

## Poster

**Can fire events increase chromium uptake by durum wheat in polluted soils?**

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Farmlands are increasingly exposed to uncontrolled fires due to global warming, prolonged drought periods and land abandonment. Soil burning can also be intentionally adopted as an agronomic strategy. The fire-induced effects on soil physical-chemical properties have been extensively investigated, whereas little is known about the modifications induced on the biogeochemistry of nutrients and, even less, of potentially toxic elements (PTEs), as well as their impact on plants. This study aims at elucidating the rhizosphere processes driving the mobilization of Cr and other PTEs in a polluted agricultural soil, before and after heating at 300°C and 500°C, and the uptake of these elements by durum wheat (*Triticum durum* Desf.) plants. Cr occurred at a high concentration in unburned soil, but it was immobilized as Cr(III) due to the high content of soil organic matter (SOM). After burning, SOM sharply decreased and Cr was partly oxidised (with total and exchangeable Cr(VI) concentrations up to 175 and 36 mg kg<sup>-1</sup> at 500°C, respectively), whereas the mobilization of other PTEs slightly changed. Rhizotest experiments were performed using 25 days old plants, kept in contact with soil for 7 days. An unpolluted soil was used as control at the same treatment temperatures. After the plant-soil contact, root exudates were collected and characterized for the content of total phenols, flavonols and flavonoids, total chelating compounds and organic acids. Total concentrations of Cr and other elements were measured in roots and shoots by TXRF analysis after acid digestion. Root and shoot biomass was also recorded. Soil burning increased the Cr accumulation in plants grown on the polluted soil. Cr concentration in roots raised from 34 mg kg<sup>-1</sup> DW, in the unheated soil, to 467 and 825 mg kg<sup>-1</sup> DW in 300°C and 500°C-heated soil, respectively. Cr was also detected in shoots of plants grown on 300°C and 500°C-heated soils, at concentrations of 26 and 51 mg kg<sup>-1</sup> DW, respectively. The Cr accumulation in plants appeared to be related to the exchangeable Cr(VI) amount in soil, rather than to total Cr, DTPA-extractable Cr and total Cr(VI). Exudation of chelating compounds and organic acids decreased at increasing soil heating temperatures. The overall results suggest that Cr was preferentially taken up by the plants as Cr(VI). Further experiments are needed to investigate Cr speciation inside the plant and Cr-uptake mechanisms underlying its plant acquisition.