Sociedad Argentina de Microbiología General

# XIX CONGRESO DE LA SOCIEDAD ARGENTINA DE MICROBIOLOGÍA GENERAL

22 al 25 de octubre del 2024
Centro cultural y Pabellón Argentina de la Universidad Nacional de Córdoba, Córdoba, ARGENTINA.

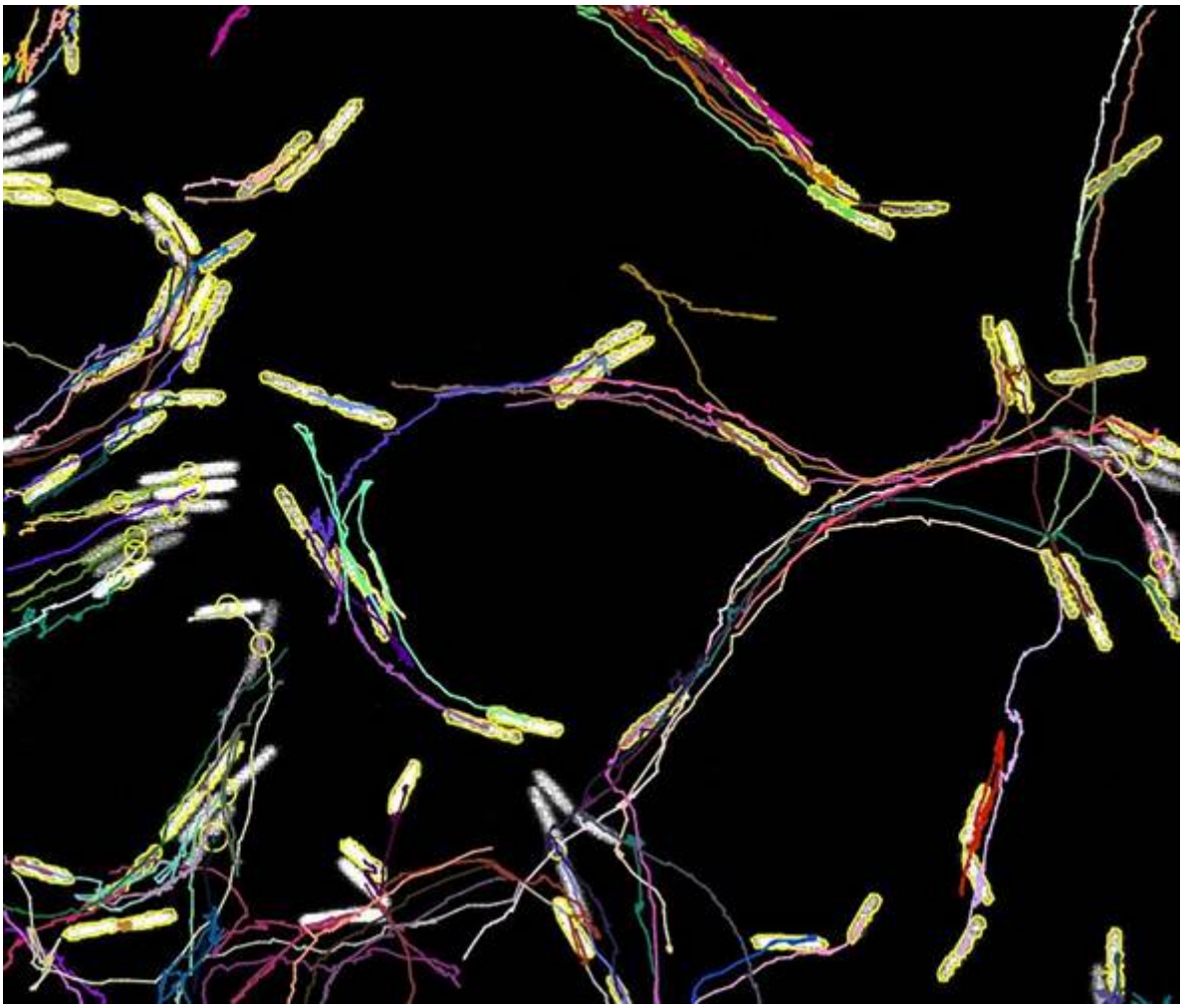

Foto: Se hace camino al andar. Celeste Dea. 1er puesto. Concurso fotográfico SAMIGE 20 años.

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# IMPACT OF BIOMEMBRANES ON ARSENIC ACCUMULATION IN SOYBEAN (Glycine max L.)

Cardozo, Paula[1] - Vergara Rubio, Alicia[2] - Pramparo, Romina[1] - Talano, Melina[1] - Agostini, Elizabeth[1] - Pereira, Paola[1]

1) Departamento de Biología Molecular, Facultad de Ciencias Exactas, Físico-Químicas y Naturales, Universidad Nacional de Río Cuarto / Instituto de Biotecnología Ambiental y Salud, INBIAS-CONICET - Río Cuarto - Córdoba - Argentina.
2) Laboratorio de Polímeros y Materiales Compuestos, Departamento de Física, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires / Instituto de Física de Buenos Aires, IFIBA-CONICET, Buenos Aires, Argentina.
*Contacto: pgabcardozo@gmail.com*

Soil and groundwater contamination with arsenic (As) affects many agricultural areas in Argentina, with soybean (*Glycine max* L.) being one of the most affected crops by its toxicity. Due to the harmful impact of this metalloid on crops and on human and animal health, different strategies have been developed to mitigate the effects of its presence and toxicity. These strategies comprise physical, chemical, and biological methods and/or combinations thereof. In this context, strategies that integrate biological remediation agents with nanostructures or nanocomposites represent an area of growing research interest. Among all the available polymeric substances used in the remediation of contaminants, polyvinyl alcohol (PVA) is one of the preferred materials due to its non-toxic nature, its ease of acquisition and handling, and its biodegradable character. The aim of this work was to evaluate the efficiency of polymeric membranes, alone and associated with plant growth-promoting and bioremediation bacteria, in reducing the accumulation of the metalloid by soybean seedlings. For this purpose, tests were carried out in a growth chamber with controlled temperature, photoperiod and humidity using the BIOCERES 3.41 soybean variety. A sterile mixture of field soil and perlite (3:1) was used as support. Treatments consisted of plants irrigated with an As (V) solution (33 µM) with and without the application of control or bioassociated PVA electro-spun polymeric membranes (7,5 x 2,5 cm each; 2 units per pot). Biological agents used were *Pseudomonas* sp. AW4 and *Bacillus toyonensis* SFC-500 1E. Plants without the addition of the contaminant and without membranes were used as controls. Seeds of all treatments were inoculated at sowing with *Bradyrhizobium japonicum* strain E109, as in conventional practice. At 25 days post planting, seedlings were removed from the pots and the growth parameters were determined. The levels of As were quantified in different plant fractions and in the membranes as well. In all treatments that included the use of biomembranes, associated either individually or simultaneously with AW4 and SFC-500 1E, a statistically significant increase in fresh and dry root biomass was observed. On the other hand, in seedlings

irrigated with the contaminant and grown in the absence of membranes and/or biological agents, the chlorophyll content was significantly lower than in control seedlings. This negative effect of As was reversed in those treatments where both non-associated and bioassociated membranes were applied. The contaminant content in membranes was higher in the treatments with bioassociations compared to the control membranes; and among the former, the simultaneous association of AW4 and SFC 500-1E was the biotreatment that promoted a greater accumulation of As in the membranes. Taken together, the results point the PVA biomembranes as a promising strategy to mitigate the harmful effects of As on crops of agronomic interest.

Palabras clave: contaminants - bioremediation - arsenic - membranes - soybean.