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## Authoritative discussion and analysis on the environmental issues of wide interest to the international community

**Journal of Environmental Biology (JEB)** is an internationally recognized peer-reviewed journal in the field of Environmental Sciences, Environmental Engineering, Environmental Pollution, Environmental Biotechnology, Toxicology, Forestry and related fields. The journal is of special interest to: Toxicologists, Pharmacologists, Zoologists, Botanists, Ecologists, Microbiologists, Environmental Scientists, Biotechnologists, Industry R&D Organizations and others engaged in Environmental Research. The present issue (JEB Vol. 41, issue 05, 2020) contain 19 articles, covering both basic and applied aspects of Environmental Biology. The issue provides a state of the art insight on the current researches on major environmental issues covering both basic and applied aspects of Environmental Science. The issue is oriented towards broader understanding of environmental problems covering new and untraditional topics in the field of Soil Science, Ecology, Microbial Ecology, Ecopathology, Toxicology, Horticulture, Genetics, Metabolic Engineering and Fisheries.



A fungicide treatment of crops is essential for maintaining high-quality yields. Pathogen resistance to fungicides is widespread affecting the performance of many fungicides. In this issue, Ghule *et al.* deals with fungicide resistance status of *Plasmopara viticola* in vineyards of Maharashtra, suggesting future guidelines for developing downy mildew management of grapes in India. In view of the side effects to the environment due to indiscriminate use of synthetic pesticides and resistance development in targeted pests, there is a need to explore possibilities of biological control measures as an alternative strategy. In this respect, the potential of PGPR in agriculture is steadily increased as it offers an attractive way to replace the use of chemical fertilizers, pesticides, and other supplements. Growth promoting substances produced in large quantities by rhizosphere microorganisms indirectly influences the overall morphology and health of the plants. Mazrou *et al.*, assessed the effects of bio-control agents like *Bacillus subtilis*, *Serratia marcescens* and *Spirulina platensis* on inducing resistance in tomato roots against *Meloidogyne* spp., a root-knot nematode. In addition, *Trichoderma* is a fungal genus, especially known for its biocontrol activities against several phytopathogens and also for enhancing plant growth. In view of the above, Chaudhary *et al.*, evaluated the potential of different native *Trichoderma* isolates in controlling rice sheath blight pathogen *R. solani* and also the growth-promoting potential of rice cultivation. Beneficial effects of plant-associated bacterial communities well recognized in natural and managed ecosystems for their important roles in supporting plant health, growth, and productivity. Different endophytes have been realized as neutral, commensal, beneficial, and dormant saprobe microflora that can benefit host plants directly by promoting nutrient availability, biological nitrogen fixation, and production of phytohormones. Indirectly, they may act as biological control agents to reduce microbial pathogens, through antibiosis, competition, and/or systemic resistance induction. The study planned by Suman *et al.*, investigated diverse *Pantoea* isolates for multifarious plant growth-promoting activities for cereal crops.

Micronutrients like Zinc, Copper, Manganese, Iron, Boron and Molybdenum play a pivotal role in plant growth. The soil in some regions of India has been reported to be deficient of micronutrients and a rigorous survey in this regard is essential. In this view, Debroy *et al.* aimed to get an insight about the depth-wise distribution of fractions of cationic micronutrients (Fe, Mn, Zn and Cu) and their availability across landscape positions on Meghalayan plateau in the North-Eastern Region of India. In a similar paper, Poojan *et al.* assessed the efficacy of foliar application of nutrients on yield and quality of guava, especially undertaking the effects of calcium and boron, individually and in combination for improving yield and quality of guava fruits. Presently, Antarctica remains the only unpolluted part of the Earth. However, some areas within the continent is contaminated by petroleum hydrocarbons, notably diesel oil, associated with anthropogenic activities through national government research stations as well as the rise in tourism in recent decades. Petroleum hydrocarbons are the major source of energy used in Antarctica has been reported to persist in contaminated environments along with different heavy metals. In an another study, Abdurkashied *et al.* assessed the ability of psychrotolerant bacterial strains *Arthrobacter* sp. AQ5-05 and AQ5-06,

originally obtained from Antarctica to degrade diesel oil in the presence of various heavy metal co-pollutants. Biofouling is another important environmental issue which refers to as the build-up of undesirable living organisms and organic and inorganic compounds. In most cases, biofouling includes microscopic organic impurities or an observable slimy layer comprising bacteria and other microorganisms. Kavitha and Vimala in their study entitled 'Screening of marine Actinomycetes for inhibitory activity against biofilm-forming bacteria' had screened some marine actinomycetes for their anti-fouling potential and their findings have been recommended for future application to combat the problem. Control of different pathogens in water is considered important to avoid the spread of water-borne infection. As per World Health Organization (WHO, 2012), around 1.5 million deaths have been reported due to water-borne diseases. Recently, Electron Beam Irradiation (EBI), a non-thermal processing technique, is gaining much attention owing to its potential antibacterial activity. It is being widely practiced in several countries to sterilize medical devices and food preservation. Visnuvinayagam *et al.* made an effort to determine the effective destructive dose of electron beam irradiation for pathogenic waterborne bacteria. The findings will be useful for eradicating different pathogenic bacteria in water. Mangrove ecosystem supplies a group of essential services that support human welfare, including provisioning services (e.g., fish, timber, fuel-wood, etc.), regulating services (e.g., flood, storm and erosion control, climate resilience, prevention of saltwater intrusion, etc.), supporting services (e.g., breeding, spawning and nursery habitat for commercial fish species, nutrient cycling, rich biodiversity, etc.) and cultural services (e.g., recreation, aesthetic and non-use benefits). The Karnataka sea shore of India is a highly populated coastal zone with a mangrove cover of about 8 sq. km; however, the mangrove forest of the area is threatened due to rapid economic development and high population pressure. Sachin *et al.* in their study aimed to analyze people's perception about the importance of mangroves and their willingness to pay for its conservation and maintenance. The coastal ecosystem is largely unexplored and possibly a rich source of hereto unknown and unencountered strains of microorganisms that are expected to yield novel and efficient antimicrobial agents for future healthcare and other biomedical applications. In view of the above, Qureshi *et al.* aimed to isolate, purify, and characterize the native antibiotic-producing bacterial strains present in the mangrove-sediments from four major coastal cities of Saudi Arabia.

Mutation breeding plays an important role in increasing the genetic variability for desired traits in various crop plants. Thus, it is essential to make mutation breeding a more efficient, directed, and reliable technology. An induced mutation is one of the best alternatives for improving plants as it can help to regenerate and restore the variability, which is generally lost in the process of adaptation to various stresses. Singh and Kumar evaluated ionizing radiation mediated effects on the morphological, biochemical, and microsporogenesis behavior of *Artemisia annua* L., which is an important antimalarial plant. Excessive bitter taste in Citrus juice is a major problem for Citrus processing industries worldwide since it reduces the quality and commercial value of the processed juice. Kumar *et al.* studied the major bittering factors in terms of harvesting time, spatial basis as well as during processing and elucidated a process for kinnow juice de-bittering. *Rauwolfia serpentina*, popularly known as sarpgandha, is a hub of more than 100 medicinally important terpenoid indole alkaloids. Ajmalicine is one of the principal alkaloid known for the treatment of hypertension. However, studies on the optimization of nutritive factors for the augmentation of secondary metabolites are meager. Through metabolic engineering, Bhagat *et al.* in their study examined the nutrient factors and pH for the growth of hairy roots and enhanced production of ajmalicine, a pharmaceutically important secondary metabolite from *Rauwolfia serpentina*. The mushrooms of genus *Pleurotus* are the second most cultivated group of fungi, having high nutritional value since they are an excellent source of protein, carbohydrates, vitamins, and minerals, cholesterol-free and low lipid content. Although, mushrooms of the genus *Pleurotus* have important nutritional and therapeutic properties, however, it is important to assess differences in their nutritive properties depending on the species and strains. Acosta-Urdapilleta *et al.* investigated the proximal chemical content, antioxidant activity, and total phenol content of fruiting bodies of seven strains from five cultivated *Pleurotus* spp. produced on wheat straw. Similarly, the microalga *Chlorella vulgaris* is considered as a rich source of phytohormones and essential nutrients. The protein of this alga contain essential amino acids. Aldayel *et al.* have investigated the application of *Chlorella vulgaris* in agriculture and silver nanoparticles biosynthesis. Tilapia is pondered as one of the most widely-farmed and cultured fish globally, owing to its rapid growth rate, acceptance of different dietary protein sources, and tolerance to the awful environment. Anti-parasitic drugs are widely used tool for managing parasite infections in cultured aquatic species. Emamectin benzoate (EB) is formulated and marketed under the trade name SLICE by Schering-Plough Animal Health (SPAH) presently Merck Animal Health. The current reports on the biomass reduction and elevated levels of serum biomarker raise concern on the effectiveness of oral EB-dosing in Indian condition. Julinta *et al.* assessed the dietary influence of EB on the growth and serum biochemistry of Nile tilapia, *Oreochromis niloticus*, at the recommended dose in a tropical environment. Aquafeed industry is heavily dependent on deoiled rice bran (DORB) as a major ingredient. However, other animal feed industries are equally in demand for rice bran, which may reduce the availability of DORB for aquafeed in the near future. Thus, there is a need to search for other plant ingredients as alternative sources to fulfill the increasing demand for the aquafeed industry. To date, several studies have been conducted on different parts of various plant species which has been used as an alternative available protein source for aquafeed without compromising the nutritional quality of aquafeed. Anand *et al.* aimed at evaluating Sesbania leaf meal as a replacer of DORB owing to its nutritional composition, low cost, presence of anti-nutritional factors and protein content below 30%.

My interest in the area of Environmental Biology grew stronger when some formulations of neem products were reported as biodegradable and novel strategy for the management of agricultural pests keeping in view the environmental problems caused due to the use of synthetic pesticides. We started working on the formulation of some plant-based green preservatives to control biodeterioration of food commodities and enhancing their shelf life. Our research group has recommended and patented a few chemically characterized essential oil formulations as plant-based preservatives and as safer alternatives to synthetic chemicals based on their efficacy in controlling spoilage of food commodities caused by fungi, insects, and aflatoxins in storage containers, antioxidant potential and favorable safety profile on mice. The mode of action of formulations has been studied. We have also reported some plant-based formulations which showed effective management of insects of stored food commodities by altering their reproductive behavior (not directly killing the pests). Such products have a bright future in sustainable agriculture and Integrated Pest Management (IPM) which constitute an effective and environmentally sensitive approach to pest management, keeping in view the development of resistance in insects due to lethal action of synthetic pesticides. The plant-based formulations can reduce the loss of stored food commodities from fungi, mycotoxins, and insects as well as from free radicals with favorable safety profile as tested on mice. Such products are listed in GRAS (Generally Recognized as Safe) category by US Food & Drug Administration (FDA) and Environment Protection Agency (EPA) and can be recommended as better alternatives of synthetic preservatives in food security programs. The formulations proved effective as semiochemicals showing antifeedant activity and altering reproductive behavior of bruchids. The formulations have societal significance as green pesticides and safer alternatives of many non-biodegradable synthetic chemicals posing environmental problems and will be helpful in bioprospection of biodiversity in view of the biopiracy of our plants and claiming sovereign right on biodiversity.

In conclusion, in this editorial I have made an attempt to summarize the research articles included in the present issue of JEB. I have also emphasized on the current research needs of Environmental Sciences with particular reference to society. Specialists and non-specialists who work in the field of Environmental Sciences will be benefitted from the articles published in this issue. We are thankful to Eminent Scientists, Academicians and Researchers, who have contributed their original research articles for publication in the September, 2020 issue of JEB.

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