

Biomonitoring chromium contamination in urban and rural topsoils from Leicestershire, England.

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INTRODUCTION

Consumption of urban garden products is increasing despite the risks that they can represent due to high urban contamination (Petkovšek & Pokorny, 2013). Effects of urbanisation in wild edible mushrooms are scarce.

Aim: A monitoring study was performed to characterise the risks to chromium (Cr) in Leicestershire, England.

MATERIAL AND METHODS

106 wild mushrooms were collected from different green areas in Leicestershire (UK; Fig. 1) in Autumn 2018.

- ❑ Species identification was confirmed by DNA barcoding after extracting DNA from frozen homogenised ground mushroom material using DNeasy Plant Mini Kit® (Sgamma et al., 2018).
- ❑ Cr was monitored by ICP-MS in cleaned/dried/homogenised mushrooms appropriately mineralised [LoD=1.012 µg/g dry weight (dw)].
- ❑ Cr was also monitored in 850 topsoils collected across Leicestershire processed as composite samples by ICP-MS after acid/microwave digestion (LoD=3.683 µg/g).

✓ A similar distribution of Cr was found in the topsoils and mushrooms monitored, *i.e.* the highest concentration in those collected in the southeast and the lowest in the southwest quadrant.

✓ Significantly higher levels were found in topsoils collected in the urban area, which might be attributed to different anthropic sources such as vehicles.

✓ All bioconcentration factor values were lower than one, suggesting a low bioaccumulation of Cr in the wild mushrooms species collected in Leicestershire.

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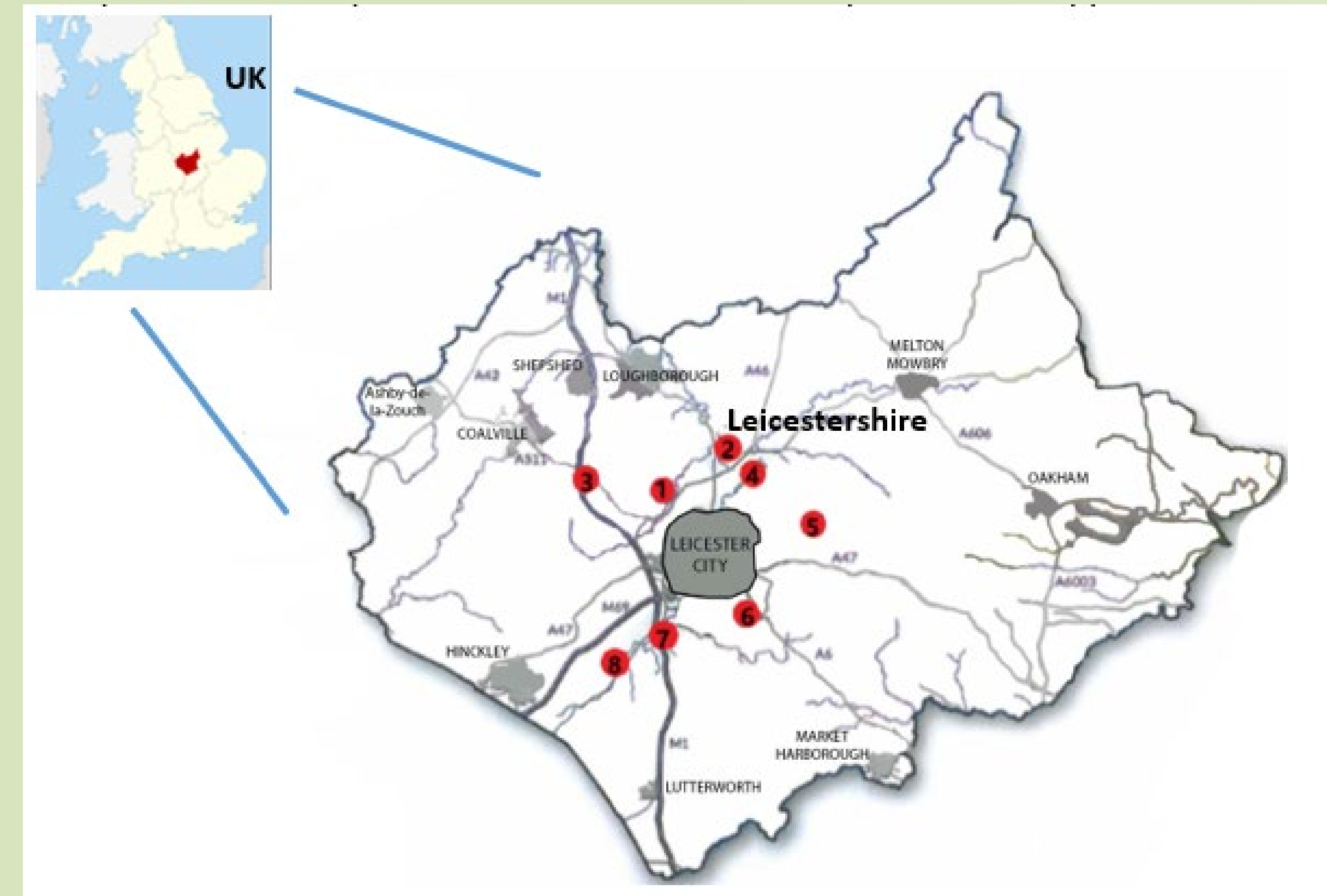

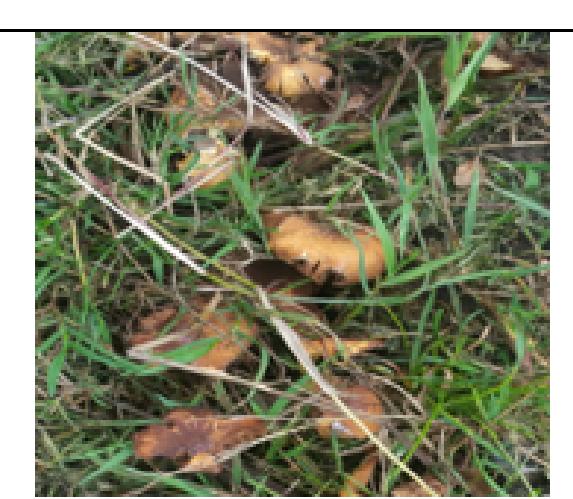



Fig 1. Study area. The city of Leicester is indicated in grey (Leicestershire, UK).

RESULTS AND DISCUSSION

- ✓ Cr was detected in 92.2% of the topsoil samples, meanwhile was found in 47.1% of the mushroom samples.
- ✓ Results suggest some level of pollution by Cr in Leicestershire, as they were higher than the proposed reference interval for wild mushrooms that grow in unpolluted areas.

Table 1. Poisonous wild mushroom species identified in Leicester city and Bradgate Park.

Mushroom poisonous species	Photo
<i>Coprinus atramentarius</i>	
<i>Hypholoma fasciculare</i>	
<i>Panaeolus foenisecii</i>	

CONCLUSIONS

Toxic risks derived from oral, inhalation and dermal exposure to Cr from topsoils in the urban four ordinal directions, were lower than the unit, suggesting a minimal risk for Leicester's population.

However, speciation analysis would be needed to rule out carcinogenic risks to hexavalent Cr.