Analysing half-lives for pesticide dissipation in plants - DTU Orbit (13/08/2019)

Analysing half-lives for pesticide dissipation in plants

Overall dissipation of pesticides from plants is frequently measured, but the contribution of individual loss processes is largely unknown. We use a pesticide fate model for the quantification of dissipation by processes other than degradation. The model was parameterised using field studies. Scenarios were established for Copenhagen/Denmark and Shanghai/PR China, and calibrated with measured results. The simulated dissipation rates of 42 pesticides were then compared with measured overall dissipation from field studies using tomato and wheat. The difference between measured overall dissipation and calculated dissipation by non-degradative processes should ideally be contributable to degradation in plants. In 11% of the cases, calculated dissipation was above the measured dissipation. For the remaining cases, the non-explained dissipation ranged from 30% to 83%, depending on crop type, plant part and scenario. Accordingly, degradation is the most relevant dissipation process for these 42 pesticides, followed by growth dilution. Volatilisation was less relevant, which can be explained by the design of plant protection agents. Uptake of active compound from soil into plants leads to a negative dissipation process (i.e. a gain) that is difficult to quantify because it depends largely on interception, precipitation and plant stage. This process is particularly relevant for soluble compounds.

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