

## NRP Endocrine Disruptors

### Final Summary

Original project title <b>Environmental exposure to estrogenic mycotoxins</b>
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### Environmental exposure to estrogenic mycotoxins

*The estrogenic mycotoxin zearalenone produced by fungi on crops is not only found in food and feed, but also emitted into the environment. Most of it remains in soil, but some minute fractions are eluted into surface waters. Dilution mostly leads to non-detectable concentrations, but the toxin may add to the estrogenicity of small rural water bodies.*

### Research questions

Fungi of the genus *Fusarium* cause Fusarium head blight (FHB) on cereals such as corn or wheat, and produce toxic metabolites, so-called mycotoxins. The mycotoxin zearalenone (ZON) and its metabolites are potent natural estrogens. Their risk for human and animal health has been recognized for several decades. Hence, food and feed products are frequently analyzed for ZON and other mycotoxins. However, the environmental exposure to ZON has so far not been studied. We therefore asked the following questions: 1) Is ZON emitted into surface waters via drainage water from FHB-infected wheat and corn fields, and to what extent? 2) Does ZON contribute significantly to the total estrogenicity present in Swiss river waters? 3) Are there other relevant sources of ZON, such as human excretion or the food industry?

### Results

Several grams per ha of ZON were emitted into the environment from experimental wheat and corn fields infected with FHB. Most of the ZON was retained in the soil. Still, it was also regularly present in drainage water at concentrations up to 35 ng/L. However, the river water monitoring campaign revealed that the emitted amounts were mostly diluted to non-detectable (sub-ng/L) concentration levels. The ZON metabolites were not detected anywhere. So far, we found no evidence for other relevant sources of ZON.

## Perspectives

In most surface waters, ZON from agricultural runoff will be diluted to concentrations well below environmental relevance. However, in small water bodies receiving mainly runoff from wheat and corn fields and in case of FHB attacks, ZON might contribute to the total estrogenicity. The ecotoxicological consequences from the presence of ZON in soils remain to be investigated. Nevertheless, adapted agricultural practice such as the avoidance of corn-wheat rotation, the selection of wheat and corn varieties with low susceptibility to FHB, and post-harvest straw management, can effectively reduce FHB and minimize the prevalence of ZON in food, feed, and the environment.