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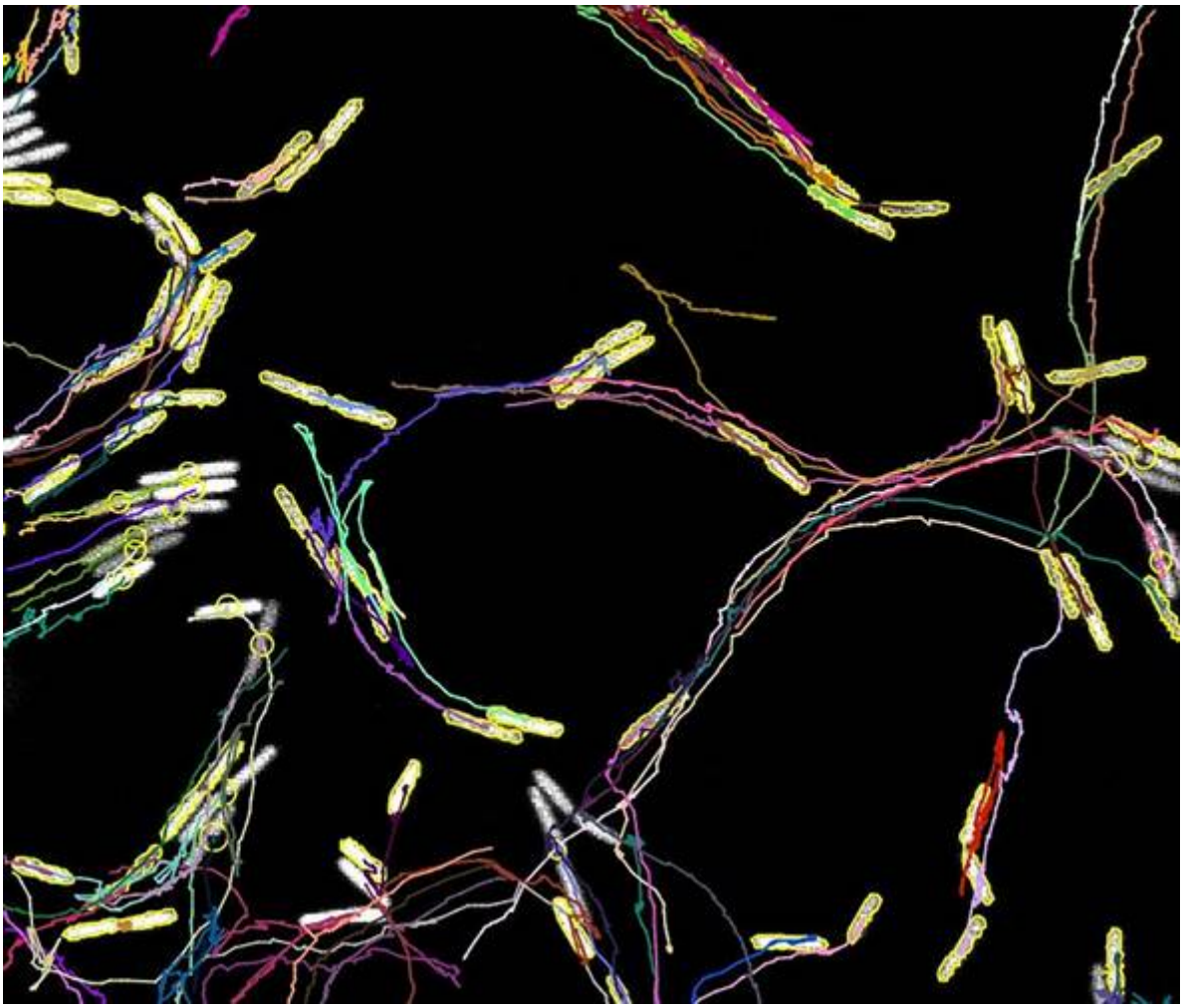

Foto: Se hace camino al andar. Celeste Dea. 1er puesto. Concurso fotográfico SAMIGE 20 años.

BIOCLOGGING BY DIFFERENT BACTERIAL SPECIES ON WOVEN AND NON-WOVEN GEOTEXTILES USED IN LEACHATE LEVEL CONTROL SYSTEMS IN MUNICIPAL SOLID WASTE LANDFILLS

Crespo Andrada, Karina Fernanda[2]- de Goycoechea, Julieta[2]- Bongiovanni, Sofia[1]- Ramos Seguí, María Catalina[1]- Daján, Salomé[1]- Montoro, Marcos Alexis [2]- Paraje, María Gabriela[1]

1) Laboratorio de Microbiología Aplicada y Biotecnología (LaMAB), Cátedra de Microbiología, Instituto Multidisciplinario de Biología Vegetal (IMBIV- CONICET), Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba (FCEFyN-UNC), Córdoba, Argentina.
2) Instituto de Estudios Avanzados en Ingeniería y Tecnología (IDIT -CONICET) y Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba (FCEFyN-UNC), Córdoba, Argentina.
Contacto: gparaje@unc.edu.ar

Microorganisms can clog the geotextiles (G) used for filtration and drainage of the leachate collection systems (LCS) of solid waste landfills. The present study aimed to investigate the in vitro kinetics of bioclogging by 3 different bacterial genera in 2 types of non-woven geotextiles (GnW) (130g/m² and 500g/m²) and one woven geotextile (GW), commonly used for filtration and drainage of the LCSs. The G were inoculated with a standard solution of 105 CFU/mL of Escherichia coli ATCC 25922, Pseudomonas aeruginosa ATCC 27853 or Enterococcus faecalis ATCC 29212. The bioclogging and formation kinetics were determined using 1 cm x 1 cm squares of different G types. The samples were submerged in the standard solution during 21 days. After incubation, the G were washed with a sterile physiological solution and sonicated at 80 W and 40 kHz for 2 minutes. The cell counts (CFU/ml) of the samples was then measured and plotted against time. The experiments were done in triplicates. Data were analyzed using ANOVA, followed by the Student-Newman-Keuls test for multiple comparisons. A *P < 0.01 was considered significant for comparisons with untreated samples, and #P < 0.01 for comparisons between microbial genera. On the surface of both G, a significant increase in the cell counts was observed up to day 14 (*P < 0.01), after which it began to decrease. E. faecalis grew at a different extent depending on the type of G assayed. E. coli grew in a significant higher extent (*P < 0.01) than P. aeruginosa in all the assayed G. Moreover, this bacterium showed the greatest growth on the GnW (500 g/m²) throughout the testing period. Bioclogging, which occurs due to microbial growth within the pores of a filter medium, is highly dependent on the characteristics of the microorganisms involved. Microbial colonization of the surface and pore matrix of G varied among the different bacterial assays, particularly on the GnW with a mass per unit area of 500g/m². All bacteria formed bioclogging, which can significantly decrease the effectiveness of the G, reduce compromise the

performance and the structural integrity of the entireleachate collection system. Consequently, this increases the risk of soil and groundwater contamination, leading to significant environmental problems.

Palabras clave: Microbial growth, Bioclogging, Geotextiles, Leachate collection system, Filtration layers, Environmental contamination