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Section Information:

The "Environmental Sciences" Section of *Applied Sciences* is open to receive high quality original articles and reviews related to environmental conservation, environmental technologies, environmental pollution and remediation, environmental quality and treatment, monitoring and modelling of environmental systems. All manuscripts submitted for publication in this section will undergo a thorough peer review process and will be published rapidly online on acceptance.

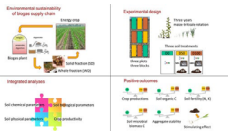
Section Environmental Sciences

Featured Papers

DOI:10.3390/app11020750

Recycling Biogas Digestate from Energy Crops: Effects on Soil Properties and Crop Productivity

Authors: Roberta Pastorelli, Giuseppe Valboa, Alessandra Lagomarsino, Arturo Fabiani, Stefania Simoncini, Massimo Zaghi and Nadia Vignozzi

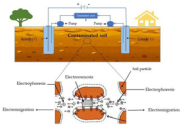


Abstract: Digestate from biogas production can be recycled to the soil as conditioner/fertilizer improving the environmental sustainability of the energy supply chain. In a three-year maize-triticale rotation, we investigated the short-term effects of digestate on soil physical, chemical, and microbiological properties and evaluated its effectiveness in complementing the mineral fertilizers. Digestate soil treatments consisted of combined applications of the whole digestate and its mechanically separated solid fraction. Soil microbial community was only transiently affected by digestate treatments and no soil contamination from Clostridiaceae-related bacteria were observed. Digestate can significantly impair seed germination when applied at low dilution ratios. Crop yield under digestate treatment was similar to ordinary mineral-based fertilization. Overall, our experiment proved that the agronomic recycling of digestate from biogas production maintained a fair crop yield and soil quality. Digestate was confirmed as a valid resource for sustainable management of soil fertility under energy-crop farming, by combining a good attitude as a fertilizer with the ability to compensate for soil organic C loss.

DOI:10.3390/app11094134

Remediation of Metal/Metalloid-Polluted Soils: A Short Review

Authors: Carla Maria Raffa, Fulvia Chiampo and Subramanian Shanthakumar

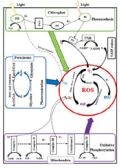


Abstract: The contamination of soil by heavy metals and metalloids is a worldwide problem due to the accumulation of these compounds in the environment, endangering human health, plants, and animals. Heavy metals and metalloids are normally present in nature, but the rise of industrialization has led to concentrations higher than the admissible ones. They are non-biodegradable and toxic, even at very low concentrations. The severity of the effect depends on the type of heavy metal or metalloid. Indeed, some heavy metals (e.g., Mn, Fe, Co, Ni) at very low concentrations are essential for living organisms, while others (e.g., Cd, Pb, and Hg) are nonessential and are toxic even in trace amounts. It is important to monitor the concentration of heavy metals and metalloids in the environment and adopt methods to remove them. For this purpose, various techniques have been developed over the years: physical remediation (e.g., washing, thermal desorption, solidification), chemical remediation (e.g., adsorption, catalysis, precipitation/solubilization, electrokinetic methods), biological remediation (e.g., biodegradation, phytoremediation, bioventing), and combined remediation (e.g., electrokinetic–microbial remediation; washing–microbial degradation). Some of these are well known and used on a large scale, while others are still at the research level. The main evaluation factors for the choice are contaminated site geology, contamination characteristics, cost, feasibility, and sustainability of the applied process, as well as the technology readiness level. This review aims to give a picture of the main techniques of heavy metal removal, also giving elements to assess their potential hazardousness due to their concentrations.

DOI:10.3390/app11093959

Antioxidant Production in *Dunaliella*

Authors: Uttam Kumer Roy, Birthe Vejby Nielsen and John James Milledge

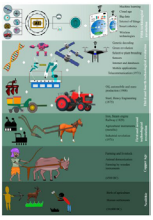


Abstract: Microalgae have become an attractive natural source of a diverse range of biomolecules, including enzymatic and non-enzymatic antioxidants; nevertheless, economically sustainable production of such compounds from microalgae biomass is still challenging. The main hurdles are: (a) increasing microalgae yield; (b) achieving optimal cultivation conditions; (c) energy-efficient and cost-effective downstream processing (extraction and purification); (d) optimal storage of post-processed antioxidant molecules. This review provides a detailed overview of enzymatic and non-enzymatic antioxidants in the cellular metabolism of the commercially important microalgae Dunaliella, industrial applications of antioxidant enzymes, strategies to enhanced antioxidant accumulation in cells, and the opportunities and limitations of current technologies for antioxidant enzymes production from microalgae biomass as an alternative to common microbial sources.

DOI:10.3390/app11135911

Ensuring Agricultural Sustainability through Remote Sensing in the Era of Agriculture 5.0

Authors: Vanesa Martos, Ali Ahmad, Pedro Cartujo and Javier Ordoñez



Abstract: The application of RS is indispensable today for a highly productive and sustainable agriculture. Therefore, the present study draws a general overview of RS technology with a special focus on the principal platforms of this technology, i.e., satellites and remotely piloted aircrafts (RPAs), and the sensors used, in relation to the 5th industrial revolution. Nevertheless, since 1957, RS technology has found applications, through the use of satellite imagery, in agriculture, which was later enriched by the incorporation of remotely piloted aircrafts (RPAs), which is further pushing the boundaries of proficiency through the upgrading of sensors capable of higher spectral, spatial, and temporal resolutions. More prominently, wireless sensor technologies (WST) have streamlined real time information acquisition and programming for respective measures. Improved algorithms and sensors can, not only add significant value to crop data acquisition, but can also devise simulations on yield, harvesting and irrigation periods, metrological data, etc., by making use of cloud computing. The RS technology generates huge sets of data that necessitate the incorporation of artificial intelligence (AI) and big data to extract useful products, thereby augmenting the adeptness and efficiency of agriculture to ensure its sustainability. These technologies have made the orientation of current research towards the estimation of plant physiological traits rather than the structural parameters possible. Futuristic approaches for benefiting from these cutting-edge technologies are discussed in this study. This study can be helpful for researchers, academics, and young students aspiring to play a role in the achievement of sustainable agriculture.

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Novel Technologies for Pollutants Removal from Water and Wastewater
Collection Editors: Dr. Nídia Dana Lourenço, Prof. Dr. Maria A.M. Reis

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Collection Editors: Prof. Dr. Sergio Montelpare; Prof. Dr. Renato Ricci;
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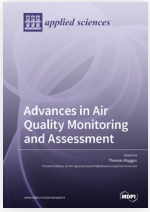

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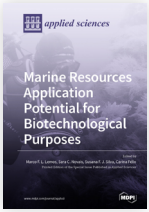

Advancements in Biomonitoring and Remediation Treatments of Pollutants in Aquatic Environments

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