

MULTIRESIDUE METHOD FOR THE DETERMINATION OF PPCPS IN BEETROOT CROPS USING QUECHERS BY LIQUID CHROMATOGRAPHY-TRIPLE QUADRUPOLE TANDEM MASS SPECTROMETRY

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Presence of unregulated and not assessed organic microcontaminants such as pharmaceuticals and personal care products (PPCPs) in wastewater effluents represents a significant challenge to wastewater reclamation, especially if intended for human consumption or irrigation practices. It is widely accepted that due to the insufficient treatments for PPCPs at WWTPs, certain fractions of these contaminants are discharged in effluents and then are introduced into agroecosystems through land application of manure and biosolids, as well as crop irrigation with reclaimed water. The uptake and bioaccumulation of PPCPs in the edible parts of food crops and fodders and their subsequent entry into the human food chain have been received considerable attention over the last decade. Consequently, comprehensive and high-throughput analytical methods should be developed and validated to accurately quantify the amount of PPCPs accumulated in crops and assess the potential human health impact from long-term consumption of PPCP contaminated crops. In this context, an analytical methodology using a quick, easy, cheap, effective, rugged, and safe (QuEChERS) procedure has been developed for multi-residue determination of 114 PPCP compounds (belonging to more than 30 different therapeutic classes) in beetroot crops. Liquid chromatography coupled to electrospray ionization tandem mass spectrometry (LC-ESI-MS/MS) was used for their determination. The QuEChERS procedure was optimized in terms of extractor solvent, partitioning salts and clean-up salts, through recovery and matrix-effect studies. The method developed was validated according to Document SANTE/11945/2015 and proved to be selective, accurate and precise, obtaining limits of quantification from 3.6 ng/g to 337.8 ng/g, depending on the nature of the substance. The method allowing acceptable recoveries for most of the PPCPs (71%), within the range 60–120% with an associated precision (Relative standard deviations - RSD) < 20%. The methodology of QuEChERS was successfully applied in real samples of redroot crops.