



Occurrence and fate of the norsesquiterpene glucoside ptaquiloside (PTA) in soils

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The bracken fern *Pteridium aquilinum* (L.) Kuhn, one of the most common plant species on Earth, produces a wide range of secondary metabolites including the norsesquiterpene glucoside ptaquiloside (PTA). This bracken constituent causes acute poisoning, blindness and cancer in animals, and can be transferred to man when bracken is utilized as food. Also milk from cows eating bracken is thought to be the vector for the transfer of PTA to humans, as well as PTA-contaminated drinking waters.

Although some studies on the effect of growth conditions and soil properties on the production and mobility of PTA have been carried out (mainly in the North of Europe), results are sometimes conflicting and further investigations are needed. The aim of the present work is to study the occurrence and the fate of PTA in soils showing different physico-chemical features, collected in different pedoclimatic areas (from the South of Italy), but having the extensive ("wild") livestock farming as common denominator.

The PTA content was determined in both soil and fern samples by GC-MS; both the extraction protocol and recovery were previously tested through incubation studies. Soils samples were also characterized from the physical and chemical point of view (pH, EC, texture, total carbonates, cation exchange capacity, organic C, total N, available nutrients and heavy metal concentration) in order to correlate the possible influence of soil parameters on PTA production, occurrence and mobility.

PTA concentration in soil samples was always <LOQ and <LOD (0.0001 and 0.0003 mg/l, respectively), independently by: i) the PTA concentration in the corresponding *Pteridium* samples (2-780 $\mu\text{g/g}$), ii) the soil organic matter content (ranging from 3.4 to 22.8%), iii) the soil pH (ranging from 5.9 to 6.6), iv) the soil texture, v) the depth (0-10 cm; 10-20 cm), and vi) precipitations (ranging from 780 to 960 mm/a).

This seems to suggest the degradation of the PTA by indigenous microbial community, whereas incubation studies underlined a certain affinity of PTA for both organic colloids and clay/silt particles. Furthermore, no significant correlations ($p < 0.05$) were found between PTA concentration in *Pteridium* samples and all the studied soil and climatic parameters.

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