

# New Research Reveals Pesticide Mixtures Widespread in Environment, Urging Enhanced Regulatory Measures

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A groundbreaking study from the SPRINT project, funded by the European Union's Horizon program, has unveiled a concerning reality: pesticide residues are pervasive in both agricultural environments and residential settings, raising concerns for environmental and human health. These findings, which have significant implications for European Union decision-makers, emphasise the urgent need for comprehensive regulatory measures to address potentially far-reaching impacts of the co-occurrence of pesticides.

For decades, pesticides have been employed globally to bolster agricultural productivity, yet the cumulative effects of their residues have been largely overlooked. The scientific community are increasingly unveiling an alarming trend: pesticide residues, often assessed for risk on a substance-by-substance basis, are in fact extensively mingling in ecosystems. This issue is not confined to agricultural fields and waterbodies but also in the very homes of farmworkers and of their neighbours.

The SPRINT project undertook a field sampling campaign in 10 European countries that identified pesticide residues at all study sites [[doi.org/10.1371/journal.pone.0259748](https://doi.org/10.1371/journal.pone.0259748)]. The first peer-reviewed paper presenting the sampling results has recently been published [<https://doi.org/10.1016/j.envint.2023.108280>]. This unique dataset has raised concerns about the consequences of such a wide distribution of pesticide residues.

The SPRINT team analysed 200+ pesticide residues in over 600 environmental samples from both organic and conventional farms. The sampled matrices included soil, water, sediments, crops, outdoor air, and indoor dust. Remarkably, the study reveals that 86% of the tested samples contained pesticide residues and 76% mixtures of pesticides. The total number of different pesticides detected in the different matrices ranged from 76 in outdoor air, 78 in crops, 99 in sediments, 100 in soil to 197 in indoor dust. Most of these pesticides are on the approved EU list, but recently and long banned residues represent a significant part of the pesticide mixtures. Glyphosate residues are the most frequently detected with high concentrations over all environmental samples studied.

The indoor dust findings are particularly striking, as this might have possible implications on the health of individuals living in farmhouses and rural areas. Dust in one house contained residues from 121 different pesticides. Although the study did not assess the specific level of exposure experienced by the inhabitants, it is concerning that over two-thirds of the residues identified in the dust are classified according to the Pesticide Properties Database (PPDB), as being "highly hazardous" to mammals and are linked to adverse human health effects. Based on the results, the study proposed a new prioritization hazard-based indicator of pesticides for ecosystem and human health assessments that may be applied in the achievement of the pesticide reduction goal of the Farm to Fork Strategy.

Professor Violette Geissen from Wageningen University & Research, SPRINT project coordinator, underscoring the far-reaching significance of these findings, said

*"Our research highlights that the issue of pesticide mixtures transcends the agricultural field areas; it reaches the very households of those working on farms and their neighbouring communities. The results show that not only are mixtures of pesticide residues rather common in both agricultural and residential settings, but also that they can be highly complex, and variable in these settings. We need a more nuanced understanding of the impact of chemical mixtures in the field and related exposure-response data to better understand the ecosystem and human health risks. We urgently require integrated risk assessments that mirror the real-world complexity of these widespread pesticide mixtures."*

- Professor Violette Geissen, Wageningen University & Research, SPRINT project coordinator

The SPRINT project's next phase will delve into assessing ecosystem and human health risks posed by the identified pesticide mixtures. Equipped with the comprehensive data, the project aims to develop a novel indicator tailored for regulatory purposes, thus providing EU decision-makers with information to support tools to tackle the mounting challenges posed by pesticide mixtures.

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