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Degradation pathway and field-scale DT_{50} determination of Boscalid in a sandy Soil

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The research on environmental fate of pesticides has received increasing attention within the last decades and the persistence of several compounds in soil matrices is well documented. However, the fate of the new fungicide Boscalid (introduced in 2003) is not yet completely investigated.

The aim of this study was to analyze the environmental fate of Boscalid in a sandy soil. Three years after the second application on a cropland site in Kaldenkirchen, Germany, 65 undisturbed soil samples from the plough layer were derived.

Boscalid residues were extracted using Accelerated Solvent Extraction (ASE) and measured with UPLC-MS/MS. The Boscalid residues ranged between 0.12 and 0.53 μg kg^{-1}with a field mean of 0.20 $\pm$ 0.09 μg kg^{-1}. These results differed considerably from the predicted field concentration of 16.89 μg kg^{-1} (calculated from the application rate) and half-lives (DT_{50}) of 104-182 days compared to 345 days reported in literature. Adjusting the extraction efficiency to 20% could not explain the large difference. Therefore, an incubation study with ^{14}C-labeled Boscalid was conducted to measure the DT_{50} under controlled conditions. Here, the DT_{50} values were in the range of values stated in literature (297-337 days compared to 345 days) but still much larger than the DT_{50} based on the field-study values (104-182 days). Our results indicate that Boscalid dissipation under field conditions is much faster at agricultural sites with sandy soil type as expected from laboratory incubation experiments.

Future experiments with Boscalid will be conducted in two different soils with different particle size. A laboratory experiment with uniformly ^{13}C-labeled Boscalid will provide insight into the uptake and incorporation in microbial biomass.