Exploring the hydraulic functioning of *Viscum album* L. and its relationship with the host tree *Pinus sylvestris* L.

José Victor dos Santos Silva[1], Eustaquio Gil-Pelegrín[2], Rubén Martín-Sánchez[1], Juan Pedro Ferrio[1,3], José Javier Peguero-Pina[1,4] and Domingo Sancho-Knapik[1,4]*

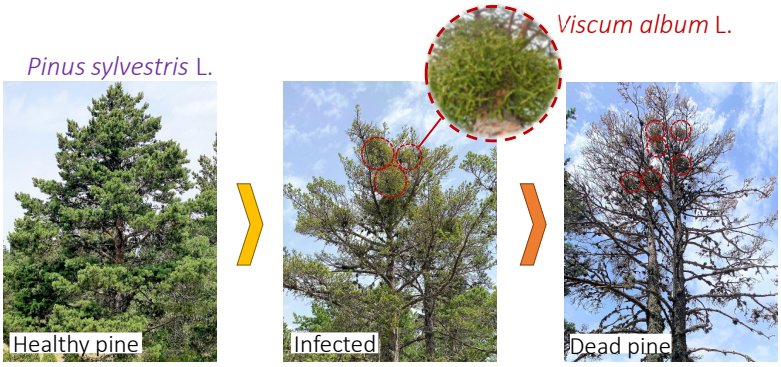
[1]Agrifood Research and Technology Centre of Aragon (CITA). Avda. Montañana 930, 50059 Zaragoza, Spain. [2]Estación Experimental de Aula Dei (EEAD), CSIC. Avda. Montañana 1005, 50059 Zaragoza, Spain. [3]Aragon Agency for research and development (ARAID), E-50018 Zaragoza, Spain. [4]Instituto Agroalimentario de Aragón - IA2 (CITA-Universidad de Zaragoza), Zaragoza, Spain

Introduction

- Excessive mistletoe infection tends to weak the host pine, which become more vulnerable to other threats such as intense droughts, that can entail anything from a slight stippling to partial or total death of the pine (**Fig.1**).
- We assessed the response to drought during summer 2023 of *Pinus sylvestris* branches with different levels of mistletoe infection in Orihuela del Tremedal (Teruel, Spain).

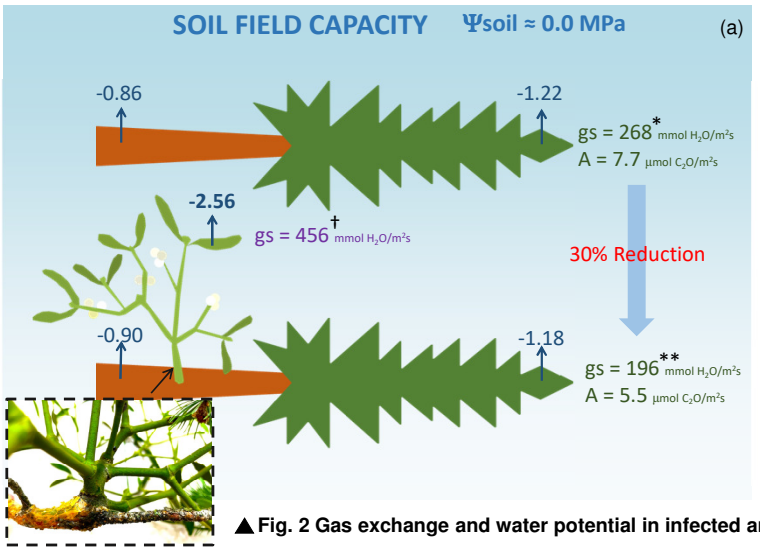
Objective:

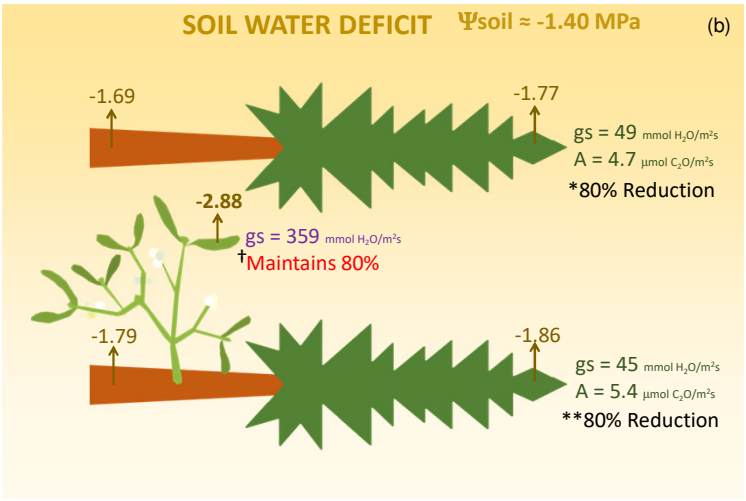
- To explore the hydraulic functioning of mistletoe in order to elucidate the possible hydraulic causes behind the host pine decline.



▲ **Fig. 1 Pine decline process due to mistletoe**

METHODS: We have measured gas exchange, pre-dawn water potential and the stem water potential gradient at midday in branches of mistletoe and scots pine in two conditions: saturated soil field capacity and soil water deficit. We have also assessed the hydraulic conductivity.



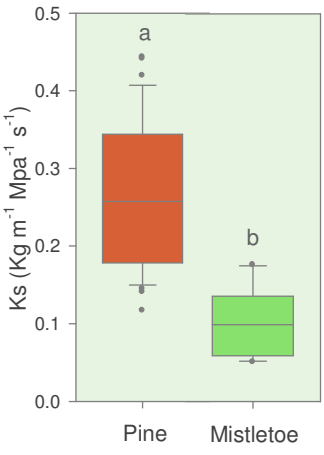


▲ **Fig. 2 Gas exchange and water potential in infected and non-infected branches with soil field capacity (a) and with soil water deficit (b)**

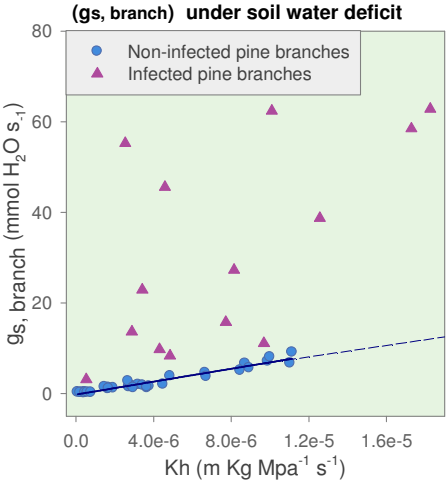
Results and discussion

- Infected branches of scots pine without soil water stress showed a 30% less in stomatal conductance and carbon assimilation than non-infected branches (**Fig. 2a**).
- At the end of summer (with a predawn soil water potential of -1.40 MPa) both types of pine branches, infected and non-infected, showed a reduction in stomatal conductance and carbon assimilation of ca. 80%, while mistletoe barely reduced stomatal conductance by 20% (**Fig. 2b**).
- The higher stomatal conductance of mistletoe together with its lower specific hydraulic conductivity (Ks, **Fig. 3**) can explain their more negative midday water potential values measured (**Fig. 2**).
- When calculating the stomatal conductance of the whole branch ($gs_{,branch}$, mmol H2O s-1), the infected branches showed a much higher $gs_{,branch}$ than the expected for a given xylem hydraulic conductivity measured in the pine prior the infection. This was specially noticed under soil water stress conditions (**Fig. 4**).
- It seems that in infected branches there is an imbalance between the whole-branch stomatal conductance and the xylem hydraulic conductivity, with in turn seems to harm the pine tissues after the mistletoe infection.

▼ **Fig. 3 Specific hydraulic conductivity (Ks)**



▼ **Fig. 4 Hydraulic conductivity (Kh) and whole branch stomatal conductance ($g_{s,branch}$) under soil water deficit**



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