REGENERATED WATER AS A POTENTIAL SOURCE OF ORGANIC CONTAMINANTS AND MP$_S$ IN IRRIGATED CROPS

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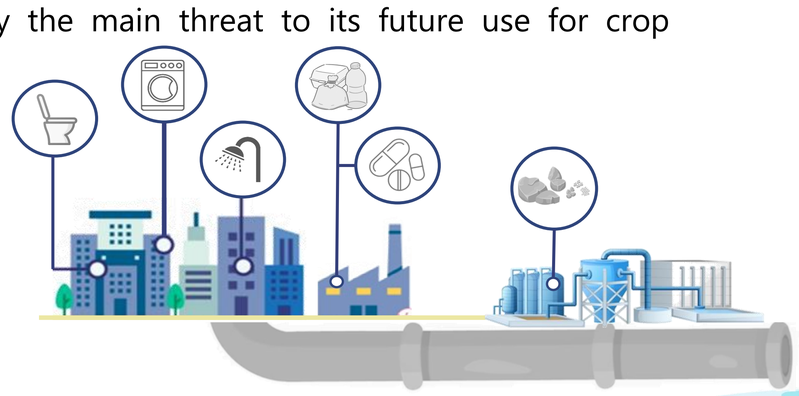
BACKGROUD OF THE STUDY

Reclaimed water quality is clearly the main threat to its future use for crop irrigation.

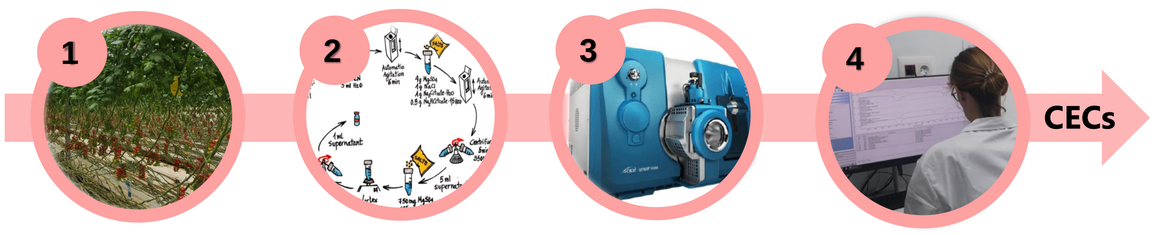
Prolonged exposure to advanced treatment processes leads to the progressive decomposition of plastic into countless smaller plastic particles called MPs as well as the degradation of the organic contaminants themselves into other transformation products.



OBJECTIVES

1. To **evaluate** the **presence of CECs** across the entire water-soil-plant continuum.
2. To **determine** the **relative and total abundance of MPs** in terms of morphology, color and number in reclaimed water used to crop irrigation.
3. To **identified** the **chemical composition** of the extracted **MPs.**

SAMPLE COLLECTION AND METHODOLOGY



Sample collection & extraction — LC-MS/MS Analysis

Sample collection & extraction — Microscopy & FT-IR Analysis

RESULTS

CECs Analysis

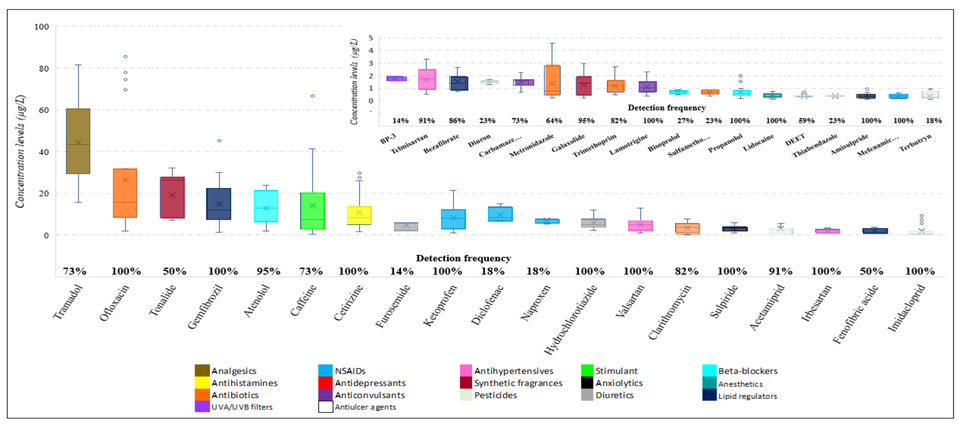


Figure 1. *CECs detected in the irrigation water samples analysed.*

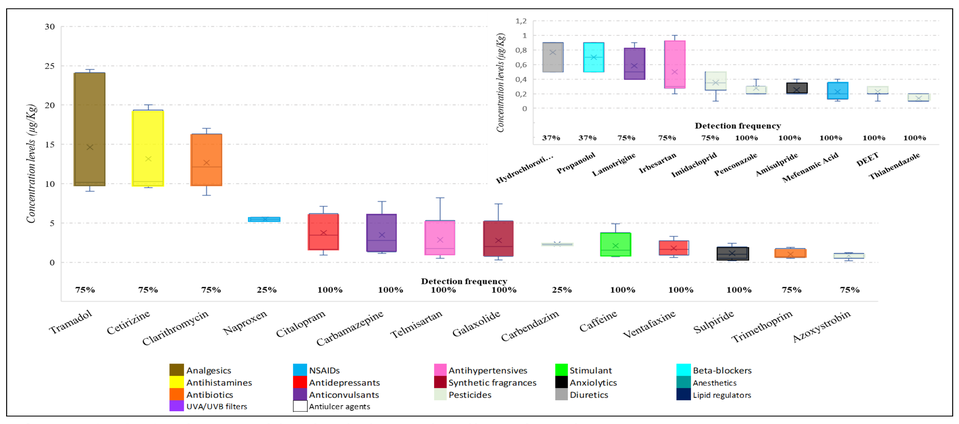


Figure 2. *CECs detected in the irrigated soil analysed.*

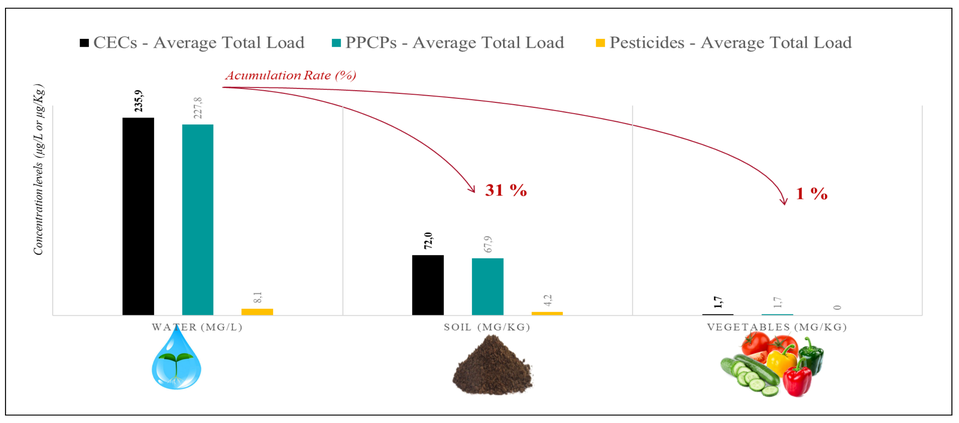


Figure 3. *Impact of reclaimed water reuse on an agroecosystem.*

MPs Analysis

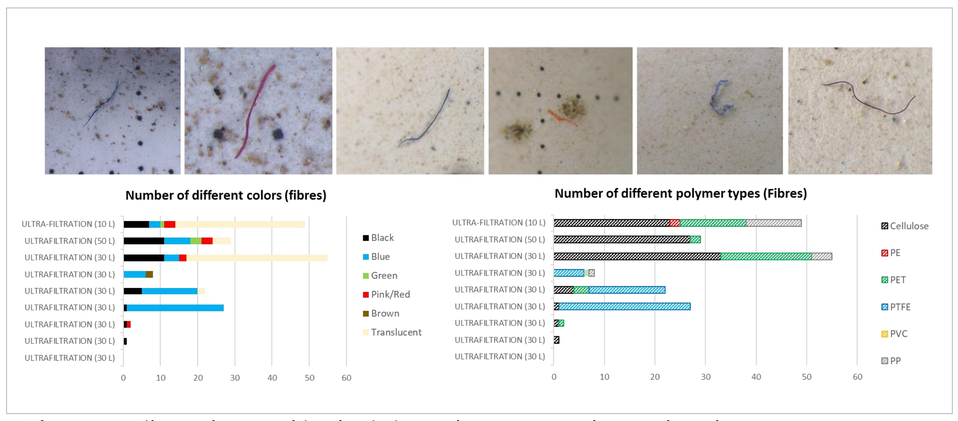


Figure 4. *Fibres detected in the irrigated water samples analysed.*

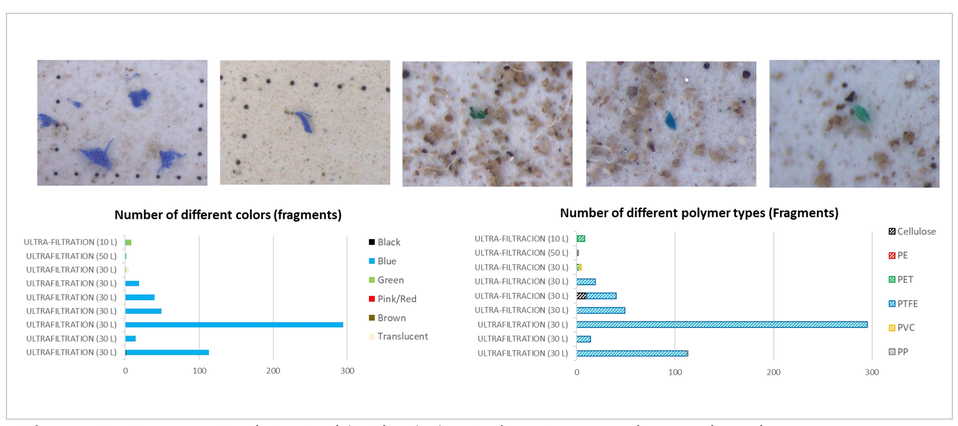


Figure 5. *Fragments detected in the irrigated water samples analysed.*

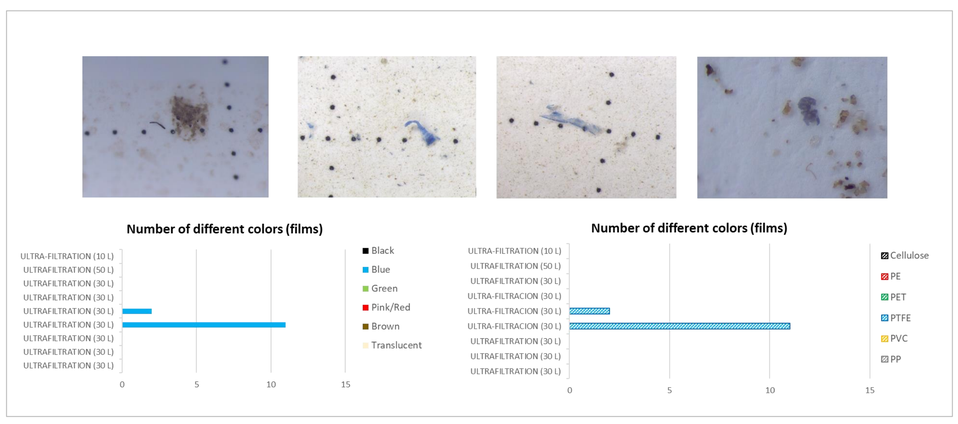


Figure 6. *Films detected in the irrigated water samples analysed.*

Polyvinyl chloride; PP: Polypropylene; PE: Polyethylene; PET: Polyethylene terephthalate; PTEF: Polytetrafluoroethylene; PVC:

DISCUSSION & CONCLUSION

- One macrolide antibiotic included in the Commission Implementing Decision (EU) 2018/840 (**clarithromycin**) and two of the pesticides (**diuron and terbutryn**) included in the list of priority substances covered by the Water Framework Directive (Directive 2013/39/EU) were detected in the irrigation water and irrigated soil samples analysed.
- **Carbamazepine, lidocaine and caffeine** were the only compounds detected across the entire water-soil-plant continuum.
- **The concentration levels of the CECs detected in all the commercial produce analyzed were very low compared to their therapeutic doses.**
- Fibers and fragments were the most abundant MPs in the reclaimed water samples analysed (average: 41% fibres, 57% fragments, 2% films). **A total of 5 different types of polymers and only 1 non-plastic material (cellulose) were identified**. Among the polymers detected, **PTEF, PET, and PP were the most abundant**. These results corroborate the problem raised by other authors regarding the lack of standardization of an analytical protocol to obtain comparable data.
- The results obtained in **this work support the reuse of water for agricultural irrigation.** However, reclaimed water constitutes a source of MPs, and its presence should be evaluated in future studies.

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