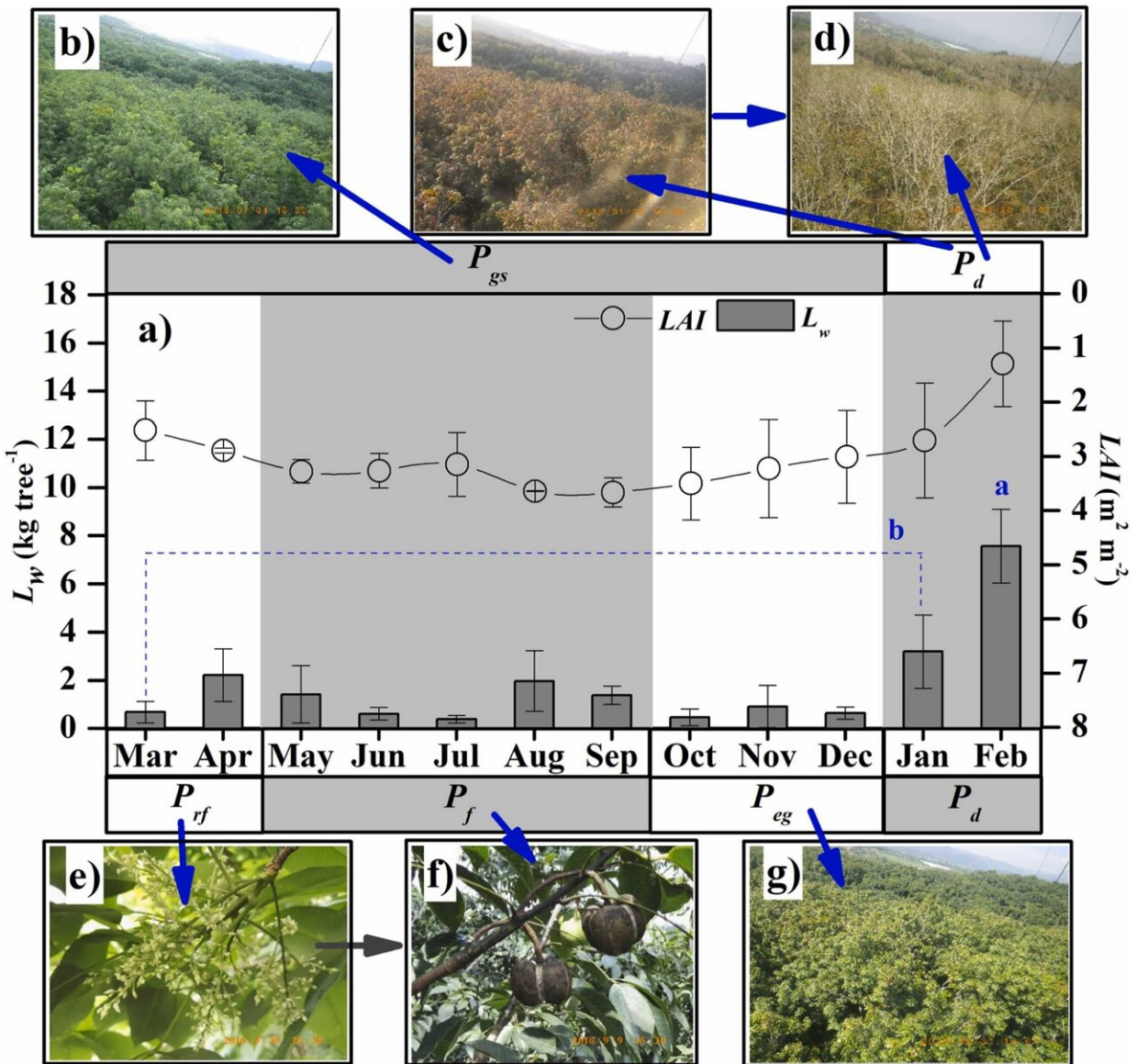


Increases in planting density tend to decrease water use efficiency in rubber trees

May 17 2022, by Zhang Nannan



Annual variation of the phenology in rubber plantations. Credit: Lin Youxing

Rubber trees (*Hevea brasiliensis*) are widely known to have high economic and defensive values. However, little is known about how the ecohydrological and coupled processes between the carbon gain and water use efficiency (WUE) of rubber plantations respond to phenological changes and site heterogeneity, i.e., the planting density and stand age.

In a study published in the *European Journal of Agronomy*, researchers from the Xishuangbanna Tropical Botanical Garden (XTBG) of the Chinese Academy of Sciences tried to explore the responses of the carbon-water coupling of [rubber](#) plantation to phenological changes, stand ages, planting densities, as well as hydrothermal conditions.

The researchers used a four-year (2013–2016) continuous dataset of biometric survey, sap flow and phenology of rubber trees in Xishuangbanna to examine WUE in response to phenological changes and cold stress.

They divided annual life cycle of rubber trees into four phenological periods rather than into months or seasons, which was more appropriate for exploring the ecophysiological characteristics of the rubber trees.

According to the researchers, WUE revealed the survival strategy of rubber trees. WUE values of the rubber trees were generally and significantly higher during the fruiting period than during other phenological periods, implying that this [tree species](#) might adjust its survival strategy to strengthen the carbon and water coupling in response to the low fruit-set rate and cold stress to adapt to the [local climate](#) and environment.

They further found that the planting density and its interactive effect

with stand age significantly depressed the effectiveness of the survival strategy and the growth of the [rubber trees](#).

"Therefore, the planting density and stand age must be well considered during the cultivation and management of [rubber plantations](#) in Southwest China," said Zhang Yiping of XTBG.

More information: Youxing Lin et al, Phenology-related water-use efficiency and its responses to site heterogeneity in rubber plantations in Southwest China, *European Journal of Agronomy* (2022). [DOI: 10.1016/j.eja.2022.126519](#)

Provided by Chinese Academy of Sciences

Citation: Increases in planting density tend to decrease water use efficiency in rubber trees (2022, May 17) retrieved 26 April 2024 from <https://phys.org/news/2022-05-density-tend-decrease-efficiency-rubber.html>

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