Does dissolved organic matter trigger inorganic Pb formation in cotyledon to decrease damage to germ?

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Lead is one of the most toxic metals. In the processes of passing through the whole food chains, changes of Pb speciation play a key role. Dissolved organic matter (DOM) is an important media for heavy metals because of its good mobility and strong biding affinity. It exists widely in ecosystem and ambient environment. Does the presence of DOM affect the amount of Pb in plants? Does DOM trigger Pb speciation changes during germination? There are no consistent conclusions. Some controversy reports can be found on the roles of DOM in increasing or decreasing the bioavailability and excotoxicity of Pb in plant.

In order to reveal the roles of DOM in Pb metabolism in plants, model plant *Arabidopsis thaliana* was chosen as an object in the research. Synchrotron radiation micro X ray fluorescence (μ-XRF) (6 μm^2 focal spot) was used to get distribution of Pb in seeds and X-ray absorption near edge structure (XANES) applied in identification of Pb species during germination.

Different types and concentrations of DOM like fulvic acid, humic acid and citric acid, were used in germination test. First of all, hot points were observed as shown in the left figure. The figure clearly described Pb distribution in a germinating seed and showed that the high concentrations of Pb occured in the parts of cotyledon. That revealed that humic acid and citric acid indeed increased the absorption of Pb in *Arabidopsis* seeds, especially in the cotyledon.
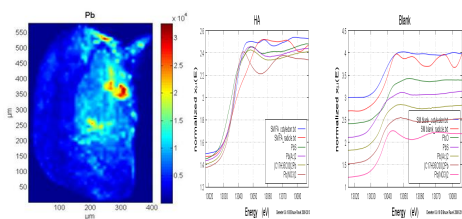
Secondly, the differences of XANES spectra of Pb L3 edge were observed between the humic acid and blank groups, as shown in the middle and right figures. The spectra showed a significant change of Pb species in the radicle and cotyledon.

What roles does DOM play in the processes of change of Pb species? Those are what would be found and discussed in this research.