ENVIRONMENTAL FATE OF TERBUTHYLAZINE AND DESETHYLTERBUTHYLAZINE IN SOIL, SURFACE WATER AND GROUNDWATER

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The herbicide terbuthylazine is widely used in Italy and it is the first herbicide within the s-triazines category. The use of this substance noticeably increased since the early 1990's due to the ban of atrazine and the subsequent withdrawal of this compound from the Italian market. In 2001 terbuthylazine was sold at amounts higher than 320,000 kg (figure relevant to the active ingredient) primarily in the maize producing regions. Monitoring data from Italy and from other countries, *e.g.*, France, indicate that terbuthylazine and its main metabolite Desethyl-Terbuthylazine (DET) are found in surface water and in ground water at noticeable concentrations and frequencies of detection and, in several cases, above the Maximum Allowable Concentrations established for pesticides in the EC and national drinking water regulations (0.1-0.5 µg/L for single and total pesticides, respectively). Thus, due to their presence in water bodies and to their biological properties, terbuthylazine and DET may pose environmental and health problems for man and aquatic organisms. For these reasons, both terbuthylazine and DET are placed among the emerging substances by the EC. The widespread presence of terbuthylazine and DET in water bodies may be traced back not only to the high amounts of the parent compound used in agriculture, but also to agricultural practices, their intrinsic and chemiodynamic properties (mainly water solubility, soil and water half-lives, soil adsorption and K_{oc}) and the hydrogeological characteristics of the receiving environment.

In this context, some results on soil degradation and mobility of these compounds under different conditions (influence of natural microorganisms, light and dark conditions, soil depths, nitrogen containing amendments, incubation temperatures, organic carbon content *etc*.) are discussed. Overall data indicate that terbuthylazine and DET possess a relatively high mobility in soil and a moderate to high persistence in soil and in water. In any case, the presence of active degrading bacterial populations is an essential prerequisite for s-triazines degradation. In this context, molecular probes were recently applied to the detection of bacteria poulations involved in *s*-triazines degradation. by Fluorescent *In Situ* Hybridization (FISH).