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PROCEEDINGS OF THE II SOUTHERN SCIENCE CONFERENCE

Book A

2024

Southern Science Conference II

Mendoza Argentina

Proceedings of the II Southern Science Conference Book A

Organization

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Editora da

Univassouras 2024

Modo de acesso: https://editora.univassouras.edu.br/index.php/PT/article/view/5095

P9415 Proceedings of the II Southern Science Conference Book A. / Organizado por: Adiel Queiroz Ricci...[et al.]. – Vassouras, RJ : Universidade de Vassouras, 2024.
57 f.

Recurso eletrônico
Formato: E-book

ISBN: 978-85-88187-88-7

1. Desenvolvimento sustentável. 2. Abordagem interdisciplinar do conhecimento. 3. Organização e administração. I. Ricci, Adiel Queiroz. II. Universidade de Vassouras. III. Título.

Sistema Gerador de Ficha Catalográfica Oline – Universidade de Vassouras

Preface

The Second Southern Science Conference (SSCon 2024) stands as a remarkable testament to international scientific collaboration and knowledge exchange. Taking place simultaneously in Mendoza, Argentina and Vassouras, Brazil, this hybrid event brought together researchers, academics, and industry experts from across the globe to address pressing challenges in science and technology.

Image 1: Conference staff, from left to right: Dr. Luis A. B. De Boni, Dr. Cristiane de Souza Siqueira Pereira, Dr. Cristián Andrés Quintero, Dr. Walter José Peláez.

Building upon the success of its inaugural edition, SSCon 2024 expanded its scope to encompass a broader range of disciplines, from biomedicine and environmental sciences to advanced materials and artificial intelligence. The conference's unique format, combining in-person sessions with virtual presentations, enabled unprecedented accessibility and participation from six continents, truly embodying the spirit of global scientific cooperation.

The proceedings collected in this volume represent the cutting-edge research presented during the conference. Notable highlights include groundbreaking work in biofuel production from agricultural waste, novel approaches to treating neurodegenerative diseases, and innovative applications of artificial intelligence in healthcare. The research presented demonstrates not only technical excellence but also a strong commitment to addressing real-world challenges, particularly those facing the Global South.

A distinguishing feature of SSCon 2024 was its emphasis on sustainable development and environmental responsibility. Many presentations focused on renewable energy, waste management, and eco-friendly technologies, reflecting the urgent need to address climate change and environmental degradation. The conference also highlighted the importance of bridging the gap between academic research and practical applications, with several sessions dedicated to technology transfer and industry collaboration.

The organizing committee, led by Dr. Cristián Andrés Quintero, Dr. Cristiane de Souza Siqueira Pereira, and Dr. Walter José Peláez, deserves special recognition for

orchestrating this complex international event. Their dedication, along with the support of our institutional partners and sponsors, ensured the conference's success despite the challenges of coordinating across multiple time zones and venues.

This first book serves not only as a record of the scientific achievements presented but also as a roadmap for future collaboration and research directions. The diversity of topics and approaches represented here reflects the interdisciplinary nature of modern science and the importance of international cooperation in addressing global challenges.

We extend our gratitude to all participants, reviewers, and supporters who contributed to making SSCon 2024 a landmark event in scientific exchange between nations. May this collection inspire future generations of researchers and foster continued collaboration across borders in pursuit of scientific excellence and societal progress.

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- M. Sc. Hamilton Moss de Souza, Professional Master's Degree in Environmental Sciences, University of Vassouras, Brazil.
- M. Sc. Luiz Felipe Caramez Berteges, Professional Master's Degree in Environmental Sciences, University of Vassouras, Brazil.

Resum Lectures/mediators

II Southern Science conference schedule

Room A and B

- Adiel Queiroz Ricci
- Ana Beatriz de Andrade Pereira
- Carlos Vitor de Alencar Carvalho
- Cristiane de Souza Siqueira Pereira
- Cristián Quintero
- Felipe Marinho Masid
- Irenilda Reinalda Barreto de Rangel Moreira Cavalcanti
- Ligia Marcondes Rodrigues dos Santos
- Luciana de Souza Marques
- Luis Alcides Bandini De Boni
- Nicole Aparecida Martins Klimko Fraguas
- Rafael Cardoso
- Walter Pelaez

Summary

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Biovassouras project: valorization of products and co-products from the reuse of residual

Dra. Cristiane de Souza Siqueira Pereira
Vassouras University

This presentation outlined the innovative BioVassouras Project, focusing on the valorization of products and co-products from residual vegetable oil in biofuel production. The project represents a significant initiative in sustainable waste management and renewable energy production in Vassouras, Rio de Janeiro, Brazil. Brazil holds a prominent position as the world's second-largest biofuel producer. In 2022, global biofuel production reached 175 billion liters, comprising 114.2 billion liters of ethanol and 60.8 billion liters of biodiesel. The National Agency of Petroleum, Natural Gas and Biofuels (ANP) reported that Brazilian biodiesel producers delivered approximately 7.34 billion liters of biodiesel to distribution companies in 2023. The production process primarily utilizes transesterification, yielding 90% biodiesel and 10% glycerin.The presentation highlighted recent legislative developments, particularly the "Lei do combustível do futuro" (Future Fuel Law), which establishes progressive increases in mandatory biodiesel blending percentages. The law mandates incremental increases from 15% in 2025 to 20% by 2030, demonstrating Brazil's commitment to sustainable fuel alternatives. This legislation encompasses economic, environmental, social, and governance benefits, contributing to efficient, resilient, and sustainable transport infrastructure. The BioVassouras Project, supported by FAPERJ through the CapacitAgro program, addresses the critical issue of illegal disposal of residual cooking oil, with over 1 billion liters being improperly discarded. In Vassouras alone, approximately 910 liters of used cooking oil are collected monthly, with a portion being directed to the University of Vassouras for biodiesel production. The project operates within a semi-pilot plant at the Unit Operations Laboratory, ensuring compliance with ANP quality specifications.A significant aspect of the project involves research into the valorization of production by-products, particularly glycerin. The research team has developed innovative applications, including the production of concrete blocks and tactile flooring using residual glycerin from biodiesel production. This approach demonstrates the project's commitment to circular economy principles and waste valorization.The project aligns with the National Environmental Education Plan and Municipal Environmental Education Law No. 3,200/20, reflecting Vassouras Municipality's dedication to environmental education and responsible actions. The initiative has gained recognition for its groundbreaking approach in Rio de Janeiro, highlighting the city's commitment to sustainable practices and public education regarding proper waste oil disposal. Current research developments include the optimization of biodiesel production through the ethylic route from residual oil, the development of virtual models using metaverse technology for environmental education, and innovations in sustainable tactile flooring production. These initiatives demonstrate the project's multifaceted approach to sustainability and education. Future steps include expanding partnerships with municipalities and institutions, developing new products and patents, implementing reverse logistics legislation, and applying the technology to agricultural machinery. The project serves as a model for sustainable development in the Vale do Café region, integrating academic research, environmental protection, and practical applications in mu-

nicipal infrastructure. The BioVassouras Project exemplifies successful integration of academic research, environmental sustainability, and community development, providing a replicable model for other municipalities seeking to implement sustainable waste management and renewable energy solutions.

Keywords: Biodiesel Production, Waste Valorization, Environmental Sustainability, Circular Economy, Renewable Energy Technology

Author information:

Prof.ª Dr.ª Cristiane de Souza Siqueira Pereira

Dr.ª Cristiane Siqueira holds a degree in Industrial Chemistry from the University of Vassouras (2006), a master's degree in Chemical Engineering from the Federal Rural University of Rio de Janeiro (2009), and a Ph.D. in Chemical and Biochemical Process Engineering from the School of Chemistry at UFRJ (2015). She is currently the Coordinator of the Chemical Engineering and Production Engineering courses (2022-present) and the Coordinator of the Professional Master's in Environmental Sciences at the University of Vassouras (2023-present). She has been a faculty member of the Professional Master's in Environmental Sciences at Univassouras since 2017. Dr. [Nome do usuário] is a member of the Executive Committee of the Technology Incubator at the University of Vassouras (VassourasTec) and a Training and Technical Qualification Scholarship holder from the Capacitagro/PESAGRO/FAPERJ program. She also serves as the Director of Environmental Restoration at the Collegiate Board of the Guandu Committee (2023-2026) and a representative of the Technical Chamber of General Studies of the Guandu Basin Committee (2021-2022). Additionally, she is part of the Permanent Technical Committee for the Implementation and Monitoring of the Municipal Atlantic Forest Conservation and Restoration Plan, representing the Guandu Committee. She is a member of the Fluminense Forum of Hydrographic Basin Committees (Guandu Committee) and an Associate Editor for the journals Tchê Química and Southern Journal of Sciences. Dr. [Nome do usuário] coordinates the BIOVASSOURAS project in partnership with the Vassouras Environmental, Agriculture, and Rural Development Department. Her expertise lies in chemical processes and chemical technology, focusing on the following areas: environmental studies, water resources, separation processes, biofuels, supercritical extraction, bioproducts, green chemistry, and process modeling and simulation.

Lecture Date: 08/11/2024
Time: 15:30-16:00 Virtual Room A
Moderator: Luis de Boni

Sustainable Agriculture and the challenges of climate emergencies

Dr. Felipe da Costa Brasil
Agricultural Engineer Undersecretary of Agriculture of the State of Rio de Janeiro

The increasing challenges posed by climate emergencies require a fundamental shift in agricultural practices toward more sustainable approaches. This presentation explores the complex relationship between sustainable agriculture and climate resilience, focusing on practical implementations and solutions in the State of Rio de Janeiro, Brazil, while addressing global concerns about food security and environmental conservation.Sustainable agriculture, as defined by the Food and Agriculture Organization (FAO), encompasses multiple crucial factors: soil conservation, water resource management, preservation of animal and plant genetic resources, environmental conservation (including physical, biotic, and socioeconomic aspects), and the implementation of appropriate, economically viable, and socially acceptable techniques. These elements form the foundation for addressing current environmental challenges while ensuring food production meets growing global demands.The State of Rio de Janeiro, through its Secretariat of Agriculture (SEAPPA), implements various programs and initiatives to promote sustainable agricultural practices. These efforts are coordinated through multiple agencies, including the Superintendence of Agricultural Defense, Superintendence of Sustainable Rural Development, EMATER, FIPERJ, and CEASA, working together to address environmental degradation and promote sustainable development aligned with UN Sustainable Development Goals (SDGs).Current environmental challenges include soil degradation, water resource depletion, loss of genetic resources and biodiversity, landscape degradation, environmental contamination, and declining technical and economic viability in land use. These issues are exacerbated by practices such as inappropriate hillside plowing and illegal deforestation, which contribute to soil erosion and environmental degradation.To address these challenges, several innovative approaches and technologies have been implemented. These include the Rural Environmental Registry (CAR) system for environmental property adequacy, direct planting systems adapted to local geomorphological conditions, and conservation practices such as contour planting and strip cultivation. The region has also embraced advanced agricultural systems such as Direct Vegetable Planting Systems (SPDH) and Integrated Crop-Livestock-Forest (ILPF) systems, which promote soil conservation and biodiversity.Family farming plays a crucial role in sustainable agriculture, encompassing various stakeholders including plant and animal producers, small agro-industries, tourism and gastronomy enterprises, foresters, aquaculturists, and artisanal fishermen. Additionally, urban and periurban agriculture initiatives have gained importance, along with the promotion of Unconventional Food Plants (PANC), contributing to food security and agricultural diversity. The presentation highlights key challenges facing sustainable agriculture in the context of climate emergencies, including the transition from conventional to agroecological production methods, reducing greenhouse gas emissions through Low Carbon Agriculture (ABC) practices, improving water and input efficiency, enhancing soil and water management, proper waste management in agrosilvopastoral systems, and protecting and restoring conservation areas while combating deforestation and forest fires.The implementation of new agro-environmental

technologies and practices demonstrates the potential for achieving sustainable agricultural development while addressing climate challenges. These approaches not only help mitigate environmental impacts but also promote economic viability and social responsibility in agricultural practices.

Keywords: Sustainable Agriculture, Climate Resilience, Environmental Conservation, Agroecological Practices, Food Security

Author infomation:

Prof. Dr. Felipe da Costa Brasil

Professional with solid academic background and extensive experience in Agronomy and Environmental Engineering, began his career as an Agricultural Technician (1992), followed by a degree in Agronomic Engineering (UFRRJ, 1997), Master's (2001) and Ph.D. in Agronomy/Soil Sciences (UFRRJ, 2005), including research at the University of Évora, Portugal. Currently serves as Deputy Undersecretary at SEAPPA-RJ and Visiting Researcher at PESAGRO-RIO, while also teaching in MBA programs at IBMEC Agro, FIA-SP, and FGV. In the private sector, he manages Costa Brasil Engineering and Embarque Cultural Academic Tourism, providing consulting through Eco4solutions Brazil-Paraguay. His experience includes positions as Advisor at CREA-RJ, Council Member of CECA and CONEMA-RJ, and Research Dean at Severino Sombra University. Specialist in Corporate Environmental Management, Environmental Licensing, and Soil and Water Conservation and Management, he contributes significantly to sustainable development and environmental management in Brazil.

Lecture Date: 08/11/2024
Time: 16:30 – 17:00 Virtual Room A
Moderadtr: Dr. Carlos Vitor de Alencar Carvalho e Felipe Marinho Masid

Nutrition and Chronic Disease Prevention: An Integrative Approach to Global Health Challenges

Luciana de Souza Marques
Vassouras University

This presentation addressed the critical relationship between nutrition and chronic disease prevention, focusing on integrative approaches to reducing the global burden of non-communicable diseases (NCDs). The discussion highlighted the complex challenges facing public health systems worldwide and the importance of developing sustainable nutritional strategies. Non-communicable diseases, including cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes, represent a significant global health burden. These conditions disproportionately affect low- and middle-income countries, where over three-quarters of global NCD deaths occur (31.4 million). The presentation emphasized that every two seconds, someone under 70 dies from an NCD, with 86% of these deaths occurring in developing nations. The identified key risk factors for NCDs encompass both behavioral and metabolic aspects. Behavioral factors include tobacco use, physical inactivity, unhealthy diet, and harmful alcohol use, while metabolic factors include elevated blood pressure, overweight/obesity, hyperglycemia, and hyperlipidemia. Environmental factors, particularly air pollution, were identified as significant contributors, responsible for approximately 6.7 million deaths globally. The impact of globalization and modern lifestyle changes on dietary habits was extensively discussed. Over the past two decades, significant shifts in food purchasing and consumption patterns have been observed worldwide, with a marked transition from fresh, home-prepared foods to processed and ready-made options. In Brazil, for example, data from the Food and Nutritional Surveillance System (SISVAN) revealed concerning trends, including high consumption of ultra-processed foods among children and decreasing consumption of fresh foods among adults. The presentation highlighted three major paradoxes in the current global food system: its inability to provide adequate nutrition despite sufficient production, the allocation of significant food resources to non-human consumption (animal feed and biofuels), and substantial food waste that could otherwise feed four times the number of people currently experiencing hunger. Regarding disease prevention, the presentation outlined specific nutritional recommendations. Total fat intake should be limited to 30% of daily energy, while increasing protein and monounsaturated fat intake while reducing refined carbohydrates. The consumption of fish and nuts is promoted for cardiovascular health, along with abundant vegetable and fruit intake of at least five servings daily. Adequate calcium intake through dairy products and reduced salt consumption are crucial for cardiovascular risk reduction. The comprehensive dietary recommendations emphasized the importance of maintaining a lean and active lifestyle, primarily consuming non-hydrogenated vegetable oils, and choosing whole grains over refined varieties. The guidelines also stress the importance of limiting refined sugars and sweetened beverages, moderating red meat consumption, and following salt intake guidelines of 1,500 mg daily for most individuals. These recommendations were presented with the understanding that nutritional science continues to evolve, and guidelines must be adaptable to new research findings while remaining practical for implementation in various cultural and socioeconomic contexts. The focus remains on developing sustainable, cul-

turally appropriate interventions that can effectively address the global burden of chronic diseases through improved nutrition.

Keywords: Chronic Disease Prevention, Global Nutrition, Non-communicable Diseases, Dietary Guidelines, Public Health Interventions

Author infomation:

Prof.ª Luciana de Souza Marques

Luciana de Souza Marques holds a degree in Nutrition from Centro Universitário Leonardo da Vinci – Blumenau/SC (2010). She has completed postgraduate studies in Clinical Nutrition and Nutritional Therapy at Universidade Anhembi Morumbi (2017), Nutritional Coaching and Eating Behavior at Faculdade Educamais (2022), and Nutrition and Nephrology at Instituto Cristina Martins (2022). Additionally, she earned a Professional Master's Degree in Applied Health Sciences from Universidade Severino Sombra (2019). With more than nine years of experience in hospital nutrition, Luciana Marques has specialized in clinical practice and nutritional therapy. Her expertise includes enteral nutritional therapy, intensive care nutrition, and the nutritional management of pediatric and geriatric populations. She also has significant experience in surgical and oncology nutrition, as well as in supporting patients undergoing hemodialysis. For the past six years, she has focused on maternal and child health, providing individualized patient care, facilitating postpartum support groups, and delivering educational programs for pregnant and breastfeeding women. Since 2021, Luciana Marques has been the Adjunct Coordinator of the Nutrition program at the University of Vassouras, where she also serves as a faculty member teaching "Dietetic Techniques." Her academic contributions include coordinating extension projects such as "Nutrição Simplificada," which integrates digital technologies into nutritional education. She has published several works, including the "I Ebook de Receitas da Disciplina de Técnica e Dietética" (2023). Her professional interests encompass clinical nutrition, nephrology, dietetics, and population nutritional analysis. Luciana Marques is dedicated to advancing the field of nutrition through her clinical expertise, educational initiatives, and commitment to professional growth.

Lecture Date: 11/08/2024
Time: 08:30-09:00 Virtual Room A
Moderator: Felipe Masid

Lab in space: chemical experiments in low Earth Orbit (LEO) and suborbital flights

Dr. Élcio Jeronimo de Oliveira
Kvantum - Technology & Innovation

Spaceflight experiments have allowed scientists to investigate how various chemical processes and reactions are affected by microgravity and the unique environment of space. Both low Earth orbit (LEO) and suborbital flights have provided platforms for performing such experiments, offering unique opportunities to understand chemical phenomena without the interference of Earth's gravitational field. This research encompasses multiple experimental platforms, including the International Space Station (ISS), suborbital rockets, and drop towers, each providing different durations of microgravity conditions for scientific investigation. The study of chemical processes in microgravity has revealed fascinating insights across several key areas. Combustion studies in space have demonstrated significant differences in flame behavior, contributing to both space safety protocols and improved understanding of combustion processes on Earth. The FLEX (Flame Extinguishment Experiment) project, for instance, has provided valuable data about flame size, shape, and temperature in microgravity conditions, leading to advances in fire safety and cleaner combustion technologies.Protein crystallization in microgravity has emerged as a particularly promising field, with direct applications in pharmaceutical development. The absence of gravity-induced sedimentation and convection allows for the formation of larger, more uniform crystals. A notable success story is Merck's research on the ISS, which led to improvements in the formulation of pembrolizumab (Keytruda®), demonstrating the practical benefits of space-based research for medical applications.Electrolytic processes in microgravity have provided crucial insights for space-based life support systems. The absence of buoyancy forces has necessitated innovative approaches to gas-liquid separation, leading to the development of specialized technologies for oxygen generation and hydrogen-based energy systems. These advances are essential for future long-duration space missions and have potential applications in terrestrial energy systems. The study of fluid mixing and diffusion in microgravity has revealed fundamental aspects of chemical kinetics that are typically masked by Earth's gravity. Without convection currents, researchers can observe pure diffusion processes, leading to improved understanding of reaction mechanisms and better reactor designs. Similarly, research on metal alloy formation in microgravity, conducted using the Electromagnetic Levitation Facility (EML) aboard the ISS, has enabled the production of higher-purity materials with enhanced properties.Polymer science has also benefited from microgravity research, with studies of polymerization reactions providing insights into the formation of new materials with potential applications both in space and on Earth. Furthermore, quantum chemistry experiments in space, such as those conducted in the Cold Atom Lab, have enabled the study of exotic states of matter like Bose-Einstein condensates under optimal conditions.

The Brazilian space ecosystem has contributed to this field through various initiatives, including the MICRO-G Program of the Brazilian Space Agency, which supports microgravity research using suborbital rockets. This program has facilitated numerous experiments and technological developments, fostering international collaboration in space research.Looking toward the future, these chemical expe-

riments in space are increasingly relevant for developing sustainable space exploration technologies. Space agriculture research and pharmaceutical development in microgravity are particularly promising areas, with potential benefits for both space missions and terrestrial applications. The unique conditions of microgravity continue to provide new insights into fundamental chemical processes, advancing our understanding and capabilities in fields ranging from materials science to biotechnology.This comprehensive approach to chemical experimentation in space environments not only advances our scientific understanding but also provides practical applications that benefit life on Earth. As we continue to explore space and plan for long-term missions to the Moon and Mars, the knowledge gained from these experiments becomes increasingly valuable for developing sustainable technologies and improving life both in space and on our planet.

Keywords: Microgravity Chemistry, Space Experimentation, Low Earth Orbit, Chemical Processes, Space Technology

Author infomation:

Prof. Dr. Élcio Jeronimo de Oliveira

Dr. Élcio Jeronimo de Oliveira holds a postdoctoral degree in Aerospace Engineering from the University of Rome - La Sapienza (2014), a PhD in Space Engineering and Technology from the National Institute for Space Research - INPE (2011), a master's degree in Ocean Engineering with an emphasis on Submarine Engineering from COPPE (2001), an MBA in Public Management from the Air Force University (2012), a degree in Physics from the Federal University of Rio de Janeiro - UFRJ (1999), and a Technology degree in Aeronautical Communications from the Brazilian Air Force (2001).He is a retired officer of the Brazilian Air Force, having held the positions of Deputy Chief of the Space Subdirectorate, Head of the Space Systems Division, Manager of the SARA Project (Atmospheric Reentry Satellite), and Coordinator of the Critical Technologies Action (20VB - AEB) at the Institute of Aeronautics and Space - DCTA. He also worked as Flight Test Coordinator for the 14-X Project at the Institute for Advanced Studies - DCTA, carrying out the technical and operational planning of the Scramjet engine (14-X S) flight test mission.Dr. Oliveira is an Academician of the International Academy of Astronautics (IAA), a member of the Space Materials and Structures and Space Transportation Committees of the IAF (International Astronautical Federation), a former Professor in the area of Space Systems at Luleå University of Technology - Sweden, and a former Business Director of Innospace do Brasil, responsible for planning and executing the first private rocket launch operation of a foreign company at the Alcântara Launch Center.Currently, he is CEO/Founder of KVANTUM Tecnologia e Serviços LTDA. He conducts research in the areas of flight dynamics and trajectory optimization of space vehicles, inertial sensors, GNC, and dynamic modeling of flexible vehicles. Dr. Oliveira has experience in Submarine and Aerospace Engineering, having worked mainly on the following topics: Optimization of launch vehicle trajectories, post-flight analysis of suborbital vehicles, inertial navigation, antennas,

electromagnetism, sonar, underwater acoustics, signal processing, radio navigation, and control systems.

Lecture Date: 08/11/2024
Time: 10:00-10:30 Virtual Room A
Moderator: Cristiane Siqueira

The use of geotechnologies in monitoring new raw materials for biofuel production

Profa. Dra. Anna Claudia dos Santos
Consultant United Nations Development Programme (PNUD), Brazilian Association of Producers of Biodiesel and Biokerosene (UBRABIO) and Brazilian Agency for Environment and Information Technology (Ecodata)

As the world shifts towards cleaner energy sources, biofuels play a critical role in decarbonizing the energy matrix and enhancing energy security. However, sustainable production faces challenges such as land-use competition, environmental degradation, and the need for diverse feedstocks. The use of geotechnologies, including satellite imagery and spatial analysis, offers precise tools to address these challenges by providing real-time data on agricultural and environmental conditions. This study aims to demonstrate how geotechnologies and remote sensing can be applied to monitor new raw materials for biofuels, ensuring a resilient and sustainable transition to a low-carbon economy. It also explores the role of these technologies in aligning production with national policies like RenovaBio and global sustainability goals, such as those outlined by the International Energy Agency (IEA). Brazil, with its vast and diverse territory, exemplifies the potential of integrating geotechnologies into biofuel production. The country has a robust foundation for innovation in bioenergy, driven by the strategic use of geospatial tools to monitor feedstocks and production systems. Agricultural monitoring of alternative feedstocks, canola as macaúba and agave, shows promise for large-scale biofuel production. Technologies like Agricultural Risk Zoning (ZARC), coupled with data from MapBiomas and other satellite tools, enable detailed analyses of climate risks, land-use changes, and productivity patterns, making the monitoring process more efficient and accurate. Remote sensing technologies provide critical insights for decision-making, including identifying optimal cultivation zones, monitoring compliance with environmental regulations, and assessing carbon sequestration potential. This data-driven approach fosters the diversification of feedstocks, minimizes environmental impacts, and promotes innovation in the bioenergy sector. Furthermore, the ability to track land-use changes and monitor deforestation is vital for ensuring that biofuel production remains sustainable and compliant with environmental policies, such as Brazil's RenovaBio, which aims to reduce greenhouse gas emissions through biofuels. Geotechnologies and remote sensing are indispensable for modernizing biofuel production in the face of climate change and increasing energy demands. By enabling efficient monitoring and sustainable practices, these technologies support Brazil's leadership in renewable energy and its commitment to reducing greenhouse gas emissions. The findings underscore the importance of integrating technological advancements with public policies to achieve a resilient and inclusive energy transition.

Keywords: geotechnologies, remote sensing, new raw materials, biofuels, climate change

Author infomation:

Prof.ª Dr.ª Anna Claudia do Santos

PhD in Environmental Sciences/Remote Sensing from the Federal University of Goiás, Master's in Ecology from the Federal University of Rio Grande do Norte, specialist in Geoprocessing from the Federal Institute of Goiás, and graduate in Biological Sciences from the Federal University of Goiás. She is an associate researcher at the Laboratory of Image Processing and Geoprocessing (LAPIG) at the Federal University of Goiás (www.lapig.iesa.ufg.br), one of Brazil's leading institutions for processing and analyzing moderate spatial resolution satellite data applied to biophysical-environmental monitoring and territorial governance. She works as a scientific consultant for the Sustainable Soy Program and Fellowship Cerrado, serving as a Senior Evaluator for startups focused on life cycle analysis and geotechnologies. She was a member of the Working Group that developed the Agriculture Sector Plan and participated in the State Management Groups of the ABC Plan under the leadership of Embrapa, alongside representatives from various Brazilian universities. Currently, she is part of the Parliamentary Biodiesel Front as a scientific consultant on land use changes and life cycle analysis. Her work focuses on projects related to energy transition, family farming, decarbonization, ESG trends, and climate change. Additionally, she serves as a scientific consultant for climate change, land use, and land occupation projects with the United Nations Development Programme (PNUD).

Lecture Date: 07/11/2024
Time: 15:00-15:30 Virtual Room A
Moderator: Walter Pelaez

AI: Humans and Machines Shaping tomorrow

MSc. Anrafel Fernandes Pereira
Vassouras University

The talk “AI: Humans and Machines Shaping Tomorrow” explores the transformative impact of Artificial Intelligence (AI) on society, highlighting its historical evolution from the Turing Test to modern tools such as ChatGPT. It distinguishes between types of AI, addressing weak AI, specialized in specific tasks, and strong AI, which aims to achieve human-comparable intelligence, not yet available. It discusses technological advances that make AI one of the main drivers of global transformation, emphasizing challenges such as data literacy, continuous learning, effective question formulation, privacy, ethics, transparency, and reducing digital inequalities. It also highlights initiatives at Univassouras, such as the XXI ENIC in the metaverse, which integrates AI into academic practices. The presentation concludes that, despite fears and uncertainties, collaboration between humans and machines is essential to overcome challenges and build a smarter, more sustainable, and ethical future, leveraging AI’s transformative potential in a responsible and inclusive manner.

Author infomation:

Prof. MSc. Anrafel Fernandes Pereira

PhD Student in Informatics from the Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Master in Computer Science from the Federal University of Juiz de Fora (UFJF), Executive MBA in Project Management, postgraduate degree in Systems Engineering and degree in Information systems. He works as a University Professor, Coordinator of the Undergraduate Course in Systems Analysis and Development and General Coordinator of Digital Education at the University of Vassouras. Community Manager at Google Developers Group (GDG Vassouras) and Leader in the Google Educators Group (GEG Vassouras). INEP/MEC Higher Education Course Evaluator. He has published and presented at national and international symposiums and conferences. Associate member of the Brazilian Computing Society (SBC) and the Brazilian Health Informatics Society (SBIS)

Lecture Date: 08/11/2024
Time: 14:00-14:30 Virtual Room A
Moderator: Adiel Ricci

Challenges of selective collection: analysis of the implementation of the national solid waste policy

André Dantas Martins; Dr. Paloma Martins Mendonça

According to ABREMA, Brazil recycles only 4% of its waste (ABREMA, 2023). Population growth and increased consumption, driven by marketing strategies, have significantly impacted ecosystems due to the surge in waste generation. In Brazil, the National Solid Waste Policy (PNRS), established by Law n° 12,305/2010, sets guidelines for sustainable waste management, promoting selective collection as a solution to the environmental, social, and economic challenges faced by municipalities (Brasil, 2010). The municipality of Paty do Alferes, located in the Centro-Sul Fluminense region, stands out as a successful example of implementing door-to-door selective collection. This study analyzes the progress of this program, its contributions to solid waste management, and its positive impacts on the local community. Environmental degradation caused by poor urban solid waste (USW) management poses a threat to ecosystems and communities. Studies highlight the nation's poor performance in managing these wastes, with issues related to inadequate collection and disposal (Motta, 2006). The PNRS emphasizes fundamental pillars such as waste prevention, reduction, reuse, recycling, and appropriate final disposal, aligning with the concept of a circular economy. Selective collection emerges as an essential strategy, enabling the segregation of recyclable waste directly at the source. This process reduces the volume of waste sent to landfills, generates revenue through the commercialization of recyclable materials, and contributes to the preservation of natural resources. The implementation of selective collection brings significant benefits across environmental, economic, and social dimensions. Environmentally, it reduces natural resource exploitation and extends landfill life by removing recyclable waste from the general waste flow. Additionally, it helps mitigate climate change by reducing greenhouse gas emissions associated with producing materials from raw resources. Proper waste disposal, such as plastics and used vegetable oils, also prevents soil and water contamination, promoting the preservation of ecosystems and water resources. Economically, selective collection lowers the costs of final waste disposal and generates revenue through the commercialization of recyclables, exemplified by increased revenues from the ICMS Ecológico (State Law n° 5,100/2007). Socially, it promotes the productive inclusion of waste pickers, strengthening cooperatives, and generating decent jobs for low-income families. The program also engages the population through environmental education initiatives, such as the Municipal Environmental Education Program (PROMEA), which raises awareness and mobilizes communities to adopt sustainable habits, enhancing collective responsibility. In Paty do Alferes, door-to--door selective collection began in 2018, initially covering four neighborhoods and collecting approximately five tons of recyclable material per month. By 2024, gradual expansion had reached 17 neighborhoods and 45% of the population, with an average monthly collection of 20 tons. Municipal Law n° 2,631/2019 regulated the program, defining objectives such as the productive inclusion of waste pickers and environmental awareness (Paty do Alferes, 2019). The program involved a partnership between the Municipal Department of Environment and the Amigos da Natureza Waste Pickers Association, responsible for sorting, compressing, and commercializing the collected materials. The association, comprising 12 members, receives

municipal subsidies and revenue from the sale of recyclables, creating jobs and income for low-income families. Environmental education was an essential component for community adherence to the program. Through the PROMEA, initiatives such as theatrical performances, educational material distribution, and mobilization campaigns were conducted in schools and communities. Training sessions were organized through the Public Leadership Center (CLP – Public Connection) and Instituto Humanize, involving personnel from the Department of Environment, Public Works, and Public Services, Health Department, Environmental Council, Waste Pickers Association, Project Management Office, and Social Communication Sector (Martins et al., 2023). Residents' awareness was further reinforced by community health agents and strategic visual communication, ensuring proper waste separation (Dias, 2006). The program's implementation yielded measurable benefits, including a 244% increase in recyclable collection and a 309% growth in revenue generated between 2018 and 2024 (Martins et al., 2023). Additionally, costs related to USW disposal were reduced, and the municipality began receiving funds through the ICMS Ecológico (Besen et al., 2017; State Law No. 5,100/2007). Socially, the recognition of waste pickers and job creation strengthened socio-economic inclusion (Canejo, 2021). The experience of Paty do Alferes demonstrates that selective collection is a powerful tool for sustainable solid waste management, integrating environmental, economic, and social benefits. The collaboration between public policies, waste picker associations, and environmental education was critical to the program's success. This initiative serves as a model for other municipalities, showing that community engagement and sustainability can go hand in hand in building a more balanced future.

Authors infomation:

André Dantas Martins

Serves as the Environment Secretary for the Municipal City Hall of Paty do Alferes, leveraging expertise in General Biology with a focus on Environmental Management, Clinical Analysis, Forest Restoration, Recovery of Degraded Areas, Environmental Licensing, Environmental Education, Waste Management, and Conservation Unit Management. With demonstrated experience in public leadership and management, he specializes in Environmental Management of Hydrographic Basins, Environmental Expertise and Audit. Currently pursuing a master's degree in Environmental Sciences at the University of Vassouras, Martins is actively engaged as a member of the Municipal Environmental Council, REBIO ARARAS Advisory Council, and the Executive Board of the Pirabanhas Committee. He also holds the position of President at ANAMMA-RJ.

Dr. Paloma Martins Mendonça

Bachelor in Biological Sciences in Universidade Santa Úrsula (2004). Specialist in Medical Entomology from the Oswaldo Cruz Institute - IOC/FIOCRUZ (2006). Training Course in Studies on Muscoid Diptera of Forensic and Public Health Importance, held at the Oswaldo Cruz Institute. Master in Parasitic Biology from the Oswaldo Cruz Institute, Fiocruz. PhD in Veterinary Sciences (Veterinary Parasitology) from UFRRJ where she was a CNPq scholarship holder. He has a Post-Doctorate in Biodiversity and Health at Fundaçõo Oswaldo Cruz (2015-2017), with a scholarship from CNPq. He has experience in the area of Parasitology, with an emphasis on Entomology of Parasites and Vectors and Forensic Entomology, working mainly on the following topics: Bionomy of muscoid dipterans, morphology, scanning electron microscopy, human and animal myiasis, alternative control of arthropods of medical importance-veterinary, molecular taxonomy of muscoid dipterans. She was a scholarship holder of the Bolsa Nota 10-FAPERJ Program from March 2009 to February 2010. She served as Municipal Secretary for the Environment and Urbanism of Itaboraí (2017-2020). She works as an Environmental Consultant at the company Contact Soluções Ambientais. Vice Coordinator of the Professional Master's Degree in Environmental Sciences at the University of Vassouras (04/2021 to 08/2023). Adjunct Professor of the Professional Master's Degree in Environmental Studies at the University of Vassouras. Executive Editor of Revista da Saúde - UV (2017-2024).

Lecture date: 08/11/2024
Time: 14:30-15:00 Virtual Room A
Moderator: Lígia Marcondes and Ranyere de Souza

The endosomal recycling pathway: a novel target in cancer?

Dr Andrew Lindsay
School of Biochemistry and Cell Biology, Biosciences Institute, University College Cork, Ireland

The endosomal recycling pathway lies at the heart of the cell's membrane trafficking machinery. It plays a crucial role in determining the composition of the plasma membrane and is thus important for normal cellular homeostasis. However, defective endosomal recycling is linked to a wide range of diseases, including cancer and some neurological disorders. This pathway is also frequently hijacked by many diverse human pathogens during their life cycle. Despite its importance, the endosomal recycling pathway remains relatively understudied. A greater understanding of the molecular mechanisms that support transport through the endosomal recycling pathway will provide deeper insights into the pathophysiology of disease and will likely identify new approaches for their detection and treatment. Work from my laboratory has demonstrated that key regulators of endosomal recycling are dysregulated in many cancers, including breast, lung, and brain cancers. We have shown that small molecule endosomal recycling inhibitors synergize with a number of targeted therapies that are currently in use in the clinic. For this reason, we believe the endosomal recycling pathway represents a novel and unexploited target for the development of new anticancer drugs. This talk will provide an overview of the normal physiological role of the endosomal recycling pathway, describe the consequences when it malfunctions, and discuss potential strategies for modulating its activity.

Author information:

Dr. Andrew Lindsay

Dr. Andrew Lindsay is a Senior Lecturer in the School of Biochemistry and Cell Biology in University College Cork, Ireland. Andrew has 20 years' experience of teaching and research in Biochemistry, Genetics and Biotechnology, and he is the director of the of BSc Genetics degree programme in UCC. He is an editor for the European Journal of Human Genetics. He serves on the Senior Council of the Irish Association for Cancer Research and is a member of the National Research Ethics Committee, Ireland. Andrew is an active researcher, and his laboratory seeks to identify new therapies for treating drug resistant cancers. He also has an interest in studying the role of dysregulated membrane trafficking pathways in neurodegenerative disorders. He holds a Bachelor's degree in Genetics from Trinity College Dublin and a PhD from UCC. He has obtained substantial research funding and has published over 30 research articles. He has worked in labs in Ireland, the United States and France.

Lecture date: 08/11/2024
Time: 10:00-10:30 Virtual Room A
Moderator: Cristián Quintero

Materials surface modification by pulsed laser techniques

Dr. Maximiliano Rossa

Instituto de Investigaciones en Fisicoquímica de Córdoba, Dpto. de Fisicoquímica y Centro Láser de Ciencias Moleculares. Facultad de Ciencias Químicas, Universidad Nacional de Córdoba

A glimpse of the possible uses of pulsed laser techniques to modify the textures and topographies of solid materials, and to add functionalities to them will be given through a few selected studies from the last decade, as carried out by the Laser Chemistry group (led by Prof. Juan C. Ferrero until retirement in 2017) at the UNC. To this aim, high-power laser sources with visible (Vis) or ultraviolet (UV) outputs, and pulses of nanosecond duration have been used in two different set-ups: i) Single-Beam Incidence (SBI), with straightforward incidence of every pulse onto the sample surface, and ii) Direct Laser Interference Patterning (DLIP), at which every pulse is equally split into two sub-beams that are subsequently allowed to interfere onto such a surface. The emphasis will be placed on illustrating the versatility of these laser techniques to process a number of polymeric materials, either synthetic or composite, and in a variety of forms, mostly films of micrometric thickness. With appropriate selection of the laser wavelength (Vis/UV) and control of the incident laser fluence (energy per unit area), the SBI technique showed capability for either increasing the intrinsic surface roughness, or developing craters and layers of micro-foams, at the surface of hydrophilic polymers. The DLIP technique proved higher selectivity to produce periodic (e.g., line/groove) patterns with micrometric precision at the surface of polymer films, which can be accompanied by the development of properties not present in the pristine materials like fluorescence, or enhancement of their intrinsic wettabilities. Potential applications of such laser-processed materials will be suggested, in the framework of collaborations with other research groups of Argentina.

Author information:

Dr. Maximiliano Rossa

Dr. Maximiliano Rossa carried out under-graduate and doctoral studies at the Facultad de Ciencias Químicas of the Universidad Nacional de Córdoba, earning a Ph.D. in Chemical Sciencies in 2005. He held post-doctoral positions at INFIQC (Córdoba, Argentina) in 2007-2009, and at the Laboratoire de Chimie Physique/Université Paris-Sud 11 (Orsay, France) in 2010. As well, he performed short research stays at the Departamento de Química Física I/Universidad Complutense de Madrid (Spain) in 2008, and jointly at the Centre Laser Infrarouge d´Orsay (France) and at the Centre Physique des Interactions Ioniques et Molculaires/Université Aix-Marseille (France) in 2017 and 2019. He is currently an Adjunct Researcher of the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) at INFIQC, and an Adjunct Professor at the FCQ-UNC. His main research field is Physical Chemistry, with focus on Molecular Reaction Dynamics for studying a variety of gas-phase physical and chemical processes (involving metal-containing species and clusters, as well as s-heptazine derivatives), and on Laser Chemistry, especially in pulsed laser ablation/desorption of solids and its applications to laser processing of (bio)materials.

Lecture date: 07/11/2024
Time:13:30-14:00 Virtual Room A
Moderator: Walter Peláez

Open Access:

Silica synthesis from biomass: sustainable use of agroindustrial waste

Dr. Denise Alves Fungaro
Instituto De Pesquisas Energéticas e Nucleares, IPEN/CNEN

Agribusiness activities are generating large amounts of waste due to production processes and society's high consumption standard. The most common types of crop biomass waste are straw, bark, cob and bagasse. The amount of agricultural waste generated in the world (million tons/year) is: Rice husk: 130-170; Corn Cob: 164; Sugarcane Bagasse: 700. Most of this waste is disposed of by burning, dumping, or landfilling. Incorrect disposal raises serious questions related to human health and the environment, mainly associated with air pollution, water and soil contamination. The strategy to mitigate the effects of disposal is the reuse of agricultural biomass waste. Wastes such as rice husk, corn cob, wheat straw and sugarcane bagasse present high content of silica in the composition, thus can be utilized for the production of nanosilica (SiNPs). SiNPs present a variety of applications due to their distinctive properties such as stability, biocompatibility, surface reactivity, tunable pore size, and high surface area. Extracting silica from agricultural waste is an excellent alternative to obtain high added-value products. Methods of extracting silica from agricultural waste are divided into thermal, biological and chemical. The chemical synthesis method has the advantage of size and shape control, as well as purity improvement. Among the chemical methods, SiNPs are mainly synthesized via a sol-gel polymeric route. The silica is extracted from the waste as sodium silicate, then treated with acid to convert it into a gel. A transformation occurs in colloidal suspension of sol into gel through 3D interconnecting network. The sol–gel technique allows control the size, distribution, and morphology of particles with a large specific area and high porosity. Pure amorphous silica was successfully extracted at a 99.1% from sugarcane waste ash. The synthesized SiNPs can be characterized by a combination of spectroscopic and chemical techniques, such as XRD, XRF, SEM, TEM, particle size distribution, N2 adsorption-desorption isotherms, TGA, and FTIR. In this approach, the adoption of the circular economy in agroindustrial waste management contributes significantly to the achievement of the Sustainable Development Goals (SDGs), specifically, SDG 12: "By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse".

Author infomation:

Dr. Denise Alves Fungaro

Denise Alves Fungaro is a researcher at the Nuclear and Energy Research Institute (IPEN-CNEN/SP) in Brazil, with a Ph.D. in Chemistry from the University of São Paulo (1993) and post-doctoral experience at the University of Coimbra, Portugal, specializing in electrochemistry applied to the environment. Dr. Fungaro leads research projects that focus on converting waste into value-added materials like adsorbent materials, zeolites, biochar, nanosilica, and activated carbon. She also explores the use of waste in green roofs and cementitious matrices. As an academic advisor, she supervises students at various levels, including undergraduate, master's, doctoral, and post-doctoral fellows. Her research addresses the development and environmental application of materials derived from waste, including coal combustion by-products, sugarcane ash, agricultural waste, and aluminum industry waste. These materials are characterized and applied in areas such as wastewater treatment, carbon capture and sequestration, green roof substrates, and cement additives. Dr. Fungaro is a prolific author, with over 80 peer-reviewed journal articles and more than 240 citations in the Web of Science. She has an h-index of 9, reflecting the impact of her work. In summary, Denise Alves Fungaro is an expert in developing sustainable solutions for waste management through the synthesis of innovative materials. Her research transforms industrial and agricultural waste into valuable products for environmental remediation.

Lecture date: 07/11/2024
Time: 15:30-16:00 Virtual Room A
Moderator: Luis De Boni

The omnipresence of plastic and its consequences on the environment and humans

Dr. Jesse Marques Pavão
Coordinator of the Graduate Program in Environmental Systems Analysis (PPGA-SA)

The lecture titled Innovation and Global Public Policies: Uniting Nations to Transform Research into Solutions Against Ocean Plastic Pollution provided a comprehensive view of the global impact of plastic pollution in the oceans and emphasized the need for joint strategies to drive scientific and technological innovation alongside supportive public policies. The discussion focused on how research can promote concrete changes in the management of plastic waste, offering solutions that protect marine ecosystems and foster sustainable. Plastic pollution is one of the most urgent environmental crises of our time, with approximately 11 million tons of plastic discharged into the oceans each year. This number is projected to triple by 2040 without robust interventions. This material does not quickly decompose and has devastating consequences for marine life, human health, and economic processes, especially for coastal communities reliant on fishing and tourism. Studies have shown that plastic is present at nearly every level of the marine food chain, with impacts on human health still largely unknown. Given this alarming scenario, the lecture emphasized the need for collective efforts, uniting the power of scientific research with the support of public policies to promote sustainable change. The central idea was to illustrate how collaboration between nations, companies, universities, and NGOs can catalyze effective solutions against plastic pollution. Scientific innovation was discussed as a fundamental pillar in tackling ocean plastic pollution. Research on micro- and nanoplastics, for example, has advanced significantly in the last decade, bringing new monitoring and detection methods essential to understand the full impact of these pollutants. The lecture presented emerging technologies, such as marine sensors and drones equipped with artificial intelligence, which help map and quantify plastic concentrations in coastal areas and the open sea. Another focus was the creation of alternative materials to conventional plastics. Research on bioplastics, biodegradable materials, and compostable polymers has shown potential to replace common plastic products, reducing environmental impact. Additionally, advanced recycling methods that enable the reuse of hard-to-recycle plastics were highlighted as critical steps to prevent their disposal in the environment. A central aspect of the lecture was analyzing successful public policies in the fight against plastic pollution, exemplifying how these actions can serve as models for other countries. This section included case studies of countries implementing policies that restrict or ban single-use plastics, such as the European Union and various nations across Asia and Africa. These policies have shown positive results in reducing the consumption of single-use plastics and promoting reuse and recycling practices. The importance of data-driven policies was underscored. The lecture suggested that governments creating plastic-related legislation should work closely with researchers to ensure that the policies reflect the latest scientific findings. Additionally, creating incentives for companies investing in eco-friendly solutions—such as subsidies for bioplastic production and carbon credits for recycling processes—was cited as essential for sustainable transitions. International Collaboration and Global Challenges. The lecture stressed the

need for a coordinated global response. Plastic pollution is a problem that crosses borders, and unilateral actions by isolated countries are not sufficient to resolve the issue. The lecture highlighted international agreements and partnerships, such as the Global Alliance to End Plastic Pollution and the UN Ocean Initiative, which encourage a multilateral approach to tackle the crisis. Another crucial point was the inclusion of developing countries in global discussions about plastic pollution. Many of these nations, while facing economic and infrastructure challenges, possess significant potential for local innovation and adaptation. Technology transfer programs and capacity-building for waste management were discussed as strategies to empower these regions to implement effective local solutions. Education and Awareness as Complementary Tools. Environmental education was presented as an essential complementary factor for the success of public policies. The lecture pointed out that, without public awareness of the impacts of plastic pollution and the importance of recycling and conscious consumption, government initiatives will face limitations. Awareness campaigns on plastic's environmental impact and promoting sustainable consumption practices were suggested as ways to engage society. Furthermore, the lecture discussed the role of universities and research institutions not only in creating solutions but also in training a new generation of professionals and citizens committed to sustainability. Investing in education and disseminating knowledge about plastic's impact on the oceans is vital to building a culture of environmental responsibility. Conclusion and Call to Action. At the end of the lecture, a call to action encouraged the audience to support innovative policies and initiatives promoting sustainable solutions for plastic pollution in the oceans. The presentation reinforced that the fight against plastic pollution requires a collective and continuous effort from governments, research institutions, companies, and citizens. Only through a solid integration of innovation, science, and public policies will it be possible to protect the oceans and ensure a sustainable future for coming generations. The final appeal was for all sectors of society to take responsibility for their actions and contribute to a development model that respects and preserves the environment.

Author infomation:

Dr. Jesse Marques Pavão

Graduated in Agronomy from the Federal University of Alagoas (2006), Master's in Agronomy/Plant Physiology from the Federal University of Lavras (2007), and Ph.D. in Agronomy/Plant Physiology from the same institution (2009). During his master's degree, he studied and developed methodologies for the degradation (breakdown) of the cell wall in monocots using protoplasts. During his Ph.D., he studied the activity of the enzyme Phenylalanine Ammonia Lyase (PAL) related to the lignification processes of the cell wall. He completed his postdoctoral research at the Seed Conservation Department, Royal Botanic Gardens, Kew, Wakehurst Place, West Sussex - England, where he conducted research to understand the basis of desiccation tolerance in seeds of native species. He is currently a professor and researcher at Cesmac University Center, working in the courses of Agronomy, Biomedicine, Nutrition, Physiotherapy, Pharmacy, and Biology. He coordinates the "Oceanos de Plástico" project, approved by the National Council for Scientific and Technological Development (CNPq) under the call: CNPq/MCTI-FNDCT CT-Petro No. 43/2022, Process 405449/2022-4, endorsed by the United Nations (UN). Since 2018, he has been the Coordinator of the Graduate Program in Environmental Systems Analysis (PPGASA), rated 4 by CAPES, where he teaches courses in Plant Physiology and Biochemistry, Plant Ecology, Structural and Quantitative Plant Anatomy, and Scanning and Transmission Electron Microscopy. Since 2021, he has been a professor in the Professional Graduate Program in Biotechnology in Human and Animal Health (PPGBiotec). Chief Researcher at the Laboratory of Emergetics and Ecosystem Resilience (LERE). Leader of the Socio-Eco-Economy Research Group of the Northeast. He was a Municipal Science, Innovation, and Technology Councilor (2019-2021). Since 2021, he has been a Councilor of the Committee for Non-Patrimonial Damages. Currently, he is a member of the Environment and Sustainability Nucleus (NUMAS/CESMAC). Associate of the Advances in Cleaner Production Network (ACPN) and CEO of the startup Policoncret. He is a researcher in the field of soilless cultivation, where he focuses on strawberry cultivation and its adaptation in the Northeast region.

Lecture date: 08/11/2024
Time: 16:30-17:00 Virtual Room A
Moderator: Luis De Bon

Open Access:

Green valorization of highly underutilized tropical seeds as nutricosmeceutics and dermocosmeceutics

O. Atolania[1], b, P. Banerjeeb[2], S.O. Ibrahimc, L. Kambizid[3], and R. Preissnerb[4]

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Globally, the application of safe cosmetic products is inevitable since many individuals aspire to maintain beautiful skin and hair. An innovative green synthetic route was adopted for the direct characterization of some conventional and non-conventional underutilized tropical seeds which include Sebal causarium, Cola gigantea, Blighia sapida, Cordia sebestena, Daniellia oliveri, Elaeis guineensis, Ricinus communis, Citrus aurantifolia, Citrus paradise, Vitellaria paradoxa, Mormodica charantea, Delonix regia, Moringa oleifera, Kigelia africana and Prosopis africana. The lipid, fatty acid methyl and butyl/isobutyl esters obtained via multistep and direct methyl/butylation were characterized using Fourier Transform Infrared Spectroscopy and Gas Chromatography-Mass Spectrometry. The principle of green chemistry was further adopted for the preparation of cosmetics which were fully plant-based, biodegradable and free of all artificial antibiotics, colourings, fragrance and preservatives. The *In vitro* antimicrobial, antioxidant, anti-inflammatory and membrane stabilisation activities of the oils and cosmetic products were determined using standard procedures. Among others, ricinoleic acid (70%), a unique omega-9 fatty acid was predominant in Ricinus communis seed oil. Daniellia oliveri oil contains 57% linolelaidic acid as the major fatty acid, while oleic acid (46%) and lauric acid (44%) were the most prominent in Vitellaria paradoxa and Elaeis guineensis respectively. Linoeladic acid was the most predominant in Citrullus vulgaris, Delonix regia and Prosopis africana. Oils and allied products of Daniellia oliveri, Delonix regia and Vitellaria paradoxa significantly inhibited the growth Streptococcus aureus, Klebsiella granulomatis and Aspergillus niger while others exhibited significant antioxidant or anti-inflammatory activities. The natural (green) cosmetics, free of all synthetic additives were potent, and cost effective compared to commercial products. The research concept aligns with and contribute particularly to sustainable development goals (SDGs) 3, 6 and 9.

Keywords: Green Chemistry; Nutricosmetics; Tropical Seed; Tyrosinase; Butylation; Skin and hair-care

Author infomation:

Dr. Atolani Olubunmi

Dr. Atolani, Olubunmi is an Associate Professor of Organic (Medicinal) Chemistry with extensive experience in teaching and research. He obtained his PhD from the University of Ilorin, Nigeria, where he studied the anticancer and antioxidant properties of bioactive compounds from African medicinal folklore. His current research focuses on organic synthesis, cheminformatics applications for drug discovery in diseases like cancer and malaria, and exploring green cosmeceuticals from tropical seeds. He also conducts research in scientometrics, analyzing global institutional rankings. Dr. Atolani has received doctoral and postdoctoral training in Germany and Pakistan on many occasions. As Principal Investigator and co-investigator, he has won numerous prestigious international research grants awards such as Deutsche Forschungsgemeinschaft-Germany, UNESCO, TWAS-DFG, TWAS-CIIT, Seeding Labs Equipment grants – USA, European Association of Cancer Researcher (EACR) grants inter alia. He has authored over 120 peer-reviewed publications (scopus-indexed majority), delivered keynote addresses globally, and served as a reviewer for reputable journals. He is an external examiner and research grant assessor to institutions and bodies in South Africa, Mexico, Nigeria etc. His research outputs and acumen has been presented in many local and international research scientific forums in Nigeria, Germany, Luxembourg, Netherlands, Ghana, Niger Republic, Kenya and United State of America etc. He is a member of professional bodies like the American Chemical Society (ACS), Royal Society of Chemistry (RSC), European Association of Cancer Researcher (EACR), and Nigerian Young Academy (NYA). At the University of Ilorin, he supervises undergraduate and postgraduate students. Previously, Dr. Atolani held leadership roles as Assistant Director at the Centre for International Education, Deputy Director (Research) at the Centre for Research Development and In-House Training and currently, the coordinator of African Center for Herbal Research, University of Ilorin, Nigeria.

Lecture date: 08/11/2024
Time: 10:00-10:30 Virtual Room A
Moderator: Cristiane Siqueira

Impact of HPV and Chlamydia Trachomatis infections on male infertility: interactions, immune responses, and sperm

Dr. Cecilia Cuffini

Facultad de Ciencias Médicas - Universidad Nacional de Córdoba. Argentina.

Human Papillomavirus (HPV) is a common sexually transmitted infection that includes high-risk (HR-HPV) and low-risk (LR-HPV) strains, with HR-HPV linked to significant malignancy risks. However, the impact of these infections on male fertility remains unclear. HPV is also recognized as a risk factor for Chlamydia trachomatis (CT) infection and vice versa, and their co-infections are prevalent, especially in women, often without symptoms. This interplay requires further investigation to understand its implications for male reproductive health. Our previous results (..\manuscritos 2023\Carolina HPV 16-C-tr\fcimb-13-1214017.pdf) indicated that during CT and HPV co-infection, E6 and E7 oncoproteins impair the transition from retinoblastoma (RB) to the E2F transcription factor and affect the generation of infectious progeny from CT. Additionally, the expression of immune inhibitory molecules and HPV-16 E6E7 is cooperatively enhanced in CT-infected cells, which would favor both oncogenesis and immunosuppression. Our latest research (..\manuscritos 2024\Caro y Vicky\fcimb-14-1420307.pdf) findings highlight the intricate relationships between HPV and CT infections, which are associated with impaired sperm quality, oxidative stress, and inflammation. HPV was detected in 19% (39/205) of semen samples, with HR-HPV infections being more prevalent; HPV-16 was the most frequent genotype. Neither HR-HPV nor LR-HPV was associated with significant alterations in routine sperm quality parameters. However, HR-HPV+ individuals showed significantly higher levels of sperm necrosis and exhibited increased proportions of ROS+ spermatozoa compared to LR-HPV+ or control individuals. Furthermore, no significant semen inflammation was detected in patients infected with either HR-HPV or LR-HPV, and unexpectedly, reduced levels of semen leukocytes and inflammatory cytokines (IL-6 and IL-1ß) were observed in HR-HPV+ patients compared to controls. These observations highlight the necessity of comprehensive HPV screening, including genotyping, in urology and fertility clinics. Our findings indicate that screening for HPV and Chlamydia trachomatis co-infection could provide critical opportunities for intervention to prevent severe reproductive health outcomes, including cervical cancer.

Author infomation:

Dr. Cecilia Cuffini

Cecilia G. Cuffini is a Biochemist (1991), Magister (1998) and PhD in Medical Sciences from the National University of Córdoba (2005). She has served as an Adjunct Clinical Researcher from the National Council of Scientific Research and Technology (CONICET) since 2015. Dr. Cuffini is an Adjunct Professor at the Medical Faculty of the National University of Córdoba (2005) and serves as the Head of the Laboratory for Chlamydias and Human Papilloma Virus at the Institute of Virology Dr. J.M. Vanella of Córdoba within the National University of Córdoba. Her laboratory conducts surveillance of Chlamydia psittaci and the research findings of her team contributed to the enactment of the law on the ownership and commercialization of birds in the province of Cordoba. Her main research interests lie in the field of molecular epidemiology of the two globally prevalent sexually transmitted infections: viral (Human Papilloma Virus) and bacterial (Chlamydia trachomatis) in asymptomatic youth, infertile couples, and vulnerable populations. Currently, her team is researching sexually transmitted infections in extragenital mucosa and exploring their potential synergistic effects in “in vitro” models as well as in patients with cervical cancer and oral cancer.

Lecture date: 08/11/2024
Time: 10:00-10:30 Virtual Room A
Moderator: Cristián Quintero

Bird migration and climate

Dr. Zurab Javakhishvili

Birds migrate for various reasons, primarily driven by climate and food availability. To escape harsh winters and secure optimal breeding conditions, many bird species undertake long-distance journeys. They migrate to areas with abundant food sources during breeding seasons and to warmer regions with plentiful food during winter. Not all birds migrate. Obligate migrants are genetically programmed to migrate regularly, while facultative migrants are more flexible in their migration patterns. Birds navigate using a combination of Earth's magnetic field, celestial bodies, and learned routes. The evolution of bird migration is closely linked to global climate cycles, particularly the Ice Age. Climate change is now affecting migration patterns, leading to shifts in timing and potential disruptions to breeding and feeding schedules. Migratory birds face numerous threats, including predation, habitat loss, and extreme weather events. Protecting habitats and mitigating climate change impacts are crucial for ensuring the survival of these remarkable creatures.

Author information:

Dr. Zurab Javakhishvili

Dr. Zura Javakhishvili is one of Georgia's leading academicians and wildlife conservationists, with 25 years of experience in wildlife conservation and management and over 15 years as a researcher and lecturer of ecology at Ilia State University. His career began at the Georgian Center for the Conservation of Wildlife (GCCW) in 1997, where he researched and mapped raptor and owl distribution in Georgia, leading to the publication of Georgia's first bird identification books: "Raptors of Georgia" (1999) and "Raptors and Owls of Georgia" (2005). After volunteering at Hawk Mountain Sanctuary in Pennsylvania and participating in American kestrel research, he coordinated the Important Bird Areas project in Georgia with BirdLife International from 2004 to 2006. Javakhishvili earned his Master's degree in Biology and Zoology from Ivane Javakhishvili Tbilisi State University in 2003, studying griffon vulture nest site selection. He served as GCCW's Conservation Program Manager before joining Ilia State University as a lecturer and PhD student, where he focused on seasonal bird movement in the Caucasus and its role in A-type Avian Influenza Virus spread. His expertise expanded through training in satellite telemetry at the University of Idaho and data analysis at the University of Cambridge, leading to ongoing collaborations with prestigious institutions including Erasmus University Medical Center, the University of Cambridge, and Royal Veterinary College, while continuing to build capacity for wildlife conservation and research in Georgia through his teaching.

Lecture Date: 08/11/2024
Time: 10:00-10:30 Virtual Room A
Moderator: Cristián Quintero

The impact of legal regulation on the monitoring and control of antimicrobial resistance

Dr. Ramon Loureiro Pimenta
Federal Rural University of Rio de Janeiro

Brazil is the world's largest exporter and second largest producer of chicken meat, with a per capita domestic consumption of 45,1 kg. The country's success in this activity is due to the use of high technology in the sectors of poultry management, genetics, health and nutrition. It is estimated that 80% of all antimicrobials produced in the world are used in animal production, being used in the following forms: metaphylactic, prophylactic and as an additive growth promoter (AGP). The metaphylactic and prophylactic forms are characterized by the use of antimicrobials above the minimum inhibitory concentration, with the objectives of treating and preventing bacterial diseases, respectively. The use as AGP is characterized by doses below the minimum inhibitory concentration, with the objectives of controlling the intestinal microbiota, reducing: ammonia production, lesions in the intestinal mucosa, energy demand for the immune system and, optimizing: absorption and use of nutrients for tissue construction. However, the use as AGP is described in the literature as responsible for selecting resistant bacteria. Colistin is an important antimicrobial used in intensive care centers due to its efficiency in treating infections caused by multidrug-resistant Gram-negative bacteria and also for preventing the occurrence of endotoxic shock. In China in 2015, the mcr-1 gene was detected in an Escherichia coli plasmid. This gene encodes an alteration of the lipid A of LPS, reducing the affinity between LPS and colistin. In 2016, the Brazilian Ministry of Agriculture and Livestock published normative instruction n° 45 of November 22, 2016, prohibiting the use of colistin as an AGP and stipulating a two-year deadline for feed manufacturers to adapt. The objective of the study was to evaluate how the regulation of the use of colistin and other antimicrobial as an AGP impacted the dynamics of phenotypic and genotypic resistance in Escherichia coli strains. The strains were obtained from broiler chicken farms between 2015 and 2023 in the municipality of São José do Vale do Rio Preto, located in the state of Rio de Janeiro, Brazil. The initial isolation was carried out on Methylene Blue Eosin Agar medium, and the colonies that grew in the medium were identified by MALDI-TOF. The colonies that were identified as E. coli were subjected to phenotypic resistance testing on Mueller-Hinton Agar supplemented with 2 µg/mL and 4 µg/mL of colistin and also to the disk diffusion test for the following classes: fluoquinolones, sulfonamides, and beta-lactams. The strains identified as Enterococcus spp. were tested on Muller-Hinton Agar supplemented with vancomycin. All E. coli strains were subjected to the multiplex PCR technique for detection of the mcr-1, mcr-2, mcr-3, mcr-4, mcr-5, mcr-6, mcr-7, mcr-8, mcr-9 genes. The results obtained before the legal framework showed that the phenotypic resistance to colistin found was 98%, with the genes mcr-1 and mcr-5 detected in 58% and 2,8% of the strains, respectively. However the genes: mcr-2, mcr-3, mcr-4, mcr-6, mcr-7, mcr-8, mcr-9 not detected. Six years after the ban, the phenotypic resistance to colistin found was 18%, while the prevalence of the genes was: mcr-4 23%, mcr-1 18%, mcr-2 16%, mcr-6 15%, mcr-9 14%, mcr-3 10%, mcr-8 8% and mcr-5 3% while mcr-7 is not detected. The phenotypic resistance profile to the classes of beta-lactams, sulfonamides and fluroquinolones was 37%, 71% and 36% respectively. All Enteroccus spp. strains

were sensitive to vancomycin. The results demonstrate that the dynamics of antimicrobial use directly influences their resistance profile. Colistin and vancomycin were antimicrobials used only as AGP, and their prohibition in 2018 and 1998 were sufficient to significantly reduce the prevalence of resistant strains in chicken cloaca samples. However, the same behavior is not observed for beta-lactams, sulfonamides and fluoquinolones, which even with the suspension of their use as AGP, are frequently used in metaphylactic and prophylactic forms. The creation of laws prohibiting their use as AGP combined with the rational use of antimicrobials is the key to reducing the occurrence of resistance in animal production.

Author information:

Dr. Ramon Loureiro Pimenta

Dr. Ramon Loureiro Pimenta graduated in Veterinary Medicine from the Federal Rural University of Rio de Janeiro (UFRRJ) in 2009, PhD in Science, Technology and Innovation in Agriculture from the Federal Rural University of Rio de Janeiro (UFRRJ) in 2018. He has been working in the poultry industry for 14 years, slaughtering, processing and recycling of butcher animals in various industries in Brazil and 6 years as a university professor, currently linked to the Department of Public Health at the Federal Rural University of Rio de Janeiro teaching the subject Poultry Health. Participates as a collaborator in research groups at UFRRJ, Fiocruz and University of Vassouras in the areas of antimicrobial resistance in poultry farming, aquaculture and slaughterhouse effluents. He has been part of the Rio de Janeiro Poultry Health Committee for 6 years, in addition to having carried out several works together with the Ministry of Agriculture, Livestock and Supply (MAPA) and EMBRAPA.

Lecture Date: 08/11/2024
Time: 10:00-10:30 Main Auditorium Room B
Moderator: Dr. Cristián Quintero

NBS, Water Security and climate resilience

Engª Mayná Coutínho

The presentation emphasized that Nature-Based Solutions (NBS) are transformative strategies for promoting water security by aligning ecological preservation with human needs. NBS offer practical, cost-effective, and sustainable approaches to mitigate water-related challenges exacerbated by climate change, such as droughts, floods, and water quality degradation. One of the core ideas presented was the enhancement of natural infrastructure—such as wetlands, forests, and riparian zones—to regulate water flows, improve water retention, and reduce sedimentation in water bodies. These interventions not only support ecosystems but also reduce reliance on expensive engineered solutions. For instance, the Guandu Basin restoration project illustrated how forest restoration on degraded pastures led to a significant reduction in sedimentation, thereby improving water quality and lowering treatment costs. This example highlighted the dual benefit of ecological recovery and economic efficiency, showcasing significant environmental and economic benefits. The presentation also discussed how NBS, such as agroforestry and urban green infrastructure, address diverse water security challenges across rural and urban contexts. Agroforestry systems enhance soil water retention, benefiting agricultural productivity, while urban green spaces mitigate urban flooding and improve groundwater recharge. Real-world examples, including the Guandu Basin restoration project, were showcased to demonstrate significant environmental and economic benefits. The discussion emphasized the importance of integrating NBS into urban and rural planning frameworks, highlighting their potential to support vulnerable communities disproportionately affected by extreme climatic events. Importantly, the presentation stressed the necessity of integrating NBS into national and regional water management policies. This integration requires stakeholder collaboration across sectors, fostering a comprehensive watershed management approach. By aligning NBS with water resource planning, cities and rural areas can better adapt to hydrological variability, ensuring sustainable water availability for future generations while enhancing the resilience of ecosystems and communities. The implementation of NBS was also framed as essential for reducing the disproportionate impacts of water insecurity on vulnerable populations, advocating for inclusive and equitable approaches to water resource management. Overall, the presentation underscored the role of NBS as a cornerstone for achieving long-term water security and climate resilience.

Author infomation:

Engª Mayná Coutínho

Mayná Coutínho is a seasoned Environmental Engineer, currently serving as Advisor at Agência Reguladora de Energia e Saneamento Básico do Estado do Rio de Janeiro (Agenersa). Also, Coordinator and Professor of the First executive training in Chief Climate Officer (CCO) in Brazil, at the University of Vassouras. Served as Environmental/Sustainability Coordinator (ESG) at Companhia Estadual de Águas e Esgotos (CEDAE) in Rio de Janeiro, Brazil. Additionally, she holded the prestigious positions of President of the Guandu River Basin Water Committee and President of the State Water Resources Council of Rio de Janeiro, where she has driven significant environmental policy development and management. With a strong academic background, including a Bachelor of Science in Environmental Engineering from Universidade Federal Fluminense and an Associate Degree in Environment from Colégio Federal Pedro II, Mayná has been instrumental in implementing sustainability practices and pioneering environmental projects. Her notable work includes leading the Forest Restoration Programme of Tingua-Bocaina, in partnership with the State Government of Rio de Janeiro and The Nature Conservancy Brazil, aimed at reforesting 30,000 hectares in the state's most crucial water supply basin. Complementing her professional endeavors, Mayná is currently enhancing her expertise through online specializations in Climate Solutions at the University of Edinburgh and Sustainable Cities at Johns Hopkins University.

Lecture date: 08/11/2024
Time: 9:30-10:00 Virtual Room A
Moderator: Nicole Klimko

Changes and progress in Brazil's environmental policies in times of climate crisis

Dra. Cristiane Borborema Chaché

Over the past decade, Brazil has faced numerous severe events caused by intense climate crises. For instance, during the recent period between 2023 and 2024, the country experienced one of the worst droughts in 75 years[1], which exacerbated wildfires across various biomes. In the Amazon, approximately 11 million hectares were burned[2], while in the Cerrado, fires affected 8.4 million hectares, 85% of which consisted of native vegetation[2]. The Pantanal also suffered unprecedented damage, with a 2,306% increase in burned area compared to the average of the past five years[2]. Concurrently, extreme heat events, such as the record thermal sensation of 62.3°C in Rio de Janeiro[3], highlighted the intensity of the climate crisis in the country. In this context, it is important to recognize the role of environmental public policies as a result of joint efforts between the State and society, grounded in the principle of the Brazilian Constitution that guarantees the right to a balanced environment[4]. However, when seeking legal and political solutions to climate crises, it becomes evident that the timing of nature does not align with the timeframe required for legislative projects to be discussed and approved. The complexity and rapidity of natural phenomena are at odds with the slower and more bureaucratic processes of the legal-political system[5]. For this reason, it is increasingly evident that environmental government policies should be converted into and recognized as state policies. While government policies refer to the temporary management of political power by the ruling group, often limited by specific mandates and, therefore, remaining in effect for a determined period; state policies persist regardless of the ephemeral nature of governments and ensure that long-term guidelines and projects are integrated into temporary administrations, thereby guaranteeing continuity and alignment with collective interests[6]. Some of these state policies stand out in formulating strategies aimed at sustainability and addressing climate change. Among the main regulations are the National Environmental Policy (Law 6,938/81)[7], which establishes principles and instruments for environmental preservation; the National Water Resources Policy (Law 9,433/97)[8], which regulates the integrated and participatory management of the country's water resources; and the Future Fuel Law (Law 14,993/2024)[9], which incorporates biodiesel into Brazil's energy matrix, setting targets to expand its use by 2025. The integration of these legislations reflects the need for coordinated actions between the executive and legislative branches to address and mitigate the impacts of climate change. Furthermore, societal engagement is essential for the formulation of effective public policies that promote sustainability and ensure the quality of life for future generations.

Author infomation:

Dra. Cristiane Chaché

Cristiane Chaché is a Lawyer and Adjunct Professor in the Professional Master's Program in Environmental Sciences at Vassouras University, Rio de Janeiro, Brazil. She holds a PhD and Master's degree in Sociology and Law from the Graduate Program at the Fluminense Federal University, Rio de Janeiro, Brazil, with a research focus on Socio-environmental, Rural, and Urban Conflicts. She works as a researcher at the INCT-Institute of Comparative Studies in Institutional Conflict Management (INCT-InEAC) at Fluminense Federal University, Rio de Janeiro, Brazil. She holds a Bachelor's degree in Law, also from Fluminense Federal University, and initially graduated as a Technician in Environment from the Federal Institute of Education, Science, and Technology of Rio de Janeiro (IFRJ), Brazil. She has worked at the Marine Biology Institute of the Federal University of Rio de Janeiro (UFRJ), Brazil, at the Municipal Secretariat of Environment and Urbanism of Itaboraí, Rio de Janeiro, Brazil, and at the State Institute of Environment (INEA), in the Environmental Licensing Directorate, Rio de Janeiro, Brazil, having passed a public competition. Her research and interests are particularly focused on Environmental and Urban Law, Environmental and Social Sciences, with an emphasis on rural and urban socio-environmental conflicts.

Lecture date: 08/11/2024
Time: 10:30-11:00 – In Person / Virtual Room A
Moderator: Irenilda Cavalcanti and Rafael Cardoso

Innovation and opportunities in Bioeconomy: a new economic paradigm

Dr. Paulo Wilton Camara
University of Vassouras, Brazil

The recent presentation at the II Southern Science Conference in Mendoza, Argentina, provides a comprehensive analysis of bioeconomy's emergence as a new economic paradigm, addressing both current macroeconomic challenges and opportunities within the bioeconomic sector. According to World Bank projections for 2024, the global economic outlook presents significant concerns, with GDP growth rates showing a decline from 2.6% in 2023 to an expected 2.4% in 2024. This performance represents the worst half-decade in 30 years, affecting 60% of economies and impacting 80% of the global population with growth rates below the previous decade's average. The International Monetary Fund has identified declining economic growth, inflation reduction requirements, and financial stability maintenance as primary global concerns. Within this challenging economic landscape, bioeconomy emerges as a promising solution to environmental, social, and economic challenges. It represents a fundamental integration of biological principles with economic systems, aiming to create a sustainable economy based on biological resources. Biotechnology serves as a crucial tool in this transformation, being defined by the UN Convention on Biodiversity as any technological application utilizing biological systems, living organisms, or their derivatives to create or modify products and processes for specific uses. The circular bioeconomy concept stands in stark contrast to the traditional linear economic model of "extract, produce, and discard." This new approach emphasizes the importance of integrating circular economy principles with bioeconomic practices to enhance resource efficiency and sustainability. Global initiatives demonstrate the growing importance and implementation of bioeconomic principles across different regions. Brazil's 2024 National Bioeconomy Strategy focuses on promoting sustainable products and processes using biological resources and new technologies, aligned with the New Brazil Industry program. The United States, through its Department of Agriculture, has been emphasizing technological development since 2002, implementing the Bio Preferred Program that establishes purchasing guidelines for federal agencies and provides voluntary labeling for certified biological products. The European Union's 2021 Joint Undertaking for a Circular Bio-based Europe aims to accelerate innovation and market deployment of bio-based solutions while ensuring high environmental performance of bio-based industrial systems. Several major corporations have successfully implemented circular bioeconomy practices. Interface has pioneered the use of recycled nylon and sustainable raw materials, while implementing comprehensive carpet recycling programs. Unilever has made significant investments in bioplastics and sustainable raw material sources, and Philips has focused on developing medical equipment using recycled plastics while promoting medical device recycling programs. The economic potential of bioeconomy is remarkable, with Boston Consulting Group projections suggesting a market value of US$30 trillion by 2050. This potential has elevated bioeconomy to unprecedented prominence in the G20 agenda, underscoring its importance in global economic discussions. The field creates opportunities for sustainability enhancement, technological advancement, economic development, biodiversi-

ty conservation, and global competitiveness. However, these opportunities must be considered against the backdrop of the UN's Sustainable Development Goals, where progress has been limited, with only 17% of SDGs showing advancement as of June 2024. UN Secretary-General António Guterres has emphasized the urgent need for action to prevent Agenda 2030 from becoming merely "an epitaph for a world that could have been." The transformation to a bioeconomy represents a crucial paradigm shift in production and consumption patterns, seeking to balance economic development with environmental sustainability. This transition requires coordinated efforts across sectors, innovative approaches, and strong policy support to realize its full potential in addressing current global challenges and creating a more sustainable future for all.

Author information:

Dr. Paulo Wilton Camara

Paulo Wilton Camara is a highly accomplished academic and professional with extensive experience in various fields. He holds a Post-Doctorate in Military Sciences and a Doctorate in Political Science, among other degrees. With over 33 years of experience in teaching and academic management, he has worked in multiple institutions in Rio de Janeiro and Goiás. Throughout his career, he has been involved in creating and managing educational programs, such as the Soma Business Incubator. He currently holds several leadership positions at the University of Vassouras, including General Coordinator of Postgraduate Studies and Deputy Coordinator of the Master's Degree in Environmental Sciences. Additionally, he is actively involved in research projects related to renewable energy, environmental monitoring, and circular economy. In the business realm, he founded PW/TARGET Consulting and Services Ltd., specializing in strategic business management and innovation. He is also a member of professional associations and has served as a consultant and instructor for organizations like Sebrae/RJ. With expertise in public policy, planning, sales, marketing, operations, and logistics, Paulo Wilton Camara is a respected figure in academia and business, contributing significantly to both fields.

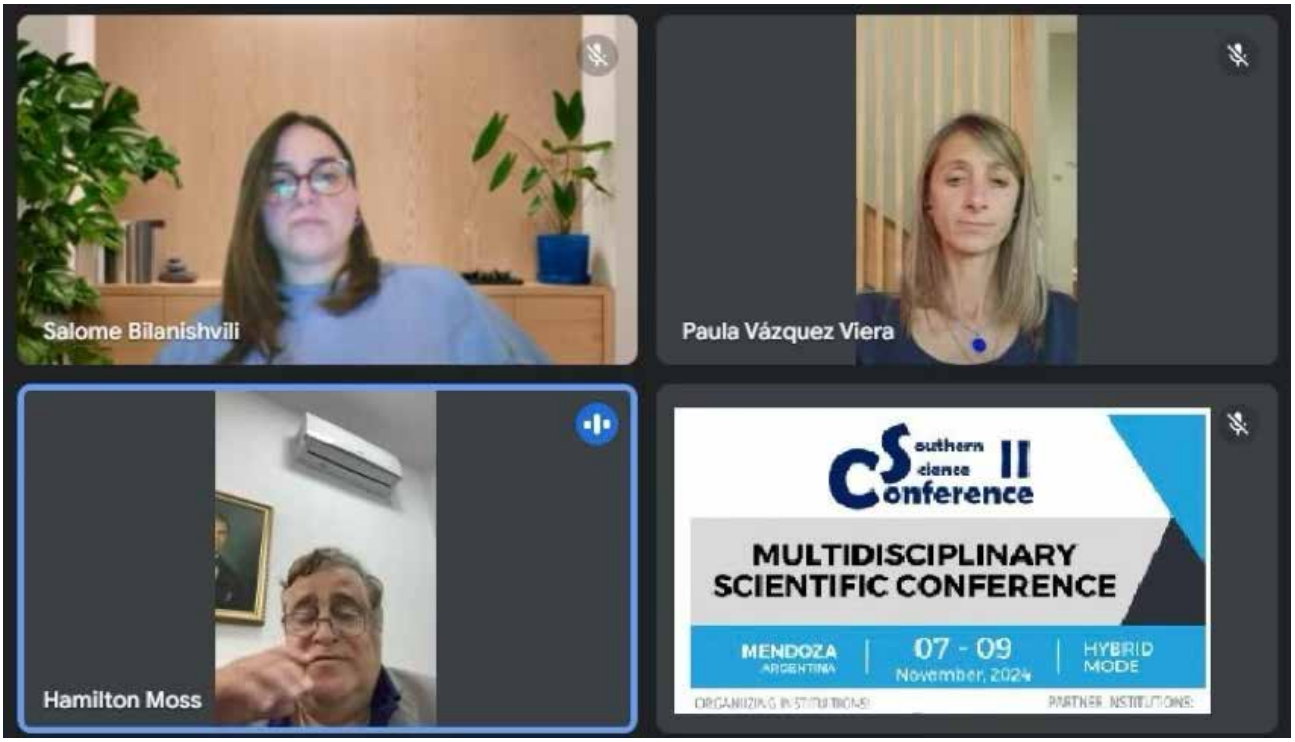
Lecture date: 08/11/2024
Time: 14:00-14:30 – In Person / Virtual Room B
Moderator: Irenilda Cavalcanti and Rafael Cardoso

APPENDIX I

Dr. Eduardo F. Luna, Rector and Dr. Francisco Cutroni, Dean of the University of Mendoza at the opening.

Dr. Walter José Peláez (National University of Córdoba), Dr. Cristián Andrés Quintero (Director of Medical Research at the University of Mendoza), Dr. Cristiane Siqueira (Vice-Rector of Postgraduate Studies and Professional Training and Coordinator of the Professional Master's Degree in Environmental Sciences at Univassouras), Luis De Boni (Conference Coordinator and Editor of the Southern Journal of Sciences).

Rector of the University of Vassouras, Dr. Marco Antonio Soares de Souza, remotely.



Hamilton Moss, from Institutional Relations at Univassouras and representatives from other institutions, Paula Vázquez Viera (Relaciones Internacionales y Centro de Idiomas - Universidade de Mendoza) e Salome Bilanishvili (Head of International Relations Office, Ilia State University).

Closing Ceremony with Professor Dr. Cristiane Chaché (Univassouras).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APPENDIX II

Crossing Borders for the Dissemination of Knowledge

The teacher Dr. Ramon Loreiro Pimenta, embarked on an inspiring journey to the Mendoza Conference in Argentina, traveling by motorcycle, symbolizing the spirit of adventure and a commitment to the dissemination of knowledge.
This experience highlights the importance of crossing physical and cultural boundaries to share knowledge and strengthen international academic collaboration. The trip, marked by challenges and discoveries, not only enriched the exchange of scientific experiences but also demonstrated how individual efforts can contribute to strengthening knowledge networks and valuing science on a global scale.

Testimonial from Professor Dr. Ramon Loureiro Pimenta: “On October 30, 2024, I began my journey leaving Rio de Janeiro, heading to Mendoza, Argentina, where I arrived on November 6, 2024. The experience was enriching as I had the opportunity to cross Argentina from east to west, observing diverse landscapes and realities. During the trip, I visited poultry-producing areas with modern structures, such as new feed mills and aviaries. This recent development in poultry farming, especially 300-400 km from the border with Brazil, reflects a growing industry.On November 8, I gave my lecture at the University of Mendoza, which impressed me with its prime location in a prestigious area of the city and excellent infrastructure. I was warmly welcomed by both the university staff and the people I met along the way, including

local residents, gas station attendants, and students.The lecture was a special moment of exchange, with great interest from the professors present, such as Prof. Dr. Cristián Quinteiro from the University of Mendoza and Walter Peláez from the University of Córdoba. Their contributions enriched the discussion, strengthening the goal of expanding the network of researchers.A total of 8,000 km were traveled (round trip) in the name of knowledge dissemination and strengthening scientific cooperation. Thank you very much".

A small view of the backstage of a big conference

Participating in the II Science Conference in Mendoza, Argentina, a hybrid event jointly hosted by the University of Mendoza (AR) and the University of Vassouras (BR), was an extraordinary opportunity to strengthen the scientific, cultural, and friendship bonds between Brazil and Argentina.

Figure 1Andes

The impressive roster of confirmed speakers represented a rich diversity of knowledge areas and expertise. The event demonstrated a strong multidisciplinary character, with special emphasis on themes related to sustainability, scientific research, and technological development.

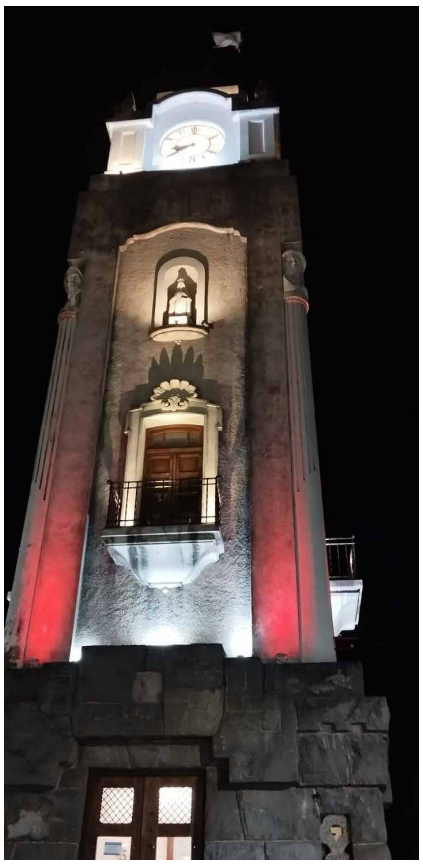

Figure 2Alta Gracia

In the field of Environmental Sciences and Sustainability, specialists in water resource management, forest restoration, and circular economy stood out, demonstrating significant concern for contemporary environmental issues. In the Biomedical Sciences and Health area, the event featured renowned professionals in biochemistry, pharmacology, parasitology, microbiology, immunology, neurobiology, and cardiovascular medicine.

The Engineering and Technology sector was well represented by experts in chemical engineering, aerospace, biotechnology, and information technology, along with professionals dedicated to materials processing. Agricultural Sciences also played a prominent role, with important contributions in agronomy, plant physiology, and sustainable agricultural production. In Biological Sciences, the event brought together specialists in entomology, molecular biology, genetics, ecology, and wildlife conservation. The Chemistry and Materials field was repre-

sented by researchers in organic chemistry, physics, and new materials development, including nanotechnology.

The legal aspect was not overlooked, with representatives from Environmental Law and Legislation focusing on socio-environmental conflict management and environmental licensing. The Education and Research area was also present, with experts in scientific methodology and educational innovation.

The geographical diversity of speakers was noteworthy, with a strong presence of researchers from Brazil and Argentina, as well as other countries including Nigeria, Georgia, and the USA, demonstrating an important exchange of knowledge and experiences across regions. This diverse composition of experts facilitated rich and comprehensive discussions on various aspects of contemporary science and technology, with particular attention to sustainability and development issues.

At the conclusion of the event, I had the honor of being included in a photograph with the senior team and “junior staff” (JS). In the pictured from right to left were Cristián Quintero, Vera Roman (JS), Walter Pelaez, Cristiane Chaché, Cristiane Siqueira, Luisa De Boni (JS), and Luis De Boni.

The 2024 edition was amazing, and we are looking for the 2026 edition!

Figure 3 Mendoza AR

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