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Diagnosis of service tree (Sorbus domestica L.) dieback in an experimental Mediterranean agroforestry system

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Agroforestry is one of the keys to the agroecological transition. In 2008, it represented 172 500 ha of French farmland. In Hérault, at the Restinclières estate, an agroforestry research platform has been implemented in 1995 with two main tree species: hybrid walnut, Juglans nigra x Juglans regia, and service tree, Sorbus domestica L. .The service tree is a multifunctional and overlooked species of growing interest for agroforestry, forestry and urban use. Although considered drought resistant, a decline of this species has been observed on several plots within the site. The objective of this study is to identify the factors causing service tree dieback by using intra- and inter-plot variability in tree performance and retrospective analysis of growth. We assessed and quantified tree decline through architectural diagnosis. We then tested the role of water stress by focusing measurements on soil water status and root characteristics while examining several aboveground structural and functional traits. The first results highlight major water stresses over several years with differentiated impacts on the above and belowground architecture and development of trees. They show the importance of providing insights on the resilience of the service tree, in order to guide the choices of its implantation in agroforestry systems but also in forestry and urban environments.