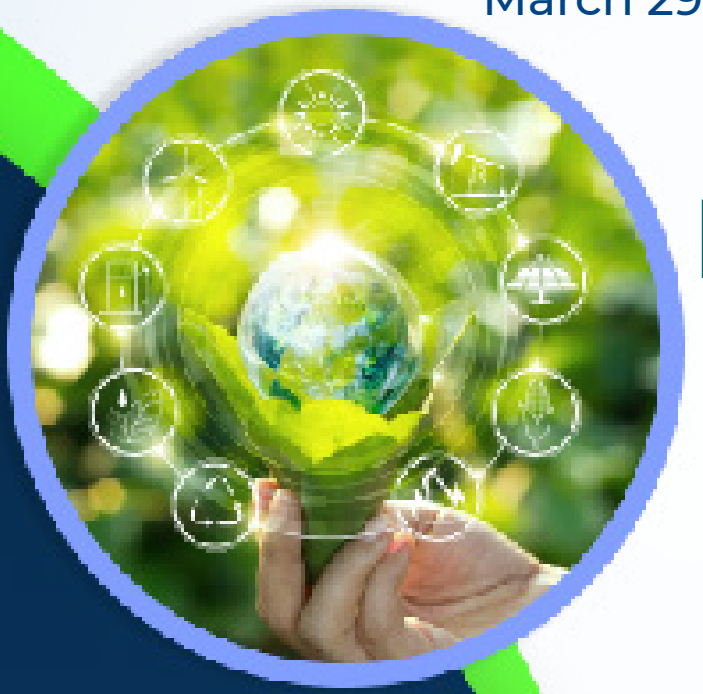
Coalesce Research Group

2nd International Webinar on

ENVIRONMENTAL SUSTAINABILITY AND CLIMATE CHANGE

March 29-30, 2021



Theme:

Emerging issues on climate change and environmental sustainability

Coalesce Research Group
33 Market Point Dr,
Greenville, SC 29607, USA

Contact Us:

Phone: +1-718-543-9362
Whatsapp: +1-315-902-2237
climatechange@crgmeetings.org

Scientific Program

2nd International Webinar on

Environmental Sustainability and Climate Change

Monday
March 29, 2021

Day 1 - March 29, 2021 STARTS AT BRITISH TIME - 10:00 AM	
10:00 - 10:10	Introduction
Oral Presentations	
10:10 - 10:35	Elevated CO_2 and increased nitrogen worsen damage caused by aphid pest on wheat Eva Maria Carreras Navarro, **Agriculture Victoria and The University of Melbourne, Australia**
10:35 - 11:00	Efficient development of functional composts utilizing spent coffee ground, rice bran and biochar through microbial bioaugmentation Sung-Cheol Koh, **Korea Maritime and Ocean University, South Korea**
11:00 - 11:25	Biochar's role in soil health and food quality: A case study of soil microbiome improvement against rot disease with Chinese Panax ginseng grown in a continuously cropped Alfisol Genxing Pan, **Nanjing Agricultural University, China**
11:25 - 11:50	Study on the chemical and crystal structure in wood treated by high-intensity microwave Wang Zhenyu, **Chinese Academy of Forestry, China**
11:50 - 12:15	Biochar significantly reduced fumigant emissions under field conditions Qiuxia Wang, **Chinese Academy of Agricultural Sciences, China**
12:15 - 12:40	Evidences of N_2O emissions in chloropicrin-fumigated soil Wensheng Fang, **Chinese Academy of Agricultural Sciences, China**
12:40 - 13:05	Chloropicrin alternated with biofumigation increases crop yield and modifies soil bacterial and fungal communities in strawberry production Daqi Zhang, **Chinese Academy of Agricultural Sciences, China**
Lunch (13:05 - 13:30) **Keynote Presentations**	
13:30 - 14:00	Proso millet (*Panicum miliacuem* L.) as climate-resilient food grains for human health Dipak Santra, **University of Nebraska-Lincoln, Panhandle Research and Extension Center, USA**
14:00 - 14:30	Large scale production and field applications of ready-mix recycled aggregate concrete (RAC) for sustainable construction M Shahria Alam, **The University of British Columbia, Canada**
Poster Presentations	
14:30 - 14:50	Modeling the spatial distribution of grey mullet using fishery and remote sensing data Teng Sheng-Yuan, **National Taiwan Ocean University, Taiwan**
14:50 - 15:10	Valorization by acid hydrolysis from three industrial crops (Tagasaste, Leucaena and Paulownia trihybrid) Susana Lozano Calvo, **University of Huelva, Spain**
15:10 - 15:30	Health area of LIFE NAdapta Project Estrella Miqueleiz, **Instituto de Salud Pública y Laboral de Navarra, Spain**
15:30 - 15:50	Quality of compost from hop biomass related to compost heap preparation Lucija Luskar, **Slovenian Institute of Hop Research and Brewing, Slovenia**
Oral Presentations	

2nd International Webinar on

Environmental Sustainability and Climate Change

Monday
March 30, 2021

15:50 - 16:15	Małopolska region's actions towards climate neutrality and air quality improvement Janusz Zyśk, AGH University of Science and Technology, Poland
16:15 - 16:40	*In Situ* trans esterification of low quality rapeseed in diesel fuel media Migle Santaraite, Vytautas Magnus University Agriculture Academy, Lithuania
16:40 - 17:05	Comparative study of the energetic and reproductive condition of the European pilchard between two nearby water bodies: The Atlantic Ocean and the Mediterranean Sea (South of the Iberian Peninsula) Marta Caballero Huertas, University of Girona, Spain
17:05 - 17:30	Pressure of parasitism, microplastics and thermal regimes on the state of health of European sardine along the Catalan Coast Xènia Frigola Tepe, University of Girona, Spain

End of Day 1 Sessions

Scientific Program

2nd International Webinar on
Environmental Sustainability and Climate Change

Tuesday
March 30, 2021

Day 2 - March 30, 2021 STARTS AT BRITISH TIME - 10:00 AM	
Oral Presentations	
10:00 - 10:25	Maltose and totally impermeable film enhanced suppression of anaerobic soil disinfestation on soilborne pathogens and increased strawberry yield Zhaoxin Song, Chinese Academy of Agricultural Sciences, China
10:25 - 10:50	Dimethyl disulfide (DMDS) as an effective soil fumigant against nematodes in China Dongdong Yan, Chinese Academy of Agricultural Sciences, China
10:50 - 11:15	Effect of treated wastewater on soil and environment Ajay Singh, Indian Institute of Technology Kharagpur, India
11:15 - 11:40	Bacterial identification in the root of candidate intergeneric hybrid of common bean Dilek Tekdal, Mersin University, Turkey
11:40 - 12:05	Proteomic responses of barley landraces to salt stress at the tillering stage Rahma Jardak, Centre of Biotechnology of Borj-Cedria, Tunisia
12:05 - 12:30	Main sources of dioxins generation at metals thermal treatment Anahit Aleksandryan, Ministry of Environment of the Republic of Armenia, Armenia
12:30 - 12:55	Egyptian standard specifications for drinking water: Parasitic point of view Wafaa Mohamed Abdalla Hikal, National Research Centre, Egypt and University of Tabuk, KSA
Keynote Presentations	
12:55 - 13:05	Title: Changing the channel on communicating climate change to the public Anton Holland, NIVA Inc., Canada
13:05 - 13:35	Use of perennial wild food plants to diversify Cambodian agriculture for improved nutrition and income Ricky M Bates, Penn State University, USA
Certificate Felicitation and Closing Ceremony	
End of Day 2 Sessions	

Day-1
Keynote Presentations

PROSO MILLET (*Panicum miliacuem L.*) AS CLIMATE-RESILIENT FOOD GRAINS FOR HUMAN HEALTH

Dipak Santra and Nirupama Das

University of Nebraska-Lincoln, USA

Abstract

Proso millet certainly is climate-smart, gluten-free, ancient, and small grain cereal, which is healthy to human and the environment. It was domesticated in 8000 - 10,000 BP in northern China, and is one of the seven commonly cultivated millets. Its impeccable climate resiliency is because of its drought tolerance and short-growing season. It has the highest water use efficiency (i.e. produces the highest amount of grain per gallon of water) among all cereals. It is gluten-free, rich in minerals (P, Ca, Zn, Fe), vitamins (niacin, B-complex vitamins, folic acid), lecithin which supports the neural health system, essential amino acids - methionine and cysteine, dietary fiber, and polyphenols. It has a low glycemic index and reduces the risk of type-2 diabetes. The exceptional nutritional properties of the grain resulted in a gradual surge in its demand in the human food market especially for people with diabetes and celiac disease. Unfortunately, in the USA, it is mostly considered as bird feed, whereas it is mainly used as human food in many other countries. The main challenge is to expand the proso millet market beyond bird feed into the human food industry. This paper will cover current status of proso millet research for genetic improvement, production, uses in food industry, and available foods in the markets. The paper will also cover current and future challenges to increase proso millets in human food industry. To overcome the challenge, unique proso millet varieties for human food and ready-to-use multiple food products must be developed. This requires successful collaboration among experts from diverse disciplines such as agriculture (plant breeders, geneticists, agronomists, etc.), food chemistry, socio-economics, policy makers, and industry partners. The optimism is that millets will be recognized as source of environmental-sustainable superfoods in 21st century.

Biography

Dipak Santra - I am a plant breeder and geneticist with over 25 years of professional experiences. My research goal is to develop genetically improved alternative crops (proso millet, pea, fenugreek, camelina, buckwheat, cowpea, einkorn wheat, tef, and amaranth) for rainfed and limited irrigated production systems. I have my brawny belief in the axiom 'Food for Health' and 'Medicine for Disease'.

Consuming nutritious and proportionate food is the cheapest and most sustainable option for gaining good health. Many of the crops in my portfolio fall under 'ancient and/or gluten-free', 'high quality plant protein', or 'medicinal/nutraceutical' (e.g. Fenugreek, Buckwheat); containing numerous exclusive attributes for human health. My goal is to bring these crops towards mainstream agricultural sciences, popularize their production and feed the food industries with these crops as the raw input. My ultimate vision is nothing but to bring the concept of 'Farm2Pharma' into the mainstream society. My research interests include forgotten ancient food crops for health of human and earth.

LARGE SCALE PRODUCTION AND FIELD APPLICATIONS OF READY-MIX RECYCLED AGGREGATE CONCRETE (RAC) FOR SUSTAINABLE CONSTRUCTION

M Shahria Alam, Humera Ahmed and Mohammad Tiznoba

The University of British Columbia, Canada

Abstract

Recycled concrete aggregate (RCA) is not widely accepted as a raw material for concrete production in North America due to the availability of natural aggregate. However, procuring natural aggregate relates to the increasing social and environmental costs. A large portion of the Canadian infrastructure is more than fifty years old and might require major rehabilitation/replacement. Their replacement will generate a large volume of demolished concrete waste. On the other hand, there will be more demand for concrete for new construction in near future. Hence, instead of sending this concrete waste into landfills, this could have potentials for recycling. A feasible option will be to use the demolished concrete as an aggregate for producing recycled aggregate concrete (RAC) in the ready-mix and precast industries. However, some challenges need to be overcome before this new type of concrete is introduced into the market. Here, several case studies will be presented that show how research works at UBC could help local industries overcome those barriers and eventually bring this 'green concrete' product into the market. The long-term performance of RAC examined for 5 years in terms of in-place compressive strength will be discussed. Moreover, strength correlations developed specifically for RAC for the estimation of compressive strength based on rebound numbers will be demonstrated.

Biography

M Shahria Alam is a Professor of Civil Engineering in the School of Engineering at The University of British Columbia (UBC)'s Okanagan campus. He is serving as the Director of the Green Construction Research & Training Center (GCRTC) at UBC. Dr. Alam is the Chair of the Engineering Mechanics and Materials Division of the Canadian Society for Civil Engineering (CSCE). He is an active and voting member of several ACI committees including ACI 341, ACI 441 and ACI 555. He received his PhD in Civil Engineering from Western University in 2008. His research interests include sustainable construction, smart and recycled materials and their structural engineering applications. He has published more than 300 peer-reviewed articles in these areas. He is the recipient of many national and international awards including CSCE Pratley Award 2015 and UBC Moldovan Memorial Award 2014. Research interests include smart materials, recycled materials and earthquake engineering.

Day-1
Oral Presentations

ELEVATED CO_2 AND INCREASED NITROGEN WORSEN DAMAGE CAUSED BY APHID PEST ON WHEAT

Eva Maria Carreras Navarro[1,2], Lam, Shu Kee[2], Trębicki and Piotr[1,2]

[1]*Agriculture Victoria, Australia*

[2]The University of Melbourne, Australia

Abstract

Background: The rise in atmospheric carbon dioxide (CO_2) will decrease the nutritional value of wheat products by reducing their nitrogen and protein content. This may be addressed by increasing or optimizing fertilizer use, which in turn can alter the metabolic rates, development and performance of insect pests. To our knowledge, our study is a first that investigates the effects of different levels of CO_2 and nitrogen fertilizer application on the performance of the bird cherry-oat aphid, a global pest and vector of viruses in cereals affecting quality and yields.

Methods: We investigated the effect of three nitrogen application rates (low, medium and high) and two CO_2 levels (current and future) on wheat growth and quality and the development and performance of the bird cherry-oat aphid under controlled environmental conditions.

Results: We found that predicted CO_2 levels significantly decreased aphid progeny and wheat nitrogen content by 22% and 39%, respectively, when compared to current CO_2. Greater nitrogen input significantly increased the number of aphid pests as well as plant nitrogen content, however, did not offset the effects of increased CO_2 level.

Conclusion: Strategies to mitigate lower protein content in grain products as a result of future CO_2 concentration through increasing nitrogen fertilization, can backfire by increasing aphid infestation and thus damage caused.

Biography

Eva Maria Carreras Navarro graduated from the University of Melbourne with a Food Science degree in December 2019. She wrote her thesis on the impact of elevated CO_2 and nitrogen application rates on the interaction between wheat and its aphid pest. Since finishing her master's degree she has been working at Agriculture Victoria, Australia on several projects with a focus on insect vectors and plant diseases, climate change and food security.

EFFICIENT DEVELOPMENT OF FUNCTIONAL COMPOSTS UTILIZING SPENT COFFEE GROUND, RICE BRAN AND BIOCHAR THROUGH MICROBIAL BIOAUGMENTATION

Sung-Cheol Koh, Yong-hun Han and Aalfin Emmanuel S

Korea Maritime and Ocean University, South Korea

Abstract

Background: Spent coffee grounds (SCG), one of the world's most discarded wastes, could be an excellent resource to make a good organic fertilizer because of its richness in organic nutrients. Interestingly, the by-products carry rich organic compounds such as cellulose, hemicellulose, protein, sugars, chlorogenic acid and polyphenols. SCG, rice bran (a replacer for chicken manure as a nitrogen source) and agricultural waste-derived biochar were used to manufacture functional composts through microbial bioaugmentation, resulting in a rapid composting process

Objective: The objective of this study is to develop a quality functional compost utilizing SCG, rice bran and biochar through a microbial bioaugmentation technology in a short period.

Method: The composts manufactured from the lab and pilot scales were subjected to functional efficacy test for commercial applications. Physical parameters were monitored throughout 14 days of composting and the control was made without the microbial bioaugmentation. Compost phytotoxicity tests based on germination index of radish, anti-oxidant tests (DPPH, TPC, TFC, TEAC) for radish plants grown in the composts and the microbial community analysis for the composts were conducted.

Result: The germination indices of composts treated with plant promoting bacteria increased by 32-39% and *Streptomyces sp*. antagonistic to the plant pathogen caused 21% of increase in germination index. DPPH, TPC and TEAC anti-oxidant activities of radish plants grown in the presence of Tr_5 compost were higher by 15, 27 and 33% compared with the control (Tr_4). The genus halotalea and lactobacillus were highly dominant in Tr_5 with the percentage of 59% and 19%, respectively.

Conclusion: This novel technology can render an eco-friendly recycling of organic wastes such as spent coffee grounds, rice bran, and agricultural wastes. A high availability of the low cost composting materials and benefits of the functional compost should allow commercialization of the compost as a marketable product.

Biography

Sung-Cheol Koh has been working for Dept. of Environmental Engineering, Korea Maritime and Ocean University, Busan, South Korea since 1996. His major research interests have been developments of eco-friendly and economical technologies for recalcitrant wastewater treatment, malodor removal, organic farming and organic aquaculture (RAS) using beneficial composite microorganisms and biomaterials (biochar, etc.), and CDM business for the wastewater treatment plants using the bioaugmentation system using beneficial microorganisms. Research interest include solid waste management.

Coalesce Research Group

2nd International Webinar on

Environmental Sustainability and Climate Change

March 29-30, 2021

BIOCHAR'S ROLE IN SOIL HEALTH AND FOOD QUALITY: A CASE STUDY OF SOIL MICROBIOME IMPROVEMENT AGAINST ROT DISEASE WITH CHINESE PANAX GINSENG GROWN IN A CONTINUOUSLY CROPPED ALFISOL

Genxing Pan[1], Cheng Liu[1], Rong Xia[1], Man Tang[1], Xue Chen[1], Bin Zhong[1], Xiaoyu Liu[1], Rongjun Bian[1], Li Yang[2], Jufeng Zheng[1], Kun Cheng[1], Xuhui Zhang[1], Stephen Joseph[1,3], Marios Drosos[1] and Lianqing Li[1]

[1]*Nanjing Agricultural University, China*
[2]*Jilin Agricultural University, China*
[3]*University of New South Wales, Australia*

Abstract

Soil health and food safety was increasingly advocated, particularly with COVID-19. Improved growth with biochar soil amendment (BSA) through reducing incidence of plant pathogens was addressed as system acquainted resistance. A continuously cropped Alfisol with Chinese Pantax ginseng was amended at 20 t ha^{-1} respectively with maize (MB) and wood (WB) biochar, compared to manure compost (MC) as control. Annually, mineral (MCF) was supplied at 900 kg ha^{-1} yr^{-1} for MC while biochar compound fertilizer (BCF) at 600 kg ha^{-1} yr^{-1} for BSA, respectively. With improved survival rate and growth traits, root biomass increased by 25% and 27%, but total ginsenosides unchanged and increased by 10%, respectively under WB and MB compared to MC. Relevantly, bacterial abundance was increased significantly and insignificantly while soil fungal abundance increased by 96.2% and 384.6%. With changes in microbial richness and diversity, community structure both of soil bacteria and fungi was seen altered with biochar amendments. Under WB and MB respectively over MC, abundance of pathogenic *Fusarium spp*. was significantly decreased by 19% and 35%, in addition to higher abundance of beneficial bacterial species such as *Penicillium spp*.. And, abundance proportion of pathotrophic fungi to the fungal total significantly decreased while that of Arbuscular mycorrhizal very significantly increased in WB and MB, respectively compared to MC. Thus, BSA and biochar fertilizer, particularly with maize residue biochar, could be a practical measure to improve soil health and ensure growth and functional quality of ginseng roots in continuously cropped fields mainly through improving soil microbiome.

STUDY ON THE CHEMICAL AND CRYSTAL STRUCTURE IN WOOD TREATED BY HIGH-INTENSITY MICROWAVE

Wang Zhenyu, Xu Enguang, Lin Lanying and Fu Feng

Chinese Academy of Forestry, China

Abstract

Mongolian Scotch pine (*Pinus sylvestris var. mongolica Litv.*) is one of the dominant fast-growing species in northern China. Before the solid utilization of fast-growing wood, an appropriate functional modification is necessary to improve their natural defects. High-intensity microwave (HMW) treatment can be used as an efficient and green way to significantly increase the wood permeability, which benefits the modification process and the applications of renewable fast-growing wood resources. However, researches on the changes occurred at the scale of macromolecular after HMW treatment were insufficient, resulting in a lack of full understanding of HMW treatment mechanism. In this study, the effects of HMW on the chemical and crystal structure characteristics of wood were investigated, mainly using Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD) to detect the changes in chemical functional groups and crystallinity, respectively. During HMW treatment, both of the microwave intensity and wood moisture content (MC) had significant influence on wood macromolecular characteristics. From the FTIR spectrum, the intensity of carbohydrate peaks, especially for hemicellulose, decreased after HMW treatment, whereas that of lignin peaks was relatively stable. Although the length of hydrogen bond didn't show great differences between each HMW groups, with the increase of microwave energy density, the total hydrogen bond energy showed a downward trend in 20% MC samples, while it first decreased and then increased in 30% and 40% MC samples. In XRD tests, the crystallinity and the width of crystal zone of HMW-treated wood were determined. Compared with control samples, the crystallinity decreased obviously in 20 kWh/m^3 HMW treatment, followed by a slightly rebounding in 40 kWh/m^3 due to the crystallization of non-crystalline area in wood. When the microwave intensity came to 60 kWh/m^3, the crystallinity reached the maximum, and decreased again in 80 kWh/m^3 mainly because of the degradation of cellulose.

BIOCHAR SIGNIFICANTLY REDUCED FUMIGANT EMISSIONS UNDER FIELD CONDITIONS

Qiuxia Wang, Suduan Gao, Dong Wang and Aocheng Cao

Chinese Academy of Agricultural Sciences, China

Abstract

Background: Soil fumigation continues to be an essential practice to control soil-borne pests and diseases, but fumigant emissions must be minimized to reduce exposure risks and environmental impact. Studies have shown a great potential of using biochar to reduce fumigant emissions, but there are no sufficient field studies to develop an agronomic practice.

Objective: Determine the effects of three biochar products and two application rates on fumigant 1,3-dichloropropene (1,3-D) and chloropicrin (CP) emissions, distribution, and persistency in soil, nematode control, and potential toxicity to plants in a field experiment.

Methods: The three products included biochar produced from almond shells (ASB) at either 550 or 900°C pyrolysis temperature or from coconut shells (CSB) at 550°C. Each biochar's two amendment rates were 30 and 60 t ha^{-1}, plus a surface covering with a low permeability film (TIF) and no surface treatment or covering (control). A mixture of 1,3-D and CP was injected to 60 cm soil depth at a total rate of 640 kg ha^{-1}. Fumigant emissions and distribution in the soil-gas phase were monitored for three weeks. Residual fumigant in surface-treated soil or the profile was monitored. Germination of cucumber seeds and biomass were investigated after fumigation.

Results: All biochar applications significantly reduced fumigant emissions by 38-100% compared to the control. The ASB (900°C) at both rates reduced emissions as effectively as the effective TIF (by 99-100%). Cucumber germination rate and dry biomass were negatively correlated with residual fumigant concentrations in surface soil (52 days after fumigation), with the highest from CSB (550°C)>ASB (900°C) >ASB (550°C), which suggesting phytotoxicity.

Conclusion: This research demonstrated the benefits of using biochar to control fumigant emissions, but products vary significantly for effectiveness in emission reduction and potential phytotoxicity.

Biography

Qiuxia Wang's research interests are in aspect of environmental behavior and application methods of soil fumigants, especially in transport and atmospheric emission of soil fumigants. She did several researches to evaluate the effects of amending different materials biochar into soil on fumigant such as methyl isothiocyanate, dichloropropene and chloropicrin degradation, distribution, emission and biological activity. Studies have shown a great potential of using biochar to reduce fumigant emissions. The results were published on Journal of Environmental Quality, Journal of Agricultural and Food Chemistry, Science of the Total Environment. Research interest is on environmental behavior of soil fumigants.

EVIDENCES OF N_2O EMISSIONS IN CHLOROPICRIN-FUMIGATED SOIL

Wensheng Fang and Aocheng Cao

Chinese Academy of Agricultural Sciences, China

Abstract

Background: Soil fumigation has been used to control soil-borne pathogens, nematodes, and weeds for several decades worldwide. As one of the most used fumigant, chloropicrin (CP) has been widely employed in crops, such as strawberry, cucumber, tomato, ginger, melon, and eggplant, to control soil-borne pathogens and plant-parasitic nematodes. Soil treated with CP increased N_2O emissions by 12.6 times. However, the role of microbial community in increasing N_2O emissions and the biochemical pathways used by microorganisms to produce N_2O emissions after CP fumigation have not yet been reported.

Objective: To examine the mechanism of N_2O production following chloropicrin (CP) fumigation.

Methods: Real-time PCR and 16S rRNA gene amplicon sequencing techniques were used to determine N_2O emissions from bacterial microorganisms associated with nitrogen (N) transfer when soils was fumigated with CP. N_2O emissions pathway was determined by Metatranscriptomes and dual-label 15N-18O isotope anaylsis.

Results: Our results showed that CP fumigation increased N_2O production from 23 to 25 times in comparison with the control and significantly decreased the abundance of 16S rRNA and N-cycling functional genes. CP also decreased the soil bacterial diversity and caused a shift in the community composition. The N_2O emissions in fumigated soil were significantly correlated with soil environmental factors (NH_4^+, dissolved amino acid, microbial biomass nitrogen and NO_3^-) but were not correlated with the abundance of functional genes. Metatranscriptomes and dual-label 15N–18O isotope analysis revealed that CP fumigation inhibited the expression of gene families involved in N_2O production and sink processes and shifted the main pathway of N_2O production from nitrification to denitrification.

Conclusion: CP inhibited the expression of gene families involved in both N_2O production and sink processes and caused a shift from the nitrification N_2O emissions pathway to the denitrification pathway, which became the main pathway of N_2O production following CP fumigation.

Biography

Wensheng Fang has his expertise in the soil microbial ecology and biogeochemical cycles of carbon (C), nitrogen (N) and phosphorus (P) in soil ecosystems. In his PhD and post-PhD, Dr Fang employs advanced bio-molecular (such as Metagenomics and Metatranscriptomes) and physicochemical approaches (including dual-label 15N-18O isotope analysis) to understand the distribution and diversity of microbial communities in fumigated soils, and the processes and mechanisms of microbes-mediated N cycles. Dr Fang is specifically interested in the interactions of soil-plant, soil-microbe, plant-microbe, especially the field in competition and succession sequence of functional microorganisms and pathogenic bacteria, construction of microbial community in agricultural soil. He has published 42 high quality papers in the field of soil ecology and environmental behavior of pesticides. Research interests include soil microbial ecology and biogeochemical cycles of carbon (C), nitrogen (N) and phosphorus (P) in soil ecosystems.

CHLOROPICRIN ALTERNATED WITH BIOFUMIGATION INCREASES CROP YIELD AND MODIFIES SOIL BACTERIAL AND FUNGAL COMMUNITIES IN STRAWBERRY PRODUCTION

Daqi Zhang and Aocheng Cao

Chinese Academy of Agricultural Sciences, China

Abstract

Background: Chloropicrin (Pic) and biofumigation are both considered effective chemical and non-chemical alternatives to methyl bromide, respectively, for controlling crop-limiting soil-borne pests and diseases.

Objective: In this study, we evaluated the effects of Pic alone and 'chloropicrin alternated with biofumigation' (CAB) on the soil's physico-chemical properties and strawberry yield, as well as their effects on soil bacterial and fungal communities.

Methods: Data come from a strawberry greenhouse in Mancheng, Hebei, China. The experiment collected information on the soil physicochemical properties, two main pathogens *(Fusarium* spp. and *Phytophthora* spp.*),* strawberry yield, strawberry fruits chemical indicators, and soil microbial community diversity. Duncan's new multiple range test was used to determine statistical differences.

Results: The contents of NO_3^--N, available phosphorus and potassium, and organic matter were all significantly increased when CAB was used. *Fusarium* spp. and *Phytophthora* spp. which are known to cause plant disease were significantly decreased after CAB treatment. In addition, CAB also significantly increased the strawberry marketable yield, enhanced chlorophyll levels in the leaves of strawberry plants, and the soluble sugar and ascorbic acid content in strawberry fruit. We used high-throughput gene sequencing to monitor changes in the soil's bacterial and fungal communities. Although CAB significantly decreased the diversity of these communities, it increased the relative abundance of some biological control agents in the phylum Actinobacteria and the genera, An increase in these biological control agents would reduce the incidence of soil-borne pathogens and plant disease Pseudomonas, Bacillus and Chaetomium.

Conclusion: These results indicated that CAB could improve the physico-chemical properties of soil for strawberry production, increase the genetic diversity of microbes in the soil and enhance marketable fruit yield. In addition, CAB treatment is also important for reducing the use of chemical fumigants, effectively using livestock manure, reducing environmental pollution and reducing planting costs.

Biography

Daqi Zhang has many years of research experience in soil fumigants to prevent soil- borne diseases. After China proposed the policy of "*zero growth in the use of chemical fertilizers and pesticides*", she launched a new fumigation mode – "chemical fumigants alternated with biofumigation (animal manure)", and evaluated the impact of this new fumigation mode on soil-borne diseases and crop yields. The results show that this new fumigation mode is feasible. This research provides new ideas for reducing the use of chemical fumigants and slowing down the pollution of animal manure to the environment.

Coalesce Research Group

2nd International Webinar on

Environmental Sustainability and Climate Change

March 29-30, 2021

MAŁOPOLSKA REGION'S ACTIONS TOWARDS CLIMATE NEUTRALITY AND AIR QUALITY IMPROVEMENT

Janusz Zyśk, Justyna Mazurkiewicz, Anna Sowiżdżał, Anna Ostręga, Aleksandra Pup, Artur Wyrwa, Piotr Łyczko, Ewa Adamiec, Wojciech Suwała, Marcin Pluta and Maciej Raczyński

AGH University of Science and Technology, Poland

Abstract

Background: Małopolska Region (Lesser Poland Voivodship), one of the sixteen voivodships in Poland, is located in the south of the country. It has an area of 15 183 km^2 and a population of 3.3 million. The capital city of the region is Cracow. In Małopolska, hard coal remains the main energy carrier. There are two operating hard coal mines in the region. Coal is used as a fuel in four combined heat and power plants but also in ca. 40% of households for space heating and hot water preparation. The latter results in high emissions of pollutants (PM, B(a)P and CO_2) from low stacks and consequently poor air quality. The high dependence on coal, particularly in the household sector, means that the future energy transition must take into account social and economic conditions. With this in mind, in 2021 the province started LIFE IP "Implementation of the Regional Climate and Energy Action Plan" in the framework of the EU LIFE program.

Objective: Elaboration of an action plan for the Małopolska Region, including economic and social aspects, to reduce GHG emissions by 40% in 2030 as compared to 1990.

Methods: Development of energy balances in the sectors of energy, transport, industry, households and agriculture. Estimation of the GHG emissions based on energy balances. Scenario analysis of PM and GHG emissions reduction for four sub-regions. Renewable energy sources (RES) potential assessment in the Małopolska Region - assessment of the resource potential as well as the actual state of RES use, the prospects of increasing their share in the energy balance, and the various aspects of operation RES installations in the region.

Results: GHG emissions in 2018 were estimated to be 24.5 Mt CO_{2e}, nearly 10% lower compared to 1990. Coal consumption accounted for 37% of all energy carriers. RES shares in transport, electricity and heat production were 5.5%, 5.0% and 7.6%, respectively. It is estimated that there are over 35,000 installations of renewable energy sources with a total installed capacity of 546 MW. Solar collectors, photovoltaic panels and heat pumps play an important role in the market of RES installations in Małopolska, but the potential for renewable energy sources utilization is much greater. Post-mining areas, including extractive waste facilities and other degraded areas, will be analyzed as potential sites for solar farms or energy crops. The scenario analysis showed that elimination of coal and thermo-modernization in the household sector would result in a 76% reduction in GHG emissions.

Małopolska Region is facing a great environmental challenge, which includes improvement of air quality and reduction of greenhouse gas emissions. This will require economic and social changes, which can be a great opportunity for the development of the region. The achievement of ambitious environmental

goals requires close cooperation between scientific entities, government and society as a whole. It is necessary to take actions to increase the use of clean and environmentally friendly renewable energy in the region and also use degraded areas for this functions.

Biography

Janusz Zyśk, Ewa Adamiec, Anna Ostręga, Marcin Pluta, Maciej Raczyński, Artur Wyrwa, Anna Sowiżdżał and Wojciech Suwała are researchers at the AGH University of Science and Technology in Cracow, Poland. They represent three faculties of AGH: (i) Energy and Fuels, (iii) Geology, Geophysics and Environmental Protection, (iii) Mining and Geoengineering. In their research, among other things, they investigate the environmental impact of various energy processes and energy sources, including air quality and climate change as well as post-mining reclamation and revitalisation. Piotr Łyczko, Justyna Mazurkiewicz, Aleksandra Pup work at the Environmental Department of the Marshal's Office of the Małopolska Region (Poland). They work on air quality improvement and climate change mitigation. Research interests include energy, environment and climate change.

Coalesce Research Group

2nd International Webinar on

Environmental Sustainability and Climate Change

March 29-30, 2021

In Situ TRANS ESTERIFICATION OF LOW QUALITY RAPESEED IN DIESEL FUEL MEDIA

Migle Santaraite and Egle Sendzikiene

Vytautas Magnus University Agriculture Academy, Lithuania

Abstract

Background: Due to poor transport or storage conditions, about 10% (of the total harvest) of rapeseed loses its quality–the acidity of their oil often exceeds the norms suitable for human or animal consumption. As a consequence, these seeds become biological waste, and the right way to reuse them must be found, from an energy and environmental point of view.

Objective: To explore the possibilities of producing diesel-biodiesel fuel blends using low quality rapeseed in diesel fuel media and using different alcohols for the enzyme-catalyzed *in situ* transesterification process, as well as to optimize the optimal conditions of process.

Results: The optimal lipase suitable for the *in situ* transesterification process using different alcohols was screened by thin layer chromatography. The yields of rapeseed oil and rapeseed methyl, ethyl or butyl esters from the reaction products was analyzed by Fourier transform infrared spectroscopy. The degree of transesterifications and the quantities of glycerides (mono-, di-, tri- glycerides) was evaluated by gas chromatography.

Immobilized lipase – *Lipozyme LT IM* was chosen as the most suitable catalyst according to the reaction conditions. Diesel fuel, as an oil extraction solvent, showed over 99% of the yield of rapeseed oil and rapeseed methyl, ethyl or butyl esters in fuel mixtures. Diesel-biodiesel fuel mixtures that meet the requirements of European standard for biodiesel: EN 14214, were produced, and reactions conditions were optimized.

Lipase – *Lipozyme LT IM*, is an excellent biocatalyst in the presence of higher acidity of rapeseed oil, for the synthesis of biodiesel using different alcohols (methanol, ethanol or butanol). In the *in situ* transesterification process, the diesel fuel media gave excellent results as an oil extraction solvent and for the production of direct fuel mixtures. This method of producing fuel mixtures has environmental and energy benefits.

Biography

Migle Santaraite is PhD student in Environmental Engineering in Vytautas Magnus University Agriculture Academy. Her field of study relates to the biodiesel-to-diesel fuel mixtures production by using in situ transesterification process and biocatalysts – lipases. Also the evaluation of physical and environmental properties of products obtained.

Egle Sendzikiene has completed her PhD in Environmental Engineering in 2005. She is the head research fellow and professor at Agriculture Academy of Vytautas Magnus University (Lithuania). She has published more than 50 papers in the scientific journals. E Sendzikiene has also conducted a number of national and international projects. She has both scientific and practical knowledge of the analysis and usage of renewable energy, biodiesel fuel and biogas. Research interest is on biofuels.

COMPARATIVE STUDY OF THE ENERGETIC AND REPRODUCTIVE CONDITION OF THE EUROPEAN PILCHARD BETWEEN TWO NEARBY WATER BODIES: THE ATLANTIC OCEAN AND THE MEDITERRANEAN SEA (SOUTH OF THE IBERIAN PENINSULA)

Marta Caballero Huertas, Xènia Frigola Tepe, Fernández-Iniesta C, Viñas J and Muñoz M

University of Girona, Spain

Abstract

Background: Reproductive potential is closely related to body and energetic status in fish. The study of energetic and reproductive condition has been broadly used to assess the health state of fish populations. European pilchard (*Sardina pilchardus*) is an important small pelagic fishery species with cold-temperate water affinity distributed throughout both Mediterranean and eastern Atlantic. Oceanographic variables of physical (i.e., temperature, salinity, etc.), chemical and biological (i.e., productivity) nature are key in the life cycle of pelagic teleost, affecting their condition and health status. Therefore, regional divergences in these variables from nearby areas but different seawater masses could have a lot to do with the quality of the fishing resource.

Objective: To compare both energetic and reproductive condition in European pilchard individuals from two nearby areas influenced by different bodies of water: Alboran Sea (Mediterranean Sea) and Gulf of Cádiz (Atlantic Ocean) in two seasons (winter 2019- 2020 and summer 2020).

Methods: Sex ratio was defined, and reproductive condition was analyzed by determining the reproductive developmental stage and calculating the gonadosomatic index (GSI) of pilchard specimens from the two locations mentioned; energetic condition was estimated from tissue fat content percentage through fatmeter and by visual mesenteric fat scale, together with the evaluation of relative condition factor (Le Cren's factor, K_n).

Results: Significant differences in both reproductive and energetic condition were detected among the individuals from the two locations studied, reflected by GSI and K_n parameters.

Conclusion: This preliminary work shows regional differences in reproductive and energetic condition of the European pilchard associated to the influence of two water bodies (Atlantic Ocean and Mediterranean Sea) during winter 2019-2020 and summer 2020. Whole-year studies will reveal the condition and, therefore, health status of these two stocks located in the south of the Iberian Peninsula.

Biography

Marta Caballero Huertas' current research involves teleost reproductive condition and its variability associated with population differences. Specifically, she is conducting her PhD in the analysis of the genomic variability and condition of Sardine populations in the Mediterranean Sea and its implications for fishery management (ConSarVar project). She has her background in fish reproductive physiology and genetics. Previous research that she carried out is related to the reproductive study of rare fish species in an area as a method of predicting their settlement in a scenario of global warming that favours invasions. Moreover, she has worked in the study of the immune system-reproductive system interactions in zebrafish model species with the focus on epigenetic mechanisms.

Coalesce Research Group

2nd International Webinar on

Environmental Sustainability and Climate Change

March 29-30, 2021

PRESSURE OF PARASITISM, MICROPLASTICS AND THERMAL REGIMES ON THE STATE OF HEALTH OF EUROPEAN SARDINE ALONG THE CATALAN COAST

Xènia Frigola Tepe, Marta Caballero Huertas, Gispert-Fontanet N, Viñas J and Muñoz M

University of Girona, Spain

Abstract

Background: *Sardina pilchardus* is a small pelagic fish with a key role in marine ecosystem. European sardine is under a continuous threat of overfishing, sea-water temperature rise, parasitism and pollution, including microplastics, one of the most worrying concerns in recent years. Because of the combination of these factors, sardines have been experienced a decrease in catches by the Mediterranean purse seine fleet, accompanied by a reduction in the total size, in their condition and changes in maturation.

Objective: To evaluate how parasitism and microplastics are affecting sardines' condition under two thermal regime areas of the Catalan Coast (Northwestern Mediterranean).

Methods. We characterized the parasitism by nematodes and quantified the microplastics found in the visceral cavity of sardines during more than an annual reproductive cycle. In this context, to define the potential effect of both factors on the condition of the individuals sampled, we calculated the Le Cren (K_n) factor, and the total lipid content and the amount of mesenteric fat were measured.

Results. Sardines distributed in the southern warmer Catalan Coast have a significantly worse condition. On the one hand, microplastics have been found in almost all sardines analyzed, located in several parts of the visceral cavity, without differences in sardines from the two thermal regime areas. On the other hand, sardines from the southern Catalan Coast appeared with a significantly higher infection prevalence, mean intensity and mean abundance by the nematode parasite *Hysterothylacium aduncum* in larval stage 3. Moreover, spawning period in 2020 has begun earlier than in 2019, maybe due to changes in water temperature.

Conclusion: Microplastics do not affect the condition of sardines, and do not show differences along the Catalan Coast. In contrast, a higher parasitism mean intensity, in combination with a higher temperature regime, significantly affects the condition of sardines from the southern Catalan Coast.

Biography

Xènia Frigola Tepe is currently working as a research technician for the Department of Biology in the University of Girona. She is analysing the relationship between parasitism and condition in sardine (*Sardina pilchardus*) in the frame of the project: Detection of parasites in the Catalan fishery of sardine. Impact on health and condition (ARP059/19/0001 1 and file CAT: 152CAT00012). This project is granted by the "European Fisheries and Maritime Fund (FEMP)" for the innovation in the fishing sector and the collaboration between scientist and fishermen. She holds a Bachelor's degree in Biology from the University of Girona and a Master's degree in Oceanography and Marine Environmental Management (University of Barcelona). Her Bachelor's Degree Final Project was focused in analysing the nematodes infecting *Molva macrophthalma* and her Final Master's Degree Project in combining methods to assess oocyte development in the Blue whiting, *Micromesistius poutassou*.

Day-2
Keynote Presentations

CHANGING THE CHANNEL ON COMMUNICATING CLIMATE CHANGE TO THE PUBLIC

Anton Holland

NIVA Inc., Canada

Abstract

Public concern about the impacts of climate change is the highest it's ever been, and so too are the planet's temperatures and the carbon emissions that are driving them up. Warnings from scientists and environment agencies about what's happening to our climate are everywhere. And yet we find ourselves at a point where experts say we have 12 years or less do what has to be done to curb our carbon emissions to prevent the Earth's temperature from rising more than 1.5 degrees Celsius above pre-industrial levels and prevent even more catastrophic effects like droughts, wildfires and intense storms.

Why, then, is it so hard to get people to connect the messages they hear about a changing climate with generating the will to take actions, make sacrifices, and push their governments to spend public resources to lessen our collective impact on Earth's climate? Simply transferring the right information and knowledge doesn't work. Communicating about climate change presents us with a unique set of communication challenges that must be overcome, including scientific complexities and uncertainties, confusion surrounding the idea of risk, long timescales, and a wide spectrum of impacts and outcomes that will vary based on location. Many climate change communication strategies have failed to connect with the public and policy makers, with messages and methods often not responding to the needs and motivations of their target audiences. To be successful, we need to change the way we get these messages across, through approaches designed to address core beliefs in a constructive manner, countering misinformation relentlessly, using compelling narratives that can localize risks and evoke an emotional response, and earning credibility and trust through plain language and high-impact visual content. Only then will we tip the balance in bridging the gap between climate scientists and the public and harness the power of influence to make positive change.

Biography

Anton Holland is President and CEO of NIVA Inc., leading the company's science and risk communication practice. NIVA helps clients transform complex subject matter into powerful content and tools that are clear, understandable, and relevant to target audiences. Anton partners with a broad array of public sector, NGO, and private industry clients whose concerns encompass many areas of science and technology and their impacts on society. This includes how they communicate about climate change. His team developed a major report for Fisheries and Oceans Canada on the state of the Atlantic Ocean, noted for its success in helping various types of audiences understand and appreciate important changes and impacts resulting from climate change. Anton also served on the Intergovernmental Panel on Climate Change's expert review committee for the upcoming 6th assessment report on climate change, specifically to provide advice on clearly communicating audience-centric climate change messages. Research interest is on climate change communication.

USE OF PERENNIAL WILD FOOD PLANTS TO DIVERSIFY CAMBODIAN AGRICULTURE FOR IMPROVED NUTRITION AND INCOME

Ricky M Bates

Penn State University, USA

Abstract

To meet the expected rise in global food demand we need robust and resilient agriculture systems. This means increased reliance on sustainable intensification strategies such as the use of diverse and regionally adapted species for food production. In Cambodia, diversifying smallholder farms via the use of nutritious and climate-hardy underutilized plant species is at the core of this effort. Underexploited wild food plants have high potential to contribute to nutritional and/or medicinal health while generating income and sustaining the environment. Groupings of these species, whether occurring naturally or by design, become low maintenance, naturalized 'Wild Gardens'. By incorporating a suite of these wild food plants into marginal land, fencerows, vacant plots, or the homestead, this technique of "farming the messy fringe" serves to maximize the land's use-an important consideration as many resource-poor women farmers have limited space. Once established, Wild Gardens require very little management, thus addressing the feminization of smallholder farming in Cambodia and associated labor insecurity due to the outmigration of the mostly male workforce. Project research to document market linkage and nutritional profiles verify that wild food plants can be valuable sources of nutrients, and have an important presence in local produce markets. Our results indicate that Wild Gardens can uniquely contribute to the temporal, spatial and functional diversification of smallholder farming systems. Such diversification can enhance livelihood strategies by providing options for improved household nutrition and income. This presentation will address research to characterize and leverage this overlooked food production system, including: 1) How Wild Gardens integrate with and complement other components of home and community food production, 2) Potential nutritional, medicinal, and economic contributions of wild food plants, and 3) Role of women in managing and maintaining Wild Gardens. Opportunities and constraints to scaling will also be discussed.

Day-2
Oral Presentations

Coalesce Research Group

2nd International Webinar on

Environmental Sustainability and Climate Change

March 29-30, 2021

MALTOSE AS A CARBON SOURCE USED FOR ANAEROBIC SOIL DISINFESTATION INCREASE CROP YIELD WITH MINIMAL IMPACT ON SOIL MICROBIOME IN THE STRAWBERRY PRODUCTION SYSTEM

Zhaoxin Song[1,2,3], Sebastien Massart[3] and Aocheng Caoa[2]

[a]*Chinese Academy of Agricultural Sciences, China*
[b]*State Key Laboratory for Biology of Plant Disease and Insect Pests, China*
[c]*University of Liege, Belgium*

Abstract

Background: Anaerobic Soil Disinfestation (ASD) is widely used to control soil-borne diseases in organic crop production.

Objective: In this study, ASD was evaluated as an environment friendly and chemical alternative pre-planting soil disinfection treatment for the strawberries production at two production sites in China.

Methods: The effect of ASD used different sealed films on soilborne pathogens and strawberry growth was evaluated in two laboratory studies and two field trials. ASD was achieved using 6 and 9 t/ha maltose as the added carbon source. The impact of ASD on soil physico-chemical properties, its efficacy against soil pathogens of strawberry plants and its effect on the soil microbiota were evaluated and compared with reference treatment with chloropicrin (Cip) or soil solarization (Sol).

Results: With maltose as carbon sources, 28°C temperature, and 30% of soil moisture optimal conditions, ASD decreased *Fusarium* spp. and *Phytophthora* spp by 100%. ASD used maltose as an organic amendment and sealed with totally impermeable film (TIF) obtained the highest suppression (>96%) against *Fusarium* spp. and *Phytophthora* spp. Our results showed ASD significantly reduced cultivable *Fusarium* spp. and *Phytophthora* spp. as well as the mortality of strawberry plants compared with untreated control. ASD performed similarly to Cip by significantly increasing the soil's $NH4^{+}$-N concentration, electrical conductivity and significantly reducing $NO3^{-}$-N concentration. However, unlike Cip, ASD increased the content of available potassium and organic matter, which promoted plant growth and significantly increased strawberry yield. The analyzed fungal and bacterial microbiota did not show significant differences in the taxonomic richness and diversity between the compared treatments. Nevertheless, the abundance of some bacterial and fungal taxa tended to change between treatments.

Conclusion: Our research shows that adding 6 or 9 t/ha maltose as ASD has the potential to replace Cip for pathogen control in commercial strawberry production.

Biography

Zhaoxin Song focuses on the research on the prevention and control of soil-borne diseases of economic crops. She is good at the evaluation of conventional chemical fumigants and the selective chemical fumigant compounding technology. In recent years, she evaluated using biological fumigation technology as alternative pre- planting soil disinfection. She uses cost-effective and available organic matter such as syrup, rice husk, composted chicken manure as a carbon source to add to the soil to carry out anaerobic disinfection. This technology can effectively prevent and control crops such as strawberries, tomatoes, cucumbers, and other crops caused by fungi, bacteria, and nematodes. Soil-borne diseases improve crop yield and quality and maintain sustainable and green development of protected land agriculture. At the same time, her research helps increase farmers' economic output.

DIMETHYL DISULFIDE (DMDS) AS AN EFFECTIVE SOIL FUMIGANT AGAINST NEMATODES IN CHINA

Dongdong Yan, Qiuxia Wang, Yuan Li, Meixia Guo, Xiaoqin Guo and Aocheng Cao

Chinese Academy of Agricultural Sciences, China

Abstract

Background: ARoot-not nematode is an important soil pest in horticulture crop and constrains the rapid development of protected agriculture after phasing out methyl bromide (MB) in China. DMDS was found excellent efficacy against nematodes. Laboratory experiments and field trials were set up to clarify the dose, the efficacy and the yield.

Objective: To evaluate the efficacy of DMDS to control nematodes and its feasibility as an MB alternative in soil fumigation.

Methods: In laboratory dose-response experiments, three methods were used to identify the dose response curve on chemicals direct contact and fumigation activity and soil fumigation activity: small tube, desiccator, and soil fumigation. Field trials were conducted in cucumber and tomato greenhouses in three field sites. Efficacy, root galling index and plant yield were evaluated.

Results: A dose-response experiment using three methods showed that DMDS presented high efficacy against the nematode *Meloidogyne incongnita*. The LC_{50} values of direct fumigation activity in the desiccator method were 0.086 and 0.070 mg L^{-1} for DMDS and 1,3-D, 29.865 and 18.851 mg L^{-1} for DMDS and 1,3-D of direct contact activity in the small tube method, 6.438 and 3.061 mg L^{-1} for DMDS and 1,3-D of soil fumigation activity in the soil fumigation method, respectively. The field trials indicated that DMDS showed an excellent efficacy of 80%–94% on root-knot nematode applied at 10–100 gm^{-2} on tomato in Tongzhou, Beijing. The crop yields showed no significant difference after applying 10–80 gm^{-2} DMDS. Results indicate that DMDS applied at 10 gm^{-2} for controlling root-knot nematode in Beijing is cost effective.significant differences in the taxonomic richness and diversity between the compared treatments. Nevertheless, the abundance of some bacterial and fungal taxa tended to change between treatments.

Conclusion: DMDS is an excellent soil fumigant that can be used for controlling root-knot nematode and can be a potential novel alternative to MB in China.

Biography

Dongdong Yan is an associate professor of Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Beijing, China. Dr. Yan has his expertise in soil-borne disease control and soil fumigation technologies. His research interest is on novel soil fumigants and soil disinfestation technologies on soil pathogens and reconstruction of soil microecology after soil fumigation. Research interests include soil fumigation and its effect on soil microecology.

EFFECT OF TREATED WASTEWATER ON SOIL AND ENVIRONMENT

Ajay Singh

Indian Institute of Technology Kharagpur, India

Abstract

The burgeoning population has increased the production of wastewater considerably and its appropriate management has become a global challenge as disposal of untreated wastewater contaminates the water sources and spreads water-related diseases. The UN' SDG6 thrusts the reuse of treated wastewater to ensure the availability of water for all. The use of treated wastewater for crop irrigation is a feasible option as the agriculture sector is the largest user of all water sources. A properly treated wastewater can safely be used for crop irrigation, particularly in dry areas where good quality water resources are scarce. Most of the previous literature revealed improved crop production with the treated wastewater irrigation. The long-term sustainable use of wastewater for irrigation needs a strategy to remove the specific heavy metals and toxins from the wastewater which can be done by implementing some better policies, for example, the separation of industrial sewage to lessen the most unsafe wastewater segments. This paper provides a review of wastewater utilization for crop irrigation with a specific focus on environmental impacts. The need for wastewater irrigation and valuable fertilizer contribution from wastewater along with wastewater treatment processes are presented. The environmental impacts of wastewater irrigation on soil and plant are detailed. The effect of wastewater irrigation on human and animal health due to pathogens (bacteria, protozoa, viruses) and contaminants of emerging concern (pharmaceuticals, pesticides, personal care products) are described. The water-related vector-borne diseases (dengue fever, zika, malaria, yellow fever) are also detailed. The link between wastewater irrigation and climate and greenhouse gasses (carbon dioxide, methane, nitrous oxide) emissions is discussed. And the global case studies of wastewater irrigation and their implications are described. The literature analysis revealed that poorly-treated wastewater resulted in the deposition of heavy metals and other toxic elements in soils and plants apart from raised pathogens level and increased microbial threats to human and animal wellbeing. The long-term impacts of emerging contaminants should be established in future studies because these are generally new chemicals and there are no standard analytical techniques to precisely detect and analyze them. Similarly, the reliable long-term comprehensive appraisal of heavy metals' threat to human health needs to be explored in future investigations.

Biography

Ajay Singh holds a PhD and have an almost unmatched and consistent publication (and citation) record with over 75 publications in the reputed high-impact factor-'Refereed International Journals'(SCI journals), etc. Recently, he has been included in the list of 'World's Top 2% Scientist' by a study conducted by a reputed team of 'Stanford University', together with the publishing house 'Elsevier' and 'SciTech Strategies'. He is a dedicated researcher and have over 25 years of development-focused research/professional experience. His research is particularly aimed at management and optimal use of natural resources for increasing agricultural water-productivity and production to achieving food security and sustaining livelihoods for the poor people of resource-scarce regions; economic analysis of resources problems; conjunctive use planning and management of resources through the use of various optimization and simulation

models; irrigation planning and management under different cropping systems; and sustainable use of resources for environmental conservation. He has strong evidence of the scientific contribution of international repute and have major external recognition within the peer professional network due to publications and other leadership activities. I have been/am an 'International Expert (Consultant)' of many international project proposals. Also, I have been associated with many relevant scientific 'International Journals' as an editorial board member, reviewer, and author. Research interests include Management and optimal use of water and land resources; Agricultural water management and water productivity; Irrigation planning and management; Groundwater resources management and modelling; Decision support systems and policy analysis; Waterlogging and salinity management; Conjunctive use planning and management of resources; and Optimization and simulation modelling.

BACTERIAL IDENTIFICATION IN THE ROOT OF CANDIDATE INTERGENERIC HYBRID OF COMMON BEAN

Dilek Tekdal, İlknur Akça, Aslı Küçükrecep, Selim Çetiner and Rüştü Hatipoğlu

Mersin University, Turkey

Abstract

Background: The most important function of plant root is to enhance the uptake of nutrients and water. Besides, plant roots have secrete compounds that affect microbial populations. These secretions change the chemical and physical characteristics of the soil and microbial community.

Objective: Although our first aim in our study is to obtain a hybrid plant, we investigated the possible microbial source of the abnormal situation in the root structure of the hybrid candidate.

Methods: *Phaseolus vulgaris* L. (common bean) (2n=22), which is one of the legume crops feed the World, and *Vuralia turcica* Uysal et al. (2n=18), which is a Turkish endemic plant species, were selected to investigate the possibility of gathering hybrid plant by intergeneric crossing. Crosses between *P. vulgaris* (♀) (variety Bitlis-76) and *V. turcica* (♂) were carried out in the greenhouse at Mersin University, Mersin, Turkey. Potential hybrid seeds were harvested and sown for further analysis until obtaining plantlets. When collecting the data on hybrid candidates' morphological development, an abnormal root was observed and taken to the laboratory to investigate its microbial potential. Bacterial species from abnormal root were identified by the 16S ribosomal RNA gene.

Results: The identified partial 16S rRNA sequences were submitted to the NCBI database (accession number MW630118 and MW630119, respectively). Amplified sequences were used to construct a phylogenetic tree. Phylogenetic analysis based on the identified sequences showed that the isolates belonged to the genus *Bacillus* and *Microbacterium*.

Conclusion: Future steps for the understanding relationship between the isolates and intergeneric hybrid of *Phaseolus vulgaris L.* (variety Bitlis-76) include the analysis of siderophores and morpho-physiological characters of the isolates

Acknowledgment: The study described here was carried out within the Project (No. 119O003) funded by the Scientific and Technological Research Council of Turkey (TÜBİTAK).

Biography

Dilek Tekdal - As a scientist for her entire life, observes and investigates the plants. She was a Biotechnology Department faculty member at Mersin University, where she leads the research group that works on plant tissue culture, plant biotechnology, and breeding in plants. At Mersin University, Dr. Tekdal teaches undergraduate courses in plant sciences. She has many publications and fellowships. Research interests include plant biotechnology, plant tissue culture, agricultural biotechnology and plant breeding.

PROTEOMIC RESPONSES OF BARLEY LANDRACES TO SALT STRESS AT THE TILLERING STAGE

Rahma Jardak[1], Jawaher Riahi, Sébastien Planchon[2], Hatem Boubakri[1], Badra Bouamama[1], Aida Bouagila[1], Samiha Mejri[1], Jenny Renaut[2], Hans-Peter Mock[3] and Abdelwahed Ghorbel[1]

[1]Centre of Biotechnology of Borj-Cedria, Tunisia
[2]Luxembourg Institute of Science and Technology "Environmental Research and Innovation" (ERIN), Luxembourg
[3]Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Germany

Abstract

Background: Recent records showed significant reductions in crop productivity worldwide due to climatic change. In this context, salinity is one of the major abiotic factors limiting crop yields particularly in arid and semi-arid regions. Amongst the cereal, barley (*Hordeum vulgare* L.) is one of the most important cultivated ones, ranking fourth in the world and second in Tunisia in terms of production. Here, a proteomic approach was used for the characterization of two Tunisian barley landraces contrasting in their salinity tolerance for breeding program.

Objective: Revealing mechanisms related to salinity tolerance in Tunisian barley landraces.

Methods: Tunisian barley landraces "Barrage Malleg" (tolerant) and "Saouef" (sensitive) were subjected to a salt assay and the 4th leaves were harvested after 14 days of reaching 200 mM NaCl under greenhouse controlled-conditions. Physiological responses of plants were assessed and the harvested leaf material was analysed using bi-dimensional electrophoresis and PDQuest software based Student's t-test. Differentially expressed spots were subjected to MALDI TOF/TOF MS for identification.

Results: In total, we revealed significant differences between proteomes of control and salt- treated plants as well as between stressed plants of both barleys. Consequently, annotation of the identified differentially abundant proteins showed the involvement of ten biological functions including redox regulation and photosynthesis as the most important ones. Furthermore, key candidates have been associated with signal transduction, nucleic acid binding, protein synthesis and redox regulation.

Conclusion: TOverall, our study provides some pathways associated with barley salinity tolerance based on the identified proteins. Key candidates will be validated in further experiments to pursue biochemical marker selection

Biography

Rahma Jardak is titular of a PhD in Biology from the Faculty of Sciences of Tunis. As an Assistant Professor in the Plant Physiology Laboratory of the Center of Biotechnology Borj-Cédria, she was involved in Tunisian and bilateral cooperation projects with AgroScience Alplanta (Germany), the "Instituto de Technologia Quimica e Biológica" (ITQB) Oeira (Portugal) and Applied Biochemistry group at the Leibniz Institute of Plant Genetics and Crop Plant research IPK (Germany). She worked on the production of virus-resistant transgenic grapevines, the improvement of grapevine tolerance to abiotic and biotic constraints; the functional characterization of grapevine genes involved in the response to salt and water stresses as well as on barley proteome responses to saline constraint for breeding programs. Research interests include plant tissue culture and genetic transformation, biotic stress research (genetic engineering; gene silencing) and abiotic stress research and functional genomics making use of complementary approaches.

MAIN SOURCES OF DIOXINS GENERATION AT METALS THERMAL TREATMENT

Anahit Aleksandryan
Ministry of Environment of the Republic of Armenia, Armenia

Abstract

Background: The following branches of industry were considered as potential sources of Dioxins/Furans at the territory of the Republic of Armenia: production of ferrous and non-ferrous metals, copper, molybdenum, steel, aluminum; production of goods from mineral raw materials; production of lime; production of household chemicals/consumer goods; and production of paper.

Objective: To assess and quantify Dioxins/Furans emissions.

Methods: The assessment and quantitative evaluation of Dioxins/Furans was done using calculations based method according to "Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases" prepared by UNEP Chemicals. The study was performed in the following branches of industry: ferrous and non-ferrous metals production; blister copper production; molybdenum production; steel production; aluminum production.

Results: The PCDD/PCDF emissions at production of converter copper, ferromolybdenum, and firebricks (chamotte bricks) in Armenia were quantified for 2015-2018 in mg TEQ/year. Average values were as follows:

- Converter copper (air): average 0.12 mg TEQ/year
- Ferromolybdenum (air): 0.66 mg TEQ/year
- Firebricks (residues): 0.11 mg TEQ/year

PCDD/PCDF emissions at production of rolled aluminum were quantified for 2015-2018 and average values were as follows:

- Rolled aluminum (air): 0.9 mg TEQ/year – 54.3 mg TEQ/year
- Rolled aluminum (residue): 2.4 mg TEQ/year – 108.6 mg TEQ/year

Conclusion: The results obtained through assessment/quantification demonstrate that thermal treatment of metals is one of main sources of Dioxins/Furans emission

Biography

Anahit Aleksandryan graduated from Yerevan State University in 1978 with Diploma in Biophysics. In 1985 Ms. Aleksandryan defended PhD thesis in Biology; in 2011 she completed doctoral dissertation "Scientific grounds for environmentally sound management of persistent organic pollutants in the Republic of Armenia". In 1978-1979, Ms. Aleksandryan was employed at Armenian Branch of All-Union Institute of Hygiene and Toxicology (Yerevan, Armenia). From 1979 to 1996 she was senior researcher at Institute of General Hygiene and Occupational Diseases (Yerevan, Armenia). Since 1996, Ms. Aleksandryan became employee at Ministry of Nature Protection of the Republic of Armenia; her current position is Head of Hazardous Substances and Wastes Policy Department of the Ministry of Environment. Ms. Aleksandryan is Focal Point of Stockholm Convention on POPs, Rotterdam Convention on PIC, and Minamata Convention on Mercury. Dr. Aleksandryan is author of 4 books, including 2 monographs, and author/co-author of above 150 publications. Research interests include environmental sciences and industrial toxicology.

EGYPTIAN STANDARD SPECIFICATIONS FOR DRINKING WATER: PARASITIC POINT OF VIEW

Wafaa Mohamed Abdalla Hikal

National Research Centre, Egypt and University of Tabuk, KSA

Abstract

Water is essential for human life. The world health organization has considered access to safe drinking water a basic human right to maintain human health. Therefore available drinking water must meet drinking water quality standards and does not pose any health risk over a life time. Waterborne parasites represent a great challenge and cause many diseases to humans. Thus, constant monitoring of drinking water from the relevant authorities in pollutants is required. The safety of drinking water can be ensured with the ever-increasing population through by the correct use of water treatment technologies. Also, interest in scientific research in the field of developing new technologies that contribute to the detection and removal of parasites, especially Cryptosporidium being the first parasite to cause concern to health officials in the world. Also, Giardia which increased the world's concerns because of its severity. Acanthamoeba species that cause both cerebral and corneal disease and *Naegleria fowleri* causes fatal cerebral infection. This study is based on highlighting the guidelines and standards for drinking water quality issued by the World Health Organization and some countries, especially Egypt. A globally concern after the scientists revealed the effects of polluted drinking water. Therefore, a large number of the population is at risk from water pollution for the purpose of human access to clean drinking water and other uses.

Day-2
Poster Presentations

MODELING THE SPATIAL DISTRIBUTION OF GREY MULLET USING FISHERY AND REMOTE SENSING DATA

Teng Sheng-Yuan, Nan-Jay Su, Ming-An Lee and Shin-ichi Ito
National Taiwan Ocean University, Taiwan

Abstract

Background: Grey mullet is one of the most important commercial species of fish in the coastal fisheries of Taiwan. It was recorded that the spawning and nursery grounds are distributed in the coastal waters of the southeastern Taiwan Strait. For previous studies, the feeding grounds are located in the coastal and estuarine waters of China which at 25-30°N and migrates to the coastal waters of the southeastern TS for spawning in the cold North China Coastal Current in winter.

Objective: To find the potential habitat and the relationship between mullet production and environment.

Methods: Annual fishing data concerning the coastal gillnet fishery of Taiwan from 2015 to 2017 were obtained from logbook. The dataset contained the point data (1°×1°) information on the daily commercial gillnet vessel fishing locations, catch species (number and weight) and fishing date, where all the mullet occurrence data used for habitat model analyses. The Representative Concentration Pathways (RCPs) represent the full bandwidth of possible future emission trajectories. Two of climate scenarios (RCP2.6 and RCP8.5) about SST, SSH, SSS, MLD, Chla (Chlorophyll-a) and current velocity values were downloaded from the Geophysical Fluid Dynamics Laboratory (http://www.gfdl.noaa.gov/).

Results: The distribution patterns of the habitat hotspots for spawning season (winter) was separated in the western central Taiwan (Chang-Yun Rise, CYR). Because grey mullet tends to stay in 20°C of the waters, the area of higher HSI value is located in the coastal waters of western Taiwan in current year. When the 6 environmental variables were used that shows current velocity was the most important environmental variables in the HSI modeling of mullet and remaining variables include SSS and SST.

Conclusion: The distribution of HSI in the study area for the spawning season. The area of high HSI value is located in CYR in current year. The western north part also has high HSI value over time (2035). In 2050, the distribution of high HSI value still shift toward eastern north Taiwan.

Biography

Teng Sheng-Yuan - Climate change is considered a key threat to marine fisheries. Climate-related events, such as increased sea surface temperatures, can have profound impacts on fisheries and the people that depend on them. I try to provide a framework for other types of threats and different social-ecological systems more broadly and integrates ecosystem considerations into the fishery assessment process, with the intent being to facilitate the realization desire of the Taiwanese government and relevant management institutions to improve management of its fishery resources. Research interests include fisheries oceanography, remote sensing and ecology.

VALORIZATION BY ACID HYDROLYSIS FROM THREE INDUSTRIAL CROPS (TAGASASTE, LEUCAENA AND PAULOWNIA TRIHYBRID)

Susana Lozano Calvo, García M T, García J C, López F and Loaiza J M

University of Huelva, Spain

Abstract

Background: Burning fast-growing trees or forest wastes to obtain energy can be an effective alternative to conventional raw materials. Thus, lignocellulosic biomass and forest waste, which can be used to obtain chemicals with a high added value.

Objective: The objective is the xylan extraction by acid hydrolysis from three different industrial crops (Tagasaste, Leucaena and Paulownia trihybrid). The extraction was modelled and optimized, and the residual solid phases were used for energy production.

Methods: Data were obtained by using a factorial design (the independent variables of the extraction process were temperature: 130 to 170°C and acid (H_2SO_4) concentration: 0.5, to 2%. The process was modelled with polynomial multiple regression methodology. Characterization of material was carried out according international standards.

Results: The process was influenced by the operating conditions of the pretreatment, which increased the High heating value (HHV) of solid phase by 0.6–0.7% relative to the starting material. HHV for the hydrolysed materials increased with increasing hemicellulose extraction efficiency but differed markedly among raw materials. The activation energy of combustion of the solid residues from acid hydrolysis of tagasaste and paulownia decreased markedly with increasing degree of conversion, and also with increasing temperature and acid concentration in the hydrolysis treatment. No similar trend was observed in leucaena owing to its low content in hemicelluloses.

Conclusion: Acid hydrolysis of the three raw materials provided a valorizable liquor rich in hemicelluloses and a solid residue with an increased heat power amenable to efficient valorization by combustion. There are many potential applications of the hemicelluloses-rich and lignin-rich fraction.

Biography

Susana Lozano Calvo - industrial chemical engineering graduate in 2019 and master's student in chemical engineering. I belong to the research center in Technology of Products and Chemical Processes (PRO^2TECS). I work in the Green Asphalt project. Research interests include biomass valorization, renewable resources and renewable energy and biorefinery.

HEALTH AREA OF LIFE NADAPTA PROJECT

Estrella Miqueleiz, Paula Navarro, Irene Iniesta, Beatriz Agudo, Ana Tabar and Sagrario Laborda

Instituto de Salud Pública y Laboral de Navarra, Spain

Abstract

Background: Climate Change is an unequivocal reality and constitutes one of the greatest environmental challenges for Humanity. Adaptation strategies are needed at international, national and specially regional and local levels. Project LIFE-IP NAdapta-CC is an integrated strategy for Climate Change Adaptation in a region of Spain, Navarra, and is part of Navarra´s contribution to the international commitment against Climate Change in the framework of a Climate Change Roadmap of Navarra (2017-2030-2050) and of the Spanish National Climate Change Adaptation Plan (2021-2030). With a 8 year duration (2017-2025) and with shared budget between Europe and the region, the project will develop climate change adaptation measures in 6 areas: monitoring, agriculture and livestock, water, health, forestry and infrastuctures and territorial planning.

Objective: To describe the activities and results in the Actions of the Health Area of LIFE- IP Nadapta-CC project.

Methods: To know and reduce Climate Change effects on human health and to define new adaptation measures, LIFE NAdapta project intends to foresee changes that may occur through the development of adaptation measures that will both limit the negative effects resulting from those changes and take advantage of the positive ones, whenever possible. These early and well planned adaptation measures will guarantee a brighter future and prevent economic loses.

Results: Among the expected results, we have new surveillance and monitoring systems to analyze Climate Change impact and consequences on human health: high temperatures on both general and working populations, air quality, emerging risks, pollination and invasive vectors; Adaptation preventive actions in the previous 6 areas; Information recording and dissemination systems for the population and elaboration of Guides for professionals

Conclusion: LIFE NAdapta will ease health protection against Climate Change consequences through the surveillance of its effects and the definition, implementation and dissemination of adaptation measures for the population.

Biography

Estrella Miqueleiz has her expertise in Public Health. She is a pharmacist and she is a PhD from Public University of Navarra. She has experience as a research technician and as a public health inspector. She has been working for two years as coordinator of the health area of the Life NAdapta-CC Project. Within the life NAdapta-CC project, she works with different areas such as environmental health, occupational health, laboratory and epidemiology or health promotion. Research interests include climate change and health.

QUALITY OF COMPOST FROM HOP BIOMASS RELATED TO COMPOST HEAP PREPARATION

Lucija Luskar and Barbara Čeh

Slovenian Institute of Hop Research and Brewing, Slovenia

Abstract

Background: Hop plant is dioecious, perennial, climbing plant. In one season, it can grow up to 7 m high and needs guiding twine for support. Using polypropylene (PP) twine, what is common practice in Slovenia, is huge environmental issue. Introduction of 100% biodegradable and 100% on site compostable bio-plastic polylactic acid (PLA) twine within the project LIFE BioTHOP is offering better solutions for this biomass, one of them being a substrate for production of high quality compost.

Objective: Examine different composting procedures to determine the most suitable approach for on-site composting of hop biomass after harvest with PLA twine.

Methods: 6 different composts were made and tracked for seven months. We used the procedures, which are carried out by hop growers themselves on farms; those are covering/not-covering compost piles, turning/not-turning, adding effective microorganisms, biochar and manure. Chemical composition, germination index, microbial respiration and plant growth assay were studied after 7 months to see the biochemical properties of the compost.

Results: All composts have reached the limit temperature for PLA degradation but in most of the piles the temperature dropped too soon. All of the composts exceeded the concentration of macronutrients (C, N, P, K) of usual composts. Compost 3 (EM and black foil - where fermentation took place) contained the most total nitrogen. A lot of total nitrogen was also in pile 6, where the manure was added. In compost 4 (biochar and *Folsomia candida* and covered by black foil) the content of total phosphorus increased for 208%. In compost pile 1 (without additives and covered by Topex foil) the total potassium increased for 133% in comparison (1:5 w/v) to input material. The concentration of ammonium nitrogen decreased in all composts. Compost water extracts had good effect on seeds germination of cress.

Conclusion: Compost that was turned twice, without additives and with small fragments of hop stems (observation 5) was among all sampled composts the most degraded.

Biography

Lucija Luskar - After studying microbiology in University of Ljubljana, Biotechnical Faculty and additional semester in Kings College, Aberdeen, Lucija Luskar finished her Master of Science in University of Ljubljana, Biotechnical Faculty, field Biotechnology in 2019. The research for master thesis was done at the National Institute for Biology with the title Optimisation of CRISPR Cas9 technology for gene editing in potato. She worked gained her experience by cooperating in many researches at University and other Institutes. She works as a researcher at Slovenian Institute of Hop Research and Brewing in scope of LIFE project BioTHOP. Research interests include agriculture environment, ecology and circular economy.

Coalesce Research Group

BOOKMARK YOUR CALENDAR

April	
Global Webinar on Gynecology & Obstetrics	April 09-10, 2021
2nd Webinar on Addiction & Psychology	April 26-27, 2021
2nd Webinar on Plant Science & Genomics	April 29-30, 2021
3rd Webinar on Agriculture & Food Research	April 29-30, 2021
Webinar on Cannabis, Hemp & its Research	April 29-30, 2021
May	
Webinar on Ageing Research and Gerontology Studies	May 03-04, 2021
2nd International Webinar on Vaccines and Immunology	May 10-11, 2021
Webinar on Pediatrics and Neonatology	May 20-21, 2021
Webinar on Rheumatology and Orthopedics	May 24-25, 2021
Webinar on Surgery and Anaesthesia	May 24-25, 2021
Webinar on Acupuncture & Chinese Medicine	May 24-25, 2021
Webinar on Traditional & Alternative Medicine	May 24-25, 2021
Webinar on Nursing and Health Care	May 27-28, 2021
June	
Webinar on Nutrition Research	June 07-08, 2021
World Congress on Materials Science & Nanotechnology	June 14-15, 2021
International Conference on Polymer Science and Technology	June 14-15, 2021
World Conference and Expo on Vision Science and Optometry	June 14-15, 2021
International Webinar on Pediatrics and Neonatology	June 14-15, 2021
World Congress on Neurology	June 17-18, 2021
International Conference on Biopolymers and Bioplastics	June 21-22, 2021
International Conference on Renewable Energy and Sustainable Technologies	June 21-22, 2021
International Conference on Occupational Health and Public Safety	June 21-22, 2021
Global Webinar on Chemistry and Applied Sciences	June24-25, 2021
Webinar on Biocatalysis & Green Chemistry	June24-25, 2021

Coalesce Research Group

BOOKMARK YOUR CALENDAR

3rd Webinar on Catalysis, Chemical Engineering & Technology	June24-25, 2021
2nd E-Meeting on Advanced Catalysis (AdCat-2021)	June24-25, 2021
International Webinar on Artificial Intelligence and Robotics	June24-25, 2021
July	
4th Webinar on Nanotechnology & Nanomaterials	July 05-06, 2021
4th Webinar on 3D Printing & Additive Manufacturing	July 05-06, 2021
Online International Conference on Diabetes and Endocrinology	July 19-20, 2021
Online International Conference on Atmospheric and Earth Sciences	July 19-20, 2021
Webinar on Laser, Optics & Photonics	July 26-27, 2021
International Webinar on Quantum Physics and Nuclear Technology	July 26-27, 2021
International Webinar on Artificial Intelligence and Robotics	June24-25, 2021
Online International Conference on Physiotherapy, Physical Rehabilitation and Sports Medicine	July 29-30, 2021
3rd Online International Conference on Nutrition and Nutraceuticals	July 29-30, 2021

Coalesce Research Group LLC

33 Market Point Dr,
Greenville, SC 29607, USA

Phone: +1-718-543-9362

WhatsApp: +1-315-902-2237

Contact Us:

info@coalesceresearchgroup.com
contact@coalesceresearchgroup.com
sponsors@coalesceresearchgroup.com

Website: https://coalesceresearchgroup.org/