

Phytoremediation Of Phenol Red Dye Using Biomediated Stannous Oxide Nanoparticle And Its Efficiency In Decolourization

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Phytoremediation is a promising, cost-effective and eco-friendly approach in the treatment of polluted wastewater and industrial waste effluents. The aim of the study is to understand the potential effects of *Catharanthus roseus* leaf extract mediated stannous oxide nanoparticles (SnO) formation and its efficiency of dye degradation was investigated. The *C. roseus* was used for the first time as a reducing agent in the formation of SnO nanoparticles. The secondary metabolites present in plants were evaluated by GC-MS and its bioactive compounds are identified. The synthesized SnO nanoparticles were confirmed and supported by XRD, FTIR, Zeta, DLS, SEM with EDX and TEM with SAED pattern analysis. Photocatalytic activity of SnO nanoparticles efficiency and its synergetic effects against dye degradation was estimated. Thus, *C. roseus* acts as a reducing agent in the formation of SnO nanoparticles and also helps in maintaining stability. Also, it is an eco-friendly approach with the effect of time in process of dye degradation.

KEYWORDS

Photocatalytic degradation, *C. roseus* extract, Stannous oxide, Dye adsorption behaviour

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Production Of Biopreservative Using *Lawsonia inermis* And Evaluating Their Toxicity

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Salt preservation is the general and old age popular practice. Alternate methods of preservations have been analyzed in order to reduce the pollution load in the soaking process of leather by many researchers. Due to the stringent pollution of total dissolved solids (TDS) and salinity in tannery effluents, there is a need to develop and adopt salt-free curing methods suitable for Indian raw material. Chilling is the most commonly employed short term preservation method in many countries and is considered more efficient and cost-effective than biocides based methods. In the current study, plant derived extract from *Lawsonia inermis* was used as salt-less formulations for curing goat skins, proving an effective alternative to the conventional preservation with NaCl. The physico-chemical properties of all goat skin were tested and the results met the standard requirements. After treatment with plant extract, the pollution loads of soaking liquors were assessed and there was a dramatic reduction in levels of total solids, total suspended solids (TSS), chloride, total dissolved solids (TDS), biological oxygen demand (BOD) and chemical oxygen demand (COD) released. From the results, it is clear that the proposed preservation technique is completely comparable with the traditional salt curing approaches, which may be used as viable alternative options for skin preservation in leather processing industries.

KEYWORDS

Sodium chloride, *Lawsonia inermis*, Goat skin, Antimicrobial, Leather processing

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Study On Cheeyappara Waterfalls To Set Up An Environmentally Sustainable Small Hydropower Station

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Energy has always been a deciding factor in the progress of mankind. Small hydropower stations (SHP) are emerging as a solution for the sustainable, green, environment-friendly and long term, cost-effective source of renewable energy; more advantageous than conventional medium or large hydropower projects. Small hydropower station requires very less flow or head compared to conventional hydropower plants and specially adapted to serve remotely hilly areas on an independent basis to save large investment needed for extending transmission and distribution for low consumption centres from the power grid supplies by harnessing the hydro potential of small rivers and streams. A Cheeyappara waterfall is located in Idukki district of Kerala state along the side of NH 85 (Kochi – Madurai National Highway) and joins the river Deviyar. Using the available head of Cheeyappara waterfalls, a small hydro project is feasible and can be completed within a shorter period without much ecological disturbance. The catchment area is calculated using toposheet of the location and the available head is determined using a handheld GPS survey. By power potential study using available rainfall readings and optimization study for various capacities, it is possible to finalize the capacity of the power station. The selection of the turbine depends on the available head and flow rate. The feasibility study concludes that SHP of 300 kW capacity using two crossflow type turbines of 150 kW each can be envisaged using Cheeyappara waterfalls, enabling clean green energy at a lower cost, if implemented.

KEYWORDS

Small hydropower station, Renewable energy, Cheeyappara waterfalls, Environment friendly

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Experimental Study Of Nallaru River For Water Pollution by Dyeing Industries Nearby In Tirupur

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Tirupur district is an important textile industry region; it is the fifth largest collection of urban areas and fourth largest city by its area located in Tamil Nadu. The city of Tirupur is virtually the knitwear capital of India. It is located about 460 km from the state capital Chennai and 50 km from Manchester of South India. The dyeing industries are the backbone of the textile industry present in Tirupur. Toxic compounds are present as liquid waste from the textile industry. The river water becomes unfit for irrigation and drinking due to its contamination by the toxic compounds. Since river water is used for agricultural purposes and as drinking source and also for household activities by the locality people in the city, it is not a good practice to allow this chemical waste into the water body. Suspended solids particles in water may choke the fish gill which leads to their death or reduces their growth rate. It also reduces algae growth and diminishes their ability to produce food and oxygen. So, proper treatment of liquid wastewater and pollution due to this liquid waste must be controlled by the authorised authority by preventing the discharge of textile wastewater into water bodies. The case study was proposed to design the wastewater treatment plant in the city of Tirupur to reduce the industrial pollution caused by the dyeing industries and sewage wastes.

KEYWORDS

Effluent, Treatment plant, Nallaru river, Pollution

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Evaluation Of Biochemical And Nutritional Factors In Selected Green Leafy Vegetables Cultivated In Organic And Conventional Farming

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The present study determined the comparative analysis of the biochemical and nutritional factors present in the vegetables cultivated in the both organic and conventional method of farming. Acid digestion method was used to digest the sample for detection of iron, chromium and zinc by atomic absorption spectroscopy (AAS) analysis and nutritional factors, such as protein, carbohydrate, ascorbic acid and amino acids were estimated in the selected vegetables (*Solanum melongena* and *Raphanus sativus*). Elemental analysis shows that the iron content found to be high compared to the zinc in both vegetables in comparison to the organically cultivated vegetables having higher zinc and iron content. The biochemical compositions of *Solanum melongena* and *Raphanus sativus* both showed high content of protein (13.465 $\mu\text{g}/100 \mu\text{g}$), *Solanum melongena* alone showed high content of amino acid (24.732 $\mu\text{g}/500 \mu\text{g}$) in the conventional method, *Raphanus sativus* showed a high level of carbohydrate (328.924 $\mu\text{g}/200 \mu\text{g}$) in conventional and higher ascorbic acid (724.382 $\mu\text{g}/500 \mu\text{g}$) in organic cultivation. Finally, results showed that the organically cultivated vegetables contain more biochemical elements compared to the conventional method. *Raphanus sativus* contain more biochemical and nutritional elements compared to *Solanum melongena* due to the absorption of plant nutritional factors are high in root compared to fruits. Here we have taken rhizomatous parts of *Raphanus sativus* for analysis.

KEYWORDS

Raphanus sativus, *Solanum melongena*, Organic cultivation, Atomic absorption spectroscopy

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Eco-friendly Production Of Cellulose Using Different Agro-wastes By *Bacillus subtilis*

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Plant biomass waste consists almost entirely of lignocellulose, which is formed by three types of polymers, namely cellulose, hemicellulose and lignin. Cellulose is a linear polymer composed of D-glucose linked by β -1,4 glucoside bonds. The cellulose enzyme system usually comprises three cellulolytic enzyme classes which hydrolyze the cellulose: endoglucanases (EC 3.2.1.4), cellobiohydrolases (EC 3.2.1.91) and cellobiases (EC 3.2.1.21). Celluloses are used in various industries, such as fuel, food, detergent, animal feed, agriculture, wine, beer, pharmaceuticals and cosmetics. The main objective of the study is to explore an easy and cost effective method to produce the cellulase using various agricultural wastes, such as sugarcane bagasse, sago waste and rice bran as substrates. Cellulase producing bacteria were isolated from forest soil. Among the isolates, three strains show the maximum activity on carboxymethyl cellulose (CMC) agar plates. Among the three strains, a strain was showed maximum enzyme activity, which was measured by dinitro salicylic acid (DNS) method. The isolates were identified as *Bacillus subtilis*. Optimization of the fermentation medium for the production of maximum cellulase was carried out through submerged fermentation (SmF). The highest production of cellulase was obtained as 7.9 U/mL at 3% glucose as a carbon source, 8.1 U/mL at 3% meat extract as a nitrogen source and 7.0 U/mL at 3% sugarcane bagasse at 37°C, 8.2 U/mL at pH 9, 6.9 U/mL at 3.5% inoculum level at 48 hr. Cellulase was purified to centrifugation, ammonium sulphate precipitation and diethylaminoethyl-cellulase (DEAE-cellulase) chromatography. By adopting these steps, a fold purification of 18.02 with 86% overall yield was obtained. The purified cellulase with a molecular mass of 22 kDa determined by SDS-PAGE. *Bacillus subtilis* are capable to produce the cellulase for industrial application.

KEYWORDS

Cellulase, *Bacillus subtilis*, Submerged fermentation, DEAE cellulase

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The Effect Of Phytotoxicity Of Green Synthesized Iron Oxide Nanoparticles On Oil Seed Crops

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In the present investigation, the iron oxide nanoparticles (TFeONPs) were produced by ferrous chloride and aqueous extract of *Tridax procumbens*. The properties of as-synthesized TFeONPs were assessed. Moreover, the toxicity effects of TFeONPs on oilseed crops (*Sesamum indicum* and *Arachis hypogaea*) were investigated. The toxicity effect of TFeONPs on the germination of seed and formation of root and shoot of oilseed crops was determined using different concentrations of TFeONPs. The results of characterization confirmed that the synthesized TFeONPs were spherical-shaped. The various concentrations of TFeONPs significantly enhanced seed germination and the length of root and shoot of *S. indicum* and *A. hypogaea*. The highest concentrations (0.4% and 0.5%) of TFeONPs inhibited seed-germination and shoot and root formation, while the lowest and optimal concentrations (0.1-0.5%) of TFeONPs induced positive effects on seed germination and the length of root and shoot. The lowest concentration of TFeONPs was able to promote plant growth without any toxicity to other plants and the environment.

KEYWORDS

Phytotoxicity, Iron oxide, Seed germination, Oilseed crops

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Production Of Compost Using *Eichhornia crassipes* And Its Nutritive Analysis

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The aquatic weed of monster invasive nature is *Eichhornia crassipes* (mart) with massively grown in tonnes and occupies various lakes. It takes up the nutrients of the lake water and destroys the habitat environment for the fauna and other flora. To reduce the weed with an alternative method, they were collected, shredded and mixed up with the vegetable waste (4:1) and subjected to composting. After 68 days of composting, the matured compost prepared using the *Eichhornia crassipes* is subjected to colour, odour and foam were found to be in the acceptable range similar to the commercial compost. The electrical conductivity of both matured compost and commercial compost were analogous to each other. The ratio of carbon was about 15 whereas the nitrogen was one. With the pH of the prepared matured compost was about 7 analogous to the commercial compost, the chemical parameter, such as organic carbon of prepared matured compost and commercial compost with a 1.31% difference. The total nitrogen, total potassium, total phosphorus of the prepared matured compost and commercial compost are similar and within an acceptable range. The total calcium and total magnesium are very low with the maximum acceptable range. The mineral content, such as iron and manganese with a minimal difference, whereas the zinc and copper were within the acceptable limits for both the prepared compost and the commercial compost. In this study, the resource utilization approaches of *Eichhornia crassipes* by using turn waste into treasure and solve the water hyacinth breeding problem, it could also produce economic and ecological benefits.

KEYWORDS

Eichhornia crassipes, Organic carbon, Total nitrogen, Total phosphorus, Total potassium, Weeds ecological benefit

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Recent Approach On Biodegradation Of Textile Dyes - A Review

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Rapid industrialization has certain upsurge to several undesirable origins that accrued in the planet upto noxious intensities to destroy the natural atmosphere. Systematic growths are deliberated as key influences for improvement of both emerging and under established nations, but awkwardly, maximum of the productions industries in these nations do not have accurate waste treatment amenities and liberating a huge amount of wastes discharges. A preponderance of xenobiotics (either untreated or partially treated) unrestricted from industries is diversified up with the natural water streams and to the territory of the planet. Unprocessed or incompletely treated textile effluents are extremely lethal, as they comprise a huge amount of lethal compounds and heavy metals. The problem of water pollution due to the release of industrial wastewater into natural water streams were perceived by western nations in the 19th century and also in India after independence. Biodegradation or usage of microbes in textile dye breaks down into non-hazardous ingredients.

KEYWORDS

Microorganism, Biodegradation, Textile dye, Non-hazardous ingredients

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Evaluation Of Micro-irrigation With Automation Techniques: Case Study

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Rapid growth in the Indian population leads a requirement of enhancement of food technology which makes a huge impact on the field of irrigation. In this study, irrigation water distribution from the Parambikulam Aliyar Project (PAP), Tamil Nadu which was accompanied by the Thirumoorthi reservoir and it covers four-zone patterns of 377152 acres was studied. Present canal network consists of main and branch canals, distributaries, water coarse and field channels. Loss of water is about 24-45% was observed on the irrigation even though the canal lining is provided to improve the water carrying efficiency. In order to enhance the irrigation efficiency and further extending the area of irrigated land, implementation of micro-irrigation with automation techniques was adopted in the Parambikulam Aliyar project. Automated systems reduce the requirement of manpower and increase the application efficiency by applying the water directly on or below the soil surface near the root zone of the plant. The implementation of smart irrigations aids in reducing the theft and improper use of water and provides a centralized control valve in the system. It was concluded that the overall water use efficiency in a micro-irrigation system is about 85-93% which greatly reduces the amount of water loss.

KEYWORDS

Micro-irrigation, Automated irrigation technique, Irrigation, Parambikulam Aliyar project

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In-vivo Nitrate Reductase Activity Of Marine Angiosperm *Halodule pinifolia* (Miki) Hartog

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Halodule pinifolia, a marine angiosperm collected from the Gulf of Mannar were assayed for nitrate reductase activity in order to determine the nitrate as a sole nitrogen source. Roots, rhizomes and leaves of *H. pinifolia* were used in the present study and the activity observed was very low. Pre-treatment of plant parts with varying concentration of nitrate did not induce higher nitrate reductase activity. Roots at a concentration of 100 μM NaNO_3 showed the maximum nitrate reductase activity (21.9×10^{-9} equiv. $\text{NO}_2/\text{h.gfr.wt}$), followed by the leaf part at a concentration of 100 μM NaNO_3 (19.65×10^{-9} equiv. $\text{NO}_2/\text{h.gfr.wt}$). Nitrate reductase activity was not significantly influenced by varying the nitrate and propanol concentrations or pH of the assay medium. Present findings conclude that *H. pinifolia* does not use nitrate as a sole nitrogen source for their growth and might undergo other mechanisms, such as N_2 fixation and/or ammonium uptake to reach their growth and productivity in the marine environment.

KEYWORDS

Halodule pinifolia, Enzyme, Nitrate reductase, Propanol, Pre-treatment

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A Case Study On Smart Water Management With 'AMR' Solution In Coimbatore Corporation

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The present study focused on minimization of loss of treated potable water and loss of revenue. By utilizing the technology of the smart water management system, by using automatic meter reading, it was proved efficient and profitable. A huge amount of money was being wasted on treatment plants, storage and maintenance. To have control over the usage of treated water, water was supplied uniformly in limited quantity through meters. This study was less tedious than older ones, as it needed less manpower and helps to know the quantum of water actually discharged. The smart water management systems help us, to minimise the loss of water and revenue. From the result obtained from the sample study, it was decided to implement this automatic meter reading (AMR) technology to the entire Coimbatore Corporation.

KEYWORDS

Automatic meter reading, Smart water meter, Meter reading, Bulk water supply reading, Treated water

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Repair And Rehabilitation Of Amaravathy Dam In Tiruppur District: Case Study

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Irrigation is the backbone of the Indian economy which is the cornerstone in Tamil Nadu agriculture development on which the livelihood of more than 60% of the population is depending on it. In Tiruppur district, Tamil Nadu, Amaravathy Dam was constructed across the Amaravathy river during the year 1953-58 for the benefit of irrigating the 22116 ha of irrigation land and basic domestic water needs in Tiruppur and Karur district. Amaravathy Dam is a composite structure made with both earthen type and masonry types dam. The dam was in service for the past 7 decades. So, the dam has been affected by seepage water through dam structures. Rehabilitation of structures in dam components is the need of the hour. Seepage is the main problem in the masonry portion of this dam and chokage in drainage systems. Repairing or rehabilitating the dam structure will enhance the life and durability of the structure. Reconstruction of chute and toe drains is also considered as effective. In this article, detailed study has been carried out to control the seepage and chokage problems in the dam structure, methods, like reaming, epoxy coating and injection grouting are followed.

KEYWORDS

Amaravathy dam, Repair and rehabilitation of dam structure, Seepage, Reaming, Epoxy coating

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Case Study And Analysis Of Water Supply System For Pillur Water Supply Improvement Scheme's Area

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Sufficient water of appropriate quality and quantity has been one of the most important issues in human history. People began to transport water from other locations to their communities. A water supply system consists of infrastructure that collects, treats, stores and distributes water between water sources and consumers. This project concerns the design of urban and rural water distribution system in Coimbatore and Tiruppur districts. Sedimentation, aeration, filtration, chlorination of raw water is the main treatment in the collection of raw water from Pillur reservoir through Headworks. Clear water pumping main and distribution of treated water to the public is ensured.

KEYWORDS

Water supply, Water treatment, Pillur, Bhavani river

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Case Study And Analysis On Reduction Of Solid Waste At Compost Yard In Coimbatore City Municipal Corporation

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Collecting, treating and disposing of a discarded solid material is called solid waste management. Wastes heap up causing problems due to improper waste disposal systems by waste management teams. Biological and physico-chemical problems are caused to the environment due to the solid wastes from companies, like toxic metals, hazardous wastes and chemicals. When hazardous wastes, like pesticides, batteries containing lead, mercury or zinc, e-waste and plastics are mixed up with paper and other scraps, dioxins are produced and causes various diseases like cancer. The hazardous wastes usually mix up with other ordinary garbage and flammable wastes while amassing solid waste thus these results in the risky disposal process. Another waste management method is proposed in Coimbatore City Municipal Corporation as a case study for the reduction of solid waste at compost yard.

KEYWORDS

Solid waste management, Biological problems, physico-chemical problems, Hazardous wastes

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Adsorption Of Wastewater Using Green Nanoparticles Synthesized From *Murraya koenigii* And *Coriandrum sativum*

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Nanoparticles are usually synthesized from metals, such as silver, gold, platinum, copper and zinc. There are several methods used for the synthesis of nanoparticles, such as physical, chemical and biological. People all over the world use different kinds of personal care products (PCPs), like soaps, sunscreen lotions, hair styling products, hair removers, shampoos, conditioners, moisturizers, anti-agers, nail and cuticle care products, oral care including toothpaste and whiteners. Curry leaves are part of a regular diet in India and many parts of the world, it may also serve as a possible nutritional intervention and the extract itself or fractions obtained there from may be used also as a future nutritional supplement to combat oxidative stress-induced tissue damage in the people exposed to lead. Plant mediated synthesis of silver nanoparticles and the study of their size and properties are of fundamental importance in the advancement of recent research. The size and shape of the nanoparticles form a basis for the wide variety of applications. In the present study, biosynthesis and characterization (UV-visible spectroscopy and FTIR) of green nanoparticles from aqueous extract of curry leaves (*Murraya Koenigii*) and coriander leaves (*Coriandrum sativum*) was performed and the same was subjected to adsorption studies for wastewater treatment to find out the optimum pH, dosage and time of action for effective removal. The initial absorbance value of household wastewater was 0.788. After treating with zinc nanoparticle synthesised from curry and coriander leaf extract was found to be 0.422 and 0.615, respectively. In this, *Murraya koenigii* (curry leaves) proves more efficient for treating household wastewater.

KEYWORDS

Wastewater, Nanoparticles, Curry leaves, Coriander leaves, FTIR, Adsorption

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Methyl Geranate: A Novel Quorum Quencher As An Anticorrosion Agent To Prevent Metal Biocorrosion

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Microbial colonization causes damage to the integrity of metal surfaces which lead to microbiologically influenced corrosion (MIC). Consequently, it becomes a serious problem for aquatic and marine industries globally. Despite the availability of biocides to control corrosion, most of them are ineffective due to its toxicity. Hence, to address the problems with toxic biocides, in the present study, the anticorrosion activity of a quorum quencher molecule methyl geranate (MG) known to interfere with bacterial signaling was investigated. Experimental stainless steel (SS-316) coupons were submerged in pond water for 10-30 days in the laboratory. Biocorrosion was evaluated by determining the structure of the biofilm covered on stainless steel (SS 316) coupons submerged in pond water by scanning electron microscopy (SEM), confocal laser scanning microscopy (CLSM) and fluorescence microscopy imaging of the coupon surface. Adding up, MG significantly reduced the secretion of biofilm EPS by 57% without affecting the bacterial growth. MG treated stainless steel coupons indicated the reduced oxygen reduction current at the metal surface as evident from applied electrode potential measurements which was associated with significant changes in the composition of bacterial biofilms on the steel surfaces. These results demonstrate the potential of the quorum quencher MG to prevent biocorrosion on metal surface.

KEYWORDS

Biofilm, Biocorrosion, Quorum sensing, Quorum quenching, Methyl geranate

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A Case-Control Study On Pulmonary Parameters And Pulmonary Diseases Among The Bus Drivers

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Drivers are exposed to significant amounts of health-damaging air pollutants. The aim of the present investigation was to study the risk of respiratory disorders among professional bus drivers. This case-control study was carried out on 170 bus drivers and 94 control groups. Work history, respiratory symptoms, smoking habit, etc., were recorded. Lung function parameters of the participants were determined by a portable spirometer. The pulmonary parameters of bus drivers were significantly lower than those of controls. Lung function indices of the drivers decline with an increase of duration of exposure. A significant decline in lung function parameter was observed among smokers compared to non-smokers. The prevalence of different respiratory symptoms among bus drivers was significantly higher than that of control participants. The risks of restrictive and chronic obstructive pulmonary disorders among bus drivers were 9.31 times and 2.83 times higher than that of control participants, respectively. The likelihood of having a dry cough, productive cough, chest tightness, dyspnea and chest pain were significantly higher among bus drivers than the controls. The present study revealed that exposure to vehicle emissions leads to a significant risk of different pulmonary disorder among professional drivers. Driving with a smoking habit can be termed as a dreadful combination with respect to pulmonary health.

KEYWORDS

Automobile emission, Duration of exposure, Smoking, Respiratory impairment

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Assessment Of Physico-Chemical Quality Of Groundwater In The Plain Of Bahira (Basin Oum Errabia)

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The present work aims to evaluate the physical and chemical quality of groundwater in the plain of Bahira pouring in Oum Errabia and on the other hand prevent the risk of alkalization and salinization in the study area. 11 water points were sampled with 22 samples distributed as follows: 11 samples in the period of February 2017 and 11 samples during the period of August 2017 for pH, conductivity, eight major chemical elements (NO_3^- , Cl^- , Na^+ , HCO_3^- , Ca^{2+} , Mg^{2+} , K^+ and SO_4^{2-}). Also, Piper, Scholler and Wilcox diagrams were used. The results show the water wells P1, P2, P4, P5, P8 and P10 are characterized by geochemical facies sodium chloride and potassium or calcium sulphate and chloride-facies and calcium and magnesium sulphate to the wells P3, P6, P7, P9 and P11. According to the Wilcox diagram waters are good, acceptable for agriculture according to the distribution of wells in the area. The analysis of the overall water quality revealed that contents of bicarbonates, calcium and sodium exceed the standards.

KEYWORDS

Scholler, Facies, Major chemical elements, Alkalization, Groundwater, Bahira

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Topographical, Pedological And Physico-Chemical Analysis Of Various Soil Samples For Wheat, Barley And Mustard Production At Dehradun

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Soil study was carried out at two sites of the Sahasthdhara region of Dehradun in order to know the exact relation between the soil minerals and the type of crop which could be cultivated here. The concerned region was analyzed for the topographical, pedological and physico-chemical analysis. In the study, it had been found that the concerned region is suitable for the cultivation of wheat and barley. The whole region of Dehradun has a temperate climate and the selected sites were found in a good condition for the cultivation of wheat and barley. The two sites have an appropriate soil particle size, particle density, particle porosity, pH, conducting salts, mineral composition and other factors. The Sahasthdhara region is well fertile and multiple crop cultivation especially wheat and barley could be carried out very easily.

KEYWORDS

Topography, Pedology, Soil, Minerals, Physico-chemical parameters

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