

Título: ANALYTICAL METHOD DEVELOPMENT FOR THE UPTAKE STUDY OF DIFFERENT ORGANIC POLLUTANTS BY CROPS CULTIVATED IN COMPOST-AMENDED SOILS

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Resumen: Two unavoidable residues from wastewater treatment plants (WWTPs) are effluent water and sewage sludge. The latter, isconsidered one of the largest pollutant sink because it contains a broad range of microorganisms and organic and inorganicpollutants. Although, prior to its disposal, it is submitted to different chemical and physical treatments. However, due to the lack ofeffectiveness of these treatments in removing pollutants, concern about its use in agriculture as soil fertiliser is increasing. In thissense, it is important to study the behaviour of pollutants by plants cultivated in sewage or compost-amended soils.Two main objectives were defined in the present PhD thesis. On the one hand, a great effort was made in the development of robust,selective, accurate, precise and sensitive analytical procederes for the determination of several organic pollutants, includingpolybrominated diphenyl ethers (PBDEs), perfluoroalkyl substances (PFASs), hormones, triclosan (TCS), bisphenol A (BPA),musk fragrances and alkyl phenols (APs), in solid matrices, such as compost-amended soil, carrot and lettuce in order to achieve reliable data. For this purpose, focused ultrasound solid-liquid (FUSLE) extraction combined with different clean-up strategies,such as traditional solid-phase extraction (SPE), dispersive solid-phase extraction (dSPE) or enrichment on cheap polymericmaterial were

optimised. Once the analytical methodologies were validated, the second objective was related with the uptake of some organic pollutants (PBDEs, PFASs, BPA and musk fragrances) by carrot and lettuce crops cultivated in fortified compost-amended soils. Regarding the observed behaviour of the pollutants, it was concluded that pollutant properties, crop type and soil characteristics exert an important influence in the chemical translocation through the plant. In general, the higher the soil organic carbon content was, the lower the calculated bioconcentration factors. Concerning target analyte properties, water-solubility was the best property to describe the movement of the pollutants through the plant. The pollutants with higher water-solubility tended to accumulate more in the above part compartments such as leaves. As far as crop type is concerned, although differences between crops were observed, it was not possible to achieve a general conclusion. Bearing in mind all the above mentioned, the application of sewage sludge or its derivatives as fertiliser in the agriculture could be a pathway for the entrance of the pollutants in the food chain and, therefore, it could be considered a practice for human and environmental health.