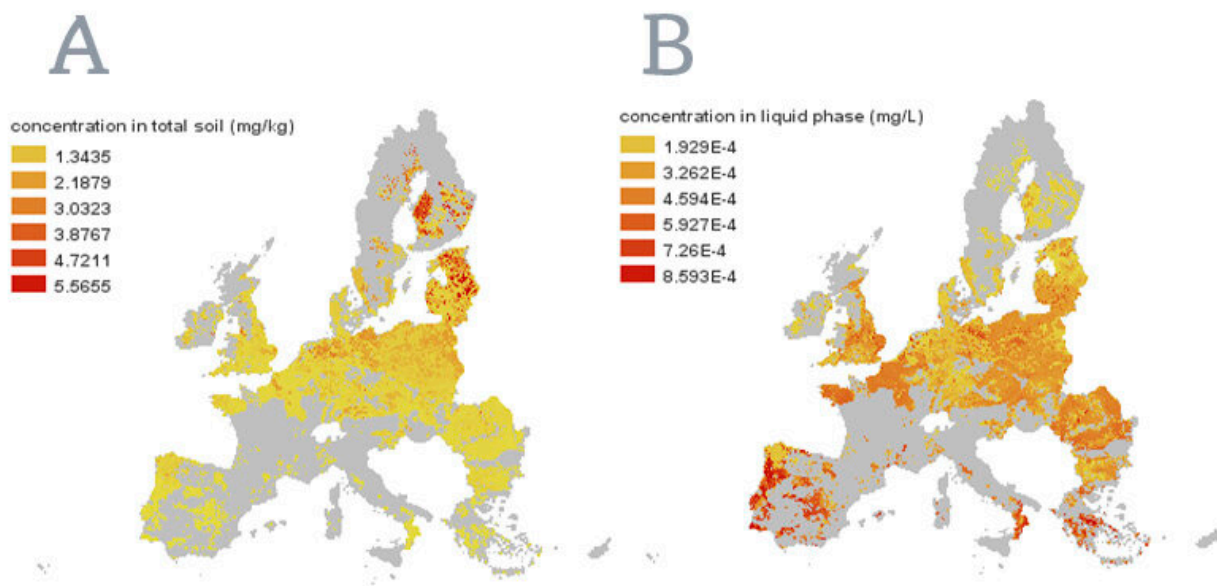


Study on adjusting pesticide regulation and use in European soils

August 10 2022



Distribution maps of the concentrations observed in soil (a) and in soil pore water (b) (at a depth of 1 cm) after applying the plant protection product esfenvalerate. There are differences in the concentrations between the two types of compartment (a vs b), as well as differences in concentration between different regions, although the application of the plant protection product in Europe has been similar. Credit: UPV/EHU

Plant protection products raise concerns because their application may affect certain soil organisms regarded as non-target species and which could be highly sensitive to certain pesticides. The European Food and Safety Authority (EFSA, which regulates agricultural practices, uses of plant protection products, etc. on a European level) has developed a guide and a software tool called the Persistence in Soil Analytical Model (PERSAM) to carry out exposure assessments in soil.

Until now, the PERSAM program "has helped to calculate the concentration that could be anticipated of a given application of plant protection products", explained the UPV/EHU lecturer Manu Soto. "We have now managed to extrapolate the potential risks of these concentrations and the factors influencing that risk, not only taking [soil conditions](#) into consideration, but also the type of crop and the type of pesticide used."

Soil characteristics and [environmental variables](#) vary along the latitudinal axis across the European continent, which influences predicted environmental concentrations, degree of toxicity to [soil](#) biota and therefore characterization of risk. "If toxicity varies depending on soil characteristics, the logic of applying a single dose across Europe cannot be followed, as one dose may have no effect in Sweden, but may exert an effect in Spain or France, for example. The EFSA wanted to make this differentiation, and contacted our group because it was essential to develop a landscape-based assessment method that would take regional variability into account," as Erik Urionabarrenetxea, a UPV/EHU researcher, explained.

Soil and pore water

Members of the Department of Zoology and Animal Cell Biology investigated the effect of four pesticides on two different types of organisms in different parts of northern, central and southern Europe.

The study was carried out with earthworms and springtails or collembola, because earthworms are affected by contamination in the soil and springtails by contamination present in the aquatic pores of the soil. "Depending on the diet and needs of each organism, some are more vulnerable than others to contamination present in one soil compartment or another." The research team believes that many factors have to be taken into account when calculating risk.

In the study carried out, the team found that the risks arising from the concentrations vary greatly between one soil compartment and another. They pointed out that, for the purpose of adjusting the regulations, this issue should be taken into account in addition to the possible landscape variabilities between the different Euroregions. "A great deal of variability can be seen between the north and the south of Europe, but also within each region," they pointed out. Regarding the type of pesticides, they also noted that "the characteristics of the pesticides greatly influence their distribution in each of the compartments."

"It is a matter of calculating the risk better, and not just sticking to the concentrations, as they can be highly variable. It is important to look at the [toxic effects](#) caused by these concentrations, their potential effects and the risks involved, when it comes to subsequently applying them to [agricultural practices](#)," said the researchers. The need to take into account soil characteristics is a major step forward, as it has not been taken into account until now." The team continues to work in this field: "We are now looking at the impact this would have from an environmental perspective."

The research was published in *Chemosphere*.

More information: Erik Urionabarrenetxea et al, Predicting environmental concentrations and the potential risk of Plant Protection Products (PPP) on non-target soil organisms accounting for regional and

landscape ecological variability in european soils, *Chemosphere* (2022).
[DOI: 10.1016/j.chemosphere.2022.135045](https://doi.org/10.1016/j.chemosphere.2022.135045)

Provided by University of the Basque Country

Citation: Study on adjusting pesticide regulation and use in European soils (2022, August 10)
retrieved 12 May 2024 from <https://phys.org/news/2022-08-adjusting-pesticide-european-soils.html>

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