

Influence of soil organic matter on isoproturon sorption

Scrano L. *, Lelario F. *, Bouhaouss A. **, Scopa A. *, And Bufo S. A. *

**Dipartimento di Scienze dei Sistemi Colturali, Forestali e dell'Ambiente, Università della Basilicata, Via dell'Ateneo Lucano 10, Italie 85100 Potenza. Fax: +390971206226; e-mail: scrano@unibas.it.*

***Laboratoire de Chimie Physique Générale, Département De Chimie, Faculté Des Sciences, Av. Ibn Battouta, B.P. 1014, Rabat, Maroc.*

Soil organic matter is the result of the biological and chemical degradation of dead plant residues or animal remains. The exact structure of the organic matter is not known, but it is known the influence of this soil component on the sorption phenomena of xenobiotics and on the formation of bound residues.

IUPAC (the International Union of Pure and Applied Chemistry) has found it relevant to define the term bound residues as "chemical species (active ingredient, metabolites and fragments) originating from pesticides that are un-extracted by methods that do not significantly change the chemical nature of these residues, but which remain in the soil".

Bound residues appear in various forms: the entire molecule of the xenobiotic or parts of it may have entered a new molecular structure as a part of the organic matter, it may be sequestered in inaccessible sites in the soil aggregates or it may be strongly sorbed.

The aim of this research was to evaluate the influence of different fractions of soil organic matter on the sorption of isoproturon (IPU), a phenyl urea herbicide used against annual grasses and broad-leaved weeds in cereal production across Europe and Mediterranean Countries.

Two Moroccan soils (1.4 and 1.5% O.C.; 58 and 69% clay; 34 and 30% silt; 8 and 1% sand) were treated with a solution of ^{14}C labelled Isoproturon (80 mCi mmol^{-1}) and extracted after 0, 7, 15 and 30 days at first with water, to evaluate the residue quickly available, and afterwards with methanol. On the same soil samples organic matter was extracted and the different organic fractions were separated as humic acids, fulvic acids and humine. Mineralization of the herbicide was also monitored. Isoproturon was determined in the different soil extracts using a liquid chromatograph equipped with a liquid scintillator. The localisation of bound residues in the different fractions of the organic matter was performed using pyrolysis/GC equipment furnished of a gas-scintillation detector.

Retention of Isoproturon after 30 days of incubation ranged from 22 to 32 % (non extractable fraction). The herbicide extracted in aqueous environment was from 20 to 33% of the amount used for the treatment; meanwhile, methanol was able to extract another 48%. Both soils showed quantities of bound residues into the humine fraction higher than humic and fulvic acids. The amount of Isoproturon retained into the organic fraction of the soil did not change with time; on the contrary, the sorption rate of the retention reaction is mostly influenced by the clay fraction of the soil. Only a little part of the herbicide was mineralized during the experimental time.