THE OHIO STATE UNIVERSITY

Winter | 2020

CFAES DR. RATTAN LAL CARBON MANAGEMENT AND SEQUESTRATION CENTER

C-MASC NEWSLETTER

C-MASC Restructured: Working Groups

The new structure of C-MASC, recently affirmed by the CFAES College of Food, Agricultural, and Environmental Sciences, organizes its efforts through the constitution of working groups with a substantive focus through which work across all mission areas will be integrated and acted upon. The working groups 'Agricultural Soils' and 'Forestry Carbon' have been established at the end of 2020 with both aiming at considerable shared research, teaching and outreach overlap. The working group activities will create opportunities to provide services to stakeholders interested in investing in, supporting and implementing carbon sequestration and management practices. Working group meetings are held monthly with a focus on identifying research needs and priorities also in preparation to identify funding opportunities with joined development and submission of proposals.

Working Group Agricultural Soils

Chair: M. Scott Demyan (SENR School of Environment and Natural Resources) *(pictured left)*, Co-chair Steven W. Lyon (SENR) *(pictured right)*

Members: David Barker (HCS Department of Horticulture and Crop Science), Marilia Chiavegato (HCS/Animal Science), Steve Culman (SENR), Matt Davies (SENR), Rachel S. Gabor (SENR), Jeff Hattey (SENR), Dennis R. Heldman (Department of Food Science and Technology), Laura Lindsey (HCS), Vinayak Shedekar (FABE Department of Food, Agricultural and Biological Engineering), Ajay

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Winter Break

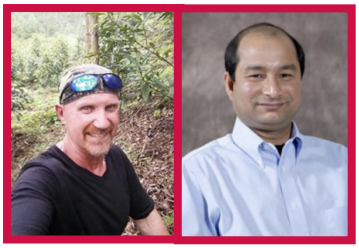
The first doses of COVID-19 vaccine have arrived at OSU Wexner Medical Center, and with them, the hope that we can return to campus some time in 2021.

C-MASC Working Groups

Shah (FABE), Christine Sprunger (SENR), R. Mark Sulc (HCS), (ex-officio: Rattan Lal, Klaus Lorenz)

Tentative research priorities: Importance of the soil organic carbon-soil health-water quality nexus; Extension and outreach activities towards enhancing carbon sequestration in agricultural soils; Establishment of new long-term field experiments to identify soil organic carbon sequestering practices; Assessment of the carbon sink capacity of soils under agricultural land use; Interaction between agronomy and soil carbon sequestration; Importance of agricultural carbon policy and carbon markets; Modeling of changes in soil organic carbon stocks; Research on soil inorganic carbon

Working Group Forestry Carbon



Chair: Roger Williams (SENR *(pictured left)*, Co-chair Sayeed R. Mehmood (SENR) *(pictured right)*

Members: Rachel S. Gabor (SENR), Matthew Hamilton (SENR), Jeff Hattey (SENR), Stephen Matthews (SENR), Brian Slater (SENR), Katy Smith (SENR), Brent Sohngen (AEDE Department of Agricultural, Environmental, and Development Economics), Eric Toman (SENR), Kaiguang Zhao (SENR), (ex-officio: Rattan Lal, Klaus Lorenz)

Tentative research priorities: Assessing carbon stocks in Ohio's forests; Identifying forest management practices for sequestering and storing carbon; Potential of silvopasture systems in Ohio for carbon sequestration and storage; Feasibility of carbon offset projects in Ohio

The C-MASC Steering Committee will work with Jeff Sharp, Director SENR on matters of planning, policy and other management issues, including priority setting and identification of resources. Steering Committee members are appointed by the Director and Gary M. Pierzynski, CFAES Associate Dean of Research and Education, with each working group having at least one representative on the Steering Committee.

Steering Committee Members: Nick Basta (SENR), Marilia Chiavegato (HCS/Animal Science), M. Scott Demyan (SENR), Brent Sohngen (AEDE), Eric Toman (SENR), Steven W. Lyon (SENR)

Con"grad"ulations to ManMan Fan

ManMan Fan at her graduation

I would like to share some updates with our C-MSAC family. I finally graduated last month and attached is a photo with cap and gown, which was taken in this June. Thanks for Dr Lal's wishes in last email, and it has come true that I found a satisfying job in this month. I am glad to tell you that my husband Taotao and I find our job in the same university named "Huaiyin Normal University" in Huaian city (two hours' drive from Nanjing), Jiangsu Province, which is happenly my husband's hometown. The university provide good conditions for our research and living, and the leaders are very kind. I am going to start my work there next month and I will prepare for applying a research program about soil carbon sequestration. Then in the new semester, I will teach the undergraduates one or two courses.

The year 2020 is really too special. I believe everyone has experienced a different year like me. I have met many obstacles on graduation and work before this month in this year, but finally I got what I want. So I want to share with you something about life, like sometimes we have to experienced something we don't want to, but the experience values, you will know the meaning of these experiences one day. Just keep going and you will get what you want in the near future! I am always grateful for the time spent in C-MSAC, especially for Dr Lal's guidance and encouragement. Best wishes to all of you!

--ManMan Fan

Quarterly Viewpoint

FROM THE DESK OF RATTAN LAL

30 December 2020

Mother Nature Knows Best

COVID-19 has disrupted human activities as never before during the recent past. There have been drastic changes in human-earth interaction through decreases in gaseous emissions into the atmosphere, reduction in discharge of industrial affluents into the rivers and waterways, and decline in agricultural activities. These and other disruptions had strong impacts on atmospheric chemistry and air quality, concentration of pollutants and water quality, and mechanical disturbance and soil quality. Global daily emissions decreased by 17% in early April 2020 compared to that in April 2019. Annual emissions may decrease by 7% by the end of 2020. The trinity of soil-water-air, three components of the environment, benefitted from the shutdown caused by the COVID-19 pandemic. Some positive impacts of the shutdown on the environment were reflected globally, but especially in developing and densely populated countries like India, such as cleaner water in rivers (e.g., the Ganges), reduction in smog and soot in the air so that Himalayan snowy peaks were visible from more than 100 km away, and appearance of wildlife in unexpected places, such as dolphins in the Ganges, flamingos on the Western coast of Southern India, and peacocks in abandoned schools. While nature benefitted, humans suffered because of increased prevalence of food insecurity. Indeed, prevalence of food insecurity increased globally between 80 and 130 million by the end of 2020.

Humanity must never forget some important lessons learned from the COVID-19 pandemic. One, the invisible microscopic foe (coronavirus) affected all nations, regardless of their economic development, military power, education status, scientific skills, and global status. Mother Nature did not discriminate, and she exhibited no mercy to anyone who did not respect her power to discipline the disobedient and disrespectful. Two, while humanity suffered, nature benefitted. Nature's resilience is infinite. Three, humanity must create strong buffers between it and nature by returning some land back to nature. Four, it is important to redefine critical natural boundaries (the so-called "Lakshman Rekha" of the Ramayana Epic) that humanity must respect. Trespassing these boundaries can lead to drastic consequences to humanity, while nature will flourish.

Sincerely,

Rattan Lal
Distinguished University Professor of Soil Science, SENR
Director, CFAES Dr. Rattan Lal Carbon Management and Sequestration Center (C-MASC)
Past President, International Union of Soil Sciences
IICA Chair in Soil Science & Goodwill Ambassador for Sustainable Development Issues

International Decade of Soils 2015-2024

C-MASC World Soil Day

FFAR: Enhanced Soil Carbon Farming as a Climate Solution

On December 3rd, in honor of World Soil Day, the Foundation for Food and Agriculture Research (FFAR), with the CFAES Dr. Rattan Lal Carbon Management and Sequestration Center (C-MASC) held an engagement event to demonstrate the importance of modifying agricultural techniques in North America entitled "Enhanced Soil Carbon Farming as a Climate Solution."

Featuring a lecture by Dr. Lal of the same title and illustrious panel guests Pipa Elias of The Nature Conservancy, Ranveer Chandra of Microsoft Azure Global, and Hayden Montgomery of the Global Research Alliance on Agricultural Greenhouse Gases, the event aimed to educate and inspire attendees to support research and development in this area through the interdisciplinary Agriculture Climate Partnership, whose immediate goal is to make US agriculture net carbon negative.

C-MASC is honored to be invited to develop a close working relationship with FFAR, lead by CEO Dr. Sally Rockey and her team, including Scientific Program Director Dr. LaKisha Odom. We hope to contribute to FFAR's mission to "connect funders, researchers, and farmers through public-private partnerships to support audacious research addressing the biggest food and agriculture challenges." For more information abotu FFAR, please visit here: https://foundationfar.org/agriculture-climate-partnership/

You can view the FFAR/World Soils Day event here: https://go.osu.edu/ffar-wsd

If you are interested in supporting this venture, please contact Jason Phillips at the OSU Development Office at phillips.814@osu.edu.

IICA: Living Soils of the Americas (LiSAm)

The Inter-American Institute for Cooperation on Agriculture (IICA), in conjunction with the CFAES Dr. Rattan Lal Carbon Management and Sequestration Center (C-MASC) and the Ohio State Unversity (OSU) were pleased to launch the initiative "Living Soils in the Americas (LiSAm)" on December 4th in honor of World Soil Day. The initiative highlights the importance of soils as carbon sinks throughout North and South America, and it intends to build up this carbon sequestration potential by "creating sectoral policies, promoting land management practices, and establishing economic incentives required to transform agricultural systems into ecosystems with a greater accumulation of organic carbon in soils."

With the support of Ministers of Agriculture and other important members of the public and private sectors, the intiative will "put into practice carbon science, creating monitoring and verification processes, as well as incentives for carbon sequestration practices."

The LiSAm initiative "seeks to provide countries in the Americas with access to various cost-effective strategies for soil carbon (con't)

Please enjoy Dr. Lal's lecture dedicated to World Soil Day 2020 here: https://go.osu.edu/world-soil-day-2020

C-MASC World Soil Day

IICA: Living Soils of the Americas (LiSAm)

sequestration, taking into account the diversity that characterizes the region and its agricultural systems."

Dr. Lal was honored to be a part of this event, hosted by IICA, and for the opportunity to connect with so many important figures in agriculture throughout the region. He is especially grateful to Dr. Manuel Otero and the team at IICA for arranging the event and to CFAES's Dean Kress, who showed her support with a short greeting at the event. He looks forward to the exciting progress that will come about in the region, thanks to this initative. See the event here: https://youtu.be/D8K1KL8IeP0

Arrell Global Food Innovation Award

ARRELL FOOD INSTITUTE
AT THE UNIVERSITY of GUELPH

Dr. Rattan Lal is honored to be awarded the Arrell Global Food Innovatin Award in the Research Category from the University of Guelph, Ontario, Canada. The Arrell Global Food Innovation Award, given to two recipients annually, "recognizes global leaders who are ensuring future food security for the planet, and hopes to inspire new leaders to take bold steps toward change. Scientific excellence and community enaggement are necessary to the challenges our world will face in feeding 9 billion people and beyond." The award culminated in an interview that Dr. Lal gave at the Arrell World Food Summit in on Friday, November 20, 2020.

Dr. Lal is pleased to join the the winners of the Achievement for the Community Award in 2020, Appetite for Change, founded by Princess Haley, Michelle Horovitz, and LaTasha Powell, from North Minneapolis, MN, USA, for "using food to build health, weath, and social change in their community," and Community Food Centres Canada, founded by Nick Saul and Kathryn Scharf, for "offering dignified space to community and advocating for justice through food."

The Arrell Food Institute completed several lovely animated tribute videos to illustrate the accomplishments and journeys of these three prize winners.

Dr. Lal's journey can be found here: https://youtu.be/KlFvniVySYQ

Appetite for Change's journey can be found here: https://youtu.be/pcrknhNc-u8

Community Food Centres Canada's journey can be found here: https://youtu.be/ubAdeCjOckQ

More information about the prize can be found here: https://arrellfoodinstitute.ca/innovation-awards/

C-MASC Arrivals

Dr. Kathleen Bridges and the Sustainable Stark Initiative

It was an unexpected circumstance that led to my becoming a part of the Dr. Rattan Lal Carbon Management and Sequestration Center as a postdoctoral scholar.

In January of 2020, I was contentedly working away for a private company when three weeks into the new year, I and dozens of my coworkers were let go. I floundered for a few months, desperately searching for a new job. At the time, I was living in beautiful North Carolina, and having lived in the southeastern US my entire life, I did not envision leaving it for the Midwest. However, I applied for the postdoctoral position in Dr. Lal's lab because the position was focused on soil health in agriculture systems with an extension aspect that I found greatly appealing. That and, of course, Dr. Lal's outstanding reputation convinced me to apply. Fortunately, Dr. Lal and Ohio State University invited me to accept the job and just in time. A few days later, COVID-19 had shutdown the country, and no one was hiring anywhere. At the end of April, I arrived in Stark County, OH and began work on the Stark Sustainable Soil Initiative.

Incorporating the safety measures required by the university, I was able to work closely with the Stark County Extension office and the Stark Soil and Water Conservation District. Heather Neikirk is the Stark County Agriculture Extension Educator and a co-PI of the research project and has contributed in multiple ways to the progress of the project including identifying participating farmers, assisting in fieldwork, providing logistical guidance, and communicating with all the stakeholders involved in the project.

The Stark Sustainable Soil Initiative is a five-year on-farm research project focused on agricultural management in Stark County, Ohio. It is funded by the Herbert W. Hoover Foundation. The main objective of the project is to determine how farm management practices affect soil health of small farms (<100 acres) in the county. Due to the nature of my research, I was granted exceptions for traveling within the county in spite of the pandemic and was able to identify twelve participating farmers who do or do not utilize tillage, different types of tillage, manure or commercial fertilizers, crop rotation, or cover crops. During the growing season, I collected crop growth information and at harvest collected plant and soil samples with the help of Heather Neikirk, Kyle Sklenka, Nall Moonilall, and local volunteers. These samples were stored and dried at the facilities in Wooster until I could travel to Columbus, OH to conduct lab analyses at the CMASC lab. Those analyses were completed in November and December of 2020 with the generous help of Kyle and Nall.

I look forward to reporting on the findings of this project in future newsletters. For now, I will end by saying how grateful I am to Dr. Lal for giving me the opportunity to work with him and the farmers of Ohio. I am excited to discover how farm management can improve soil and environmental health and maintain production goals and sharing those discoveries with the world. I would also like to thank Maggie Willis for her warm welcome and her tireless efforts to make sure I have all that I need to carry out the work of the project. Any readers of the CMASC newsletter who would like to know more about me are welcome to contact me at bridges.200@osu.edu.

C-MASC Updates

World Coffee Research: Virtuous Agriculture

Dr. Lal thorougly enjoyed the opportunity to speak with the esteemed guests and hosts at the online Virtuous Agriculture event on 4 November 2020, hosted by World Coffee Research (WCR) and featuring speaker Andrea Illy of Illycafe and moderator Doug Welsh, Vice President of Peet's Coffee and Chair of the Board of Directors for WCR. Mr. Illy opened with a presentation outlining many ways that agriculture can be virtuous: reducing GHG emissions, increasing the nutritional components of food, and meeting the needs of a growing population by taking care of the soils. Dr. Lal was so pleased to hear Mr. Illy express his philosophy about how to make agriculture "virtuous," as his own philosophy aligns almost exactly with Dr. Illy's. Dr. Lal's talk, entitled "Virtuous Agriculture: Enhancing Sustainability and Saving Land for Nature," complemented that of Dr. Illy's, and further discussed the important points Mr. Illy made. One clear point emerged clearly from the presentations, and that is: "Soil Health is Human Health."

Dr. Lal is pleased to have found such like-minded colleagues, and he looks forward to deepigning the relationship with Mr. Illy, Dr. Vern Long, and everyone at World Coffee Research to make progress toward our mutual goals as stewards of the planet.

The talks are available online here: https://youtu.be/748P9Ma-qZc.

Who Wants to Be a Soil Scientist?

Imagine Dr. Lal's surprise when he was watching *Kaun Banega Crorepati?* (KBC), India's version of *Who Wants to Be a Millionaire?,* on December 25th, and he saw a question about his life posed to contestants Dr. Anil Joshi and his companion Mr. Anurag Basu. Mr. Amitabh Bachchan is the host of KBC and called the greatest actor of the century, "Star of Millenium," "Big B," and "Shehenshah of Bollywood." He has acted in over 200 movies in a career spanning over five decades.

While the primary contestant, Dr. Joshi wasn't sure of the answer, as he had never heard of any of the answer choices, his companion, Mr. Basu suspected that the correct answer was "Rattan Lal!" In the end, the question was not answered correctly, but do not worry, because Mr. Bachchan was glad to explain the legacy of Dr. Lal's work and how he received the World Food Prize without a pause.

C-MASC Updates

ICAR Silver Jubilee Foundation Lecture

Prof Rattan Lal Delivered the ICAR-National Institute of Animal Nutrition and Physiology Silver Jubilee Foundation Day Lecture

By C-MASC Alumnus Dr. V.S. Sejian

The ICAR-National Institute of Animal Nutrition and Physiology, Bengaluru organized a Webinar to celebrate its Silver Jubilee Foundation Day on 24th Nov 2020.

Dr Rattan Lal, a Distinguished University Professor of Soil Science and Director, Carbon Management and Sequestration Centre and 2020 World Food Prize Winner delivered the Foundation day lecture via online mode.

In his Foundation Day Lecture on "Integrating Livestock with Crops and Trees for Climate-Smart Agriculture in India", Prof. Rattan Lal, Recipient of World Food Prize - 2020 highlighted the significance of integrated approach to sustain animal agricultural in India and pointed out that the country's richest animal genetic resources provides the opportunity for future production sustenance. Prof. Lal stressed the importance of reducing the non productive animals in the country and suggested that the research efforts should be oriented in meeting the animal production with less number of productive animals. Further, he emphasized that burning of crop residues must be stopped with immediate effect as this could pave way for soil erosion. He highlighted the importance of enriching the fertility of soil and opined that this is a crucial measure to feed the largest livestock population in the country. He suggested that whatever we take it from the soil must go back to the soil and he related it with livestock production by urging the application of dung as manure to enrich the fertility of the soil so that more crops can be cultivated as fodder for livestock. He opined that this could be a useful approach for effective carbon sequestration as well as indicated that this could be an efficient measure for improving the soil quality. In addition, Prof Lal has signified the role of plant breeders to identify climate resilient plant varieties to ensure sustainable animal agriculture. He also urged the importance of efficient use of water resources and opined that only optimum water requirement is necessary for agriculture rather than over flooding the agricultural land which predominantly gets wasted. Finally, he emphasized the importance of policy development for sustaining animal agriculture through integrated approach involving, soil, crop and animal component.

Dr Trilochan Mohapatra, Secretary DARE and Director General ICAR, Dr. B.N. Tripathi, Deputy Director General (Animal Science) and Dr. Raghavendra Bhatta, Director, ICAR-NIANP and all ICAR-NIANP staff. And several others attended the webinar.

Dr. Lal Joins Board of IFDC

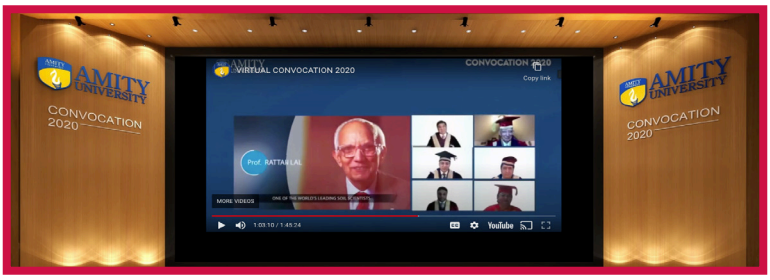
Dr. Lal joined the board of the International Fertilizer Development Center (IFDC) in 2020. The mission of this independent, science-based, non-profit center is to alleviate global hunger by bringing together "innovative research, market expertise, and strategic public and private sector partners to identify and scale sustainable solutions for soil and plant nutrition that benefit farmers, entrepreneurs, and the environment.

IFDC

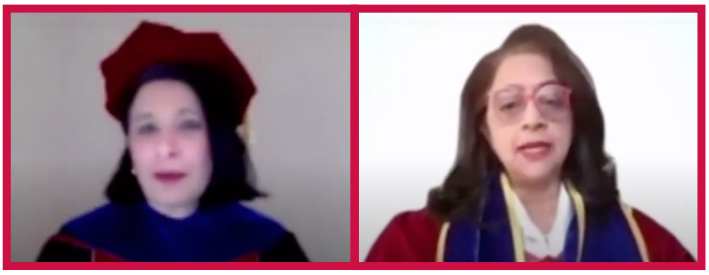
He is pleased to be able to contribute to the important work of this board, and looks forward to cooperation in 2021. More info available here: https://ifdc.org/

C-MASC Updates

Amity University Virtual Convocation 2020



Dr. Lal was so grateful to receive a degree of Doctor of Science, *Honoris Causa,* from Amity University in Noida, Uttar Pradesh, along with his esteemed colleagues Dr. Renu Khator, Chancellor and President of the University of Houston, and Dr. Siva Kumari, Director General of the International Baccalaureate, who each received an honorary Doctorate Degree in Philosophy. In an impressive online ceremony featuring extensive computer graphics, including a beautiful virtual auditorium, Dr. Lal was conferred the degree on on December 29, 2020. The lovely ceremony was presided over by Amity University's Founder President, Dr. Ashok K. Chauhan, who congratulated all the 18,769 students receiving degrees this year, and encouraged students to "fix their aim in life and not deter from any problems they face." Chancellor Dr. Atul Chauhan, Vice-Chancellor Dr. (Prof.) Balvinder Shukla, and Dr. Sean Tompkins also presided over the ceremony. Dr. Lal would like to congratulate Dr. Nutan Kaushik as well and her whole team for a successful event, and he'd like to express his deep enthusiam for a partnership with Amity University going forward.



Esteemed colleagues Dr. Renu Khator (left) and Dr. Siva Kumari (right)

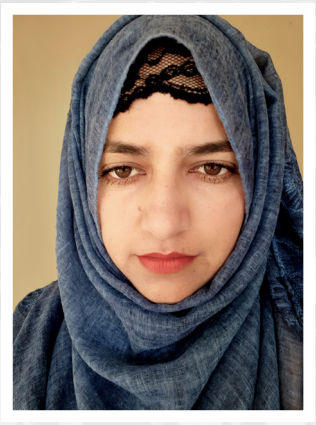
C-MASC Classes

(Left) Nall Moonilall demonstrates the use of the infiltrometer to students of ENR 5261 in a previous semester.

Even though C-MASC classes will be entirely virtual for the first time ever in Spring 2021, students will still be able to benefit from the valuable information soil science can provide. Soil science is pertinent to a range of disciplines, and those majoring in Earth Sciences, Soil Mechanics, Geography, Agricultural Engineering, Civil Engineering, and Environmental Sciences may find the information quite useful. We encourage you to look into enrolling in *ENR 5261 Environmental Soil Physics* or *ENR/EARTHSCI 5268 Soils and Climate Change* to better understand the importance of the ground beneath your feet!

C-MASC Scholar Viewpoint

FROM THE DESK OF MAH-NOOR AZAD



I am Mah-Noor Azad, Ph.D. Scholar at PMAS-AAUR, Pakistan, and I worked with Dr. Rattan Lal in The Ohio State University, U.S.A as a Visiting Scholar from February 2020 to August 2020. During my visit, I worked on the estimation of gaseous emissions and carbon fractionation on the OSU university research farm, having 5-7% slope mulching and chemical fertilizers as treatments during summer. As we know, soil erosion is one of the most serious problems. Human being takes 99.7% of their food from land and less than 0.3% from ocean and other aquatic ecosystems (David Pimental).

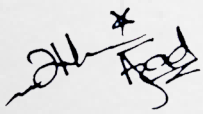
Erosion occurs when soil is left exposed to rain and wind energy. Rain drops hit exposed soil with enormous energy and easily displace the soil particles from the surface (Troeh et al., 1991). It is reported by Batie et al. (1997) that cropland area affected by water erosion on U.S cultivated land gradually decreased 1982-1997 from 152.4Mha to 132.3Mha. There has been speedy increase in atmospheric concentration of CO_2 and other greenhouse gases. Gaseous emissions from terrestrial ecosystems are exacerbated by soil degradation. On-site effects of soil erosion poorly affects soil quality and productivity, and off-site effects are worse, but difficult to properly estimate. Eutrofication and contamination of surface water by no-point surface pollution is serious, and the greenhouse gases emitted by these processes are a big concern (Lal 2001).

The field experiment was conducted during summer 2020 in the experimental area of th OSU research farm. We select a field and divided it into 1 sub plots and set treatments as: mulching (16kg/ha), mulching (16kg/ha) and fertilizers (244kh/ha), and only fertilizers (244kg/ha). Sub treatments were crops, soybean and maize with replications of main treatments.

We observed that the plot with mulching (16kg/ha) and fertilizer (244kg/ha) had highest total organic carbon (4.67mg/kg), and the plot with the lowest (1.21mg/kg) had mulching (0kg/ha) and fertilizer (0kg/ha). Same with particulate organic carbon (7.289mg/kg and 1.106mg/kg), mineral associated carbon (4.67mg/kg and 1.21mg/kg) and dissolved organic carbon (58.19mg/kg and 17.90 mg/kg): each were higher with higher application of mulching and lower with no application. And for gases emission we observe NO2 emission at 0 time was 0.3ppm and 0.5 after 45minutes, CO2 was 591ppm at 0 time and 666ppm was recorded after 45min and CH4 was 1.97 at 0 time and 1.2 after 45 min with higher application (mulching 16kg/ha and fertilizer 244kg/ha) and in control plots (mulching 0kg/ha, fertilizers 0kg /ha) we observe the concentration of NO2 was 0.2ppm at 0time and 0.17ppm after 45 min, CO2 was 563ppm at 0 and 463ppm at 45 and 2.28ppm CH4 was recorded at 0 time and 1.52 at 45minutes.

We conclude with this experiment that with the application of mulching save more carbon and emission of green house gases can decreased with mulching. We have to promote mulching in conservation agriculture to save our soils.

Sincerely,



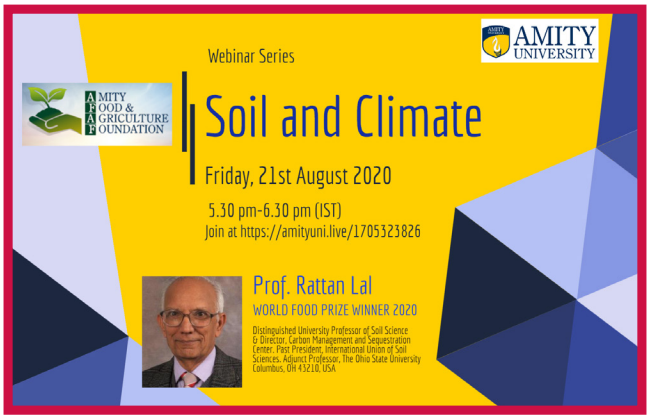
Ms. Mahnoor Azad
Ph.D. Scholar
Pir Mehr Ali Shah Arid Agriculture University (PMAS-AAUR)
Rawalpindi, Pakistan

Where in the Zoom is Dr. Lal?

Amity University Uttar Pradesh

July 10 and August 21

Dr. Lal was pleased to begin a relationship with Amity University Uttar Pradesh this year upon the invitation of Founder President Dr. Ashok K. Chauhan. He had the opportunity to speak twice at Amity Univeristy and learn of their ambitious and innovative conservation and agricultural programs, spanning a wide variety of agricultural disciplines. He gave a lecture 10 July 2020 entitled "Managing Soil Health for Sustainable Food and Agriculture in India," available here: https://youtu.be/2OTBL2QYQoA and on Friday, 21 August 2020, "Soil and Climate." He looks forward to further developing this productive relationship.



TEDx Countdown 2020

July 15

Dr. Lal greatly enjoyed the invitation to speak at the TEDx pause ... COUNTDOWN 2020, series, session #2 Food in Vail on 15 July to discuss "Soil and Sustainable Development." He was joined by knowledgable colleagues such as Genesis Butler, who spoke about veganism, Suzie Davis of the Eagle Valley Community Foundation, and Dr. Oliver Zahn, Phd, of Climax Foods. Together, they discussed the importance of ethical food sources, strong communities, and the environmental sustainability of agricultural practices.

Climate Reality Project

July 20

Dr. Lal was honored to be able to participate as a panelist in Vice President Gore's Climate Reality Leadership Corps initiative on 20 July 2020. The trainings provide in-person or virtual experience that allow attendees "to gain the the knowledge and tools to shape public opinon, inspire action, and lead the global fight for climate solutions. These two to three day immersive events have a particular focus on local and regional climare impacts and solutions." The events have no fee, but leaders trained are expected to "pay their experience forward by completing 10 Acts of Leadership within one year of the training," which spreads awareness, drives change, or supports solutions to the climate crisis. More information is available here: https://climaterealityproject.org/

Where in the Zoom is Dr. Lal?

SWCS Convention

July 28

Dr. Lal was so happy to be able to join the celebration with the Soil and Water Conservation Society for their 75th International Annual Conference, "Expanding Horizons: Where Conservation meets Innovation," from July 27-29, 2020. He presented a ten minute virtual lecture entitled "Conservation to Sequester Carbon," along with colleagues Debbie Reed, Jessica Fox, Bob Kremer and Kristen Veum, Barry Fisher, Jean Steiner, Dennis Flanagan, and Sara Carlson. Together they covered a variety of important topics in their symposium, from soil biology, markets, modeling, cover crops, and climate change. Here's to another 75 years!

Patagonia: Regenerative Organic

July 29th and August 6

Dr. Lal greatly enjoyed participating in Patagonia's groundbreaking initiative for organic regenerative agriculture practices in their products. He participated as a panelist in a media event in the U.K. on 29 July and an online live panel discussion on 6 August 2020 entitled, "We have a growing problem." He was joined by Helena Barbour of Patagonia, Permaculture designer Stefan Schwarzer, Jyoti Fernandes at The Landworkers Alliance, and Elizabeth Witlow of the Regenerative Organic Alliance. More information here: https://regenerativeorganic.splashthat.com/

MSSRF

August 7

Dr. Lal was delighted for the opporunity to give a special lecture at the M.S. Swaminathan Research Foundation, Science for Sustainable Development, on a day marking Dr. M.S. Swaminathan's birth. His lecture, "Soil-Centric Approach to Realize India's Ever-Green Revolution" was part of the Virtual Consultation Science for Resilient Food, Nutrition, and Livelihoods: Contemporary Challenges, and it is available online here: https://www.mssrf.org/content/session-3-special-lecture. He wishes Dr. Swaminathan the best of health and many more years of wonderful birthdays.

Where in the Zoom is Dr. Lal?

Punjab Agricultural University

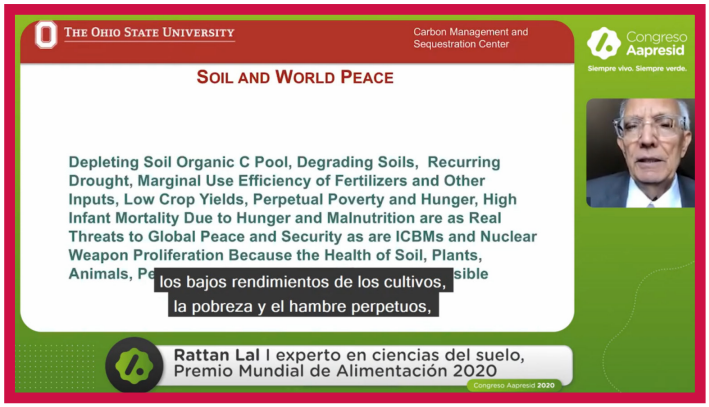
August 19

It is always an honor to speak at one's alma mater, and Dr. Lal accepted the invitation for a Felicitation Program and Webinar at Punjab Agricultural University with pride. Given with the support of the National Agricultural Higher Education Project (NAHEP), the Centre for Advanced Agricutlrual Science and Technoloogy, (CAAST), and the School of Natural Resouces Management for Sustainable Agriculgture, his talk, "Soil-Centric Green Revolution: A Paradigm Shift" occured on the 19th of August 2020. He would like to thank Deputy Director for Soil and Natural Resources Dr. Choudhary, Vice Chancellor Dr. Dillon, and Devesh Sharma for hosting and moderating the event. More information available here: http://www.nahep-caast-pau.in/webinar.html

XVIII AAPRESID Virtual Congress 2020

August 24

Dr. Lal presented his lecture, "The Importance of Soil in the Future of Humanity" at Always Alive, Always Green: XVIII Aapresid Virutal Congress on 24 August 2020. Hosted by the Argentine No-Till Farmers Association (AAPRESID) in Santa Fe, Argentina, this event featured more than 300 conferences, with a virtual hall including co-working and meeting rooms, and recreational spaces. More information available here in Spanish: https://www.aapresid.org.ar/blog/xxviii-congreso-aapresid-ya-podes-registrarte-en-el-evento-de-innovacion-tecnica-mas-grande-del-agro-argentino



Microsoft

September 10

Dr. Lal was happy to address Microsoft employees as part of their Azure Global Guest Speaker Series on the subject of "Soil Carbon and Its In-Situ Measurement on Landscape." He thanks Dr. Ranveer Chandra for the invite to be a speaker and Dr. Chandra's entire team for organizing a successful event. We look forward to learning more about and contributing to Microsoft's projects concerning carbon monitoring and measurement and developing a productive working partnership!

Where in the Zoom is Dr. Lal?

Field, Lab, Earth with Abby Morrison

September 15

Abby Morrisson sat down with Dr. Lal on Field, Lab, Earth, the podcast from the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, to discuss the importance of soil health in 2020. She covered a broad range of topics with him from the importance of animals like earthworms, termites, and centipedes to soil health, how covering soils can increase soil health properties, how the health of animals, people, plants, soil, and the environment intertwine, and what future steps we can take to increase food security and soil health. https://fieldlabearth.libsyn.com/soil-health-with-2020-world-food-prize-laureate-dr-rattan-lal

IPCC/UNFCC: Resilience Frontiers

September 17

As part of its continued effort to engage global thought leaders, Resilience Frontiers convened the Virtual Resilience Lab series between July and September 2020. Following the successful launch of part I and part II in July and September, part III of the series will take place on 17-18 September and focus on "Transforming sectoral approaches to sustain long-term regenerative resilience." Dr. Lal was pleased to give a talk entitled "Regenerative Food Production and the Rights of Soils" as part of this important event hosted by the IPCC and UNFCC.

Syngenta

September 23

Dr. Lal was truly honored to be part of the launch of Syngenta's Good Growth Plan, an initiative in which Syngenta is committing to "invest $2bn in sustainable agriculture breakthroughs by 2025 and to deliver two sustainable technology breakthroughs each year." On 23 September 2020, he gave a keynote lecture "Realizing Sustainable Development Goals by Regenerative Agriculture and Soil Organic Matter Management" at the launch, and he would like to thank all involved at Syngenta, as well as IICA, for their support of this promising initiative. He looks forward to deepening the cooperation between all three parties in the coming years. More here: https://ggp2020.com/en/

Where in the Zoom is Dr. Lal?

IICA Canada Compost

September 30

The 30th Annual Organics Recycling Conference of the Compost Council of Canada (CCC) has launched for the first time online, and Dr. Lal has been deeply grateful to be part of this important event, hosted by IICA Canada and CRE: Composting & Anaerobic Digestion Association of Ireland. He was pleased to contribute a short lecture entitled "Soil: The Essence of Life on Our Planet," and he would like to thank Ms. Susan Antler on her whole team for the completion of a truly successful and impactful event.

Charles V. Riley Memorial Lecture

November 19

Dr. Lal was deeply honored to be invited to moderate the panel at the 2020 AAAS Charles Valentine Riley Memorial Lecture on 19 November 2020. After introductions from Dr. Sudip Parikh, CEO of the American Association for the Advancement of Science (AAAS), and Dr. Catherine Woteki, President of the Charles Valentine Riley Memorial Foundation and Professor of Iowa State Univeristy, Dr. Lal joined keynote speaker Dr. Even H. DeLucia of the University of Illinois at Urbana-Champaign and panelists Dr. Maya Almaraz of the University of California, Davis, Dr. Marty Matlock of the University of Arkansas Resiliency Center, and Dr. Meredith Niles of the University of Vermont in an insightful and thoughtful discussion about Dr. DeLucia's speech, "Rethinking American Agriculture: Reducing Greenhouse Gas Emissions from Food Production." More information avaiable here: https://youtu.be/xrr5lm8rG4w

Cotton Webinars: WCRC-7 Plenary Lecture

December 2

Dr. Lal was pleased to be invited to the Cotton Webinars: WCRC-7 Plenary Monthly Lectures, hosted by World Cotton Day, International Cotton Researchers Association, Cotton Incorporated, ICAC, and WCRC-7. He gave a talk entitled "Soil health and its management" to the webinar's esteemed guests, and he looks forward to developing a relationship mutually beneficial to cotton farmers, researchers, and the soil .

FICCI, East-West Seed, Dutch Embassy

December 11

In the online webinar "How to Lift India's Smallholders Out of Poverty," hosted by the Federation of Indian Chambers of Commerce and Industry (FICCI), East-West Seed, and the Embassy of the Netherlands, Dr. Rattan Lal joined his esteemed colleagues from the World Food Prize, Dr. Simon Groot, Dr. Surinder Vasal, and Dr. Gurdev Khush, as well as the honorable Marten van den Berg, Ambassador of the Netherlands to India, Ananda Uvl of East-West Seed, and moderator Meghna Ravishankar, Director of the International Borlaug Dialogue, The World Food Prize Foundation, for an important session addressing the concerns and issues of smallholders in India. Their numerous insights can be seen in the recording available online here: https://youtu.be/Um6bCPWaBqY

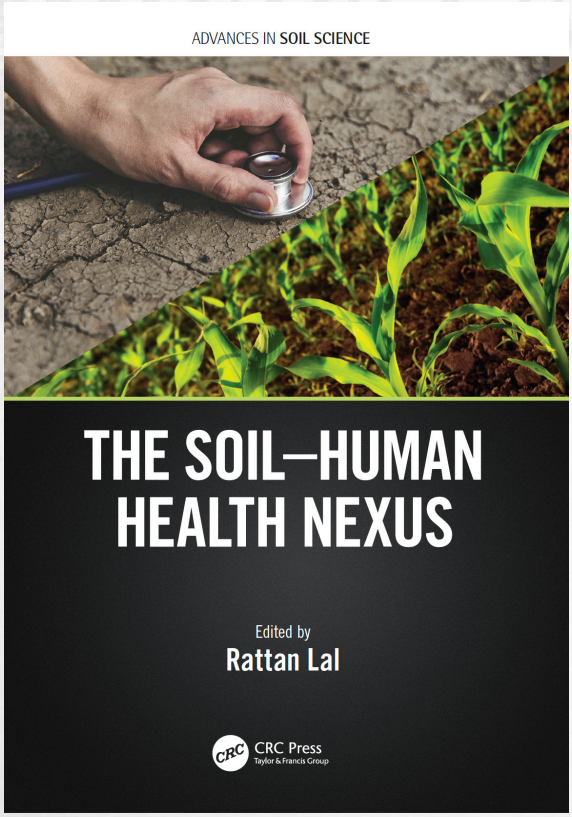
Quarterly Publications

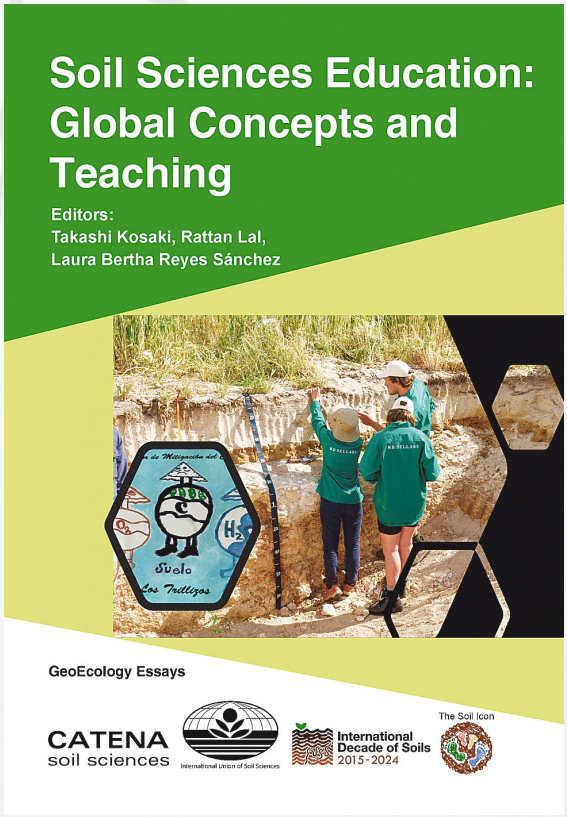
Refereed Journal Articles

- Amelung, W., Bossio, D., de Vries, W. et al. Towards a global-scale soil climate mitigation strategy. Nat Commun 11, 5427 (2020). https://doi.org/10.1038/s41467-020-18887-7
- Das, A., Layek, J., Babu, S., Kumar, M., Yadav, G.S., Patel, D.P., Idapuganti, R.G., Lal, R. and Buragohain, J., 2020. Influence of land configuration and organic sources of nutrient supply on productivity and quality of ginger (Zingiber officinale Rosc.) grown in Eastern Himalayas, India. Environmental Sustainability, pp.1-9.
- Das, A., Yadav, G.S., Layek, J., Lal, R., Meena, R.S., Babu, S. and Ghosh, P.K., 2020. Carbon Management in Diverse Land-Use Systems of Eastern Himalayan Subtropics. In Carbon Management in Tropical and Sub-Tropical Terrestrial Systems (pp. 123-142). Springer, Singapore.
- Kan, Zheng-Rong, Jian-Ying Qi, Qiu-Yue Liu, Cong He, Ahmad Latif Virk, Rattan Lal & Hai-Lin Zhang (2020) Effects of conservation tillage on wheat growth duration and grain yield in the North China Plain, Archives of Agronomy and Soil Science, DOI: 10.1080/03650340.2020.1868039
- Kan ZR, Ma ST, Liu QY, Liu B Y, Virk AL, Qi JY, Zhao X., Lal R, Zhang HL. 2020. Carbon sequestration and mineralization in soil aggregates under long term conservation tillage in the North China Plain. Catena. 188, 104428. https://doi.org/10.1016/j.catena.2019.104428
- Kan ZR, Virk AL, Wu G, Qi JY, Ma ST, Wang X, Zhao X, Lal R, Zhang HL. 2020. Priming effect intensity of soil organic carbon mineralization under no-till and residue retention. Applied Soil Ecology. 147, 103445. https://doi.org/10.1016/j.apsoil.2019.103445
- Kurmi, B., A.J. Nath, R. Lal, and A.K. Das. 2020. Water Stable Aggregates and the Associated Active and Recalcitrant Carbon in Soil under Rubber Plantation. Science of The Total Environment 703: 135498. http://www.sciencedirect.com/science/article/pii/S0048969719354920.

- Lal, R. 2020. Achieving land degradation neutrality in developing countries. Indian Journal or Soil Conservation. 48 (2): 1-10
- Lal, R. 2020. Managing Organic Matter Content for Restoring Health and Ecosystem Services of Soils of India. Journal of the Indian Society of Soil Science. 68 (1): 1-15. DOI: 10.5958/0974-0228.2020.00001.8
- Meena, R.S., Lal, R and Yadav, G.S. 2020. Long-term impact of topsoil depth and amendments on carbon and nitrogen budgets in the surface layer of an Alfisol in Central Ohio. Catena, 194:104752 . https://doi.org/10.1016/j.catena.2020.104752
- Sun, T, Zhao, C, Feng, X, et al. Maize-based intercropping systems achieve higher productivity and profitability with lesser environmental footprint in a water-scarce region of northwest China. Food Energy Secur. 2020; 00:e260. https://doi.org/10.1002/fes3.260
- Xu Y., Sun L., Lal R., Bol R., Wang Y., Gao X., Ding F., Liang S., Li S., Wang J. 2020. Microbial assimilation dynamics differs but total mineralization from added root and shoot residues is similar in agricultural Alfisols. Soil Biology & Biochemistry, 148: 107901.
- Xu Y., Ding X., Lal R., Gao X., Li S., Sun L., Wang Y., Li M., Bai S., Wang J. 2020. Effect of soil fertility on the allocation of nitrogen derived from different maize residue parts in the soil-plant system. Geoderma, 379: 114632
- Yadav, G.S., Lal, R., Moonilall, N.I. and Meena, R.S. 2020. The long-term impact of vehicular traffic on winter and spring methane flux under no-till farming in Central Ohio. Atmospheric Pollution Research. 11: 2030-2053, https://doi.org/10.1016/j.apr.2020.07.02

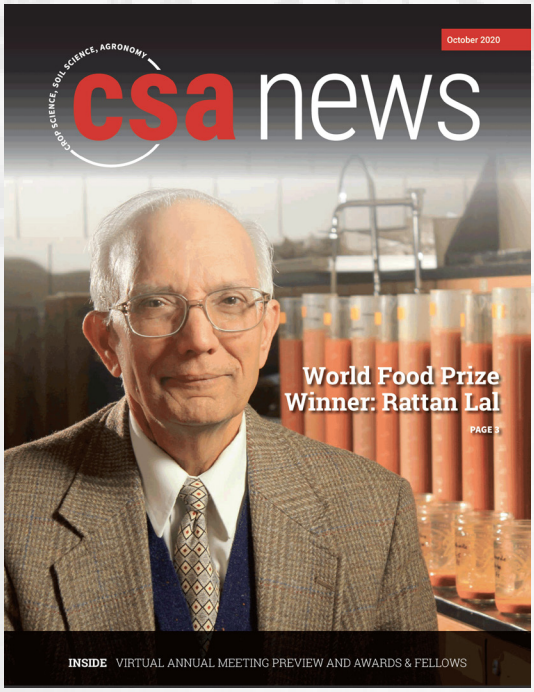
Books Edited





Book Chapters

- Kemper, K., Xia, Y., Lakritz, J., Lal, R.. 2020. Health of Soil, Plants, Animals, and People. In The Soil-Human Health-Nexus. Lal, R. (Ed). Boca Raton: CRC Press.
- Lal, R. 2020. Managing Soil for Global Peace by Eliminating Famines and Pandemics. In The Soil-Human Health-Nexus. Lal, R. (Ed). Boca Raton: CRC Press.
- Lal, R. 2020. Soil Health and Human Nutrition. In The Soil-Human Health-Nexus. Lal, R. (Ed). Boca Raton: CRC Press.
- Lal, R. 2020. Soil–Human Health–Environment Trinity. In The Soil-Human Health-Nexus. Lal, R. (Ed). Boca Raton: CRC Press.
- Lal, R. 2020. Structural Attributes of Disease-Suppressive Soils and Their Impact on Human Health. In The Soil-Human Health-Nexus. Lal, R. (Ed). Boca Raton: CRC Press.
- Lal, R. 2020. Tenents of Soil Education. In Kosaki, T., R. Lal, and L.B. Reyez-Sanchez (Eds). Soil Science Education: Global Concepts and Teaching. Catena Soil Sciences, Schweizerbart, Stuttgart, Germany
- Lal, R. 2020. Conserving Soil and Water to Sequester Carbon and Mitigate Global Warming, In: Delgado, J.A., Gantzer, C.A., Sassenrath, G.F. (Eds.), Soil and Water Conservation: A Celebration of 75 Years. Soil and Water Conservation Society, Ankeny, IA, p. 344.
- Lal, R., 2020. Advancing Climate Change Mitigation in Agriculture while Meeting Global Sustainable Development Goals, In: Delgado, J.A., Gantzer, C.A., Sassenrath, G.F. (Eds.), Soil and Water Conservation: A Celebration of 75 Years. Soil and Water Conservation Society, Ankeny, IA, p. 344



Miscellaneous

- Energy Futures Initiative. “From the Ground Up: Cutting-Edge Approaches for Land-Based Carbon Dioxide Removal.” December 2020. https://static1.squarespace.com/static/58ec123cb3db2bd94e057628/t/5fd25dad0435fb34f51d095a/1607622070340/From+the+Ground+Up+12.10.20+Final.pdf
- Lal, R. 2020. Forward. Journal of Development Policy Review (JDPR), Special Issue on the COVID-19 Pandemic and India. Volume 1, Issues 1 and 2, (Jan-Mar/April-Jun 2020): 16-17.
- Lal, R. 2020. India Must Have a National Soil Protection Policy. Agriculture Today, August 2020, 23(8):16-19.
- Lal, R. 2020. Is Soil a Renewable Resource? Agriculture Today, December 2020, 23(12): 8-11

For Dr. Lal’s invited keynote speeches and selected interviews, please visit cmasc.osu.edu

With winter comes a hope of spring and the hope of a COVID-19 eliminating vaccine.
Image courtesy The Ohio State Universty Signature Image Gallery

CONTACT INFORMATION

Do you have contributions for our next newsletter?
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