Laser photostimulation of inoculum of selected fungi could be also supporting factor of stimulation of mycorhisis moulds and adaptation of the infected roots of seedlings to contaminated soil. Proper photostimulation of inoculum of selected moulds and bacteria could also biodegradation of some organic pollutants of soil and water.

Laser biotechnology seems to be a new tool of sustainable development of different kind of the regions (industrial as we as rural), including contribution to prevention against food in the rivers regions as well as for more effective protection of aquatic ecosystems against euthrophisation.

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[P-E.144]

Potential use of a novel reporter bacterium to determine phenanthrene biodegradation and toxicity in a model solid

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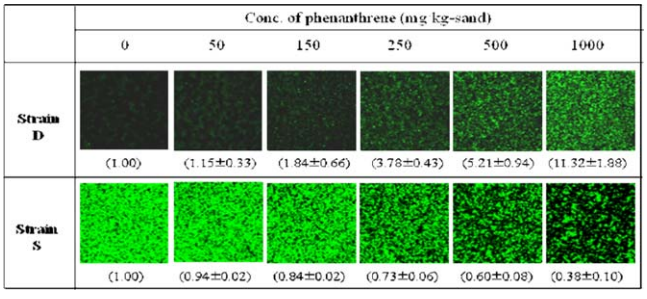
Keywords: bioavailability; phenanthrene; fluorescence; reporter strains

A novel reporter strain harboring a cell-killing *gef* gene (named strain S) was reconstructed using the phenanthrene-degrading *Sphingomonas paucimobilis* EPA505 as a host bacterium. The strain S was supposed to die on the initiation of phenanthrene biodegradation, which was accomplished by the reconstructed plasmid pBBR1PGEF possessing the phenanthrene-inducible *pbhA* promoter located upstream of the *gef* gene on plasmid pBBR1. Cell death was visualized by a live/dead cell staining method combined with confocal laser microscopic observation (i.e., diminish in green fluorescence with biodegradation), and the extent was quantified by image analysis. Quantitative, linear relationships were established between increasing phenanthrene concentrations and the extents of cell death in solid phase as well as in aqueous phase. As a comparison, another reporter strain (named strain D) who adopted the commonly used *gfp* gene to emit fluorescence when biodegrading phenanthrene was reconstructed. The results demonstrate that the fluorescence intensity generated by strain S decreased (i.e., from 1 to 0.38 ± 0.10 in relative intensity) and the intensity by strain D increased (i.e, from 1 to 11.32 ± 1.88 in relative intensity) in the presence of Ottawa sand with the phenanthrene concentration of up to 1,000 mg/kg. The potential use of the two reporter strains in quantitatively determining available phenanthrene, either toxic or biodegradable, in solid matrix was discussed.



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[P-E.145]

Discoloration of textile dyes by peroxidases from melon, chayote, lemon and orange peels

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Keywords: discoloration; dye; peroxidases; peels

Traditional textile finishing industry consumes about 100 liters of water to process about 1 Kg of textile materials, it has been estimated that about 10% of the dye used in the process does not bind to the fibers. This wastewater creates environmental problems due to the generation of hazardous degradation products from dyes. In wastewater treatment plants dyes remain unchanged and are discharged to rivers. Additionally there are some advanced treatment systems to discolored the textile dye but they are expensive. The aim of this study was to test different materials: a) lemon peel, b) melon peel, c) orange peel and d) chayote peel, to discolor solutions of three textile dyes: i) indigo carmine, ii) direct brown 2 and iii) direct black 22. The different peels were blended with water, centrifuged and filtered with paper to get the extract; then the enzymatic extract was incubate with the dye solution at room temperature and with magnetic stirrer during 24 hours Periodically it was taken samples and analyzed with the UV-Vis spectrophotometer, and it was calculated the % of discoloration by measuring the absorbance changes. Lemon, orange and chayote peels discolored both the indigo carmine and the direct brown 2 solution in different percentage; melon peel only discolored the indigo, whereas direct black 2 did not have an important discoloration with any of the biological materials. Indigo was discolored easily than others dyes, because it redox potential is the lowest of the three dyes. For indigo, discoloration reached 19% using melon shell, 56% using chayote shell, 50% using lemon and 21% using orange peel, in 24 hours. Results are very interesting because we have demonstrated that cheap material like vegetable peels can be used to treat some textile dye solutions efficiently.

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[P-E.146]

Comparison of associated and extracellular enzymes and immobilized laccase in the discoloration of indigo carmine

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Keywords: indigo; discoloration; enzyme

The textile industry is one of the top water polluting industries in terms of spent volume, as well as color and chemical composition of residual wastewater. Textile effluents include dyes that have a complex chemical structure, which frequently are disposed untreated to municipal sewers or into surface waters. The degradation of azo dyes have been extensively studied using a wide range of fungi and bacteria. In this work we compared the discoloration of indigo carmine using associate enzymes (using the mycelia) of *Trametes versicolor*, extracellular enzymes (using the residual culture medium) and immobilized enzymes (using immobilized commercial laccase). *Trametes versicolor* were growth in a complex medium containing 20 g of corn stubble, 0.05 g $CuSO_4$, 0.05 $MnSO_4$, 0.05 $CaCl_2$ in 1 liter of water incubated at 30 °C during 15 days, after that was separated the mycelia and the residual culture

medium. In other hand laccase form Novo Nordisk was purified by precipitation with acetone and immobilized in silica using glutaraldehyde. After that were prepared mixtures of reaction with 1 g and 5 g of mycelia with 20 mL of indigo at 100 ppm, 1 g and 5 g of silica with immobilized enzyme with 20 ml of indigo at 100 ppm and 1 and 5 mL of residual culture medium with the same quantity of indigo. Samples were incubated at room temperature with magnetic stirrer, samples were taken to be analyzed with an UV-Vis spectrophotometer and calculate the % of discoloration. Using 5 g of immobilize laccase could oxidize completely indigo in 1 hour, whereas using 1 g discoloration was nearby 40%. Using extracellular enzymes (residual culture medium) discolorations were less than 20% and with 5 g of mycelia completely discoloration was achieve in 3 hours. The three kind of enzymes tested had the capacity to discolor indigo carmine.

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[P-E.147]

Occurrence and distribution of bacterial indicators and pathogens in the Nanshi River in Northern Taiwan

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Keywords: Fluorescence in situ hybridization; Bifidobacteriaceae; Clostridiaceae; Streptococcaceae

The Nanshi River is a multi-functional river in Taipei County in Northern Taiwan, which is applied to recreation, water supply and aquaculture practice farms in different reaches. Intensive recreational activities discharge amounts of untreated sewage into this river since Taiwan government began two days off for each week in 2001. More and more tourists might get waterborne illnesses by contacting with faecal contaminated river water. Appropriate treatment process for water supply was designed to remove pathogens in the Nanshi River. This study is to monitor the seasonal incidence and occurrence of faecal bacteria and pathogens at eight sampling sites in the Nanshih River during 2006. Fluorescence in situ hybridization (FISH), one of molecular biotechnology is applied to measure three representative bacterial indicators at the first time. The results showed many variations in the bacterial community at sampling sites through the Nanshi River every two month. Significant difference in the class Actinobacteria ranged as 3.70% to 17.56% and the class Firmicutes ranged as 2.82% to 12.76% is found at same sampling sites for all year. The highest percentage of Bifidobacteriaceae ranged from $7.21 \pm 1.84\%$ to $14.14 \pm 1.24\%$ to identify as faecal pollution of domestic sewage, contributed from the on-site investigation of point sources along riversides such as hot spring resorts, hotels and guest houses, campsites, restaurants, aquaculture practices etc. The effluent of the FuShan Wastewater Treatment Plant spreads the distribution of Clostridiaceae to downstream, detected as the range of $1.85 \pm 1.36\%$ to $8.87 \pm 1.92\%$. A possibility of animal fecal pollutants is occurred in a short term due to the positive FISH signals of Streptococcaceae ranged from $1.63 \pm 1.64\%$ to $16.57 \pm 3.82\%$. It is suggested Taiwan EPA monitors more bacterial indicators in the Nanshih River. Point source pollutants should be controlled strictly for the human health and safety of drinking water and recreational activities.

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[P-E.148]

Study of microbial diversity in soil contaminated by PCB as a consequence of plant presence

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Keywords: phytoremediation; PCB; MS MALDI-TOF; bacterial diversity

In modern environmental microbiology an unknown microbial community is often the subject of study. Description and characterization of such a community helps us understand its inner connections and relations. The aim of this project is to characterize a microbial diversity of contaminated soil with PCB in the presence of horseradish plant (*Armoracia rusticana).* Four types of soils were used for the analyses. Soil with the plant cultivated with and without a fertilizer, added during cultivation, and respective soils without the plant as negative controls. From these soils, total numbers of microorganisms on PCA and mineral medium with biphenyl as a carbon source were calculated and evaluated. A T-RFLP analysis was performed to describe microbial diversity of cultivable bacteria. 11 bacterial strains were isolated and identified by sequencing of 16S rRNA genes and NEFERM-test biochemical assay. In addition identification by MS MALDI-TOF was carried out using Bruker's Biotyper software and data were evaluated in respect to those obtained by previous mentioned methods. .All strains were tested for the presence of *bphA* gene (first gene of biphenyl operon) using PCR and different sets of primers as well as PCB degradation abilities were measured. At the end of the project several experiments testing the effect of cultivation conditions of the isolated strains on quality of the MS spectra and following bacterial identification itself were performed.

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[P-E.149]

Mathematical modeling of a biofiltration process in a trickle-bed reactor

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Keywords: biofiltration; mathematical modeling; trickle-bed reactor; biofilm

The aim of the contribution is to present a mathematical model of the biofiltration process taking place in a trickle-bed reactor and to compare numerical results with experimental data.

A general definition of biofiltration says it is a process of removing pollutants from wastewaters or waste gases by microorganisms. In our case we focus on removal of organic dyes from textile industry wastewaters by a white-rot fungus *Irpex lacteus*. The use of the fungus has two main advantages: 1) it is able to degrade substances that cannot be removed by other types of