

How pesticides change the environment

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Using pesticides in Vaucluse, France. Credit: Rita Triebskorn/University of Tübingen

The number of humans on the planet has almost doubled in the past 50 years – and so has global food production. As a result, the use of pesticides and their effect on humans, animals and plants have become more important. Many laboratory studies have shown that pesticides can harm organisms which they were not meant to affect. Intensive farming is also linked to collapsing populations of wild animals and the endangerment of species such as amphibians. Can the biochemical

effects of pesticides upset entire ecosystems?

Professor Heinz Köhler and Professor Rita Triebkorn from the University of Tübingen's Institute of Evolution and Ecology (EvE) have published a study on the link between pesticides and changing ecological systems in the latest edition of *Science*. The two ecotoxicologists cite deficits in the research which have prevented recognition of the consequences of biochemical pesticide effects on a [species population](#) or on the composition of biological communities. "Although there are many indications of [animal populations](#) and ecosystems changing because of pesticides, there are few studies proving the connection without a doubt," Köhler and Triebkorn say. The researchers point to mathematical and experimental approaches which can be used to recognize links between the effects of pesticides in individuals and ecological changes in [biological communities](#) and ecosystems in regions where [intensive farming](#) is practiced.

An important role is played by number of rare studies combining experimental fieldwork and research on sections of ecosystems, as well as a broad selection of chemical and biological analyses. An interdisciplinary approach can plausibly demonstrate connections between the effects of chemicals in humans and animals and the often indirect consequences on the population, community and ecosystem levels.

Köhler and Triebkorn also postulate interdependent effects between pesticides and global warming. The researchers forecast changes to "natural" selection, the spread of infections, and the sexual development and fertility of wild animals. This in turn could have a knock-on effect on populations, ecosystems and food chains. The researchers say it is a further challenge for science to show how strongly the effects of pesticides are influenced by climate change – and to find out which ecological processes are especially sensitive to this interdependence.

"The links to the effect of pesticides at every level of increasing biological complexity require more thorough research," say Köhler and Triebkorn.

More information: Köhler, Heinz-R.; Triebkorn, Rita: Wildlife Ecotoxicology of Pesticides – Can We Track Effects to the Population Level and Beyond? *Science* (2013), 16th August 2013:

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