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PRAGMATIC ROLE OF MICROBIAL BIOSTIMULANTS IN THE MITIGATION OF ABIOTIC STRESSES IN CROPS

Sajid Ali

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The ever-increasing global population is expected to be approximately 9.7 billion by 2050, which will require 50% more food from the present scenario. Therefore, it is essential to mitigate the adverse effects of environmental stresses, enhance agriculture productivity, and produce sustainable food for the global population. Global food security can be achieved through rigorous agricultural security because agriculture is the basis of food, whereas, abiotic stresses are leading to excessive crop yield penalties and are the main threat to worldwide agriculture. It is essential to equip crop plants with multi-stress tolerance to mitigate the adverse effects of abiotic stressors and meet the demands of the increasing worldwide population. Agricultural practices worldwide are moving toward safer, sustainable, and environmentally friendly approaches because the continuous use of agricultural chemicals is a serious threat to human health and the environment. The association of plants and symbiotic microorganisms are involved in key functions at the ecosystem and plant level, and the use of microbial plant biostimulants (MPBs) is a sustainable strategy to augment plant growth and productivity, even under abiotic stress conditions. Various microorganisms can be used as MPBs to enhance plant growth and produce a progressive and reproducible effect on crop plants. The present study aimed to report the current knowledge on the use of MPBs, discuss diversity and characteristics of MPBs and deliver a meticulous analysis on the possible application of MPBs in the mitigation of abiotic stresses in crops.

Biography

Sajid Ali has completed his Ph.D. at the age of 30 years from the Center of Biotechnology and Microbiology (COBAM), University of Peshawar and Postdoctoral studies from Kyungpook National University (KNU), School of Applied Biosciences. He is an International Research Professor in the Department of Horticulture and Life Science, Yeungnam University, Republic of Korea. He has published more than 20 papers in reputed journals and has been serving as a reviewer and editorial board member of reputed science journals.

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THE DAMA PROTOCOL – IMPLEMENTING EVOLUTION INTO PUBLIC HEALTH TO PREVENT EPIDEMICS

Orsolya Bajer-Molnár

Konrad Lorenz Institute for Evolution and Cognition Research, Klosterneuburg, Austria

The recent COVID19 pandemic is the latest example of the devastation the ongoing Emerging Infectious Disease (EID) crisis can cause. Despite the numerous advances and existing health security measures, our current approaches are unable to deal with newly emerging infections, as all risk-assessment and preparedness strategies rely on historical data. The DAMA (Document, Assess, Monitor, Act) protocol serves as an umbrella framework for preventing the wave of emerging diseases. It is based on the evolution behind emergence, but integrates activities ranging from the local, boots on the ground contributions of citizen scientists led by ecologists to the most sophisticated technologies of bioinformatics, molecular biology and satellite surveillance. It is able to truly prevent diseases not at the stage of outbreak, but at the stage of crossing to new hosts. Nevertheless, its implementation into our current public health structure requires transdisciplinary collaboration and a conceptual integration into existing disease management strategies. My work involved reviewing historical changes and creating a model to categorize current disease management initiatives by aims and limitations. The model assigns existing organizations and initiatives based on their key outcomes into categories of Palliate and Prepare, and implements guidelines of the DAMA protocol within the third category of Prevent, thereby creating the interconnected Prevent – Prepare – Palliate (3P) model. This conceptual approach clarifies aims of existing structures and offers dynamic solutions to expand activities to prevent novel emergence.

Biography

Dr. Bajer-Molnár completed her PhD in Evolutionary Biology at Eötvös Loránd University, Hungary. She continued her research as a postdoctoral fellow at Dartmouth College (US) and at UFRN (Brazil). As a senior postdoctoral fellow, she is currently interested in implementing evoltuonary predicitons into public health practices to prevent emergence of novel diseases. She has published 14 papers in peer-reviewd journals, and plays an active role in science communicatonpresenting on events such as TedX, MemoBudapest and the FameLab competition series.

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CLIMATOLOGICAL CONDITIONS OF THE BLACK SEA-EFFECT SNOWFALL EVENTS IN ISTANBUL, TURKEY

Hakki Baltaci

Gebze Technical University,Turkey

A climatological analysis and overlying synoptic conditions of Black Sea-effect snowfall events were investigated for Istanbul, Turkey, during the 1971– 2006winter (DJF) periods. Using the synoptic climatological approach, the Lamb Weather Type (LWT) method was applied to NCEP/NCAR daily mean sea level pressure data. Basically, northwesterly (NW), northerly (N), and northeasterly (NE) circulation types (CTs), which blow from the Black Sea (BS), were thought to be important for sea-effect snowfall events to occur. Wind speeds and flows at 850-hPa, directional shear, and temperature difference between sea surface and 850-hPa level (SST-T850) thresholds were applied to these three CTs in order to find suitable snowfall cases originating from the BlackSea. The results showed that 4, 14, and 111 snowfall episodes occurred during NW, N, and NE circulation types over Istanbul with the 2.8, 4.1, and 3.5 cm daily mean snow cover depths (DMSCD), respectively. In particular, it was found that interaction between a surface high located over continental Europe and a low pressure located over the central Black Sea, and a relativelywarm sea surface temperature (SST), and cold temperature anomaly at the low level of the atmosphere (SST-T850 > 17ºC) are a favourable environment for the development of intense Black Sea-effect snowstorms (DMSCD > 10 cm) sourced by NE cases. A statistically significant positive relation between snow cover depths and SST-Tmax (daily maximum temperature) under NE cases($r = 0.28$, $p < .05$) indicated that we observe intense daily snow accumulation when land-sea temperature contrast increases (> 7ºC) in the region.

Biography

Dr. Hakki baltaci has completed his PhD at the age of 35 years from Istanbul Technical University, Turkey and postdoctoral studies from Turkish State Meteorological Service. He is the Assoc. Prof. and Head of Gebze Technical University, Institute of Earth and Marine Sciences after 2020. He has published more than 23 SCI papers, numerious presentations/proceedings, and invited talks about climate sciences.

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USE OF ACCELERATED OLIVINE WEATHERING AGAINST CLIMATE CHANGE

Chirag Bhimani

Sustainability and Climate Change Expert, India

Since the origin of the Earth, one natural process has removed almost all the carbon dioxide that was ever produced by various tectonic activities. That process is the reaction of carbon dioxide and water with rocks, a process known as weathering. We can accelerate and logically use the same process to remove the vastly higher carbon dioxide emissions caused by burning in a few hundred years the fossil fuels, that have taken hundreds of millions of years for their formation. This process called as Accelerated or Enhanced weathering is a carbon dioxide removal (CDR) strategy that is inexpensive, modeled on nature's natural long term carbon removal cycle, and requires no new or untested technologies in order to be deployed on a large scale.Ground olivine in large-scale coastal applications has been proposed as a low-tech, low-risk approach to remove carbon dioxide and also to counteract ocean acidification. With each 1 tonne of olivine weathered, equating to 1 tonnes of carbon dioxide stored eventually stored in magnesium bi carbonate.As a highly abundant mineral, there is sufficient olivine to remove significant quantities of carbon dioxide from the atmosphere and oceans.It is claimed that the rate of weathering of olivine is too slow to counter climate change, but they base this on experimental data in sterile laboratories, under exclusion of biotic and other environmental factors. Weathering experiments that use conditions closer to nature show already much higher weathering rates.With the help of data on the weathering of olivine in nature, it is explained that the weathering of olivine is fast enough to play an important role in the cycle of carbon dioxide capture and it is safe and sustainable storage as carbonate rocks.

Biography

Chirag Bhimani is working as Sustainability and Climate Change expert in India since 3 years now. Earlier he was working as the Head of Division in the Gujarat Pollution Control Board (State Environment Protection Agency in India). His major areas of interests are Environment and Climate Change Policy, Planning & Data Analytics; Air Quality Management; Climate Change Mitigation; Best Available Techniques (BAT) Reference Documents; Contaminated Sites Remediation and Management and Coastal & Marine Pollution Management.

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IMPACTS OF FERTILIZER AND WATER MANAGEMENT ON GREENHOUSE GAS EMISSIONS FROM RICE CULTIVATION IN BANGLADESH

S.M. Mofijul Islam

Bangladesh Rice Research Institute, Bangladesh

Efficient N management such as urea deep placement (UDP) and water saving irrigation alternate wetting and drying (AWD) are critical to increase rice yields, nitrogen use efficiency (NUE) and mitigate greenhouse gas (GHG) emissions. However, studies on the impacts of UDP and integrated plant nutrient system (IPNS) that combines organic inputs and inorganic fertilizer with different irrigation regimes on GHG emissions and yield in rice cultivation are limited. We conducted multiyear field experiments during the dry seasons to compare the effects of four fertilizer treatments including control (no N), prilled urea (PU), UDP and IPNS (integrated use of poultry manure and PU) with two irrigation regimes (AWD and continuous flooding, CF) on GHG emissions and rice yield. CH4 and N2O emissions were measured using the closed chamber technique and their concentrations were determined using a gas chromatograph. CH4 and N2O emissions varied across fertilizer treatments and irrigation regimes. UDP significantly ($p<0.05$) reduced cumulative CH4 emissions compared to PU and IPNS treatments, respectively. Across the year and fertilizer treatments, AWD irrigation significantly ($p<0.05$) reduced cumulative CH4 emissions, and GHG intensity without any yield penalty compared to CF condition. Although AWD irrigation increased cumulative N2O emissions by 73%, it reduced the total global warming potential by 27% compared to CF irrigation. Across the irrigation regimes, UDP significantly increases rice yield compared to PU. These results suggest that both UDP and AWD irrigation might be considered as a carbon-friendly technology.

Biography

S. M. Mofijul Islam is a Senior Soil Scientist of Bangladesh Rice Research Institute (BRRI), Bangladesh. He has completed PhD on fertilizer and water management on N use efficiency and GHG emissions from Khulna University, Bangladesh under Agrotechnology discipline. He has published more than 24 papers in peer reviewed journals, 1 book chapter, 1 short communication, and 1 abstract. He reviewed 30 international papers of reputed journal. His Google scholar citation is 350, h-index 9 and i10-index 8.

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SYNERGISTIC OPTIMIZATION OF ELECTROCOAGULATION PROCESS PARAMETERS USING RESPONSE SURFACE METHODOLOGY FOR TREATMENT OF HAZARDOUS WASTE LANDFILL LEACHATE

Pratibha Gautam

UPL University of Sustainable Technology, India

Leachate treatment is an essential and integral part of solid waste management system, and its efficient treatment becomes more crucial when the leachate is produced from industrial or hazardous waste landfills (HWLs), as it is multi-fold more toxic than the leachate produced from municipal solid waste landfills (MSWLs). Electrocoagulation has appeared to be a promising technology for treating complex wastewater including MSWL leachate, but specific treatability studies dedicated to HWL leachate are rarely available, and thus pose a demand for fundamental and advance research in this area to bridge the existing gap. The current study delves into systematic design of experiments to check the treatability of HWL leachate through electrocoagulation, considering reduction (maximum) in chemical oxygen demand (COD) as a response variable. Response Surface Methodology (RSM) was used for design of experiments and process optimization and three-dimensional surface response was also created to understand the relationship among process parameters and response variables. After extensive experimental trials and data analysis, it was observed that electrocoagulation can be used as a potential treatment technology for leachate with Galvanized Iron (GI) as preferable electrode material and it resulted up to 90% reduction in COD under optimized condition. Significant reduction in other parameters was also observed with a removal efficiency of 58.1%, 63.6%, 42.4%, 52.5%, 54.7% and 84% for cadmium, zinc, phenolic compounds, lead, TOC, and colour, respectively. The results showed that Electrocoagulation can be used as a replacement of currently practised energy extensive treatment technologies like multiple effect evaporators, which are used by landfill operators for managing their HWL leachate. The methodology and results from this research may be utilized by the researchers and operators of HWL landfills to decide the treatment trail for HWL leachate

Biography

Dr. Pratibha Gautam is Assistant Professor and Head of Department of Environmental Science &Technology at UPL University of Sustainable Technology, Ankleshwar (Gujarat), India. As head ofdepartment she is handling diploma, UG and PG course in Environment Engineering. Additionally,she is working as an environmental auditor (schedule-1), recognized by Gujarat Pollution ControlBoard (GPCB). Dr. Gautam is also QCI-NABET approved Functional Area Expert (FAE) for Airpollution monitoring, prevention, and control (AP). She is also designated as Technical Manager(TM) for NABL accredited Environmental Laboratory. In total, she has more than 10 years ofindustrial as well as academic experience. Dr. Gautam has completed her graduation (B.Tech) inChemical Engineering from Uttar Pradesh Technical University. She has done her Post Graduation(M.Tech) in Environmental Science and Engineering from Indian Institute of Technology (IIT-ISM)Dhanbad and Ph.D. from CSIR- National Environment Research Institute (CSIR-NEERI), Nagpur.At present, she is actively involved in environmental audit of industries and several research andconsultancy projects based on environmental issues for industries. She has guided several graduateand post graduate students on their thesis projects. She has a wide knowledge of differentenvironmental aspects including solid waste management, Air Pollution control, advanced oxidationprocesses for wastewater treatment and environmental audit etc. She has many publications inreputed international journals and has published several book chapters. She is a GATE and NETqualified environment professional and is the recipient of scholarships from the Indian government(MHRD) and the Netherlands government (NFP fellowship).

PARTICIPATORY MONITORING OF FOREST HEALTH IN THE CHICO MENDES EXTRACTIVE RESERVE, ACRE, BRAZIL

Sabina Cerruto Ribeiro

Federal University of Acre, Brazil

"Forest Health" is a program focused on community capacity building to support participatory monitoring of forest health in the Chico Mendes Extractive Reserve (CMER) in the state of Acre, Brazil. The project pursued a two-stage approach: 1) community workshops along with 2)engagement with the public school system in Acre. The project team implemented participatory workshops for training of young adult leaders from community associations of CMER on community forest monitoring. The use of scientific instruments, which provided foundations for documenting vegetation characteristics, combined with skills training in forest inventories and information technologies, allowed participants to gain knowledge useful for forest health monitoring and valuable in local job markets. In addition to capacity building with young adults, the project team also implemented an environmental education component with teenagers and children from rural schools. Their inclusion arose as a demand of the workshops' participants. For work with schools, the team stimulated the use of forests as laboratories to facilitate the teaching-learning process with regard to curricular content in many standard disciplines, highlighting the importance of forest health. Enabling children and young people today to know more about forest health will produce adults able to make more conscious decisions about how to conserve and manage forests in the future.

Biography

Sabina Ribeiro is Professor of Forest Management at the Federal University of Acre, Brazil. She has conducted research in the Amazon on tree mortality, sustainable forest management, carbon stock and participatory monitoring of forest health. She has led a project with funding from USAID and participates in other national and international projects. Her work features collaboration across disciplinary, national and organizational boundaries. She has over 35 peer-reviewed publications in scholarly journals and books.

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The Essential Role of Photosynthesis in Defining Net Zero Carbon Dioxide Emissions for Equilibrium Calculations

Dave White

Chemical Engineer Climate Change Truth Inc.,United States

In this research manuscript, the authors seek to answer four essential questions relative to the current climate change conversation now underway globally: (Q1) What is the numerically defined goal for annual Net Zero Carbon Dioxide Emissions in gigatonnes essential for global atmospheric homeostasis? (Q2) Why is atmospheric CO2 rising even though recent data support that CO2 emissions have the rate of rise lowered by 50% since 2014 globally? (Q3) Are CO2 cap and trade policies the best immediate intervention, or does globally increasing photosynthesis offer a more rapid and better long-term solution to climate change? (Q4) What strategies can be employed to have the greatest positive impact over the upcoming crucial twelve-year period? Nothing absorbs carbon dioxide out of our atmosphere like photosynthesis, and therein lies the most under-discussed solution to the greatest problem of our time. A single hectare of healthy Amazon Rainforest can sequester up to 100 tons of CO2yr-1 due to photosynthesis. And the fast-growing Empress Tree (Paulownia tomentosa) not only grows ten to twenty feet tall in its first year, but a single hectare of these trees can sequester up to 103 tons of CO2yr-1 due to photosynthesis (Emily Chasan 2019). Prior to the Industrial Revolution and long before global deforestation devastated Earth's delicate atmospheric ecosystem, forests around the world are estimated to have consumed up to 400 billion tons of CO2yr-1. As of 2019, that has been reduced dramatically as global forests consume less than 10 billion tons of CO2yr-1 with photosynthesis (Max Roser 2015).

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THIRD POLE'S CLIMATE CHANGE : IMPLICATIONS FOR REGIONAL PERSPECTIVES

Jairam Singh Yadav
Wadia Institute of Himalayan Geology,India

The Himalayan meteorology is critical for understanding cryospheric-hydrological processes and climate change forecasts. Meteorological observations in the Indian Himalayan Region (IHR) are limited, particularly in glacierized catchments. Therefore, the current study aims to demonstrate a comprehensive investigation of past and present meteorological parameters at regional (e.g., Indian Himalayan region) and local (e.g., Dokriani glacier catchment (DGC)) scale. In contrast to global temperature, an increasing trend of air temperature in the Himalayas has been forecast in recent decades (after 1990, TAvg~ 0.85°C), with a faster warming rate in the maximum temperature than in the minimum temperature. Trend of precipitation was inconsistent; for example, a substantial decrease in rainfall in monsoon season was reported in the western Himalayas. In the DGC, results show a rapid decrease in wind speed and out-flux radiation as the monsoon season begins, while relative humidity (RH) and positive degree-days (PDDs) increase. The existing positive temperatures (>3°C) in higher elevation bands (> 5500 m) raise serious concerns on the summer accumulation characteristics for the Dokriani glacier. The DGC has an average nearsurface temperature lapse rate (NSTLR) of 6.0°C km-1, with steeper in the pre-monsoon and shallower during the monsoon, and thus avoiding the use of standard environmental lapse rate (SELR~6.5°C km-1) in glacio-hydrological modelling. During the winter and pre-monsoon seasons, wind speed and albedo are particularly sensitive. The dataset of the present study is important for correlating hydro-meteorological measurements in various regions of the Himalayas; for example, the Kedarnath Tragedy-2013, and the most recent flash flood in Raunthi valley, Tapovan on 7th February 2021 was clearly a consequences of the regional climate change.

Biography

Dr. Jairam Singh Yadav has completed his PhD from Kurukshetra University in Haryana, India, and is presently a research associate at the Wadia Institute of Himalayan Geology. Climate change, glacier morphometric variations, and mass fluctuations are among his research interests.

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RESILIENCE OF INFRASTRUCTURES TO CLIMATE CHANGE

Davide Forcellini
University of Auckland, New Zealand

The assessment of infrastructures functionality during natural events is fundamental in the evaluation of emergency response and socio-economic recovery procedures. In this regard, resilience may be considered a key parameter for decision-making procedures such as post-hazard event mitigations and recovery investments. However, climate change has been increasing the effects of natural disasters and the assessment of potential risks are fundamental in the design of infrastructures. With this aim, resilience has been proved an appropriate approach to assess the recovery to various levels of pre-event functionality. A case study is considered in order to show the application of the proposed methodology to a real infrastructure. The principal outcome consists of calculating resilience as a readable finding that may have many applications for a wide range of stakeholders, such as infrastructure owners, transportation authorities and public administrators who can apply the outcomes in the assessment of the best recovery techniques and solutions.

Biography

Prof. Davide Forcellini completed his master's degree from the University of Bologna in Civil and Environmental Engineering in 2006. His master's thesis, titled "Study of Soil Structure Interaction" was developed at the University of California, San Diego. Since then, he has continued collaborations with UC San Diego and Berkeley. He worked as a bridge engineer between 2007 and 2009. Since 2009, he has been teaching at University of San Marino. He completed his Ph.D. at the University of San Marino where he is teaching. He is teaching at University of Azuay, Ecuador and collaborating with University of Auckland, New Zealand.