

Hydrol. Earth Syst. Sci. Discuss., author comment AC3
<https://doi.org/10.5194/hess-2021-351-AC3>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Reply on CC1

Yakun Tang et al.

Author comment on "Differential response of plant transpiration to uptake of rainwater-recharged soil water for dominant tree species in the semiarid Loess Plateau" by Yakun Tang et al., Hydrol. Earth Syst. Sci. Discuss.,
<https://doi.org/10.5194/hess-2021-351-AC3>, 2022

This manuscript analyzed water consumption in response to rainfall pulses of two dominant tree species in water limited region, the result showed that mixed afforestation enhanced the influence of rainwater uptake to water consumption after rainfall pulse, regardless of sensitivity to rainfall pulses.

Response: Thanks for this comment. Indeed, this manuscript mainly focused on the influence of rainwater recharged soil water uptake by plant root to plant transpiration

after rainfall pulses, for two dominant tree species, *Hippophae rhamnoides* subsp. *sinensis* and *Populus tomentosa*. In pure plantation, the rainwater uptake proportion (RUP) significantly increased the relative response of daily normalized sap flow (SF_R) for *H. rhamnoides*. Meanwhile, the SF_R was also significantly influenced by leaf water potential gradient ($\Psi_{pd} - \Psi_m$, difference between predawn and midday leaf water potential) for *H. rhamnoides* in pure plantation. However, the SF_R was significantly influenced by $\Psi_{pd} - \Psi_m$, but not RUP, for *P. tomentosa* in pure plantation, suggesting that its transpiration was mainly constrained by plant physiological characteristics. Therefore, *H. rhamnoides* and *P. tomentosa* exhibited sensitive and insensitive responses to rainfall pulses, respectively.

Furthermore, mixed afforestation significantly enhanced RUP, SF_R , and reduced the water source proportion from the deep soil layer (100–200 cm) for both species ($P < 0.05$). The SF_R was significantly influenced by RUP and $\Psi_{pd} - \Psi_m$ for both species in the mixed plantation. Lower Ψ_m and higher Ψ_{pd} were adopted by *H. rhamnoides* and *P. tomentosa* in mixed plantation, respectively, to enlarge $\Psi_{pd} - \Psi_m$ and enhance RRS uptake. These results indicate that mixed afforestation enhanced the influence of RRS uptake to plant transpiration for these different rainfall pulse sensitive plants.