Geophysical Research Abstracts
Vol. 15, EGU2013-1198, 2013
EGU General Assembly 2013


# Modeling of penconazole and metalaxyl mobility in undisturbed vineyard soil cores, unamended and amended with spent mushroom substrate

Jesus Maria Marin-Benito (1), Laure Mamy (2), Maria Sonia Rodriguez-Cruz (1), and Maria Jesus Sanchez-Martin (1)

(1) Instituto de Recursos Naturales y Agrobiología de Salamanca (IRNASA), CSIC, Post Office Box 257, 37071, Salamanca, Spain, (2) INRA, UR 251 PESSAC, Route de Saint Cyr, 78026 Versailles, France

In Spain, one of the main producers of mushrooms in the world, a huge amount of the substrates used for the growth of mushrooms have to be eliminated after harvest. However, this substrate represents a promising amendment because of its high organic matter content and, in particular, it could be used in vineyard soils because they generally are poor in organic matter. But the effect of this amendment on the fate in soils of fungicides that are massively used in vineyards is unknown.

Therefore, the objectives of this work were to model the mobility of two fungicides, penconazole and metalaxyl, in undisturbed vineyard soil columns using the PRZM3 (Pesticide Root Zone Model) parameterized with laboratory data, and to compare the simulations with the experimental results obtained in mobility studies. Soil cores (40 cm x 9 cm d.i.) were collected from experimental plots in three different vineyard soils of La Rioja (Spain). Three different treatments were tested in each soil: natural (control) soil, soil amended with fresh spent mushroom substrate, and soil amended with composted spent mushroom substrate. The leaching of fungicides was studied in non-incubated and incubated (outdoors for 77 days) soil cores under unsaturated flow conditions.

In general, the addition of mushroom substrates decreased the leaching of fungicides compared to control soils. For the most hydrophobic fungicide, penconazole, the predictions obtained by the model were highly correlated ($r > 0.88$) with the experimental results. Penconazole was never observed in the leachates, its vertical distribution was similar within all soil profiles, and retention of almost all the fungicide was into the topsoil (0-8cm). For the less hydrophobic fungicide, metalaxyl, and the CGA 62826 metabolite generated from its degradation during the experimental period, PRZM3 was not able to reproduce the observations and it was necessary to calibrate the model. After calibration, the correlation between model predictions and experimental results of leaching and vertical distribution within the soil profile were greatly improved, although it was not enough to obtain a good fit between the observed data and the modeling results. The reasons could be the existence of important processes which were not taken into account in the model, for example preferential flows, or because the parameters, which were determined under laboratory conditions, were inappropriate to represent the field conditions.

Based on the results, PRZM3 can be used to predict the environmental fate of hydrophobic fungicides, such as penconazole, in the long-term. On the other hand, for hydrophilic fungicides such as metalaxyl, it would be necessary to calibrate the initial conditions of soil water content or to use the MACRO model which considers preferential flows.