

13-3: Development of an analytical method to extract and detect pharmaceuticals in plant matrices

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It has been shown that human-use macrolide antibiotics (azithromycin, clindamycin, and roxithromycin) are environmentally available in wastewaters, source waters, and biosolids. Since some water authorities use the treated wastewater effluent for non-potable water reuse such as for crops, it is important to better understand the fate of these compounds into plants via root migration. In order to achieve that, we developed an analytical method to extract and detect these contaminants in plants grown in soils watered with treated wastewater effluent from a southwestern city (~ 1 million population, July 2008).

A new analytical extraction method had to be developed to extract the antibiotics from the complex matrix of plant samples. The plants were dissected and separated into leaf and root, then air-dried. The air-dried samples were homogenized and 1-g subsamples were extracted using a modified pressurized liquid extraction (PLE) technique, followed by a rigorous hexane clean-up. Subsequent PLE extracts were analyzed by liquid chromatography-electrospray-ion trap mass spectrometry (LC-ESI-ITMS/MS) in the positive ionization collision induced mode (CID) for greater specificity.

In order to verify the validity of the results the analyzed data, included spiked samples as well as non-spiked samples of each plant collected. The treated wastewater effluent had previously been characterized, and was known to contain the macrolide antibiotic azithromycin, the over-the-counter drug pseudoephedrine, the illicit drug methamphetamine, and an industrial flavoring agent n,n-dimethylphenethylamine (n,n'-dmpea, an isobaric compound to methamphetamine).

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