



Biomonitoring the heavy rare-earth element ytterbium in tree bark samples across Leicester, England

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INTRODUCTION

Although the presence of ytterbium (Yb) in topsoils from Leicester city (UK) could represent some risks for the population, consuming wild edible mushrooms species would not represent a risk. To elucidate past air contamination with Yb using tree bark.

MATERIAL AND METHODS

Initial 2-6 millimetres of bark were collected from 55 different trees across Leicester city and 41 from surrounding rural/suburban areas (Fig 1); samples were taken at 1.50–1.80 metres from the ground to limit contamination from topsoil/dust (Guéguen et al., 2011) from September to November 2018.

- ☐ Y was monitored by ICP-MS in cleaned/ground/homogenised samples (Minganti & Drava, 2018) mineralised with HNO₃/H₂O₂ [LoD=0.075 ng/g dry weight (dw)].
- ☐ Data was processed using statistical methods applied to censored data available in the 'NADA' statistical package.

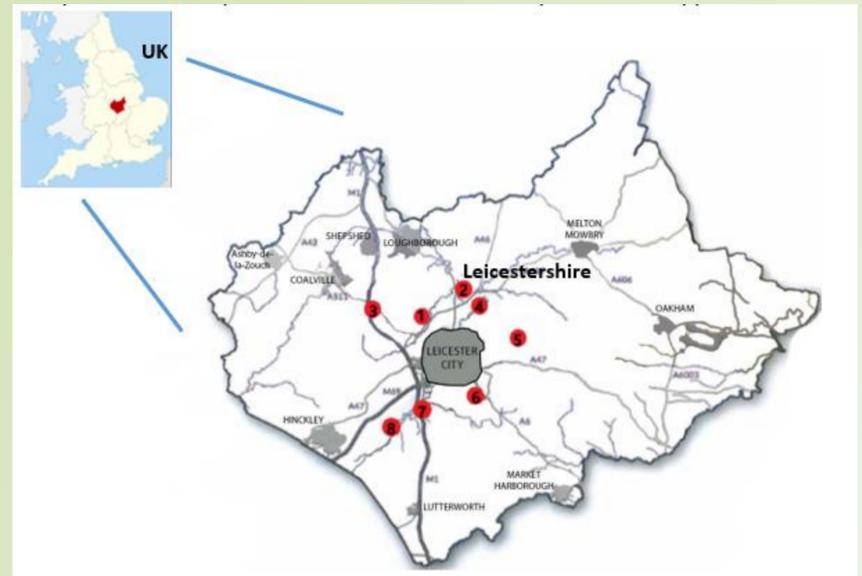


Fig 1. Study area. The city of Leicester is indicated in grey (Leicestershire, UK).



RESULTS AND DISCUSSION

- ✓ Levels of Yb in the tree bark samples were similar when comparing both main areas, *i.e.* urban versus rural (median and ranges, in ng/g dw): 1.205 (0.375-12.146) vs. 1.206 (0.672-4.731). However, some samples collected from trees monitored across the urban area showed the highest content of Yb.
- ✓ The trees that grow in these locations might indicate areas of pollution within the city, which should be further investigated for levels of atmospheric particulate matter and their Yb composition.

- ✓ These results correlate with previous studies performed on 106 wild mushrooms and 850 topsoils collected from the same areas; thus, although the levels of Yb were slightly higher in mushrooms and topsoils collected in the rural areas (Peña-Fernández et al., 2023, 2024), these were non-significant, suggesting similar potential sources of Yb throughout Leicestershire.
- ✓ Levels were slightly higher than the range reported in bark samples from *Pinus ponderosa* trees growing in an area with an inactive open pit uranium mine in eastern Washington (US; 0.37-3.85 ng/g dw) (Flett et al., 2021), suggesting some atmospheric contamination of Yb in Leicester city and surrounding areas.

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CONCLUSIONS

Although Yb is described as having a low toxicity, the levels found in the trees monitored suggest some **anthropic pollution of Yb in Leicester city that should be further investigated to identify potential risks to human health.**