



GEMAS: Molybdenum Spatial Distribution Patterns in European Soil

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Molybdenum is an essential trace element for both plants and animals as well as for human being. It is one such trace element for which potential health concerns have been raised but for which few data exist and little investigation or interpretation of distributions in soils has been made. The main goal of this study was to fill this gap.

Molybdenum (Mo) concentrations are reported for the <2 mm fraction of soil samples from agricultural (Ap horizon, 0–20 cm; N=2218) and grazing land (Gr, 0–10 cm; N=2127). The survey covers 33 European countries and 5.6 million km² at a sample density of 1 site/2500 km². All samples were analysed by ICP-MS following an aqua regia extraction.

The European median Mo concentration is 0.416 mg/kg in agricultural soil and 0.424 mg/kg in grazing land soil. Molybdenum geochemical maps for both land use types (Ap and Gr) show overall similar spatial distribution patterns mainly governed by geology (parent material and mineralisation), as well as weathering, soil formation and climate since the last glaciations period. The dominant feature is represented by low Mo concentrations over the coarse-grained sandy deposits of the last glaciations in central northern Europe while the most extensive anomalies occur in Scandinavian soils. The highest Mo concentration value occurs to the North of Oslo close to one of the largest porphyry Mo deposit of the World. Some interesting anomalous patterns occur also in Italy in correspondence with alkaline volcanics, in Spain and Greece associated with sulfides mineralizations and in Slovenia and Croatia where are probably related to the long weathering history of karstic residual soils. Anomalous concentrations in some areas of Ireland represent a clear example of how an excess of molybdenum has produced potentially toxic pastures. In fact, these give rise to problems particularly in young cattle when excess molybdenum in the herbage acts as an antagonist, which militates against efficient copper absorption by the animal.