KEEPING IT REAL:

Multidisciplinary approaches to aquatic risk assessment

CAMBRIDGE ENVIRONMENTAL ASSESSMENTS

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Background

Aquatic risk assessments for plant protection products can often be complex, comprising multiple crops, application rates, Member States (MSs) and, thus, exposure scenarios. Where scenarios fail, it is critical to consider what that hazard quotient (PEC/PNEC ratio) really represents - is it a realistic representation of the true risk? A number of assumptions and worst-case parameters are used within the Tier I risk assessment, on both the exposure (predicted exposure concentration; PECsw) and the effect (predicted no effect concentration; PNEC) side of the equation. To maximise risk assessment realism, it is advantageous to take a multidisciplinary approach, involving specialists in environmental fate, exposure modelling, aquatic ecotoxicology testing and regulatory ecotoxicology when developing refinements for the risk assessment.

By developing integrated solutions, it is possible to progress from theoretical to more realistic estimations of risk. For example, assessing the relevance of efate input parameters used in exposure models, how the models represent the actual fate processes and designing field fate studies to derive more realistic model input parameters or replace/confirm model outputs with empirical data; comparing exposure profiles associated with the maximum PECsw with exposure conditions used in standard aquatic ecotoxicology studies and designing modified exposure studies to more accurately mimic these exposure profiles; etc. The aim of this poster is to illustrate how different disciplines can work together to increase the realism of aquatic risk assessments, enabling appropriate refinement options to be derived, and together design optimal solutions that are closer to addressing the real risks rather than the theoretical ones.

Case study: increasing the realism in the aquatic risk assessment for a granular product used on multiple crops in multiple EU zones

What will product application really be like?

- How applied? E.g. incorporation depth & efficiency
- Where applied? E.g. environmental conditions → relevance of scenarios
- When applied? E.g. application timing & soil trafficability in the real world vs the GAP

How will the product really behave once applied?

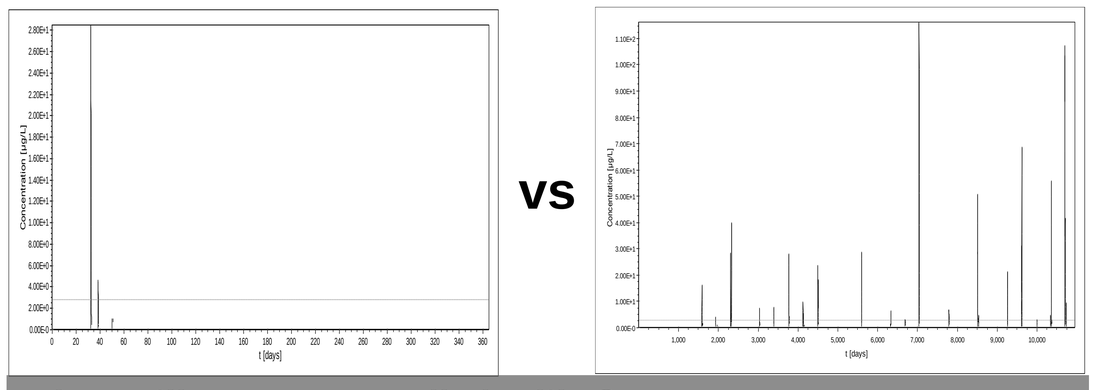
- Which exposure model input parameters are most critical/unrealistic e.g. realistic CAM value for granular products?
- Use field fate studies to inform/refine/replace exposure modelling?
- Realistic mitigation options e.g. plastic covers, run-off micro-dams?

What is the real risk?

What effects would really be expected?

- Critical effects – acute vs chronic?
- Unbounded endpoints from max conc tested?
- Additional single species data beyond standard Tier I data set (e.g.SSD approach)?
- Use modified exposure studies mimicking more realistic exposure profiles with relevant species?
- Data from realistic exposure systems containing multiple species e.g. micro/mesocosms?

→ **Generate realistic toxicity endpoint (+ assessment factor = regulatory acceptable concentration (RAC)**



What will exposure really be like?

- Have new and upcoming exposure models been considered? E.g. new UK drainflow guidance and tools, planned $FOCUS_{sw}$ repair[1], updated PEC_{soil} guidance and models
- Short-term or pulsed exposures, rather than constant?
- Exposure refugia possible in natural systems e.g. aqay from flowing drains, uneven mixing following run-off

→ **Generate realistic exposure scenarios**

[1]http://www.cea.adas.co.uk/News/ArtMID/731/ArticleID/188/Repair-to-FOCUS-Surface-Water-Scenarios

CONCLUSIONS

Tier I risk assessments use conservative assumptions regarding both exposure to the substance and the effects that the substance may have in the environment following the proposed use. If we consider what is likely to happen in the real world, in terms of how the product is used, and how it will behave, then we can generate more realistic exposure profiles. These refinements of the exposure side of the risk assessment can then be used to generate a more realistic picture of what effects the substance might have in the environment, taking into account data on additional species, in more realistic systems and under more realistic exposure scenarios. If we use multidisciplinary approaches, using realistic exposure scenarios together with realistic measures of toxicity, then we can assess the real risks of a substance, not the theoretical ones.