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The NORMAN network's special view on prioritisation of biocides as emerging contaminants

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1. Introduction

In the field of emerging environmental contaminants, the NORMAN network (www.norman-network.net) has been active since 2005 as an independent forum of more than 60 leading organisations, facilitating the exchange of information, debate and research collaboration, both at the European and at a more global level, as well as the transfer of research findings to policy-makers.

NORMAN promotes the use of innovative monitoring and assessment tools for identifying the substances of emerging concern most in need of future regulation. The network maintains various databases (e.g. EMPODAT for monitoring data on emerging substances) and has developed a prioritisation scheme for surface water monitoring and management, specifically designed to deal with “problematic” substances for which knowledge gaps are identified (Dulio & von der Ohe (eds.) 2013). These tools have been significantly improved in recent years (expansion of EMPODAT database from 1 million to more than 6 million records; a new “ecotox” module to allow systematic collection of ecotoxicity test data from online databases worldwide, plus existing regulatory quality standards).

Here we present, as an example, the application of this approach for the prioritisation of biocides for monitoring and management actions at the European scale, but the same scheme can be adapted for other compound groups and geographical scales.

Biocides are chemicals intentionally released in the aquatic environment as a result of anthropogenic activities. In the European Union (EU) biocides are regulated under the Biocidal Products Regulation (No. 528/2012; BPR). About 100 biocides are already approved for one or more product type. However, a large number of compounds is still under review (regulation (EC) 1062/2014) and would benefit from such a risk assessment.

2. Materials and methods

Unlike other prioritisation methods, which aim simply to rank all candidate substances against one single prioritisation objective, the NORMAN method combines the ranking process with an *a priori* allocation of the substances into action categories, which allows substances to be managed on the basis of the level of available information, thereby avoiding emerging substances being discarded or given lower priority simply because limited information is available.

The overall prioritisation procedure is carried out in two successive steps. In the first step, the NORMAN prioritisation methodology uses a decision tree that classifies chemicals into six categories, based on identified (“categories” of) knowledge gaps and actions to be taken by the research community and public authorities to fill them. In a second step the substances within each (action) category are ranked based on specific criteria / indicators defined for each category.

The NORMAN list of “frequently discussed” emerging substances is regularly updated and today contains 862 compounds. As regards biocides, the list contains 151 active substances that are still in use, under review or formerly used in Europe and 12 compounds (e.g., cybutryne, cypermetryne, dichlorvos, etc.) that are still listed for data collection but labelled as “former NORMAN” compounds since they are now regulated as priority substances under the Water Framework Directive.

The data used for this study are those available in the EMPODAT database, which counts today 1,747,528 records from 16 european countries for 92 biocidal substances.

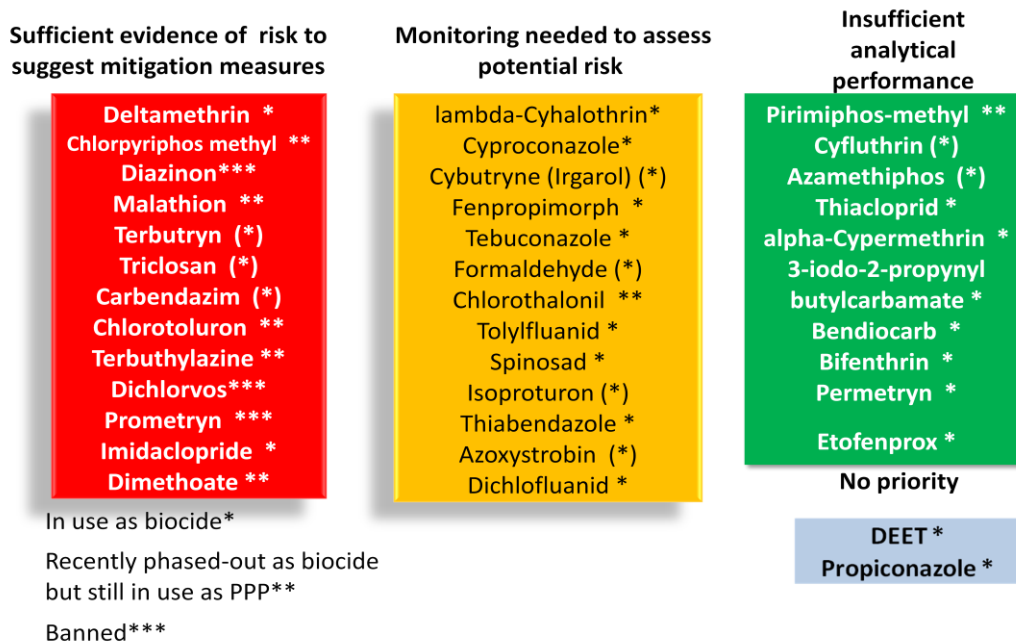


Figure 1: Results of the prioritisation process and list of substances for each category

3. Results and discussion

According to the NORMAN prioritisation scheme for monitoring data in surface waters, compounds such as, deltamethrin, terbutryn, imidacloprid, carbendazim and triclosan need control / mitigation measures, i.e. their use is associated with unacceptable risk to the environment.

For other substances, such as, tebuconazole and tolylfluanid, a potential risk of exceedance of the predicted no-effect concentration (PNEC) can be identified, but further monitoring is required. Cyfluthrin and permethrin were identified as substances for which analytical performance should be improved (target: the limit of quantification (LOQ) should be below the PNEC). For example, permethrin was banned as PPP in 2000 but was later approved as biocide (wood preservatives & insecticides/acaricides). Data in EMPODAT show a low level of quantification (only 0.07% of the analysis above the LOQ). However, the minimum LOQ ("best performance") associated to data records available in EMPODAT corresponds to 5 ng/L (and 60 ng/L is the 90 percentile of all LOQ available), whereas the PNEC value set for this compound is 0.094 ng/L. A further category covers compounds like N,N-diethyltoluamide (DEET) and propiconazole which appear as already sufficiently monitored, but with no evidence of risk for the ecosystems. DEET, for example, is found at relatively high concentration in water, in the order of 240 ng/L (95 percentile of the maximum concentrations measured at each site), but always below the environmental protection threshold.

Overall, a complete assessment was not possible because only 15% of the compounds solely approved as biocides in the EU have monitoring data in the database, although data are available for 70% of the compounds that are also used as PPPs.

4. Conclusions

Biocides are active substances that are often emitted into our environment and therefore definitely need to be regarded as substances of emerging concern. The NORMAN prioritisation scheme helps to identify those compounds which need control / mitigation measures or further actions (monitoring, analytical performance improvement, hazard assessment, etc.). The scheme can be easily applied at different geographical scales.

EMPODAT confirms that biocides are still insufficiently covered in monitoring programmes. Access to the latest information on emerging pollutants, with an overview of benchmark values on their occurrence across Europe and in other continents would certainly be of a major importance for risk assessors.

5. References

[1] Dulio V, von der Ohe PC (eds.). 2013. NORMAN Prioritisation framework for emerging substances, ISBN: 978-2-9545254-0-2