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Simultaneous QuEChERS and DLLME extraction of pesticides in tomato samples

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Tomato is one of the most widely grown vegetables in the world. It is one of the basic components of the Mediterranean and Asian diet and is used almost daily in several countries, raw, home-cooked or processed as a canned product, juice or paste¹. Search for pesticide residue and bioaccumulation in this type of vegetable is the major importance, becoming eventually a risk/threat to both animal and human life².

Development of analytical methods for pesticides analyses is difficult, due to the fact that compounds of different polarities, solubility's, volatilities and pKa values have to be simultaneously extracted and analyzed³.

In this work, a quick easy cheap effective rugged and safe (QuEChERS) method was combined with dispersive liquid-liquid microextraction (DLLME) procedure coupled to high-performance liquid chromatography with diode array detection. Capable of quantifying trace amounts of thirteen pesticides (i.e. 2,4-D, acetamiprid, bentazone, cymoxanil, deltamethrin, dicamba, diuron, foramsulfuron, mesotrione, metalaxyl-M, methomyl, pyraclostrobin and tembotrione) in tomatoes.

Experimental conditions affecting the procedure parameters (dispersive SPE, sodium chloride percentage and amount of extraction solvent) were optimized by means of an experimental design. Extraction solvent and pH in DLLME method were optimized by univariate method. The calibration was performed using calibration standards matrix matched conducted in certified organic tomato samples.

The method showed good linearity (above $r^2 > 0.9980$ for all pesticides studied) over the range assayed. Limits of quantification achieved (0.0058–0.0495 mg/kg) were below the harmonized maximum residue limits established by the European Union (EU).

This approach is simple, precise, rapid and reproducible, uses small volumes of solvents and samples, reducing the risk for human health and the environment.

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