Geophysical Research Abstracts
Vol. 19, EGU2017-2245, 2017
EGU General Assembly 2017

Characterization of bacterial functional groups and microbial activity in microcosms with glyphosate application

Sofia Moyano (1), Mariana Bonetto (2), Tomas Baigorria (3), Vanesa Pegoraro (3), Jimena Ortiz (3), Valeria Faggioli (3), Belen Conde (3), Cristian Cazorla (3), and Monica Boccolini (3)

(1) Instituto de Investigación Médica Mercedes y Martín Ferreyra, Argentina, (2) CONICET, Argentina, (3) EEA Marcos Juárez (INTA) Argentina

Glyphosate is a worldwide used herbicide as c. 90% of transgenic crops are tolerant to it. Microbial degradation of glyphosate molecule in soil is considered the most important process that determines its persistence in the environment. However, the impact of this herbicide on target groups of soil biota remains poorly understood. Our objective was to characterize the abundance of bacterial groups and global microbial activity, under controlled conditions with application of increasing doses of glyphosate. A bioassay was carried out in microcosms using an agricultural soil (Typic Argiudoll) with registered history of glyphosate application from National Institute of Agricultural Technology (INTA, EEA Marcos Juarez, Argentina). Glyphosate of commercial formulation (74.7%) was used and the following treatments were evaluated: Soil without glyphosate (control), and Soil with doses equivalent to 1.12 and 11.2 kg ai ha-1. Microbiological parameters were estimated at 3, 7, 14 and 21 days after herbicide application by counting heterotrophic, cellulolytic, nitrogen fixing (N), and nitrifying bacteria; and fluorescein diacetate hydrolysis (FDA), microbial respiration (MR) and microbial biomass (C-BM). The N cycle related bacteria showed greater sensitivity to glyphosate with significant increases in abundance. On the other hand the C cycle parameters were strongly conditioned by the time elapsed since the application of the herbicide, as did the MR. The FDA declined with the highest dose, while the C-BM was not affected. Therefore, we conclude that in the studied experimental conditions glyphosate stimulated bacterial growth (i.e. target abundances) representing a source of N, C and nutrients. On the other hand, enzymatic activity (FDA) decreased when glyphosate was applied in the highest dose, whereas, it had no effect on the MR nor C-BM, which could be attributable to the organic matter content of the soil. However, future research in field conditions is necessary, for evaluated glyphosate behaviour in soil bioactivity and interaction with different soil factors.