

EFFECT OF THREE ORGANIC WASTES ON THE ADSORPTION BEHAVIOUR OF NORFLURAZON IN SOILS

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Norflurazon is a selective herbicide effective against many annual broad-leaved weeds. Its retention in soils is related to the organic matter, being subject to considerable leaching in sandy soils with low organic matter content.

Application of organic wastes to soils can be a good method to reduce pesticide losses due to leaching processes, and also has been generally accepted as a disposal practice that recycles beneficial plant nutrients. However, a wide diversity of organic wastes can be applied on soils of very different characteristics, and the behaviour of these systems with respect to pesticides adsorption can be also very different. For this reason, the aim of this study was to assess the influence of three organic waste amendments on norflurazon adsorption-desorption processes in several soils with very different properties, as a first step to evaluate the potential leaching of this pesticide through organic fertilised soils.

Three organic amendments were used: a commercial product manufactured from olive mill wastewater and other plant residues, an urban waste compost, and wastes from paper industry. The organic carbon amendment of the soils was carried out by mixing thoroughly, during 24 hours, 300 g of the original soil with 20 g of the three amendments. The amended soils were used immediately after preparation and also after aging during two months at 37°C, adding water periodically.

Quadruplicate adsorption experiments were done by mixing 10 g of the native and amended soils with 20 mL of 0.01 M $\text{Ca}(\text{NO}_3)_2$ solutions, containing various concentrations (4, 8, 12, 16, 20 mg L⁻¹) of norflurazon. After shaking for 24 h at 20 ± 1 °C, the suspensions were centrifuged and the concentration of norflurazon in the supernatant was determined. Desorption experiments were performed after adsorption equilibrium was reached, by removing half of the supernatant after centrifugation, replacing it by 10 mL of 0.01 M $\text{Ca}(\text{NO}_3)_2$ solution, allowing equilibration for an additional 24-h period, and after that operating as in the adsorption experiment. This process was repeated twice more.

As a consequence of the basic pH of the residues, the soil pH was higher after the addition of the waste fertilisers. The OM content of the soils also increased after fertilisation, but decreases a little after ageing.

Norflurazon adsorption increases in some of the fertilised soils, specially in those soils with a very low OM content, but decreases in those soils that adsorbed a high amount of pesticide before fertiliser addition. The effect of the different waste fertilisers added on norflurazon adsorption depends on the properties of the soil in which it is applied.

Norflurazon desorption increases in all cases in fertilised soils in comparison to pesticide desorption from native soils, even in those fertilised soils in which the pesticide adsorption was very high. The waste fertiliser that gave a higher norflurazon desorption was the urban waste compost.