

Chapter 18

Monitoring Pesticides and Metabolites in Surface Water and Groundwater in Spain

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Automated on-line solid-phase extraction (SPE) followed by liquid chromatographic techniques [(LC)-Diode array, LC-post-column fluorescence detection (EPA Method 531.1) for carbamate pesticides) and LC-thermospray mass spectrometry (TSP-MS)] were used for the monitoring of various pesticides and metabolites in surface (river) water and ground water. The Ebro river estuary (Tarragona, North East) and a representative aquifer in Almeria (South East), both in Spain, were monitored during one year periods from March 92 to 93 and March 93 to 94, respectively. Alachlor, metolachlor, atrazine, simazine, molinate, propanil, bentazone, MCPA and the herbicide metabolites deethylatrazine, deisopropylatrazine and 8-hydroxybentazone were found to be the major pollutants in surface waters. Carbofuran, methiocarb, methomyl and the pesticide metabolites 3-hydroxycarbofuran and methiocarb sulfone were detected in ground waters. The contamination levels varied from non detectable (below 10 ng/L) up to 3.0 µg/L. The seasonal variation studies showed that pesticide pollution was conservative for triazines and their metabolites, alachlor and metolachlor, which were detected through-out the year at 0.1-0.3 µg/L levels, whereas the other pesticides exhibited a sporadic occurrence related to agricultural and irrigation practices.

The assessment of non-point sources of pollution from pesticides is an important water quality issue (1). These sources are difficult to identify and quantify, occur in pulses during spring or early summer precipitation events and are more complex to control than point sources of pollution (2). Pesticides applied to crops are transported to surface waters by various mechanisms such as run off, ground water discharge, and atmospheric deposition. Triazines and their metabolites deethylatrazine (DEA) and deisopropylatrazine (DIA) alachlor and metolachlor can be regarded as the most frequently encountered modern pesticides in surface waters (2-7). Atrazine and