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Evaluation of sampling adsorbents and validation of a LC-HRMS method for determination of 28 airborne pesticides.

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Abstract

A new strategy for sampling, using a low-volume sampler, and determination of airborne pesticides by liquid chromatography coupled to high-resolution mass spectrometry (UHPLC-HRMS) has been developed. The trapping efficiency of three adsorbents (sandwich PUF-XAD2-PUF; XAD-2 and XAD-4) was tested for 33 currently used pesticides and the first adsorbent (PUF-XAD2-PUF) was selected because it presented the highest retention capacity without breakthrough. Selected PUF-XAD2-PUF had the following design: 5 g of Amberlite XAD-2 sandwiched between two cylinders of PUF (6.87 cm^3, height: 1.4 cm, diameter: 2.5 cm). A validation of the analytical methodology that includes microwave extraction with ethyl acetate, and determination by UHPLC-HRMS was employed. The method showed recoveries ranging from 75 % to 120 % with quantification limits in the range of 32.2-129.0 pg m^{-3} when 155 m^3 were sampled. This analytical strategy was applied to 15 air samples collected in a rural area of Valencia Region (Spain). Ten polar pesticides, namely acetamiprid, carbendazim, carbofuran, imidacloprid, iprovalicarb, metalaxyl, myclobutanil, pirimicarb, pyrimethanil and terbuthylazine were detected in air samples with concentrations ranging from 411.16 pg m^{-3} (imidacloprid) to 11011.45 pg m^{-3} (pyrimethanil).