



# Carbon Management and Sequestration Center

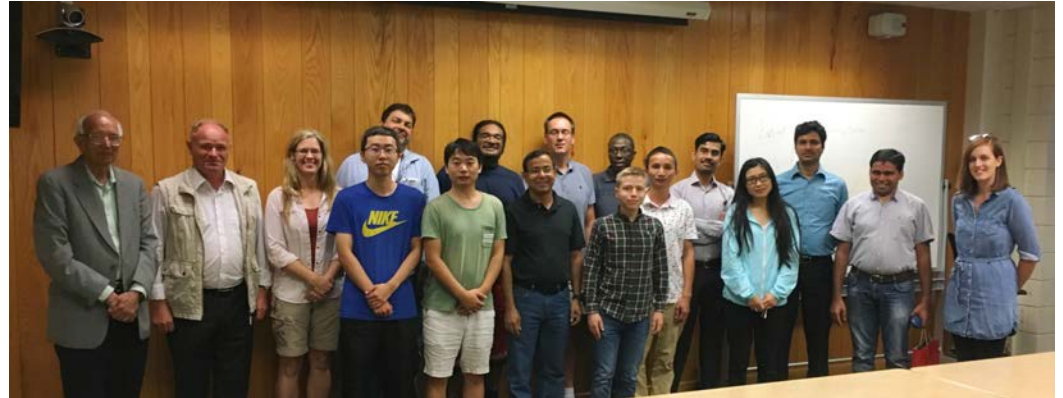
Issue 3 | 2017

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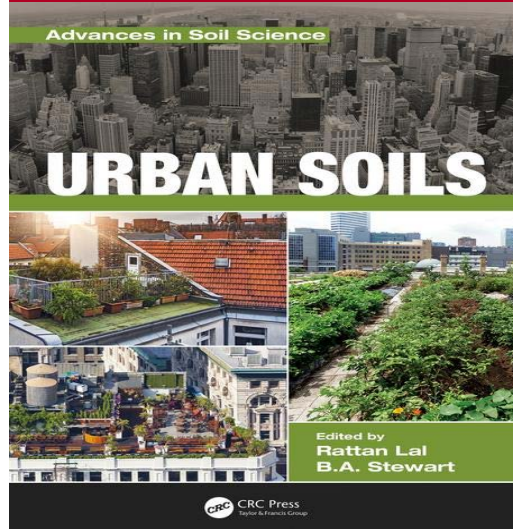
[cmasc.osu.edu](http://cmasc.osu.edu)



## Seminar Series Resumes at C-MASC

With the beginning of the autumn semester, C-MASC resumed its seminar series and welcomed two new visiting scholars: Prof. Boris Boincean (Alecu Ruso University, Moldova) and Professor Frederico Almeida (Fed. Univ. Mato Grosso, Brazil), as well as said farewell to three departing scholars: Dr. Gulab Singh Yadav (India), Prof. Qingbiao Wu (China) and Mr Atif Javed (Pakistan). See pages 2-5 for details about all our new visiting scholars.

## New Book on Urban Agriculture



The first edition is printed in October 2017. Urban agriculture is gaining momentum and has important economic, social, and ecological implications

## The "Fall" Season



To truly understand the meaning of *Fall* one has to experience the fall in temperature from 32°C on 27<sup>th</sup> September to 6°C on 1<sup>st</sup> October. It is this sudden change that affects all life: plants, animals, and people.



## BORIS BOINCEAN

Dept. Sustainable Farming Systems  
Select Res. Institute of Field Crops,  
Alecu Russo Balti State University  
Moldova

## New Visiting Scholars



Dr. Boris Boincean is the Head of the Department of Sustainable Farming Systems at the Selectia Research Institutes of Field Crops, and Chief Chair of Natural Sciences and Agroecology at Alecu Russo, Balti State University, Moldova. He joined C-MASC in August for six months, funded by a Fulbright Scholarship, to begin a draft of a book about sustainable soil management and global warming. It will also discuss the challenges faced by modern and future agriculture and how to overcome these difficulties.

The central idea of the book will be regarding changing the simplistic (reductionistic) approach to agricultural intensification by a new holistic(systemic) one. The role of agroecology as the scientific basis for a more sustainable agriculture will be described. Because each farming system suppose a close integration between crop sequence, systems of soil tillage and fertilization in the frame of crop rotation it would be important to analyze their influence on carbon sequestration and climate change in different regions of the globe, including in Moldova. Some data from long-term field experiments conducted in Moldova will be discussed.

Dr. Boincean chose The Ohio State University because of its history of research in this area. He appreciates the contribution of Prof. Rattan Lal at the international level in promoting a new concept of agricultural intensification. He believes that the concept of "green revolution" does not work anymore, and we have to find new ways for a more sustainable agricultural intensification.







## FREDERICO TERRA ALMEIDA

Professor  
UFMT – SINOP,  
Mato Grosso, Brazil

## MANMAN FAN

Ph.D Student  
Nanjing University  
China

## New Visiting Scholars

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Dr. Frederico Terra Almeida has a degree in Civil Engineering from the Federal University of Rio de Janeiro - UFRJ (1995), a M.S. degree in Agricultural Engineering from the Federal University of Viçosa - UFV (1997) and PhD in Plant Production from the State University of North Fluminense Darcy Ribeiro - UENF (2000). In March 2003, he joined the Federal University of Mato Grosso - Sinop, where he is today an Associate Professor, teaching classes in Hydrology and Watershed Management, and postgraduate Natural Resources and Erosion and Sedimentation. His research focuses on Water Resources and Water and Soil Engineering, and more recently has been training in Hydrossedimentology. He has several projects where he collaborates with multiple partners within and outside his institution, with financing from CNPq, FAPEMAT and other organizations. The



results of the works were published as presentations at scientific conferences. He developed research projects on themes of agrometeorology, water resources management, and water and soil management in hydrographic basins. Current projects are focused on soil erosion. This semester (2017/2) he is participating in an internship at The Ohio State University under the supervision of Dr. Lal. The topic of this current research is soil erosion.

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Manman Fan is a second year PhD student from Nanjing University, China. She completed her MS degree in Physical Geography from Nanjing University in 2016. Her research mainly focuses on changes of soil organic carbon sequestration in an intensively cultivated agricultural region based on DNDC model. She is also very interested in improving the performance of the DNDC model and identifying suitable land uses and tillage ways to minimize C loss and maximize retaining C in soil. She joined Carbon Management and Sequestration Center (C-MASC) on Aug 28, 2017 as a visiting scholar. She sincerely appreciates China Scholarship Council, Nanjing University and C-MASC, OSU to provide her the opportunity to study here.





## New Visiting Scholars



### MILSON EVALDO SERAFIM

Institute of Education, Science and  
Technology of Mato Grosso,  
Cáceres Campus  
Brazil

Dr. Milson Serafim received a degree in agricultural engineering from the Federal University of Mato Grosso do Sul (UFMS), and his PhD in soil science at the Federal University of Lavras (UFLA). He is currently a professor of the soil science at the Federal Institute of Education, Science and Technology of Mato Grosso, Campus Cáceres. He is the successor to Prof. Olegário Baldo. He teaches technical courses in agriculture and forestry engineering.


He is a visiting scholar at C-MASC for a period of one year. His current research aims to obtain reference values for soil organic attributes and organic carbon in areas of commercial high grain yield soybean cultivation (see abstract below).



#### ***Soil quality in high-yield soybean crops: reference values of physical attributes, biological attributes and carbon stock***

This project aims to obtain reference values for soil physical attributes and organic carbon, in areas of commercial high grain yield soybean cultivation. The study will be conducted in 100 soybean plots, with a yield equal to or greater than 70 bags per hectare. Soil samples will be collected in the 0-0.05, 0.10-0.15 and 0.30-0.35 m layers for determination of the variables soil bulk density, porosity, micro and macroporosity, penetration resistance to moisture at field capacity (6kPa), clay content, particle density, Fe and Al oxides and organic carbon content. Multivariate techniques will be applied in the analysis of the response variables, to establish groups with reference values for the soil physical attributes and soil organic carbon. Also the dual relationships between attributes will be calculated to define values more favorable to soybean. Fertility and mineralogy (soil chemistry) and beta-glucosidase and arylsulfatase (soil biology) enzyme analyses will be carried out in the soil samples and results analyzed together with the use of factor analysis and regression models to explain the high soy productivities. As the main product, soil physical attributes, biologic attributes and carbon reference value tables will be generated for application in the diagnosis of soil for soybean.





**KRISTINE S. PASCUAL**

Senior Science Research Specialist  
Philippine Rice Research Institute  
Philippines

**JINGTAO YAO**

Ph.D Student  
China Agricultural University

## New Visiting Scholars

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Kristine S. Pascual is a licensed agricultural engineer in the Philippines and a Senior Science Research Specialist at the Philippine Rice Research Institute (PhilRice). She obtained her BS and MS in Agricultural Engineering, Major in Land and Water Resources at the University of the Philippines in Los Baños. Her current research works at PhilRice deal on improving the water productivity of rice in irrigated environment through effective water management; and investigating the effects of biochar and alternate-wetting and drying in reducing greenhouse gas (GHG) emissions and improving grain yield. She had been involved with several projects on water management and GHG emissions with the International Rice Research Institute and the National Agriculture and Food Research Organization, Japan.



She joined C-MASC through the Borlaug International Agricultural Science and Technology Fellowship Program sponsored by United States Department of Agriculture. She will focus her work on the effects of varying irrigation technique and biochar on greenhouse gas emissions of rice. She hopes to use her output as supplementary information in her current study on biochar in the Philippines.

Yao, Jingtao is a Ph.D. student from China Agricultural University. His research focus on the modelling and optimization of land-use changes to improve the carbon holding capacity of soil (CHCS). CHCS is important in facing climate change problems, and also plays important roles in ensuring the productivity of land-use system. CHCS is highly related to land-use conservations among built-up land, agricultural land, and ecological land. Land-use optimization, both the scale optimization of land-use types and the spatial optimization of protection zones, will affect land use changes and do benefit to improve the CHCS of land-use system. In order to improve the CHCS through the optimization of land-use, multi-methods would be employed in this research, such as the Grey Linear programming model to get the scale optimization result of land-use types, the Particle Swarm Optimization model to get the spatial optimization result of setting protection zones, and the cellular automaton model to simulate land-use changes under different scenarios. If you are interested in his research topic or methods used in this research, he encourages you to contact him ([yao.680@osu.edu](mailto:yao.680@osu.edu)).







## Visiting Scholars

Being a Scientist of Indian Space Research Organization (ISRO), India it was a great experience for me to visit space vehicle mockup facility, Apollo Mission control Centre, Saturn V Launch Vehicle Center at NASA's Johnson Space Center (JSC), Houston, Texas, USA on 9<sup>th</sup> August, 2017. I am thankful to Dr. Rattan Lal and IUSSTF-SERB, India for allowing me for such exposure visit.

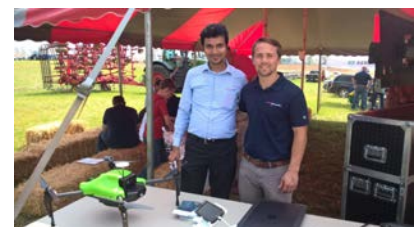


Dr. Tarik Mitran, Scientist/Engineer-SD, ISRO & Visiting Scholar, CMSC, The Ohio State University at Apollo Mission Control Center, Johnson Space Center (JSC), Houston, Texas, USA.

## Farm Science Review 2017

Photographed (left to right) are: Prof. Serafim, Prof. Almeida, Prof. Boincean and Dr. Mitran. They attended the 2017 Farm Science Review and took interest in farm machinery and other innovations in Ohio agriculture.

Important among other innovations included field demonstrations on tillage, combine harvester for corn and soybean, aerial drones to measure NDVI and spot check farm. Visiting Scholars also went to the Gwynn Conservation Conservation Center. The Farm Science Review also includes extension oriented discussions on specific topics such as no-till farming, sustainable agriculture, climate-smart farming, weed management, etc.





## Exiting Visiting Scholars



### SOME RECENT PUBLICATIONS:

Yadav, G.S., R. Lal, R.S. Meena, M. Datta, S. Babu, A. Das, J. Layek, P. Saha. 2017. Energy budget for designing sustainable and environmentally clean/safer cropping systems for rainfed rice fallow lands in India. *Journal of Cleaner Production* 158:29-37.

Layek, J., A. Das, R.G. Idapuganti, D. Sarkar, A. Ghosh, S.T. Zodape, R. Lal, G.S. Yadav, A.S. Panwar, S. Ngachan, R.S. Meena. 2017. Seaweed extract as bio-stimulant improves productivity and quality of rice in eastern Himalayas. *Journal Applied Phycology*, DOI 10.1007/s10811-017-1225-0



Three visiting scholars who returned back to their home countries during September include (left to right above) Prof. Qingbiao Wu, (China), Mr. Atif Javed (Pakistan), and Dr. Gulab Singh Yadav (India). Prof. Wu conducted research on identifying routine and cost-effective methods of determining soil organic carbon concentration by comparing loss on the ignition methods with others. Mr. Javed compiled reports on soils under the rice-wheat system, and Dr. Yadav prepared a series of articles on sustainable management of soil of the northeastern Himalayan region. Prof Lal suggested that together population of these three countries represented ~40% of the world population in 2017— 2.95 billion out of 7.55 billion.

Therefore, scientific cooperation between China, India and Pakistan on thematic issues such as soil carbon sequestration will have an important and long-lasting effect on agronomic productivity, environment quality, and peace and stability in Asia and the world.

Dr. R.S. Meena also returned back to India. He was the recipient of the Raman Fellowship for Post Doctoral Research for Indian Scholars in the U.S., and while at C-MASC he studied themes of soil carbon sequestration and climate change mitigation.

He is a faculty member of the Banaras Hindu University, Varanasi, India.





## Exiting Visiting Scholars



### GULAB SINGH YADAV

Scientist  
ICAR Research Complex for  
North Eastern Hill Region  
Tripura, India



#### *My C-MASC Experience:*

I joined the C-MASC at Visiting Scholar on 27<sup>th</sup> September, 2016. I was there for a year (up to 21<sup>st</sup> September, 2017). In C-MSAC, I was worked on the role of carbon dynamics in mitigation of greenhouse gases (GHGs) emission. During my stay in C-MASC, I learned a lot about Soil science, Climate Change, Soil Physics, Carbon dynamics, GHGs monitoring and trend, etc. In addition, I learned, how to write scientific reports (scientific writing) and how to present the paper (presentation). In my opinion, C-MASC is a home of knowledge and best place to learn science on the Earth. Nevertheless, it represent the whole world, by this I got the opportunity to meet with scientist from other countries, like China, Pakistan, Brazil, Morocco, Cost-Rica etc.

This was a wonderful year of my life. I will miss all my C-MSAC colleagues and working environment of C-MASC. There is a lot to say about C-MASC, but this I would like to thanks to **my mentor and Director of C-MASC, Prof. Rattan Lal** for giving me an opportunity to work in C-MASC. I also would like thank to all the member of C-MASC for all kind of support and help.



Dr. Yadav in a soybean plot at the Waterman Farm in August 2017, and receiving a certificate on 24<sup>th</sup> August, 2017.





## Graduate Students

Nall Inshan Moonilall is a third year Ph.D. student in the Environmental Science Graduate Program (ESGP) pursuing an Environmental Science degree here at Ohio State University, and Dr. Rattan Lal is his advisor. He is originally from Miami, Florida. He graduated with a BS in Environmental Studies with a focus in Agroecology from Florida International University, in Miami, Florida, in 2013. He obtained an MS in Environmental Science from Ohio State in August of 2015. His thesis research focused on looking at the impact of various amendments on soil properties and agronomic productivity in Guyana, South America. Currently, his Ph.D. dissertation research is focused on evaluating the effects of topsoil depth (TSD) on soil health and crop productivity in Central Ohio. This semester, he is serving as a graduate teaching associate for ENR 5279 (Urban Soils and Ecosystem Services) within The School of Environment and Natural Resources. He is looking forward to expanding his knowledge in the soil science field and about soil carbon sequestration.



Nall's thesis research is focused on assessing the impact of topsoil depth on soil health and productivity. The field experiment has been established to include three topsoil depth (0, 1, and 2) by scapling (topsoil) and adding (x2 topsoil) to simulate erosion and deposition land forms. These plots are managed by applying organic amendments and inorganic fertilizers. One of the objectives of the study is to assess the rate of topsoil formation with input of chemical fertilizers vs. Organic manure by evaluating the thickness of surface soil and concentration of soil organic carbon.

### Other graduate students at C-MASC include:



**Chris Eidson**  
Final year Ph.D student



**Ellen Maas**  
First year Ph.D student



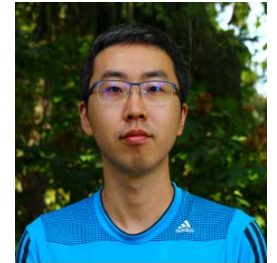
**Henry Peller**  
Ph.D student



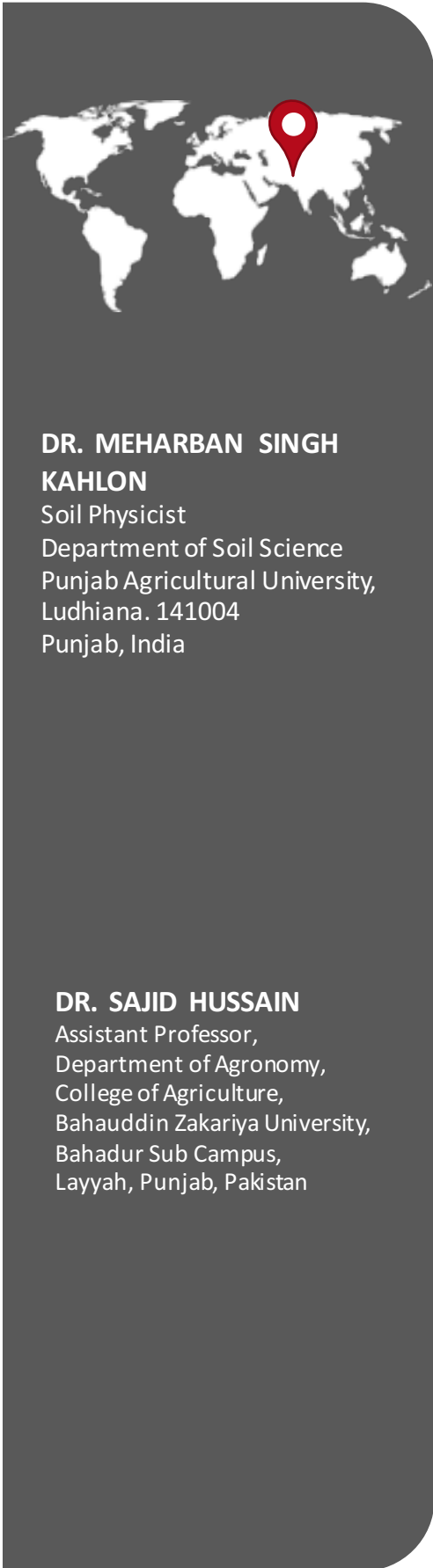
**Steven Doyle**  
Second year M.Sc student



**Chloe Turner**  
Second year M.Sc student



**Hengkang Zhao**  
First year M.Sc student



**DR. MEHARBAN SINGH KAHLON**

Soil Physicist  
Department of Soil Science  
Punjab Agricultural University,  
Ludhiana. 141004  
Punjab, India

**DR. SAJID HUSSAIN**

Assistant Professor,  
Department of Agronomy,  
College of Agriculture,  
Bahauddin Zakariya University,  
Bahadur Sub Campus,  
Layyah, Punjab, Pakistan

**C-MASC Alumni and Awards**

I was promoted as Associate Professor by Punjab Agricultural University, Ludhiana on July 7<sup>th</sup>, 2017. I am working on interactive effects of tillage, residue and water management on crop water productivity and soil health. I have guided 4 M.Sc and 1 Ph.D student. I have published more than 30 research papers in various International and National journals. One of the research articles based on the studies conducted at Waterman Farm, OSU, USA along with Dr. Rattan Lal on long term tillage and mulch impact on soil physical properties and carbon sequestration was rated as the most cited paper in journal *Soil and Tillage Research* for the year 2014/15.



I visited C-MASC during 2010-11 as a research scholar for one year. I will always be thankful to Dr. Lal and C-MASC for giving me an opportunity to work in collaboration with OSU and learning new experiences for applying under Indian conditions. I continued my research work on same theme after coming back to India. Our group is going to submit research proposal on enhancing soil health and crop water productivity in cereals, pulses and oilseed based cropping systems.

Best Wishes for C-MASC



Since joining the Bahauddin Zakariya University, of Pakistan, I have been involved with studies related to Modern Agriculture related challengers and strategies in Changing climate to ensure the world food security and to safeguard the environment with sustainable crop production. Before joining University, I had visited the Ohio State University USA and worked with world famous scientist Professor Dr. Rattan Lal. Than after coming back to my home land I have been worked at a Fertilizer company as a senior researcher.





### C-MASC Alumni and Awards



**DR. MEILING ZHANG**  
Gansu Agricultural University  
China

**RECENT PUBLICATION:**

Zhang, M., R. Lal, Y. Zhao, W. Jiang, Q. Chen. 2017. Spatial and temporal variability in the net primary production of grassland in China and its relation to climate factors. *Plant Ecology* 218:1117-1133.

**DR. RICARDO DE OLIVEIRA BORDONAL**  
National Bioethanol Science and Technology Laboratory

**RECENT PUBLICATION:**

Bordonal, R.O., R. Lal, C.C. Ronquim, E.B. Figueiredo, J.L.N. Carvalho, W. Maldonado, D.M.B.P. Milori, N. Scala. 2016. Changes in quantity and quality of soil carbon due to the land-use conversion to sugarcane (*saccharum officinarum*) plantation in Southern Brazil. *Agriculture, Ecosystems & Environment* 240:54-65.

Dr. Meiling Zhang, a former visiting scholar at C-MASC (July 2014 –July 2015), is an associate professor of Center for Quantitative Biology/College of Science, Gansu Agricultural University of China. She teaches “Probability theory and mathematical statistics”, “Operational Research” and “Mathematical modeling” .

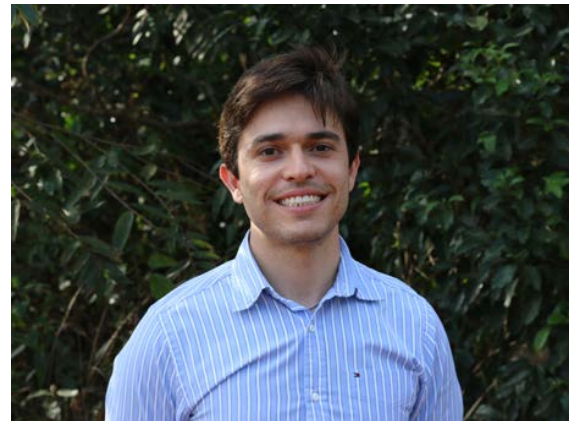


Her research interest area is ecological model, climate change and grassland remote sensing. She is currently working on the subject

of “The grassland ecosystem carbon cycle in Gannan and its mechanism to climate factors”. The objective of this work is to estimate the grassland ecosystem carbon sequestration in Gannan, China using improved model. To illustrate the key driving factors of carbon cycle, the spatio-temporal variations of carbon cycle of different classes of grassland will be analyzed. Expected results of the work will establish a foundation for the study of response mechanism of grassland carbon cycle under global climate change.

Dr. Lal gave her great help when she was in C-MASC Based on the research works during her academic visits, two papers have been published in Science Citation Index (SCI) source publications.

He completed his Ph.D. in Sanduiche (2013-2014) with the Carbon Management and Sequestration Center (C-MASC) at The Ohio State University (OSU). He holds a Specialization in Environmental Management (2012) from the Federal University of São Carlos (UFSCAR) and Post-Doctorate (2016-2016) by the National Bioethanol Science and Technology Laboratory (CTBE), belonging to the National Center for Research in Energy and Materials (CNPEN) located in



Campinas / SP. He has been a Specialist in Biomass Production at CTBE / CNPEM since 2016, developing research related to the agronomic and environmental impacts of the removal of straw for the production of bioenergy, with emphasis on soil quality and biomass production. He has experience in the area of Agronomy, working mainly in the following subjects: bioenergy, sugarcane management, inventory of greenhouse gases, climate change in agriculture, land use change and management, sustainability and biomass production.





## C-MASC Alumni and Awards

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Dr. Rattan Lal is the Recipient of 2017 Sustained Achievement Award of RNF.

The Renewable Natural Resources Foundation (RNRF) is an I.R.C. §501(c)(3) nonprofit, public policy research organization, founded in 1972. It is a consortium of scientific, professional, educational, design and engineering organizations whose primary purpose is to advance science, the application of science, and public education in managing and conserving renewable natural resources. RNRF's member organizations recognize that sustaining the Earth's renewable resource base will require a collaborative approach to problem solving by their disciplines and other disciplines representing the biological, physical and social sciences. The award recognizes a long-term contribution and commitment to the protection and conservation of natural resources by an individual.

Prof. Lal will receive the award on 15<sup>th</sup> November in Washington, D.C.

## The Resilience and Resolve: Survival of the Fittest and Adaptable

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During his 2008 visit to Iceland, Rattan Lal saw for the first time ever, the blooming *Silene acaulis*, and have ever since admired its unique characteristics "bloom even under the most harsh environments and stand out where nothing else can." That is resilience and adaptability and demonstrates that life creates environment favorable to itself: Gaia Hypothesis.

Photo: Courtesy of Anne Bau, Scientist, SCS, Iceland.



### Books Edited

- Lal, R. and B.A. Stewart. 2017. Urban Soils. Taylor and Francis, Boca Raton, FL

### Referred Journal Articles

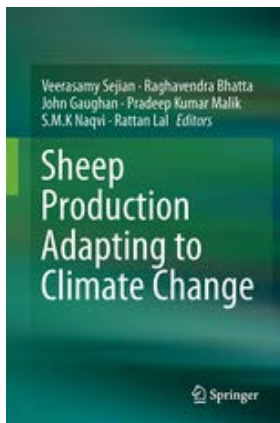
- Araujo, M.A., Y.L. Zinn, R. Lal. 2017. Soil parent material, texture and oxide contents have little effect on soil organic carbon retention in tropical highlands. *Geoderma* 300:1-10.
- Daigh, A.L.M., W.A. Dick, M.J. Helmers, R. Lal, J.G. Lauer, E. Nafziger, C.H. Pederson, J. Strock, M. Villamil, A. Mukherjee, R. Cruse. 2017. Yields and yield stability of no-till and chisel-plow fields in the Midwestern US Corn Belt. *Field Crops Research* (In press)
- Lal, R. 2017. Restoring soil and water resources and mitigating climate change in India by judicious management of agricultural and urban wastes. *Journal of the Indian Society of Soil Science* 65(2):105-117.
- Lal, R. 2017. Improving soil health and human protein nutrition by pulses-based cropping systems. *Advances in Agronomy* 145:167-204
- Lal, R. R.H. Mohtar, A.T. Assi, R. Ray, H. Baybil, M. Jahn. 2017. Soil as a basic nexus tool: soils at the center of the food-energy-water nexus. *Current Sustainable/Renewable Energy Reports* 4:1-13
- Lal, R. 2017. Making agriculture a solution to environmental problems in India. *Agriculture World: Krishi Jagran*, New Delhi, India.
- Layek, J., A. Das, R.G. Idapuganti, D. Sarkar, A. Ghosh, S.T. Zodape, R. Lal, G.S. Yadav, A.S. Panwar, S. Ngachan, R.S. Meena. 2017. Seaweed extract as bio-stimulant improves productivity and quality of rice in eastern Himalayas. *Journal Applied Phycology*, DOI 10.1007/s10811-017-1225-0
- Yadav, S.S., R. Lal. 2017. Vulnerability of women to climate change in arid and semi-arid regions: the case of India and South Asia. *Journal of Arid Environments* (In Press)
- Zhang, M., R. Lal, Y. Zhao, W. Jiang, Q. Chen. 2017. Spatial and temporal variability in the net primary production of grassland in China and its relation to climate factors. *Plant Ecology* 218:1117-1133.
- Zinn, Y., 2017. A simple model to estimate BET-N<sub>2</sub> specific surface area of contrasting soils in Brasil. *Soil Science Society of America Journal* (In Press).

### Chapters in Multi-Authored Books

- Lal, R. 2017. Restoring soil quality to mitigate soil degradation. In: D.L. Karlen and C.W. Rice (Eds) *Enhancing Soil Health to Mitigate Soil Degradation* (Special Issue), *Sustainability Journal*, (Reprint) pp. 11-28
- Lal, R. 2017. Soil conservation. Reference Module in Life Sciences, Elsevier, ISBN: 978-0-12-809633-8, 1-11 pp.

### Invited Keynote Presentations

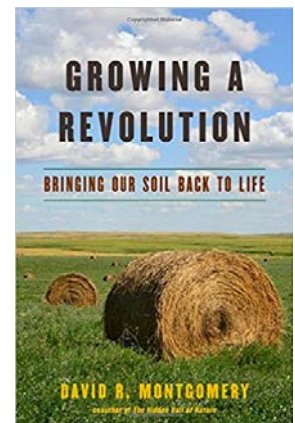
- Lal, R. 2017. Soil carbon and climate change. 254th ACS National Meeting and Exposition, 20-24 August, Washington DC
- Lal, R. 2017. Soil organic matter in the Anthropocene. 6<sup>th</sup> International Symposium on Soil Organic Matter, 3-7 September, Rothamsted, Harpenden, U.K.



### Book Recommendations:

**(Left)** Sejian, V., R. Bhatta, J. Gaughan, P.K. Malik, S.M.K Naqvi, R. Lal (Eds). 2017. *Sheep Production Adapting to Climate Change*. Springer, Singapore, pp.441

**(Right)** Montgomery, D.R. 2017. *Growing a Revolution: Bringing our Soil Back to Life*. W.W. Norton & Company, New York, pp.316 ISBN 978-0-393-608312-8



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

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