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Research Paper

Origins of pesticide residues in agricultural soils in Biskra (South-East Algeria): survey vs. detection

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Abstract

In southern Mediterranean countries, little is known about pesticide inputs under greenhouses, and use is rarely compared with the actual content in the soil. The contamination of agricultural soils by pesticides in the Ziban region (Algeria) was studied by comparing field surveys (farmers, sellers) and direct observations (pesticides packaging) with results of a soil multi-residue analysis using chromatography (liquid and gas) and mass spectrometry detection. Twelve soil samples (six locations at two depths) under tomato greenhouses in six localities (M'Ziraa, Sidi Okba, Ain Naga, El Ghrous, Doucen, and Lioua) were analyzed. The number of active ingredients reported by respondents and observations reached 71 AIs belonging to 34 chemical groups. Despite the wide range of AIs declared to be used by farmers, four other (unexpected) AIs have been identified and quantified by chromatographic analyzes: azinphos-methyl (AZM) (organophosphate), methyl-parathion (organophosphate), and the metabolites p,p'-DDE (organochlorine) and desethylatrazine (triazine). Only AZM and p, p'-DDE were detected in all samples. After examining the possible sources, AZM could be drifting from neighboring regions. The origin of p,p'-DDE was likely the historical use of DDT in locust control or the recent use of dicofol. In conclusion, phytosanitary surveys alone are not sufficient to identify all the AI that can circulate in an agricultural landscape; periodic multi-residue analyses are required to monitor soil contamination. Also, maximum limits for each active ingredient in the soil must be established at the national level to classify a « pollueted » soil.

Key words: Surveys, Multi-residue analysis, GC/MS, LC/MS, azinphos-methyl (AZM), p,p'-DDE, Soil, greenhouses, Biskra.

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