



Analysis of 11 trace elements in flight feathers of Italian Sparrows in southern Italy: A study of bioaccumulation through age classes, variability in three years of sampling, and relations with body condition

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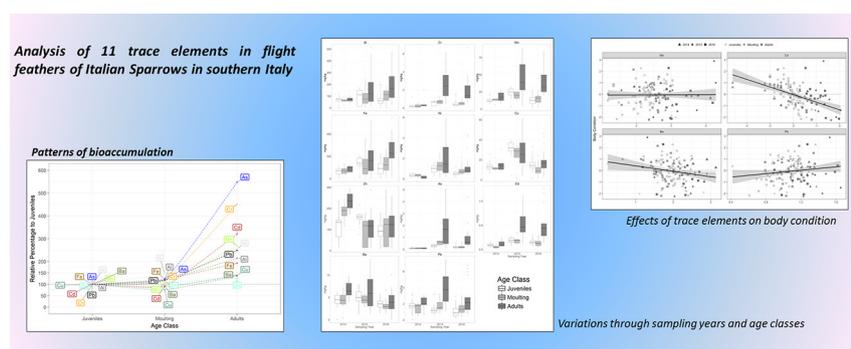
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HIGHLIGHTS

- Trace elements can be monitored in the total environment by using bird feathers.
- 184 flight feathers from juveniles, moulting, and adult sparrows were analysed.
- Clear bioaccumulation patterns from juveniles to adults for As, Cr and Cd was shown.
- Elements such as As, Cd and Cr can be variable across the years.
- Cd and Ba were negatively correlated with body condition.

GRAPHICAL ABSTRACT



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ABSTRACT

Trace elements have been acknowledged as one of the subtlest environmental hazards in all compartments of the total environment. Enhanced by activities in the anthroposphere, they accumulate in the atmosphere, lithosphere, and hydrosphere. Eventually, trace elements can bioaccumulate or biomagnify in the biosphere, with harmful effects on animals occupying higher trophic levels, including humans. Accordingly, there is great interest in assessing and monitoring trace element concentrations in the biosphere, and birds, especially passerines, have been commonly chosen as biomonitors. In this study, the concentration of 11 trace elements was measured (i.e. aluminum, chromium, manganese, iron, nickel, copper, zinc, arsenic, cadmium, barium, and lead) in flight feathers of Italian Sparrows, a common bird species hitherto not analysed in this respect. Samples were collected in an agricultural area in southern Italy, where a mosaic of natural environments, urbanized areas and industrial facilities can be found. Linear mixed modelling was applied to the analysis of flight feathers in juveniles, juvenile birds moulting to adulthood, and adults in three sampling years on 184 birds. Results are timely as they add new data to the scarce available information on Ba and As in bird feathers and showed clear bioaccumulation patterns from juveniles to adults for As, Cr, and Cd. Moreover, the modelling approach showed that the concentration of elements such as As, Cd and Cr can be variable across the years and that some elements, notably Cd and Ba, were inversely correlated with body mass and wing length, respectively, suggesting potential negative effects on bird

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