

Mobilising Citizen Science for Resilient and Responsive Water Quality Monitoring

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Introduction

The EU has stated that citizen science is providing a method of environmental data collection that allows for complementary datasets to be gathered in a cost effective and alternative way. The EU has suggested that data collected as part of citizen science campaigns can be used to provide not just complementary data that is needed as part of monitoring EU environment policy, but also it could hold the potential to be useful for the provision of early warnings about environmental trends and specific problems¹. Under the STARDUST Project, a Citizen Science co-created project provide the groups with water testing kits for turbidity assessment and for pesticide screening. Using the CSHydro test kits volunteers will collect samples for target analysis of pesticides using Liquid Chromatography-Mass Spectrometry (LC-MS and will target azoles, noenicitinoids, pyrethroids etc. and relevant metabolites. This research describes the development of a simple-to-use citizen science tool using the concept of solid phase extraction (SPE) to collect samples from water bodies in a simple process.



Figure 1. CS Hydro sample collection in the field.

CS In Ireland and CS tools

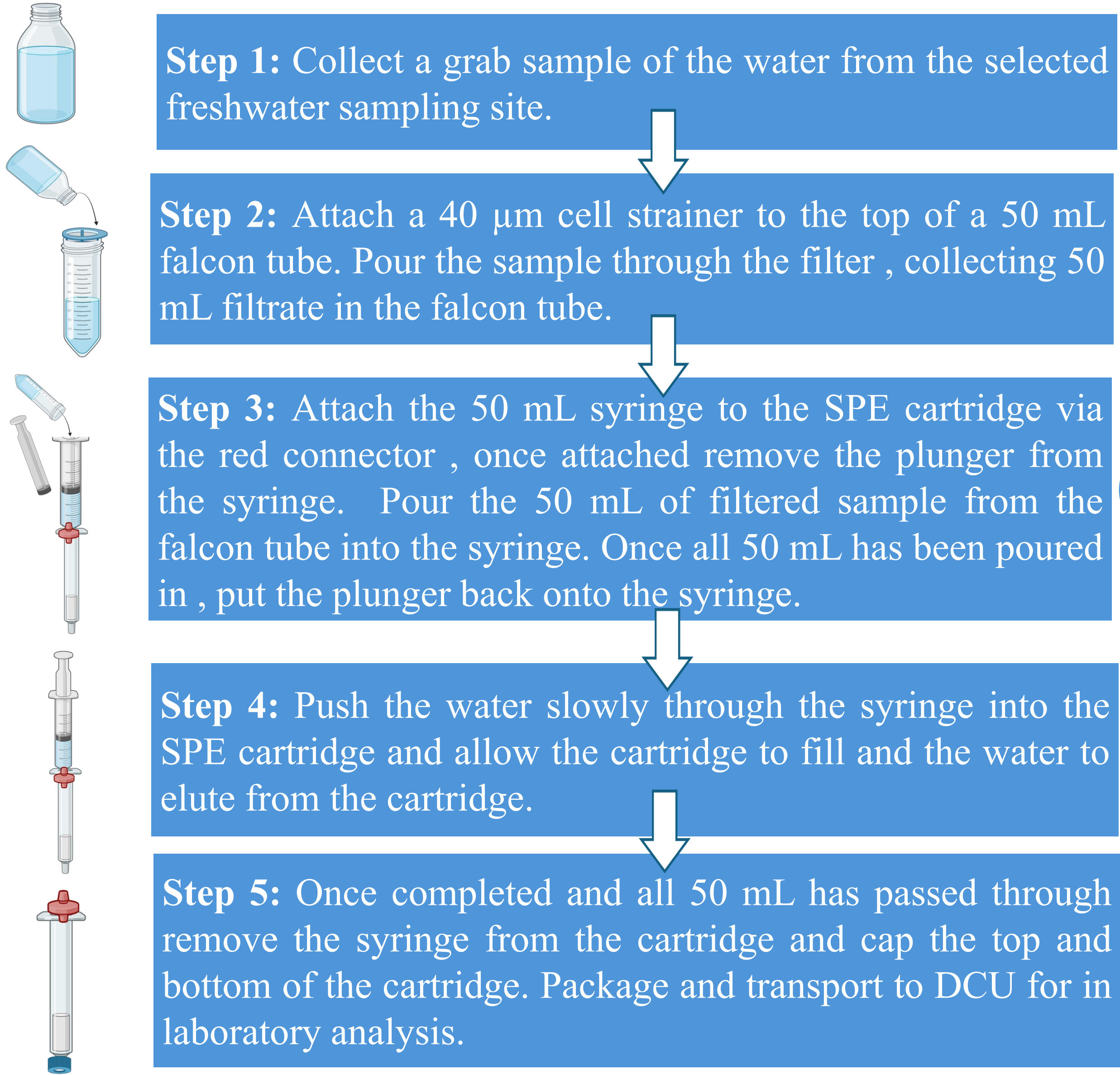
Currently there are a limited number of tools available in the water space that can be easily applied to a citizen science framework. While sensors are a mainstream approach used by researchers, they are not a plausible tool to use in these community led initiatives as they are too expensive and complex. Thus, other avenues have been taken when organizing citizen science programs that focus primarily on water quality parameters that can be measured with colorimetric approaches and the use of Secchi disks and other techniques². Along with these, associated websites and smartphone applications have recently been developed to coincide with these citizen science data collection tools³.

Inside the Citizen Science CSHydro Tool Kit

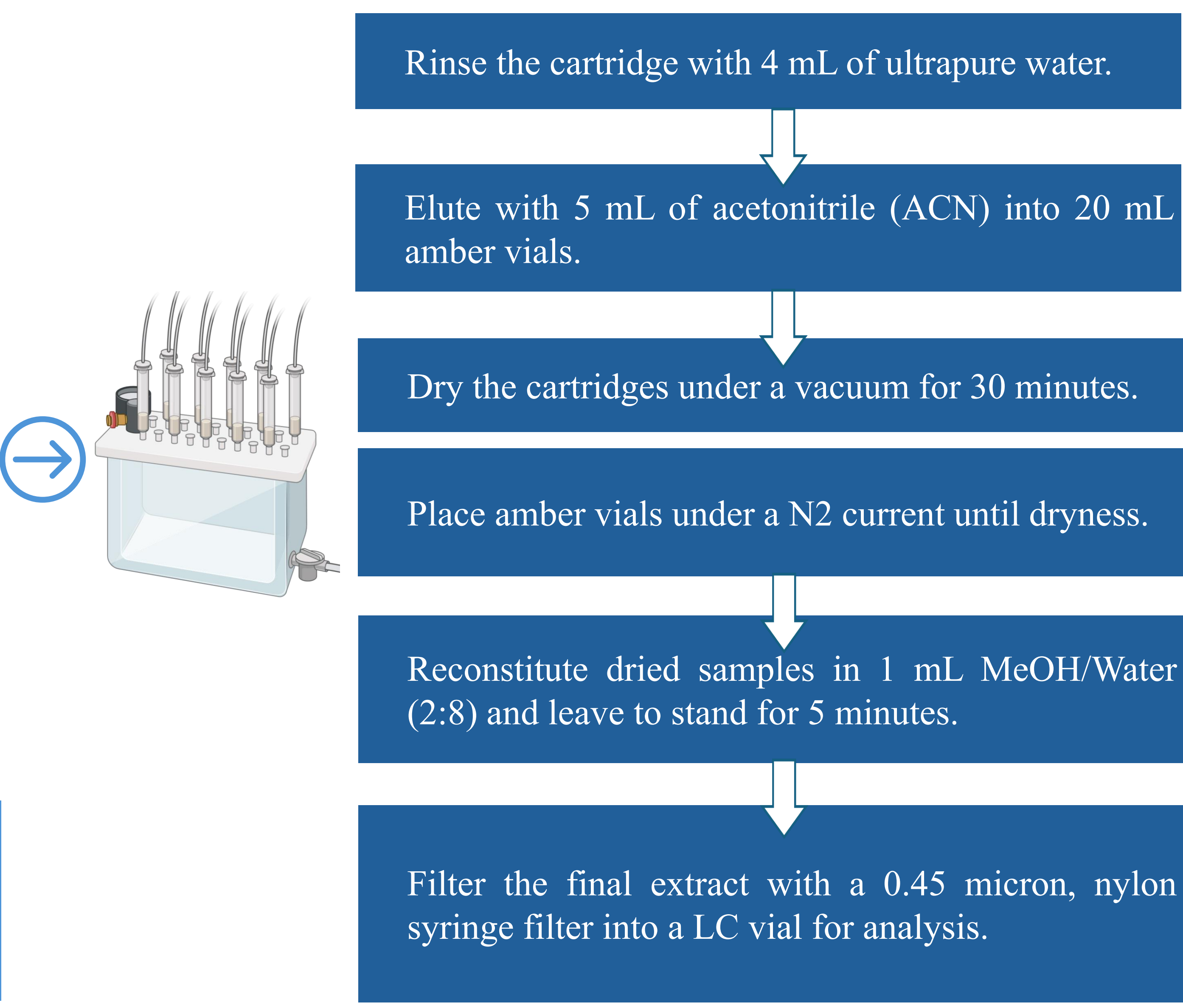


- Oasis HLB 6cc/ 500mg SPE Cartridge
- 50 mL syringe
- Red SPE connector
- 50 mL falcon tube
- 40 µm nylon cell strainer
- SPE cartridge stand
- SPE Cartridge cap

Methodology for CSHydro sample collection



Solid Phase Extraction (SPE) Procedure



LC-MS Protocol

Compounds are confirmed with retention time and 1 qualifier.



CS Hydro optimisation of sample collection steps

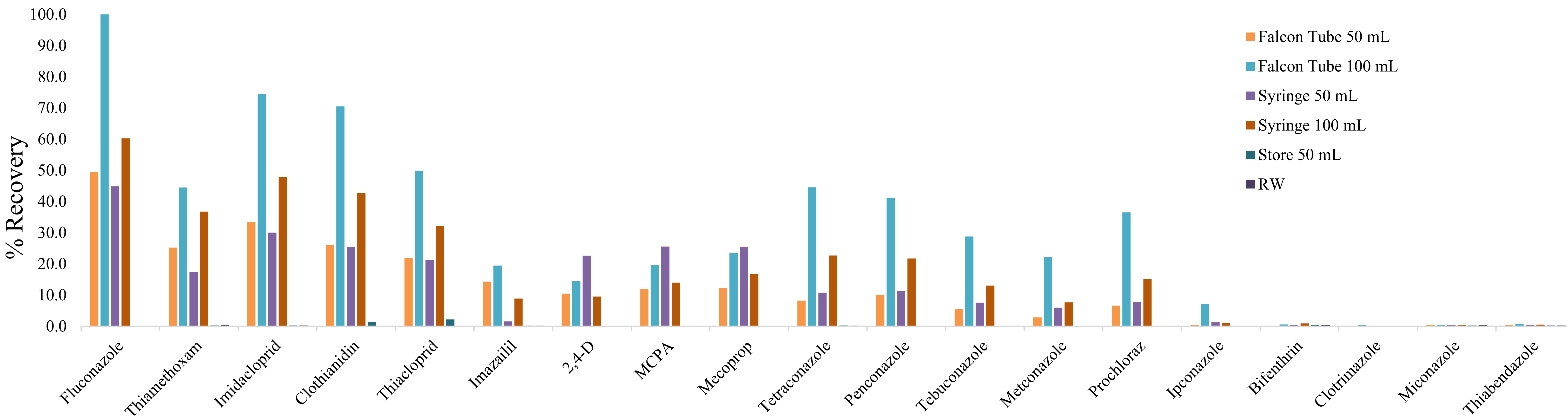


Figure 2. Recoveries achieved for the CSHydro sample collection protocol of a river water sample spiked with 10 ppb of a pesticide mix. Fractions were collected with (Falcon Tube samples 50 mL and 100 mL, see legend) and without straining (Syringe samples 50 mL and 100 mL, see legend) and by comparison with the unspiked sample (RW, see legend).

Conclusion and Key Findings

- Highest recovery rates were achieved by introducing a straining step prior to the solid phase extraction.
- A simple solid phase extraction protocol for pesticides from fresh waters has been developed.
- The field tests demonstrated that this a robust, easy to use method that can be employed by citizens to collect sample for pesticide detection in freshwater bodies.

References:

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