ICAR-IIISS Newsletter

Volume 28, No.1 January – June 2025

CONTENTS

EDITORS

FORTHCOMING EVENTS

- IRC Meeting
- Hindi Pakhwada
- Vigilance Awareness Week
- World Soil Day

Director's Desk

Agricultural Carbon Projects: Scope and Challenges in India's CCTS and the Global ETS Landscape

The global climate policy landscape is rapidly evolving, with carbon markets and emissions trading systems (ETS) becoming central instruments for achieving net-zero targets. In this context, agriculture and soils are gaining renewed attention as both sources of greenhouse gas (GHG) emissions and potential sinks for carbon. India's notification of the Carbon Credit Trading Scheme (CCTS) marks an important step toward integrating land-based mitigation into the national climate strategy.India's agriculture, dominated by small and marginal farmers and spanning diverse agro-ecological regions, offers substantial scope for climate action through improved agricultural practices. Conservation tillage, crop residue management, balanced nutrient use, integrated nutrient management, efficient irrigation, and organic amendments can reduce emissions and enhance soil organic carbon (SOC) sequestration, while simultaneously improving soil health, productivity, and resilience. These co-benefits make agricultural carbon projects particularly relevant to India's development priorities.

Under the CCTS, agricultural carbon projects can generate additional income streams for farmers, particularly when aggregation models and farmer collectives are effectively leveraged.

At the global level, ETS frameworks are increasingly expanding to recognise carbon removals and emission reductions beyond the energy and industrial sectors, creating future opportunities for alignment between India's domestic market and international carbon mechanisms.However, integrating agriculture into carbon markets is scientifically and operationally challenging. SOC dynamics are highly variable, influenced by soil type, climate, cropping system, and management history. Establishing credible baselines, distinguishing between carbon removals and avoided emissions, ensuring permanence of soil carbon gains, and designing cost-effective yet robust monitoring, reporting, and verification (MRV) systems are critical challenges that must be addressed to maintain environmental integrity.The Indian context adds further complexity due to fragmented landholdings, limited long-term datasets, and varying institutional capacities across states. These challenges necessitate context-specific methodologies that balance scientific rigour with practical feasibility.

Overly complex MRV systems risk excluding smallholders, while overly simplified approaches may undermine credibility.In this regard, the mandate and long-standing research of ICAR–Indian Institute of Soil Science (IISS) are closely aligned with the needs of India's CCTS.Through decades of work on soil carbon sequestration, long-term nutrient management experiments, conservation agriculture, residue management, and quantification of GHG emissions from soils, IISS has generated a strong evidence base across India's major agro-ecological zones. National networks on long-term fertilizer experiments, soil health assessment, and GHG monitoring provide valuable platforms for developing India-specific baselines, sampling strategies, and SOC monitoring frameworks suitable for agricultural carbon projects.

As Director of ICAR–IISS, I view India's Carbon Credit Trading Scheme as a timely opportunity to position soil health and sustainable agriculture at the centre of nation's climate action agenda.

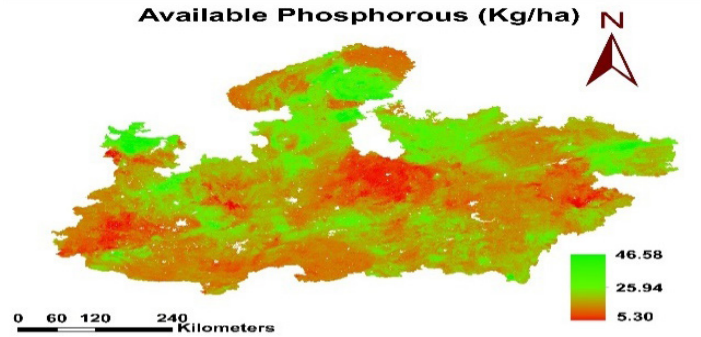
Agricultural carbon projects must be built on sound soil science, practical agronomic principles and a farmer-centric design. Our institute is committed to supporting the CCTS by translating research into credible methodologies, strengthening national capacity for soil carbon measurement, and ensuring that carbon accounting in agriculture remains robust, transparent, and inclusive.If implemented thoughtfully, agricultural carbon projects can become a powerful instrumentnot only for climate mitigation but also for restoring soil health and enhancing the livelihoods of Indian farmers. ICAR-IISS Bhopal will continue to collaborate closely with policymakers, state agencies, and farming communities to help realise this vision.

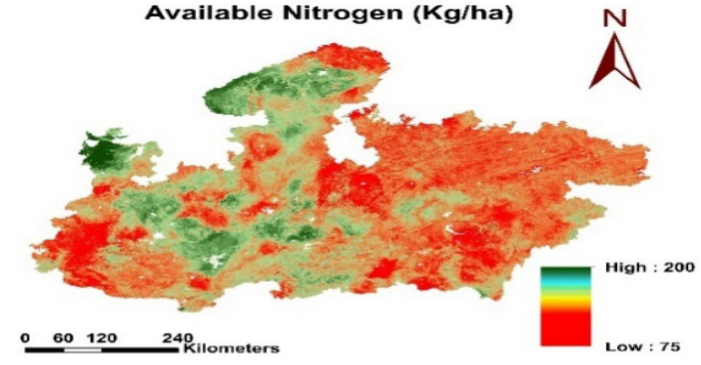
Dr. Monoranjan Mohanty
Director

RESEARCH HIGHLIGHTS

Predictive mapping of soil macronutrients (N, P, K) in central India using SCORPAN-driven environmental covariates and machine learning

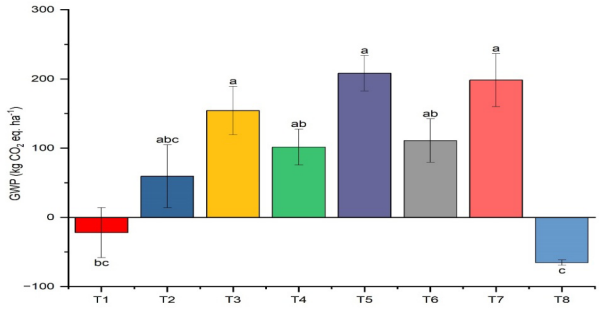
Three machine learning algorithms classification and regression trees (CART), random forest (RF), and gradient tree boosting (GTB) were evaluated using spatial cross-validation to assess their predictive accuracy and uncertainty. Among these, RF outperformed the others for P and K, with R^2 values of 0.53 and 0.54, respectively, while N prediction remained weaker (R^2 = 0.46), reflecting high spatial variability and limited covariate explanatory power. RF and GTB achieved satisfactory reliability for P and K predictions (RPD > 1.73), though N predictions were less dependable. Covariate importance analysis indicated that climatic and topographic variables such as precipitation seasonality, elevation, and slope are key factors in nutrient prediction. This work highlights the value of large-scale machine learning-driven DSM frameworks for creating high-resolution (100 m) nutrient maps that support precision fertilizer application and better soil health management.





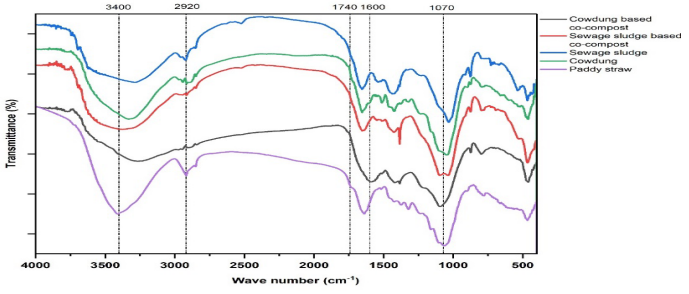
Long-term influence of nutrient management modules on crop productivity and greenhouse gas emission under wheat in Vertisols

The long-term influence of nutrient management modules on crop productivity and greenhouse gas emissions was studied in wheat grown in Vertisols. The highest growth parameters were recorded under T4 (75% NPK of T3 + FYM 5 t ha^{-1}) followed by T5 (75% NPK of T3 + VC 1.5 t ha^{-1}) compared with GRD. Yield and yield attributes were also maximized in T4 and T5. Soil respiration ranged from 520.86 kg C ha^{-1} (T8) to 844.61 kg C ha^{-1} (T7), while nitrous oxide (N_2O) flux varied from –0.08 kg N ha^{-1} (T8) to 0.52 kg N ha^{-1} (T5). Global warming potential ranged from –65.22 kg CO_2-eq ha^{-1} (T8) to 208.31 kg CO_2-eq ha^{-1} (T5). Soil health indicators improved markedly with FYM 20 t ha^{-1} (T8) followed by T4 (75% STCR-NPK + FYM 5 t ha^{-1}).



FTIR-based evaluation of organic matter transformation and maturity in co-composted sewage sludge

FTIR spectroscopy was used to assess organic matter transformation and compost maturity after 120 days of co-composting 1) paddy straw with cow dung and vermiworms compared with 2) sewage sludge with paddy straw, cow dung and vermiworms. Compared to feedstocks, both treatments showed marked reductions in polysaccharide (1030–1150 cm^{-1}) and aliphatic C–H (2920–2850 cm^{-1}) bands, indicating degradation of labile organic matter. Concurrent enrichment of aromatic/amide (1650–1550 cm^{-1}) and carboxylate (1400–1420 cm^{-1}) groups reflected humification and stabilization. Lower aliphatic-to-aromatic ratios in sewage sludge-based compost suggest slightly higher humification than cowdung based compost, confirming sewage sludge addition enhanced compost maturity.



Phosphorus adsorption behavior under conservation agriculture practices in soybean–wheat system

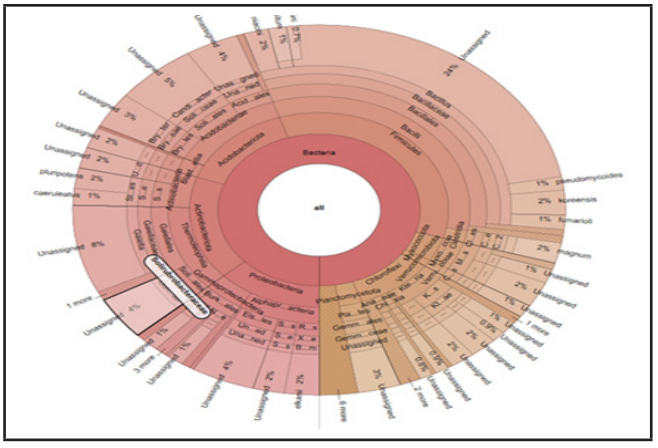
The treatments consisted of zero tillage (ZT) with 0%, 30%, 60% and 90% residue retention (ZTCR0, ZTCR30, ZTCR60, ZTCR90) and conventionally tilled plots without residue (CT). Parameters derived from Langmuir and Freundlich adsorption isotherms showed that there was a significant reduction in adsorption capacity in ZT-based treatments with either 30%, 60%, or 90% residue addition as compared to CT or ZTCR0. The reduction in adsorption maxima (b) and affinity constant (k) (by 26.7% and 20%, respectively) was highest in ZTCR90 compared to CT. In the Freundlich adsorption isotherm, the parameter 'a' describing adsorption affinity is invariably reduced in ZTCR30, ZTCR60, and ZTCR90 over CT and ZTCR0, and was lowest in ZTCR90. Different thermodynamic parameters were also calculated from adsorption data. It was observed that P adsorption was spontaneous ($\Delta G° < 0$), endothermic with greater enthalpic demand under residue retention ($\Delta H° > 0$), and entropy-driven ($\Delta S° > 0$). This study was undertaken in the Consortia of Research Platform on Conservation Agriculture (CRP-CA) programme.

Impact of conservation tillage and crop residue levels on wheat productivity and profitability in Vertisols

A field experiment in Vertisols evaluated five treatments: conventional tillage (CT) with 0% residue, no tillage (NT) with 0% residue, and NT with 30%, 60%, and 90% crop residue under RBD with six replications. Results showed that NT with 90% residue significantly improved soil organic carbon, reduced bulk density, and enhanced soil moisture conservation. These improvements increased plant growth, grain and straw yields, and profitability (gross and net returns, B:C ratio). In contrast, CT and NT without residue recorded lower yields and soil health, emphasizing residue retention benefits.

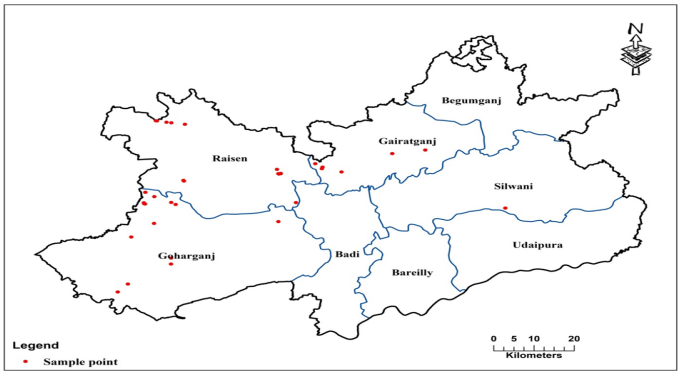
Scientific validation of traditional farm management practices of tribal communities in Balaghat district

Indigenous land management practices of tribal farmers in Central India were evaluated for their role in sustaining soil health and resilience in rice–fallow systems. PRA-based documentation supported by soil, crop, and metagenomic analyses showed soils with 60-75% sand, pH 5.3-6.6, and organic carbon 0.5-2.1%. Available N, P, and K ranged from 163-282, 2.2-67.2, and 60-328 kg ha^{-1}, with sulphur and boron deficiencies. Rice yields were 2.5-3.5 t ha^{-1}. High microbial activity (dehydrogenase: 15.9-95.2 μg TPF g^{-1} day^{-1}) and diverse bacterial communities (as shown in the metagenomic profile) highlight strong nutrient cycling and ecosystem resilience.



Assessing yield constraints in guava orchards using DRIS

To establish DRIS (Diagnosis and Recommendation Integrated System) norm and identify yield-limiting factors in guava orchards, soil and leaf samples (34 in number) were collected from different blocks in Raisen district, Madhya Pradesh. In these orchards, fruit yield is varied from 10 to 85 kg per plant in the same aged 12-15 year old plants. Analysis of these leaf samples revealed that nitrogen varied from 0.9 to 1.79%, phosphorus 0.05 to 0.4% and potassium 0.63 to 2.01%.



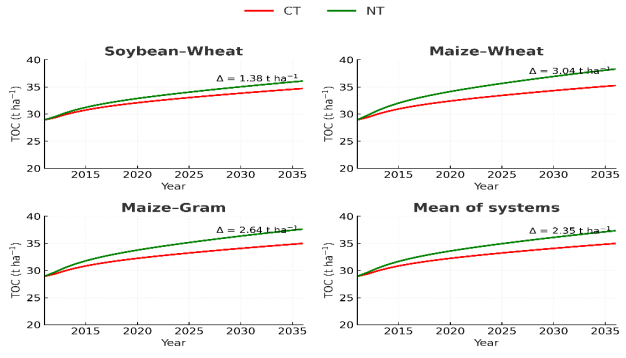
Average yearly carbon increase required to meet the "4 per 1000" initiative in key agro-ecosystems of India

The annual organic carbon (C) inputs needed to meet the "4 per 1000" target across the long-term fertiliser experiment (LTFE) have been quantified using a well-calibrated and validated RothC model. Using multi-location soil organic carbon (SOC) modelling under four Shared Socio-economic Pathways (SSP1-2.6, SSP2-4.5,

SSP3-6.0, and SSP4-8.5), ten contrasting soil–climate combinations were analysed, covering Inceptisols, Vertisols, and Alfisols in hot sub-humid, hot semi-arid, and hot arid regions. Across centres, the estimated C additions needed to achieve a 0.4% per year increase in SOC stock ranged from about 0.01 to 5.7 t C ha^{-1} yr^{-1}, depending on soil type, climate, and emission scenario. On an all-India average, the requirement increased from approximately 1.1 t C ha^{-1} yr^{-1} under SSP1-2.6 to about 2.0 t C ha^{-1} yr^{-1} under SSP4-8.5, highlighting the higher C inputs needed under warmer, high-emission futures.

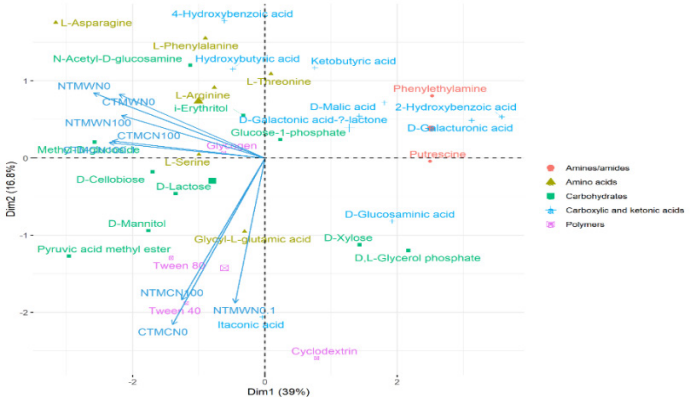
Modelling long-term SOC turnover in different tillage systems in Vertisols of central India using the RothC framework

In this study, two different tillage practices were compared: no-tillage (NT) and conventional tillage (CT), across three cropping systems. To ensure accuracy, the model was calibrated with observed SOC values, enabling it to reproduce the measured SOC trends. The results showed that Total organic carbon (0–30 cm) gradually increased from 28.9 t ha^{-1} in 2011 to 35.0 t ha^{-1} under conventional tillage (CT) and 37.3 t ha^{-1} under no-tillage (NT) by 2036. These increases correspond to mean sequestration rates of 0.24 t ha^{-1} yr^{-1} in CT and 0.34 t ha^{-1} yr^{-1} in NT. Among cropping systems, Maize–Wheat recorded the greatest SOC increase, especially under NT, with a gain of 9.38 t ha^{-1} (0.38 t ha^{-1} yr^{-1}), representing a 32.4% rise from the 2011 baseline. These impactful findings highlight the potential of conservation agriculture practices, particularly no-tillage, as effective strategies for increasing soil carbon stocks in the Vertisols of central India.



Functional diversity of soil microbes influenced by long-term contrasting tillage, nitrogen level, and cropping system

The functional diversity of soil microbes under two contrasting tillage practices, i.e., no tillage (NT) vs. conventional tillage (CT), two cropping systems, i.e., maize-wheat (MW) vs. maize-chickpea (MC), and two nitrogen levels, i.e., 0% vs. 100% of the recommended dose, was studied using community-level physiological profiling after nine years of applying these treatments., the functional diversity of soil microbes was higher at the 0% N level than at 100% N. The mean Shannon diversity index in the MC system was 3.374, which was significantly higher than in the MW system at 3.35, while diversity at the lower fertilizer dose of 0% N was higher (3.377) than at 100% N (3.347). Despite higher AWCD in CT-MW, the functional diversity was greater in NT-MC, and higher at 0% N than at 100% N. The study indicated that CT and optimal N levels encouraged utilization of specific carbon substrates to a greater extent in the MW system, whereas NT and N limitation promoted the utilization of a wider range of substrates, increasing functional diversity in the MC system.

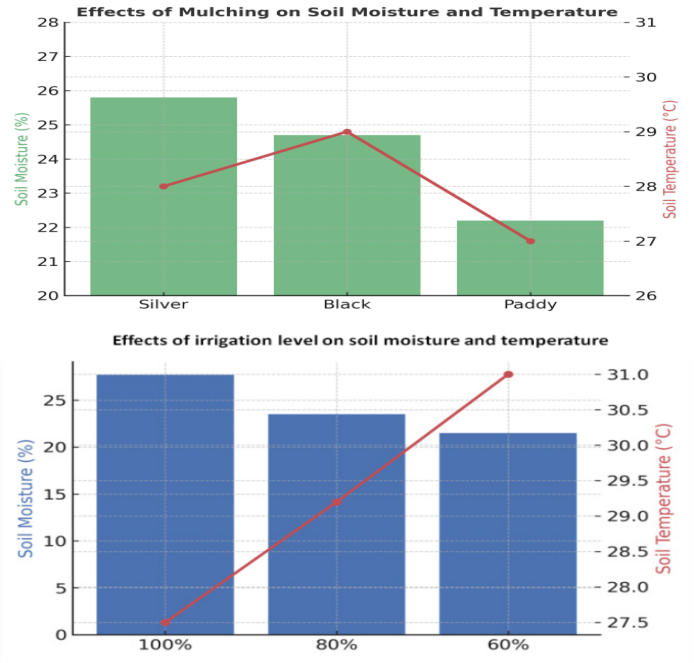


Biplot of carbon utilization pattern in conventional (CT) and no tillage (NT) and N fertilizer level (0 and 100) under Maize-wheat (MW) and maize-chickpea (MC) cropping system.

Soil moisture and soil temperature are influenced by different types of mulch and levels of irrigation

Soil moisture content was significantly affected by irrigation levels and mulching treatments. The surface soil layer (0–15 cm) maintained the highest moisture under 100 % irrigation (27.7 %), followed by 80 % (23.5 %) and 60 % irrigation (21.5 %), showing decline with reduced water application. Similar trends were observed at the 15–30 cm depth, though differences were statistically non-significant. Among mulch types, silver mulch retained the highest surface soil moisture (25.8 %), followed by black mulch (24.7 %) and paddy mulch (22.2 %). The higher reflectivity of silver mulch likely reduced evaporative loss, Soil temperature showed an inverse relationship with moisture, increasing under lower irrigation and non-mulched conditions. Paddy straw mulch moderated temperature fluctuations, while

silver mulch reflected solar radiation, reducing surface heating. Yield was highest under paddy mulch (36.17 t ha^{-1}), followed by black (34.53 t ha^{-1}) and silver mulch (33.48 t ha^{-1}). Maximum yield and dry matter were observed under 100% irrigation, comparable to 80%, but significantly reduced at 60% irrigation.



Development of water and nutrient management practices in conservation agriculture for Vertisols

Field experiment on wheat (cv. HI 1544) in Vertisols evaluated irrigation (FI: 345 mm; SI: 80% FI; DI: 60% FI), tillage (CT, RT, NT), and nutrient management. Flood irrigation was applied 5 times (345 mm), while SI and DI used reduced water at twice-weekly and alternate-day intervals, respectively. Grain and straw yields were not significantly affected by irrigation, but water use efficiency was highest under DI, followed by SI and FI. Water savings were 12 cm (DI) and 6 cm (SI) over FI. Tillage had no yield effect; RT and NT matched CT, saving energy and labour. STCR and LCC slightly improved grain yield over 100% and 75% RDF.

CO_2 Fixation by Rhizobia in relation to Diazotrophy and plant growth promotion of Pigeon pea

This study explored the CO_2 fixation potential of autotrophic rhizobia and its influence on pigeon pea growth. A total of 48 rhizobial strains were screened for the cbbL gene encoding RuBisCO; twenty were cbbL-positive. Two strains viz., BRP5 (*Bradyrhizobium yuanmingense*) and BRP51 (*Rhizobium* sp.), showed superior autotrophic ability, enhancing nodulation, nitrogen fixation, and biomass in three pigeon pea varieties (Asha, ICPL 85063 and ICPL 14003). Soil inoculation also improved phosphorus availability and microbial enzyme activity. These results demonstrate that CO_2-fixing rhizobia can thrive under nutrient-poor conditions and serve as promising bioinoculants for sustainable pigeon pea cultivation in a changing climate.

Effect of microbial culture inoculation on soil respiration: A laboratory incubation study

A laboratory experiment was conducted to assess soil respiration using rice straw residue (finely chopped, about 0.5-1.0 cm) mixed at a rate of 1% with 100 g of soil, and moisture was added to attain field capacity. Activated microbial consortium (four culture *Trichoderma asperellum* IISS-F1, *Aspergillus niger* IISS-F2, *Rhizopus oryzae* IISS-F3, and *Aspergillus terrus* IISS-F5) was added to the soil containing residue. Treatment was administered along with N supplementation via a 2% urea solution. Then the incubation study was performed for a month, with a 10-day interval, and CO_2 evolution was observed. It was observed that the soil respiration decreased with the advancement of the decomposition period. Soil respiration increased by 177% when microbial culture was applied with urea (T4) compared to the control (T1). Microbial consortium alone (T3) also increased soil respiration by 10% over urea alone (T2) and 120% over the control (T1).

Impact of residue retention on methane flux in a Maize-Chickpea cropping system in tropical Vertisols of central India

A field experiment was conducted during the kharif–rabi season to study methane cycling under varying crop residue retention levels in a maize–chickpea system. The randomized block design included two tillage practices (conventional and no-tillage), three residue levels (0%, 30%, and 90%), and two soil depths (0–15 cm and 15–30 cm). Methane consumption in maize ranged from 2.00–4.49 g CH_4 consumed g^{-1} soil day^{-1} in 0-15cm and 0.74–2.06 g CH_4 consumed g^{-1} soil day^{-1} in 15-30 cm, while chickpea showed lower uptake. Methane production varied from 0.11–0.13 and 0.008–0.014 ng CH_4 g^{-1} soil day^{-1} in maize and chickpea, respectively, with no significant depth effects. qPCR analysis revealed the highest abundance of methanotroph (pmoA) and methanogen (mcr) genes under 90% residue retention. Slightly higher organic carbon and β-glucosidase activity in chickpea soils reflected enhanced microbial processes. The study underscores that higher residue retention promotes methane regulation and soil health in *Vertisols* under conservation agriculture.

Impact of silicon solubilizing bacteria (SSB) on wheat productivity in *Vertisols* of central India

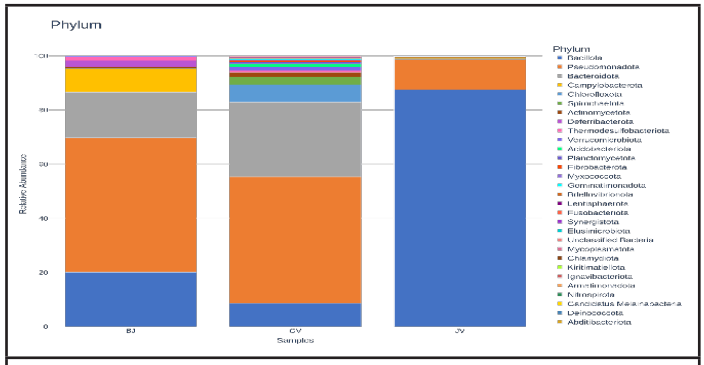
A field experiment was carried out under the activities of silicate solubilizing bacteria for enhancing nutrient use efficiency of Rice-wheat cropping systems in Vertisols of Central India. Result shows that thehighest grain yield (6.5 t ha^{-1}) was recorded at 75% RDF + SSB 4 the control was the lowest grain yield (1.8 t ha^{-1}) among the treatments. The yield increased over the 75 % RDF (T1) was observed as follows: T6, 75% RDF + SSB 4 (31%) > T5, 75% RDF + SSB 3 (25%) >T3, 75%RDF + PSB 4 (8.8%) > T4, 75% RDF +PSB 5 (8.5%)>> T2, 100 % RDF (7.8%).This study suggests that the application of Si and P as SSB and PSB significantly benefits the rice growth and productivity in Central India's *Vertisols*.

Effect of in-situ decomposition of crop residue mediated by lignocellulolytic microbes on soil CO_2 flux under rice-wheat cropping system

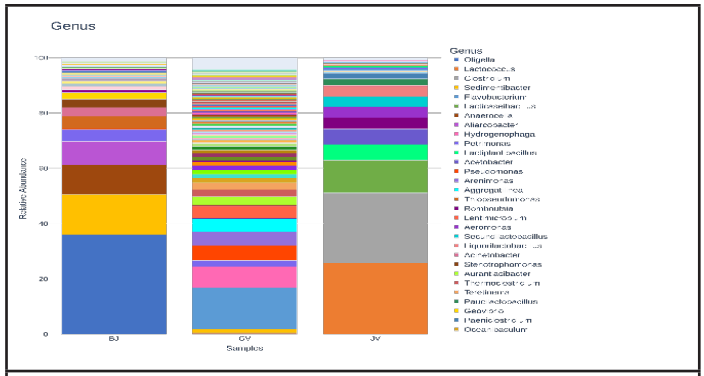
In situ CO_2 flux was measured after application of microbial consortia on crop residue to study the effect of in-situ decomposition of crop residue mediated by lignocellulolytic microbes under rice-wheat cropping system. The treatments included, T1: residue incorporation, T2: Microbial consortia application on residue and incorporation, T3: Microbial consortia application on residue + urea spray and incorporation, T4: Residue removal, T5: Residue burning and T6: Residue retention. The flux measurement was taken before transplanting of rice in 2025. Following consortia application, CO_2 flux initially increased but gradually declined with time after application. Field measurements of CO_2 flux during the study period (15 days) revealed that treatments T2 and T3 (consortia application) recorded the highest flux values of 1.12 and 1.11 g CO_2 m^{-2} hr^{-1}respectively, whereas T4 (0.05 g CO_2 m^{-2} hr^{-1}) (residue removal) showed the lowest. The total cumulative CO_2 flux followed a similar trend to that observed in the day-wise flux pattern.

Characterization of microbiome in natural farming inputs

The bacterial composition of three natural farming inputs—Ghanajeevamrit, Jeevamrit, and Beejamrit—was analyzed using metabarcoding. A total of 29 bacterial phyla were identified, with Ghanajeevamrit showing the highest diversity. Jeevamrit was dominated by *Bacillota* (87.5%), while *Pseudomonadota* was most abundant in Beejamrit (49.67%) and Ghanajeevamrit (46.77%). Beejamrit was enriched with *Oligella*, *Sedimentibacter*, *Anaerocella*, *Aliarcobacter*, and *Acinetobacter*, whereas Jeevamrit contained *Lactococcus*, *Clostridium*, *Lacticaseibacillus*, *Lactiplantibacillus*, *Acetobacter*, and *Aeromonas*. Ghanajeevamrit had a broader range of genera, including *Flavobacterium*, *Hydrogenophaga*, and *Pseudomonas*. OTUs of *Azospirillum* and *Azotobacter* were found in Jeevamrit and Ghanajeevamrit but absent in Beejamrit, while *Mesorhizobium* occurred in Beejamrit and Ghanajeevamrit only. After rarefying data to uniform sequencing depth, diversity indices showed that Ghanajeevamrit had the highest Chao1 (322), while Jeevamrit and Beejamrit recorded 174 and 176 value of Chao1 respectively. Shannaon and Simpson diversity index was also recorded highest (4.05 and 0.95 respectively) for Ghanjeevamrit. Cluster analysis revealed close microbial similarity between Beejamrit and Ghanajeevamrit.



Bacterial phyla in natural farming input



Bacterial genera in natural farming input

Effect of elevated CO_2 and temperature on soil particulate organic carbon and mineral associated organic carbon

A comparative study was conducted to assess the impact of climate change represented through elevated CO_2 concentration and elevated temperature on soil particulate organic matter and mineral associated organic matter. The ambient temp and CO_2 treatment recorded the highest POC (3.8 g kg^{-1}), while the combined effect of elevated temperature and elevated CO_2, significantly

reduced POC (2.5 g kg^{-1}), indicating a decline in POC under climate stressors. In contrast, MAOC reduced under elevated CO_2 (4.7 g kg^{-1}) and combined effect of elevated CO_2 and temp (5.4 g kg^{-1}); however elevated temperature recorded equal amount of MAOC as compared to ambient temperature and CO_2 treatment. However, the difference among the treatments with respect to MAOC was non-significant.

Effect of humic acid spray on rhizospheric soil nutrient cycling enzymes

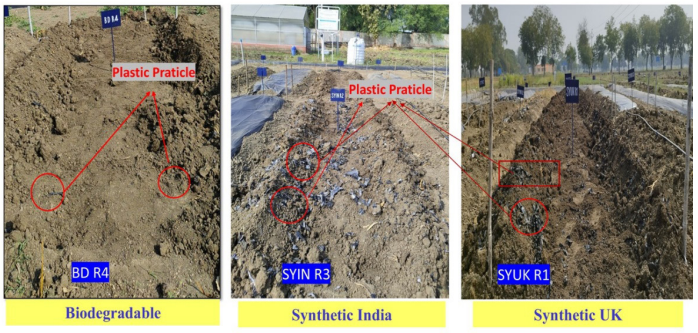
Soil enzyme activities varied notably across treatments and crops. Urease activity was highest under T3 (75% RDF + 0.1% H.A IISS) in tomato (132.5 μg NH_4^+-N^{-1} g hr^{-1}) and under T4 (75% RDF + 0.2% H.A IISS) in chickpea (9.03) and wheat (27.7). Alkaline phosphatase peaked under T3 in tomato (55.2 μg^{-1} g hr^{-1}) and T4 in chickpea (53.9) and wheat (70.5), indicating enhanced P-mineralization. β-glucosidase activity was maximum under T4 in wheat (396.5 μg PNP/g/hr) and chickpea (385.3), and T5 (100% RDF + 0.1% H.A IISS) in tomato (387.2). Dehydrogenase activity was highest under T3 in tomato (59.98 μg TPF^{-1}g hr^{-1}) and T4 in chickpea (57.9) and wheat (55.6). Overall, treatments with 75% RDF + 0.2% H.A (IISS) consistently outperformed RDF alone (T1, T2), demonstrating the efficiency of humic acid integration in enhancing soil enzyme activities across crops.

Effect of Forced Aeration and Manual Turning on compost quality

The P-S-N compost with manual turning showed the highest total nitrogen (1.47%), indicating better nutrient mineralization. The forced aeration compost had TN of 1.33%, higher than the unturned compost (0.91%), confirming enhanced aeration promotes nitrogen retention by supporting an oxygen-rich environment that fosters microbial processes stabilizing nitrogen in the compost or soil, reducing losses by gaseous emissions. The C:N ratio was lowest (16.23) in manually turned compost, followed by 17.45 in forced aeration suggesting efficient decomposition than no turning (38.97). Total phosphorus (TP%) and total potassium (TK%) were higher in aerated and turned treatments compared to unturned. The citric acid soluble phosphorus was greatest (0.295%) in manually turned compost, showing improved P availability. Microbial counts (Azotobacter, actinomycetes, bacteria) were markedly higher under aeration and turning, indicating active microbial activity.

Poly mulch degradation rate in experimental soil

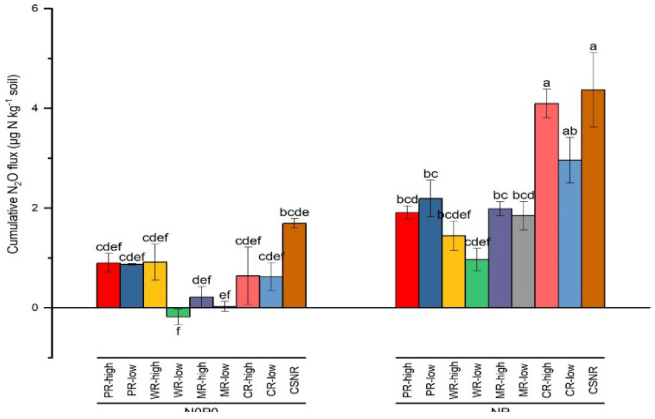
Under an agronomic trial on poly mulch field experiment at ICAR-IISS, Bhopal, it was observed that amongst the different types of poly mulch like Biodegradable, UK Synthetic, and India Synthetic, the Biodegradable poly mulch showed 39.4% reduction in mulching weight, calculated based on weight at the stage of sowing (initial) and at the stage of harvesting (final). The UK synthetic poly mulch recorded a 23% reduction, whereas the Indian synthetic poly mulch documented a 21.4% reduction in weight (Crop –Maize). Moreover, it was visually observed that biodegradable poly mulch started degrading after one month of sowing the maize crop during the kharif season, as compared to synthetic mulch. But during the winter season, the degradation of biodegradable poly mulch started after 60 days of sowing. After harvesting of the crop, during the bed preparation, it was observed that the number of macro plastics under biodegradable poly mulch soil is less than that under synthetic mulch.



Effect of crop residue quality on nitrogen transformation in Vertisols

An incubation experiment evaluated the effects of four crop residues (wheat, chickpea, maize, and paddy) differing in residue quality (low and high C:N ratio) and a no-residue control (CSNR) on soil N dynamics

under two nutrient regimes (with and without NP) in a Vertisol. Low C:N residues combined with NP significantly enhanced NH_4-N by 18–22%. Chickpea residue (C:N 48:1) with NP produced the highest NH_4-N (44.4 mg kg^{-1}; 22.4% increase), followed by maize (C:N 45:1) at 43.1 mg kg^{-1} (18.7% increase). In contrast, high C:N residues without nutrients reduced NH_4-N by 19–25%, with wheat (C:N 245:1) declining to 27.4 mg kg^{-1} (24.5% decrease) and paddy (C:N 88:1) to 29.4 mg kg^{-1} (19.1% decrease). Nutrient-amended control soil showed a 21.8% increase in NH_4-N (44.2 mg kg^{-1}). NO_3-N accumulation peaked under NP-amended chickpea (30.9 mg kg^{-1}; 105% increase over control) and maize (17.8 mg kg^{-1}; 18% increase), while high C:N wheat strongly suppressed NO_3-N (<8.5 mg kg^{-1} without NP; 44–79% reduction), even with NP (10.7 mg kg^{-1}; 29% reduction). Nitrous oxide emissions increased markedly with NP, especially in chickpea residue (4.1 μg N kg^{-1}; 142% increase) and control soil (4.4 μg N kg^{-1}; 158% increase), whereas wheat residue with NP showed minimal N_2O release (1.4μg N kg^{-1}; 17% reduction), highlighting strong residue-specific controls on N transformations and emissions.



Application of bottom ash from thermal power plant in Vertisol of central India and its impact on soil quality

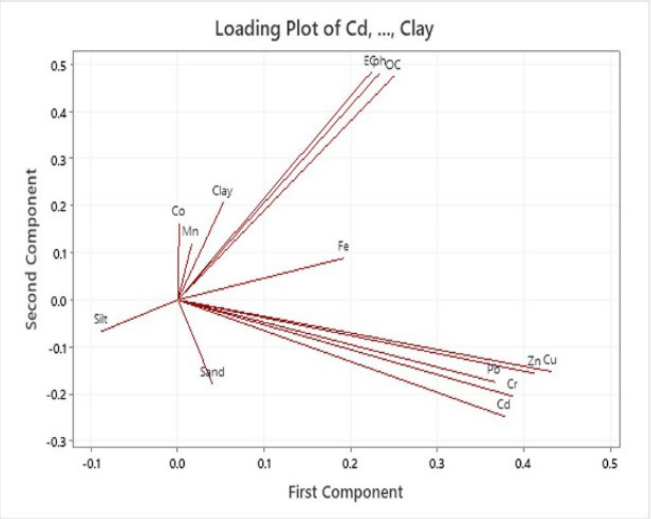
A three-year field study on Vertisol was conducted to evaluate the effects of weathered coal ash on soil quality parameters and trace element accumulation. Results showed that Ash @400 t ha^{-1} in 1st year only improved soil physical properties, including a notable reduction in clay content (17.9%), bulk density (8.8%), and particle density (7%). It increased the availability of plant nutrients P, S, B, and Mo by 1.4, 2, and 10 times, respectively, as well as total contents of P and Mo were increased by 0.5 and 1.95 times in soil as compared to RDF with FYM (T_2). However, ash application significantly decreased soil organic carbon content with 19.04%, particularly at 400 t ha^{-1} application rates. Importantly, the application of ash did not significantly alter the availability or total content of micronutrients or toxic trace elements Zn, Cu, Ni, Co, As, Cd, Cr, and Pb. The study concludes that a one-time application of ash at rates @400 t ha^{-1} can have significant beneficial effects on soil quality in clayey Vertisol.

Effect of fly ash application as P source on the growth and yield of soybean crop

A field study initiated during rabi 2023–24 at ICAR-IISS, Bhopal, evaluated fly ash as a phosphorus (P) source in Vertisols. Fly ash was applied once at 400 t ha^{-1} before wheat, and its residual effect was assessed in soybean during kharif 2024. Results showed significant improvement in soybean growth parameters, including plant height, leaf area, SPAD values, branches, and pods, when fly ash was applied with the recommended fertilizer dose (RDF). Grain yield increased by 7.94% over RDF alone. Even with reduced P levels, fly ash enhanced yields by 15.05% (-50% P) and 23.39% (-100% P) compared to respective RDF treatments, indicating its potential as an alternative P source.

Multivariate statistical analysis of soil heavy metals in Jajmau industrial zone, Kanpur

Multivariate statistical technique like Principal Component Analysis (PCA), were used to reduce the dataset, identify the dominant minimum data set (MDS) and analyse relationship between various heavy metals and soil properties like pH, EC etc along with factor analysis (FA). The results indicated that the concentration of Cr, Cd, Pb, Zn, and Cu in both components and the rotated matrix related to anthropogenic origins, such as industrial activity in the region. The multivariate analysis concluded that the industrial chemical waste is responsible for soil pollution in the agricultural fields near the industrial region.



Principal Component Analysis (PCA) results, loading plot of components influencing geochemical variation

Characterization of municipal sludge from different sewage treatment plants (STPs) of Madhya Pradesh

Municipal sludge (MS) samples were collected from four different sewage treatment plants (STPs) of Madhya Pradesh during the winter and pre-summer season 2024-2025. The solarized MS from four STPs: Kabitkhedi STP (Indore), Sehore STP (Sehore), MaholiDamkheda STP (Bhopal) and Bawadiya Kalan STP (Bhopal). Moisture content is highest in Bawadiya Kalan (about 19%), followed by Kabitkhedi (17%), MaholiDamkheda (10%), and Sehore (9%). pH is near neutral to slightly alkaline in all plants, ranging roughly from 6.5 to 7.2. Electrical conductivity (EC) ranges from about 1.5 to 3.8 dS/m, with the highest values in Kabitkhedi and the lowest in Sehore. Carbon (C) content is highest in Kabitkhedi (about 23%), followed by Bawadiya Kalan (21%), MaholiDamkheda (20%), and Sehore (17%), indicating appreciable organic matter in all sludges. Nitrogen (N) content is around 2–2.3% in all four plants, with only minor variation.

Enrichment and characterization of fermented organic manure (FOM)

FOM sampling was done from 10 Compressed Biogas (CBG) plants across Madhya Pradesh and more than 90% of the FOM sample was passed through 4.0 mm IS sieve The other parameters were: moisture content 32.8 - 45.6%, pH: 7.19–7.63, EC: 1.68 – 3.89 dS m^{-1}, organic C content: 26.4 – 32.9%, total N and P content: 1.38 – 1.84% and 0.01 - 0.11%, C: N ratio: 17.3 – 19.9%, As 0.31 – 3.21 mg kg^{-1}, Cd 0.55 – 1.29 mg kg^{-1}, Cr 11.8 – 43.6 mg kg^{-1}, Cu 23.8 – 89.8 mg kg^{-1}, Ni 0.89 – 19.7 mg kg^{-1}, Pb 8.93 – 87.1 mg kg^{-1} and Zn 88.9 – 189.8 mg kg^{-1}.

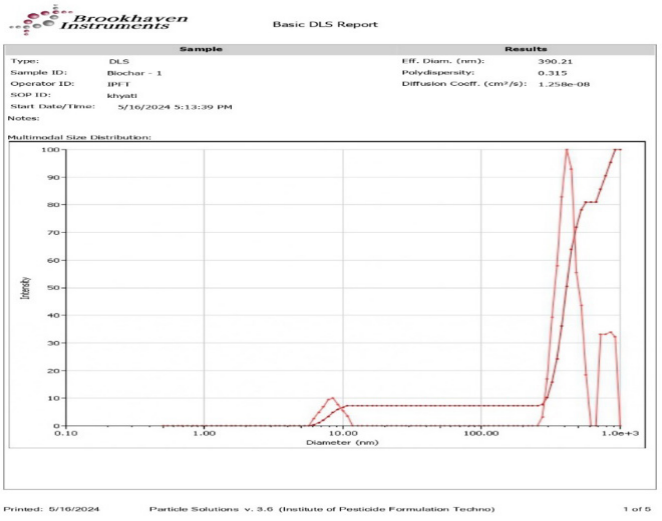
M/s Dayoday, Bhopal M/s IMC, Indore

Characterization of municipal wastewater of the Maholi Damkhera sewage treatment plant of Bhopal

Untreated and treated municipal wastewater samples were collected from the inlet and outlet of Bhopal - Maholi Damkhera, the operational sewage treatment plant (STP) for primary investigation during two different seasons, summer and winter. The pH of the treated municipal wastewater was slightly higher in summer (7.31) than in winter (7.19), and EC and TDS were significantly higher in summer (565 mg L^{-1}) than in winter (498 mg L^{-1}). The DO of treated water was low (4.45 mg L^{-1}) in summer compared with winter (4.78 mg L^{-1}). All the preliminary water quality parameters were within the standard permissible limit given by USEPA (2001)

Preparation and characterization of municipal sludge size-reduced biochar product for safe utilization in agriculture

Size-reduced biochar was prepared at ICAR-IARI, New Delhi, using a Retsch PM 400 planetary ball mill. A stainless-steel ball (10 mm) served as the milling media to effectively grind the biochar particles. The sample-to-ball weight (S:B) ratio was carefully maintained at 1:2.5 to ensure optimal contact between the municipal sludge biochar (MSB) particles and the grinding media, thereby promoting efficient size reduction. The milling was performed at a rotational speed of 300 rpm for 32 hrs. Upon completion of the milling process, the reduced-size biochar was carefully collected and prepared for further analysis to determine its particle size distribution. The particle size of the reduced-size municipal sludge biochar was measured using a Brookhaven Instruments Nano Brook Omni Model at the IPFT in Gurgaon, Haryana. Dynamic Light Scattering (DLS) analysis was employed to assess the particle size distribution of the milled biochar. The DLS results revealed that, although only a few particles were below 100 nm, the majority exhibited an effective diameter in the 300-400 nm range.



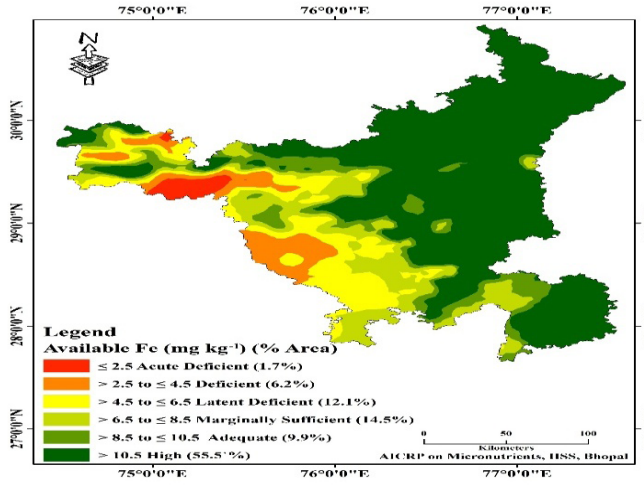
Basic DLS report of size reduced biochar

Crop response to potassium in Vertisols under long-term fertilizer experiments

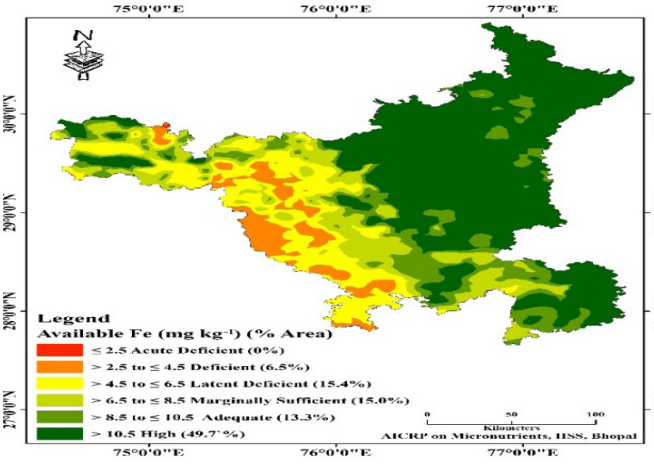
The study on potassium response in Vertisols was examined under LTFE sites. Application of K resulted in increase in yield of sorghum and wheat at Akola by 54.0 and 30.0%, soybean and wheat at Jabalpur by 16.0 and 38.0% and marginal response to K doses in rice and wheat at Raipur by 3.50 and 2.60%, respectively. Moreover, soybean and safflower showed an increase in yield due to K application by 21.0 and 30.0%, respectively, at Parbhani even though soils were high in available K (> 620 kg ha^{-1}). However, crop showed minimal to negative response to applied K to groundnut and wheat to the extent of 1.90 and -6.05%, respectively, at Junagadh even though soils are low in K status (about 160 kg ha^{-1}). In Vertisols, even though at present K is sufficient to meet K requirement of crops but in years to come K could be a limiting nutrient in soil under highly irrigated and intensive agriculture.

Geostatistics-based understanding of temporal changes in the spatial distribution of soil fertility parameters

Geostatistical analysis (2016–2023) revealed temporal shifts in spatial distribution of soil fertility parameters in Haryana. Variability ranged from 6.22% (pH) to 127% (EC). Mean EC declined from 0.50 to 0.39 dS m^{-1}, available S from 83.4 to 65.9 mg kg^{-1}, available Zn from 1.99 to 1.56 mg kg^{-1}, available Fe from 12.6 to 11.0 mg kg^{-1}, and available Mn from 11.6 to 9.14 mg kg^{-1}. Spatial patterns changed significantly, with expansion of low-nutrient zones for available S and micronutrients over seven years. Generated maps support site-specific S and micronutrient management strategies for sustainable soil fertility improvement.



Available Fe in 2016



Available Fe in 2023

Development of a prescription equation based on soil test crop response correlation

Prediction equations for the post-harvest soil test value for the onion crop were developed

Nutrient	R^2	Multiple regression equation
N	0.99**	68.61 - 0.13 RY**+ 0.89 SN**+ 0.034 FN*
P	0.82**	15.93 -0.05 RY*+ 0.87 SP**0.013 FP**
K	0.94**	41.93 + 0.11 RY**+0.74 SK**+0.10 FK

FN : Fertilizer Nitrogen (kg ha^{-1}); FP: Fertilizer Phosphorus (kg ha^{-1}); FK Fertilizer Potassium (kg ha^{-1}); SN: Soil available Nitrogen (kg ha^{-1}); SP: Soil available Phosphorus (kg ha^{-1}); SK: Soil available Potassium (kg ha^{-1}); RY: Realized Yield (q ha^{-1})

EXTENSION ACTIVITIES

Demonstration of livelihood improvement of tribal population of Balaghat district, Madhya Pradesh through crop diversification

To enhance income and livelihood security among tribal farmers, demonstrations on crop diversification were conducted in the homestead gardens of Balaghat district, Madhya Pradesh. Hybrid vegetable seeds were distributed to 100 farmers across 15 villages, promoting the cultivation of high-value crops such as ridge gourd, brinjal, cowpea, and chilli. A model demonstration farm, where vegetables were grown on raised earthen beds covered with plastic mulch and supported by drip irrigation, recorded impressive profitability with a combined benefit–cost ratio of 15.17, led by ridge gourd and brinjal. Wheat cultivation was also demonstrated as a rabi crop in rice–fallow fields with available water sources, achieving a B:C ratio of 2.93 and establishing the feasibility of double cropping in tribal areas.

Demonstration of microbial-based waste decomposer in SAP villages

Microbial cultures were multiplied on a large scale in the laboratory to prepare decomposer capsules. These capsules will be distributed to farmers and used to demonstrate in situ decomposition of wheat residue in selected villages. Farmers visiting the institute were guided on the use of these decomposer capsules for field composting. Demonstrations using Ekcel microbial decomposer capsules were conducted in seven farmers' fields across different villages, with participation from more than 10 farmers.

Demonstration of drone technology and visit to experimental farm

A demonstration of drone technology was organized on March 21, 2025 to create awareness among farmers about its applications and advantages in modern agriculture. During the event, farmers were briefed on the use of drones for precise fertilizer and pesticide application, crop monitoring, and efficient resource management. The demonstration highlighted the potential of this technology to reduce input costs, save time, and ensure uniform field coverage, thereby promoting smart and sustainable farming practices.

Demonstration of nutrient management technologies in farmers' Fields

Frontline Demonstrations on balanced fertilizer use and integrated nutrient management (INM) was conducted in 17 farmer fields (12 in wheat and 5 in chickpea) of Agariya, Chapar, MugaliaKot, and Jagdishpur villages of Bhopal during the Rabi season (October 2024 to March 2025) under the Scheduled Caste Sub Plan (SCSP) to showcase effective nutrient management practices aimed at enhancing crop productivity and soil health.

Technical demonstration on waste recycling technologies

ICAR IISS Bhopal demonstrated and provided technical guidance on the use of Ekcel-Shred R and Ekcel-Compost R for recycling the Ashram's domestic waste at Satsang Ashram, Deoghar (Jharkhand) (Dr. Asit Mandal)

Soil Health Card and fruit tree sapling distribution under Farmer FIRST project

Under the Farmer FIRST Project, Soil Health Cards were distributed to 30 farmers from Khajuri and Barkhedi Hajjam villages in Bhopal, Madhya Pradesh. To promote on-farm diversification, saplings of fruit trees such as Mango, Guava, Orange, and lemon were also distributed to two farmers of Barkhedi Hajjam village for establishing a block plantation of fruit trees.

Input distribution to farmers under the NICRA project

Under the NICRA project, vermi-beds were distributed to farmers on March 23, 2025 to promote sustainable soil health management and organic waste recycling.

Input distribution to farmers under SCSP project

Under the Scheduled Caste Sub Plan (SCSP) project, agricultural inputs including High-yielding variety (HYV) seeds of Soybean (JS 2098) and Rice (PB 1692), along with fertilizers (DAP and Urea), were distributed to farmers of in various villages of Bhopal and Vidisha districts of Madhya Pradesh in the months of May-June 2025 (Drs. D.K. Yadav, R.K. Singh, Madhumonti Saha, R.Elanchezhian, Abhijit Sarkar, Jitendra Kumar, and N.K. Lenka).

Kishan sangosthi

Kishan sangosthi and capacity building was conducted with farmers of four villages viz., Guradiya, Prithvipura, Gunga, and Dhamarra (Bhopal, Madhya Pradesh) under the SCSP project during January 13-14, 2025 (Drs. Ajay, Abhijit Sarkar and Madhumonti Saha).

ICAR-IISS conducted a kishan sangosthi at Chanderi village on January 30, 2025 under the SCSP project (Drs. Ajay, R.K. Singh and Asit Mandal).

Exhibition of IISS technologies during krishi skanlap yatra

ICAR-IISS technologies such as Test-Based Fertilizer Recommendation Tools, Nano-fertilizer Evaluation, Carbon and Energy Smart Agriculture Technologies, and Integrated Nutrient Management were demonstrated in the Krishi Sanklap Yatra organized during May 25–26, 2025 at Ladkui and Bhadkui villages of Madhya Pradesh, on the Visit of Hon'ble Union Agriculture Minister Shri Shivraj Singh Chouhan.

MAJOR EVENTS

National workshop on poly mulching in agriculture

A two-day National Workshop on "Use of Polymulching in Agriculture: Challenges and Opportunities" was organized jointly by ICAR-IISS Bhopal, ICAR-ATARI Kolkata, and RAKVK Nimpith, West Bengal during February 5-6, 2025.

Workshop cum awareness programme on poly mulching

A workshop cum awareness program on *"Poly Mulching in Crop Productivity: Potential and Limitations"* was jointly organized by ICAR-IISS, Bhopal and Krishi Vigyan Kendra (KVK), Raisen on February 27, 2025 at Naktara village, KVK Raisen under the GCRF–UKRI international funded project.

ICAR central zone sports tournament 2024

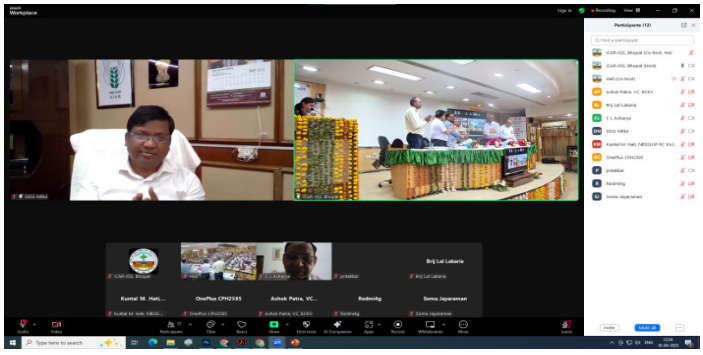
ICAR-IISS, Bhopal, served as the lead organizer for the ICAR Central Zone Sports Tournament 2024, held from March 4-7, 2025, successfully hosting participants from multiple ICAR institutes and promoting sportsmanship and camaraderie among staff and students.

Women's Day

The Women's Cell of ICAR-IISS celebrated International Women's Day on March 11, 2025 by organizing a Women Farmer Field School on "Principles and Benefits of Regenerative Agriculture and Nutritional Garden" in collaboration with Solidaridad at the Nico Roozen International Centre of Excellence for Regenerative Agriculture, Barkhedi, Sehore (M.P), with participation of 150 farm women.

38th Foundation Day

The 38th Foundation Day of ICAR-IISS, Bhopal was held on April 16, 2025 with Dr. A.K. Nayak (DDG, NRM, ICAR) as Chief Guest, who appreciated the institute's contributions to soil science. He emphasized technology translation, impact assessment of NRM practices, advancements in NIR/MIR soil analysis, carbon standards and trading, nanotechnology, and the need for regulatory frameworks for biofertilizers, along with addressing microplastic pollution and promoting the One Health approach. Dr. S.K. Sharma delivered the 1st Dr. N.S. Randhawa IISS Foundation Day Lecture.



ICAR-IISS crèche inaugurated

ICAR-IISS, Bhopal established a crèche facility on its premises, inaugurated on April 16, 2025 (Foundation Day) to provide a safe and supportive environment for children of staff.

World environment day 2025

ICAR-IISS celebrated World Environment Day 2025 on June 20, featuring a special lecture by Dr. Pravakar Mishra, Former Scientist G, NCCR, Chennai, on *"Plastics in Our Environment - Role of Citizen Science"* (Dr. M. VassandaCoumar - Organizing Secretary)

Viksit Krishi Sankalp Abhiyan (VKSA)

The ICAR-IISS scientists actively participated in the 15 days Viksit Krishi Sankalp Abhiyan (VKSA) organized by ICAR which during June 03-17, 2025. In 15 days, the institute scientists travelled across nearly 500 villages of 10 districts of Madhya Pradesh and conducted awareness programs and interactive meetings to sensitize farmers about soil health, balanced fertilization, water-use efficiency, and climate-resilient agriculture. Also, demonstrated ICAR-IISS technologies including soil testing kit, integrated nutrient management, and carbon- and energy-smart agriculture approaches.

Visit of Secretary, DARE and DG, ICAR

Dr. M. L. Jat, Secretary, DARE and DG, ICAR and Dr. A.K. Nayak, DDG (NRM), ICAR visited institute on May 26, 2025.

International Yoga Day 2025

ICAR, Bhopal celebrated International Yoga Day on June 21, under the theme "Yoga for One Earth, One Health". Over 50 staff and researchers joined, experiencing invigorating poses like Surya Namaskar and serene dhyana, promoting stress relief and mindfulness essential for demanding research roles.

PROGRAMME/ TRAINING/ WORKSHOPS/ SEMINAR/ MEETING ORGANISED

Farmers training under the ICAR-IISS Tribal Sub Plan (TSP) programme

A three days training programme on "Soil Health Management in the Low-Input Tribal Agriculture System of Madhya Pradesh" for the farmers of Ratlam district was organized during January 14–16, 2025 at ICAR-IISS, Bhopal (TSP Ratlam team).

A workshop-cum-training and input distribution programme was organized from March 17-19, 2025, at KVK Surgi, Rajnandgaon district, Chhattisgarh, under the TSP project (TSP Rajnandgaon team).


कृषि विज्ञान केंद्र, राजनांदगाँव में एक दिवसीय कृषि मेला सह कृषक संगोष्ठी का आयोजन

The training-cum-agricultural input distribution programme were conducted for tribal farmers of Barwani district organized by ICAR-IISS, Bhopal at KVK Barwani during March 23-25, 2025 (TSP Barwani team).

Training, awareness programme, and input distribution under SAP

Under the Swachhta Campaign, ICAR-IISS organized a series of training programmes in different villages involving farmers and members of the civil society and, distributed portable vermibeds and earthworms to

the farmers. 180 farmers/Students participated in these programs in different villages.

ICAR-IISS organized training cum awareness programme on soil health management and enhancing crop productivity under SCSP at Berkhedi Hajjam Village, Bhopal during January 16-17, 2025.

ICAR sponsored 21 days Winter school on "Recent advances in conservation agriculture for regenerating soil health and climate change mitigation" during February 27 to March 19, 2025.

A four day's training program was conducted under the NICRA project on Climate-Smart Agriculture for sustainable Soil Health Management during March 20-23, 2025.

Training-cum-Awareness Programmes under SCSP Project

Under the Scheduled Caste Sub Plan (SCSP) project, training-cum-awareness programmes were organized for SC farmers in selected villages. The programs were conducted at Agariya and Chapar on January 30, 2025 and at Mugalia Kote on 28 February 2025.

Farmers training on "Rapid Composting Techniques" and "Advanced Composting Techniques"on January 2, and April 9, 2025, at ICAR-IISS, Bhopal for progressive farmers sponsored by the Office of the Chief District Agriculture Officer, Bargarh and Angul, Govt. of Odisha (Dr Asha Sahu).

Training on "Advanced Biowaste Management Technologies" on January 9, 2025, at ICAR-IISS, Bhopal for 25 M.Sc./Ph.D. students (Dr. Asha Sahu).

Training program cum exposure visit on "Soil Health Management for Livelihood Security" during February 06-11, 2025, at ICAR-IISS, Bhopal for the farmers of Bolangir district of Odisha (Dr. Asha Sahu).

A Training on "Nature-positive agricultural practices: an Indian perspective" on June 19, 2025 at ICAR-IISS Bhopal for Princeton University students through Jaivik Jeevan (Drs. N.K. Sinha and J.K. Thakur).

Exposure visit of students from IES University, Bhopal, at ICAR-IISS on April 3, 2025 to gain hands-on training on environmental monitoring, sustainable agricultural practices, and research methodologies (Dr. Abinash Das).

ICAR-IISS orgnized 10 days ICAR short course on "Recent developments in instrumentation techniques for assessment of soil quality" during January 02-11, 2025 (Drs. Nisha Sahu, M. Vassanda Coumar, Tapan Adhikari).

ICAR-IISS orgnized training programme on "Soil Health Management for Sustainable Agriculture" (Sponsored by Mahashakti Foundation, Balangir, Odisha) during February 10-14, 2025 (Dr. M. Vassanda Coumar).

ICAR-IISS organized five days training programme on "Crop Diversification and Soil Health Management" for Progressive farmers sponsored by Office of the Chief District Agriculture Officer, Angul, Govt. of Odisha during April 7-11, 2025 (Drs. A.K. Tripathi, B.P. Meena, D.K. Yadav).

AWARDS/ HONORS/ RECOGNITION

Dr Khushboo Rani appointed as external examiner for M.Sc. studentsof Rani Lakshmi Bai Central Agricultural University Gwalior-Jhansi Road, Jhansion February 28, 2025.

Dr Khushboo Rani acted as reviewer in the Journal "Plant and Soil" on May 26, 2025.

Dr RS Chaudhary was recognised as a panellist in the International Conference On "Rained Agriculture Building pathway for resilience and sustainable livelihoods" From January 29-31, 2025, at CRIDA Hyderabad.

Dr RS Chaudhary elected as Vice President of "Indian Association of Soil & Water Conservations" kaulagarh road, Dehradun Uttarakhand.

Dr Jitendra Kumar acted as an expert member in the jury constituted by the Environmental Planning and Coordination Organization (EPCO) to evaluate and select candidates for the Ph.D. Fellowship Programme on May 14, 2025.

Dr Abinash Das appointed as external examiner for Odisha University of Agriculture & Technology on May 1, 2025

Dr. J. K. Thakur received best oral presentation award in 1st International Farming Systems Conference (IFSC 2025) on Transforming Food, Land and Water Systems under Global Climate Change Held during March 7 – 9 , 2025 at IIFSR, Modipuram

Dr. J. K. Thakur was invited as an expert in Multistakeholder workshop on Understanding organic cropping system and value chains in Madhya Pradesh with special reference to cotton, vegetables, fruits and other crops held at SIAET, Barkhedi, Bhopal on February 21, 2025

Dr. Asha Sahu acted as Chairperson of the committee to prepare Screening Test Paper and evaluation for recruitment of Young Professional-Il under the "ICAR-IISS, Bhopal" on February 03, 2025.

Dr. Asha Sahu received Outstanding Woman Researcher in Soil Science and Agricultural Chemistry at 10th Venus International Women Awards (VIWA 2025) held on March 01, 2025 at Green Park Chennai, India.

Dr. Asha Sahu nominated as Editor in the newly reconstituted Editorial Board of the Indian Society of Soil Science to function during the period 2025 and 2026.

Dr. Sangeeta Lenka was a distinguished speaker for the Session: - Climate Resilient Agriculture: Adapting to Changing Weather Patterns at the upcoming Regional Policy Dialogue Series titled ‹Climate Change & Its Impact on Agriculture,' held on May 14, 2025, organized by Sustainability Matters and Solidaridad.

Dr. Sangeeta Lenka served as the chief guest of the International Women's Day function at ICMR-National Institute for Research in Environmental Health, Bhopal, on March 20, 2025.

Dr. M. Vassanda Coumar, as a technical Assessor, assessment of CAB was performed done as per NABL conformity protocol for the Vasanthi Engineers and Consultants Laboratory Services, PVt. Limited, Sangli during February 15-16, 2025.

Dr. M. Vassanda Coumar, as a technical Assessor, assessment of CAB was performed done as per NABL conformity protocol for the Nilawar Laboratories, Pvt.

Limited, Nagpur during February 22-23, 2025.

Dr. M. Vassanda Coumar, as a Member Joint Committee for ensuring compliance to the Hon'ble NGT Southern Zone, Chennai order dated 15.10.2024 in O.A.No. 14/2024 (SZ), participated during field survey and vegetable sampling from various locations in Bangalore during February 27-28, 2025.

Dr. Nisha Sahu was awarded Women Scientist of the Year 2025 by Agricultural Technology Development Society.

Dr. Nisha Sahu was the Editorial Board Member of American Journal of Environmental Science and Engineering (AJESE), International Journal of Agricultural Invention and Agriculture Letters.

Dr. D. K. Yadav acted as the External Examiner for the evaluation of Ph.D. Thesis of a student from Junagadh Agricultural University, Junagadh, Gujarat during June, 2025.

Dr J.K. Thakur delivered a radio talk on the importance of microbes in agriculture at Akashvani on February 17, 2025.

INTERNATIONAL COOPERATION

Dr. D. K. Yadav participated in the EU–India Information and Networking Event and presented their project idea on June 13, 2025. The event was organized by the Ministry of Earth Sciences – National Centre for Coastal Research (NCCR), Chennai.

Scientist's Participation in Conferences/Seminars/Trainings/Meetings/Workshops

Name	Programme attended	Date	Venue/Organizers
Dr. Asha Sahu	Training on Recent Advances in Natural Farming: Opportunities and Challenges (Online)	Jan 06-10, 2025	ICAR -NRIIPM, New Delhi & MANAGE, Hyderabad
Dr. Sangeeta Lenka	Workshop on Strengthening Madhya Pradesh to leverage benefits and opportunities from Carbon Markets	Jan 15, 2025	EPCO and WRI India.
Dr. Shinogi K C	International Conference on Global Research Initiatives for Agriculture, Science and Technology	Jan 20-22, 2025	IGKV Raipur
Dr. Nisha Sahu	Webinar on Hydrological Modelling and Simulation for Watershed Management, Indian Institute of Science, Bangalore	Jan 24, 2025	Centre of Excellence on Watershed Management UAS, Bengaluru, India
Drs. Asha Sahu, Nisha Sahu	Eighth batch of pedagogy development programme on Enhancing pedagogical competencies for agricultural education	Jan 28- Feb 1, 2025	NAAS , New Delhi
Dr. Nisha Sahu	Tenth CSR webinar on LEAD: Learn, Evaluate, Adapt, Deliver; From Lab to Lives: Bridging R&D and CSR for Societal Good	Jan 31, 2025	CSIR- Institute of Microbial Technology
Drs. J. K. Thakur, Asit Mandal	ICOMIN 2025 International Conference on Microplastic, Nanoplastic and Human health (online)	Feb 13, 2025	Colombo, Sri Lanka
Dr. Jitendra Kumar	Golden Jubilee Celebration and Agri-Tech Expo on 50th Foundation Day celebration of ICAR-Central Institute of Agricultural Engineering	Feb 15–16, 2025	ICAR-CIAE, Bhopal
Drs RH Wanjari and Dhiraj Kumar	XXVIII Meeting of ICAR-Regional Committee No. V comprising of States of Punjab, Haryana and Delhi (Online mode)	Feb 18, 2025	ICAR-IASRI, New Delhi
Dr Rahul Mishra	International Agriculture Conference entitled Navigation Unique Trends in Agricultural Research, Innovation, Engineering, Nutrition and Technology	Feb 20-21, 2025	BGGI, Sangrur Punjab IKGPTU and Agri Meet Foundation Bharat in knowledge partnership with ICAR, New Delhi

Dr. Narayan Lal	All India Agro- Industrial Exhibition & Farmer's Fair-2025	Feb 21-24, 2025	RVSKVV Gwalior
Dr. Nisha Sahu	Eighth International Conference: Cutting-edge Research Innovation in Sustainable Education, Environment, and Agriculture	Feb 24-26, 2025	Goa, University
Drs. Asha Sahu, RH Wanjari and Dhiraj Kumar	Online Orientation Workshop on Mission Karamyogi	Feb 27, 2025	DARE/ICAR
Dr. Tapan Adhikari	UKRI GCRF Plastics Event under the International collaborative project entitled Do agricultural micro plastics undermine food security and sustainable development in less economically developed countries?	March 3-6, 2025	Brunel University, London
Dr. J. K. Thakur	First International Farming Systems Conference Transforming Food, Land and Water Systems under Global Climate Change	March 7-9, 2025	IIFSR, Modipuram
Drs. Abhijit Sarkar and Madhumonti Saha	Online workshop on Analysis of Agricultural Statistics and Survey Data	March 10-12, 2025	ICAR-IASRI, New Delhi
Drs RH Wanjari and Dhiraj Kumar	National Seminar on Interventions of Climate Resilient Technologies for Regeneration of Farming Systems	March 11-12, 2025	Dr PDKV, Akola
Dr. Seema Bharatwaj	First international conference on role of digital technologies in innovation entrepreneurships and startup	April 25-26, 2025	MIT, Bhopal
Dr. Seema Bharatwaj	International workshop on advanced research methodologies: quantitative and qualitative approaches in SPSS	May 8-10, 2025	RCHUB International Foundation for Research and Education, Chennai, Tamilnadu, India.
Dr. D. K. Yadav	Hindi Workshop on Advanced Statistical Techniques in Ecological and Environmental Data Analysis in Agriculture	June 24-30, 2025	ICAR-IASRI, New Delhi
Dr. Seema Bharatwaj	Second International electronic conference on horticulture	May 27-29, 2025	Sci forum
All Scientists	Vikasit Krishi Sankalp Abhiyan	June 8-12, 2025	ICAR-IISS, Bhopal
All Scientists	Special Lecture entitled Plastics in our Environment – Role of Citizen Science	June 20, 2025	ICAR-IISS, Bhopal
All Scientists	Interaction meeting with the Honorable Union Minister of Agriculture and Farmer's Welfare	June 22, 2025	ICAR-IISS, Bhopal

Staff News

- Dr. Seema Bharatwaj, Senior Scientist, Division of Soil Chemistry and Fertility promoted to revised research pay level 13A w.e.f.07.01.2021
- Dr. Shinogi K C, Senior Scientist, Division of Soil Chemistry and Fertility promoted to revised research pay level 13A w.e.f. 27.04.2023
- Dr. Bharat Prakash Meena, Senior Scientist, Division of Soil Chemistry and Fertility promoted to revised research pay level 13A w.e.f. 15.09.2023
- Dr. Jitendra Kumar, Senior Scientist, Division of Soil Physics promoted to revised research pay level 13A w.e.f 15.09.2024
- Dr. Sudeshna Bhattacharjya, Senior Scientist, Division of Soil Biology promoted to revised research pay level 12 w.e.f. from 01.01.2024.

- Dr. Mayanglambam Homeshwri Devi, Scientist, AINP SBB promoted to revised research pay level 11 w.e.f. 07.01.2024
- Dr. Immanuel Chongboi Haokip, Scientist, AICRP STCR promoted to revised research pay level 11 w.e.f. 07.01.2024
- Dr. D.K. Yadav, Scientist, Division of Environmental Soil Science promoted to revised research pay level 11 w.e.f. 05.10.2024
- Dr Khushboo Rani, Scientist, Division of Soil Chemistry and Fertility promoted to revised research pay level 11 w.e.f. 05.10.2024
- Dr. Abinash Das, Scientist, Soil Biology Division, ICAR-IISS, Bhopal promoted to revised research pay level 11 w.e.f. 05.10.2024

Institute Publications