Is the EFSA effect assessment approach for fungicides sufficiently protective for aquatic ecosystems?

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Introduction

In Europe, the EFSA Aquatic Guidance Document [1] describes the procedures for the derivation of Regulatory Acceptable Concentrations (RACs) for pesticides on the basis of Tier-1 (standard test species), Tier-2 (geomean and SSD) and Tier-3 (micro/mesocosms) data. The consistency of this tiered approach has previously been evaluated for insecticides and to some extent for herbicides. **The aim of the present study was to evaluate the adequateness of the EFSA Tier-1 acute and chronic data requirements for protecting populations of aquatic organisms using Tier-3 data.** Follow-up studies will consider the evaluation of the Tier-2 RACs, and will try to assess the protectiveness of the tiered effect assessment approach for aquatic fungi.

Methodology

Single-species toxicity data mining

Toxicity data sources and selection criteria are based on the descriptions provided in poster TUPC02.

Derivation of Tier-1 RACs

Acute Tier 1 RACs were derived following the indications provided in Fig. 1 based on the general MoA of the evaluated compound (i.e., biocidal, insecticidal, herbicidal).

Chronic Tier-1 RACs were calculated as the lowest of *D. magna* EC10 or NOEC (reproduction) – 21d, lowest of *P. subcapitata* or *D. subspicatus* EC50 (preferably ErC50), and for a standard fish species an EC10 or NOEC derived from an early life stage test or prolonged exposure duration test (lowest of mortality or growth for >21 d), divided by an AF of 10. Additional data was used when the compound was classified as insecticidal or herbicidal (see guidance in [1]).

Derivation of Tier-3 RACs

Tier-3 RACs were derived for 17 fungicides as described in Fig. 1 making use of micro-/mesocosm data from published literature and EFSA/industry reports. Exposure conditions in those studies was classified as: short-term pulse (DT50<1d), short-term exposure (single application 1d<DT50<10d), medium-term exposure (repeated applications with short DT50) and long-term exposure (more or less constant), after [2].

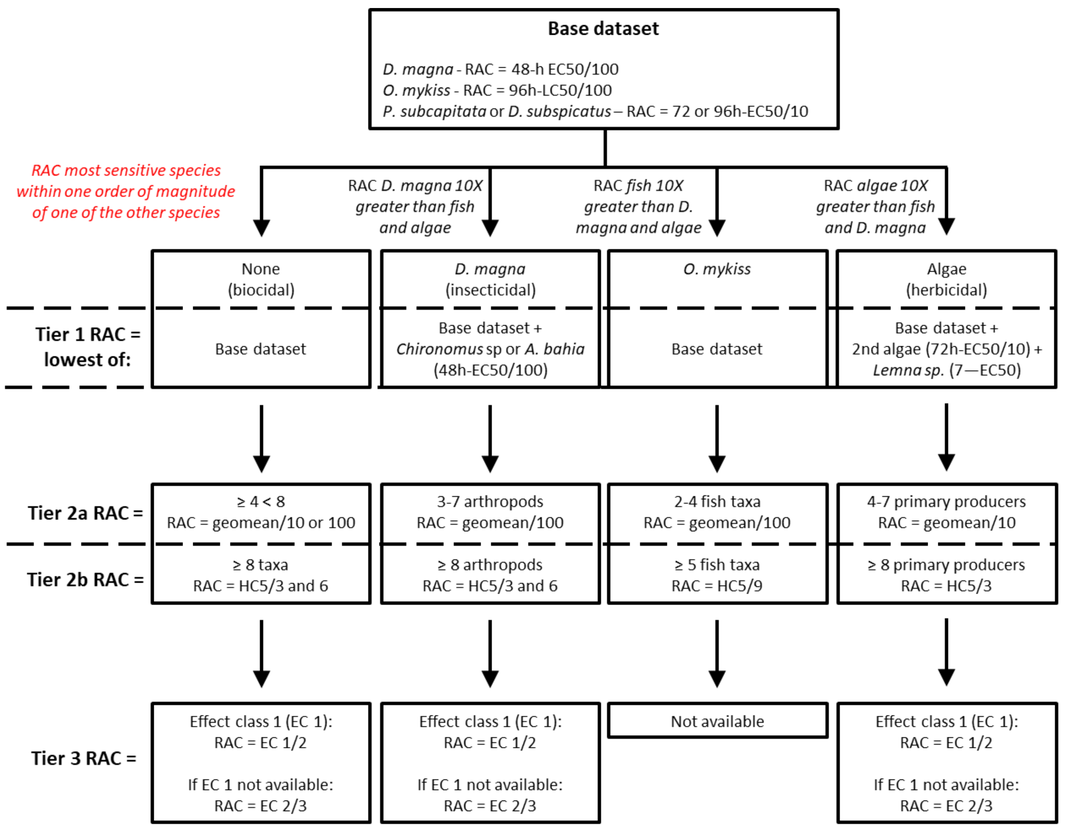
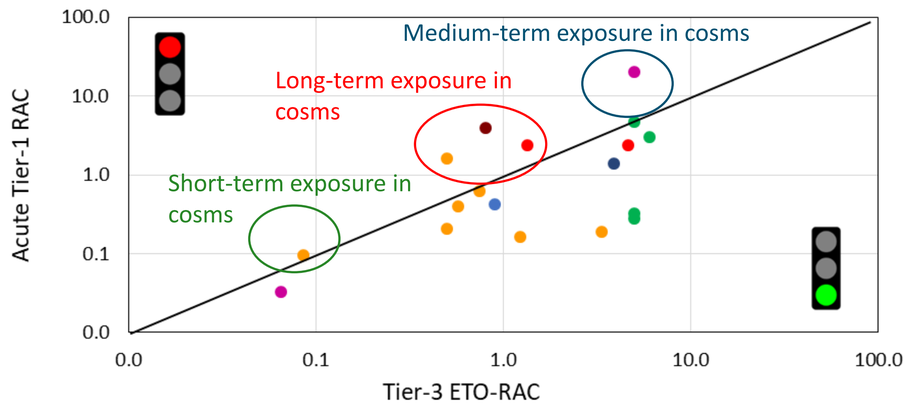
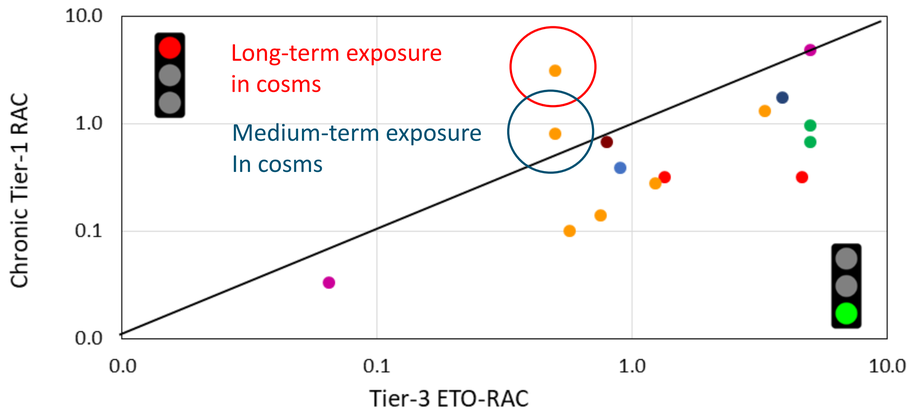


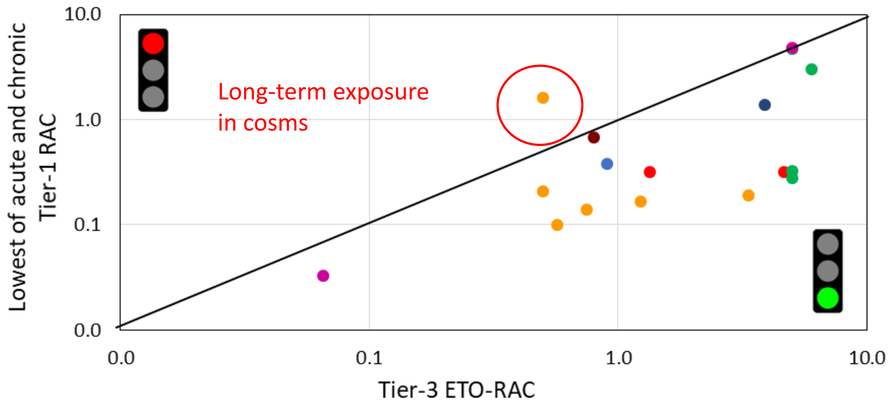
Figure 1. *Scheme used to calculate acute Tier-1 and Tier-3 RACs.*

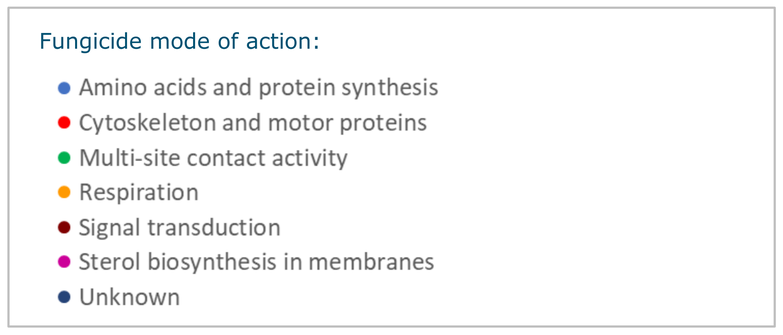
Results

Figure 2*. Comparison of acute and chronic Tier-1 RACs with Tier-3 ETO RACs. For compounds above the 1:1 the Tier-1 RACs seems not to be protective for semi-field effects.*









Conclusions

- Acute Tier-1 RACs were triggered by toxicity data for fish in 7 cases, for invertebrates in 8 cases and for algae in 2 cases.
- Lowest value of the acute and chronic Tier-1 RACs resulted in a sufficient protection level for semi-field effects in all but one of the cases.
- Insufficient protection of populations of invertebrates and plants was related to long-term constant exposures simulated in the micro-mesocosm experiments for the acute data comparisons, and due to long-term effects on populations of crustaceans for the chronic (for fungicides affecting microbial respiration)
- Further evaluations require the comparison of Tier-1 RACs with higher-tier toxicity data for fish.

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[1] EFSA, 2013. EFSA Panel on plant protection products and their residues. Guidance on tiered risk assessment for plant protection products for aquatic organisms in the edge-of-field surface waters. EFSA J 11:3290.
[2] Maltby et al., 2009. Environmental Science and Technology 43, 7556-7563.