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Title: Effects of temperature on the dissipation of total- and water-extractable pesticides in Japanese soils

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Abstract: We investigated the dissipation of 27 pesticides in five Japanese soils at three temperatures and the variability of activation energies (E_a). The dissipation of total pesticides extracted sequentially using water and acetone was fitted to a single first-order (SFO) model. The E_a values calculated from the dissipation rate constants of the SFO model showed a normal distribution with a median of 61.1 kJ mol⁻¹. The dissipation of water-extractable pesticides (*i.e.*, phytoavailable pesticides) was fitted to a double first-order in parallel model with two dissipation rate constants: k_1 and k_2 . The E_a values calculated from k_1 and k_2 showed normal or lognormal distribution, and the medians of the normal distribution calculated from k_1 and k_2 were 62.8 and 45.2 kJ mol⁻¹, respectively. Furthermore, the method for estimating the biphasic dissipation of phytoavailable pesticides at different temperatures by using the median E_a values of the laboratory experiment was demonstrated in a field experiment.

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