



ICAR-IISS Newsletter



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FORTHCOMING EVENTS

- World Water Day on 22 March 2021
- World Environment Day on 5 June 2021
- National Webinar on "Nanotechnology in Agriculture : Opportunities and Challenges" on 24 June 2021
- International Day of Yoga on 21 June 2021

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UN - FAO KING BHUMIBOL WORLD SOIL DAY 2020 AWARD

The ICAR- Indian Institute of Soil Science, Bhopal, Madhya Pradesh, India has been conferred the prestigious King Bhumibol World Soil Day 2020 Award by the Food and Agriculture Organization on its World Soil Day 2020 function. Launched in 2018, the 'King Bhumibol World Soil Day Award' acknowledges individuals or institutions that raise public awareness of soils by organizing successful and influential World Soil Day celebrations. The award, sponsored by the Kingdom of Thailand, is named after King Bhumibol Adulyadej of Thailand for his lifelong commitment for raising awareness of the importance of sustainable soil management and rehabilitation for food security, poverty alleviation and more. This award by FAO to ICAR-IISS, Bhopal, is an international recognition in view of excellent contribution in 'Soil Health Awareness' by the Institute during last year.

In the framework of World Soil Day 2019, ICAR-IISS, Bhopal organized its event entitled "Soil Health Awareness Week" (1-7 December 2019) to raise awareness of soil health and the importance of maintaining crop productivity while protecting the environment. The institute organized interactive sessions in universities, awareness-raising activities in schools exhibitions, screenings field visits and training sessions throughout the week to reach out to all soil stakeholders in the country. The celebrations were widely disseminated online and were relayed at the national level by national media outlets.





Director's Message

Soil Biodiversity: The Key to Sustainability

Soils are a globally important reservoir of biodiversity, hosting at least one quarter of all living organisms on the planet. The soil biota are the foundation for numerous ecosystem functions including generation of biomass; biogeochemical cycling; regulation of water movement, climate mitigation and pollution that directly and indirectly support human wellbeing. Any disturbance in soil biodiversity can lead to serious health crisis and its loss will lead to erode the very foundations of our economies, livelihoods, food security, health and quality of life. Soil biodiversity loss is mainly due to soil organic matter decline, soil compaction, soil contamination, salinization and acidification. Climate change can also impact soil biodiversity by increasing atmospheric greenhouse gases and temperature.



To preserve soil biodiversity, UN has initiated several programs. Food and Agriculture Organization, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, and the Convention on Biological Diversity are working intensively to spread awareness on soil biodiversity. Every year UNESCO celebrates May 22 as the International Day for Biological Diversity or World Biodiversity Day. Its main focus is to protect soil biodiversity as the mainframe for sustainable agriculture and environment. ICAR-Indian Institute of Soil Science is also contributing to improve soil biodiversity through research and enhancing awareness activities. The Institute is the coordinating unit of the All India Network Project on Soil Biodiversity Biofertilizers (AINP-SBB) sponsored by ICAR which exclusively focus to assess soil microbial diversity using metagenomics approach under various agricultural practices and developing microbial inoculants for intensifying biofertilizer use across agro-ecological regions, north eastern hilly regions, and areas dominated by marginal scheduled caste and scheduled tribe farmers. Biofertilizer developed under this project have contributed significantly in reducing dependence on chemical fertilizer use while at the same time improving soil biology. The institute also undertakes several research projects to study the soil biodiversity changes under climate change such as elevated CO₂ and temperature. To improve soil biodiversity, our priorities includes (1) understanding the detailed structure and functions of soil biota using high-throughput metagenomics; (2) determining the ecological 'hot spots' and habitats of most vulnerable for soil biodiversity loss, amenable to restoration; (3) intensifying research on climate change microbiology to link climate change, soil biodiversity and ecosystem functioning; (4) determining the key species in soil influencing agriculture productivity and invasive species dominance, and (5) spreading awareness on the importance of soil biodiversity.

The institute also celebrated 'World Soil Day 2020 : Keep Soil Alive, Protect Soil Biodiversity' by organizing awareness programs and interactive meets at village level to educate farmers on soil health. Our intensive effort in research and awareness activities enabled us to receive FAO's King Bhumibol World Soil Day 2020 Award. However, there is need for paradigm shift in our perspective in recognizing soil as a limited biological resource that supports our overall well-being, rather than an input/output system for agriculture. Thus, we envisage intensifying basic and strategic research on soil biodiversity and contribute to the national missions on food security, human health and climate change.

Ashok K. Patra



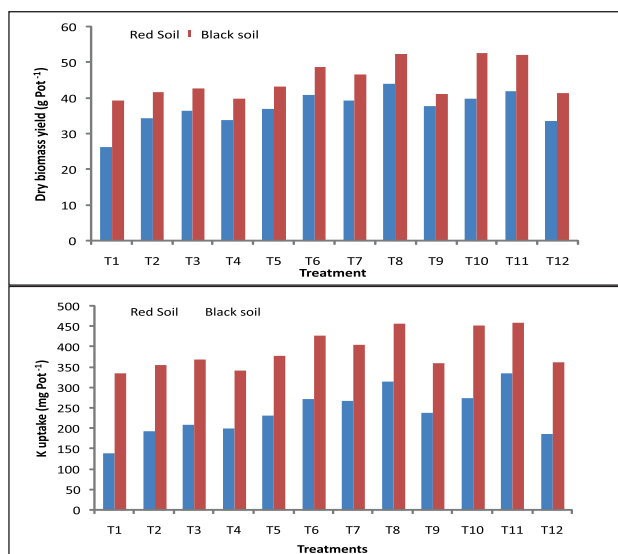
RESEARCH HIGHLIGHTS

Package of practices (PoPs) for improving crop productivity and soil health in the maize-chickpea system.

A field experiment was conducted to evaluate the different integrated nutrient management modules for enhancing crop productivity and soil quality during kharif season with maize as a test crop. Crop yield was significantly improved by integrated nutrient management (INM) modules than organic and inorganic modules. Maize yield was highest with FYM based INM modules (FYM + STCR based 75% NPK) followed by FYM at 20 t/ha and 75% NPK + poultry manure than general recommended dose (GRD) and 100% NPK based STCR alone. Total organic carbon (TOC) content and nitrogen concentration increased significantly under FYM at 20 Mg ha⁻¹ and STCR based 75% NPK + FYM at 5 Mg ha⁻¹.

Evaluation of calcined and acidulated glauconite on maize yield in red and black soil

Calcined glauconite and acidulated glauconite either alone or along with FYM was evaluated on maize in Alfisol (red soil) and Vertisol (black soil). The results indicated that calcined glauconite and acidulated calcined glauconite application alone or in combination with FYM showed higher growth and uptake of K by maize in both the soils. Application of glauconite + FYM was more effective than the glauconite alone and their effect on crop performance was more prominent in red soil than black soil.



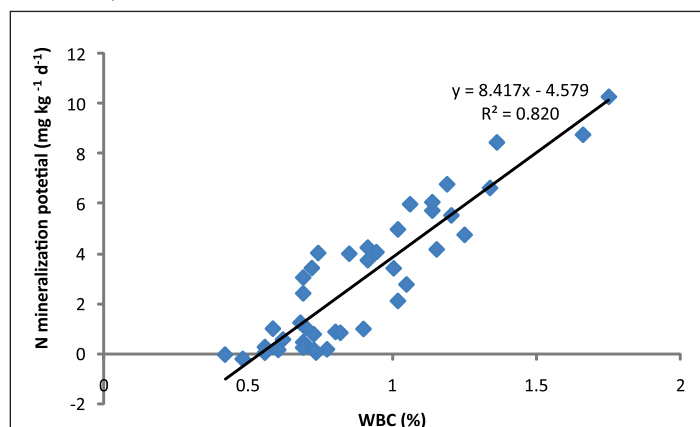
Dry biomass yield and uptake of K by maize as influenced by glauconite application

T1- No glauconite (Control); T2- Glauconite; T3- FYM 0.5% of soil weight; T4- Acidulated glauconite; T5- Calcined glauconite; T6- Glauconite along with FYM 0.5% of soil weight; T7- Acidulated glauconite along with FYM 0.5% of soil weight; T8- Calcined glauconite along with FYM 0.5% of soil weight; T9- Acidulated calcined glauconite; T10- Acidulated calcined glauconite along with FYM 0.5% of soil weight; T11- Muriate of potassium; T12- Waste mica

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Soil nitrogen mineralization as affected by carbon pools

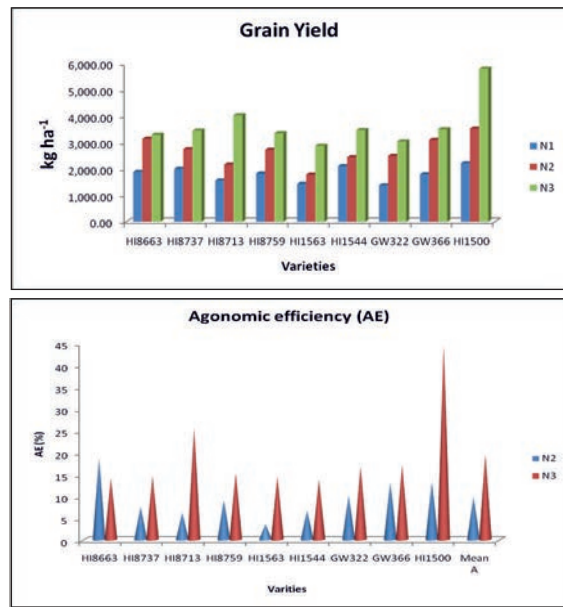
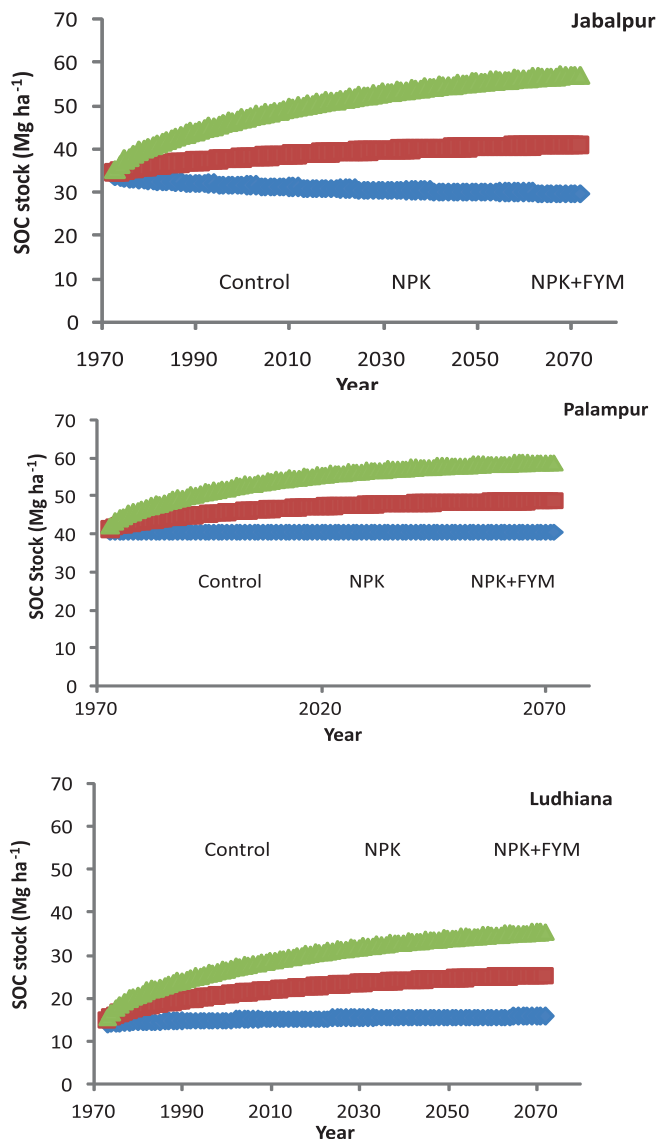
Nitrogen mineralization potential of soil was predicted by developing the relationship between different soil quality parameters and N mineralization potential. A correlation matrix was developed to identify the factors which significantly affected the N mineralization potential of soil. The results indicated that N mineralization potential of soil was significantly and positively correlated with total carbon ($r=0.79$), WBC ($r=0.89$), active carbon ($r=0.83$), very labile carbon ($r=0.80$) and easily extractable glomalin concentration ($r=0.72$). Further, nitrogen mineralization potential was predicted accurately from WBC and active carbon (Adj. $R^2=0.91$).



Predicting nitrogen mineralization potential using WBC

Rothamsted Carbon Model: Initialization and prediction under Indian condition

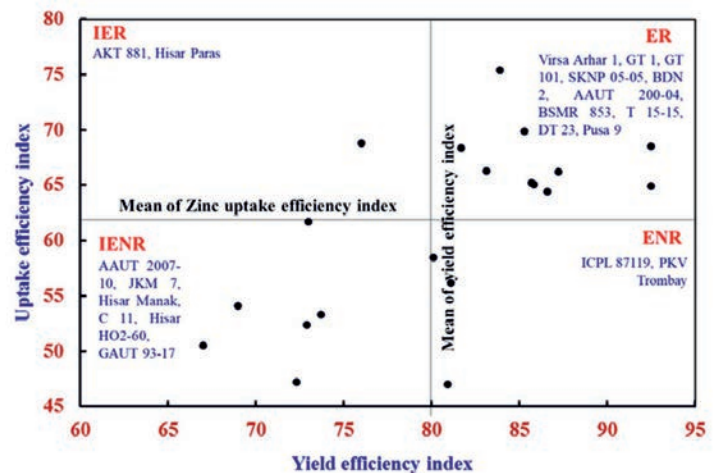
Model prediction accuracy depends upon correct initialization procedure. The present study indicates that Global carbon model RothC can be successfully initialized (forward mode) by adjusting the carbon input (determined by Bolinder approach) and inert organic matter (IOM) content of soil under equilibrium condition to predict C dynamics. The results of the RothC simulations demonstrated that NPK and NPK+FYM across three different soil types (Vertisol, Alfisol and Inceptisol) increased SOC stocks in 0-30cm of soil depth by 12-61 and 30-107% over the initial value. SOC stocks reached steady state under the treatments of NPK and NPK+FYM between 48 to 95 and 68 to 116 years under three different soil types.



Grain yield and agronomic efficiency of wheat genotype

Zinc uptake efficiency of pigeonpea (*Cajanus cajan* (L.) Millsp.) genotypes in Vertisol of central India

Twenty different pigeonpea genotypes were evaluated based on seed yield and Zn uptake efficiency. Based on seed yield efficiency index (SYEI) and Zn uptake efficiency index (ZUEI), the genotypes were classified as efficient and responsive (Virsa Arhar-1, GT-1, GT-101, SKNP 05-05, BDN-2, AAUT 2007-04, BSMR 853, T 15-15, DT 23, Pusa 9), efficient and non-responsive (ICPL 87119, PKV Trombay), inefficient and responsive (AKT 8811, Hisar Paras), and inefficient and non-responsive (AAUT 2007-10, JKM 7, Hisar Manak, C 11, Hisar HO2-60, GAUT 93-17). The efficient and



Classification of pigeonpea genotypes for zinc efficiency. ER = efficient and responsive, ENR = efficient and non-responsive, IER = inefficient and responsive, IENR = inefficient and non-responsive

Evaluation of selected wheat genotypes for NUE under different nitrogen levels

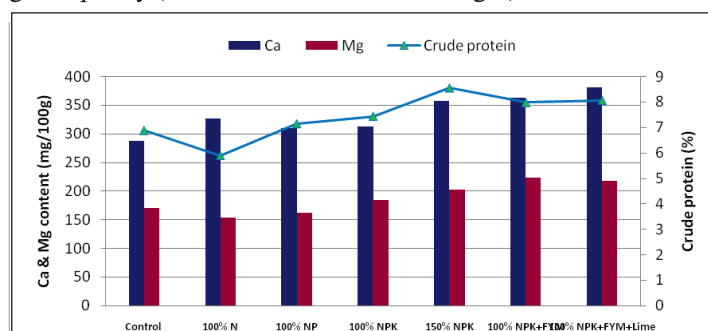
Nutrient use efficiency (NUE) of nine genotypes of wheat viz. HI8663, HI8737, HI8713, HI8759, HI1563, HI1544, GW322, GW366 and HI1500 were evaluated under three different doses of nitrogen fertilizer viz. Control (N1), sub-optimal N (N2; 60 kg ha⁻¹) and normal N (N3; 120 kg ha⁻¹). The results indicated that among all the genotypes HI1500 exhibited significantly higher grain yield of 5,808, 3,536 and 2,222 kg ha⁻¹ under normal, sub-optimal and control fertilizer doses, respectively. The N concentration in the grain of selected genotypes ranged from 1.5 to 2% and average total N uptake was higher in variety HI1500 (85.10 kg ha⁻¹) followed by GW366 (61.71 kg ha⁻¹) among all the nine genotypes.



responsive genotypes are the most useful as they yield well under low soil Zn conditions and also responded to Zn fertilizer application. The inefficient and responsive genotypes can be used in plant breeding programs to identify responsive traits.

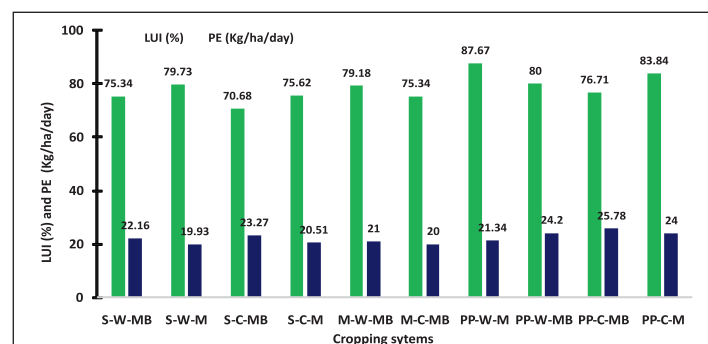
Impact of long term fertilizer and manure application on the nutritive quality of grain in finger millet grown in Alfisols

Finger millet (*Eleusine coracana*) also known as *ragi* is an important millet grown extensively in various regions of India. A study was conducted at GKVK Bangalore under AICRP-LTFE indicated that nutrient application at an optimal dose (100% NPK), above optimal (150% NPK) and integrated nutrient management (100% NPK + FYM/Lime) resulted in good nutritional quality (Ca, Mg, micro nutrient and crude proteins) of finger millet grain. On the contrary, imbalanced nutrient application (Control, N and NP alone) resulted in poor grain quality (dark colour and less test weight).



Land utilization index (LUI) and production efficiency (PE) of different cropping system in central India

Fourteen cropping systems were evaluated based on land utilization index (LUI) and production efficiency (PE). The crops used in the APSIM crop growth simulation platform were soybean (S), wheat (W), Pigeon pea (PP), chickpea (C), summer maize (M), and summer mung bean (MB). The land utilization index (LUI) (%), which is defined as the percentage of the number of days during which the crops in sequence occupy the land during a year to the total number of days in a year, i.e., 365 was highest under the PP-W-M cropping system followed by PP-C-M. The lowest LUI was found under S-C-MB. The production efficiency (PE), expressed as the ratio of



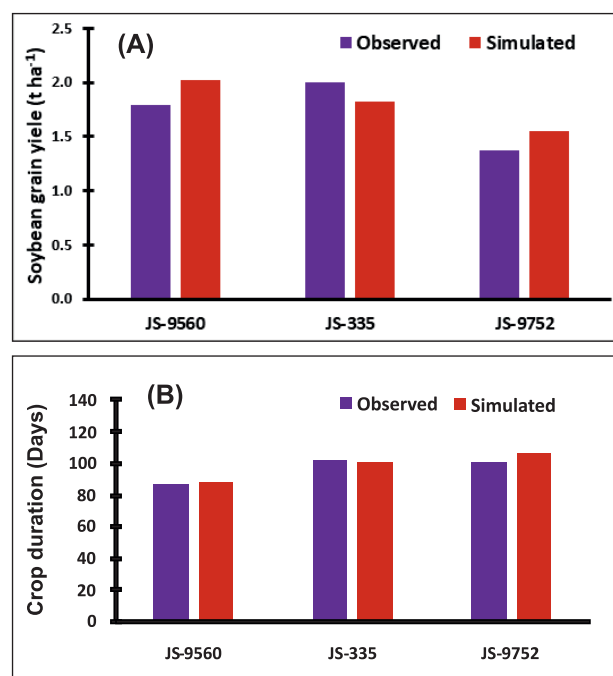
Land utilization index (LUI %) and production efficiency (PE, $\text{kg ha}^{-1} \text{d}^{-1}$) of different cropping systems.

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system productivity to the total duration of the system in days, was highest under the PP-C-MB system. The highest LUI and PE were observed in the pigeon pea-based system, whereas the lowest LUI and PE were observed in the soybean-based system.

Calibration of DSSAT model for simulating soybean yield in central India.

Crop models are effective tools to predict crop productivity under different management options and climatic conditions. Soybean cultivar viz. JS-9560, JS-335 and JS-9752 popularly grown in central India were used for calibration using the Decision Support System for Agrotechnology Transfer (DSSAT). Results showed that percent error differences (PE) for observed and simulated grain yields of soybean varieties were 12.5, 9.4, and 10.79%, respectively for JS-9560, JS-335 and JS-9752. Similarly, PE differences for crop duration were 1.1, 1.0, and 5.0%, respectively. These PE values were within the acceptable range (below 15%).

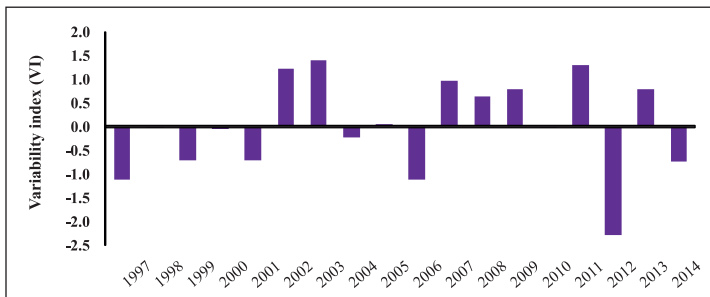


The observed vs simulated (a) grain yield and (b) crop duration for soybean cultivars using DSSAT model.

Variability in soybean grain yield in response to climatic variability

In central India, soybean yield is subject to climate variability risks mainly due to the erratic distribution of rainfall. The variability analysis of Jabalpur districts' soybean grain yield was performed using variability index (VI) from 1997 to 2014. The results showed that the highest

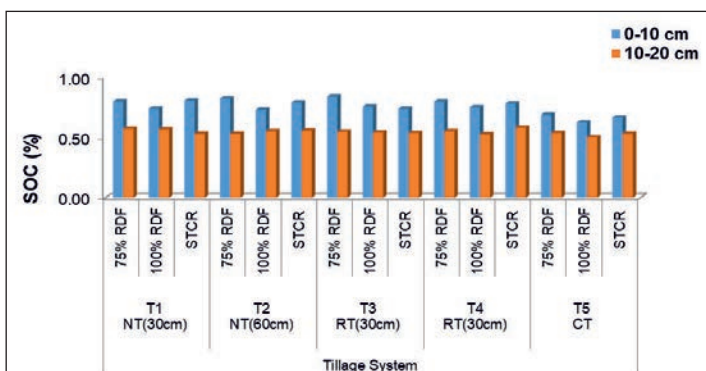
soybean yield for Jabalpur district was obtained in 2003 and 2012, respectively. The results also revealed that interannual variation in rainfall, minimum temperature, and maximum temperature substantially affect the region's soybean yield.



Annual plots of variability index (VI) for soybean grain yield.

Impact of conservation agriculture and nutrient management on soil aggregation and soil organic carbon

Different tillage systems significantly impacted mean weight diameter (MWD) and SOC after five crop cycles. The highest value of MWD (1.56 mm) and SOC (0.78%) was observed under no-tillage (NT) with 60 cm crop residue retention at 0-10cm; similarly at lower soil depth (10-20 cm) MWD (1.43 mm) and SOC (0.55%) was highest under reduced tillage (RT) with 60 cm residue retention. The lowest value of MWD (1.13 and 1.20 mm) and SOC (0.66 and 0.52%) was observed under T5 (Conventional tillage) at 0-10 and 10-20 cm soil depths, respectively. Further, significantly highest SOC (0.79 and 0.54%) was recorded under STCR treatments while minimum (0.72% and 0.53%) under 75% RDF at 0-10 and 10-20 cm soil depth, respectively.



Soil organic carbon (%) at end of kharif season (2019)

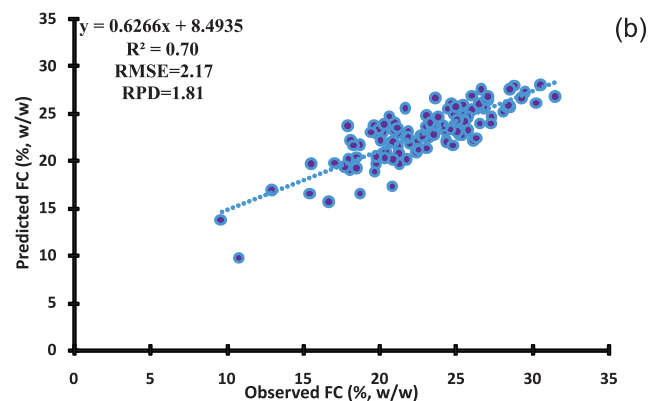
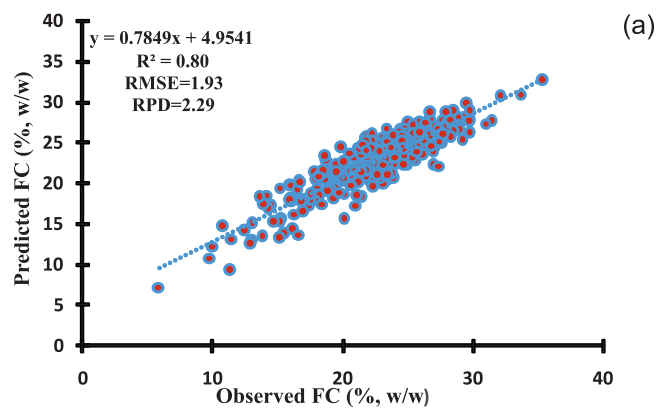
Soil aggregate stability and aggregate associated organic carbon under long-term fertility experiment

Application of farmyard manure and biofertilizers increased the proportion of water-stable macroaggregate (>0.25 mm) fractions compared with the application of inorganic fertilizer alone. Macroaggregates (>0.25 mm) had higher aggregate stability and organic carbon (OC) as compared to microaggregates (<0.25 mm). Cultivation without organic

amendments led to a higher proportion of micro aggregates, which may not be very beneficial to soil tilth.

Prediction of field capacity (FC) water content in alluvial soil using mid-infrared (MIR) spectroscopy

The chemometric models using MIR spectroscopy were developed to rapidly assess the moisture content at field capacity (FC). The model was evaluated with an independent dataset (30% of total 447 geo-referenced soil samples) using statistical criteria such as the ratio of performance to deviation (RPD), coefficient of determination (R^2), and root means square error (RMSE). The R^2 (0.80 and 0.70), RMSE (1.93 and 2.17), and RPD (2.29 and 1.81) value for calibration and validation indicates that the FC of the alluvial soils could be predicted with reasonable accuracy using MIR spectroscopy.



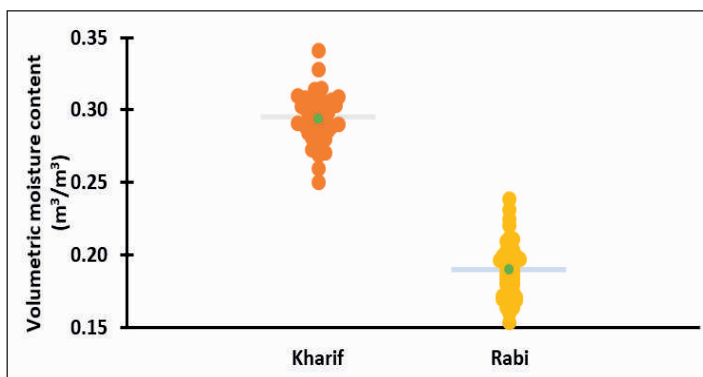
The calibration (a) and validation (b) of chemometric model for predicting field capacity moisture content in Alluvial soil

Estimate of long term (1989-2019) surface soil moisture variation in central India

The daily near-surface (0-5 cm depth) volumetric soil moisture data were acquired from the European Space Agency (ESA) Climate Change Initiative (CCI) for Madhya Pradesh for the period 1980 to 2019 (40 years). It was found that the computed average near-surface soil moisture in the Kharif season ranged



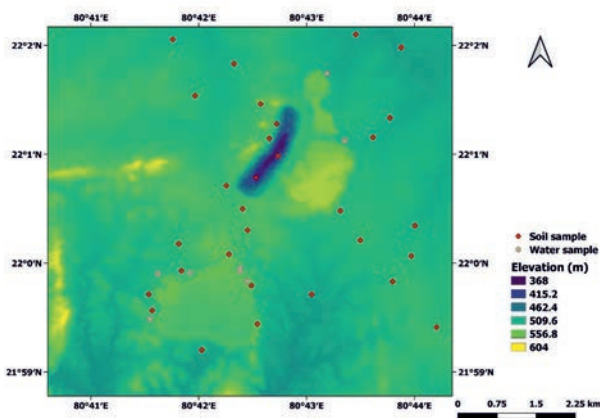
from 0.25 to 0.34 m^3/m^3 whereas in the *Rabi* season from 0.15 to 0.24 m^3/m^3 for the last 40 years. The average near-surface soil moisture in Madhya Pradesh during the *Kharif* season was 54.6% higher than in the *Rabi* season. No temporal trend was found in the change of soil moisture content at a 5% level of significance through the Mann-Kendall test for the last 40 years in both the cropping seasons.



The variation in near-surface volumetric soil moisture content (m^3/m^3) in Madhya Pradesh for the last 40 years (1980-2019) during both cropping seasons

Assessment of acid mine drainage affected areas in Madhya Pradesh

Mine area soils collected from the Malanjkhand open cast copper mines of Madhya Pradesh were extremely acidic (pH 2.52) to slightly acidic (pH 5.08) in nature whereas in nearby villages (Chinditola, Bhimjhuri, Karamsar, Borekhera, Darbaritola, Kaindatola, Chartola and Dudhi) of agricultural field soils pH ranged between 4.26 and 6.21. Total and exchangeable acidity of mine soils were in the range of 10.52 to 13.83 meq/ 100 g soil and 1.58 to 2.07 meq/ 100 g soil, respectively. In nearby agricultural soils, total and exchangeable acidity has been found in the range of 5.45 to 12.03 and 0.82 to 1.80 meq/ 100 g soil, respectively.



Soil sampling sites and digital elevation model of Malanjkhand copper mine belt

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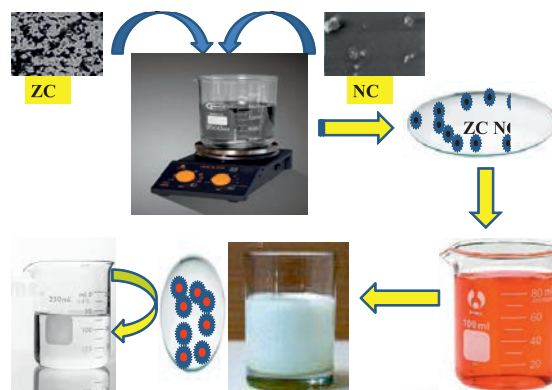
Modified Fly ash product as soil amendments for remediation of Cd, Pb and Cr contaminated soil

Pot culture experiment result revealed that highest per cent reduction of 44.9% and 55.6% in spinach leaf Cd and Pb content as compared to control was observed in a Cd and Pb contaminated soil amended with alkali modified fly ash, respectively. Similarly, the highest per cent reduction of 64.6% in spinach leaf Cr content as compared to control was observed in a Cr contaminated soil amended with acid modified fly ash. Further, the lowest transfer coefficient value was observed in the alkali modified fly ash amended Cd and Pb contaminated soil and the acid modified fly ash amended Cr contaminated soil indicates greater reduction in mobility of heavy metal (Cd, Pb and Cr) from soil to plant system.



Lead sorption potential of a novel nanocomposite product

A novel nano-composite product referred as ZC was synthesized to adsorb lead (Pb^{2+}) from waste water. The highest sorption capacity using Langmuir isotherm for the ZC was observed to be 728167 mg kg^{-1} at higher temperature 40° C. The positive magnitudes of ΔH° (1.36 kJ mol^{-1}) and ΔS° (204 $\text{J mol}^{-1} \text{K}^{-1}$) obtained in the experiment suggested that an endothermic reaction was predominant and randomness was enhanced during sorption of Pb^{2+} onto the adsorbent. Overall, experimental findings bear wide prospective in the arena of Pb adsorption as well as to devise low-cost proficient nano enhanced material for Pb decontamination. Further, the developed nanocomposite was used to decontaminate waste water generated from Nagda industrial area.



Decontamination of lead contaminated water with nanocomposite ZC

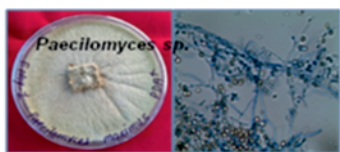
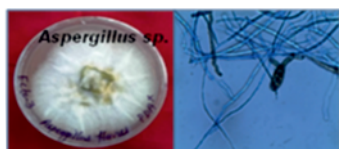


Influence of crop biomass on CH₄ production and consumption

Abundances of methanogens and methanotrophs in soil amended with different crop biomass after methanogenic and methanotrophic metabolism was studied. Biomass of cereals stimulates both CH₄ production and consumption at a higher rate than the biomass of legumes. Abundance of methanogens in control, wheat, maize, chickpea and soybean was 11±2.45, 84±3.70, 68±4.55 27±4.65 and 40±4.27 mcr gene copies 10³ g⁻¹ soil, respectively. Similarly, abundances of methanotrophs in control, wheat, maize, chickpea and soybean was 15±2.87, 49 ± 5.62, 36± 4.27, 18±3.10 and 26 ±4.27 pmoA gene copies x 10⁴ g⁻¹ soil, respectively. Available nitrate content was high in CH₄ consuming soil than CH₄ producing soils which was attributed to the nitrifying property of the methanotrophs.

Endophytic fungi for phytoremediation of heavy metal contaminated soils

Total 16 endophytic fungi were isolated from roots of the plants (*Parthenium*, *Xanthium*, *Cassia*, *Alternanthera*, *Datura*, *Calotropis*, *Corchorus*, *Vetiver* and *Chrysopogon*) that were normally growing on municipal solid waste contaminated site of Bhanpur for heavy metal (Pb, Cd, Cr, and Hg) tolerance study. Some fungal isolates can tolerate heavy metals such as Pb and Cr up to 100 ppm; and Cd and Hg up to 50 ppm concentration. Identified heavy metal tolerant organism are *Nectriaceae* sp. isolate CasT-1 (MT635194), *Alternaria longipes* isolate CasT-2 (MT635195), *Ectophoma multirostrata* isolate CorT-2 (MT635196), *Talaromyces funiculosus* isolate Asp-2 (MT635197), *Aspergillus flavus* isolate Esac-1 (MT635198) and *Aspergillus terreus* isolate Esac-2 (MT635199)

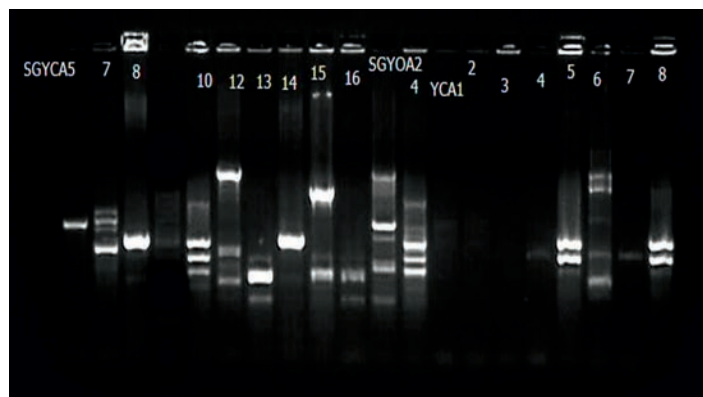
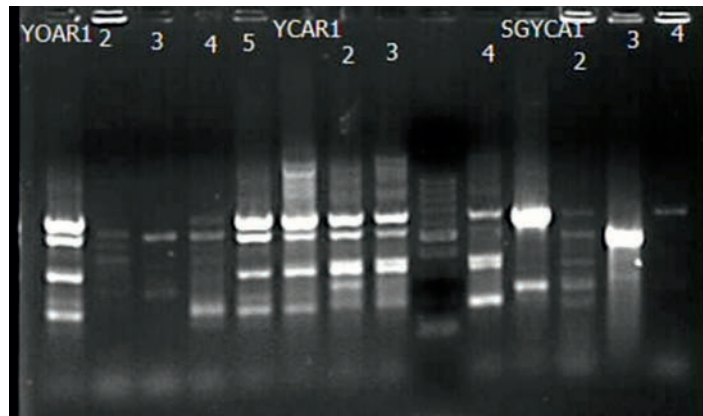


Isolates of heavy metal tolerant microbes

Evaluation of soybean nodule endosymbionts under climate change

Diversity of soybean nodule endosymbionts under elevated CO₂ and temperature was studied. Soybean var 9560 was grown in Walk-in plant growth chamber under ambient CO₂ (400 ppm) and temperature (28 °C); and elevated CO₂ (600 ppm) and temperature (+5°C). Seven non rhizobial nodule endophytic bacteria which were homologous to *Bacillus*, *Microbacterium* and *Enterobacter* were found. Two rhizobial strains identified

produced maximum number of nodules at elevated temperature and were homologous to *Bradyrhizobium* sp. Seed inoculation of non-rhizobial endophytes improved the yield of soybean grain by 28% over control.



Box PCR of various isolates from Soybean nodules grown under eCO₂/Temp

Programmes Held

Felicitation of Dr. Rattan Lal, World Food Prize 2020 Laureate

A virtual felicitation function was organized by ICAR-IISS jointly with NAAS, Bhopal Chapter and ISSS, Bhopal Chapter





on 21st July, 2020 in honour of Indian-American Soil Scientist, Dr. Rattan Lal, the winner of the World Food Prize 2020. Dr. Lal emphasized that the COVID-19 crisis necessitates implementation of the "One Health" strategy: health of soil, plants, animals, people, and environment is one and indivisible. The programme was chaired by Dr. S.K. Chaudhari, DDG (NRM), ICAR. Several Vice-Chancellors of State Agricultural Universities, Directors and past Directors of several ICAR Institutes, Fellows and Associates from NAAS, Bhopal Chapter and scientists from across the country participated in the felicitation programme. About 300 researchers and education managers took part in the function.

Independence Day Celebration

Institute celebrated 74th Independence Day on 15 August 2020 with enthusiasm and fervour.



Hindi Pakhwada

Institute celebrated Hindi Pakhwada during 14-28 September 2020.

Celebration of birth anniversary of Mahatma Gandhiji

A week long programme was organized to celebrate 151th birth anniversary of Mahatma Gandhiji and chief guest was Sh D. Deshrajani-Toilet man of India. During this week long programme, several activities like tree plantation, lecture on Gandhian way of agriculture and gram swaraj, swachhta marathon and prize distribution for best cleanliness in campus and best clean working labs was given.

Mahila Kisan Diwas

Mahila Kisan Diwas programme for farm women was organized on 15th October, 2020. About 25 women farmers from



Khamkheda and Bhairapura village participated in this programme. An interactive session Mahila Kisan Gosthi was organized which covered the issues on soil health management, vermicomposting, organic farming, use of biofertilizers, crop residue management, nutrition and sanitization. Also, awareness was made for prevention of Covid-19.

World Food Day

The ICAR-Indian Institute of Soil Science, Bhopal in collaboration with the National Academy of Agricultural Sciences, Bhopal Chapter organized a one day interactive session on the theme : "Soil, Water, and Food : Issues and Challenges in the Present Era" at the Sage School of Agriculture, SAGE University, Bhopal on 16th October, 2020 on the occasion of the World Food Day.



Vigilance Awareness Programme

Vigilance Awareness Week was celebrated during 27th October to 2nd November, 2020. All the staff attended the lecture delivered by Vigilance Officer on 28th October, 2020. The closing ceremony was conducted on 2nd November, 2020 and a special lecture was delivered by Mr. S.K. Mitra, Former Director (P), ICAR.





World Soil Day

On World Soil Day 5th December, 2020 a March-Past was organized in the Institute campus, where more than 200 participants joined. Dr. S. K. Chaudhari, DDG (NRM) graced the occasion and appreciated the efforts of the Institute in involving a number of stakeholders in the soil health awareness campaign. In his address to the 300 farmers in the virtual meeting, he called for sustained efforts in preserving the health of soil through use of scientific methods of soil management.



Farmer-Scientist Interaction Meet and Field Day

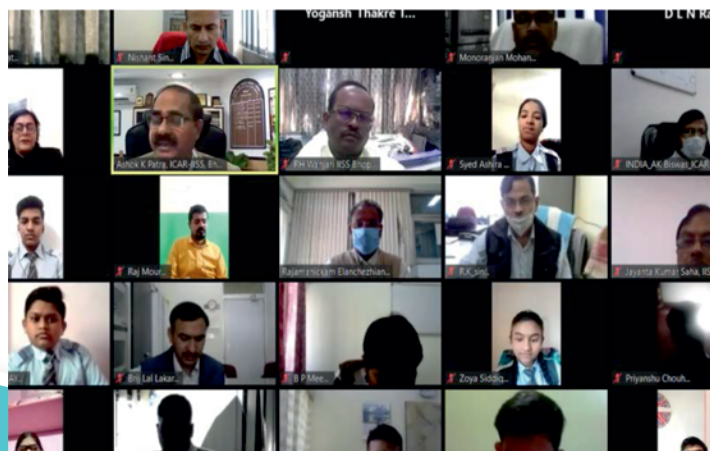
Institute organized Farmer-Scientist Interaction Meet & Field Day at Karond Khurd, Bherupura, Parwalia Sadak and Khamkheda (1-7 December, 2020).

Soil Health Awareness week

Soil Health Awareness week was organized during 1-7 December, 2020 at ICAR-IISS Bhopal in which scientists, students, farmers, public and officials from state departments participated. As part of the week-long program, farmer-scientist interaction meets were organized at different Mera Gaon Mera Gaurav (MGMG) villages viz. Karond Khurd, Bherupura, Parwalia Sadak and Khamkheda of Bhopal district with the objectives of creating awareness on soil health and crop productivity among farming communities.

Agriculture Education Day

Agricultural education day was celebrated on 3rd December 2020. School and College students of Red Rose and Bhopal School of Social Sciences were involved in the campaign "Awareness on soil health: Keep soil alive, protect soil biodiversity" through webinar programs. A special lecture on 'Science and management of soil health" was delivered by Dr. DLN Rao, former Project Coordinator of All India Network Project on Soil Biodiversity and Biofertilizers to the school students. A wide circulation about the campaign on soil health was also made to the local print media and electronic media including DD-Kisan and All India Radio.





- Kisan Diwas on 29th October, 2020 was organized at ICAR-IISS, Bhopal and distributed the farm inputs like planting materials (mango and lemon), farm implements viz., manual peg type dry weeder and maize sheller and vermicomposting units among SC farmers in the adopted villages under SCSP plan.



PM Kisan Samman Nidhi program

A programme was organized by ICAR- IISS, Bhopal on 25th December, 2020 in which Hon'ble Prime Minister Shri Narendra Modiji interacted with farmers of Madhya Pradesh. Farmers from different villages of Bhopal district namely Bhairapura, Khamkheda, Mugaliahat, Pura Chhindwada, Parwalia Sadak, Raipur, Kanch Vawali, Kalyanpur, Rasalakhedi and Tarasewaniya gathered at the institute campus and attended the programme virtually following the COVID-19 protocol and safety precautions. A field visit was organized to showcase the



technologies and achievements of the Institute and agri-inputs like, fertilizers, plant saplings and implements were also distributed to eligible farmers under SCSP programme.



Awards/Honours/Recognitions

- Ashok K. Patra was elected Fellow of The National Academy of Sciences, India (NASI) in the year 2020.
- Jitendra Kumar was conferred Young Scientist Award on 15th October, 2020 by Society for Biotic and Environmental Research.
- Jitendra Kumar was conferred Best Doctoral Researcher Award-2020 on 15th October, 2020 by Society for Biotic and Environmental Research.
- Vassanda Coumar, M and Nishant K Sinha received Scientist Award-2020 from Dr. Vasantharaj David foundation, Chennai, Tamil Nadu
- Asha Ram, Inder Dev, Ramesh Singh, Naresh Kumar, Dhiraj Kumar, Lal Chand and Sushil Kumar were conferred Best Poster award for the poster entitled "Effect of soil and water conservation measures in silvipastoral systems on productivity, water storage and soil erosion" during Hindi Saptah celebration in ICAR-CAFRI, September 14-19, 2020 Jhansi.
- Santosh R Mohanty received Scientist award in EET CRS TOP 10 List award for 2020
- Santosh R Mohanty was nominated by the SAGE University Bhopal as an esteemed member of SAGE Board of Studies.
- Santosh R Mohanty was assigned Professional attachment training for Himanshu from Directorate of Weed Research, Jabalpur, MP.
- Kollah Bharati was conferred with Fellow for the year 2020 in National Environmental Science Academy (NESAs).
- Kollah Bharati was conferred with Fellow for the year 2020 in Asian Biological Research Foundation (ABRF).
- Asit Mandal Recognition as Editorial Board Member: PLOS ONE
- Asha Sahu received certificate of recognition for Outstanding



Oral Presentation on "Efficient Recycling of Biodegradable City Waste Through Rapid Composting Technology" at the "International Webinar on Agriculture and Biotechnology" held during 16– 17 September, 2020.

- Asha Sahu acted as moderator during "International Webinar on Agriculture & Biotechnology" held during 16 – 17 September, 2020 organized by Global Conferring Organization.

Staff News

- Dr. Muneshwar Singh, Project Coordinator (LTFE) retired from ICAR service on 31.08.2020.
- Dr Dhiraj Kumar, scientist joined on 13 August, 2020 on transfer from ICAR-CAFRI, Jhansi.
- Dr. M. C. Manna, transferred from ICAR-IISS, Bhopal on 29th October, 2020 and joined the post of Professor at RPCAU, Samastipur, Bihar.
- Dr Sanjib K Behera promoted from senior Scientist to Principal Scientist w.e.f 2nd May, 2018.
- Shri Harish Kumar, Skilled Supporting Staff financial upgradation from Pay Matrix Level-3 to Level -4 w.e.f 14.03.2020.
- Shri Darash Ram, Skilled Supporting Staff financial upgradation from Pay Matrix Level-3 to Level -4 w.e.f 15.03.2020.
- Shri Ram Bharose, Skilled Supporting Staff financial upgradation from Pay Matrix Level-3 to Level -4 w.e.f 20.03.2020.
- Shri Jineswar Prasad, Upper Division Clerk financial upgradation from Pay Matrix Level-4 to Level -5 w.e.f 13.12.2018.
- Shri Laxmi Narayan Chouksey, Skilled Supporting Staff financial upgradation from Pay Matrix Level-3 to Level -4 w.e.f 17.12.2019.
- Shri Sanjay Katenga, Lower Division Clerk financial upgradation from Pay Matrix Level-3 to Level -4 w.e.f 20.06.2019.

Extension Activities

Under Farmers FIRST Project, 61 sites for zero till sown soybean and ten sites on direct seeded rice in farmers field during



kharif season 2020-21 were demonstrated. Similarly, 64 sites on zero till wheat and 20 sites on zero till chickpea were demonstrated in farmers field during *rabi* season 2020-21 based on conservation agriculture technology. Mineral mixtures were distributed in the villages Kanchvabli, Bhairapur, Kalyanpur and Khamkheda for different categories of milk animals and has been found to improve milk production by 300-500 ml per animal per day.

Farmers-Scientist interface meeting and distribution of inputs under SCSP programme

Farmer-Scientist interface meetings were organized on 14 September, 7, 8, 12, 15 and 21 October, 2020 by the MGMG group under SCSP programme. Total 90 SC farmers of adopted villages under MGMG programme were benefitted during the program held at Institute. Farm Implements such as manual peg type dry weeder, maize sheller, vermibed, fertilizers, plant of mango, lemon and guava were distributed to the SC farmers. Besides this fertilizers viz., urea and DAP were also distributed to the farmers.



Distribution of agri-inputs to the farmers under institute project of SCSP

Under this program, the distribution of fertilizers (Urea & Growmore) wheat and gram seed to approximately 142 farmers were get benefitted of the village Raipur, Kanera, Karhod khurd and Khuichital during month of October and November 2020.



Scientist–Farmers Interactive meets through online platform

On World Soil Day 5th December 2020 a farmers scientist meet was organized at Raipur village of Bhopal. Farmers are satisfied with the interaction made and raise some query about the residue burning and requested to provide facility of happy seed drill machine in the village.



Capacity Building for Enhancing Livelihood Security of Subsistence Farming community

Scheduled Caste farmers from Bagoniya and Taraisewaniya villages in Phanda block of Bhopal District were selected and soil samples were collected based on the GPS for soil health card distribution. Distribution of inputs (urea 90kg, NPK mix 75kg, wheat seed 60 kg, gram seed 40 kg) to selected farmers (150 nos.) were done based on agricultural land holdings. Technology demonstration on balanced fertilization and integrated nutrient management was done in 21 farmers field in wheat and gram crop.



- Microbial inoculants developed under AINP SBB were evaluated (*Burkholderia sp*, *Bacillus sp*, and *Actinobacteria*) for wheat crop at farmer's field located at Mengra Kalan Village, MP.



Seed coating with microbial inoculants and sowing

Demonstration of Ekel Composting Technology at Deoghar, Jharkhand

Under NASF project, technology demonstration and installation of Ekel shredder and composter was organized during 28th August to 04th September, 2020 at Deoghar, Jharkhand for faster decomposition of the waste generating from the Ashram.



Training/Workshop/Seminar/Meeting organized

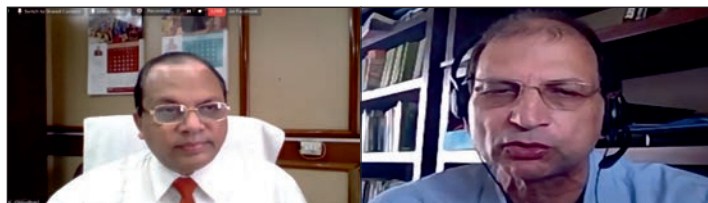
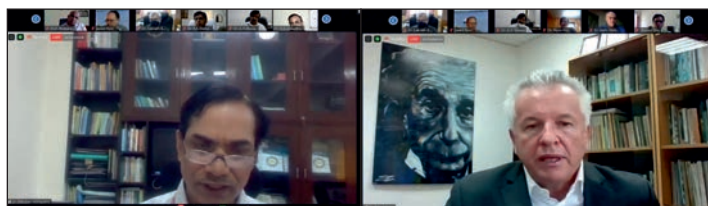
• Virtual meeting on Long-Term Fertilizer Experiment

Virtual Meeting on "Long-Term Fertilizer Experiments: Achievements and Future Strategies" was organized during 11-12th August 2020. The session was chaired by Dr. S. K. Chaudhari, Deputy Director General (NRM), ICAR, New Delhi and about 80 participants attended the virtual meeting.



• International Webinar on Soil Spectroscopy

ICAR–Indian Institute of Soil Science (IISS), Bhopal and World Agroforestry (ICRAF), Nairobi, Kenya, jointly organized an International Webinar on Soil Spectroscopy: An Emerging Technique for Rapid Soil Health Assessment on 1st October, 2020. Dr. Trilochan Mohapatra, Hon'ble Secretary, DARE and DG, ICAR; Dr. Tony Simons, Director General, World Agroforestry (ICRAF), Nairobi, Kenya and Dr. S. K. Chaudhari, DDG (NRM), ICAR addressed the participants of the webinar and expressed their views on the state of the art of 'Soil Spectroscopy' as well as its potential application as an alternative to traditional laboratory analysis. Around 850 participants representing 28 countries from scientific, educational and research institutions from private and public across the globe attended the webinar.



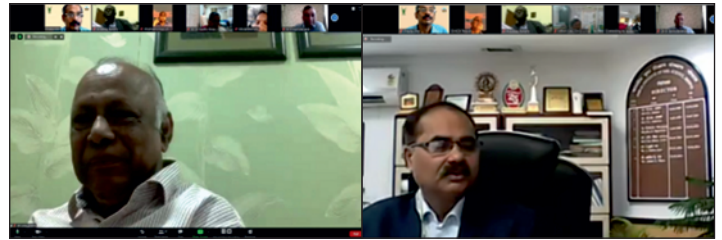


- Dr. Pradip Dey organized a Virtual Conference entitled "Zoom to grassroots for food security to build back better" on World Food Day on 16th October, 2020 at TNAU Coimbatore for the benefit of farmers.
- Drs. Pradip Dey, AK Biswas and BL Lakaria Organized a training programme on Soil Testing and Nutritional Recommendations for Agricultural Crops for the Soil Testing Officers of State Department of Agriculture jointly with SIAET, Bhopal during 20th -24th October, 2020.
- Organized a National Webinar on 'Quality Improvement and Proficiency Testing of Soil Laboratories in India: Towards Improving the Quality of Analytical Data and Harmonization of Soil Test Methods' on 31st October, 2020. During inaugural address, Dr. Anupam Mishra, Vice chancellor, Central Agricultural University, Imphal; Dr. S.K. Chaudhari, Deputy Director General (NRM) and Mrs. Nopmanee Suvannang, Chairperson, Global Soil Laboratory Network (GLOSOLAN) of FAO apprised the participants about the activities of Global Soil Partnership (GSP) and expressed the strong need of maintaining the quality standards in soil testing. Around 300 participants representing Agricultural Universities, ICAR institutes, Krishi Vigyan Kendra, State Department of Agriculture from all over the country attended the webinar.



- On the occasion of World Science Day for Peace and Development (#Science Day, #UNESCO), the All India Coordinated Research Project on Soil Test Crop Response (STCR), ICAR-Indian Institute of Soil Science, Bhopal organized a "Virtual Conference on Developing Human Resources for Recalibrating STCR" on 10 November 2020. Dr. M. Velayutham, Former Director, ICAR-NBSS&LUP; Dr. A. Subba Rao, former Director of ICAR-IISS; Dr. A.K. Patra, Director of ICAR-IISS; Dr. K.C.K. Reddy; Dr. M. Muralidharadu, former Project Coordinators (STCR); Dr. R.

Santhi, Director (NRM), TNAU, Coimbatore; Dr. Amit Rastogi, Executive Vice President-Technology, Coromandel International Limited, Hyderabad and Dr. Pradip Dey, Project Coordinator, AICRP-STCR shared their views on the occasion urged to realize the triple goals of higher productivity, profitability and fertilizer use efficiency until the last mile of the farm in the country. A Farmers' Interface was also organized in which progressive farmers shared their experiences on the usefulness of STCR technology.



- Drs.J. Somasundaram, R.K. Singh and N. K. Sinha organized online training programme on "Resource Conservation Technology in Agriculture" jointly by ICAR- Indian Institute of Soil Science and State Institute of Agriculture Extension & Training during 17-20 November, 2020.
- Drs. Pradip Dey, Sanjay Srivastava, R. H. Wanjari and Shri. M. P. Tiwari organized online training programme on "Soil Health Management" jointly by ICAR- Indian Institute of Soil Science and State Institute of Agriculture Extension & Training during 17-20 November, 2020.
- Drs. Pradip Dey, R. H. Wanjari and M. Vassanda Coumar organized an online training programme on "Integrated Nutrient Management" jointly by ICAR- Indian Institute of Soil Science and State Institute of Agriculture Extension & Training during 21-23 November, 2020.
- Organized National Webinar on "Alternatives to Plastics for Sustainable Soil and Environmental Health" on 30th December, 2020. Dr. Suresh K. Chaudhari, Deputy Director General (NRM) and Chief Guest, Dr. C.L. Acharya, Former Director, ICAR-IISS, Dr H.Pathak, Director (ICAR-NIASM) and Directors' of various NRM institutes graced the occasion.





Scientists Participation in Training/Seminar/Workshop

Name	Programme attended/Participated	Year 2020
Drs. AK Patra, AK Biswas, Pradip Dey, Sanjay Srivastava, AO Shirale Dr. R Elanchezhian	Webinar on 'Fourth meeting of the SEALNET organized by FAO, Rome	June 30 - July 02
Dr. Pradip Dey Dr. Pradip Dey	MDP on Implementation of Access and Benefit Sharing Regulations in Agriculture Research: Awareness cum Sensitization Workshop Online Training Programme on "Stress Management" organized by ICAR-NAARM National Webinar on "Impact of Population Pressure on Natural Resources and Environment" organized by the Academy of Natural Resources Conservation and Management (ANRCM), Lucknow to celebrate World Population	July 7-10, July 11
Drs. Asha Sahu and Sudeshna Bhattacharjya	60 th IIRS Outreach Program on Application of Geoinformatics in Ecological Studies	July 13-24
Drs AK Patra and Pradip Dey	92 nd Foundation Day and Award Ceremony of the Indian Council of Agricultural Research	July 16
Dr. AK Biswas	Webinar on Presentation of Foreign and Pravasi Fellows	July 21
All Scientists	Virtual meeting on 'Felicitation Programme of Dr. Ratan Lal, World Food Prize Winner'	July 21
Drs. RS Chaudhary, J Somasundaram, BL Lakaria, Pramod Jha, AK Vishwakarma, M Vassanda Coumar, Nishant K Sinha, Jitendra Kumar, BP Meena and Alka Rani	International Webinar on "Achieving Land Degradation Neutrality" organized by Indian Association of Soil and Water Conservationists, ICAR-IISWC & ICFRE, Dehradun	July 22-24
Dr. Pradip Dey	Virtual Executive Committee (EC) meeting of Society for Fertilizers and Environment, West Bengal	July 25
Dr. Pradip Dey	Webinar on "Patent Prosecution Challenges and Strategies in India" conducted by the Frontiers Legal and Turnip Innovations	July 25
All Scientists	Virtual Review Meeting on Long-term Fertilizer Experiments: Achievements and Future Strategies	August 11-12
Drs. AK Patra, MC Manna and AK Biswas	Virtual meeting on 27 th Annual General Body Meeting of NAAS	August 13
Dr. AKBiswas	National Webinar on Higher education and research in natural resource management for environmental sustainability	August 14
Drs. Pradip Dey and Sanjay Srivastava Dr. Pradip Dey	Deputation as experts for Interview for the post of Assistant Professor (Soil and Water Management) National Webinar on Abiotic Stress in Agriculture: Geospatial Characterization and Management Options NIASM, Baramati, Pune	August 25 August 27
Drs. AK Patra, AK Biswas, Brij L Lakaria and Pramod Jha Dr. Pradip Dey	Promoting Biochar in India with GIZ India and NRAA Online Brainstorming Session on Overcoming India's Water Scarcity through Micro-Irrigation: Opportunities and Challenges, International Development Centre Foundation, IDC Foundation, Delhi	September 1 September 1
Dr. Pradip Dey Dr. Pradip Dey	35 th FAO Regional Conference for Asia and the Pacific Webinar on Trends in Biomedicine & Life Sciences Publishing and Nuances and Tools of Scientific Publishing organized by Springer Nature in collaboration with Delcon, a DBT e-library consortium Springer Nature	September 1 September 3
Dr. R Elanchezhian	National Webinar on Future perspectives in Agricultural Education	September 5
Drs. Pradip Dey, M Mohanty and NK Sinha	Virtual meeting of Network Program on Precision Agriculture by Secretary, DARE and DG, ICAR, New Delhi	September 6-7
Drs. RS Chaudhary, Pradip Dey, KM Hati, M Mohanty, J Somasundaram, Nishant K Sinha, Jitendra Kumar, Dhiraj Kumar, Alka Rani	International webinar on "Drone Remote Sensing in Agriculture" organized by Indian Society of Agrophysics & Division of Agricultural Physics, ICAR-IARI, New Delhi	September 9
All Scientists	7 th Dr. B.P. Ghildyal Memorial Lecture	September 10
Dr. Pradip Dey	7 th European Soil Partnership Plenary Assembly	September 10
Drs. AK Patra, R.S. Chaudhary, Pradip Dey, KM Hati, M Mohanty, P Jha, M Vassanda Coumar, N.K. Sinha, JK Thakur and Dhiraj Kumar	First Plenary Meeting on Soil Spectroscopy, organized by Global Soil Laboratory Network (GLOSALAN) and FAO, Rome	September 24-25



Name	Programme attended/Participated	Year 2020
Drs. AK Patra, AK Biswas, BL Lakaria and Pramod Jha	Webinar on "Biochar Forum: Science, Policy and Practice Interface" organized by GIZ (Indo-German Co-operation), RRA Network (Revitalizing Rainfed Agriculture Network), NRAA (National Rainfed Area Authority)	October 5-6
Dr. Pradip Dey	RAISE 2020: Virtual global summit on Artificial Intelligence, New Delhi	October 5-9
Dr. Jitendra Kumar	WSU Digital Agriculture Summit hosted by Washington State University	October 6
Dr Jitendra Kumar	Online training programme on Introduction to Remote Sensing for Tribal Lands organized by NASA in collaboration with United Tribes Technical College (UTTC), USA	October 6-29
Drs. Jitendra Kumar and Alka Rani	Webinar on Geospatial Approaches for Agriculture Water Management, organized by Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar	October 7-9
Dr. Pradip Dey	Virtual meeting on Food Security Roundtable: Strengthening Food Security in 2020 & Beyond, organized by the World Bank	October 9
Dr. AK Biswas	International webinar (VAIBHAV) on Resource Conservation Technologies	October 9
Drs. AK Patra, RS Chaudhary and Pradip Dey	75 th foundation day of FAO on virtual platform	October 16
Drs. NK Lenka and R Elanchezhian	Interactive Senior on "Soil, water & food security" on the occasion of world food Day	October 16
Dr. Pradip Dey	World Food Day Virtual Conference on Zoom to grassroots for food security to build back better, TNAU, Coimbatore	October 16
Drs. AK Patra, Pradip Dey, RS Chaudhary, KM Hati, M Mohanty, Pramod Jha, M Vassanda Coumar, NK Sinha, JK Takur, Dhiraj Kumar	First GLOSOLAN plenary meeting on soil spectroscopy, ICAR-IISS, Bhopal	October 19
Dr. Pradip Dey	Virtual meeting on From Learning Poverty to Learning of the Future: Charting a Course Beyond the Pandemic, organized by the World Bank	October 20
Dr. Hiranmoy Das	International webinar on Harnessing the potential of tropical tuber crops under changing climate (HPTTC 2020), organized by ICAR-CTCRI, Thiruvananthapuram	October 27
All scientists	National webinar on Quality Improvement And Proficiency Testing of Soil Laboratories In India – towards improving the quality of analytical data and harmonization of soil test methods	October 31
Drs. AK Patra, Pradip Dey, BP Meena	International Salinity Webinar on Resilient agriculture in saline environments under changing climate	November 3
Dr. Pradip Dey	Foundation Day Lecture of the Indian Academy of Horticultural Sciences (IAHS) by Dr T Mohapatra, Secretary, DARE & DG, ICAR	November 6
Dr. Hiranmoy Das	International conference on recent trends in analysis and optimization (ICRTAO-2020) organized by NITTTR, Bhopal	November 9-11
Dr. Immanuel Chongboi Haokip	Training on Analysis of Experimental Data using SAS, organized by ICAR-NAARM, Hyderabad	November 9-17
Drs. AK Patra, AK Biswas, Pradip Dey, Sanjay Srivastava, Pramod Jha, Hiranmoy Das and AO Shirale	Webinar on Fourth Meeting of the Global Soil Laboratory Network organized by FAO, Rome	November 11-13
Dr. AK Patra	13th Working Session of the Intergovernmental Technical Panel on Soils (ITPS)	November 16-18
Dr. Pradip Dey	Presentation: Transforming agriculture and food innovation systems to win the race to zero.	November 17
Dr. Pradip Dey	Webinar on Value of IPR in Academic Researches BVICAM, New Delhi	November 21
All Scientists	Campaign on Improving Soil Health- December 2020 Soil Health Awareness Week at ICAR-IISS, Bhopal	December 1-7
Dr. Pradip Dey	World Soil Day event of GIZ as Panelist, organized by GIZ – ProSoil, NABARD, NRAA, RRAN	December 3-4
All scientists	Webinar on World Soil Day 2020 organized by FAO, United Nations	December 4
Dr. Pradip Dey	XXVI Meeting (virtual) of ICAR Regional Committee No. V comprising the States of Punjab, Haryana and Delhi	December 7

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