SG.04-P-5

ZONA 4: Sala Berrocal - jueves, 21 de octubre

Evaluating the bioreactive role of riparian ecosystems under the effects of wastewater treatment plant effluents

Escarmena Pascual, Laura[1]; Roca Pascual, Núria[2]; Sauras-Yera, Teresa[3]; Sabaté Jorba, Santi[4]; Sabater Comas, Francesc[5]

(1) Universidad de Barcelona; (2) Universitat de Barcelona; (3) Universitat de Barcelona; (4) Universitat de Barcelona; (5) Universitat de Barcelona, CREAF

E-mail de correspondencia: [lescarmena@ub.edu]

Riparian ecosystems as hotspots of biogeochemical processes have a large capacity to retain and remove nutrients. In this work, we evaluate the bioreactive role of riparian zones, differing on tree and understory species composition, after temporal and intermittent flooding with wastewater treatment plant (WWTP) effluents. We assess the biogeochemical reactivity of the riparian soil to reduce the nutrient and dissolved carbon load provided by WWTP effluents, as well as their impact on soil characteristics. The application period covers three months since the beginning of the growing period. We have set two 250m2 experimental plots, one control and one flooded. Flooding is performed through a sub-surface flow during 15 days and it is alternated with 15 days drainage periods. Samples are collected before and during the effluent application period at different soil depths. In a preliminary study after superficial flooding treatment, we found significant changes on soil characteristics such as pH, potential acidity, electric conductivity, and exchangeable sodium percentage. There was a significant decrease in soil nitrate but a significant increase in ammonium concentrations. Regarding soil gas emissions, there was a significant decrease in CO2 and a significant increase in CH4 and N2O. After a drainage period of one year, any significant difference between plots was found. The results reveal that riparian soils have a high potential to reduce the nutrient load from WWTP effluents. This type of flooding practice did not result on an environmental threat for the riparian ecosystem.

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Plant community phylogenetic structure predicts nutrient cycling in Mediterranean mixed forests

Rincón Herranz, Ana[1]; Prieto-Rubio, Jorge[2]; Perea, Antonio Jesús[3]; Garrido, José Luis[4]; Alcántara, Julio M[5]; Azcón-Aguilar, Concepción[6]; López-García, Álvaro[7]; Rincón Herranz, Ana María[8]

(1) Instituto de Ciencias Agrarias (ICA). Consejo Superior de Investigaciones Científicas (CSIC); (2) Estación Experimental del Zaidín (EEZ), CSIC; (3) Universidad de Jaén (UJA); (4) Estación Experimental del Zaidín (EEZ), CSIC; (5) Universidad de Jaén (UJA); (6) Estación Experimental del Zaidín (EEZ), CSIC; (7) Universidad de Jaén (UJA); (8) Institute of Agronomic Sciences (ICA), CSIC

E-mail de correspondencia: [ana.rincon@csic.es]

Nutrient cycling is an essential process in forest ecosystems, which is tightly regulated by plant-microbial interactions and environmental factors. Although the plant species pool may provide important clues about biogeochemical footprints in soil, its role in driving soil functioning remains fairly unknown. We addressed this question by testing the effects of plant phylogenetic diversity and habitat properties on soil nutrient cycling. For this, we focussed on Mediterranean mixed forests located in two natural parks of South Spain. Soil was collected in spring and autumn from the rhizosphere of representative plant community species to determine potential enzymatic activities related to carbon, nitrogen and phosphorous cycles. Our results revealed that plant species, together with spatial-temporal factors, were main drivers of nutrient cycling, pointing to meaning context-dependent plant-soil feedbacks. Phylogenetic signal of plant community was detected on activities related to carbon and nitrogen mobilization, which was particularly conserved in the former case, i.e., closely related species tended to have similar carbon cycling rates. Mycorrhizal association type was a main predictor of soil functioning. The plant species pool could have led to divergent decomposability affecting nutrient cycling, which in turn was mediated by different microbial communities mirroring differentiated resource-acquisition strategies. Our findings provide novel insights into the factors that regulate decomposition in Mediterranean forest ecosystems and highlight the role of plant trait diversity and mycorrhizal interactions on carbon turnover and nutrient cycling.

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