



# ICAR-IISS

## Newsletter



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### Forthcoming Events

- Short Course on "Advances in nutrient dynamics for improving nutrient and water use efficiency of crops" 5-14 September 2017
- QRT meeting 19-20 September 2017
- RAC Meeting 22-23 September 2017
- Training on use and maintenance of advance instruments in soil and plant analysis 13-18 November 2017
- Model training course 20-27 November 2017



### From the Director's Desk

#### Nano – Fertilizer Technology: An Innovative Strategy

The greatest challenge in Indian agriculture in the coming decades is to enhance production with ecological sustainability. The conventional blanket fertilizer recommendation is causing imbalanced and skewed use of nutrients resulting in low fertilizer use efficiency. In view of the emerging trends in current agriculture there is a need for optimum utilization of fertilizers. Despite intensive research on all issues for improving nutrient use efficiency in agricultural fields, average N, P, K use efficiency in farmers' fields has remained almost unchanged over the last 50 years. Development of new and innovative nutrient management technologies will be crucial in meeting the ecological needs and achieving the anticipated food demands of the growing population in the near future. In this context, use of nano-technology and nano-products in agricultural sector may prove to be a boon to improve agricultural production and productivity. The results of several investigations carried out at ICAR-IISS, Bhopal clearly demonstrated the ability of the plants to utilize nano-sized nutrient products like nano-rock phosphate for their nutrition. The protocol developed for the conversion of indigenous low/medium grade rock phosphate into nano-rock phosphate particle using top down approach (high energy ball mill) opens up a new avenue for effective utilization of vast deposit of indigenous rock phosphate available in the country to meet the P requirement of the crops. This technology can also be extended for utilization of other nutrient containing mineral deposits in agriculture with reduced cost and without causing damage to the environment. "Nano-urea" was documented in a recent China-focused review to benefit several crops, where nano-urea increased grain yield and N uptake significantly, leading to diminution in N loss by up to 74%. Development and use of nano fertilizers fortified with secondary and micronutrients are the need of the hour. The protocol developed at ICAR-IISS, Bhopal to fortify the urea granules with a consortium of nano-particles is one of the smart ways to deliver phosphorus and micronutrients. Nano-scale ZnO can be used as a cheap source of Zn and can also effectively be supplied through seed coating. This protocol of seed coating with nano ZnO can be used by the seed producing agencies to produce customized seed for Zn deficient areas of the country. As chemical fertilizers are not allowed in the organic farming, the nano-particles of natural mineral ores may be recommended for organic farming. The potential use of nano-fertilizers in crop production represents a dramatic departure from the dominant systems of present-day agriculture, and this needs to be investigated thoroughly over a longer time-frame.

( Ashok K. Patra)

## Water Resource Augmentation

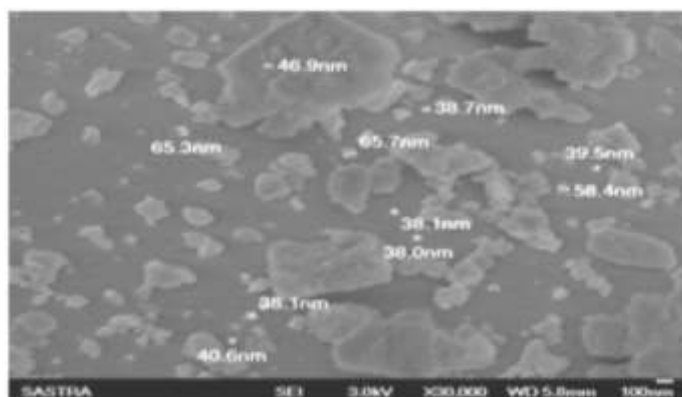
On account of water shortage for irrigating rain-fed crops in the central India, the harvesting and prolonged storage of water has become need of the hour. Institute has taken the steps forward in this direction. The existing dug out farm ponds of the institute face problem of high seepage rate. Two of such ponds have been reshaped and lined with anti-seepage film of polyethylene, which has created the water resource for additional irrigated acreage of the experiments and general farm.



## Research Highlights

### Nano rock phosphate: a potential phosphatic fertilizer to crops

Nano rock phosphate (<100 nm) was prepared by top down approach through a High Energy Ball Mill. A series of solution culture experiments conducted with maize and soybean crops clearly established that P from rock phosphate nano particles can easily be taken up by the crops and all the plant parameters like shoot and root weight, root length, root volume and enzymatic activity like nitrate reductase, phosphatase were also enhanced by rock phosphate nano particle application. Experiment showed an increase in mean yield of sorghum from 1350 kg/ha to 2180 kg/ha and finger millet yield from 640kg/ha to 986 kg/ha, when sorghum- wheat and finger millet-wheat crops were fertilized with nano rock phosphate at the rate of 50 kg  $P_2O_5$ /ha in water suspension (265 l/ha) stabilized with 150 ml of linear Alkyl Benzene Sulphonate.



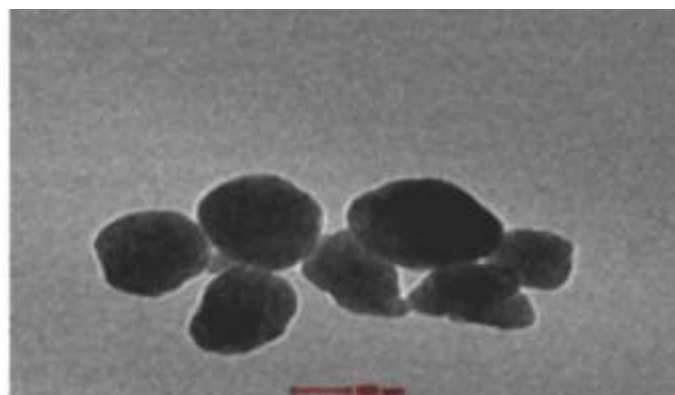
Scanning electron microscope photograph of HGRP-3 rock phosphate nano particle

### Nano particulate zinc mineral

The sphalerite zinc mineral was collected and after grinding into micro level, it was converted to nano level (< 30.73 nm) by High Energy Ball Mill (SPEX, 8000D Mixer/Mill) through top down approach. It took near about 6-9 hours grinding. The particle size was estimated by Particle Size Analyzer (Dynamic Light Scattering Techniques)

### Characterization of nano particulate glauconite mineral

The glauconite sandstone was converted to nano form (size ~ 70 nm) by top down approach and characterized by XRD, Particle Size Analyzer and Transmission Electron Microscope. It was composed of 5.5% potassium oxide plus silicon, aluminum, ferric oxide and may be utilized for alternative source of potassium supplying material for plants.



Electron transmission micrograph of glauconite nano particles

## Lead and nickel contamination on lead dynamics in soil and plant

Addition of increasing concentration of Pb reduced root and shoot biomass and enhanced Pb concentration in root and shoot of spinach. Root part accumulated higher amount of Pb than shoot part. Increased concentration of Ni reduced Pb uptake by spinach. Various ratios, i.e. bio-concentration factor, translocation factor, translocation efficiency and crop removal of Pb by spinach were also adversely affected by different levels of Ni addition. Increased Ni level in Pb contaminated soil reduced Pb toxicity in spinach.

## Elevated CO<sub>2</sub> and temperature favours soybean growth

The soybean (var. JS 20-29) crop was grown with two levels of CO<sub>2</sub> (ambient 550 ppmv) and two levels of temperature (ambient + 2.0 °C). At 70 DAS, about 7-30% higher biomass was observed under elevated CO<sub>2</sub> and/or elevated temperature treatments as compared to ambient chamber condition. A conspicuous increase in plant growth was observed at 85 DAS under all the climate treatments. The modified climate treatments were statistically at par but were higher than ambient and open field conditions. At harvest, compared to ambient chamber, 47, 31 and 47% higher biomass was recorded under elevated CO<sub>2</sub>, elevated temperature, and elevation of both CO<sub>2</sub> and temperature treatments.



Luxuriant growth of soybean crop under elevated CO<sub>2</sub> inside OTC facility.

## Strategies to mitigate the negative impact of climate change on wheat productivity

Long term yield data generated from experimentation vis-à-vis meteorological parameters were used to

assess the impact of climate change on productivity of wheat at Ludhiana and New Delhi. At Ludhiana and New Delhi, predictions were made for three climatic periods (i.e. at 2025, 2050 and 2075) to develop strategies to mitigate the negative effect of climate change on wheat productivity.

Due to increase in day-night temperature there will be decline in wheat productivity by 15, 8 and 5 percent compared to the base productivity at Ludhiana during 2025-26, 2050-51 and 2075-76, respectively. Further, study indicated that combination of agronomical management practices like an increase in N dose, a supplementary irrigation (at 40-60 days) and advancing the sowing time has increased the crop productivity. However, at New Delhi the decline in yield was not predicted with time rather likely to increase in future. The concurrent increase in nitrogen doses and CO<sub>2</sub> concentration helped in offsetting the negative effect of climate change. Advancing in sowing date and more availability of moisture due to increase in rainfall (predicted) helped to avoid the extreme events of change in temperature.

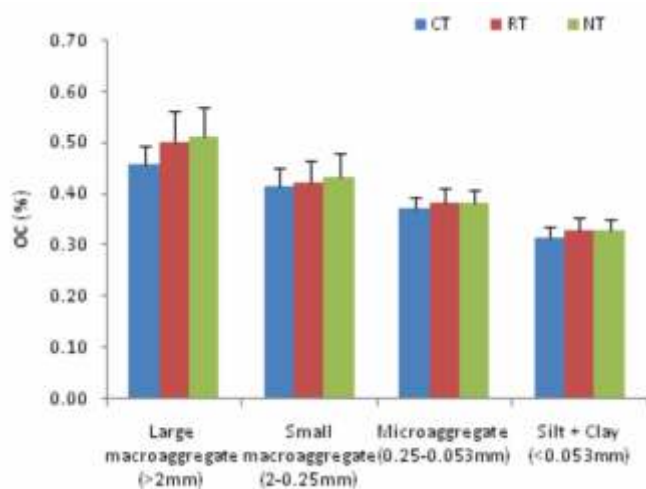
## Influence of conservation tillage practices on soil mechanical resistance

To evaluate the potential cropping systems and conservation tillage practices best suited for the Vertisols of central India, a field experiment was conducted with five tillage treatments and three nutrient management levels. Soil penetration resistance (SPR), recorded 7 days after sowing of rabi crops when the field was having near field capacity moisture content during the second cropping season, was lower in conventional tillage treatment at 0-10 cm soil depth compared to conservation tillage practices (reduced tillage, strip tillage and no-tillage). However, beyond 10cm soil depth differences in SPR was not conspicuous. This was due to the loosening of the surface soil through more intensive primary tillage operations in conventional tillage compared to the other tillage treatments.

## Conservation tillage and cropping systems impact on soil aggregation, aggregate associated carbon

Soil organic carbon (SOC) concentration after completion of six crop cycles was higher in reduced

tillage (RT) with residue retention at 0-5cm soil layer than that in conservation tillage (CT) owing to minimum soil disturbances coupled with incorporation of residue under reduced tillage. In RT, cropping system where cereal crop is a component like maize-gram and soybean-wheat the SOC content was higher than the non-cereal based systems. Tillage practices had a significant effect ( $P < 0.05$ ) on the concentration of aggregate associated-C in large macro-aggregate(LM) at 0-5cm and 5-15cm soil layers. Among the tillage treatments, the carbon concentration in large macro-aggregates from no-tillage and reduced tillage (RT) were higher than that from CT. Conservation tillage practices in combination with crop residue retention and cropping system showed positive impact on the aggregate stability, aggregate associated-C, and different carbon pools in vertisols of central India.



Carbon distribution under different aggregates and tillage practices

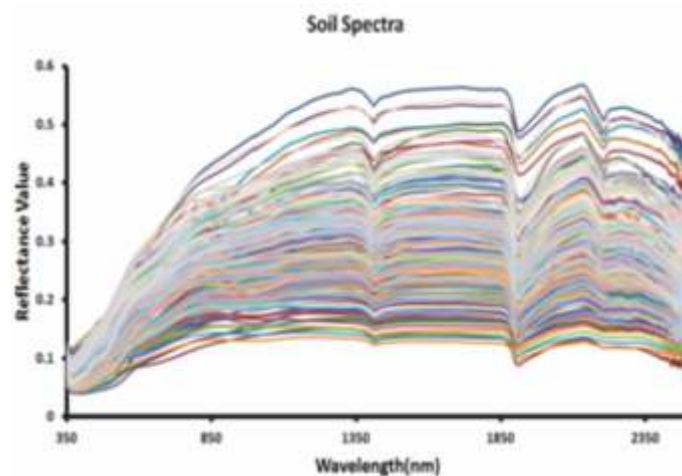
### Assessment of some important properties of Alfisols using Mid-Infrared Spectroscopy

Geo-referenced soil samples, collected from representative arable lands at different places of Kerala and Karnataka, were first analyzed for soil organic carbon (SOC), available N, P and K, EC, pH, sand, silt and clay content following standard laboratory procedures. The ranges of soil pH, EC, SOC, available N, P and K of the samples varied between 3.74-8.33, negligible-0.8dS m<sup>-1</sup>, 0.19-1.32%, 56-508 Kg ha<sup>-1</sup>, 5-189 Kg ha<sup>-1</sup> and 57-945 Kg ha<sup>-1</sup>, respectively in collected soil samples. MIR spectra of the ground soil samples were recorded using the FT-MIR

spectrometer in the diffused reflectance mode. Random forest regression method was used to develop prediction model for the various soil properties. The R<sup>2</sup> of the developed model for different soil properties varied from 0.91 to 0.96. The models developed could predict reasonably well the SOC (0.88) and pH (0.72) of the soil. The R<sup>2</sup> values of the validation dataset for the available N and P were 0.56 and 0.53, respectively while they were as low as 0.19 and 0.23 for the EC and available K, respectively.

### Development of soil spectral library for Vertisols of central India

Soil reflectance in the visible and near infrared region (VNIR) is a function of their physical, chemical and biological composition, therefore, produces unique spectral signature. To develop the soil spectral library in Vertisols, total of 750 geo coded soil samples were collected from three districts viz Bhopal, Jabalpur, and Raisen of Madhya Pradesh. After processing of soil samples, spectra data were obtained in the laboratory conditions using ASD- spectro radiometer. The soil samples were also analysed for soil organic carbon (SOC), pH, and EC. Results showed high variability within dataset as SOC, pH and EC were ranged from 0.2-1.35%, 5-9, and 0.05- 0.35 dSm<sup>-1</sup> respectively.



VNIR spectra of soil samples. Each line in the figure represents the spectrum of different soil.

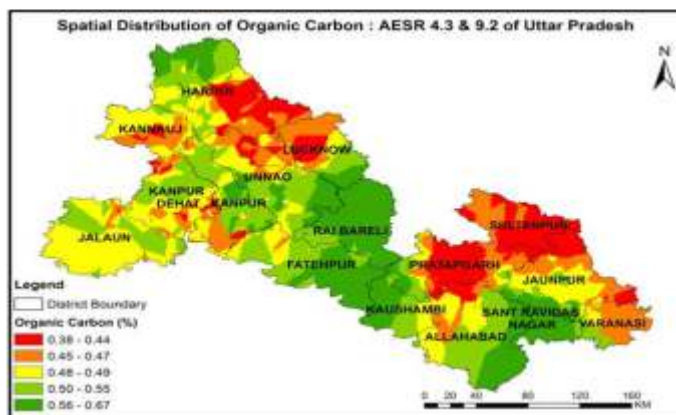
### Assessment of relationship of Zn in soil-plant-animal/human continuum

A survey was carried out in collaboration of AIIMS, Bhopal in tribal villages in Mandla district of Madhya Pradesh. During survey, soil, plant (straw/feed), food grain and human and animal blood samples were

collected from tribal families. Analysis of Zn concentration in soil, grain, straw/feed, human and animal blood serum revealed a strong correlation and interdependence of Zn in soil-plant-animal/human continuum. Statistically significant coefficient of determination ( $R^2$ ) were recorded between soil Zn concentration and grain Zn concentration ( $R^2=0.73$ ), grain Zn concentration and Zn concentration in human blood serum ( $R^2=0.87$ ) and soil Zn concentration and Zn concentration in human blood serum ( $R^2=0.66$ ). Significant  $R^2$  values were also recorded for soil Zn concentration and Zn concentration in straw/feed ( $R^2=0.71$ ), Zn concentration in straw feed and animal blood serum Zn concentration ( $R^2=0.44$ ) and soil Zn concentration and Zn concentration in animal blood serum ( $R^2=0.58$ ).

### Soil quality assessment for AESR 4.3 and 9.2 of Uttar Pradesh

A study was initiated by the ICAR-IISS, Bhopal with participation from three other ICAR Institutes, viz. ICAR-CRIDA, Hyderabad; ICAR-NBSS & LUP, Nagpur and ICAR-IIFSR, Modipuram to make a quantitative assessment of soil quality in major food production regions of the country. The study was initiated for agro-ecological sub-region (AESR) No. 4.1, 4.3, 6.1, 6.2, 9.1 & 9.2, covering the states of Uttar Pradesh, Punjab, Rajasthan, Karnataka and Maharashtra. Grid samples were collected from 61 district and 670 grid points. Thematic GIS maps were developed for soil pH, EC, organic carbon, labile carbon, labile carbon fractions, available potassium, available sulphur and exchangeable sodium content for AESR 4.3 and 9.2 covering 15 districts of Uttar Pradesh state.



Spatial distribution map using ordinary kriging for organic carbon in soils of AESR 4.3 & 9.2.

### Temperature sensitivity of soil organic carbon mineralization in aggregate fractions influenced by land management

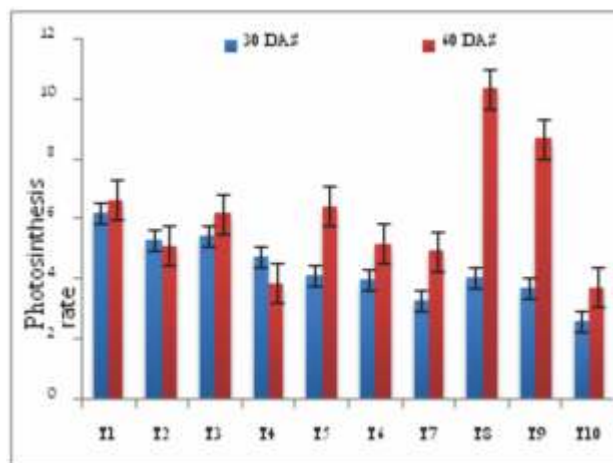
Understanding the differences in soil organic carbon (SOC) mineralization and its temperature sensitivity in different soil aggregates over bulk soil is essential to accurately assess the effects of future warming on soil carbon storage under different land management. Temperature sensitivity ( $Q_{10}$ ) of SOC mineralization was higher at 25-35°C than 35-45°C temperature range. The  $Q_{10}$  of SOC mineralization in macro aggregates (>2 mm and 2-0.250 mm) was higher than micro aggregates (<0.250 mm). In reduced tillage (RT), the cumulative C mineralized from aggregate fractions was 1.38 to 1.57 times higher than no tillage (NT) ( $P < 0.001$ ) at 25°C in 0-15 cm soil depth. However, there was no difference between RT and NT on cumulative C mineralization at higher temperatures 35 and 45°C. Across aggregate sizes, class  $Q_{10}$  of SOC mineralization was lower in RT than NT and application of FYM increased the  $Q_{10}$  of soil C mineralization in both RT and NT.

### Impact of resource conservation technologies on soil carbon content

Soil samples were collected from ongoing long-term experiment on effect of resource conservation technologies on crop productivity, water requirement and soil health in rice-wheat cropping sequence at Modipuram, Meerut. The treatments of main plots (Rice) consist of P1-Unpuddled, P2-Puddled, P3-Manual transplanter. The sub-plots (Wheat) were T1-Zero till drill, T2-Happy turbo-seeder, T3-Roto till drill, T4-Bed planting and T5-Conventional sowing. Results revealed that irrespective of soil conditions in main plots, soil carbon concentration in 0-5cm of soil depth was found maximum under zero till seed drill and happy turbo seeder plots. Among the planting methods, highest soil organic carbon (SOC) was recorded under P1 condition. Among the different sowing methods, highest SOC concentration was recorded in zero seed drill and happy turbo seeder (0.72%) in 0-5 cm of soil depth. Soil organic carbon stratification ratio under unpuddled condition in 0-5cm of soil depth ranged from 1.09 (puddled condition) to 1.59 (unpuddled condition). Lowest SOC concentration was recorded under bed planting method.

## Impact of Fe, Cu and Zn nano-particles on growth and photosynthetic gas exchange of wheat

The impact of Fe, Cu and Zn nano-micronutrient fertilization on growth and gas exchange of wheat was studied under sand culture. Among all the treatments, highest leaf area was obtained in the plants treated with Zn NP (2 $\mu$ M) at 60 DAS. Among Fe treated plants, maximum leaf area was recorded in plants treated with Fe NP (54  $\mu$ M). Highest photosynthesis rate was obtained in plants treated with Zn NP (2 $\mu$ M) at 60 DAS. Enhancement of antioxidant enzyme activities with NP application indicated reactive oxygen species scavenging in the cell. NPs at reduced concentration were useful for crop and that might have acted as catalyst for growth and gas exchange of plant.



Impact of Fe, Cu and Zn NP on photosynthesis rate of wheat

T1: control; T2: Fe NP100; T3: Fe NP50; T4: Fe 50; T5:Cu NP 100;  
T6:Cu NP50; T7: Cu50; T8:Zn NP 100; T9: Zn NP50; T10 : Zn50

## Evaluation of modified urea materials and agronomic interventions for enhancing nitrogen use efficiency and sustaining crop productivity

A field experiment was conducted to evaluate different modified urea materials for enhancing nitrogen use efficiency and sustaining crop productivity for maize-chickpea cropping sequence. There was not much influence of the residual fertility on growth and yield attributing parameters and grain and straw yield of chickpea, but the magnitude of crop yield and its attributes were higher in plot treated with biochar coated urea. Another field experiment was conducted to evaluate best agronomic interventions for enhancing crop yield and nitrogen use efficiency

during Rabi season in chickpea indicated incorporation of Leucaena biochar at large scale to field (10 tonnes/ha) as soil amendment with recommended dose fertilizer (120 Kg N/ha) improved chickpea grain and straw yield.

## Evaluation of wheat and chickpea varieties under organic farming

Performance of different varieties of chickpea and wheat were evaluated for their yield response to screen out promising varieties under organic management practices for central India. Among the 12 varieties of each crops, chickpea cultivars, cv. JG-130 registered higher yield followed by RVG-203. In wheat, GW-366 and HI-8498 out performed in terms of grain yield under organic management system.

## Long – term evaluation of integrated plant nutrient supply modules for sustainable productivity in a Vertisol

Evaluation of different integrated plant nutrient supply modules in maize-chickpea cropping sequence for sustainable crop productivity in vertisol soil was conducted. Crop productivity and nutrient uptake was significantly differed with INM modules. The application of 5 tonne farmyard manure in every season also improved the grain, and straw yield of chickpea as compared to residue management (mulching by maize residues). Increase in grain and straw yield of chickpea might be due to residual fertility effect of organic manures in maize. The higher chickpea grain yield was recorded with the application of GRD, STCR based recommended dose of fertilizers, and 100% P only with the residual fertility of maize crop. Application of 5 tonne FYM in every season also improved the chickpea crop productivity as compared to residue management (maize residues).

## Assessment of cotton for the remediation of soils contaminated with heavy metals

A study was carried out to assess Bt cotton (RCH-2) for the remediation of soils contaminated with heavy metals. The concentration in different plant parts increased significantly with the increase in the level of applied heavy metals. Invariably the roots accumulated the highest concentration of heavy metals than the shoots. The concentration of Cd in the root ranged from 3.1  $\mu$ g g<sup>-1</sup> DW at Cd 50 mg kg<sup>-1</sup> soil to

16  $\mu\text{g g}^{-1}$  DW at Cd 200  $\text{mg Kg}^{-1}$  soil. On the other hand, the concentration of Cd in shoot ranged from 2.6  $\mu\text{g g}^{-1}$  DW at Cd 50  $\text{mg Kg}^{-1}$  soil to 12.2  $\mu\text{g g}^{-1}$  DW at Cd 200  $\text{mg Kg}^{-1}$  soil. Lint recorded the lowest concentration i.e., 1.4  $\mu\text{g g}^{-1}$  DW at Cd 200  $\text{mg Kg}^{-1}$  soil. Similarly, the concentration of Pb in the root and shoot ranged from 31  $\mu\text{g g}^{-1}$  DW at Pb 500  $\text{mg Kg}^{-1}$  soil to 61  $\mu\text{g g}^{-1}$  DW at Pb 1000  $\text{mg Kg}^{-1}$  soil and 12  $\mu\text{g g}^{-1}$  DW at Pb 500  $\text{mg Kg}^{-1}$  soil to 11  $\mu\text{g g}^{-1}$  DW at Pb 1000  $\text{mg Kg}^{-1}$  soil respectively. No Pb was found in seed and lint of cotton. The concentration of chromium followed a similar trend to that of the Cd and Pb. Since the plant has been classified as an excluder, it could be useful for phyto-stabilization of Cd, Cr and Pb.

### Effect of weedicides on $\text{N}_2\text{O}$ production from soil under soybean and maize

The effect of three weedicides namely Pendimethalin, Imazethapyre and Atrazine on  $\text{N}_2\text{O}$  production was evaluated.  $\text{N}_2\text{O}$  production ranged from 5.92  $\text{ng g}^{-1}$  soil to 11.62  $\text{ng g}^{-1}$  soil under different treatments. The three weedicides exhibited similar positive effect on the  $\text{N}_2\text{O}$  production. The  $\text{N}_2\text{O}$  production and nitrification was high in top soil while the denitrification was high in deeper soil layers. This spatial effect was related with the aerobic and anaerobic gradient nature of the soil. The abundance of eubacterial 16S rRNA gene, nitrifying bacterial amoA gene and nitrifying archaeal amoA gene was high in the weedicide treated fields. Probably, the weedicide stimulated microbial population through mineralization. Potential  $\text{N}_2\text{O}$  production was high in maize crop than soybean because of high N fertilizer amendment to maize. Microbial abundance was also high in maize than that of soybean.

### Long term effect of fertilizer and manure amendments on soil enzymes

Soil samples were collected from LTFE experiments at Barrackpore (45 years old) and Parbhani (21 years old) centres and were analysed for activities of  $\beta$ -glucosidase and acid and alkaline phosphatase. It was noticed that at Barrackpore, the highest alkaline phosphatase, acid phosphatase and  $\beta$ -glucosidase activity was associated with fallow treatment. However, at Parbhani, the highest acid phosphatase and  $\beta$ -glucosidase activity were recorded under 100% NPK+ FYM and 100% NP, respectively. However, the

treatment 100% NPK+FYM had the higher  $\beta$ -glucosidase activity as compared to other treatment except Fallow at Barrackpore. The activity of alkaline phosphatase did not differ significantly among treatments at both the centres.

### New project initiated

A project on 'Development of an Automated Soil Nutrient Sensing System' under NASF scheme of ICAR. ICAR-CIAE is the lead centre. ICAR-IISS, Bhopal and CSIR-CSIO Chandigarh are co-operating centres.

### Awards, Honours/Recognition

- ICAR-IISS received "Cashless ICAR Institute Award" with a cash prize of Rs 5.00 lakh from ICAR, New Delhi on 14 February, 2017.



- Dr. Arvind Kumar Shukla awarded NAAS fellowship on 05.06.2017.



- Dr M. L. Dotaniya got Special Achievement Award-2017 by EET CRS Science & Technology
- Dr. Asha Sahu received M.P. Young Scientist Award 2017 held at MPCST, Bhopal.
- Dr. Pankaj K Tiwari received "S. N. Ranade Memorial Encouragement Award -2017" by IMT Technologies Ltd., Pune.



- Dr. A.K. Patra elected as President of the Agriculture and Forestry Sciences Section of Indian Science Congress Association for the period of 2016-17.
- Dr. A.K. Patra elected as Vice President of the Indian Society of Soil Science, New Delhi for the period of 2016-17.
- Dr. A.K. Patra, Associate Editor, European Journal of Soil Science, UK.
- Dr. A.K. Shukla elected as Vice President of the Indian Society of Soil Science, New Delhi for the period of 2017-18.



- ICAR-IISS, Bhopal was awarded Consolation Prize for "Best Stall" in Krishi Unnati Mela held at ICAR-IARI New Delhi during 15-17 March 2017.
- Dr. Brij Lal Lakaria received Certificate of Honor for support to Agri Clinic and Agri Business Scheme of MANAGE, GOI by IECCI (Indo European Chamber of Commerce and Industry), Bhopal.
- Dr. Pradip Dey received certificate for significant contribution as lead team member of ESP Biome Working Group of BWG 4A-Shrubland under Drylands of Ecosystem Services Partnership.

- Dr. Pradip Dey honored as Vice-President of Indian Society of Agrophysics, New Delhi.

### International Co-operation/ Deputation

- Dr. A. K. Patra participated in the interest group on agricultural data (IGAD) and GODAN pre-plenary meeting to 9<sup>th</sup> RDA at Barcelona, Spain, 3-7 April 2017.
- Dr. Pradip Dey participated in expert consultation meeting on "Best Practices of Integrated Plant Nutrition System (IPNS) in SARRC Countries" Bangladesh Agricultural University, Mymensingh 9-11 April 2017.
- Dr. Pradip Dey, visited Berlin, Germany to attend Global Soil Week 2017 organised by Institute for Advanced Sustainability Studies (IASS) during 27-29 May, 2017.

### Extension activities

- Organized one day Kisan Sangosthi on 04/03/2017 at Mugalia Hat and Khamkheda, Bhopal under MGMG.
- Organized one day Kisan Sangosthi on 15/03/2017 at Khamkheda village Bhopal under MGMG
- Organized one day Kisan Sangosthi on 24/03/2017 at Bhairapura village, Bhopal under MGMG
- A training programme on various aspects of resource conservation technologies, composting, vegetable production was organized on 24<sup>th</sup> March, 2017 at ICAR- Indian Institute of Soil Science, under "Farmer First" project.



- Intensive training cum awareness programmes on "Sustainable soil management for Improving crop production" were organized for the tribal farmers of Jhabua, Alirajpur and Dhar district of Madhya Pradesh. 7-9 March 2017 under TSP programme.





- A field day cum capacity building programme organized at Burjugadda Thanda, a tribal hamlet of Ranga Reddy district, Telangana and the home of Lambadi tribe on January 2, 2017 under Tribal Sub-Plan of ICAR-AICRP on Soil Test Crop Response.



- A Farmer-Scientist Interaction Meet and Field day was organized at Agricultural Research Station, SKRAU, Bikaner on January 23, 2017. The programme was jointly organized by STCR centre and KVK-Bikaner of SKRAU



## Distinguished Visitors

- 30 trainees (Deputy district collectors) from Academy of administration on 15 March 2017
- Dr. D. Srinivas, Prof. & Head, Agril College, Rajamahendaram, A.P. on 21 June, 2017
- Dr. P.P. Mahendran, Prof & Head, TNAU, Madurai on 21 June, 2017
- Dr. P. Bala Subramanyam, Trichy, TNAU, Tamil Nadu on 21 June, 2017



Dr. CL Acharya and Dr. PN Takkar, Former Directors of ICAR-IISS, Bhopal visited the OTC facility on 23 March, 2017

## Staff News

### New staff joined

- Shri S.K. Gupta, S.A.O. joined the institute on 01.04.2017.
- Dr. Sanjib Kumar Behera, Senior Scientist joined the institute on 27.06.2017.
- Dr. Prabhat Tripathi, Principal Scientist joined the institute on 28.06.2017

### Staff transferred

- Dr. K. Ramesh, Principal Scientist transferred to ICAR-IIOR, Hyderabad on 24-06-2017.
- Dr. S. Rajendiran transferred to ICAR-IIHR Bengaluru on 24.06.2017.
- Dr. Pankaj Tiwari, Scientist transferred to ICAR-CIFA, Bhubaneswar on 29.06.2017.

### Retired

- Shri R.K. Giri A.O. retired on 30.04.2017.

## Workshop/Training programmes organised



Summer Training for Students of SHUATS, Allahabad and ITM University, Gwalior

Programme	Course Directors/Coordinators	Duration	Sponsored by
ICAR sponsored short course "Advances in microbial bio-fertilizers for sustainable agriculture in diverse soil and cropping systems".	Drs. M.C. Manna, J. K. Thakur and Ashok K. Patra	10-19, January, 2017	ICAR-IISS, Bhopal
Soil health assessment and management	Drs. R. Elanchezian, K. Ramesh and A.K. Biswas	2-6 February, 2017	Department of Farmer's Welfare & Agriculture Development, Govt. of M.P.
NICRA- workshop cum training programme on "Crop simulation models in climate change impact assessment"	Drs. M. Mohnaty, N.K. Sinha, J. Somasundaram, R. S. Chaudhary, Sangeeta Lenka and Pramod Jha	14-18 February, 2017	ICAR-IISS, Bhopal
Skill Development Training Programme on "Vermicompost Production"	Dr. A. B. Singh	22 February to 2 March, 2017	ICAR-IISS, Bhopal
Farmers training Programme on "Organic Farming and Soil Health"	Dr. A. B. Singh	27 February to 3 March, 2017	ICAR-IISS, Bhopal
Soil Health Assessment and Soil Health Card Preparation	Drs. N.K. Lenka, . B. L. Lakaria and B.P Meena	14-18 March, 2017	Department of Farmers Welfare and Agriculture Development, M.P.
ICAR Short Course on "Advances in Assessment of Soil Pollution and its Remediation"	Drs. J.K. Saha, M. Vassanda Coumar and M.L. Dotaniya	16-25 March, 2017	ICAR-IISS, Bhopal

28 <sup>th</sup> National Workshop of AICRP on Micro and Secondary Nutrients and Pollutant Elements in Soils and Plants and interface meeting of researchers-extensionists-entrepreneurs-farmers was organized.	Drs. A.K. Shukla and Pankaj Tiwari	21-23 March 2017.	ICAR-IISS Bhopal
Utility of soil health card for soil health management	Dr. A. K. Biswas	27-28 March, 2017	KVKs of RVSKVV, Gwalior and ICAR-IISS, Bhopal.
Climate Smart Agriculture at Karond Khurd and ParwaliaSadak village	NICRA team	29-30 March, 2017	ICAR-IISS, Bhopal

## Programmes Held

### Republic Day

Institute celebrated 68th Republic Day. A cricket match and various cultural activities were organized for institute staff and their family members. The Director, Dr. A.K. Patra inaugurated the events and praised the efforts in this direction.



### National Productivity Week Celebration (12-18 Feb., 2017)

National Productivity Week was organized at ICAR-IISS, Bhopal during 12-18 February, 2017. An essay and painting competition on the theme "Waste to Profits through Reduce, Recycle and Reuse" and Slogan competition on the theme "Soil Health" was organized during the week. A farmer-



scientist interaction meet was organized on 14<sup>th</sup> Feb 2017 where in 120 farmers from adopted villages under "Mera Gaon Mera Gaurav" participated. TV show was recorded in which technologies like Mridaparikshak, conservation agriculture, organic farming practices, composting methods and importance of soil health and balanced nutrition were presented. An exposure visit to organic

farming for a group of 50 farmers from Datia district was organised. On-farm farmer-scientist interaction meet was organized at Village Mugaliahat, Bhopal on 17<sup>th</sup> February 2017 wherein a group of 60 farmers participated. The valedictory function was held on 18<sup>th</sup> Feb 2017 wherein Director ICAR-IISS felicitated the winners of various competitions.

## International Women's Day

Institute organized Krishak Mahila Sanghosi on 8<sup>th</sup> March, 2017 at village Amoni, near Vidisha road, Bhopal. The participants were farm women, housewives, girls, anganwadi and health workers from village Amoni and Prempura. Dr. A. K. Patra, Director, ICAR-IISS



addressed the gathering on gender equality and empowerment of all women and girls. Women are important element of society and society should recognize the individual identity of women.

## Kisan Sangoshthi

A Kisan Sangoshthi entitled 'Response of Crops to Applied Potassium in Vertisols of India' was organised under 'Mera Gaon Mera Gaurav' programme at Amoni village, Bhopal on 08<sup>th</sup> March 2017. The farmers from near by villages participated in the meeting and interacted during the discussion. On this



Field Visit



Soil health cards distribution

occasion the visit to field demonstrations were organised and soil health cards (SHC) were distributed

by Dr. A.K.Patra (Director), Dr. Muneshwar Singh (PC, LTFE) and other dignitaries.

## Foundation Day (April 16, 2017)

The 30<sup>th</sup> Foundation Day of ICAR-Indian Institute of Soil Science was celebrated on April 16, 2017 at the institute campus. The Foundation Day programme was graced by Dr. Panjab Singh, Chancellor, Rani Lakshimbai Central Agricultural University, Jhansi and Former Secretary (DARE) & Director General (ICAR) as Chief Guest who also delivered the Foundation Day lecture. Dr. C.K. Patil, Director General, Madhya Pradesh Council of Science and Technology (MPCOST), Bhopal was Guests of Honour of the event. Progressive farmers as well as institute Staff who had completed twenty years of service in ICAR-IISS were felicitated on this occasion. A Farmer-Scientist interaction programme was also organized.



## Swachhta Pakhwada (16-31 May, 2017)

The ICAR-Indian Institute of Soil Science, Bhopal observed Swachhta Pakhwada from 16-31 May, 2017. During this period, ICAR-IISS, Bhopal was vibrant with various activities and events related to cleanliness and sanitation. During the Pakhwada, on-campus and off - campus cleanliness activities have been performed involving Scientist/Staff/ Students/ Farmers/ common citizens. ICAR-IISS also conducted a Swachhta drive as well as awareness program in Parwa kheda village.



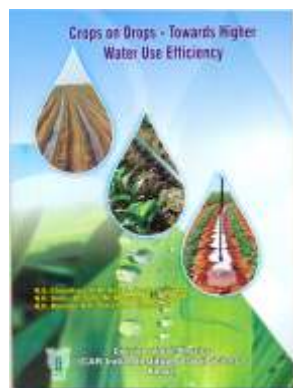
During this program, emphasis was given to use of organic inputs and bio-fertilizers for sustainable agriculture productivity.

## Krishi Unnati Mela

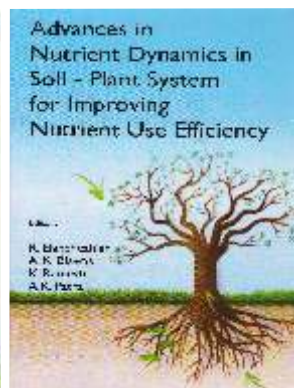
ICAR-IISS Bhopal participated in the Krishi Unnati Mela at ICAR-IARI New Delhi during 15-17 March 2017. On this occasion two technologies (i) 'Mridaparikshak: A Mini-lab for Soil Testing and Fertilizer Recommendation' and (ii) 'Rapo-composting Technology for Recycling of biodegradable waste' of the Institute in digital form were displayed. The institute stall was awarded "Certificate of Consolation" on this occasion. A large number of farmers, students, officials, entrepreneurs and local residents have visited the institute stall.



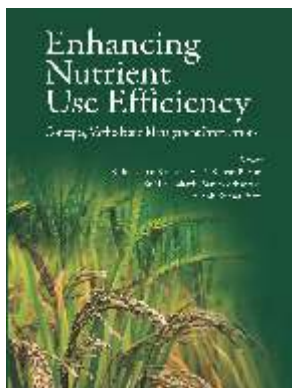
## Recent Publications



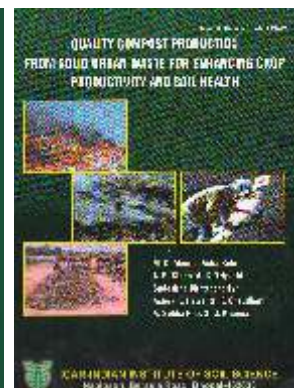
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## Scientist participation in Conferences/ Seminars/ Trainings/ Workshops

Name	Programme	Venue	Date
Drs. A.K. Patra, Pradip Dey, K. Ramesh, R. Elanchezhian and S.R. Mohanty	104 <sup>th</sup> Indian Science Congress (ISC)	S.V. University, Tirupati	02-07 January, 2017
Dr. A.K. Patra	Training programme "Managerial Effectiveness"	IIM, Ahmedabad	09-14 January, 2017
Dr. A.K. Patra	Meeting on "Establishment of soil, water and tissue test laboratories in African countries."	ICAR, New Delhi	16 January 2017
Dr. J. K. Saha	Safe utilization of fly ash in agriculture	Noida	20 January 2017
Dr. Pradip Dey	National seminar on climate resilient saline agriculture: sustaining livelihood security	Bikaner.	22 January 2017
Dr. A. B. Singh	Krishi mela on organic farming for sustainable productivity and soil health	KVK, Burhanpur, Madhya Pradesh	12 February, 2017
Dr. Pradip Dey	AICRP review committee meeting	New Delhi	14- 15 February, 2017
Dr. A.K. Patra	Directors Conference	ICAR, New Delhi	14-17 February 2017
Dr. K. M. Hati	Training programme on "Competency enhancement programme for effective implementation of training function by HRD Nodal Officers of ICAR"	NAARM, Hyderabad	16-18 February 2017
Drs. Tapan Adhikari , Gurav Priya Pandurang , Pradip Dey	Clay Science Conference -2017	NBSS&LUP, Nagpur	17-18 February, 2017
Dr. Sangeeta Lenka	XIII Agricultural Science Congress	Bangalore	21-24 February 2017
Dr. M. Mohanty	PAMC meeting of the DST project	IIST, Trivandrum	23-25 February 2017.
Dr. Pradip Dey	National seminar on "Climate Change Adaption"	Hyderabad	24 – 25 February, 2017
Dr. Gurav Priya Pandurang	Training of clay mineralogical aspects	NBSS&LUP Nagpur	02 January to 01 March 2017.
Dr R. S. Chaudhary	Ajay Khare Memorial lecture on "Bharat ka Swasthyatantra- Neetiyan aur Chunotiyan" organized by MP Jan Swasthya Abhiyan	Bhopal	4 March 2017
Dr R. S. Chaudhary	Panel discussion on "Bharat ka Jalkshetra Neetiyanaur Chunotiyan" organized by MP Jan Swasthya Abhiyan	Bhopal	5 March 2017

Name	Programme	Venue	Date
Drs. Asha Sahu and Sudeshna Bhattacharja	Workshop on advanced course on Genotyping and DNA Sequencing	MPCST, Bhopal	7-9 March 2017
Dr. Pradip Dey,	programme Management Review Committee Meeting	NABARD, Mumbai	10 March 2017
Dr. K. M. Hati	Meeting of the council of the Indian Society of Soil Science	New Delhi	18 March 2017
Dr. Tapan Adhikari	Feedback and interaction on deficiency, effectiveness and utilization of Mridaparikshak	ATARI, Kanpur	18 March, 2017
Dr. A.K. Viswakarma	National review workshop on "Farmers First"	NAARM, Hyderabad	18-19 March, 2017
Dr. R. S. Chaudhary	State level credit seminar and Water campaign	Bhopal	21 March 2017
Drs. Muneshwar Singh, Arvind Shukla, R.H. Wanjari and Pankaj Tiwari	Workshop of 'AICRP on Micro and secondary nutrients'	ICAR-IISS, Bhopal	21-23 March 2017
Dr. K. M. Hati	Review meeting of consortium research platforms (CRPs)	New Delhi	23 March 2017
Drs. A.K. Patra, A.K. Biswas and K.M. Hati	Review meeting of CRP on CA	ICAR, New Delhi	23-24 March, 2017
Dr. N. K. Sinha	Training program on KRISHI portal	IASRI- New Delhi	24-25 March, 2017
Dr. J. Somasundaram	ICAR- KRISHI Geoportal Workshop	NBSS&LUP, Nagpur	27 March, 2017
Dr. J. K. Saha	Interactive meeting with ICAR-Review committee	NIAP, New Delhi	11 April, 2017.
Dr. Asha Sahu	Joint U.S.-India International conference on waste management innovation	Mumbai	16-19 April, 2017
Dr. Pradip Dey	Review meeting of DAC & FW	New Delhi	05 & 11 May, 2017
Dr. J. K. Saha	Meeting of technical expert committee on development of soil standard	Ministry of Environment, Forest and Climate Change New Delhi	15 May 2017
Drs. B. P. Meena, K.C. Shinogi	KrishiVikash Fair-2017	BHEL, Bhopal	19-21 May 2017
Dr. Pradip Dey	Meeting on "Soil Health Campaign on Social Media"	New Delhi	2 June, 2017
Drs. A.K. Patra, A.K. Shukla, S. Kundu, A.K. Biswas, Tapan Adhikari and N.K. Lenka	GB meeting of NAAS and Award Ceremony	New Delhi	4-5 June, 2017
Dr. M. Mohanty	Meeting of NICRA project and annual review meeting of DST project	New Delhi	6-9 June, 2017

Name	Programme	Venue	Date
Drs. J.K. Saha, M.C. Manna, A.K. Biswas, Pradip Dey, Tapan Adhikari and S. Lenka	National seminar on "Nutrients and pollutants in soil-plant-animal-human continuum for sustaining soil, food and nutritional security-way forward"	BCKV, Kalayani	8-11 June 2017
Dr A. B. Singh	National sangosthi on organic farming	CTAE, Udaipur	10-11 June 2017
Dr. Pradip Dey	Pro-soil partner workshop held at Westin	Gurugram, Haryana	7 June, 2017
Dr. Pradip Dey	Meeting on web services for soil health card scheme through Bhuvan Portal	NRSC, Hyderabad	19 June 2017
Dr. M. Mohanty	Workshop on "Application of space science and technology in agriculture and allied sectors"	SAC-ISRO, Ahmedabad	28-29 June, 2017
Dr. A.K. Patra,	International partnership convention under "Feed the Future India" Triangular Training for Point of contracts of Partner Countries from Asia & Africa and Partner Institutions in India	MANAGE, Hyderabad	28 June to 1 July, 2017.

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