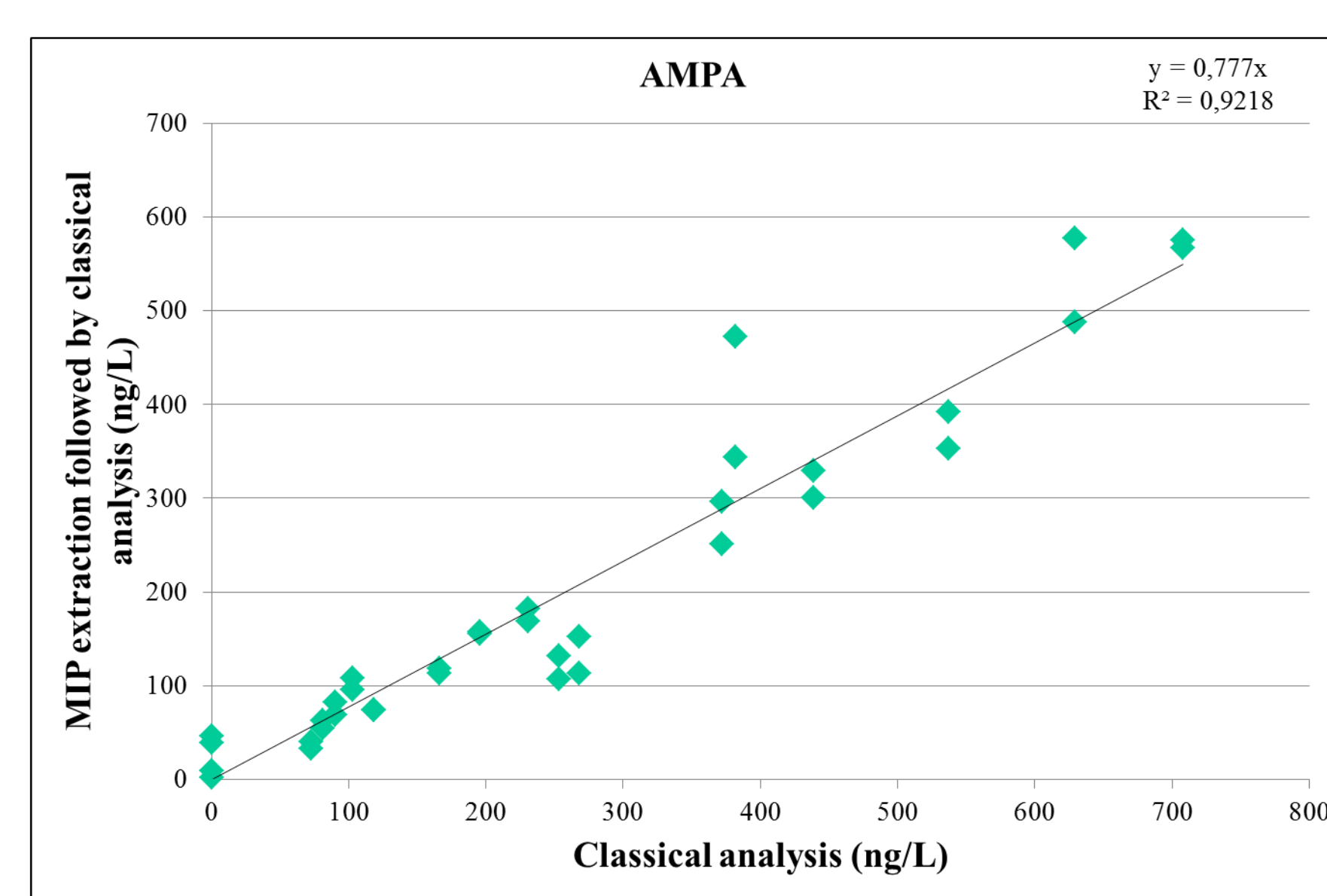
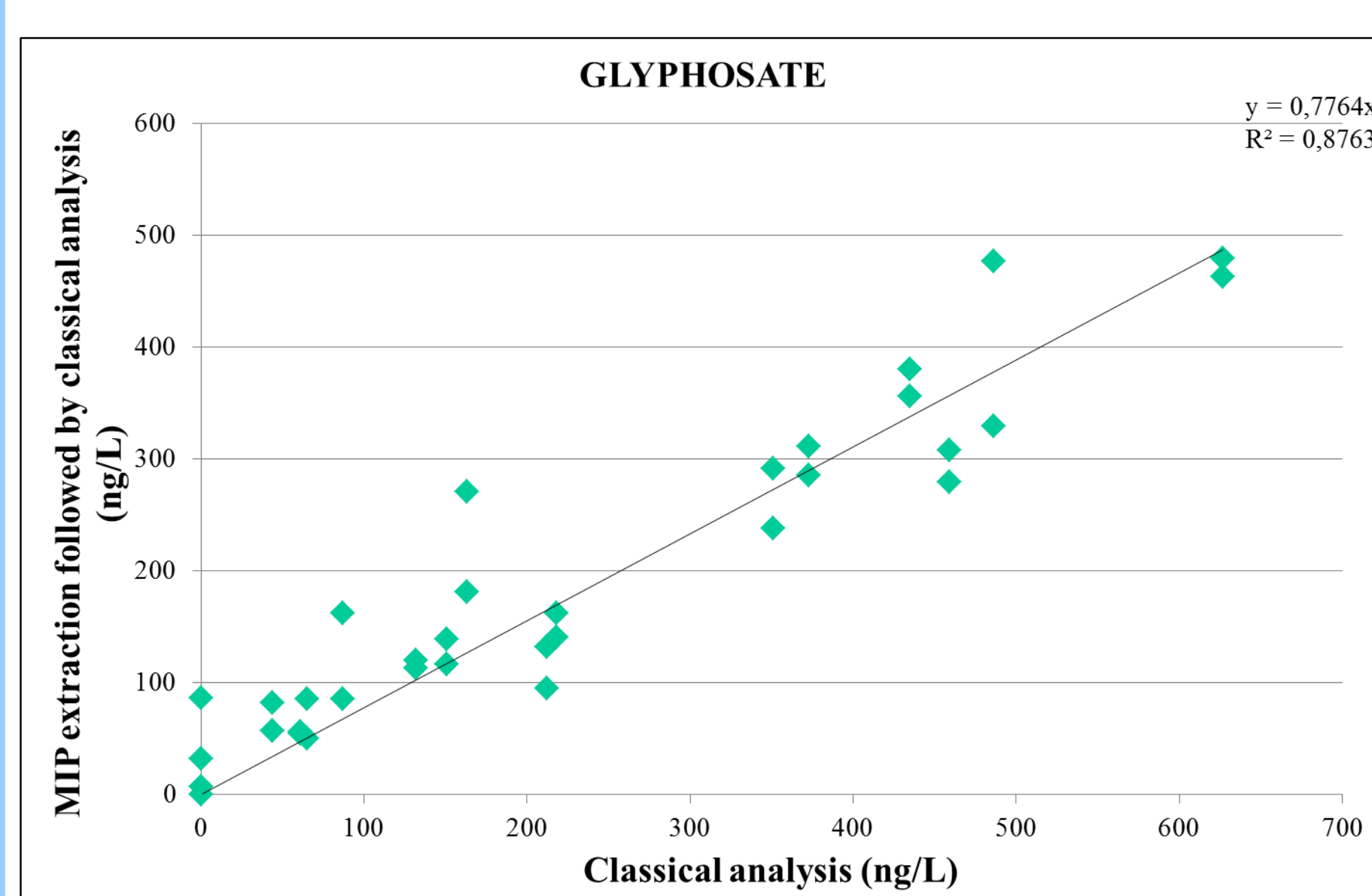


New molecularly imprinted polymers (MIP) used as SPE clean up method and as a passive sampler receiving phase for the catchment of glyphosate and AMPA in water

A new SPE sorbent based on Molecularly Imprinted Polymers (MIP) was developed for Glyphosate and AMPA to be tested as an integrative passive sampler (POCIS-LIKE) receiving phase

PERFORMANCE OF THE MIP USED AS SPE SORBENT

The performance of the MIP is evaluated by the comparison between the classical method for the quantification of glyphosate and AMPA in water samples (on line SPE/UPLC/MS/MS after derivatization) with those obtained after MIP SPE clean up followed with classical method. Five natural water with different physico-chemical properties (see Table) were spiked at several levels of concentrations from about 50 ng/L to 700 ng/L. For each level, MIP clean up followed by analysis was performed in duplicate. Results have shown that the MIP as a SPE clean up method allows the catchment both molecules in real water matrices which present contrasted physico-chemical properties (recoveries rate of about 78% for both molecules).

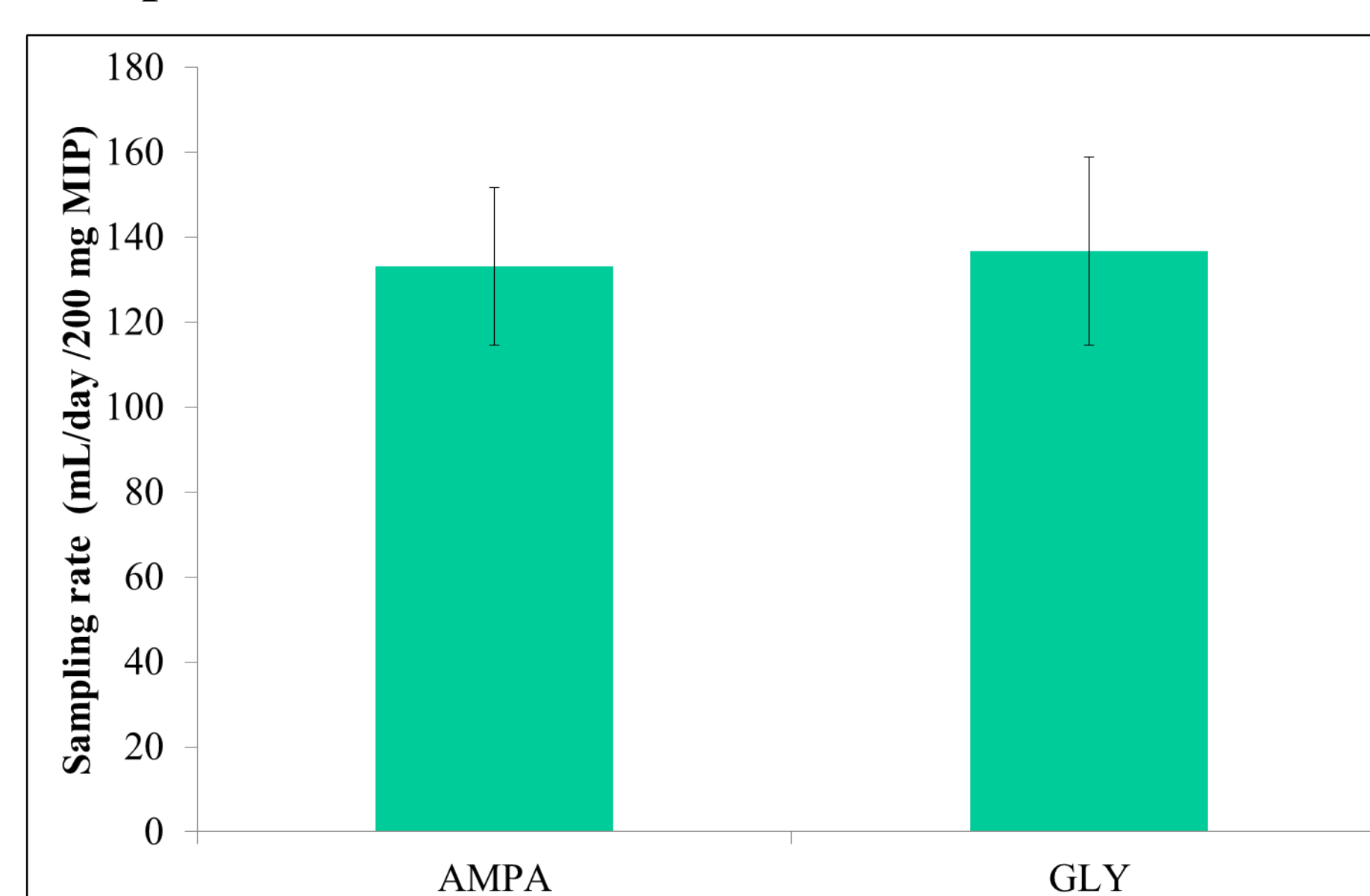
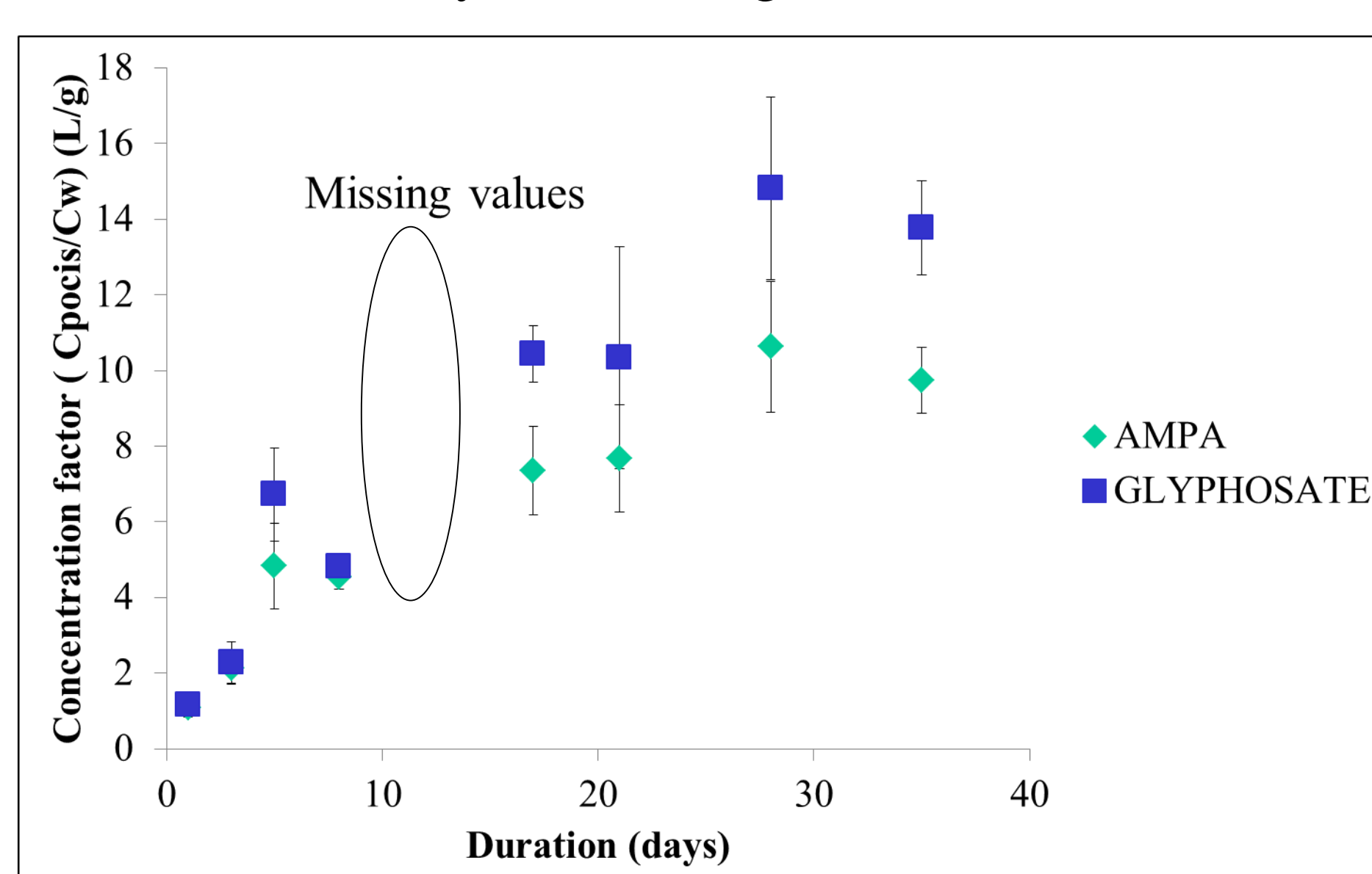


	COD	Ca	Mg	Na	K	HCO3	Cl	NO3	SO4	Al	As	Cd	Co	Cr	Cu	Fe	Mn	Ni	Pb	Se	SiO2	Zn	pH
groundwater	1.8	15.7	4.9	11.3	1.3	76	9.7	<0.5	1.2	1.12	15.6	<0.01	1.5	<0.1	<0.1	7.5	1372	0.2	<0.05	<0.1	50.4	1.28	7.1
groundwater	<0.5	22.3	17	105.7	4.7	136	159	8.9	15.8	0.91	0.49	0.05	1.5	0.15	<0.1	0.171	25	0.86	<0.05	0.42	118	170	6.4
groundwater		104.1	6.9	13.9	1.8	203	28.1	113.7	33														7.1
geothermal water		799	189.5	5163.5	71.9		9759.7		702.2							3.2						25.5	
Mineral water		80	24	6.5	1	360	3.8	3.7	12.6								26				15		7.2

Physico-chemical properties of water samples

POCIS MIP

This sorbent was also tested as an integrative passive sampler (POCIS) receiving phase between two membranes in polyetherlsufone. The calibration of POCIS-MIP in laboratory conditions has led to laboratory sampling rates estimation for AMPA and glyphosate. The POCIS calibration experiment was conducted in a stainless steel tank filled with mineral water (pH = 7) initially fortified at 500ng/L of AMPA and glyphosate. The tank contains a teflon carousel connected to an electric motor to simulate turbulence conditions in water. POCIS MIP were attached to the carousel an immersed in the tank for different time durations to study the kinetic accumulation of both molecules in POCIS MIP. The concentration of AMPA and glyphosate in water was maintained constant by the continuous supply of spiked mineral water. The pesticides concentration in the tank, the temperature, TOC and conductivity were monitored during the experimental period to verify the stability of physico-chemical conditions in water. Sampling rates were estimated by a linear regression on the linear accumulation part.



$$C_{POCIS} = C_w * \frac{k_u}{k_e} * (1 - e^{-k_e t})$$

- C_{pocis} Concentration in pesticide in POCIS (ng/g)
- C_w Concentration in pesticide in water (ng/L)
- k_u accumulation kinetic constant (L/g/day)
- k_e desorption kinetic constant (L/g/day)

$Rs = C_{POCIS} / C_w * t$ in the linear part of the accumulation curve

R_s : sampling rate (L/day/g POCIS)
 C_{pocis} : Concentration accumulated in POCIS (ng/g/MIP)
 C_w : mean concentration measured in water during the period (ng/L)
 t : time duration (day)



A technical problem occurred (the electric motor stopped) and prevent us from obtaining a reliable accumulation curve during all the experiment (values between 8 and 17 days are missing); however, rough sampling rates were calculated by considering a linear accumulation up to 8 days. They are about 130mL/day/200 mg MIP, values which are in agreement with sampling rates obtained for other pesticides in classical POCIS. This first experiment demonstrated the potential of POCIS MIP to be used as a receiving phase in POCIS passive sampler. A second experiment is under progress to confirm these preliminary results. Field testing will be conducted to demonstrate POCIS MIP applicability in real conditions.

Authors

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