



Carbon Management and Sequestration Center

Issue 3 | 2016



The "Fall Season" at C-MASC characterized by the crop harvest, changes in leaf color ranging from yellow to bright red, the Halloween and ghostly appearances within offices and communities, and of course the "football fever" with all hopes of glories based on the strength of arms and legs of the beloved "Buckeyes."

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Dr. Maria Lucia Cavalli Neder, Rector of Universidade Federal de Mato Grosso (UFMT), and her team visited the Ohio State University in September. She met with President Michael Drake (right) and OSU affiliates to discuss collaboration between the universities. (Continued on page 2)...

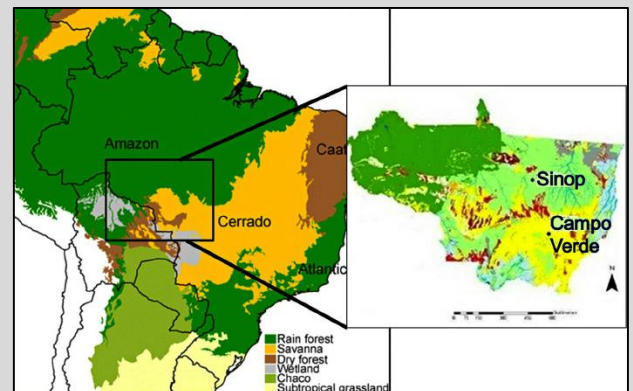


Dr. Maria Lucia Cavalli Neder and UFMT Team with President Drake
6th September 2016

President Drake hosted lunch for Dr. Maria Lucia Neder, Rector, Federal University of Mato Grosso, Brazil. Rector Neder; accompanied by the Head of International Relations Office (Prof. Dr. Paulo Teixeira de Sousa, Jr) and two faculty members (Dr. Rogerio de Andrade Coimbra, and Dr. Daniel Abreu); visited OSU from 4-9 September 2016. The goal of their visit was to establish cooperation between UFMT and OSU especially in student and faculty exchange, distant learning, and research on themes of mutual interest. The later include soil carbon sequestration, sustainable intensification, climate-smart agriculture, biofuels, wetlands, etc. The visit was jointly sponsored by C-MASC and the Ohio International Intern Program of IPA managed by Assistant Director, Mike Chrisman.

UFMT, located in the Brazilian state of Mato Grosso (map right), has an enrollment of 21,000 students, 56 graduate programs and 101 undergraduate courses. It was founded in 1970 and has campus in 5 cities (Cuiaba, Rondonopolis, Barra do Garças and Araguaia Pontal, and Sinop). Find more information [here](#).

Photographed above (bottom left to top right): Dr. Maria Lucia Neder, President Dr. Michael Drake, Dr. Paulo Teixeira de Sousa, Jr, Dr. Rattan Lal, Dr. Gifty Ako-Adounvo, Dr. Daniel Abreu, Dr. Casey Hoy, Mr. Rodrigo da Silva Viana Goncalves, Dr. Rogerio de Andrade Coimbra, Mike Chrisman.





UFMT Seminar and CFAES/SENR Reception Columbus, Ohio

Rector Neder presented a seminar at C-MASC on 6th September 2016, with the focus on education and research programs of UFMT. The seminar was jointly sponsored by C-MASC and the Ohio International Intern Program, and was attended by faculty, staff, students and administration from across the campus. The seminar was chaired by Dr. Lonnie King, Interim Vice President of Agricultural Administration and the Dean of the College of Food, Agriculture and Environmental Sciences.

Photographed above (left to right): Dr. Rogerio Coimbra, Dr. Jerry Bigham, Dr. Lonnie King, Rector Neder, Dr. Rattan Lal, Dr. Paulo de Sousa, Jr., and Dr. Daniel Abreu.

Photographed (below left): Dr. King gives opening remarks for the seminar; (below center) Drs. Neder and de Sousa presenting a seminar at C-MASC on 6th September; (below right) Drs. Lal and King and Dr. Jeff Sharp, Director of SENR, present Dr. Neder with a Certificate of Recognition





Initiative for the Adaptation of African Agriculture to Climate Change ("AAA")

Marrakech, Morocco
29-30 September 2016

The High-Level Meeting on the Initiative for the Adaptation of African Agriculture to Climate Change ("AAA") was held in Marrakech, Morocco from 29-30 September 2016. The meeting was attended by all the major stakeholders in agricultural development and climate change. The meeting was chaired by Hon'ble Aziz Akhannouch, the Minister of Agriculture and Fisheries of the Kingdom of Morocco, and attended by about 30 ministers of agriculture from across the continent of Africa. The objective of AAA is the development of sustainable, resilient and viable agricultural production systems that contribute directly to food security and improved livelihoods by improving the productive and adaptive capacity of farming communities in Africa. Prof. Rattan Lal is a member of the High Level Advisory Panel to the AAA initiative. Other members of the Advisory Panel consist of those representing international agricultural organizations (i.e., IFDC, CIMMYT, CIAT, IWMI, EC, FAO, ICRISAT), academic institutions, national programs and industry (OCP) stakeholders.

Find more information on this conference and the AAA Initiative [here](#).

Photographed above: Seated at the podium for the opening session (from left) are: Rattan Lal (3rd), René Castro Salazar, FAO (4th), Ethel Sennhauser, World Bank (6th).

Photographed right: Dr. Lal gives a presentation in the opening session entitled, "Adaptation of African Agriculture to Climate Change," on 29th September 2016 in Marrakesh Morocco.





C-MASC Visitors



Jackson Sianje Abduli & Emmanuel Odama

Young African Leadership Initiative visited C-MASC on 18th July 2016

Jackson Sianje is a 2016 Mandela Washington Fellow of the Young African Leadership Initiative, a flagship program of President Obama. He has rallied farming communities in helping improve crop productivity, enhance local markets and sustainable farming systems while working with both private and public sectors. He has worked in both National and County governments for a decade in various capacities from being a field extension agent and coordinator of extension services to being part of policy formulators in the county. He currently works as an agronomist with OCP-Africa, a fertilizer company and an affiliate of OCP Group of companies based in Casablanca Morocco.

Emmanuel Odama is an agricultural soil scientist by training, and currently works for the National Agricultural Research Organization (NARO) of Uganda. Serving currently as a research officer at Abi Zonal Agricultural Research and Development Institute under NARO, Emmanuel has over seven years of experience in agricultural research, development and administration. Part of his work involves training farmers and extension workers on soil and water conservation, crop agronomy and post-harvest handling, as well as heading the institute's natural resource management program. Emmanuel holds a master's degree in soil science from Makerere University, Kampala. Upon completion of the Mandela Washington Fellowship, he plans to promote sustainable and climate-smart agricultural production in his community, with a focus on smallscale farmers who derive their livelihood solely from agriculture.

Abduli and Odama would like to link up with the Carbon Management and Sequestration Center for collaboration in carbon studies in Kenya and among small-holder farmers. They are particularly keen to help introduce and/or implement the carbon credit facilities and climate-smart technologies to the farmers.

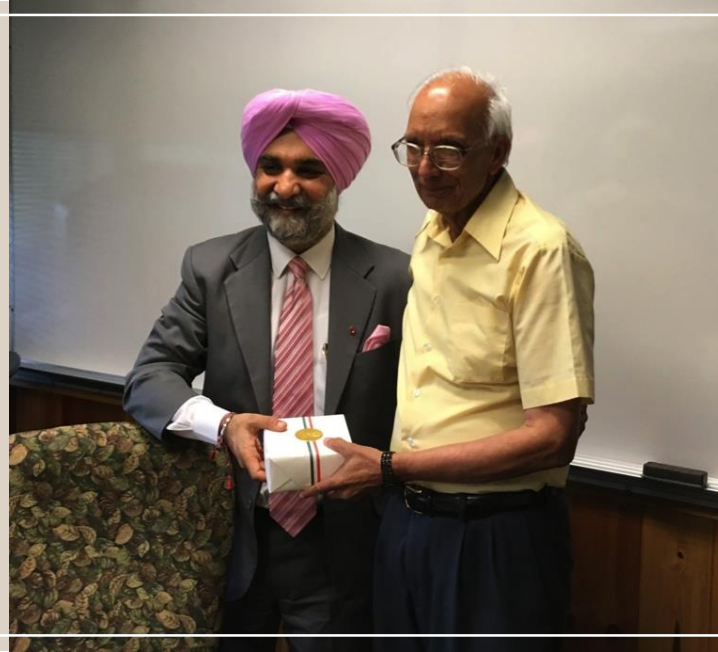


C-MASC Visitors

Taranjit Singh Sandhu

Deputy Chief Mission of the Embassy of India
Embassy of India Washington DC

Deputy Chief Mission of the Embassy of India, Mr. Taranjit Singh Sandhu, visited C-MASC on 19th August. He was in Columbus at the occasion of the celebration of India's Independence Day (15th August). Mr. Sandhu's parents were alumni of OSU. His father (Mr. Bishan Singh Samundri) graduated from OSU in Agriculture Education, and his mother obtained her degree in Home Economics. Prof. Samundri taught agriculture extension at the Punjab Agriculture University (PAU), Ludhiana, and later became Vice Chancellor (President) of the Guru Nanak University, Amritsar, India.

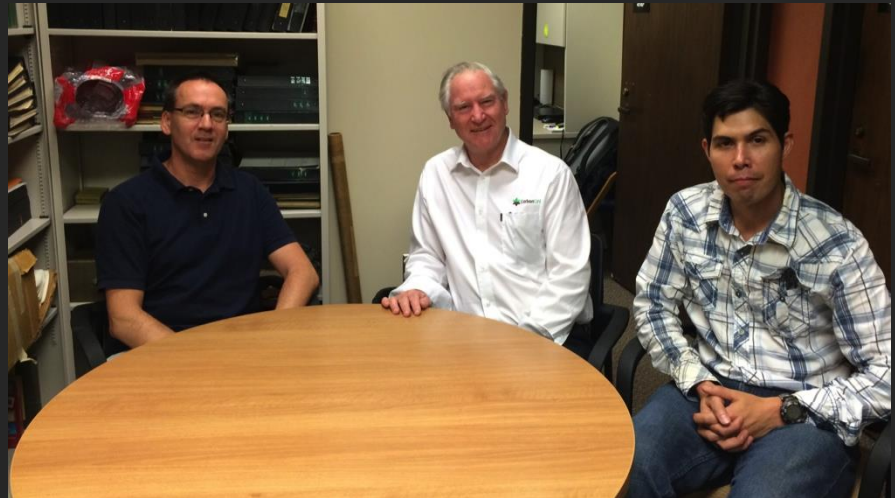


Dr. Terry McCosker

CarbonLink
Queensland Australia

Dr. Terry MoCosker, Executive Chairman of CarbonLink, an Australian agricultural extension, visited C-MASC on 18th August. CarbonLink enables farmers to put carbon on their bottom line and improve sustainability. They provide advice and service to help farmers achieve this goal, and has also developed systems that provide a process for landholders to enter the carbon market.

Photographed (right): Dr. Klaus Lorenz, Dr. Terry McCosker, and Dr. Jose Guzman .



On October 3rd, Dr. Klaus Lorenz presented a seminar at the Università di Pisa, Department of Agriculture, Food and Agro-environmental entitled, "Soil carbon sequestration for food security and climate." See the announcement [here](#).



UNIVERSITÀ DI PISA



Visiting Scholars: New

Dr. Qingbiao Wu

Department of Ecology
Forestry College of Guangxi University
Nanning, Guangxi Province, China



Dr. Wu, Associate Professor, scientist in ecology, have joined the C-MASC on Aug. 16, 2016 to work on "Can the complex practices of drained and CA regulate the SOC storage in low-lying cropland in central OHIO?" He finished his MSc from Guangxi University in 2003, and PhD from Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences (CAS) in 2007.

He conducted research on forest carbon sequestration and their attendant nutrient cycling. It was supported by National Natural Science Foundation of China. His current scientific project is: forest soil carbon stability and saturation in subtropical region; The effect of forest wild fire and controlled fire on the stability of forest SOC. He sincerely appreciates the Guangxi University and C-MASC, OSU to provide him the opportunity as a visiting scholar in here.



Dr. Ram Swaroop Meena

Department of Agronomy
Institute of Agricultural Sciences
BHU, Varanasi (UP)- 221 005, India



Dr. Ram Swaroop Meena, Assistant Professor has joined the C-MASC on 01st July, 2016 to work on legume based corn-soybean rotation. He has awarded for Raman Fellowship from ministry of MHRD, Government of India through University Grants Commission to complete his Post doctoral research in USA at renowned research lab on C-MASC. Dr. Meena was born in farmer family at VOP. Harsana, Teh. Laxmangarh, Dist. Alwar, Rajasthan, India. He had his schooling in the same Village and graduated in Agriculture from Sri Karan Narendra Agriculture University, Jobner, Jaipur, (Rajasthan). Dr. Meena got his master and doctorate degree in Agronomy from Swami Keshwanand Rajasthan Agricultural University, Bikaner (Rajasthan) and securing first division in all classes. He has awarded NET (three times), SRF from Indian Council of Agricultural Research & RGNF from University Grants Commission.



His research work on oilseeds and pulses to increase the natural resources use efficiency, nutrient management, soil sustainability under current climatic era. Dr. Meena has supervised 10 PG and 4 Ph.D. students under supervision including one co-supervisory. He is teaching in UG/PG/Ph.D. classes. He has published more than 50 research and review papers in national and international pre-reviewed reputed journals. Dr. Meena has contributed as author in the Hand Book of Organic farming and co-editor in the book KSB role in soil sustainability publish with Springer and author of ten another book chapters. Dr. Meena is a member of three reputed societies and he has attended several national and international seminar, conferences, workshop etc. Dr. Meena has contributed in agricultural extension activates on farmers level as associate coordinator in trainings, Meetings, workshops and farmers fair.



C-MASC Graduate Students: Returning and New

Chloe Turner

My name is Chloe Turner and I am a beginning my first semester at The Ohio State University. I completed my undergraduate degree at Western Kentucky University in May 2016. I have a B.S. in Geography and Environmental Studies. The focus of my coursework surrounded global climate change and sustainability, as well as, a certification in Geographic Information Systems. During my time as an undergraduate I had the opportunity to travel and study in Iceland for a few weeks, so as a M.S. student I hope to have the chance to travel and research different environments globally.

My research interests include carbon sequestration and mitigation, urban soils, global climate change, biochar, and various urban agriculture techniques. I previously worked at the USDA-ARS in Bowling Green, Kentucky and assisted on research on soil columns; this research looked at bacterial transport throughout the column following various intensity of rain events. Currently, I am working on developing my thesis topic under Dr. Lal and learning as much as I can about soils and their overall connection to climate change.



Steven Doyle

I am a first year graduate student at Ohio State's Environment and Natural Resources program pursuing a Master's of Science in Soil Science. My undergraduate studies were done at the University of Cincinnati, where I dual majored in Biology and Environmental Studies. During this time, I performed research on nutrient cycling in green roof plant species and had the opportunity to spend time in rural India. Both of these experiences shaped my interest in studying soil fertility in the developing world. My primary areas of interest include soil fertility management in tropical regions, agroecology, intercropping and cover crops, and aligning scientific research with subsistence farmers' needs. My Thesis is currently undecided, but I am in the process of designing the study.

Chris Eidson

I am a second year PhD Student from Bucyrus, OH. I completed my MS degree here at Ohio State (also with CMASC) in 2015 while working on a project studying the effects of cereal rye cover crop on soil quality and corn and soybean yields. This study utilized data from several sites across the U.S. Corn Belt. My current research is on the potential of Ohio crop residues to support cellulosic ethanol production. I am using a modeling approach to determine the amount of corn stover and wheat stubble that can be sustainably harvested while maintaining or enhancing soil carbon. The effects of different conservation management practices (cover cropping, no tillage, etc.) are being considered for various soil types on a gradient of residue harvest scenarios. I plan to conduct life cycle analysis of the GHG emissions associated with the various scenarios and management strategies to see which result in decreases of total emissions relative to 2005 gasoline fuel equivalence.





C-MASC Graduate Students: Returning and New

Nall Moonilall

My name is Nall Inshan Moonilall and I am a second year Ph.D. student in the Environmental Science Graduate Program (ESGP) pursuing an Environmental Science degree here at OSU. I am originally from Miami, Florida. I graduated my B.S in Environmental Studies with focus in Agroecology from Florida International University, in Miami, Florida, in 2013. I obtained my M.Sc in Environmental Science from Ohio State in August of 2015. My thesis research focused on looking at the impact of various amendments on soil properties and agronomic productivity in Guyana, South America. For my Ph.D. dissertation research, I am building upon this research and continuing the study I have going on in Guyana. Currently, I am serving as a graduate research associate for The School of Environment and Natural Resources and the Carbon Management and Sequestration Center. I am looking forward to expanding my knowledge in the soil science field and about soil carbon sequestration.



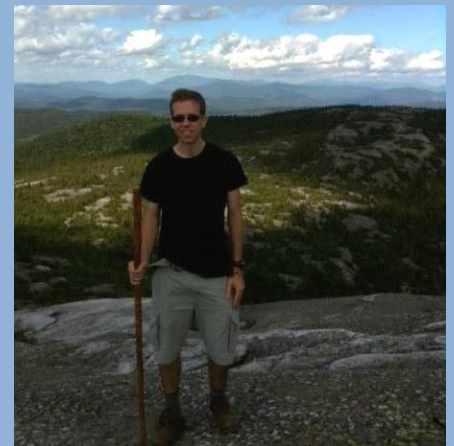
Ellen Maas

Ellen is a second year M.Sc student, who is working on her thesis topic of modeling soil organic carbon in corn-based systems in Ohio. She is from St. Louis, MO where she previously worked as a computer programmer.



Henry Peller

Under a Borlaug Fellowship, Henry has been completing his masters work in Southern Belize, where he works on soil management and land use issues in Mayan territories. He was raised on a small farm in Appalachian Ohio. As an undergraduate, he was trained in agronomy and in political economy, and studied these topics in both Haiti and Cuba. Henry plans to graduate with a M.Sc in the summer of 2017.



Eric Stein

Eric is pursuing a Masters in Environment and Natural Resources (MENR) at OSU. He did research at the Sokoine University of Agriculture (SUA), Tanzania, and is preparing his thesis on carbon sinks of Mount Kilimanjaro. He plans to graduate at the end of this semester.



C-MASC Graduate Students in Southeast Asia

International Rice Research Institute (IRRI) Los Baños, Philippines

Nall Moonilall

This past summer, I had the great opportunity to travel to the International Rice Research Institute (IRRI) in Los Baños, Philippines to participate in the Rice: Research to Production short course from August 8 to August 27. This program was through Cornell University and was funded through a National Science Foundation (NSF) grant. I was one of 12 graduate students selected from various schools throughout the United States.

During the short course, we learned about all the steps involved in rice production and literally got our feet wet in the rice paddy fields. We also learned about current, innovative research that is occurring within all of the production steps in rice production. We toured various labs at IRRI and saw first hand the type of research that is being done by the different lab groups. Furthermore, we visited the IRRI genebank and learned about rice breeding and development. We visited rice fields in different villages and got hands-on training on rice cultivation. Lastly, we had the opportunity to talk and interact with local rice farmers from surrounding villages.

Participation in this course has definitely been a life changing experience. I feel that I got a lot of it and broadened my knowledge about agriculture, especially that of rice production. I definitely see myself using some of the knowledge I obtained from this training in my own research that I am doing for my PhD. It was a great experience to interact with scholars from around the world and gain ideas and perspectives from those students, researchers, and scientists from other countries.



Trailblazer Cambodia Organization Central Cambodia & IRRI, Los Baños, Philippines

Steven Doyle

In December, 2015, I spent several months in Southeast Asia gaining agricultural experience. From February through June, 2016, I was volunteering in central Cambodia with a community-based NGO called Trailblazer Cambodia Organization. My work was primarily focused on designing beneficial agricultural programs for local farmers. This included diversifying diets through sustainable fishing techniques, growing mushrooms for extra protein and income, and designing training farms for local schools. I also worked to facilitate communication between international groups and the communities we served. During August, 2016, I participated in a training course on rice research and production at the International Rice Research Institute in the Philippines. This was a wide-ranging, intensive course that delved into such topics as rice physiology, growing techniques, and genomic research. Both experiences have greatly expanded my understanding of agriculture in the areas I wish to pursue. As I begin my research I will value the opportunities I have taken to learn more about our world's agriculture and look forward to new opportunities to do so.





Annual Farm Science Review

The Annual Farm Science Review at the Molly Caren Agriculture Center (London, Ohio) attracts ~140,000 visitors with its 80-acre exhibits of the latest technology in agricultural production.

Above: Visiting Scholars, Drs. Wu and Meena, and Grad student, Nall Moonilall, are photographed in front of a soybean combine.

Right: Nall behind the wheel of a corn combine.

Below left: Dr. Jose Guzman, Dr. Wu and Dr. Meena

Below center: Dr. Wu at a tile drainage exhibit

Below right: Dr. Meena in front of corn combine.





C-MASC Alumni and Awards

Dr. O.P. Aishwath

Senior Scientists
National Research Centre
Rajasthan, India

Dr. Aishwath was a Visiting Scholar at C-MASC in 2010, and we congratulate him on a very successful year!

Awards:

- **Distinguished Scientist Award:** in the field of Soil Science on the occasion of National Conference on Global Research Initiatives for Sustainable Agriculture and Allied Sciences held during 12-13 December, 2015 at RVSKVV, Gwalior, M.P. (in absentia) by the SSDAT, Meerut.
- **Leadership Award:** conferred by **Soil Conservation Society of India** for leading work on 'edaphic stresses, phyto-mobilization of nutrients and their re-transaction rate' during 25th National Conference on Natural Resource management in arid and semi-arid ecosystem for climate resilient agriculture and rural development. Held on 17-19 February 2016 at SKRU, Bikaner, Rajasthan.
- **Best Poster Award:** for the research paper entitled "Isolation of Zinc Solubilizers from Coriander Rhizosphere and their Efficacy" Presented in National Seminar on "New Dimensional Approaches for Enhancement of Seed Spices Productivity and Profitability under Era of Climate Change" held during 02-03 February, 2016 at ICAR-National Research Centre on Seed Spices, Ajmer Rajasthan

Recognitions

- **Elected as Joint Secretary** of Indian Society Seed Spices (during, 2015); **Editor** for '**Annals of Plant and Soil Research**' (APSR), recognized and appointed by the GKV Society, Agra (2015); **Editor-in Chief:** Global Journal of Biology Agriculture & Health Science (Since 2012); **Co-Chairman:** Co-Chair the Session "Remote Sensing and GIS, Hydrological and Crop Modelling for Decision Support System in Natural Resource Management" on 19th February 2016 during 25th National Conference on Natural Resource management in arid and semi-arid ecosystem for climate resilient agriculture and rural development. Held on 17-19 February 2016 at SKRU, Bikaner, Rajasthan; **Letter of Commendation** from Bioinfo Publications: For the valued reviewer of its various journals and their articles which led to quality and success of Journals of Bioinfo Publications (May-2015); and **Expert of Agricultural Sciences in RPSC:** Rajasthan Public Service Commission (RPSC) invited as an expert during January and February-2016 for various confidential activities of the commission to recruit the officers in Agricultural and Plant Sciences.



Others

- **Winter School proposal ranked 1st for competitive grant by Agri. Edu. Division-ICAR:** Based on various evaluation criteria, winter School Proposal entitled on "Utilization of Degraded Land and Soil through Horticultural Crops for improving Agricultural Productivity and Environment Quality" attained first position among the proposals invited by Agricultural Education Division-ICAR (through SMD Horticultural Sciences) and accordingly awarded the grant and organized it most successfully as **Course Director** during 3rd to 23rd December-2015.
- **Extramural Project Proposals Ranked in top five:** An extramural project proposal was formulated for the competitive grant on "Harnessing P mobilizing capacity of *Foeniculum vulgare*: An innovative and eco-friendly approach for P acquisition by plant in degraded soil ecosystem" was attained the position in top five among the 120 proposals evaluated under SMD HS and approved & sanctioned accordingly (during October-2015). Now the project is implemented.
- **Invited as a lead speaker** on '**Spices Medicinal and Aromatic Plants: A remedy for Degraded land and soil Health Too**' during 3rd International IUPAC Conference held on 6-9 April-2016 at New Delhi

Recent Publication with Prof. R Lal

Aishwath, O.P. and Lal, R. (2016): Resilience of spices, medicinal and aromatic plants with climate change induced abiotic stresses. *Annals of Soil and Plant Research*, 18(2): 91-109.



C-MASC Alumni and Awards

Dr. Ahmad Nawaz

University of Agriculture
Faisalabad, Punjab, Pakistan

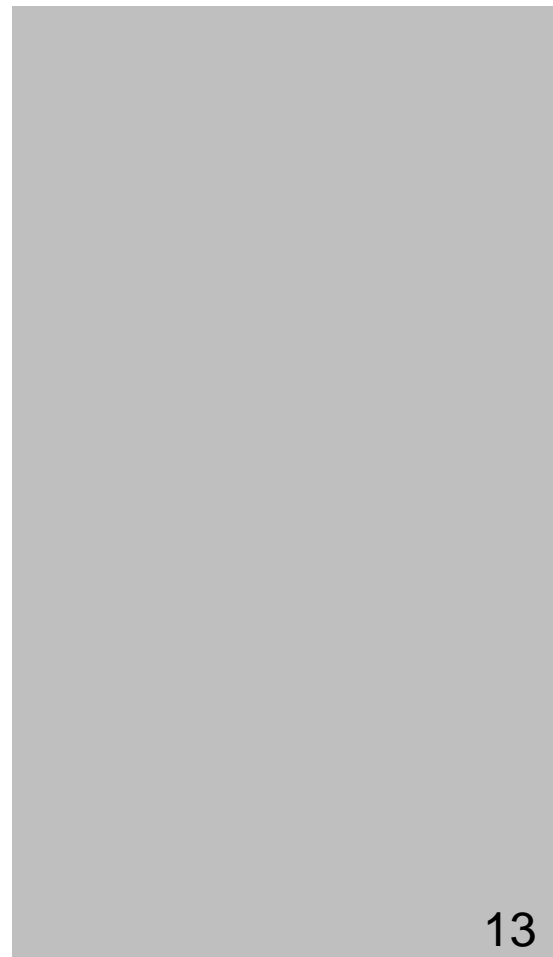


I am Ahmad Nawaz, S/O Muhammad Nawaz. I was born on September 05, 1987 in a small village of Tamman, Tehsil Talagang, District Chakwal, Punjab, Pakistan. My family has a rural background, and my father is a farmer whom I always found cultivating the fields with tractors since my birth. I got admission in the University of Agriculture, Faisalabad, Pakistan, and got B.Sc. (Hons.) degree in Agronomy in 2010, and M.Sc. (Hons.) Agronomy in 2012. Then I got admission in PhD Agronomy in 2012 and start working hard under the kind supervision of Dr. Muhammad Farooq (associate professor, department of agronomy, university of agriculture, Faisalabad). In 2013, I was awarded the Indigenous PhD fellowship by Higher Education Commission of Pakistan. In 2015, I was awarded the International Research Support Initiative Program (IRSIP) Fellowship by Higher Education Commission of Pakistan, and I spent 6 months in the carbon management and sequestration centre, Ohio State University, Columbus, USA, under the kind supervision of Prof. Dr. Rattan Lal. I was the first PhD in my entire family and the whole village (Dhoke Munian). When I got PhD notification on 29-06-2016, it was a moment of great pride for me and my family.

I feel proud to mention here that I have not only completed my PhD degree in Agronomy in 07 semester, but also have earned an impact factor of 37 by publishing articles in Journals of International repute. This the best profile of the any PhD Scholar produced from University of Agriculture, Faisalabad in short time with such high scientific contributions since the creation of this institute in 1906. I have published/submitted 5 papers from my PhD research work as given below. Two of my PhD papers have been published in Land Degradation and development which has an impact factor of 8.14.

Besides these papers from my PhD work, I have also published 09 research papers and two review articles in peer reviewed impact factor journals of international repute. I have also published 4 book chapters (published by springer), 04 conference papers and 17 abstracts in various national and international conferences. I have also presented my PhD work in three national and three international conference. Two of these international conferences were held in India and one in Bangladesh. To attend Bangladesh Conference, I was sponsored by Food and Agriculture Organization.

My basic field of expertise is to quantify the impact of conventional and conservation rice-wheat cropping systems on weed dynamics, soil health, system productivity and greenhouse gas emission. I am also well versed in cropping systems, abiotic stresses and the study on allelopathic interactions. I dedicate my all achievement during PhD to C-MASC (especially Dr. Rattan Lal), who polished my hidden abilities and made me able to publish my PhD work in journals of international reputes.



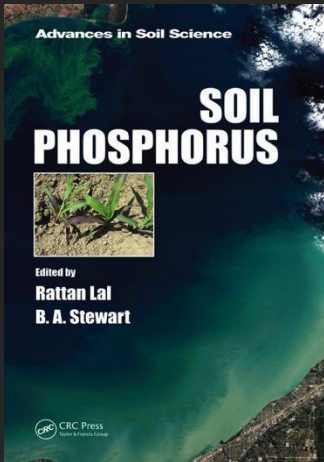


C-MASC Alumni and Awards

Dr. K.K. Bandyopadhyay

Principal Scientist
Division of Agricultural Physics
ICAR-IARI, New Delhi, India

Dr. Kalinkar Bandyopadhyay, Principal Scientist, Division of Agricultural Physics, Indian Agricultural Research Institute, New Delhi and a visiting scholar to CMASC in 2010 has been elected as Fellow of National Academy of Agricultural Sciences for the year 2016 under Natural Resource Management section. He received the certificate from Dr. S. Ayyappan, President, National Academy of Agricultural Sciences and former DG, Indian Council of Agricultural Research (ICAR) and Secretary, DARE during 23rd Annual General Body meeting of the Academy held on 5th June 2016 in A.P. Shinde Symposium Hall, NASC, Dev Prakash Shastry Marg, New Delhi, India.



A new volume of *Advances in Soil Science* has been published. *Soil Phosphorus* has 12 chapters and addresses the following topics:

- Presents critical global issues including information on peak phosphorus, eutrophication of natural water, recycling of phosphorus in urban agriculture, and soil phosphorus management.
- Assesses impacts of phosphorus fertility on agronomic productivity.
- Discusses processes and practices to mitigate the role of agricultural phosphorus on eutrophication.
- Features information on soil-specific farming and innovative phosphorus fertilizers.
- Provides information on human dimensions of phosphorus management as well as policy and regulatory measures.

For information including a Table of Contents see [here](#).

Phosphorus is an essential plant nutrient, but global population growth has dramatically reduced the availability of phosphorus fertilizer resources. Despite this scarcity, there remain numerous problems associated with the excessive and inappropriate use of phosphorus leading to non-point source pollution and eutrophication of natural waters. Identifying appropriate systems for managing soil phosphorus and reducing the risks of eutrophication are needed to minimize the environmental risks. This book focuses on the availability and recycling of phosphorus; regulatory and policy issues of sustainable phosphorus use; and water quality management in agroecosystems pertaining to phosphorus. Sections are dedicated to global phosphorus reserves; cycling and pathways of phosphorus; phosphorus in agriculture; human dimensions and policy intervention; and research and development priorities.

Phosphorus is a finite but crucial resource and is an essential element to all life. Sub-optimal availability and nutrient imbalance in the root zone can adversely impact plant growth, and the quality of food and feed grown on these soils. However, the proven reserves of phosphorus can hardly be adequate for a few centuries only. Yet, its misuse and mismanagement has caused severe problems of eutrophication of water and pollution of the environment. Thus, judicious management of soil phosphorus is essential. This volume is specifically devoted to availability and recycling of phosphorus, regulatory/policy issues of sustainable use of phosphorus, and management in agroecosystems in the context of maximizing the use efficiency and minimizing the environmental risks of water quality.



Recent C-MASC Publications

Journal Articles

- Aishwath, O.P., R. Lal. 2016. Resilience of Spices, Medicinal and Aromatic Plants With Climate Change Induced Abiotic Stresses. *Annals of Plant and Soil Research* 18(2):91-109.
- Lal, R. 2016. Soils and Climate change: is the solution to CO₂ under our feet? *Farm Journal*
- Lal, R. 2016. Ancient Soils, Modern Needs Our soil management journey continues. *Farm Journal*
- Lal, R. 2016. Global food security and nexus thinking. *J. Soil Water Conserv.* 71:85A-90A
- Li, H., J. He, Z.P. Bharucha, R. Lal, and J. Pretty. 2016. Improving China's food and environmental security with conservation agriculture. *International Journal of Agricultural Sustainability* doi: 10.1080/14735903.2016.1170330
- Nakajima, R., R.K. Shrestha, R. Lal. 2016. On-farm assessments of soil quality in Ohio and Michigan. *Soil Science Society of America Journal* doi:10.2136/sssaj2016.01.0003
- Shah, A., M. Darr, S. Khanal, R. Lal. 2016. A techno-environmental overview of a corn stover biomass feedstock supply chain for cellulosic biorefineries. *Biofuels* DOI: 10.1080/17597269.2016.1200864

Presentations

- Lal, R. 2016. Soil Carbon Sequestration: Science & Implementation of the "4 per Thousand Initiative" on U.S. Croplands and Grasslands. C-AGG Meeting, Denver, CO, 12-13 July 2016.
- Lal, R. 2016. Soil C for Climate Change, Food Security and SDGs of the U.N. Brussels, Belgium
- Lal, R. 2016. Conservation Agriculture in Sub-Saharan Africa. The Annual CA Conference, Capetown, South Africa, 1-5 August 2016.
- Lal, R. 2016. Conserving Soil and Water Resources for Climate-Resilient Agriculture. 3rd Waswac Conference, Belgrade, Serbia 22-26 August 2016
- Lal, R. 2016. Managing Soil for Mitigating Climate Change and Advancing Food Security. OARDC, Wooster, OH, 9 August 2016
- Lal, R. 2016. Soil Carbon Sequestration: Science, Rational & Implementation. Honda, Marysville, OH, 23 September 2016
- Lal, R. 2016. Adaptation of African Agriculture to Climate Change. Opening Session, AAA High Level Meeting, Marrakech, Morocco, 29 September 2016
- Lal, R. Sustainable and Resilient Soil Management in Climate Context. AAA High Level Meeting, Marrakech, Morocco, 29 September 2016

Forthcoming Books from C-MASC

- Lal, R (Ed). 2016. *Encyclopedia of Soil Science*, Third Edition. Taylor and Francis, Boca Raton, FL.
- Lal, R., D. Kryabill, B.R. Singh, T. Mosogoya, L.O. Eik and D.O. Hansen (Eds). 2016. *Climate Change And Multi-dimensional Sustainability in African Agriculture*. Springer, Dordrecht.

COP22 in Marrakech



- COP-21 in Paris was a historic landmark for soil C sequestration.
- Now, all hopes are on AAA Initiative at COP-22 in Marrakech in November 2016.

**Do you have contributions for our next newsletter?
Please contact us!**

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