

Proceedings of 23rd Annual Convention and National Conference of the Clay Mineral Society of India (CMSI) held at ICAR- IARI, New Delhi 110012

The 23rd Annual Convention and National Conference on Application of Clay and Allied Sciences in Agriculture, Environment and Industry” held at ICAR-IARI, New Delhi during December 22-23, 2021. A brief report of the Convention is presented hereunder.

DAY 1: December 22, 2021

Inaugural Session

The inaugural session was held on 22nd December, 2021 at ICAR-IARI, New Delhi. The programme was started at 11.00 AM with the Invocation song. The Conference was inaugurated by **Dr. S.K.Chaudhari, Deputy Director General (NRM), ICAR**. The guest of honor was Dr. S.K.Ghosh, Former Head, Division of Soil Science and Agricultural Chemistry, ICAR-IARI, New Delhi. The programme was presided by Dr. S.C Datta, President CMSI and Chairman of the Organizing Committee. Several awards of CMSI were conferred in the inaugural session when citations were delivered by Dr. S.K Mahapatra, Secretary CMSI and Organizing Secretary. The Honorary Memberships for the year 2020 were conferred to Dr. Saroj Kumar Sanyal, Former Vice Chancellor, BCKV, Mohanpur, West Bengal and Dr. Siddhartha S Mukhopadhyay, Former Director, Electron Microscopy & Nanoscience Laboratory, Punjab Agricultural University, Ludhiana. The Fellows of CMSI for the year 2020 were conferred to Dr. P.Raja, Principal Scientist, ICAR-IISWC Research Centre, Theetu Kal, Tamil Nadu and Dr. Samar Kumar Gangopadhyay, Former Principal Scientist & Head, ICAR-NBSS& LUP, Regional Centre Kolkata. A book entitled “Clay and other Minerals in the Formation, Management and Ecosystem Services of Indian Tropical Soils” authored by Dr. D.K. Pal, Former President, CMSI, was released by the Chief Guest. Dr. Pal presented the overview of the book. After this Dr. S.K.Chaudhari delivered the inaugural address wherein he highlighted the importance of research in Clay Sciences. The session ended with the formal vote of thanks by Dr. S.K. Mahapatra, Secretary, CMSI.

Special Lecture

After the inaugural session, a special lecture was delivered by Dr. S. K. Sanyal, Former VC, BCKV, Mohanpur, on the topic “Arsenic contamination of groundwater in parts of West Bengal (India): build-up in soil-crop systems and mitigation”.

Best Ph.D. Thesis Presentation Award Contest

Three candidates participated in the contest. They were Dr. K. Velmourougane, ICAR-CICR, Nagpur; Dr. Priya Gurav, ICAR-ISSS, Bhopal and Dr. Seema from BHU, Varanasi. On the basis of their presentations and evaluation by the Judging Committee, Dr. Priya Gurav was selected for best PhD thesis presentation award of CMSI. The award carries a certificate and cash price of Rupees five thousand (Rs.5000/-).

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Annual General Body Meeting

The 23rd Annual General Body Meeting of the Society (CMSI) was held on 22nd December, 2021 at 5.00 PM. Dr. S.C. Datta, President, CMSI, chaired the meeting. The business of the meeting as per the listed agenda was transacted. The proceedings of the 22nd AGM held on September 23, 2019 at ICAR-IARI, New Delhi were considered and confirmed by the house. The Annual Report for the year 2019-2020 and 2020-2021 of the Society was presented by Dr. S.K. Mahapatra, Secretary, CMSI. He mentioned that during the year 2019-2020, the 22nd Annual Convention cum National Conference was held at ICAR-IARI, New Delhi during September 23-24, 2019, wherein 6th Professor S.K. Mukherjee CMSI Foundation Lecture, Special Symposium and four Technical Sessions were organized. Both the issues of Clay Research 2019 (Vol.38, 1&2) were published. During the year 2020-21, Annual Convention and AGM could not be held due to Covid Pandemic situation prevailing in the country. However, several EC meetings were held on virtual platform. The 7th Professor S.K. Mukherjee CMSI Foundation Lecture was organized on May 16th, 2021 in virtual mode. The lecture was delivered by

Dr. Reiner Dohrmann, President AIPEA, on the topic “From ion exchange to XRD Rietveld refinement of clay minerals in sediments, soils and radwaste application-challenges for method development”. One special lecture was also organized from the industry side on January 31, 2021, in virtual mode. It was delivered by Padmashri Dr Swapan Guha, Former President, Indian Ceramic Society, on the topic “Use of clays in ceramics: issues and challenges”. Both the issues of Clay Research 2020 (Vol.39, 1&2) as well first issue of 2021(Vol.40, No 1) were published during the year. Secretary, Dr. Mahapatra also mentioned that the documents for revised NAAS rating of the CLAY RESEARCH journal was submitted to NAAS with the sincere efforts of Dr. S. S. Mukhopadhyay, Chief Editor and Dr. Nayan Ahmed, Vice President. The Secretary was pleased to announce that the NAAS rating of the journal was restored with a higher score of 4.37, w.e.f. 1st January, 2021. The house appreciated it. Secretary then requested all the members to intimate their colleagues, friends, students and other researchers to submit research articles for publication in CLAY RESEARCH. After this, the audited statement of account for the years ending 31st March, 2020 and 31st March

2021, were presented by the Treasurer, Mrs. Ritu Nagdev.. After this, the agenda for election of Executive Council (EC) for years 2022 and 2023 was taken up. Dr.

Mahapatra informed that in response to the announcement for new EC, only two nominations viz. Dr. Priya Gurav, Scientist, ICAR-ISSS Bhopal for Councilor of West Zone and Dr. Dibendu Chatterjee, Scientist, ICAR-NRRI, Cuttack for Councilor for East Zone, were received by the Society. House accepted their nomination. Then the elections for all the remaining positions were held. The elected EC for the year 2022 and 2023 is mentioned below.

CMSI EXECUTIVE COUNCIL 2022 -2023

President	Dr. Nayan Ahmed
Vice Presidents	Dr. S.K. Mahapatra Dr. P. Chandran
Secretary	Dr. Prasenjit Ray
Joint Secretaries	Dr. Ruma Das Dr. Debarup Das
Treasurer	Mrs. Ritu Nagdev
Chief Editor	Dr. S.S. Mukhopadhyay
Councilors	
East Zone	Dr.S.K.Reza Dr. Dibyendu Chatterjee
North Zone	Dr. Abir Dey Dr. Raj Mukhopadhyay
South Zone	Dr. K.S. Anil Kumar Dr. P.Raja
Central Zone	Dr.(Mrs.) Priya Gurav Mrs. Khushboo Rani
West Zone	Dr. Ranjan Paul Dr. (Mrs.) Swati P Zade

The meeting ended with the vote of thanks by Dr. S.K. Mahapatra, Secretary.

DAY 2: December 23, 2021

Technical Sessions

Two Technical Sessions were organized by the Society.

Technical Sessions I:

The technical session-I was chaired by Dr. S.K. Ray, Principal Scientist and Head, ICAR-NBSSLUP Regional Centre Kolkata.

Out of 15 abstracts submitted for the session, 10 were presented. Out of these 10 presentations, 4 papers were on applications of clay science, including the nutrient delivery, both macro and micro, and remediation of environmental pollution from Arsenic and synthetic dyes; 3 on the effect of clays and clay minerals on various phenomena

like soil carbon stability, mango yield and quality, and soil degradation, 1 on clay mineralogy and weathering of soil, 1 on soil acidity, and 1 on selecting a suitable extractant for soil K.

Dr. Nintu Mandal from Bihar Agricultural University, Sabour presented on Nano-clay polymer composite (NCPC) based formulations of Zn and Mn for increasing their use efficiency in crops. They have prepared and evaluated Zincated NCPC, Chitosan grafted ZNCPC, Starch grafted ZNCPC and observed promising results in enhancing plant available Zn in soil and Zn uptake by rice and wheat, along with apparent recovery. The Mn-NCPC also showed some positive results. Apparently, there were no harmful effect of these polymers on soil microbes. However, such findings have to corroborated further through long-term field experiments. Moreover, the economic aspect has to be looked into for real life agricultural application.

Sarath Kothari from ICAR-IARI synthesized and evaluated novel N fertilizer products involving bentonite, and found that naturally polymerizing oil and nutshell based products along with bentonite clay can be successfully used for coating urea fertilizer to impart slow release characteristics.

Siyaram Meena from ICAR-IARI used Fe or DMSO modified bentonite, kaolinite and red mud for immobilization of As in aqueous system and observed best As sorption with Fe-bentonite, DMSO-bentonite and Fe-red mud. However, focus should be put on the practical feasibility of this approach of immobilizing As and also the disposal of modified clay products after As adsorption.

Dr. Indu Chopra from ICAR-IARI used bentonite for removal of Reactive Black-5 dye from water and found that the dye-adsorbing capabilities of bentonite were less than the commercially available activated C, especially for large sized azo dyes. In future, attempts will be made to modify the bentonite with low-cost inputs in order to increase its dye-adsorbing capabilities without introducing much of expenses.

Dr. Abinash Das from ICAR-IISS Bhopal demonstrated the effect of pedogenic clays on soil organic C stability. He found that smectite, vermiculite and smectite/vermiculite interstratified minerals helped in the accumulation of higher labile C fractions; whereas, illite and kaolin promoted lower labile C fractions. Also, smectite tends to decrease SOC mineralization, while kaolin dominance leads to high SOC mineralization.

Dr. R. Srinivasan from NBSSLUP Hebbal worked on the influence of clay distribution and slope position on mango colour and yield and observed good colouration of mango at 3–8% slope due to highest exposure to sunlight at this slope. Best marketable mango

was obtained from moderately deep to deep and sandy clay loam textured soil with upland situation.

Dr. Ranjan Paul from NBSSLUP Nagpur worked on some cotton growing soils from Maharashtra and demonstrated a cause-effect relation of palygorskite induced natural soil degradation in terms of drainage both in sodic and non-sodic Vertisols. However, in-depth studies are required before assigning the drainage problem entirely to the presence of palygorskite.

Dr. P.S. Vishnu from Kerala Forest Research Institute studied the clay mineralogy and weathering of soils in forest ecosystems of western ghats of Kerala, and found younger soils with less weathering in the natural forest systems, whereas managed plantations led to accelerated weathering.

Dr. Chandrakala M. from NBSSLUP Hebbal worked on forms and distribution of soil acidity in surface and subsurface under different landform and land use in tropical humid region of India. She concluded crop growth can be severely restricted when Al occupies more than 50% of the exchange complex. However, the suggestion of ameliorating sub-soil acidity by gypsum needs further in-depth study.

Subhadip Paul from ICAR-IARI compared different cations and anions for exhaustive K release from soils and found 0.1 N BaCl₂ to be the most effective under successive leaching conditions. He was suggested to look into the changes in mineralogy of fine, medium and coarse clay fractions along with silt before and after leaching experiment for a better understanding of the involvement of different minerals in K release under exhaustive conditions.

The session ended with remarks and vote of thanks from the chairman.

Technical Sessions II:

The Technical Session-II was chaired by Dr. Nayan Ahmed, Principal Scientist, Division of Soil Science and Agricultural Chemistry, ICAR-IARI, New Delhi. The rapporteur of the session was Dr. Prasenjit Ray, Scientist, ICAR-IARI, New Delhi.

In the Technical Session-II, 10 deliberations were made in form of oral presentation. The broad themes of the presentations were conservation agriculture, adsorption behaviour of zinc (Zn) on clay, soil acidity, soil quality, phosphorus (P) dynamics in soil, and characterization of carbonaceous vermicompost and engineered biochar for applicability in agriculture.

The presentations involving conservation agriculture highlighted the effects of management practices (e.g., tillage, residue and nutrient management) on soil properties and crop productivity, temperature sensitivity of soil organic carbon and adsorption behaviour of soil P. Soil properties in different cropping systems as affected by the management practices under conservation agriculture was highlighted by Dr. Dhinu Yadav from CCS HAU, Hisar. Results indicated that the long-term zero-tillage practice in mung bean-wheat cropping system resulted relatively higher soil nitrogen, organic carbon and microbial biomass content with higher dehydrogenase, cellulase and urease activities at 0-15 cm soil depth in comparison to conventional tillage practice. Mr. A.K. Dash from ICAR-IARI, New Delhi in his presentation highlighted the temperature sensitivity of soil organic carbon as affected by crop residue and nutrient management practices under conservation agriculture. He found that retention of crop residue at the rate of 2 to 4 t ha⁻¹ had significant positive effect on cumulative C mineralization (Ct) in bulk soil, and macro- and micro-aggregates, whereas different K fertilizer rates did not register any significant effect. Ms. Chinmayee Behera from ICAR-IARI, New Delhi reported significant reduction in P adsorption capacity in triple zero tillage with residue retention plot under conservation agriculture as compared to conventional tillage plot.

Mr. Kapil Chobhe from ICAR-IARI, New Delhi presented on the adsorption behaviour of Zn on bentonite clay. Batch experiments were carried out to assess the feasibility of using bentonite clay for the removal of Zn metal from aqueous solutions. It was reported that maximum adsorption (up to 80%) of the Zn²⁺ ion could be achieved at pH 9 with the equilibrium time of 20 minutes.

Dr. Prasenjit Ray from ICAR-IARI, New Delhi in his presentation highlighted that the apparent clay CEC is an important indicator of acidity of soils occurring in a catenary sequence under hilly terrain of the Northwestern Himalayan region. High magnitude of total potential acidity in the studied soils was attributed to the presence of high activity clay minerals in these soils as revealed from the apparent clay CEC (>24 cmol(+)kg⁻¹ clay).

Dr. Sunanada Biswas from ICAR-IARI, New Delhi assessed soil quality under 22 years (1998-2020) old long-term experiment with rice-mustard-sesame cropping system in Inceptisol of lower IGP and reported that the highest soil quality index was obtained with the 50% recommended doses of NPK fertilizer along with FYM@ 7.5 t ha⁻¹ (NPKF), as well as with FB (FYM@ 11.25 t ha⁻¹ + biofertilizer@ 10 kg ha⁻¹) treatments. She added that in view of limited availability of organics and yield sustainability, NPKF treatment may be recommended for rice-mustard-sesame cropping system in Inceptisol of lower IGP.

Mr. Avijit Ghosh from ICAR-IARI, New Delhi in his presentation highlighted the usefulness of rice straw (RS) and P solubilizing microbes (PSMs) in mobilizing inorganic soil P under varying hydrothermal regimes. It was reported that RS application at 12 and 14 Mg ha⁻¹ under sufficient and limited moisture availability, respectively, along with PSMs could enhance P availability in soil under incubation study.

Dr. Dibyendu Chatterjee from ICAR-NRRI, Cuttack prepared vermicompost from non-conventional plant and animal sources (e.g., poultry litter, paddy straw, azolla) and assessed the feasibility of using the compost for enhancing the yield and quality of bell pepper. It was reported that application of vermicompost improved the morphological, biochemical and yield attributes, which in turn translated into higher yield and improved quality of the bell pepper. In addition to the yield and quality of the product, application of vermicompost improved soil health as well.

Ms. Saptaparnee Dey from ICAR-IARI, New Delhi delivered a presentation related to the effect of engineered biochar on nutrient retention in Inceptisol. She emphasized that engineered biochar could enhance CEC and AEC simultaneously for higher nutrient retention. She and her group prepared engineered biochars by treating the washed rice straw biochar (RBCW) separately with different oxidising and reducing agents to augment CEC and AEC, respectively and with their combined treatments to further reinforce CEC and AEC. It was reported that the engineered biochars reduced the leaching of NH₄⁺-N, NO₃⁻-N, P and K from soil in a laboratory leaching experiment.

Apart from the above research paper presentations, a review paper on oil pollution and soil health was also presented by Mr. Sayan Mukherjee from West Bengal. It was highlighted that bioremediation and phytoremediation could be the possible remediation measures for curbing the adverse effect of oil pollution on soil health.

The session ended with the remarks and vote of thanks by the chairman.

The Plenary session was chaired by Dr. S.C. Datta, President CMSI with the panelists, Dr. D.K. Pal, Dr. Nayan Ahmed and Dr. S.K. Mahapatra, wherein the rapporteurs from the technical sessions presented the reports and the same were deliberated..

The Conference was ended with the formal vote of thanks by Dr. S.K. Mahapatra, Organising Secretary.



S.K. MAHAPATRA