IECF 2024 Conference

The 4th International Conference on Forests

23–25 September 2024 | Online

MDPI

# Atmospheric contamination of lutetium in Leicestershire (England) using tree bark biomonitoring

Peña-Fernández A. *[1,2], Lobo-Bedmar MC.[3], Jagdev GS.[2], Peña MA.[4]

[1] Faculty of Medicine and Health Sciences, University of Alcalá, Ctra. Madrid-Barcelona, Km. 33.600, 28871 Alcalá de Henares, Madrid, Spain.

[2] Leicester School of Allied Health Sciences, De Montfort University. The Gateway, Leicester LE19BH, UK.

[3] IMIDRA. Departamento de Investigación Agroambiental. "Finca el Encín" Crta. Madrid-Barcelona Km, 38.2, 28800 Alcalá de Henares, Madrid, Spain.

[4] Facultad de Farmacia, Universidad de Alcalá, Crta. Madrid-Barcelona Km, 33.6, 28871 Alcalá de Henares, Madrid, Spain.

Email: antonio.penafer@uah.es

## INTRODUCTION

**The presence/distribution of lutetium (Lu) in topsoils from Leicester city and surrounding areas (England) represents a low risk for the population (ingestion and dermal contact), meanwhile its content in wild mushrooms might represent some oral risks.**

**Aim: to monitor the air quality for Lu in Leicester (UK).**

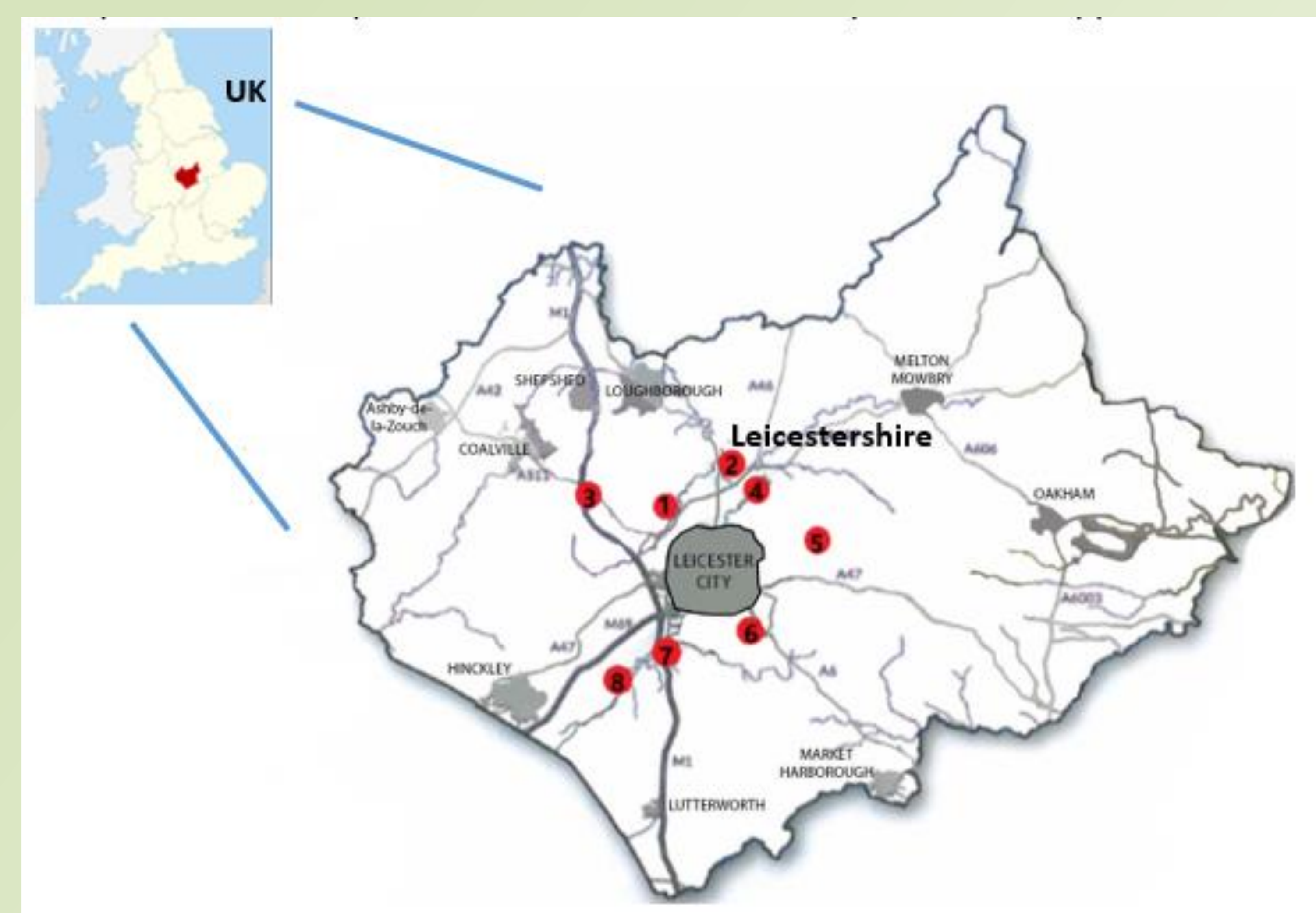


Fig 1. Study area. The city of Leicester is indicated in grey (Leicestershire, UK).

## 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.**

- Lu was monitored by ICP-MS in cleaned/ground/homogenised samples (Minganti & Drava, 2018) mineralised with $HNO_3/H_2O_2$ [LoD=0.066 ng/g dry weight (dw)].
- Results were compared with previous studies performed on 106 mushrooms and 850 topsoils collected in the same areas.
- Data was processed using statistical methods applied to censored data available in the 'NADA' statistical package.

## RESULTS AND DISCUSSION

- ✓ **Levels of Lu were similar in both main areas; data presented as median and ranges for urban and rural area respectively (in ng/g dw): 0.580 (0.182-2.118) and 0.584 (0.402-1.071).**
- ✓ **These results are in line with the distribution observed in topsoils, *i.e.* Lu did not show statistical differences between urban and rural areas (*p*-value=0.602; 0.117 vs. 0.123 mg/kg)** (Peña-Fernández et al., 2023).
- ✓ **However, some bark samples collected in the city presented higher levels of this element.**
- ✓ **This pattern is similar to the levels observed in wild mushrooms, in which the higher presence of Lu was detected in mushrooms collected in urban areas (0.347 vs. 0.196 ng/g dw) .**
- ✓ **Our results suggest similar sources of air contamination by Lu across the main areas monitored, in which topsoils might play a role that should be further assessed although these had a minor contribution to the levels monitored in wild mushrooms.**

## CONCLUSIONS

**Although preliminary, in general, levels of Lu found in the tree bark were lower than the natural background reference concentration of Lu reported in plant materials collected in a forest in northwest Germany (2.5-5 ng/g dw;** Markert & De Li, 1991**), suggesting a minor contamination by Lu in Leicestershire.**

## REFERENCES

Guéguen, F., Stille, P., & Millet, M. (2011). Air quality assessment by tree bark biomonitoring in urban, industrial and rural environments of the Rhine Valley: PCDD/Fs, PCBs and trace metal evidence. Chemosphere, 85(2), 195-202.

Markert, B., & De Li, Z. (1991). Natural background concentrations of rare-earth elements in a forest ecosystem. Science of the total environment, 103(1), 27-35.

Minganti, V., & Drava, G. (2018). Tree bark as a bioindicator of the presence of scandium, yttrium and lanthanum in urban environments. Chemosphere, 193, 847-851.

Peña-Fernández, A., Higueras, M., Repetto, G., Álvarez-Herrera, C., Llana-Ruiz-Cabello, M., Maisanaba, S., ... & Lobo-Bedmar, M. C. (2023). Environmental distribution and exposure to heavy-rare earth elements in Leicestershire (UK). In ISEE Conference Abstracts (Vol. 2023, No. 1).