to the specific resource base. A multi-enterprise system is more appropriately seen as an entrepreneurial approach, a market driven orientation in agricultural resource management. Its goals focus on finding new markets, products, and services as sources of income in agriculture. The emphasis in diversification is on value added activities by processing and marketing alternative uses of the agricultural resource base. It also constitutes more efficient use of our resources. For example, if you have animal component in the farming systems you can get milk and create several different value adding industries, besides having access to draught power for farm operations. On a farm basis, you can also use animal manure to grow worms (as a feed for aquaculture systems), to grow mushrooms, or create compost to ensure soil quality. Having lots of enterprises creates opportunities for recycling, so that pollution is minimized because a waste in one enterprise becomes an input for another. The risk minimization, employment generation and sustained/ increased household income are the obvious benefits associated with multi-enterprise farming systems. Enterprise diversity also creates biodiversity, which makes for more stable ecological systems.

The viability of any multi-enterprise system depends largely on selection of appropriate enterprise-mix that best suites to resource availability. The nature of consumer preferences and market channels are a key to success in multi-enterprise ventures. It should not be construed that the sale of mushrooms in large volumes will occur because a restaurant in Bhopal has it on the menu. At the farmers' level, the policy of enterprise diversification requires that inputs and services, including new technologies, be available to all enterprises on the farm. Finally, promotion of entrepreneurial skills and creativity is a "sine qua non" for evolving economically viable multi-enterprise farming systems from the present milieu of small farms.

C.L. Acharya