

DELL'AMBROGIO Gilda (2016): Impact des néonicotinoïdes sur le collembole *Folsomia fimetria* dans les sols agricoles

ABSTRACT

Neonicotinoids are the most widely used class of insecticides in the world. Public attention has recently focused on consequences of their utilisation on groups of non-target organisms: because of their frequent application, their persistence and their distribution in many environmental compartments, these substances are potentially dangerous for a large variety of organisms that play some fundamental roles on ecosystem services, in natural and in agricultural systems. This Master's Thesis focuses on the effect of neonicotinoids in agricultural soils, by using terrestrial ecotoxicological bioassays on the reproduction of the Collembola *Folsomia fimetaria*. The toxicity of these compounds is first tested on soil samples taken from some Swiss agricultural fields treated with neonicotinoids, and for their respective surfaces out of the field, in order to evaluate their diffusion and persistence. Later, the toxicity values for the most potentially dangerous neonicotinoids (imidacloprid and clothianidin) are calculated, by the contamination of an agricultural reference soil (LUFA 2.2), to concentration ranges previously defined (spiking). A mixture of the two substances is also tested, supposing an additive effect. A chemical analysis is finally done on soil samples and on contaminated samples, as well as the controls, in order to measure the concentration of neonicotinoids during the tests. The bioassays on soil samples coming from the cultures don't show any toxic neonicotinoids' effect on the reproduction and mortality of *F. fimetaria*, but some concentrations measured on the field are close to the toxic values obtained from the spiking, especially when a mixture effect is considered. The values obtained from the spiking (EC5/LC5 and EC50/LC50) show generally a higher toxicity than the one found on the literature and the concentration addition model is found to describe quite well the mixture effect, even if slightly underestimating his toxicity. Concentrations of neonicotinoids are measured also out of the cultures, supporting the hypothesis of persistence in soil and dispersion out of the field during the application. A risk assessment is finally done, showing that the predicted concentrations and the measured concentrations may pose a significant risk on the survival and the reproduction of *F. fimetaria*, following the actual application of neonicotinoids in agricultural fields. These observations follow the conclusions of many recent studies who call into question the massive use neonicotinoids in agriculture.