
Does the metabolome of a drought-resistant species shift under water stress over the seasonal cycle?

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Abstract

Downy oak (*Quercus pubescens* Willd.) is a drought-resistant species, largely widespread in the Mediterranean basin where it occupies 2 million ha. According to the Growth Differentiation Balance Hypothesis (GDBH), the metabolism of plant species could be modified by the decrease of water resources due to the climate change expected in this region. Climatic models predict a reduction of natural rain (-30%) as well as an elongation of the drought period, and an increase of temperature by +3.4°C on average.

The aim of this study is to evaluate the metabolomic response of Downy oak with intensified drought. We want to characterize the metabolome diversity of Downy oak under natural and intensified drought over the seasonal cycle with a focus on secondary metabolites, especially phenolic compounds.

Our study took place at the O3HP experimental site, which is equipped with a rain exclusion device allowing to create a plot where drought is intensified and to compare it to a naturally-drought plot. We harvested leaves in spring, summer and autumn on 5 trees for each plot during 2 years (2014-2015).

Analyses with UPLC-QToF-MS showed that there is no effect of drought on Downy oak metabolome diversity and only a slight effect of seasonality but there were large variabilities among trees. These results showed a minor metabolomic response of *Q. pubescens* to a middle-term increase of drought and thus, the conservative strategy of this species.

Keywords: metabolome, water stress, seasonality, *Q. pubescens*

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