SAMIGE

Sociedad Argentina de Microbiología General

IX CONGRESO DE MICROBIOLOGÍA GENERAL

Del 05 al 07 de agosto de 2013
Sede de Gobierno UNR | **ROSARIO**

www. samige.org.ar | info@samige.org.ar

DECHLORINASE ACTIVITY AND CHLORDANE REMOVAL BY *Streptomyces* STRAINS AS PURE AND MIXED DEFINED CULTURES

María S Fuentes [1], Verónica L Colin [1], Enzo E Raimondo [2], Claudia S Benimeli [1 3], María J Amoroso [1 2].

[1] *PROIMI-CONICET.* [2] *Fac. de Bqca, Qca y Fcia. UNT.* [3] *UNSTA.*

amoroso@proimi.org.ar

Chlordane (CLD) is a toxic fumigating agent widely used in the past, which is now found in air, soil and water resources. Technical chlordane consists in 147 components, and it has been included in the list of the 12 persistent organic pollutants of Stockholm Convention (2001) because of its persistence, toxicity and tendency to biomagnification. Bioremediation is an attractive cleaning technique of polluted environments. The use of actinobacteria for this purpose, results an effective biotechnological approach due to their metabolic versatility and furthermore their use in mixed cultures can increase the catabolic pathways available for biodegrading these contaminants.

The aim of this work was to evaluate the chlordane removal capacity and dechlorinase activity by pure and mixed actinobacteria cultures, under controlled laboratory conditions, and to select one mixed culture for further morphological studies.

Streptomyces spp. M7, A2, A5, A6, A13 previously isolated in the laboratory and *Streptomyces coelicolor* A3 (2) were cultivated individually in minimal medium (MM) with CLD for acclimation. These strains, as pure cultures and consortia from two to six microorganisms, were cultivated in MM with CLD (1.66 mg L^{-1}). Microbial cells were used to obtain cell-free extracts for dechlorinase activity assays and the supernatants of these cultures were used to determine residual CLD by gas chromatography. The selected mixed culture according to their dechlorinase activity and capacity to remove CLD was grown in MM either with glucose or chlordane as carbon source and analyzed at 72 h in an optical microscope the probability of morphological changes.

Dechlorinase activity ranged between 0.00 to 1291.28 µmolCl^-/h/mg protein and CLD removal percentages was between 82.6 to 95.5%. The mixed culture consisting of *Streptomyces* sp. A2-A13-*Streptomyces coelicolor* A3(2) showed the best enzyme activity but not the minimal residual CLD concentration. Because no linear relationship between residual CLD and enzyme activity was obtained, the ratio between these two parameters was evaluated, and the mixed culture *Streptomyces* sp. A2-A5-A13 with the minimal obtained relationship was selected. In CLD presence, the microscopic analysis of this culture showed scarce vegetative cells and numerous spores, which results of the hyphal fragmentation.

These *Streptomyces* strains were able to grow as mixed cultures, in CLD presence, and showed ability to dechlorinate and remove this toxic compound from the culture medium. Therefore the mixed culture of *Streptomyces* sp. A2-A5-A13 could be a promising tool for CLD biodegradation.

Código de Resumen: BB-008

Sección: Bioremediación y Biocontrol

Modalidad: Poster

BIOMINERALIZATION IN *Candida fukuyamaensis* RCL-3 UNDER COPPER OVERLOAD

Verónica P Irazusta [1], Lucas Michel [1], Carlos G Nieto-Peñalver [1 2], Lucía I Castellanos de Figueroa [1 2].

[1] *PROIMI-CONICET.* [2] *Universidad Nacional de Tucumán.*

carlosgnieto@yahoo.com.ar

Copper (Cu) plays an essential role in cellular metabolism due to its versatility as a biological catalyst. It is required as a catalytic cofactor in many enzymes involved in diverse cellular processes. While trace amounts of copper are essential for life, copper can easily react with oxygen or hydrogen peroxide (H_2O_2) generating reactive oxygen species (ROS) that may damage cell constituents through the oxidation of proteins, cleavage of DNA and RNA, and lipid peroxidation. *Candida fukuyamaensis* RCL-3 (NCBI number AY743221), yeast strain isolated from a copper filter plant at the province of Tucumán, Argentina, has the ability of supporting high amounts of copper metal by a slowdown in its growth rate. Bioremediation mechanisms as bioaccumulation, biospeciation, biomineralization has been descripting in yeast. In order to understand the mechanism involved in *C. fukuyamaensis* RCL-3 resistance to copper it was conducted an approach. Atomic absorption spectroscopy results showed decrease copper concentration (from 0.5 to 0.14 ± 0.05 mM) in the culture medium after 16 h inoculation. At the same time, change in cells coloration to brownish color was observed. Is known that cooper sulfide (CuS) mineralization on the surface of cells causes the cells turns brown. Upon addition of KCN to Cu-grown *C. fukuyamaensis* RCL-3 cells, the brownish coloration was bleached instantly, and cooper ions were solubilized. Sulfate reduction as the brown coloration of Cu-treated cells was attenuated when ammonium chloride was substituted for ammonium sulfate in the growth media.