Introduction

In the framework of Plant Protection Product (PPP) risk assessment under EU Reg. 1107/2009, groundwater (GW) monitoring programs can be carried out and assessed as refined risk assessment in the tiered approach defined by the FOCUS GW group [SANCO, 2010] and EFSA (2013). However, specific indications of methodologies on how to conduct the studies and about the possible use of the monitoring results have not been proposed by the EU authorities so far. The SETAC group EMAG/Pest/Groundwater, is developing scientific bases to recommend harmonised guidance for groundwater monitoring.

At the Italian level, a national provision requires that companies perform monitoring plans for toxically non-relevant metabolites whose PECgw exceeds 0.75 µg/L in the Italian relevant scenarios (CCPS, 2009) calculated with standard FOCUS GW models [Min. Salute, 2012]. In the last years, AEIFORIA has implemented a specific network of more than 250 wells for field teaching and groundwater monitoring (of which more than 130 new installed piezometers) distributed in relevant agricultural national areas, useful also to accomplish this requirement.

Objectives

- To establish a robust methodology at national and EU level for the identification of sites vulnerable to leaching based on the indication of GW FOCUS modelling;
- To characterize the extent of occurrence of active substance or its metabolites in wells by retrospective monitoring.

Materials and methods

- REPRESENTATIVE AREAS IDENTIFICATION: identification of areas checking shallow GW, crop data, sales data, vulnerability, potential vulnerable layer, weather data and agronomic aspects.
- SITE IDENTIFICATION AND CHARACTERIZATION: identification and characterization through direct interviews with farm owners and farmers, characterization of PPP usage, Cone penetration test and lithostratigraphic assessment.
- SITE SETUP: selection of existing suitable wells or installation of new piezometers, also taking in consideration the preliminary indication from EMAG-Pest.
- MONITORING: starting of sampling schedule, carried out in the best way possible in order to preserve samples from degradation, photo degradation and to avoid cross-contamination of GW.
- ANALYSIS: samples are analyzed using the most appropriate analytical methods in terms of specificity and sensitivity. The most common analytical technique is performed by reversed-phase HPLC with triple quadrupole mass spectrometric detection (LC-MS/MS). At least two daughter ions of characteristic transitions of each analyte are monitored.

Discussion

- The identified monitoring areas mostly correspond to the sites monitored by the national Italian authority for environmental monitoring (ARPA) and to the most intensively cultivated areas.
- Results obtained until now indicate that population of concentrations exceeding the limit of 0.1 µg/L for a.i., and relevant metabolites, and the threshold of 0.75 µg/L for toxically non-relevant metabolites is near to 5% of the whole dataset. Values above 5 µg/L have not been observed until now.

Conclusion

- The sampling data obtained until now indicate that the potential GW contamination disclosed occur in the identified vulnerable sites under realistic conditions. Thus, GW monitoring programs can constitute a valid higher tier for the pre-registration assessment of PPPs.
- Development and implementation of an official EU guidance on GW monitoring would be helpful to share common methodologies for the identification of national vulnerable scenarios. Moreover, it would facilitate the processes of PPP risk assessment and management, also in the post-authorisation phase.
- Through the use of "scenarioLife" tool (CCPS, 2007), already employed to evaluate the representativeness of FOCUS step scenarios for the national territory, the representativeness of the sampling results could be extended to larger areas in Italy. Monitoring results could be indeed considered valid for similar agro-climatic conditions, thereby reducing efforts and costs of monitoring programmes and simplifying the work both for industry and authorities.

References

- Commissione Consultiva per la protezione fiscale (CCPF), 2009: National Criteria for the environmental risk assessment: surface water and groundwater (available at: www phiênhà friction)
- EFSA, 2013: EFSA Journal 2013;1135 (391)

Table 1: The GW monitoring study implemented in recent years.