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Depth distribution of glyphosate and AMPA under diferent tillage system and soils in long-term experiments

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Glyphosate (N-(phosphonomethyl glycine) is a post-emergence, non-selective, foliar herbicide. Around 200 million liters of this herbicide are applied every year in Argentina, where the main agricultural practice is no-till (NT), accounting for 78 % of the cultivated land. In this work, we studied the depth distribution of glyphosate in long-term experiments (more than 15 years) at different locations under NT and conventional tillage (CT). Samples from 0-2, 2-5, 5-10, 10-15, and 15-20 cm depth with four replication and two treatments NT CT at three locations: Balcarce (BA) a loam soil, Bordenave (BO) a sandy loam soil y Marcos Juarez a silty loam soil (MJ).
The glyphosate concentration in the first 2 cm of soil was, on the average, 70% greater than in the next 2-5 cm. The mass of glyphosate in CT was higher at 2 to 10 cm depth. The depth concentration of AMPA follows the same trend than glyphosate, although its average concentration at 0-2 cm depth is 28 times higher than the glyphosate concentration at 2-5 cm (glyphosate = 147 ppb and AMPA = 4100 ppb). Beside the AMPA concentration at 0-2 cm depth is greater in NT than in CT, the mass of AMPA is higher in CT only for the Balcarce location.
To our knowledge, this study is the first dealing with the depth distribution of glyphosate concentration in soils under different soil managements. In the present study, it was demonstrated that glyphosate and AMPA are present in soils under agricultural activity with maximum concentration in the first two cm of soil and the AMPA concentration at this depth is greater in NT than in CT.