3rd International Conference on
Ecology, Ecosystem and Conservation Biology
3rd International Conference on &
Microbial Ecology & Eco Systems
March 18-19, 2019 | Chicago, USA

KEYNOTE FORUM | DAY 1 JOURNAL OF ECOSYSTEM & ECOGRAPHY 2019, VOLUME 9 | DOI: 10.4172/2157-7625-C1-043

Photodynamic therapy used to reduce microbial contamination and disinfection on solid surfaces of diverse materials in a sustainable and ecological way

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The Photodynamic Therapy is based on the association of a nontoxic photosensitizer and post-irradiation with a proper wavelength light source proper for the formation of reactive species oxygen. PDT may be an option for decontamination of surfaces of various materials that are based on the interaction between a non-toxic photosensitizer (PS) and irradiation with a wavelength light source suitable for the formation of reactive oxygen species with antimicrobial effects. These photoreactions have been used since the beginning of the 20th century as a tool to disable numerous pathogens and were established as a therapeutic platform commonly referred to as PDT. With help of powerful and well controlled light sources, such as lasers and light emitting diode (LED), great advances were made in photochemical and photobiotic studies the low-intensity light can also be associated with the administration of nontoxic PS to locally promote photochemical reactions that might induce cell death. In short, when the PS absorbs a photon, it is upgraded to an excitable state and can transfer charges or energy to molecular oxygen of the fundamental state inducing the formation of reactive species of oxygen. The byproducts of phenothiazine, such as toluidine blue and methylene blue (MB) are amongst the most studied PS for the antimicrobial photodynamic therapy (aPDT) and have been tested in the last decades in association with the red light to promote the bactericidal effect *in vitro* and *in vivo*. These results, based on studies in the literature, suggest good perspectives for the formulation of adequate clinical protocols for microbial control and thus, the aPDT open new frontiers and nontoxic and low-cost alternative for the disinfection of biomedical tools as non-critical instruments, besides being useful for the food industry. The objective of this paper is to demonstrate that devices such as PID (patent deposit MU-BR 20.2017.002297-3) and UPID (patent deposit MU-BR 20.2018.009356-3) are capable of reducing

contamination or microbial disinfection on solid surfaces of diverse materials in a sustainable and ecologically correct way.

Biography

Augusto Foggiato, (DDS, MS, PhD) specialist in Radiology, Orthodontics and Orthopedics, has been working as an orthodontist in private practice for 29 years. He is Professor of Human Physiology, Radiology and Child Clinic I and II of the Dentistry Course, Jacarezinho Campus of the State University of North Parana is a delegate of the Regional Council of Dentistry/ CRO-Pr. He is a Researcher in Photodynamic Therapy and has 3 patents about PDT and has recently published work in reputed journal and has been serving as an editorial reviewer.

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Restoration in northern Lake Gehu: A eutrophic lake in China

Lake Gehu is a severely eutrophic lake in southeast China. A series of restoration measures have been implemented since 2009 in northern Lake Gehu. This study compared aquatic plants, water quality, sediment, and phytoplankton between restoration and control areas to investigate the effect of restoration measures. The results demonstrated that aquatic macrophyte coverage increased from 0% to 10.6%; mean TP, TN, and CODMn concentrations increased by 50.0%, 42.4 %, and 40.8%, respectively, compared with those before the measures were carried out; the mean Secchi depth (SD) increased to 42.5cm, which is 1.4 times higher than that before restoration; the mean euphotic depth (Zeu) in the summer increased from 91 to 130cm; the mean chl.a concentration decreased from 34.8 to 20.2μg•L-1, compared with that before restoration; the Shannon–Wiener index of phytoplankton increased by 28.7%. The mean TP and TN concentrations in sediments decreased by 63.8% and 52.4%, respectively, compared with that before dredging. These results indicate that the restoration in northern Lake Gehu was effective. To complete the transformation from an algae- to a macrophyte-stable state within the region, further measures must be adopted. This restoration of a eutrophic lake can serve as a reference for similar eutrophic lakes.

Biography

Jizheng Pan has more than 20 years experience in ecological restoration and constructed wetland. He is accomplished in the research on technology of ecological restoration in eutrophic lakes and treatment wastewater by constructed wetland with artificial aeration. He is skilful in ecological research of lakes. He is good at the pollution control and ecological restoration of lakes.

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