DO AQUATIC MESOCOSMS REPRESENT REAL EDGE OF FIELD WATER BODIES IN THE UK? OUTLINE OF A FIELD SAMPLING PROGRAMME

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Abstract

Outdoor mesocosms may be used in the pesticide registrations process to evaluate effects on aquatic communities. There is an ongoing debate as to whether these artificial systems are representative of natural water bodies in terms of community composition and timing of application (exposure profile). The purpose of this study is to deliver knowledge on the extent to which communities in experimental mesocosm facilities represent real edge of field water bodies in the UK.

Introduction

There is uncertainty associated with the use of aquatic mesocosms in the regulatory process. Part of this uncertainty centres around how representative static mesocosms are of real edge of field water bodies. This project, therefore, aims to answer the following questions:

1. Are mesocosms sufficiently ecologically representative of natural water bodies in the UK agricultural landscape?
2. Do mesocosm studies conducted in spring/summer represent the 'worst-case' in relation to community changes during the season?
3. Do spring/summer mesocosms represent autumn application scenarios?

Materials and methods

A two year monitoring programme of three mesocosm facilities (CEA, UK, Mesocosm GmbH & Univ. Aachen, Germany) and 36 UK edge of field water bodies is underway.

Field site selection

An analysis of landuse, pesticide load and water body prevalence was conducted for various landscape types to indicate the most important agricultural landscapes (Figure 1).

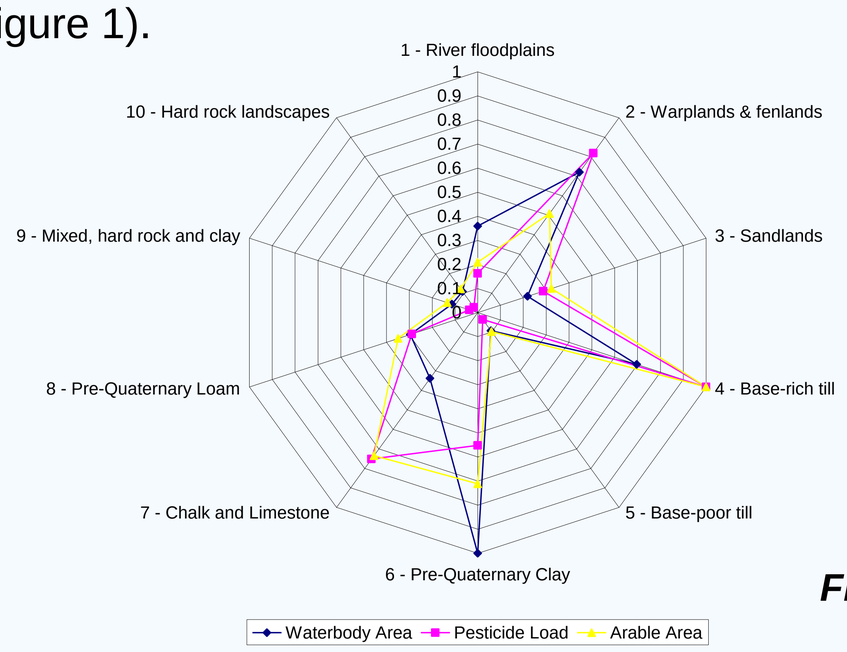
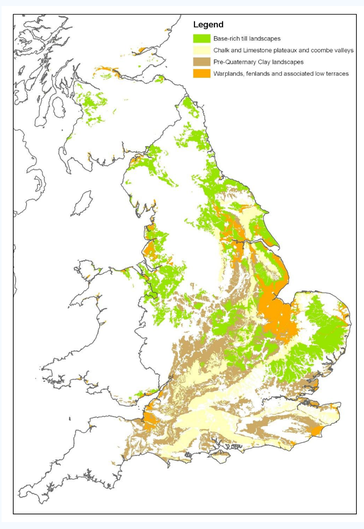


Figure 1

Four landscape classes were chosen:

1. Eutrophic tills (Cambridge & Suffolk)
2. Pre-quaternary Clays (Oxford)
3. Warplands & fenlands (Lincolnshire)
4. Chalk & limestone (Various)



Ponds **Streams** **Ditches**

Three types of water body were identified for inclusion in the study – ponds, ditches & streams.

Sites conformed to the following criteria:

- representative of abundant water body types found in the UK
- representative of different landscape classes found in the UK
- located in areas of arable farming
- should remain wet all year round, as far as possible

Sampling effort is distributed across the landscape and water body types according to Table 1.

Table 1. Selected sites

Landscape class	Ponds	Streams	Ditches	Totals
Clay	4	4	5	**13**
Warpland	0	6	0	**6**
Eutrophic tills	6	0	7	**13**
Chalks	4	0	0	**4**
Totals	**14**	**10**	**12**	**36**

Mesocosm facilities

Samples will be taken monthly to allow direct comparison with real water bodies.

The following samples will be taken:

- Benthic macroinvertebrates
- Zooplankton
- Phytoplankton
- Macrophytes

Analysis

Species indices such as Similarity, Diversity and Rarity index will be calculated to derive conclusions on the similarity/diversity of the investigated water bodies. The community composition in the mesocosms and natural water bodies will also be investigated using multivariate classification and ordination techniques (e.g. DECORANA) in order to show to what extent mesocosm assemblages resemble those of natural water bodies.

Results & Discussion

Monthly sampling has just begun. Results will be disseminated at appropriate fora when available.

Conclusions

This study will provide important information on the relationship between experimental facilities and real water bodies. It is hoped that uncertainty in mesocosm study interpretation will be reduced as a result.

Acknowledgements

This work is funded by the UK Pesticides Safety Directorate (Project code PS2339)