

ICAR-IISS

A Profile



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ICAR

ICAR-Indian Institute of Soil Science

Nabibagh, Berasia Road, Bhopal – 462 038

www.iiss.nic.in



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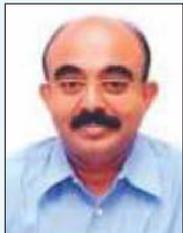
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June 30, 2018

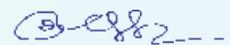


Foreword

Soil, a natural resource, developed over thousands of years of pedogenic process is the foundation of not only food production, but also a habitat of vast biodiversity and a medium for several natural ecosystem processes and services determining air and water quality. Hence, environmental health and social-economic development of a country depend on the maintenance of soil quality. Of late, this issue is gaining importance due to increased anthropogenic activities leading to over-exploitation, misuse of land resources, disturbance of natural fabrics of soil matrix, dumping of waste products on land mass, etc. Researches under the umbrella of ICAR have specifically indicated; fatigue in the agricultural production system resulting in decline of input factor productivity and deterioration in soil and irrigation water quality has been ascribed as major factor for this.

Sustaining the ever increasing population through adequate food production without sacrificing the overall potential of soil requires continuous developments of new technologies and fine tuning of existing technologies in the face of continuous changes in the degree and dynamics of various agricultural and non-agricultural activities. Therefore, a need was felt by the Indian Council of Agricultural Research (ICAR) to establish a national level institute which can carry out research work to address the core issue of enhancing and sustaining soil productivity with minimal environmental degradation. Consequently, the Indian Institute of Soil Science came into existence in 1988 at Bhopal. This bulletin, ICAR-IISS -A profile provides a glimpse of mandate, objectives, research and other facilities at ICAR-Indian Institute of Soil Science. It also enlists the research programs, research achievements and future research strategy by the Division and AICRPs. I hope that the information contained in this bulletin will help in strengthening the liaison within the country as well as with the outside world.

I sincerely appreciate the efforts of the Director and his team in bringing out this bulletin.


K. Alagusundaram





Preface

ICAR-Indian Institute of Soil Science, Bhopal was established in the year 1988 with the objective of carrying out basic and strategic research especially on physical, chemical and biological processes related to management of nutrients, water and energy. The institute is playing a pivotal role in soil characterization and management with focus on enhancing soil health and input use efficiency; conservation agriculture and carbon sequestration; microbial diversity and genomics; and remediation of soil pollution and environmental security.

After successful three decades of service, the institute is now poised to fulfil the national goal of "Enhancing Soil Health and Crop Productivity". The document "ICAR-IISS - A Profile", a revised and updated version of previous one, gives a detailed account of the major achievements, infrastructure developed and future work contemplated in the institute and that of related three All India Co-ordinated Research Projects and one All India Network Project. I hope this introductory document will help in harnessing inter institutional linkages and broad-basing research activities in its attempt to provide a path guiding role in soil science research in the country.

I owe my special thanks to Dr. J.K. Saha, Dr. R. Elanchezhian, Dr. J. Somasundaram and Dr. S.R. Mohanty for assisting in bringing out this document to the present form. I also express my thanks to all the Project Coordinators, HODs and Scientists of the Institute for providing necessary information from time to time for this bulletin.



(A.K. Patra)
Director

ICAR-Indian Institute of Soil Science

June 30, 2018



Introduction

Enhancement and sustainability in agricultural productivity and food quality is intricately related with functional quality of soil resources which is further dynamically influenced by several natural and anthropogenic factors and process. Although emphasis on adequate supply of agricultural inputs led to enhancement in food production in the country during green revolution period, on the other side, deterioration of soil resource quality gradually emerged as an obstacle in agricultural sustainability. Realizing the importance of this issue, ICAR- Indian Institute of Soil Science was established on 16th April 1988 at G.T.B. Complex, T.T. Nagar, Bhopal. Later, the Institute was shifted to a rented building at M.P. Nagar, Bhopal and subsequently was shifted to its permanent campus at Nabibagh on Berasia Road in 1995.

The Institute is the only national center in the country which is carrying out the researches on all dimensions of soil science comprising soil physics, soil chemistry and fertility and soil biology as well as on multi-dimensional area of environmental soil science. Further, in order to strengthen its activities at national scale with the National Agricultural Research System, Project Coordinating units of six All India Coordinated Research Projects (AICRPs) concerned with soil and nutrient management were shifted to the Institute. However, during Tenth Five Year Plan, two of these AICRPs were closed and one AICRP was transformed into All India Network Project.

Vision and Mandate

Institute has the vision of "Providing scientific basis for enhancing and sustaining productivity of soil resources with minimal environmental degradation" with following mandates:

- a) Basic and strategic research on physical, chemical and biological processes in soils related to management of nutrients, water and energy
- b) Advanced technologies for sustainable soil health and quality
- c) Coordinate the network research with State Agricultural Universities, National, International and other Research Organizations

Priorities and Thrust Areas

The priorities of the institute are to carry out soil science research in challenging areas, which are normally not undertaken elsewhere in the country through multidisciplinary approaches and thereby, to carry out comprehensive investigations in the following critical areas:

Programme 1: Soil Health and Input Use Efficiency

- Integrated nutrient management: Indigenous mineral and by-product sources
- Nanotechnology
- Precision agriculture
- Organic farming and produce quality
- Crop simulation modeling and remote sensing
- Fertilizer fortification
- Resilience of degraded soils.
- Developing a workable index of soil quality assessment imbibing influence of different physical, chemical and biological soil attributes

Programme 2: Conservation Agriculture and Carbon Sequestration vis-à-vis Climate Change

- The carbon sequestration research in the context of sustainable management of land and soil resources and conserving deteriorating environment.
- Conservation agriculture and carbon sequestration
- Tillage and nutrient interactions
- Crop adaptation to climate change and rhizospheric study

Programme 3: Microbial Diversity and Genomics

- Characterization and prospecting of large soil bio-diversity
- Characterization of functional communities of soil organisms
- Testing of mixed bio-fertilizer formulations
- Efficient and improved composting techniques

Programme 4: Soil Pollution, Remediation and Environmental Security

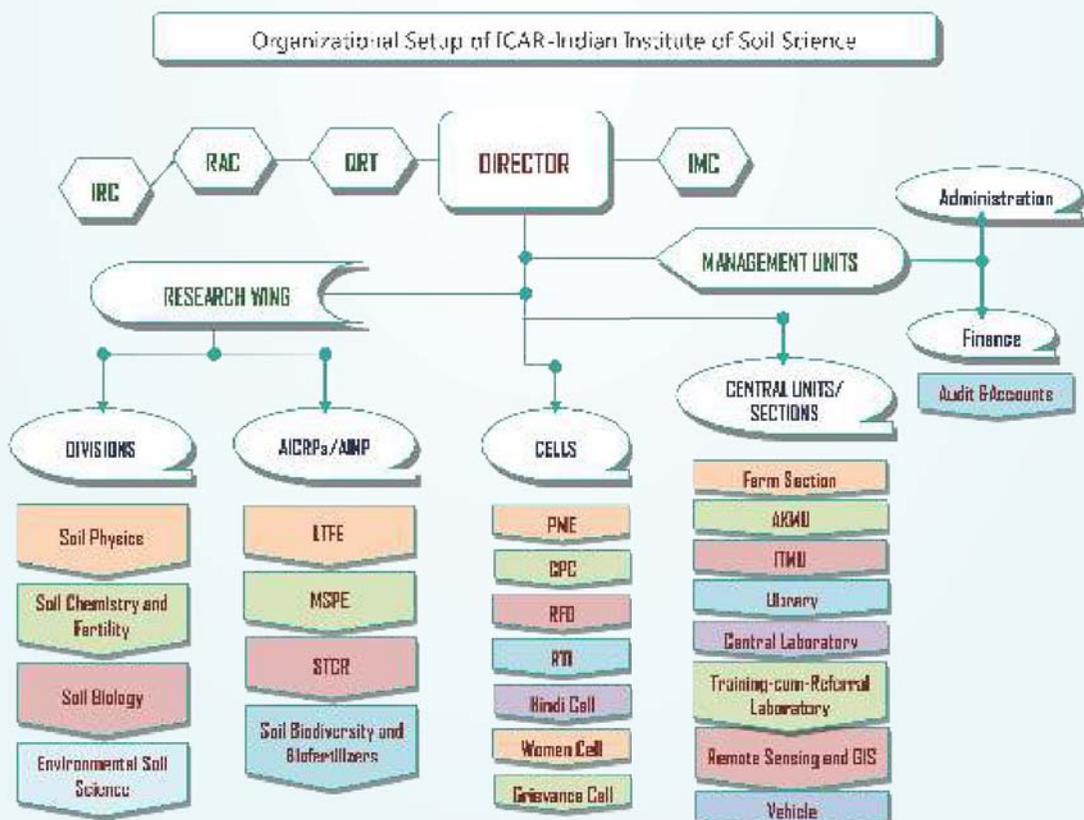
- Soil pollution impact assessment and toxicity amelioration
- Phytoremediation and bioremediation of contaminated soils
- Developing technology for efficient reuse/disposal of city and industrial wastes
- Developing soil management practices for minimizing emission of greenhouse gases
- Environmental impact and risk assessment of nanoparticles on soil health and plant nutrition.

The Institute Set-Up

Director is the overall in-charge of the institute and is responsible to the Deputy Director General, Natural Resource Management (NRM) and the Director General, Indian Council of Agricultural Research, New Delhi. At institute level, Director is assisted by Head of Divisions, Principal Scientists, Senior Scientists and Scientists in technical matters and by the Administrative Officer, Finance & Account Officer in administrative and audit & account related matters. Three All India Coordinated Research Projects (AICRP) and one All India Network Projects (AINP) on soil fertility related aspects are functioning with their coordinating/networking units at the Institute to help in fulfilling its mandate and in strengthening the horizontal reach across the country in Soil Science Research. Besides there is a Consortia Research Platform on Conservation Agriculture and Network Project on Organic farming being operationalized from the institute.

Location

The ICAR- Indian Institute of Soil Science (23.3072° N, 77.4050° E) is centrally located in a beautiful and well-linked city of Bhopal in Madhya Pradesh state of Indian Union. Its magnificent building complex is located at Nabibagh about 7 km from Bhopal Railway Station on Berasia Road and about 10 km from Bhopal Airport.



Manpower**a) Scientific**

S. No.	Discipline	Sanctioned				In Position			
		PS	SS	S	Total	PS	SS	S	Total
1	RMP	1	0	0	1	1	0	0	1
2	Agricultural Economics	0	1	1	2	0	0	0	0
3	Agricultural Extension	0	0	1	1	0	0	1	1
4	Agricultural Microbiology	1	1	2	4	0	1	2	3
5	Agricultural Statistics	0	1	2	3	0	0	2	2
6	Agronomy	1	2	4	7	0	1	4	5
7	Computer Application	0	1	0	1	0	0	0	0
8	Plant Biochemistry	0	1	1	2	0	1	0	1
9	Plant Physiology	1	1	1	3	1	1	1	3
10	Soil Science	9	8	16	33	9	8	15	32
Total		13	16	28	57	11	12	25	48

b) Technical

S. No.	Posts	Sanctioned	In Position
1	T-1	11	0
2	T-2	-	0
3	T-3	7	4
4	T-4	-	1
5	T-5	-	6
6	T-6	1	1
7	T-7-8	1	5
8	T-9	-	0
Total		19	17

c) Administrative

S. No.	Designation	Sanctioned	In Position
1	Senior Administrative Officer	1	1
2	Finance & Accounts Officer	1	1
3	Assistant Finance & Accounts Officer	1	1
4	Assistant Administrative Officer	1	1
5	Private Secretary	2	2
6	Assistant	6	4
7	Personal Assistant	5	3
8	Stenographer Gr-III	2	2
9	Security Supervisor	1	1
10	Upper Division Clerk	2	2
11	Lower Division Clerk	6	2
12	Skilled Supporting Staff	25	20
Total		53	40



Research Infrastructure and Support Services

Research Divisions

There are four divisions in the institute viz. Soil Physics; Soil Chemistry & Fertility; Soil Biology; and Environmental Soil Science.

Division of Soil Physics

Flagship Programme: Conservation Agriculture and Carbon Sequestration vis-à-vis Climate change

Theme/ Thrust Area

- Conservation Agriculture – The prospects and challenges for rainfed Vertisols.
- Impact of conservation agriculture on carbon sequestration and climate change mitigation.
- Tillage, water and nutrient interactions on water and nutrient use efficiency under different cropping systems.
- Management of soil physical components to enhance and sustain soil quality and productivity through conservation agriculture.
- Rooting system architecture of field crops under different management practices.
- Crop Growth Simulation Modeling: Climate change impact studies on different production systems.
- Hyper-spectral remote sensing approaches [visible/near infrared (NIR) and mid-infrared (MIR)] for soil quality evaluation and plant stress assessment.

Salient Research Achievements

- Sprinkler irrigation system has been found more efficient than flooding: Application of 20 cm irrigation through sprinkler in 3 installments registered significantly higher yield and WUE of wheat over application of same amount of water through flooding in 3 installments
- Developed suitable moisture conservation practices and nutrition for improved water use efficiency, P use efficiencies in the production of rainfed chickpea in Vertisols.
- Evaluated long-term impact of tillage, residue, water and fertilizer management on soil health, and productivity of soybean-wheat cropping system in Vertisols.
- Optimization of puddling in rice for maximum yield benefits and minimum adverse effect on soil physical condition in Vertisols.
- Development of a new methodology for soil quality assessment in terms of soil quality index (SQI) for rice-wheat system in Vertisol of central India.
- Soil water storage capacity in a Vertisol of central India has been enhanced through sub-soiling which increased water use efficiency in rainfed soybean.

- Long-term study on different tillage management practices showed that conservation tillage practices namely, no tillage and reduced tillage increase the soil organic carbon stock and also improve the physical health of the soil compared to the conventional tillage practices in soybean-wheat cropping system. Conservation tillage also sustained yield level on par with the conventional tillage with concomitant saving of energy and time through reduced tillage operations.



- Hyperspectral reflectance for predicting nitrogen stress in crops: Vegetation indices namely red edge position (REP) and red edge position slope (REP slope) have been developed for the prediction of nitrogen content in maize leaf and consequently nitrogen stress in maize crop during the vegetative stage using hyperspectral reflectance. The REP value less than 727nm indicates nitrogen stress in maize during the vegetative stage. Besides this, the nitrogen stress in maize could be detected at an early stage using ratio vegetation indices of 550 and 785 nm wavelength bands.

- Broad-bed and furrow (BBF) for efficient water management: Improved land surface management practice viz. broad-bed and furrow (BBF) increased the yield both soybean and maize based cropping systems compared to the traditional flat on grade system in Vertisols of central India. The BBF system safely drained excess rain water while reduced the soil losses through runoff considerably during the rainy season. BBF retained more water in the profile compared to the tradition system during the withdrawal of monsoon causing less moisture stress to the crop.

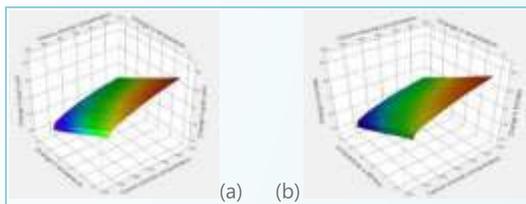


- Prediction model for soil organic carbon (SOC) as function of climate and clay content: A functional relationship has been developed to estimate SOC using maximum & minimum temperatures rainfall and clay content. Using the predicted values of rainfall, maximum and minimum temperatures for the year 2020, 2050 and 2080 as per the IPCC Had CM3 climate change prediction model, the SOC stocks for different India grid locations have been predicted for these years utilizing the functional relationship developed.
- Efficient water and nutrient use under limited water availability situation: By exploiting the synergistic interaction between water and nutrient, the crop yield and water use efficiency of Indian mustard and wheat were improved. One irrigation in wheat or mustard could be compensated through application of FYM in limited water availability situation of central India. Application of farmyard manure along with fertilizer also improved the soil organic carbon and soil physical health.

- Soybean proved better cover crop in preventing soil and nutrient losses: Among the cover crops during rainy season, soil loss (along with soil organic carbon and plant nutrients) were recorded lower under sole soybean and its intercrops (2.15 to 2.38 t ha⁻¹) as compared to sole crops of maize (2.85 t ha⁻¹) and pigeon pea (3.16 t ha⁻¹). Highest losses of SOC (25.83 kg ha⁻¹) and total NPK (7.76, 0.96, 32.5 kg ha⁻¹) were recorded from plots under cultivated fallow.
- Participatory Soil Health Assessment: A new farmer participatory approach of soil health assessment has been developed, whereby a farmer is sensitized, involved, trained and provided with the low cost means of soil health assessment at his own fields. The field assessed qualitative parameters were backed up by quantitative values of these parameters as determined in the laboratory using scientific instruments, and the results supported the inferences drawn by field tools.

			
Infiltrimeter made up of PVC pipe	Wire quadrant from coat hanger	Penetrometers from tensile wire	Measuring the Aggregate stability

- On an average 1°C increase in temperature may result reduction in grain yield by 0.3 t ha⁻¹ and total biomass yield by 0.4 t ha⁻¹. Additionally, prediction models have been used for (i) seedling emergence and growth of rice and wheat as influenced by tillage and residue management, (ii) N mineralization from green manure and farmyard manure in subtropical central India, (iii) better N management in soybean-wheat cropping system of central India for using APSIM model, (iv) investigating climate change impact on soybean and wheat productivity of Madhya Pradesh.
- The mid-infrared spectra between 400 to 4000 cm⁻¹ wave number recorded using the FT-MIR spectrometer in the diffused reflectance mode of the soil samples after their mathematical pre-processing were used for development of mathematical models for prediction of soil properties. Preliminary study results have indicated that the MIR spectroscopy could potentially be used for prediction of soil properties in Vertisols.



Areas of Training/Consultancy offered

The Division has expertise in following areas for imparting the training and consultancy:

- Conservation agriculture and climate change mitigation
- Tillage and residue management
- Soil and water conservation and water management
- Watershed development and management
- Crop Growth Simulation Modeling; Climate change risk assessment and its management.
- Prediction of soil properties through spectroscopy techniques

Manpower

S. N.	Name	Designation	Discipline	Date Of Joining ICAR	E Mail ID
1.	Dr. R. S. Chaudhary	Pr. Scientist & HOD	Soil Science	10.11.1993	ranjeet.chaudhary@icar.gov.in
2.	Dr. Kuntal Mouli Hati	Pr. Scientist	Soil Science	27.12.1996	kuntal.hati@icar.gov.in
3.	Dr. R. K. Singh	Pr. Scientist	Soil Science	25.01.1993	rakesh.singh@icar.gov.in
4.	Dr. J. Somasundaram	Pr. Scientist	Soil Science	12.11.2001	somasundaram.j@icar.gov.in
5.	Dr. Prabhat Tripathi	Pr. Scientist	Agronomy	19.09.1998	prabhat.tripathi@icar.gov.in
6.	Dr. M. Mohanty	Sr. Scientist	Soil Science	10.11.1999	manoranjan.mohanty@icar.gov.in
7.	Mrs. Seema Bhardwaj	Scientist	Soil Science	07.01.2008	seema.bhardwaj@icar.gov.in
8.	Dr. Nishant K Sinha	Scientist	Soil Science	20.04.2010	nishant.sinha@icar.gov.in
9.	Mr. R. K. Mandloi	ACTO	-	19.06.1989	rajesh.mandloi@icar.gov.in
10.	Mr. P.K. Chouhan	Technical Officer (T-5)	-	15.02.1993	pramod.chouhan@icar.gov.in
11.	Mr. Janak Singh	Skilled Supporting Staff	-	08.09.1997	janak.mehra@icar.gov.in

Future Works/ Thrust

- Conservation agricultural practices for improving soil quality, carbon sequestration potential and sustaining crop productivity.
- Improving soil health and water productivity through best management practices.
- To exploit synergistic effect of tillage x water x nutrient interactions for improving input use efficiency.

- Application of remote sensing techniques for optimizing land use managements.
- Simulation modeling approach for studying climate change impact on natural resource management and optimization of tillage, crop residues, nutrient and irrigation in different cropping systems.
- Modeling root system architecture for simulating solute and water movement in soil-plant systems.

Infrastructure/Facilities

The divisional laboratory is equipped with many modern sophisticated types of equipment to measure physical properties of soil and plant parameters like Pressure plate apparatus, Guelph permeameter, Digital cone Penetrometer, Plant moisture system, Image analysis system for leaf and root, Sand box, Kaolin box, Ksat- permeameter, Rainfall simulator, Total organic carbon analyzer, Spectro-radiometer, Yoder's Apparatus, Tensiometers, IR-thermometer, Fourier Transform mid-infrared (FT-MIR) spectroscope, Portable X-ray fluorescence (pXRF) spectroscope and Greenhouse gas (GHG) analyzer. In addition, the laboratory has facilities for determining the basic chemical properties of soil such as Digital Spectrophotometer, Flame photometer, Kjeltac Analyzer, Gerhard's digestion unit, pH meter and a range of electronic balances.



Gas Chromatograph



Pressure Plate Apparatus



Portable X-ray fluorescence (pXRF) spectroscope



Digital Penetrometer

Division of Soil Chemistry and Fertility

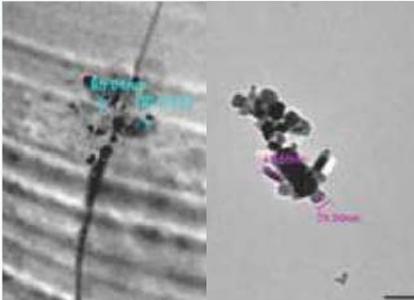
Flagship Programme: Soil Health Management and Nutrient Use Efficiency

Theme/ Thrust Area

- Conduct basic and strategic research on nutrient management and soil fertility improvement
- Study on nutrient dynamics for enhancing nutrient use efficiency
- Develop strategies towards soil health assessment and improvement
- Assess and develop new fertilizer products /formulations
- Develop strategies for utilization of indigenous alternative nutrient resources
- Development and use of simulation models for sustainable crop production

Salient Research Achievements

- Region-specific databases on nutrient resources in agriculture: Nutrient database for the entire country has been developed along with user friendly intelligent data retrieving system for efficient nutrient management. This delivers district wise information on deficiency or sufficiency of different nutrients and indicates the hotspots where nutrient availability is less than the requirement.
- Carbon pools dynamics in different IPNS modules: Organic sources of plant nutrient (8t FYM to soybean and 16t FYM to wheat) has resulted in higher organic carbon content in the soil profile as compared to integrated nutrient management in soybean-wheat cropping system in Vertisol. Higher content of carbon existed in macro aggregates than micro-aggregates. For maintaining the initial SOC, annual input of 554 kg C ha⁻¹ is required which is maintained by soybean- wheat system in central India.
- Saturation limit and stabilization mechanism of organic carbon in soil have been worked out: A study quantified C in different fractions of SOM in different land use systems of Vertisol of Bhopal. Mean residence time (MRT) of active C pool in different land use system varied from 25–67 days with an average value of 46 days. MRT of slow carbon pool (Cs) under the FYM (organic plot) increased by 4 fold (17.5 years) in comparison to inorganic treatment (RDF) plot.
- Mechanical Harvest Borne Wheat Residue Management: Wheat residue incorporation resulted in 20–22% higher yields in soybean and 15-25% in wheat as compared to residue burning. Available P and K status and soil organic carbon content of soil improved with wheat residue incorporation and residue surface retention. The value cost ratio (VCR) was 14.7 for residue incorporation and 3.1 for residue retention.
- Mobilization and utilization of phosphorus from rock phosphate: Decomposing soybean leaf litter (SLL) solubilized P to the extent of 11-20% of total P in rock phosphates within a period of 2 months. In the presence of soybean leaf litter, rock phosphates alone or in combination with pyrite (on 1:2 P to S ratio) were 46-53% and 62-74% as effective as SSP.

- A new soil carbon and nitrogen turnover model has been developed by using the soil and crop dataset of long term fertilizer experiments of India. The model simulates soil carbon dynamics for different annual crops and plant communities. It can compute total organic carbon, Walkley & Black C content, carbon in resistant (passive) and mineralizable (active+slow) pools, carbon stocks, total N, and available N.
 
- The use of Nanoparticles such as Fe, Cu and Zn on fertilization on crop growth and metabolism is gaining impetus in recent time. It was observed that optimal concentration of Fe NPs/ Cu NPs / Zn NPs had positively influenced the shoot growth, grain yield and biochemical traits viz. total soluble protein, membrane stability, proline accumulation in plants. Besides, it was also observed that nanoparticles at sub-optimal concentration was useful for the crop and acted as catalyst for growth and metabolism in order to obtain higher crop yields.
 
- Organo-zeolite mixtures were prepared for possible applications in agriculture to minimize nutrient losses especially nitrogen. It has potential to reduce ammonia volatilization and nitrate leaching. The retention potential of nano-zeolites for N, P and S is significant. Also, the nano-porous synthetic zeolite could be used as carrier of two important micronutrients, namely, Zn and Mo, for their smart delivery in the field.
- Biochar has been found as an effective amendments for acidic soils. The application of biochar increased soil pH, NO₃-N concentration, exchangeable soil potassium, Ca + Mg concentrations and reduced exchangeable Al concentration.
- Degree of Phosphorus (P) Saturation (DPS) indices were developed for some selected Indian soil orders representing Vertisol, Inceptisol, Alfisol and Ultisol using different extractants namely Olsen, Bray1, Bray2, Mehlich 3, AB-DTPA and Ammonium Oxalate. It was found that Olsen and Mehlich 3 extractants can be used in neutral to alkaline soil. Whereas, Bray1, Bray2, Mehlich 3 and Ammonium Oxalate can be used for acidic Alfisol and Ultisol.
- The plastic limit and liquid limit properties of the clay loam soil reduced with depletion in soil C level. Upon reclamation with 20 tons FYM/ha, the plastic limit increased under depleted C conditions (33–54%). Similar to plastic limit, the effect of management treatments was also conspicuous in reclaiming the liquid limit from the depleted soil C levels.

Technologies Developed

A mini-lab for soil testing and soil health advisory: A mini laboratory 'Mridaparikshak' has been developed which obviates the need of expensive and voluminous traditional laboratories. This mini lab can estimate 15 important soil parameters viz., pH, EC, organic carbon, available nitrogen, phosphorus, potassium, sulphur, zinc, boron, iron, copper, manganese, gypsum requirement (GR), lime requirement (LR), and calcareousness. It can also provide soil and crop specific fertilizer recommendations directly to farmers on their mobiles through SMS. Mridaparikshak technology has been applied for IP protection vide patent application No. 2522/DEL/2015 in India, and also internationally vide PCT Application: PCT/IB2016/054853 Trademark application No. is 3034997.



An overview of *Mridaparikshak*



Hon'ble Prime Minister distributing *Mridaparikshak* to rural youth

Ready Reckoner for Farmer Resource Based Integrated Nutrient Management in Soybean-Wheat System

- A ready reckoner developed for recommending fertilizer doses to farmers having varying levels of resources as shown below:

FYM availability (t ha ⁻¹)	Fertilizer Nutrient (kg ha ⁻¹)							
	Soybean				Wheat			
	N	P	S	Zn	N	P	S	Zn
0	35	29	40	12	140	40	40	0
4	20	24	20	6	110	32	20	0
8	10	15	0	3	80	22	0	0
16	0	0	0	0	60	10	0	0

Thus, if a farmer has 4 t FYM for one-hectare area, he should use 20, 24, 20 and 6 kg of N, P, S and Zn for soybean and 110, 32, 20 and 0 kg of N, P, S and Zn for wheat.

Low-cost Integrated Nutrient Management (INM) Technology for Soybean-Wheat System

- The INM module comprising “50% NPK + 5 t FYM /ha + Rhizobium to soybean and 75%NPK+PSB to wheat” resulted in 11% higher soybean yield and 25% higher wheat yield as compared to Farmers’ practice.



Balanced Fertilization with Broad Bed Furrow (BBF) in Soybean on Waterlogged Fields

- On waterlogged fields, planting soybean with balanced fertilization on Broad Bed Furrows (BBF) produced 50% higher yield than Balanced fertilization with Farmers’ Practice (FP).



Best INM Practices for Oilseeds Based Cropping Systems On Farmers’ Fields

- On Green manuring with sesbania @ 2 t ha⁻¹ and 75% RDF (80N+40P+20S) recorded 3.7 q ha⁻¹ higher seed yield of mustard at Bharatpur.
- Inclusion of soil moisture conservation measures, i.e. opening furrows after every 4-6 rows of crop in INM treatment (100% RDF + 2 t FYM) resulted in significant increase in yield of sunflower at Latur, Maharashtra over farmer’s practice.

Integrated Nutrient Management (INM) for Pulses

- On-farm trials on INM for pulses (chickpea and lentil) conducted at 60 farmers’ fields in Raisen, Bhopal, Rewa and Satna districts of Madhya Pradesh not only resulted in higher yields but also saved fertilizer cost
- Application of 75% NPK + 2.5t FYM + seed inoculation through Rhizobium + soil application of 3 kg PSB ha⁻¹ to the soybean during kharif and 50-75% NPK to rabi crop (chickpea/lentil) (based on residual moisture availability) produced 12-25% more chickpea and 15-28% more lentil yields as compared to traditional practice

Mechanical harvest-borne wheat residue management under soybean-wheat system

- Wheat residue incorporation or retention coupled with application of 28 kg N ha⁻¹ through fertilizer or organic manures is more beneficial than burning in terms of enhanced crop productivity and soil fertility.
- Wheat residue incorporation resulted in 20–22% higher yields in soybean and 15-25% in wheat as compared to residue burning.
- Soil incorporation of wheat residue plus N supplementation through FYM at the rate of 28 kg N ha⁻¹ (approx. 4 t FYM ha⁻¹) along with 25 kg P ha⁻¹ for rainfed soybean and 68 kg N + 30 kg P ha⁻¹ for irrigated (1+ 2 irrigations) wheat was more effective and profitable.

Farmers' resource based integrated plant nutrient supply system: In soybean-wheat system, balanced fertilization based on soil tests with 4 t FYM ha⁻¹ to soybean crop was the best in terms of system productivity. Farmers' resource-based IPNS intervention as calculated from targeted yield equation based on soil test crop response produced 8-49% more soybean yield and 11-39% more wheat yield as compared to farmers' practice. Balanced application of N, P, K, S and Zn at recommended rates increased the wheat grain yield by 15-24% as compared to farmers' practice.

Manpower

S. N.	Name	Designation	Discipline	Date Of Joining ICAR	E Mail ID
1.	Dr. A. K. Biswas	Pr. Scientist and Head	Soil Science	21.01.1992	ashish.biswas@icar.gov.in
2	Dr. S. Srivastava	Pr. Scientist	Soil Science	22.03.1996	sanjay.srivastava1@icar.gov.in
3	Dr. B. L. Lakaria	Pr. Scientist	Soil Science	01.10.1997	brij.lakariya@icar.gov.in
4	Dr. R. Elanchezhian	Pr. Scientist	Plant Physiology	09.11.1998	elanchezhian.r@icar.gov.in
5	Dr. N. K. Lenka	Pr. Scientist	Soil Science	30.11.2000	narendra.lenka@icar.gov.in
6	Dr. Pramod Jha	Pr. Scientist	Soil Science	16.04.2003	pramod.jha@icar.gov.in
7	Dr. A.K. Vishwakarma	Pr. Scientist	Agronomy	16.04.2003	anand.vishwakarma@icar.gov.in
8	Dr. A.L. Kamble	Scientist	Agricultural Economics	20.04.2010	ankush9385@gmail.com
9	Dr. (Mrs.) K.C. Shinogi	Scientist	Agricultural Extension	27.04.2011	shinogi.c@icar.gov.in
10	Dr. B. P. Meena	Scientist	Agronomy	15.09.2011	bharat.meena@icar.gov.in
11	Dr. A.O. Shirale	Scientist	Soil Science	01.01.2015	abhay.shirale@icar.gov.in
12	Dr. (Mrs.) Gurav Priya Pandurang	Scientist	Soil Science	01.01.2016	gurav.pandurang@icar.gov.in
13	Mr. Deepak Kaul	ACTO	-	29.12.1988	deepak.kaul@icar.gov.in
14	Mr. Jai Singh	Sr. Technical Officer T-6	-	22.05.1990	jai64@rediffmail.com
15	Mr. Harish Kumar Barmiya	Skilled Supporting Staff	-	14.03.1990	hbarmaiya18@gmail.com

Infrastructure/Facilities

Total Organic Carbon Analyzer; UV-Visible Spectrophotometer; Flow Injection Analyzer; Flame Photometer; Kelplus Total Nitrogen Analyzer; Low Temperature Centrifuge; Elga Water Distillation System; Orbital Shaking Incubator; Glass Distillation Unit for Available Nitrogen

Estimation; pH Meter; EC Meter; Sonicator; Magnetic Stirrer; Fume Hood Chamber for Total Elemental Analysis, OTC facility.



OTC Facility



TOC Analyzer

Flow Injection Analyzer

Areas of Training/Consultancy Offered

- Soil testing and fertilizer recommendation
- Soil health assessment and management
- Nutrient use efficiency
- Best management practices for nutrient use efficiency
- Indigenous and alternate sources of nutrients

Future Works/ Thrust

The division is poised to play a key role in meeting out the challenges for ensuring food and nutritional security from shrinking land resources and achieving self-reliance in crop fertilization through indigenous mineral and by-product sources. Besides, the division will continue to collaborate with other scientific disciplines and AICRPs in meeting out the challenges of maintaining soil quality and ecological balance.

Division of Soil Biology

Flagship Programme: Microbial Diversity and Genomics

Theme/Thrust Area:

- Management of soil biota, bio-fertilizers, phosphate solubilizing microorganisms (PSM), vesicular arbuscularmycorrhiza (VAM), earthworms etc. to enhance the nutrient supply
- Developing plant growth promoting rhizobacteria (PGPR) as inoculants
- Efficient techniques for inoculation and composting
- Organic pools, organic matter dynamics and study of bio-chemical changes in soil
- Carbon sequestration study under different land use-management systems in semi-arid tropic benchmark soils of India.
- Greenhouse gas regulating microbes and mitigation processes
- Organic farming and Produce Quality

Manpower

S. N.	Name	Designation	Discipline	Date Of Joining ICAR	E Mail ID
1.	Dr. M.C. Manna	Principal Scientist & HOD	Soil Chemistry/ Fertility/ Microbiology	21.01.1992	m.manna@icar.gov.in
2.	Dr. A.B. Singh	Principal Scientist	Plant Biochemistry	22.03.1999	a.singh@icar.gov.in
3.	Dr. A.K. Tripathi	Principal Scientist	Soil Chemistry/ Fertility/ Microbiology	05.8.1991	a.tripathi@icar.gov.in
4.	Dr. S.R.Mohanty	Principal Scientist	Soil Chemistry/ Fertility/ Microbiology	18.06.2009	santosh.mohanty@icar.gov.in
5.	Dr. Kollah Bharati	Principal Scientist	Microbiology - Plant Science	29.10.2009	kollah.bharti@icar.gov.in
6.	Dr. Asit Mandal	Scientist	Soil Chemistry/Fertility	23.06.2009	asit.mandal3@icar.gov.in
7.	Dr. J. K. Thakur	Scientist	Agricultural Microbiology	20.04.2010	jyoti.thakur@icar.gov.in
8.	Dr. Asha Sahu	Scientist	Soil Chemistry/Fertility	03.05.2010	asha.sahu@icar.gov.in
9.	Dr. Sudeshna Bhattacharyya	Scientist	Soil Chemistry/Fertility	01.01.2015	sudeshna.bhattacharjya@icar.gov.in

10.	Dr. Dolamani Amat	Scientist	Agricultural Microbiology	05.01.2017	dolamani.amat@icar.gov.in
11.	Mrs. K.S. Baise	PA	-	05.05.1997	kirti.bais@icar.gov.in
12.	Mrs. Seema Sahu	Asstt. Chief Tech. Officer	-	14.04.1987	seema.sahu@icar.gov.in
13.	Mr. S.K. Rai	Tech. Assistant	-	15.06.1989	sant.raai@icar.gov.in
14.	Mr. Kalicharan	Skilled Supporting Staff	-	01.09.1993	kalicharanverma786@gmail.com

Salient Research Achievements

- The Arbuscular Mycorrhizae population was approximately twice as high in soybean as in wheat. Bioavailable P was significantly correlated with the rates of inorganic P solubilization, and organic –P mineralization and with the activities of microbes.
 - Identified 3 earthworms (*Eisenia fetida*, *Perionyx excavatus*, and *Dicogaster bolaii*) for vermicomposting in central India. *Aspergillus heteromorphus*, *A. terreus*, *A. flavus* and *Rhizomucor pussillus* were found better cellulose decomposers during compost preparation.
 - Under organic farming system, combined application of cattle dung manure (2 t/ha) + Vermicompost (1.5 t/ha) and poultry manure (1.5 t/ha) + bio-fertilizer @ 5 kg/ha sustained the productivity of soybean, chickpea and mustard and isabgol crops as well as improved biological health of soil. Organic farming improved quality of soybean, wheat, isabgol and mustard seed as well as fruit quality of pomegranate.
- 
- Long term (30 years) cultivation in Alfisols at Ranchi, addition of NPK fertilizer either with FYM or lime amendment had greater particulate organic matter carbon and organic matter nitrogen over fallow land. SOC content significantly correlated with sustainable yield index and active fractions of SOC, which support better sustainable productivity
 - Among different fungi, *Pleurotus florida* sorbed highest amount of heavy metals (Cd and Pb) followed by *Aspergillus awamorii*, *Penicillium sp.* and *Fusarium sp.* The adsorption of Pb was relatively higher than Cd biosorption.
 - The bioproduct stimulated various soil enzymatic activities and increased abundance and activity of N₂ fixers, P solubilizers, heterotrophs, and methanotrophs. The product minimized N₂O-N loss and aided CH₄ mediated C sequestration.

- Potential methanotrophs were isolated from FYM and identified through 16S rRNA sequencing as *Methylobacter* sp. Isolated methanotrophs are useful to mitigate CH₄ emission during composting.
- Three types of composts including vermicompost (VC), poultry manure (PM), and farm yard manure (FYM) and two sizes of BC (<0.25 mm, and 0.25-2.00 mm) were applied as single or in combination to soil. Application of biochar (particularly smaller sized) reduced CH₄ emission from soil amended with different types of composts.
- A Biofiltration was developed to remove heavy metals from MSW using fungi viz. *Trichoderma viride*. This technology removed heavy metals to the extent of 18-51.5% for Pb, 15.5 -35.3% for Ni and 4.6 -32.8% for Zn.
- Potential of ornamental plants (Xerophytes: *Furcraea*, *Agave* and *Euphorbia* sp., and floriculture plants *Tuberose*, *Gladiolus*, *Aster*, *Dahlia*, *Calendula*, *Rose*, *Marigold* and *Chrysanthemum*) was evaluated for the remediation of soils contaminated with Cr. The xerophytic plants i.e., *Furcraea*, *Agave* and *Euphorbia* tolerated higher level of Cr (50 mg kg⁻¹ soil).

Areas of Training/Consultancy Offered

- Vermi compost production in small and large scale
- Production of enriched compost (phospho-Sulpho-Nitro-compost)
- Recycling of complex/harder organic waste
- Nutritional quality assessment various composts and biogas slurry
- Produce quality evaluation of cereals/pulses/oilseeds and fruits crops.
- GHG Measurement from agricultural fields and composting system
- Metagenomic approach for soil biodiversity

Future Work/Thrust

- Development of composting techniques for recycling of municipal solid wastes
- Quality assessment of agricultural produce
- Interaction study between PGPR with N₂ fixers
- Assessing soil biological quality parameters
- SOC pools and dynamics
- Management of agro-waste
- Emission and Mitigation of GHG



Compost production unit

Infrastructure/Facilities

Important equipments in the divisional laboratory include HPLC, GC, NIR-spectrophotometer, laminar flow, BOD, research microscope with camera and CCTV system, and media distributor besides other basic facilities like inoculation chamber, Gel doc, RTPCR, PCR, Nano drop Spectro photometer, Gel Electrophoresis and Compost production unit.

Division of Environmental Soil Science

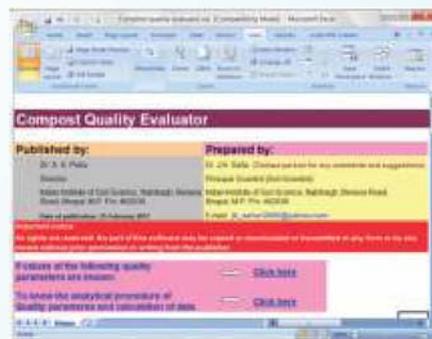
Flagship programme: Soil Pollution, Remediation and Environmental Security

Theme/ Thrust Area

- Soil pollution impact assessment and toxicity amelioration
- Determination of safe concentration limits of heavy metals in soils
- Developing technology for efficient reuse/disposal of city and industrial wastes
- Developing soil management practices for minimizing emission of greenhouse gases
- Environmental impact and risk assessment due to unregulated use of agro-industrial wastes
- Environmental impact and risk assessment of nano-particles on soil health and plant nutrition.

Salient research achievements

- Assessment of soil and water pollution in India: The division assessed contamination levels in soil and water body in 12 industrial areas in 6 states. Use of industrially polluted water for irrigation resulted build-up of salts and heavy metals in different locations.
- Phosphorus loading to Upper Lake, Bhopal: P loss from the agriculture field and its entry into lake water-body has been associated mainly with soil loss /sediment P. The bioavailable fraction of P was more in domestic waste water at discharge point where algal blooms were noticed.
- New protocol for compost quality evaluation and utilization: Developed new method of grading system for municipal solid waste (MSW) composts based on fertilizing potential and heavy metal contamination potential for maximum and safe use in agriculture. Quality evaluation of MSW compost from 29 cities of India indicated that larger cities produced poor quality composts than smaller cities and segregation of wastes prior to composting is found essential for producing good quality organic manure containing safe level of heavy metals. Developed user friendly software for evaluation of compost quality and uploaded in the Institute website for use by different stakeholders.
- Safe concentration limits of heavy metals in MSW compost: Through an innovative approach, safe concentration limits in MSW compost have been determined which protect different components of environment. Toxicity parameters of different heavy metals were



studied in details emphasizing on their impacts separately on soil microbial activity, plant growth as well as their potential to contaminate food chain.

- Low cost method to reduce heavy metals contents in MSW composts: Extraction-wet sieving through 0.25 mm sieve using efficient extractants (0.05N EDTA or RSW+0.01N EDTA) reduced different heavy metals on an average by about 34-58%.
- Safe use of industrial and municipal effluent: Technology has been developed for safe utilization of distillery effluent in Vertisol for harnessing its nutrients. Nutrient potential and soil health impact due to municipal sewage effluent use for crop production have been assessed. Irrigation with such effluent has been found a mechanism of nutrient recovery, which otherwise go waste and pollutes water bodies.
 
- Global warming potential in soybean-wheat system: GHGs emission in soybean-wheat system under different tillage systems has been quantified. Annual carbon equivalent emission (CEE) was less and soil carbon sequestration was higher in no-till (NT) treatment as compared to reduced tillage (RT) in soybean wheat system after 6 years of experimentation. Net global warming potential followed: inorganic > INM > organic nutrient treatments
- Soil quality and resilience assessment: Minimum data sets for soil quality evaluation have been identified for major agro-ecosystems of India. A protocol for assessing soil quality using relative soil quality index as well as protocol of soil resilience study has been developed. Soil fertility map for several tribal districts of Madhya Pradesh has been prepared.
- Nanotechnology for enhancing nutrient use efficiency: Nano-rock phosphate (soil application) and nano-ZnO (seed coating) were found promising source of essential nutrients. Nano rock phosphate proved equally efficient to SSP for enhancing crop production. Also a protocol for nano rock phosphate delivery system with pine oleoresin (POR) coated urea was developed.
- New slow release N fertilizer: Coating of granular urea fertilizer with pine oleoresin has been found to enhance N use efficiency in wheat and to reduce N₂O (a greenhouse gas) emission from soil.
 
- New soil testing methods: A new ion-chromatographic method of estimation of available fluoride in soil has been developed, which is simple, rapid (as compared to colorimetric method) and interference free (as compared to ion selective electrode method). Accuracy and precision of boron determination by widely popular Azomethine-H method has been

improved after detecting laboratory room temperature as an important component of error in the method. Accuracy and precision of boron determination by this colorimetric (azomethine-H) method has been improved by suggesting optimum and constant temperature in the range of 15-20°C.

Areas of Training/Consultancy Offered

- Primary and secondary data generation and interpretation on status of soil pollution.
- Soil ecosystem quality monitoring
- Assessment of carrying capacity of soil for pollutants
- Decontamination of soil pollutants through biological and chemical means
- Minimizing contamination of pollutants in the food chain
- Groundwater quality monitoring vicinity of industrial activity
- Evaluation and impact of city and industrial wastes for their use in crop production
- Reclamation of land degraded due to the use of industrial effluents
- Analysis of soil, plant, wastes and water for pollutants
- Use of distillery wastes in agriculture
- Use of municipal sewage water in agriculture

Research facilities:

The division of Environmental Soil Science has excellent facilities for conducting world class research in the field of heavy metal pollution in soil and water, and is equipped with instruments like Inductively Coupled Plasma- Optical Emission Spectrometer, Anodic stripping voltametry, CN analyzer, Leaf area meter, UV visible spectrophotometer, flame photometer, lyophilizer, BOD and COD analyzer, pH meter, EC meter, Soxlet apparatus, as well as several other instruments. The division is also developing facilities for conducting nano-technological research and has BET surface area analyzer for determining surface area of nano particles.



ICP-OES



CN analyzer

Future Work/Thrust

- Development of database on extent of soil and water pollution
- Developing technology for safe recycling of industrial and agricultural wastes in agriculture
- Determination of baseline concentration for delineating metal contaminated areas and maximum safe concentration limits of heavy metals for major soil orders
- Conversion of naturally occurring plant nutrient containing minerals using nanotechnology to enhance the availability of plant nutrients in soil and faster reclamation of problem soils
- Developing technologies for minimizing green-house emissions from agricultural land
- Developing effective phytoremediation technology for heavy metal contaminated soils

Manpower

S. N.	Name	Designation	Discipline	Date Of Joining ICAR	E Mail ID
1.	Dr. J. K. Saha	Pr. Scientist & HOD	Soil Chemistry/Fertility/Microbiology	21.01.1992	jayant.saha@icar.gov.in
2.	Dr. S. Kundu	Pr. Scientist	Soil Chemistry/Fertility/Microbiology	06.08.1992	samaresh.kundu@icar.gov.in
3.	Dr. Ajay	Pr. Scientist	Plant Physiology	12.04.1993	ajay1@icar.gov.in
4.	Dr. T. Adhikari	Pr. Scientist	Soil Chemistry/Fertility/Microbiology	22.03.1996	tapan.adhikari@icar.gov.in
5.	Dr. S. Ramana	Principal Scientist	Plant Physiology	06.02.1997	s.ramana@icar.gov.in
6.	Dr. M.V. Coumar	Scientist	Soil Chemistry/Fertility	04.11.2009	mv.coumar@icar.gov.in
7.	Dr. S. Lenka	Sr. Scientist	Soil Physics/Soil & Water Conservation	08.01.2007	sangeeta.lenka@icar.gov.in
8.	Mr. V. Meena	Scientist	Agronomy	15.09.2011	vasudev.meena@icar.gov.in
9.	Mr. Abhijit Sarkar	Scientist	Soil Science	05.07.2016	abhijit.sarkar@icar.gov.in
10.	Mrs. Madhumonti Saha	Scientist	Soil Science	05.07.2017	madhumonti.saha@icar.gov.in
11.	Dr. Utkarsh Tiwari	Scientist	Agricultural Economics	05.07.2017	utkarsh.tiwari@icar.gov.in
12.	Mr. Vinod Babu Pal	ACTO	-	15.02.1993	vinod.pal@icar.gov.in
13.	Mr. V. Choudhary	Sr. Technical Assistant	-	15.06.1989	vinod.choudhary@icar.gov.in
14.	Mr. Ram Bharose	Skilled supporting staff	-	10.06.1999	-

All India Coordinated Research Projects (AICRPs) and All India Network Project (AINP)

Institute has three AICRP units viz Long Term Fertilizer Experiments, Micronutrients, Soil Test Crop Response and one AINP on Soil Biodiversity & Biofertilizers each having its coordinating centers across the country.

AICRP on Long Term Fertilizer Experiments

Theme/Thrust Area

- The experiments cover predominant cropping systems and major soil groups of the country
- Provide an excellent experimental basis to quantify carbon sequestration; quality of organic matter and nutrient cycling and thus one can estimate the effects of input management of the soil health.
- Compilation of long term data (yield, soil properties, nutrient, budgets etc) allows evaluation of soil use systems over a period of several decades.
- The management practices are tested for their ecological impacts with computer models that stimulate soil organic matter (SOM) changes in soils.
- The experiments offer an excellent opportunity to define indicators for soil quality, which are sensitive to changes with soil management practices and evaluation of soil quality.

Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1.	Dr. Muneshwar Singh	Pr. Scientist &Project Coordinator	11.07.1989	muneshwar.singh@icar.gov.in
2.	Dr. R.H. Wanjari	Sr. Scientist	07.01.1999	r.wanjari@icar.gov.in
3.	Mr. Sunny Kumar	Stenographer (Gr. III)	21.12.2011	sunny.kumar@icar.gov.in
4.	Mr. J.N. Gaur	Skilled Supporting Staff	20.07.1992	jaganath.gour@icar.gov.in

List of coordinating centers/stations

S.N	Location (state)	Year of start	Soil Type	Cropping system
1.	CRIJAF Barrackpore (W.B.)	1971	TypicEutrochrept	Rice-wheat-jute fibre
2.	PAU Ludhiana (Punjab)	1971	TypicUstochrept	Maize-wheat
3.	IARI New Delhi (Delhi)	1971	TypicUstochrept	Maize-wheat
4.	TNAU Coimbatore (T.N.)	1971	VerticUstopept	Finger millet-maize
5.	JNKVV Jabalpur (M.P.)	1972	TypicChromustert	Soybean-wheat
6.	GKVK Bangalore (Karnataka)	1972	KandicPaleustalf	Finger millet-maize

7.	AGRAU RRS Jagtial (AP)	2000	TypicTropaquept	Rice-rice
8.	OUAT Bhubaneshwar (Orissa)	2002	AericHaplustalf	Rice-rice
9.	BAU Ranchi (Jharkhand)	1972	TypicHaplustalf	Soybean-wheat
10.	CSKHPKV Palampur (H.P.)	1972	TypicHaplustalf	Maize-wheat
11.	GBPU&T Pantnagar (Uttaranchal)	1971	TypicHapludoll	Rice- wheat
12.	JAU Junagadh (Gujrat)	1996	VerticUstochrept	Groundnut wheat
13.	Dr. PDKV, Akola (Maharashtra)	1996	TypicHaplustert	Soybean-wheat
14.	KAU Pattambi (Kerala)	1996	TypicHaplustalf	Rice-rice
15.	IGKV Raipur (Chhattisgarh)	1996	TypicHaplusterts	Rice- wheat
16.	MPUA&T Udaipur (Rajasthan)	1996	TypicUstochrept	Maize-wheat
17.	MPKV Parbhani (Maharashtra)	1996	TypicChromustert	Soybean- Safflower
18.	IASRI- Voluntary centre (Delhi)	1972	-	-

Infrastructure/Facilities

Soil analytical instruments like spectrophotometer, Ultra-sonicator, FTIR analyzer are under operation in PC unit. The database of crop yield, soil parameters is being maintained at IASRI, New Delhi.

Salient Research Achievements

- Application of N alone in Alfisol has deteriorated the soil health.
- The data generated under LTFE at different centres disapproved the notion that application of fertilizer reduced the SOC.
- Studies were conducted to focus on impact of long term fertilizer use on crop productivity, soil health and dynamics of major nutrients
- Impact of fertilizer on microbiological properties was studied in long term fertilizer trials. The study revealed that balance application of fertilizer has positive effect on microbial activities and it is always best to harness maximum potential of crop.
- Conjunctive use of fertilizer and organic manure on the soil physical properties was assessed and revealed improvement in soil physical condition.
- These long term experiments have confirmed the deficiency/inadequacy of various micro-nutrients as site specific yield limiting factors.
- Application of fertilizer nutrient either alone or in combination of organics resulted increase in productivity.
- Impact of changing climate on crop productivity is also being studied.



Areas of Training/Consultancy offered

- Soil Chemistry and Fertility
- Nutrient dynamics
- Soil quality indicators
- Organic pools and dynamics
- Carbon assimilation and net carbon budgeting/ sequestration
- Assessment of changing climate on crop yield



Future Work/Thrusts:

- Testing of different management practices for their ecological impacts and development of models to predict soil organic carbon (SOC) change in soil.
- Identify and define indicators for soil quality assessment which are sensitive to changes with respect to soil management practices.
- Impact assessment of changing climate on crop productivity and soil health.

AICRP on Soil Test Crop Response

Theme/ Thrust area: To Provide Scientific Basis for Enhancing and Sustaining Productivity of Soil and Crops through Targeted Yield Approach of Plant Nutrient Management with Minimal Environmental Degradation.

Infrastructure/Facilities: Soil analytical instruments like Nitrogen distillation and digestion apparatus, spectrophotometer, flame photometer, pH meter, E.C. meter, double distillation apparatus and centrifuge.

Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1.	Dr. Pradip Dey	Pr. Scientist & Project Co-ordinator	03.06.1993	pradip.dey@icar.gov.in
2.	Dr. Abhishek Rathore	Scientist	16.12.2002	
3.	Mr. Hiranmoy Das	Scientist	15.09.2011	hiranmoy.das@icar.gov.in
4.	Mrs. Geeta Yadav	Private Secretary	26.12.1995	geeta.yadav@icar.gov.in
5.	Mrs. Kavita Bai	Skilled Supporting Staff	20.12.1988	kavita.bai@icar.gov.in

S. No. Centre Location

- 1 Orissa University of Agriculture & Technology (OUAT), Bhubaneswar, Odisha
- 2 Professor Jayashankar Telangana State Agricultural University (PJTSAU), ARI, Rajendranagar, Hyderabad, Telangana (Earlier ANGRAU)
- 3 Bidhan Chandra Krishi Viswa Vidyalaya (BCKV), Kalyani, West Bengal
- 4 Central Research Institute for Jute & Allied Fibres (CRIJAF), Barrackpore, West Bengal
- 5 University of Agricultural Sciences, GKVK, Bangalore, Karnataka,
- 6 Chaudhary Charan Singh Haryana Agricultural University, Hissar, Haryana
- 7 Ch. Sharvan Kumar Himachal Pradesh Krishi Vishwa Vidyalaya, Palampur, Himachal Pradesh
- 8 G B Pant University of Agriculture & Technology, Pantnagar, Uttaranchal
- 9 Indira Gandhi Krishi Viswa Vidhyalaya, Raipur, Chhattisgarh
- 10 Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh
- 11 Kerala Agricultural University, Vellanikkara (Dist), Trichur, Kerala
- 12 Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra
- 13 Punjab Agricultural University, Ludhiana, Punjab
- 14 Rajasthan Agricultural University, Bikaner – 334002, Rajasthan
- 15 Dr. Rajendra Prasad Central Agricultural University, Samastipur, Pusa, Bihar
- 16 Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu
- 17 Indian Agricultural Research Institute, Pusa Campus, New Delhi
- 18 Assam Agricultural University, Jorhat, Assam
- 19 Birsa Agricultural University Kanke, Ranchi, Jharkhand
- 20 ICAR Research Complex for NEH Region, Manipur Center Lamphelpat, Imphal, Manipur
- 21 Junagadh Agricultural University, Junagadh, Gujarat
- 22 Sher-e-Kashmir University of Agriculture Sciences And Technology of Kashmir, Shalimar, Srinagar, Jammu and Kashmir
- 23 Banaras Hindu University, Varanasi, Uttar Pradesh
- 24 ICAR-Indian Institute of Sugarcane Research, Lucknow, Uttar Pradesh
- 25 Pandit Jawaharlal Nehru College of Agriculture RI, Karaikal, U.T. of Puducherry

Salient Research Achievements

- Developed fertilizer prescription equations for different agro-ecological regions for improving crop productivity and maintaining soil quality based on resource endowment capacity of the farmers.
- Developed post-harvest plant nutrients prediction models



STCR adopted happy tribal farmer

of major cropping systems for different agro-ecological regions.

- Developed tehsil-wise GIS based soil fertility maps for 11 states using the soil test data collected from different soil testing laboratories located in various parts of the country.
- Integrated STCR prescription equations in Soil Health Card Portal developed by Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Govt. of India in collaboration with NIC, New Delhi (<http://soilhealth.dac.gov.in/>).

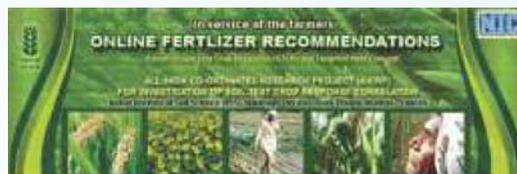
- Developed mobile based bilingual (Marathi & English) STCR App for fertilizer recommendation of Maharashtra.



STCR App for fertilizer recommendation

- Conducted more than five thousand FLDs on different crops to popularize STCR based fertilizer and manure recommendations to different crops.

- Developed Decision Support System in collaboration with National Informatics Centre (NIC), Pune for on-line fertilizer recommendation to different crops grown in various states using the fertilizer prescription equation and has been uploaded on STCR website (<http://www.stcr.gov.in>) for the benefit of farmers and other end users.



STCR Decision Support System

- Developed nutrient plan of 173 districts from GPS/GIS based soil fertility maps.
- Developed customized software for Madhya Pradesh, Odisha and Uttar Pradesh for generation of soil health card through STCR approach.

New initiatives

- STCR-IPNS based fertilizer prescription equations for drip fertigation.
- Long-term comparative evaluation of different fertilizer recommendation approaches in rice-wheat cropping sequence using dehydrogenase and alkaline phosphatase enzyme activity
- Soil testing protocol of microbiologically exploited organic phosphorus-pools in organic farming systems.
- Bio intensive integrated nutrient management strategies for remediation of iron toxicity in lowland rice ecosystem of Assam.
- Fertilizer prescription equations for dryland crops, hi-value vegetables and floriculture.
- DSS integrating GPS/GIS-based soil fertility maps with STCR prescription equations.

Areas of Training/Consultancy Offered

- Targeted yield approach of nutrient management for improving crop productivity and maintaining soil quality based on resource endowment capacity of the farmers.

- GPS/GIS based soil fertility mapping and development of nutrient plan.
- Development of customized fertilizer formulations.

Future works/Thrust

- STCR recommendations for drip fertigation.
- Fertilizer prescription equations for dryland crops, hi-value vegetables and floriculture
- New methodology for improvement in Soil Testing Services
- Precision farming vis-à-vis soil health protection

AICRP on Micro- and Secondary –Nutrients and pollutant Elements in Soils and Plants

Theme/Thrust Area

- Conducting basic and applied research on micro- and secondary nutrients and pollutant elements in soils and plants.
- Delineation and/or re-assessment and mapping of micro- and secondary nutrients (MSN) deficient and toxic areas using GPS/GIS, and developing amelioration techniques for their correction.
- Revisiting the critical limits of micro- and secondary nutrients and establishing phytotoxic limits of heavy metals in different soils and crops.
- Developing suitable techniques for increasing fertilizer-use-efficiency along with inclusion of nano-fertilizers, organic manures, sewage sludge for ameliorating the MSN deficiencies in crops and soils.
- Developing agronomic biofortification approaches for micronutrients enrichment and to identify mechanism and processes of micronutrients enrichment and their role in reproductive physiology.
- Study of micronutrients in soil-plant-animal- and/ human continuum.
- Dissemination of micro- and secondary nutrients technologies through different extension tools

Infrastructure/Facilities

The Referral Laboratory of Project Coordinating Unit is equipped with all the requisite instruments and facilities for micro- and secondary nutrients analysis in soil, plant, animal tissue, and water samples. The important instruments include, Atomic Absorption Spectrophotometer (AAS), UV-vis Spectrophotometer, Refrigerated Centrifuge, Digital Microscope/ Image Analyser, Nitrogen-cum-Protein Analyser, Dynamic Light Scattering (DLS)/ Nano size Analyser.



Manpower

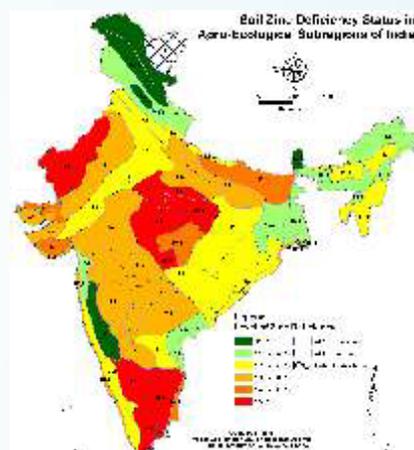
S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1.	Dr. A.K. Shukla	Pr. Scientist & Project Co-ordinator	05.07.1996	arvind.shukla@icar.gov.in
2.	Dr. S.K. Behera	Sr. Scientist	08.01.2007	sanjib.behera@icar.gov.in
3.	Mr. Shahab Siddique	Asstt. Chief Technical Officer	05.10.1992	Sahab.Siddiqui@icar.gov.in
4.	Mr. Venny Joy	PA	14.02.1991	Venny.Joy@icar.gov.in
5.	Mr. K.S. Raghuvanshi	Technical Officer	29.12.1988	khilan.raghuvanshi@icar.gov.in
6.	Mr. Bhawar Singh Yadav	Skilled Supporting Staff	01.09.1993	bhanvar.yadav@icar.gov.in

List of coordinating centres

State	Centre
1. Assam	AAU, Jorhat
2. Andhra Pradesh/ Telangana	PJTSAU, Hyderabad
3. Bihar	RAU, Pusa
4. New Delhi	ICAR-IARI, New Delhi
5. Gujarat	AAU, Anand
6. Haryana	CCSHAU, Hisar
7. Himachal Pradesh	CSKHPKV, Palampur
8. Jharkhand	BAU, Ranchi
9. Karnataka	UAS, Bengaluru
10. Karnataka	ICAR-NIANP, Bengaluru
11. Kerala	KAU, Thrissur
12. Madhya Pradesh	JNKVV, Jabalpur
13. Maharashtra	PDKV, Akola
14. Manipur	CAU, Imphal
15. Odisha	OUAT, Bhubaneswar
16. Punjab	PAU, Ludhiana
17. Tamil Nadu	TNAU, Coimbatore
18. Uttarakhand	GBPUAT, Pantnagar
19. Uttar Pradesh	CSAUAT, Kanpur
20. Uttar Pradesh	LU, Lucknow
21. West Bengal	BCKV, Kalyani

Salient Research Achievements

- Delineated soils of 508 districts and developed GIS maps for policy decision making on fertilizer distribution and precision nutrients prescription. The average deficiency has been estimated as S:27.8%, Zn: 39.8%, Fe: 13.4%, Cu: 4.4%, Mn: 7.1%, and B: 24.1%.
- Developed micronutrients fertility management zones for addressing the spatial variability of the nutrients in Haryana, Uttarakhand, Telangana states for making region-specific fertilizer prescription.
- Among the multiple micronutrients, deficiency of S and Zn, S and B and Zn and B together were up to 10% in some state, while three element deficiency was beyond 3%.
- Developed 06 critical ranges of Critical limit, i.e. acute deficient, deficient, latent deficient, marginally sufficient, adequate, high for S, Zn, Fe, Mn, Cu and B for their precise management.
- Critical limit of micronutrients (Zn, Fe, Cu, B, Mn) and S for different crops and cropping systems revisited and re-established for site- and crop- specific nutrient management.
- Developed deficiency/toxicity symptoms of different micro- and secondary nutrients as well as pollutant elements for their visual diagnosis and catalogued them for farmers' use.
- New methods for laboratory estimation of micronutrients are being evaluated against the existing ones for their efficiency.
- Developed different amelioration techniques for correcting micro- and secondary nutrients deficiencies in different agro-climatic zones for all the major crops and cropping systems.
- Technology for enrichment of organic manures with different micronutrients has been developed as a cost effective alternate source of micronutrients supplementation.
- Several novel and new products have been tested against the standard sources of micronutrients and recommended for use by farmers, if found suitable and economic.
- Identified genetically efficient cultivars capable of accumulating adequate micronutrient contents even from soils having low micronutrients supply. Developed agronomic and physiological biofortification strategies to enrich edible plant parts of cereals and pulses with micronutrients.
- Established bio flow relationship of Zn in soil-plant-animal-human continuum by conducting study at Mandla district and Bengaluru in collaboration with institutes involved in human nutrition (AIIMS Bhopal and NIANP, Hyderabad).
- Studied the extent of heavy metal pollution in soil-plant system in selected peri-urban areas occurred through sewage, industrial effluents. Characterized agricultural land affected with



heavy metal pollution in peri-urban areas of Ludhiana, Hyderabad, Bhopal, Ahmedabad, Dhapa (West Bengal), Bhubaneshwar (Odisha).

- Developed technologies for optimizing the use of micronutrients in different crops and cropping systems and published them in vernacular languages.

Future works/Thrusts

- Reassessment of periodic changes and emerging multiple micro and secondary nutrient deficiencies and their effect of crop productivity in specific soil cropping management systems.
- Delineation of micro and secondary nutrient deficiencies areas and soil fertility mapping using GIS/GPS.
- Development of decision support system for forecasting emerging nutrient deficiencies in different soil-crop production systems.
- Development of modern techniques for enhancing fertilizer use efficiency and amelioration of micro and secondary nutrient deficiencies in crops and cropping systems.
- Evaluation of biodiversity in relation to genetic potential of crops and genotypes for tolerance of micronutrient stress and to withstand under heavy metal toxicities.
- Study the role of micronutrients on floral biology, reproductive physiology, pollination and their translocation in improving seed setting and quality of produce.
- Diagnosis of visual characteristics symptoms of deficiency/ toxicity of micronutrients and heavy metals in soils and plants.
- Assessment of micro and secondary nutrient deficiencies in soils and plants and micronutrient malnourishment in fodder, livestock and human chain and suggest suitable remedial measures for nutritional security.
- Assessment of heavy metal pollution in soil, sewage and plants and to develop technologies for their remediation and/or assess nutritional potential
- Creating awareness about new technologies and its popularization among the farmers, researchers and other agencies.



ChaudharyDevi Lal Outstanding AICRP Award – 2016 conferred to AICRP on Micronutrients



Organization of 27th National Workshop of AICRP on Micronutrients at PDKV, Akola

AINP on Soil Biodiversity and Biofertilizers

Theme/Thrust Area

- Exploration of soil microbial diversity with respect to plant growth promoting rhizobacteria and rhizobia in all the major agricultural production zones of the country.
- Evaluation of efficient cultures in different soil types and crops in farmers' fields and in tribal areas including NEH region.
- Metagenomic diversity of soil microbes under the influence of unsustainable agricultural practices like extremely high rates of chemical fertilizers or pesticides and also to see beneficial effect of organic farming etc., are unique efforts of the project.
- Identification of novel strains to promote plant growth through production of growth promoting substances, to solubilize a number of nutrients like P, K and Zn and to control plant diseases.
- Technology to produce long shelf life high quality biofertilizers like liquid biofertilizers.
- Evaluation of the impact of biofertilizers to improve yields and control diseases in horticulture, medicinal crops, floriculture, vegetables is emphasized.
- Improvement in produce quality and nutrient use efficiency by biofertilizers
- Develop effective microbial cultures to ensure greater usage of biofertilizers in the disadvantaged areas.

Infrastructure/Facilities

Walk-in Environmental Growth Room, Bio-fertilizer Production Equipment, PCR, Laminar air flow chamber, Microscope.



Plant growth chamber

Areas of Training/consultancy offered

- All aspects of microbiology and biotechnology relevant to microbial strains isolation, characterization and testing as biofertilizers.
- Biofertilizer production and usage

Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1.	Dr. S. R. Mohanty	Pr. Scientist and I/c Network Coordinator	18.06.2009	santosh.mohanty@icar.gov.in

List of Network Centers

Sl.no	State	Centre
1	Assam	AAU, Jorhat
2	Andhra Pradesh	ANGRAU, Amaravathi
3	Bihar	RAU, Pusa
4	Delhi	University of Delhi
5	Delhi	IARI, New Delhi
6	Gujarat	DGR, Junagadh
7	Haryana	HAU, Hisar
8	Himachal Pradesh	YSPUHF, Solan
9	Jharkhand	BAU, Ranchi
10	Jharkhand	CRRI, Hazaribagh
11	Karnataka	UAS, Dharwad
12	Kerala	KAU, Thrissur
	Kerala	Sub-centre: KAU, Vellayani
13	Madhya Pradesh	JNKVV, Jabalpur
14	Maharashtra	MAU, Parbhani
15	Odisha	OUAT, Bhubaneswar
16	Rajasthan	MPUAT, Udaipur
17	Tamil Nadu	TNAU, Coimbatore
18	Uttarakhand	GBPUAT, Pantnagar

Salient Research Achievements

- About 2000 rhizobial strains of 20 major legumes were isolated and characterized from the major growing zones and soil types in Andhra Pradesh, Madhya Pradesh, Gujarat, Rajasthan, Haryana, Uttar Pradesh and Jharkhand.
- Microbial diversity in ricesoils of NEH region was explored and effective strains of biofertilizer organisms cultured. More than 100 efficient cultures from diverse zones of NE region were preserved for use as biofertilizer agents.
- A new biofertilizer entitled "Biomix" developed with Azotobacter, Azospirillum and PSB. It is recommended as seed inoculants@ 100ml/acre along with recommended dose of fertilizer" for Bajra.
- A sustainable and economic bionutrient package for rice was developed based on Pseudomonas-enriched mycostraw, Azospirillum, and Cyanobacteria. Validation under participatory mode for consecutive five years showed an increase of yield of 10 % in resource rich and 20 % in resource poor farmers over the farmers' conventional practices.
- Technique developed to convert normal farm compost to superior bio-enriched compost by

amending with 1% P as Rock Phosphate plus *Azospirillum/Azotobacter* and PSB broth culture @ 1% (v/w). Use of bio-enriched compost @ 1 t/ha minimized the N and P fertilizer requirement by 50% in rice- toria and rice- wheat sequence.

- A mixed microbial consortium developed for groundnut by combining PSM (*Bacillus megaterium* and *Pseudomonas sp.* ACC10) and groundnut rhizobia NRCG22 and TAL1000. It significantly increased pod yield of groundnut by 11-21%.
- Strain of *Bacillus licheniformis* was isolated which is found to completely control white-root-rot of apple caused by *Dematophora necatrix*.
- Liquid biofertilizer developed with *Rhizobium*, *Azospirillum* and *Bacillus* strains by using cell protectants like arabinose, trehalose, glycerol, polyvinyl pyrrolidone (PVP) in different combinations. It enhanced the shelf life upto 12 months in liquid inoculum with high cell counts. There was 15% grain yield increase by liquid inoculants over solid carrier based inoculants in combination with 75% RDF in Maize.



Future Work/Thrust

I. Climate change, Abiotic and Biotic Stresses, Conservation Agriculture on biodiversity

- Genome sequencing of selected rhizobia.
- Identify genes responsible for acid tolerance of rhizobia
- Develop climate ready technology of biofertilizers for dryland and cold ecosystems
- Develop PGPR for disease control and mitigating biotic stresses with focus on legumes
- Soil metagenomic studies in conservation agriculture to quantify impact on genes involved in C sequestration.
- Plant-microbial interaction under climate changing condition

II. Biodiversity in crop diversification into horticulture and cash crops

- Biofertilizers for temperate trees (cherry, apricot etc)
- Biofertilizers for tropical trees. (litchi, jackfruit etc)
- Novel Biofertilizers for sugarcane, jute

III. Biofertilizer technology, extension in drylands, tribal areas, NEH region.

- Develop technology for custom seed coating of liquid biofertilizers.
- Intensify biofertilizer technology extension to tribal areas (TSP)
- Intensify biofertilizer technology propagation in NEH region.

Services Units/Sections

Remote Sensing and GIS Lab

The main function of the section is to provide the researchers with the various latest statistical tools and other essential assistance in statistical analysis of the data generated. Besides, the section is entrusted with the work of extending the latest knowledge in computer application in research for data storage and analysis. In addition to this following work has been done by this section:

- Prepared soil fertility maps on N, P, and K of Andhra Pradesh, Maharashtra, Chhattisgarh, West Bengal, Haryana, Orissa, Himachal Pradesh, Karnataka, Punjab, Tamil Nadu, Madhya Pradesh and Bihar states of India.
- Maps are interlinked with Soil Test Crop Response Correlation (STCR) recommendations, where user/farmers can get optimum fertilizer dozes in the form of fertilizer available (eg. Urea, SSP, MOP etc.) for targeted yield
- Different models analyses for predicting fertilizer requirements of crop.
- Estimated response surface (kriging) using Gaussian method
- Online fertilizer recommendation system for targeted yields of crops
- Land Productivity Assessment using Remote Sensing (RS) and Geographic Information system (GIS)



Infrastructure/Facilities

This section is equipped with sophisticated software like SPSS 11, Arc Info, ERDAS-Imagine with two GIS work stations, A0 size scanner, A0 size plotter and well equipped GIS and remote sensing laboratory.

Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1.	Dr. M. Mohanty	Sr. Scientist	10.11.1999	manoranjan.mohanty@icar.gov.in
2.	Mr. Laxmi Narayan	Skilled Support Staff	17.12.1988	-

Central Laboratory

The main activity of central laboratory is to provide specific analytical help and facilities to the scientists working in various divisions/projects/ laboratories/sections of the institute.

Infrastructure/Facilities

The major equipments in this laboratory are Real time PCR, GC, PCR station, pH/redox meter, UV-visible spectrophotometer, deep freeze, cryostat besides other equipment of routine use in wet chemical and molecular analysis.



Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1.	Dr. S.R. Mohanty	Pr. Scientist and I/c Lab	18.06.2009	santosh.mohanty@icar.gov.in
2.	Dr. J.K Thakur	Scientist	20.04.2010	Jyoti.thakur@icar.gov.in

Agricultural Knowledge Management Unit (AKMU)

The AKMU (erstwhile ARIS Cell) is looking after the information technology and communications related activities of the Institute. The AKMU is looking after the Institute LAN. All divisions and sections are connected to the Internet through proxy server. Besides this, AKMU is also extending service in terms of maintenance of computers and peripherals in the Institute. Scientists and staff are having individual email accounts. AKMU is also taking care of the internal communication needs of the institute by providing intercom telephone connection to all divisions and section through EPABX system. It also facilitates the audio-visual presentation needs of the institute. ICAR has developed personnel Management Information System Network (PERMIS Net) and project information and management (PIMS-ICAR), to maintain the activities and records of its various institutes/research centres and their employees as well as research project. The records are updated monthly by AKMU.

The AKMU cell is also maintaining the Institute website (www.iiss.nic.in). The site contains complete information about institute R&D and other activities. It is updated from time to time as per the requirement of the institute such as RTI Act 2005, tenders, job opportunity, Photo Gallery, Latest News, Forthcoming events, other information, search engine etc. Website has been re-designed to make it more informative and attractive. Recently, our website (URL - <http://iiss.nic.in>) running on infrastructure of IDC New Delhi, migrated to cloud Environment (MeghRaj Initiatives) procured through NICSI.



Infrastructure/Facilities

The AKMU is equipped with all modern facilities to provide e-mail connectivity and Internet browsing. After discontinuing VSAT services (256 kbps) from ERNET India, Institute LAN is equipped with high speed internet connectivity at IISS during Oct 2012, through national knowledge network (NKN-NIC) for better internet connectivity (100 mbps). We are also extending support and co-operation in extending implementation of MIS-FMS/ERP System in the Office.

Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1.	Dr. J. Somasundaram	Pr. Scientist & I/c AKMU	12.11.2001	somasundaram.j@icar.gov.in
2	Dr. N.K. Sinha	Scientist	20.04.2010	nishant.sinha@icar.gov.in

Library, Information and Documentation Services

The Institute library contains core collection in the field of Soil Science and allied subjects. The unit is providing the facilities of book lending, reprographic services, reference services, CD-ROM searching facilities to its users. The library also exchanges the Institute publications with other ICAR Institutions, SAUs, and renowned scientists in the field of soil science. The collection contains 2591 books, 2508 bound journals and 2312 reports. The library subscribes 32 core international journals in the field of Soil Science and 30 national journals of soil science and other disciplines. The library has got a separate section for CD-ROM search for research abstracts published in various journals worldwide with two major databases, i.e., SOIL-CD and AGRIS-CD. The institute library has installed the Open Source Software such as TLSS, WINSIS for library management.



Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1	Dr. S. Ramana	Principal Scientist & I/c Library	06.02.1997	s.ramana@icar.gov.in
2.	Mrs. Nirmala Mahajan	ACTO& Librarian	15.03.1993	nirmala.mahajan@icar.gov.in
3.	Mrs. Gheesi Devi	Trainee (Skilled Supporting Staff)	31.05.2014	-

Farm Section

The main activity of the farm is to provide all the inputs and other resources required for the successful conduct of field experiments of the Institute. It also raises crops like soybean, pigeon pea and maize during *kharif* and wheat, chickpea, mustard, lentil and linseed during *rabi* season in the general area to improve its resource generation. It has about 5 hectares of land under horticultural crops like mango, guava, aonla, pomegranate and medicinal crops for the sustainable resource generation. Developmental activities like extension, desilting and deepening of ponds and wells, drilling of the tube wells and establishment of modern methods of irrigation has been carried out.

Infrastructure/Facilities

The farm section has a large working shed, four small tractor sheds and a well laid cement threshing floor. The farm section is well equipped with tractors, machinery and all the modern equipments for field experiments. The farm has four water-harvesting ponds. An underground water supply network system for irrigation has been established to convey and utilize water of pods, three shallow tube wells and open dug well. Modern methods of irrigation like micro sprinkles and drip irrigation systems were being used to use the limited irrigation water efficiently.



Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1.	Dr. A. K. Vishwakarma	Pr. Scientist & I/c Farm	16.04.2003	anand.vishwakarma@icar.gov.in
2.	Mr. D.R. Darwai	Technical Officer(T-5)	23.01.1993	Dashrat.Darwai@icar.gov.in
3.	Mr. O.P. Shukla	Technical Officer	22.04.1989	op.shukla@icar.gov.in
4.	Mr. Hukum Singh	Sr. Technical Assistant	30.12.1988	hukum.singh@icar.gov.in
5.	Mr. C.T. Wankhede	Technical Officer (T-5)	03.08.1992	chandrabhan.wankhade@icar.gov.in
6.	Mr. Bhagwat Prasad	Skilled Supporting Staff	24.01.1992	bhagwat.prasad@icar.gov.in
7.	Mr. Lalaram Sahu	Skilled Supporting Staff	24.07.1992	lala.sahu@icar.gov.in
8.	Mr. Rakesh Sen	Skilled Supporting Staff	08.09.1997	rakesh.sen@icar.gov.in

Director Cell

The cell is an important functionary in assisting the Director in technical and administrative communications. It also serves as an important link at institute and inter-institute level for all such matters related to the director of the institute

Important Infrastructure: The cell is equipped with latest communication devices, computer and reprographic equipments.

Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1.	Dr. A. K. Patra	Director	05.10.1989	ashok.patra@icar.gov.in
2.	Mr. Thomas Joseph	PS	18.09.1989	thomas.joseph@icar.gov.in
3.	Mrs. Yojana Meshram	PA	12.05.1997	yojana.meshram@icar.gov.in
4.	Mr. Bhoi Lal Uikey	Skilled Supporting Staff	13.11.1995	bhoi.uikey@icar.gov.in
5.	Mr. Darashram	Skilled Supporting Staff	15.03.1990	daras.ram@icar.gov.in

Research Priority Setting, Monitoring and Evaluation Cell (PME Cell)

PME Cell is undertaking the coordinated compilation of following activities:

- To coordinate and synthesize the recommendations of QRT, RAC, IRC, Vision documents of institute and ICAR to recommend research priorities of the institution for shortlisting priority researchable problems across crop(s)/divisions/programmes, commodity/livestock etc. at institution level.
- Annual updating and presenting the report to the Director of the institution for assigning research projects.
- To coordinate and arrange for annual monitoring of each ongoing projects and evaluation of completed projects through internal and external experts.
- To coordinate and arrange for technology validation and/or impact assessment of successful technology claimed by scientist(s) through internal and external experts.
- Regularly sensitizing and capacity building of research managers and scientists through



training programmes.

- Maintaining a database on all publications, technology development, IPRs, consultancies, projects undertaken and ongoing projects.

Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1.	Dr. R. Elanchezhian	Pr. Scientist & I/c PME Cell	09.11.1998	elanchezhian.r@icar.gov.in
2.	Mr. Sanjay Kumar Kori	Steno Gr. -III	03.01.2012	sanjay.kori@icar.gov.in

Vehicle section

This section is providing the timely transport services to the institute staff, goods, soil samples and other transport related services to the laboratories.

Important Infrastructure: The vehicle section is having one staff Ambassador car, one Tata Sumo jeep and One Mahindra Bolero Camper to cater the needs of the institute. The section also hires vehicle from authorized rate contractor on "as and when required" basis for smooth disposal of official works.

Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1	Dr. Asit Mandal	Scientist & I/c vehicle	23.06.2009	asit.mandal3@icar.gov.in
2	Mr. Naresh Yadav	Technical Officer (T-5)	23.09.1987	naresh.yadav@icar.gov.in
3.	Mr. Sukh Ram Sen	Sr. Tech. Asstt. (T-4)	25.01.1991	sukhram.sen@icar.gov.in

Administrative/Finance & Account Section

Manpower

S. N.	Name	Designation	Date Of Joining ICAR	E Mail ID
1.	Mr. S.K. Gupta	SAO	14.11.1986	sunil.gupta3@icar.gov.in
2.	Mr. Neeraj Tahiliani	FAO	12.06.2012	neeraj.tahiliani@icar.gov.in
3.	Mr. Rajesh Dubey	AF&AO	21.12.1988	rajesh.dubey@icar.gov.in
4.	Mr. P. S. Sunil Kumar	AAO	30.01.1989	sunil.ps@icar.gov.in

5.	Mr. Anupam A. Rajput	Assistant	14.03.1990	anupam.rajput@icar.gov.in
6.	Mr. Jineshwar Prasad	UDC	13.12.1988	jineshwar.prasad@icar.gov.in
7.	Mr. Sanjay Katinga	LDC	20.06.1989	sanjay.katenga@icar.gov.in
8.	Mrs. Babita Tiwari	Assistant	30.05.1996	babita.tiwari@icar.gov.in
9.	Mr. Bansi Lal Sarsodia	Assistant	10.09.1997	bansilal.sarsodia@icar.gov.in
10.	Mr. Anurag	Security Supervisor	29.09.1997	anurag@icar.gov.in
11.	Mr. Hira Lal Gupta	U.D.C.	23.12.1988	hl.gupta@icar.gov.in
12.	Mr. O.P. Yadav	U.D.C.	19.12.1988	op.yadav1@icar.gov.in
13.	Mrs. Raksha Dixit	LDC	24.05.2013	raksha.parsai@icar.gov.in
14.	Mr. Sanjay N Gharde	Skilled Supporting Staff	15.06.1999	sanjay.gharde@icar.gov.in
15.	Mr. Dharam Raj Singh	Skilled Supporting Staff	14.06.1999	dharam.singh@icar.gov.in
16.	Mr. A.K. Mishra	Skilled Supporting Staff	01.09.1983	arun.mishra@icar.gov.in
17.	Mr. P.K. Raut	Skilled Supporting Staff	21.07.1992	pramod.raut@icar.gov.in

Other Common Infrastructure

Screen House

Institute has developed two screen houses for providing facilities to conduct pot experiments as per requirement to different research projects.

Conference Hall

The institute has well-furnished and air-conditioned conference room with a sitting capacity of 130 persons. It has an excellent conferencing facility consisting of audio system with detachable cable-mounted microphones, audio visual projection systems with DLP technology based multimedia projector. Standby arrangements of slide projector and overhead projector were also available.



Committee Room

A well-furnished and air conditioned committee room equipped with audio system with detachable cable mounted microphones, audio-visual projection systems with multimedia projector, computer and standby arrangements of slide projector and overhead projector, has been developed to facilitate the organization of meeting, group discussions and seminars. The committee room has total sitting capacity for 65 persons.



Training Hostel

The institute has developed a training hostel in its premises to provide boarding and lodging facilities to visiting scientists, trainees and other officials both from India and abroad. The training hostel has eight rooms including VIP rooms.



Staff Recreation Club

Staff recreation club of the institute; consisting of all the scientists, officials, technical, ministerial and supporting staff; has been established to provide a platform for organizing various recreational activities amongst staff members. The club regularly functions on Republic day, Independence Day, New Year Day and other days of national importance for the recreation of staff as well as their family member.



Liaison and Linkages

In order to effectively carry out the research programmes and its adoption by the farmers, a networking arrangement has been developed for undertaking location specific research. The network involves relevant department of soil science and/or environmental science in SAUs and ICAR research institute in various ecoregions for undertaking site specific research in important agro-ecosystems. Institute undertakes and proposes to undertake various research programmes under collaborative, participatory, contractual mode by national organizations like DST, DAC, CSIR, DBT, MoEFCC etc. or international agencies like IRRI, ICRISAT, TSBF, ACIAR, IFDC, etc. Institute based AICRPs also form a part of the "Network-Support-programme" of the IISS with its centres located in SAUs providing access to the diverse soils, agro-ecosystems across the country for effective implementation of the programmes of the Institute on regional

basis. IISS enters into MOU with SAUs to mutually share and extent research facilities and expertise to the post graduate students for undertaking research works relevant to research programme of the institute on financial support.



Bhopal Chapter of the Indian Society of Soil Science

Bhopal chapter of the Indian Society of Soil Science organizes various programs in order to popularize soil science among the masses and to get them acquainted with the importance of soil and environment in which they are living. The chapter organizes lectures by eminent scientists and distinguished visitors. In the past, chapter organized Dr. D.P. Motiramani Memorial lecture, Dr. S.P. Raychaudhary Memorial lectures, National Seminars and Annual Convention of Indian Society of Soil Science. Chapter organizes various soil awareness programs, farmer's training and meetings and celebrates World Soil Day every year.

Awards Received

S.N	Name of the Scientist	Name of the Award	Year
1.	Dr. A. Subba Rao	Fertilizer Association of India Silver Jubilee Award of Excellence, FAI	1989
2.	Dr. P.N. Takkar	Hari Om Assam Trust Award: 1987-88, ICAR	1989
3.	Dr. A.N. Ganeshmurthy	Golden Jubilee Commemoration Young Scientist Award, ISSS	1990
4.	Dr. A. Subba Rao	Potash Research Institute of India Award FAI	1991
5.	Dr. A.K. Biswas	Jawaharlal Nehru Award, ICAR	1992
6.	Dr. A. Subba Rao Dr. Ch.Srinivasa Rao Dr. A.N. Ganeshmurthy	Dhiru Moraji Memorial Award FAI	1993
7.	Dr. D. Damodar Reddy	Dr. S.P. Raychaudhari Gold Medal, ISSS	1995
8.	Dr. D. Damodar Reddy	Merit Award, NAARM	1995
9.	Dr. A. Subba Rao Dr. K. Sammi Reddy Dr. A.N. Ganeshmurthy	FAI DhiruMoraji Memorial Award	1995
10.	Dr. Ch. Srinivasa Rao	A Certificate of Merit, ISCA	1995
11.	Dr. A.N. Ganeshmurthy Dr. A. Subba Rao Dr. K. Sammi Reddy Dr. P.N. Takkar	PPIC-FAI Award	1997
12.	Dr. Ch. Srinivavsa Rao	Golden Jubilee Commemoration Young Scientist Award, ISSS	1997

13.	Dr. M.C. Manna	Vijoyshree Award, IFS	1997
14.	Dr. Tapan Adhikari	Dr. S.P. Raychaudhari Gold Medal, ISSS	1997
15.	Dr. Tapan Adhikari	S.N. Ranade Award	1997
16.	Dr. A.K. Bera	Young Scientist Award, NAAS	1998
17.	Dr. Anand Swarup Dr. A. Ganeshmurthy	Dhiru Moraji Memorial Award, FAI	1998
18.	Dr. Ch.Srinivasa Rao Dr. A. Subba Rao	IPI-FAI Award, ICAR	1998
19.	Dr. Ch. Srinivasa Rao	Young Scientist Award, ICAR	1998
20.	Dr. J.K. Saha	S.N. Ranade Junior Scientist Award	1998
21.	Dr. P.N. Takkar	S.N. Ranade Life Time Achievement Award	1998
22.	Dr. Tapan Adhikari	Jawahar Lal Nehru Award, ICAR	1998
23.	Dr. C.L. Acharya	Hari Om Ashram Trust Award: 1997-98, ICAR	1998
24.	Dr. Tapan Adhikari	Shobhana Sri Krishna Ranade Award	1999
25.	Dr. Ch.Srinivasa Rao	Young Scientist Award: 1997-98, NAAS	1999
26.	Dr. K.K. Bandhyopadhya	Zonal East Award, ISSS	1999
27.	Dr. Ch. Srinivasa Rao	Pran Vohra Award, ISCA	2000
28.	Dr. D.L.N Rao	12 th International Congress of Soil Science Commemoration Award and Gold Medal, ISSS	2000
29.	Dr. G.B. Singh Dr. Anand Swarup	Dhiru Moraji Memorial Award, FAI	2000
30.	Dr. D. Damodar Reddy	Lal Bahadur Sashty Young Scientist Award: 1999-2000, ICAR	2001
31.	Dr. D. Damodar Reddy	Golden Jubilee Commemoration Young Scientist Award, ISSS	2001
32.	Dr. D.L.N Rao	FAI-Silver Jubilee Award	2002
33.	Dr. M.V. Singh	S.N. Ranade Senior Scientist Award-2000-01	2002
34.	Dr. K. Sammi Reddy	Golden Jubilee Commemoration Young Scientist Award, ISSS.	2002
35.	Dr. A. Subba Rao Dr. D. Damodar Reddy Dr. K. Sammi Reddy	IMPHOS-FAI Award	2003
36.	Dr. T.R. Rupa	Pran Vohra Award, ISCA	2003
37.	Dr. T.R. Rupa	Young Scientist Award, 2001-02, NAAS	2003
38.	Dr. T.R. Rupa	Lal Bahadur Sashty Young Scientist Award: 2001-02, ICAR	2003
39.	Dr. T.R. Rupa	Golden Jubilee Commemoration Young Scientist Award, ISSS	2003
40.	Dr. T.R. Rupa	S.N. Ranade Memorial Junior Scientist Award	2003

41.	Dr. P.K. Ghosh	Senior Award of Academy for the Advancement of Agricultural Science (AAAS), ISPP	2004
42.	Dr. Tapan Adhikari	Golden Jubilee Commemoration Young Scientist Award, ISSS	2004
43.	Dr. A. Subba Rao	Dhiru Moraji Memorial Award: 2004-05, FAI	2005
44.	Dr. K. Sammi Reddy Dr. D. Damodar Reddy	Shri B. Lakshminarayana Memorial Award-2003-04, IARI	2005
45.	Dr. M.V. Singh	Chaudhary Devi Lal Outstanding AICRP Award, ICAR	2005
46.	Dr. P.K. Ghosh Dr. M.C. Manna Dr. K.K. Bandhyopadhyaya	IMPHOS-FAI Award	2005
47.	Dr. M. Mohanty	Junior Award of Academy for the Advancement of Agricultural Sciences (AAAS), ISPP	2006
48.	Dr. A.K. Mishra Dr. K.P. Raverkar Dr. R.S. Chaudhary Dr. A.K. Tripathi Dr. D. Damodar Reddy Dr. K.M. Hati Dr. S. Ramana Dr. K.G. Mandal	Dorrem Mashler Award. ICRISAT	2006
49.	Dr. K.M. Hati	Golden Jubilee Commemoration Young Scientist Award, ISSS	2006
50.	Dr. K. Sammi Reddy Dr. Anand Swarup Dr. Muneshwar Singh Dr. A. Subba Rao	TSI-FAI Award	2006
51.	Dr. M.C. Manna	12 th International Science Congress Award	2006
52.	Dr. Ranjeet Kumar	Lal Bahadur Sashtry Young Scientist Award: 2005-06, ICAR	2007
53.	Dr. S. Kundu	Hari Om Ashram Trust Award	2007
54.	Dr. K. Sammi Reddy Dr. Muneshwar Singh Dr. A. Subba Rao	FAI Golden Jubilee Award	2008
55.	Dr. Sangeeta Lenka	Jawaharlal Nehru Award	2008

56.	Dr. K. Ramesh	Young Scientist Award, 2007-08, NAAS	2009
57.	Dr.M.V. Singh	First International Zink Association of India (IZA-FAI) Award to AICRP on Micro, Secondary Nutrients and Pollutant Elements in Soils and Plants.	2010
58.	Dr. S. Kundu	"ICAR award for outstanding Interdisciplinary Team Research in Agriculture and Allied Sciences for the biennium 2007-2008"	2010
59.	Dr. S. Ramana	Academy of Advancement of Agricultural Sciences (AAA) Senior Award of Indian Society for Plant Physiology.	2010
60.	Dr. S. Ramana	"Bharat Jyothi Award-2012" of India International Friendship Society.	2011
61.	Dr. A. K. Shukla	JSP Yadav Memorial Team Award-2011 of Indian Society of Soil Science. New Delhi.	2011
62.	Dr. A. Subba Rao Dr. K. Sammi Reddy	Hari Om Ashram Trust Award for the biennium 2008-09 of Indian Council of Agricultural Research (ICAR). New Delhi	2011
63.	Dr. Y. Muralidharudu	Chaudhary Devi Lai Outstanding All India Coordinated Research Project Award (AICRP) - 2010 of Indian Council of Agricultural Research (ICAR). New Delhi	2011
64.	Dr. Pramod Jha	Golden Jubilee Commemoration Young Scientist Award-2011 of Indian Society of Soil Science. New Delhi.	2011
65.	Dr. A Subba Rao Dr. Muneshwar Singh Dr. K.Sammi Reddy M. Mohanty	FAI Golden Jubilee Award for excellence for the best work done in the field of 'Nutrient Management in Wheat'	2012
66.	Dr. A. K. Shukla	Shri Ram Awards by Fertiliser Association of India, New Delhi	2012
67.	Dr. A.K. Biswas Dr. K.M. Hati Dr. S. Ramana Dr. A.B. Singh	Dr. J.S.P. Yadav Memorial Award for Excellence in Soil Science	2012
68.	Dr. A.Subba Rao Dr. Ajay Dr. B. L. Lakaria Dr. Sangeeta Lenka Dr. J. K.Thakur Dr. S. Rajendiran	Best annual report award of ICAR for the year 2013-14.	2013

69.	Dr. A.Subba Rao Dr. Muneshwar Singh Dr. Sammi Reddy Dr. M. Mohnaty	FAI Golden Jubilee Award for excellence for "Development of Best Fertilizer Management Practices" for the year 2013.	2013
70.	Dr. N.K. Lenka	Indian Society of Soil Science (ISSS) Golden Jubilee Commemoration Young Scientist award.	2013
71.	Dr. N.K. Lenka	Indian Association of Soil and Water Conservationists Young Scientist award.	2013
72.	Dr. A. K. Shukla	Shri Ram Awards by Fertiliser Association of India, New Delhi.	2013
73.	Dr. A.K. Shukla	International Zinc Association and - Fertilizer Association of India (IZA-FAI) Award (2014)	2014
74.	Dr. Tapan Adhikari	JC Bose Gold Medal Award - 2014 of Indian Society for Plant Physiology, New Delhi.	2014
75.	Dr. S.R. Mohanty	Eminent Scientist Award 2014-National Environmental Science Academy, New Delhi.	2014
76.	Dr. K. Bharati	Scientist of the Year Award. 2014 from National Environmental Science Academy	2014
77.	Dr. A.K. Vishwakarma	ICAR Award for Outstanding Interdisciplinary Team Research in Agricultural and Allied Sciences (Natural Resource Management & Agricultural Engineering) for 2011 -12	2014
78.	Dr. Sangeeta Lenka	Young Scientist Award from Education Expo-2014	2014
79.	Dr. A.K. Patra	Bioved Agri-innovation Award	2015
80.	Dr. Pramod Jha	Dr B.C. Deb Memorial Award for Soil/Physical Chemistry of Indian Science Congress Association.	2015
81.	Dr. A. K. Vishwakarma	Agri Innovation award form GKV Society	2015
82.	Dr. R.H. Wanjari,	Outstanding Achievement Award GRISAAS2015 (in Agronomy) of the Astha Foundation, Meerut (UP).	2015
83.	Dr. Tapan Adhikari	Endeavour Research Fellowship 2015, Government of Australia.	2015
84.	Dr. J. Somasundaram	Endeavour Research Fellowship 2015, Government of Australia.	2015

85.	Dr. Sangeeta Lenka	Endeavour Research Fellowship 2015, Government of Australia.	2015
86.	Dr. S. Rajendiran	Awarded Fellowship for Young Scientist Training, 2015 by MPCOST, Bhopal	2015
87.	Dr. Pankaj K. Tiwari	Shri Hari-Om-Ashram Trust, Nadiad sponsored "Prof. J. P. Trivedi Award—2015" by The Gujarat Association for Agricultural Sciences, Ahmedabad.	2015
88.	Drs. A. K. Shukla and Pankaj K. Tiwari	Dheeru Morarji Memorial Award by Fertilizer Association of India (FAI), India.	2015
89.	Dr. Asha Sahu	Young Scientist Fellowship 2016 for training by MPCOST, Bhopal	2016
90.	Dr. M.C Manna	Endeavour Research Fellowship 2016, Government of Australia.	2016
91.	Dr. M. Vassanda Coumar	Endeavour Research Fellowship 2016, Government of Australia.	2016
92.	Dr. A. K. Shukla	IPNI-FAI AWARD (2016)	2016
93.	Dr. A. K. Shukla	IZA-FAI AWARD (2014)	2016
94.	Dr. A. K. Shukla	Chaudhary Devlal Outstanding AICRP Award-2015 by ICAR	2016
95.	Dr. Pankaj K. Tiwari	"S. N. Ranade Memorial Encouragement Award—2017"	2017
96.	Dr. Pradip Dey	12 th International Congress Commemoration Award of Indian Society of Soil Science	2016
97.	Dr. Pramod Jha Dr. B.L. Lakaria Dr. Ritesh Saha	Dr. J.S.P. Yadav Memorial Award for Excellence in Soil Science	2016

Honours Received

S.No.	Name of the Scientist	Name of the Honour	Year
1.	Dr. P.N. Takkar	Fellow of the Indian National Science Academy, INSA	1988
2.	Dr. P.N. Takkar	Fellow of the Indian Society of Soil Science, ISSS	1988
3.	Dr. P.N. Takkar	Fellow of the National Academy of Agricultural Science, NAAS	1991
4.	Dr. C.L. Acharya	Fellow of the National Academy of Agricultural Science, NAAS	1998

5.	Dr. Anand Swarup	Fellow of the National Academy of Agricultural Science, NAAS	2000
6.	Dr. A. Subba Rao	Fellow of the National Academy of Agricultural Science, NAAS	2001
7.	Dr. C.L. Acharya	Fellow of the National Academy Agricultural of Sciences, NAAS	2003
8.	Dr. D.L.N. Rao	Fellow of the Indian Society of Soil Science, ISSS	2003
9.	Dr. A. Subba Rao	Fellow of the Indian Society of Soil Science, ISSS	2004
10.	Dr. D.L.N. Rao	Fellow of the National Academy of Agricultural Science, NAAS	2004
11.	Dr. D. Damodar Reddy	Associate of the National academy of Agricultural Sciences, NAAS	2006
12.	Dr. K. Sammi Reddy	Associate of the National academy of Agricultural Sciences, NAAS	2006
13.	Dr. Tapan Adhikari	Associate of the National academy of Agricultural Sciences, NAAS	2007
14.	Dr. K.M. Hati	Associate of the National academy of Agricultural Sciences, NAAS	2008
15.	Dr. M. C. Manna	Fellowship of Indian Society of Soil Science, ISSS	2009
16.	Dr. A. B. Singh	ISAB Fellowship for the year 2009-10	2009
17.	Dr. S. Ramana	Fellow Indian Society for Plant Physiology (FISSP).	2010
18.	Dr. Muneshwar Singh	Fellow of the Indian Society of Soil Science.	2010
19.	Dr. Ritesh Saha	Associate NAAS fellowship for the year 2014.	2013
20.	Dr. Santosh R. Mohanty Dr. K. Bharti	Fellow of "Association for the Advancement of Biodiversity Sciences" (FABSc) of India 2013.	2013
21.	Dr. A. K. Vishwakarma	Distinguished Scientist award by Society for Extension Education and Management in Agriculture	2013
22.	Dr. M.C. Manna	Fellows of National Academy of Agricultural Sciences	2014
23.	Dr. Pradip Dey	Fellow of Indian Society of Soil Salinity and Water Quality. Karnal, Haryana	2014
24.	Dr. N.K. Lenka	Associate of the National Academy of Agricultural Sciences (NAAS). New Delhi	2014
25.	Dr. A. K. Biswas	Fellow of National Academy of Agricultural Sciences	2015
26.	Dr. A. K. Shukla	Fellow of National Academy of Agricultural Sciences	2016
27.	Dr. A.K. Patra	Elected as Vice President of the Indian Society of Soil Science, New Delhi for the period of 2016-17.	2016

28.	Dr. A.K. Patra	Elected as Sectional President of the Indian Science Congress Association, Kolkata for the period of 2016-2017	2016
29.	Dr. A.K. Patra	Associate Editor, European Journal of Soil Science, UK	2016
30.	Dr. A.K. Patra	Thesis Examiner, University of Helsinki, Finland.	2016
31.	Dr. A.K. Patra	Recognized one among 13 Soil Scientist of the Word, Food Tank, USA, on World Soil Day, 2017	2017
32.	Dr. A.K. Patra	Dr. Sushil Kumar Mukherjee Commemoration Lecture Award (ISCA, Kolkata)	2017
33.	Dr. A.K. Patra	Member, Working Group, South East Asian Laboratory Network (SEALNET), FAO, Rome	2017
34.	Dr. Pradeep Dey	SAARC Focal Point for IPNS	2017
35.	Dr. R. Elanchezian	Fellow of the National Academy of Biological Sciences	2017

ICAR Sponsored Summer/ Winter School/ Short Courses/MTC/Other training Organized

- Short-term training course on "Assessment of compost quality for agriculture crop production" during November 16-25, 2004.
- ICAR sponsored Summer School on "Advances in Frontier Approaches to Increase Nutrient Use Efficiency in Crop Production" during 22 July to 11 August 2005.
- ICAR sponsored school on "Efficient composting techniques for production of nutrient enriched composts from agro-industrial and city wastes and standardization of methods" during 1-21 December 2005.
- ICAR sponsored winter school on "Soil organic carbon stocks and soil organic matter management in relation to soil quality and climate change" during 23rd January, 2007 to 12th February, 2007.
- Model Training Course (MTC) sponsored by Dept. of, Agriculture and Cooperation, Ministry of Agriculture, New Delhi on "Efficient use of on farm and off- farm resources for sustainable crop production in organic farming" during 1-8th December, 2008.
- ICAR sponsored Winter School on "Farmers resource based site specific integrated nutrient management and on-line fertilizer recommendations using GIS and GPS tools" during 3-23 January 2009.
- Model Training Course (MTC) sponsored by the Dept. of Agriculture and Co-operation, Ministry of Agriculture, Govt. of India, New Delhi on "Efficient recycling of mineral and by-product nutrient sources for sustainable crop production" during 2-9 November 2009.
- Short-term training programme on "Soil Health and Fertility Management" during 12-15 February 2010 for KVK personnel from Madhya Pradesh, Chhattisgarh and Orissa states.

- NAIP (ICAR) sponsored a national training on "Climate change, carbon sequestration and carbon trading" during 5-18 April 2011.
- Department of Agriculture and Food Production, Government of Odisha, Bhubaneswar sponsored short-term training programme on "Farmers' Resource based Site Specific Nutrient Management in Different Production Systems" during 31 January to 4 February 2011.
- Directorate of Agriculture and Food Production, Govt. of Odisha, sponsored Model Training on "Recent advances in Soil Physical Analysis and Management" during 17-21 January, 2011.
- Model Training Course sponsored by Ministry of Agriculture and cooperation on "Greenhouse Gas Mitigation Strategies in Agriculture: Microbes in Aid of Global Climate Change" during 12-19 December, 2011.
- MTC on "Soil Organic Matter Management for Climate Resilient Agriculture" during 14-21 February, 2012.
- NAIP (ICAR) sponsored a national training programme on "Assessment of quality and resilience of soils" during 9-13 January, 2012.
- RSKVV, Gwalior sponsored an Orientation cum preparatory workshop on "Management of soil health and degraded lands for sustainable agriculture" during 16 may, 2012.
- National Consultation Meeting for "Developing Roadmaps for Soil Research of India" during 18-20 December, 2012.
- Western Region Agriculture Fair, Soil health for sustainable productivity during 28-31 January, 2013.
- International Conference on Emerging Trends in Agriculture and Environmental Engineering during 15-17 November, 2014.
- ICAR Short course on "Advances in nutrient dynamics in soil plant atmospheric systems for improving nutrient use efficiency" during 2-11 September, 2014.
- Dept. of Agriculture and Cooperation, Ministry of Agriculture, New Delhi sponsored a model training course on "Best nutrient management practices for major crops and cropping systems of India" during 7-14 October, 2014.
- ICAR sponsored winter school training on "Waste recycling and resource management through rapid composting techniques" during 3-23 December 2014.
- Dept. of Agriculture and Cooperation, Ministry of sponsored a model training course (MTC) on "Climate change and conservation agriculture" during 28 January to 4 February, 2015.
- Training Programme on Online Farmer's Subsidy Tracking System and Preparation of Soil Health Card sponsored by ICAR-IISS, Bhopal and Madhya Pradesh State Agro Industries Development Corporation Ltd. during 9 February 2016.
- Training Programme on "Preparation of Soil Health card of Farmers Welfare and Agriculture Development Govt. of M.P. Bhopal" during 26 March 2016.

- Kisan Sangoshthi on "Soil Health and Conservation Agriculture" during 5 March, 2016.
- Training programme on "Secondary and Micronutrients Analysis in Soil for Enhancing Crop Production" during 23-28 May, 2016.
- Department of Farmers' Welfare & Agriculture Development, Govt. of MP sponsored training programme on "Soil health assessment and management" during 6-10 June, 2016.
- Department of Farmers' Welfare & Agriculture Development, Govt. of MP sponsored training on "Soil testing for soil health assessment" during 4-8 July, 2016.
- ICAR sponsored training on "Use & Maintenance of advanced instruments in soil and plant analysis" for technical staff of ICAR and SAUs during 8-13 August, 2016.
- SAARC regional training on "Climate change impact on soil carbon storage and turnover under different land use systems and adaptation strategies" during 16 -23 August, 2016.
- XIth Annual Group Meeting of Network Project on Organic Farming jointly organized by ICAR-Indian Institute of Farming Systems Research, Modipuram and ICAR-IISS, Bhopal, during 17-19 August 2016.
- Dept. of Agriculture and Cooperation, Ministry of sponsored MTC on "Best Nutrient Management Practices for Enhancing Input Use Efficiency and Soil Health" during 30 August to 06 Sept. 2016.
- Department of Farmers' Welfare & Agriculture Development, Govt. of MP sponsored training programs on "Soil health assessment and management "during 02-06 and 26-30 September 2016.
- ICAR sponsored short course "Advances in Soil Testing and Soil Test Crop Response (STCR) Based Fertilizer Management" during 23 August to 1 September, 2016.
- ICAR sponsored winter school on "Assessing Natural Resource Management, Climate Risk and Environmental Sustainability using Simulation Models" during 08 - 28 Nov, 2016
- 28th National Workshop of AICRP-MSPE and Contractual Projects Review Meetings during 21-23 March, 2017.
- ICAR sponsored short Course on "Advances in Assessment of Soil Pollution and its Remediation" during March 16-25, 2017.
- ICAR sponsored training on "Use & Maintenance of advanced instruments in soil and plant analysis" for technical staff of ICAR and SAUs during 22-27 January, 2018

Seminar/Symposia/workshop/Meeting Organized

- 6th NAAS Agricultural Science Congress on "Multi-Enterprise Systems for Viable Agriculture", during 13-15 February, 2003.
- National Seminar on "Standards and Technology for rural/urban compost" on 17 January, 2004.
- National Seminar on "Standards and technology of value added/fortified/Customized fertilizer as source of plant nutrients" on 17 January, 2004.

- National Seminar sponsored by Dept of Agriculture and Cooperation (DOAC), Govt. of India on "Soil testing" during 21-22 January, 2005.
- National Seminar on "Existing Waters resources and technologies for enhancing agricultural production in North Central India" during 2-3 April, 2005.
- Mid-term review workshop of the ACIAR project "Integrated manure nutrient management in soybean/wheat cropping systems on Vertisols in Madhya Pradesh and Queensland" during 29 Aug. to 01 Sept., 2006 at ICAR-IISS, Bhopal.
- Ministry of Agriculture, Dept. of Agriculture and cooperation (DAC), GOI sponsored a National seminar on "Standards and technology of value added/fortified/customized fertilizers as a source of plant nutrients" during 26-27 September 2007.
- Final review workshop of the ACIAR project entitled "Integrated manure nutrient management in soybean/wheat cropping systems on Vertisols in Madhya Pradesh and Queensland" during 15-17 September 2008.
- Department of Agriculture and Cooperation (DAC), Government of India, New Delhi sponsored mid-term workshop of the project entitled "Preparation of GIS based fertility mapping of selected districts for the farmers of India" during 13-14 October, 2010.
- Workshop cum Training of Soil testing for soil health management for KVK staff of MP and Chhattisgarh during 9-10 October, 2012.
- National Seminar on "Strategies to Rationalize and Reduce Consumption of Water Soluble Phosphorus and Potassium in the Country to Minimize Import" during 18-19 December, 2012.
- National Consultation meeting on "Roadmap to Soil Research" during 18-19 December, 2012.
- Dept of Agriculture & Co-operation & Farmers' Welfare, Govt. of India sponsored "National Workshop-cum-training on Soil Fertility mapping" during 11-12 April, 2013.
- Workshop on Contingence Planning for Kharif Crops under Delayed Monsoons in Malwa Plateau Region of MP during 3 July, 2014.
- Training cum workshop on soil health and fertility management for the scientists of KVK of Region VII during 7-9 may, 2014.
- Interactive workshop on contingency planning Kharif crops under delayed monsoon in Malawa plateau region of Madhya Pradesh during 3 July, 2014.
- NTPC sponsored workshop on "Safe utilization of fly ash in agriculture" on 30 August, 2016.
- National Seminar on "Soil health assessment with *Mridaparishak*" during 4-5 November, 2016.
- STCR-Industry Interface meet and Brainstorming session on "Customized Fertilizer and Decision Support System" on 4 December, 2016.
- National Conference on "Organic Waste management for Food and Environmental Security" during February 08-10, 2018.

Selected training activities

SAARC Regional Training
 16-23 August, 2016
 ICAR- Indian Institute of Soil Science, Bhopal





ICAR Short Course
Advances in Assessment of Soil Pollution and its Remediation
 March 16th - 25th, 2017





Training Programme on
Secondary and Micronutrient Analysis in Soil for Enhancing Crop Production
 01 - 08 May 2016
 Speaker:
 Ashwini Ingle
 ICAR- Indian Institute of Soil Science
 Malhotra, Borealis Road, Bhopal - 462 038





ICAR Staff Training Programme
ON
Use and Maintenance of Advanced Instruments in Soil and Plant Analysis
 8 -13 August, 2016
 ICAR-Indian Institute of Soil Science, Bhopal





Model Training Course (MTC) on "Advances in Rapid Composting Techniques for Efficient Bio-waste Utilization vis-a-vis Enhancing Soil Health"
 20-27th November, 2017
 Organized by ICAR-Indian Institute of Soil Science, Bhopal-462038




INDIAN INSTITUTE OF SOIL SCIENCE, BHOPAL
MTC on Conservation Agriculture for Sustaining Soil Carbon, Quality and Productivity in Rainfed Region during 10-17th Sep, 2012



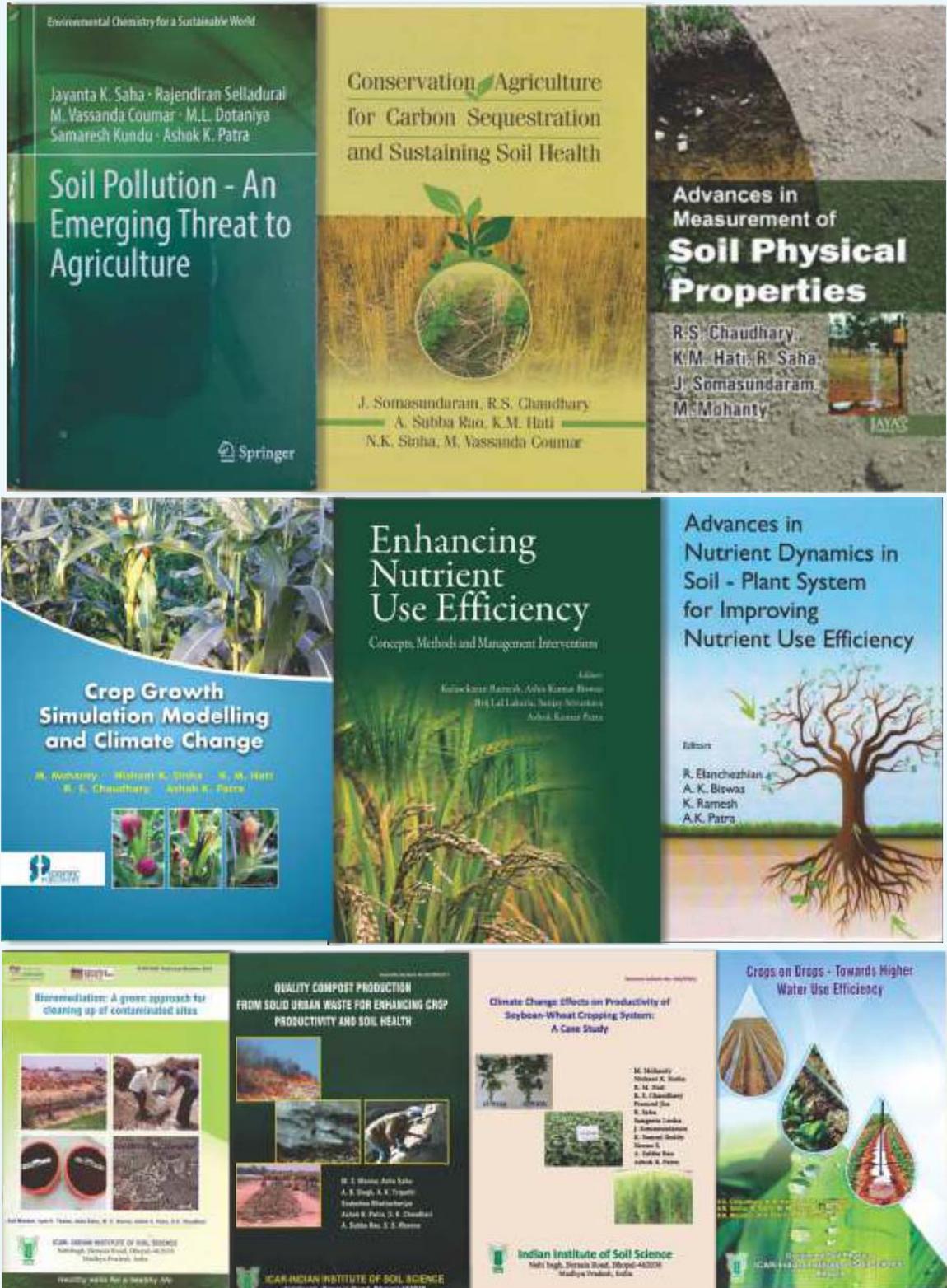

ICAR- Indian Institute of Soil Science, Bhopal
Winter School
Assessing Natural Resource Management, Climate Risk and Environmental Sustainability Using Simulation Models
 08-28 November, 2016




Selected conferences & meetings



Selected books and bulletins



Panorama of other activities





For further details, please contact:

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ICAR- Indian Institute of Soil Science (ICAR-IISS) is located at Nabibagh, Berasia Road on the periphery of the historical city of Bhopal. It is 6 km from the main bus stand, 7 km from Bhopal railway station and 10 km from the airport.



