

Investigations concerning the uptake of antibiotics into plants

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Substantial amounts of antibiotics originating from veterinary application are discharged with liquid manure onto agricultural fields. But do these antibiotics reach into the plant derived food chain? In the work here, uptake of the antibiotics chlortetracycline and sulfadiazine into the plants winter wheat, field salad and carrots is examined. Uptake experiments were performed in hydro culture using tritium-marked and unmarked antibiotics. For the analysis of the plants from the uptake experiments with unmarked antibiotics, a liquid chromatographic method (LC-MSⁿ) was developed. In selected samples it was examined with high resolution FTICR-mass spectrometry whether and which conversion products of the applied antibiotics were formed in the plant samples.

The uptake experiments show that field salad, winter wheat and carrots take up antibiotics and transport them from roots to leaves. With longer contact to the spiked nutrient solution the antibiotic concentration rose in field salad and in wheat plants. Furthermore extractable conversion products (metabolites) of chlortetracycline could be detected in the plant samples.

The apoplasts of the rhizodermis and the outer parenchyma layers of the roots as well as the mesophyll of the leaves were identified as main storage places of the antibiotics in the plants.

The identification of antibiotic substances was successful with the developed method in field plants, which had been grown under agricultural conditions. Thus a transfer of antibiotic substances over plant derived food to humans is in principle possible.