

GLYPHOSATE LOSSES BY DRAINAGE AND RUNOFF FROM MOLLISOLS UNDER NO-TILL AGRICULTURE

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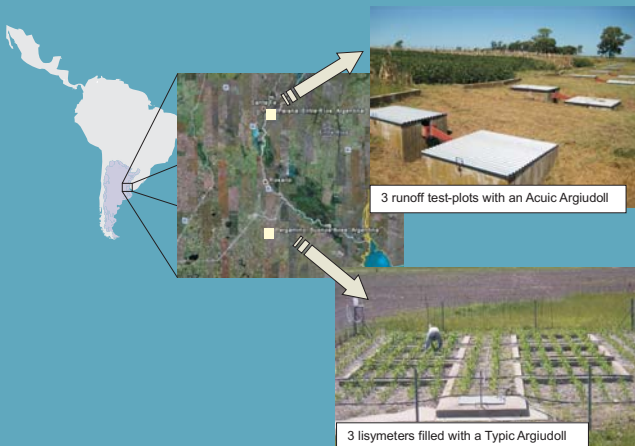
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INTRODUCTION

Agriculture is becoming more and more specialized and homogenous in Argentina. The use of transgenic soybean cultivars is widespread and directly associated to the use of the herbicide Glyphosate. However, there is scarce information referred to the environmental impact of Glyphosate and its accumulation in grain.

Objective: Quantify Glyphosate losses by drainage and runoff from Molisols representative of the Rolling Pampas under no-tillage and its translocation in transgenic soybean biomass

MATERIALS AND METHODS



Study periods 02/03 and 06/07 with 1433 and 1574 mm year⁻¹ in Pergamino and Paraná, respectively (~50% more than the long term average)

Crop: transgenic soybean (*Glycine max* (L) Merr.) under no tillage

1 Glyphosate application 1 month before sowing and 2 more after sowing (rate: 3 l ha⁻¹, a.i. 48%).

Glyphosate and AMPA determination by HPLC with postcolumn derivatization and fluorescence detection (detection limit: 0,05 µg l⁻¹ in water and 0.02 mg kg⁻¹ in grain).

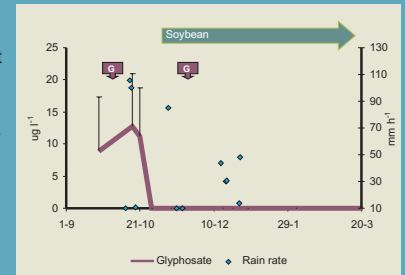
CONCLUSIONS

The high Glyphosate and AMPA concentrations found in water lost through drainage and runoff after abundant rain events show the relevance of analyzing aspects related to moment and conditions of herbicide application.

The high variability of Glyphosate concentrations found in all plant compartments analyzed needs to be improved.

RESULTS

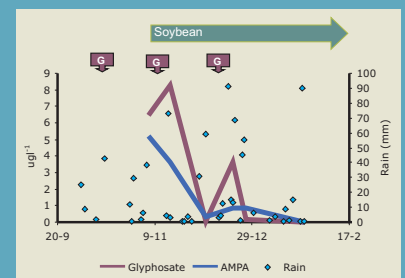
- ◆ Glyphosate was detected in drainage water between the first and second applications when there was a rainy period. The amount of glyphosate leached represented between 0.3 and 0.6% of the applied.



- ◆ Post-emergency application of glyphosate was detected in the aerial biomass in all the studied components.

	Glyphosate	
	Concentration (µg g ⁻¹)	Amount (µg ha ⁻¹)
Grains	2.8±2.5	10±9
Pods	12.4±17.6	86±45
Stems	9.9±4.2	49±23

- ◆ Glyphosate and AMPA were detected in runoff water before and soon after sowing. A month later, runoff water concentrations were much lower. The amounts of glyphosate and AMPA lost by runoff throughout the study period were very low, <0.03% of the applied.



- ◆ Average AMPA and Glyphosate concentrations in runoff water were similar, indicating that there was a fast transformation between the herbicide and its metabolite.

- ◆ Structural stability, soil porosity and organic carbon of the topsoil (5 cm) explained >75% of the variation in Glyphosate concentrations (r=0.9, r=0.75, r=0.83, respectively, p<0.01). AMPA concentration was not related with the analyzed soil properties.