



Title:

Common reed die-back and climate change: where is the link?

Abstract:

The reed die-back syndrome has severely affected *Phragmites australis* populations in Europe and North America. Eutrophication and salinity, caused by sea level rise, were indicated as causes of this phenomenon, but their mechanism of action is not clear. My hypothesis is that die-back resides on the impaired nutrient status of plants in brackish waters and on nutrient deficiency caused by modifications at the plant-soil interface. A key role could be played by Fe plaques, Fe deposits on root surfaces formed in flooded soils. Plaques enhance the availability of micronutrients but reduce that of Fe and Mn. Plaque formation is enhanced by salinity but the concomitant effect of humic substances, a redox active fraction of soil organic matter capable to complex Fe, is difficult to predict and can indirectly lead to nutrient deficiency. The project aims to clarify how salinity and humic substances affect the nutritional status of *P. australis* through their effects on Fe plaques and will feature the use of high resolution imaging techniques, i.e. SEM-EDXR and micro-PIXE, for quantification and location of trace elements. Project results can lead to the definition of active actions to contrast the reed die-back to include in habitat restoration plans at European levels.

Project objectives:

This project aims to clarify how changes in salinity and HS (amount and redox properties) affect the nutritional status of common reed (*P. australis*) through their effect on Fe plaques. The hypothesis is that the reed die-back syndrome could be not only linked to seawater intrusion or eutrophication, but also to the concomitant indirect effects of salinity, HS and iron plaques on the nutritional status of plants, including possible micronutrient deficiencies.

The project will provide answers to the following specific research objectives:

1. Does the amount of iron plaques alter micronutrients uptake in common reed?
2. Will changes in salinity and concentration of HS alter plaque formation?
3. Is unbalanced nutrient status, caused by salinity intrusion and changes in Fe availability mediated by HS, the main cause of the reed die-back syndrome?