



# **Subsurface flow carries neonicotinoids from no-till fields**

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*Tipping buckets used to measure runoff from lysimeter plots. Photo by Sarah Frame.*

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Neonicotinoids are highly toxic, water-soluble insecticides that are used in the U.S. mostly as coatings on seeds of field crops like corn and cotton. Since neonicotinoids are water soluble, plants can absorb them, systemically protecting the seeds from insect pests for a few weeks. Unfortunately, this also means that if neonicotinoids escape fields, they can pollute freshwater ecosystems and negatively influence animal populations.

New research in the *Journal of Environmental Quality* tracked neonicotinoids leaving no-till fields. In plots that had not received neonicotinoids for years, the researchers planted thiamethoxam-coated corn seeds and tracked for 12 months the neonicotinoid concentrations in water from surface and subsurface flow.

Thiamethoxam exited fields quickly with concentrations highest during the first rainfalls following planting, whereas clothianidin, the less soluble, first metabolite of thiamethoxam, persisted throughout the study. About 1% of the neonicotinoid mass applied was recovered, which is low but still concerning for such toxic compounds. Surface transport accounts for less than 10% of this while subsurface flow accounts for more than 90% of the recovered neonicotinoids. The results revealed that subsurface flow carried most neonicotinoids from fields, presenting a challenge to preventing pollution of freshwater ecosystems.

## Dig Deeper

Frame, S.T., Pearsons, K.A., Elkin, K.R., Saporito, L.S., Preisendanz, H.E., Karsten, H.D., & Tooker, J.F. (2021). Assessing surface and subsurface transport of neonicotinoid insecticides from no-till crop fields. *Journal of Environmental Quality*.  
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