

In vivo plant monitoring: a novel biosensor for precision agriculture and plant phenotyping

Michela JANNI – CNR

Drought stress imposes a major constraint over a crop yield and can be expected to grow in importance if the climate change predicted comes about. Improved methods are needed to facilitate crop management via the prompt detection of the onset of stress. A novel in vivo OECT (organic electrochemical transistor) sensor, termed as bioristor, has been developed and is integrated within the plant's stem, thereby allowing for the continuous monitoring of the plant's physiological status throughout its life cycle. Bioristor was able to detect changes of ion concentration in the sap upon drought, in particular, those dissolved and transported through the transpiration stream, thus efficiently detecting the occurrence of drought stress immediately after the priming of the defense responses, allowing for the early selection of plant genotypes with increased tolerance to the ongoing climate change. Moreover, the ability of bioristor in detecting biophysical information about the plant's water requirements directly from the plant sap, and thus the water input can be adjusted accordingly in a view of precision irrigation.