PROJECT TITLE

Exploring the among- and within-species water stress tolerance of the Arundo genus by using highthroughput non-invasive phenotyping tools

CONSORTIUM

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SUMMARY OF THE REPORT

Soil water deficit is one of the most limiting environmental conditions for plant growth and reproduction. It is now well established that the exacerbation of unfavorable environmental conditions resulting from climate changes, in particular reduced water availability, will reduce the area of available land for agriculture by 11–17 % within Europe in the next decades (Stravidou et al. 2019). A promising option to limit competition in high-grade land is growing bioenergy crops (Bc) on land unsuitable for food crops (Popp et al. 2014). However, this alternative cannot rely on expensive and impractical irrigation thus development of Bc more productive under water stress requires advances in understanding the physiological basis underlying the stress tolerance in Bc of interest.

Within the *Arundineae* sub family several species have been identified as good candidates for biomass and biofuel production (Mariani et al. 2010), although a proper physiological comparison between species and accessions is lacking in the literature. Some information is available for *Arundo donax* where different accessions have been compared for their tolerance to environmental stresses (i.e. heat and water stress) under both greenhouse (Ahrar et al. 2017) and field conditions (Haworth et al. 2016). However, to our knowledge, no screening of diverse species belonging to *Arundo* has been reported to date. This contrasts with the large amount of information available for other food and biomass crops (e.g. Miscanthus, wheat, barley, maize). Thus we aim to correct this lack of information for the potentially important biomass crop *Arundo* by studying the mechanisms controlling water use and biomass accumulation for *Arundo* species under water stress. Traits such as leaf area and expansion and transpiration sensitivity to water stress, photosynthetic efficiency, pattern of nighttime transpiration and “stay green” behavior will be investigated