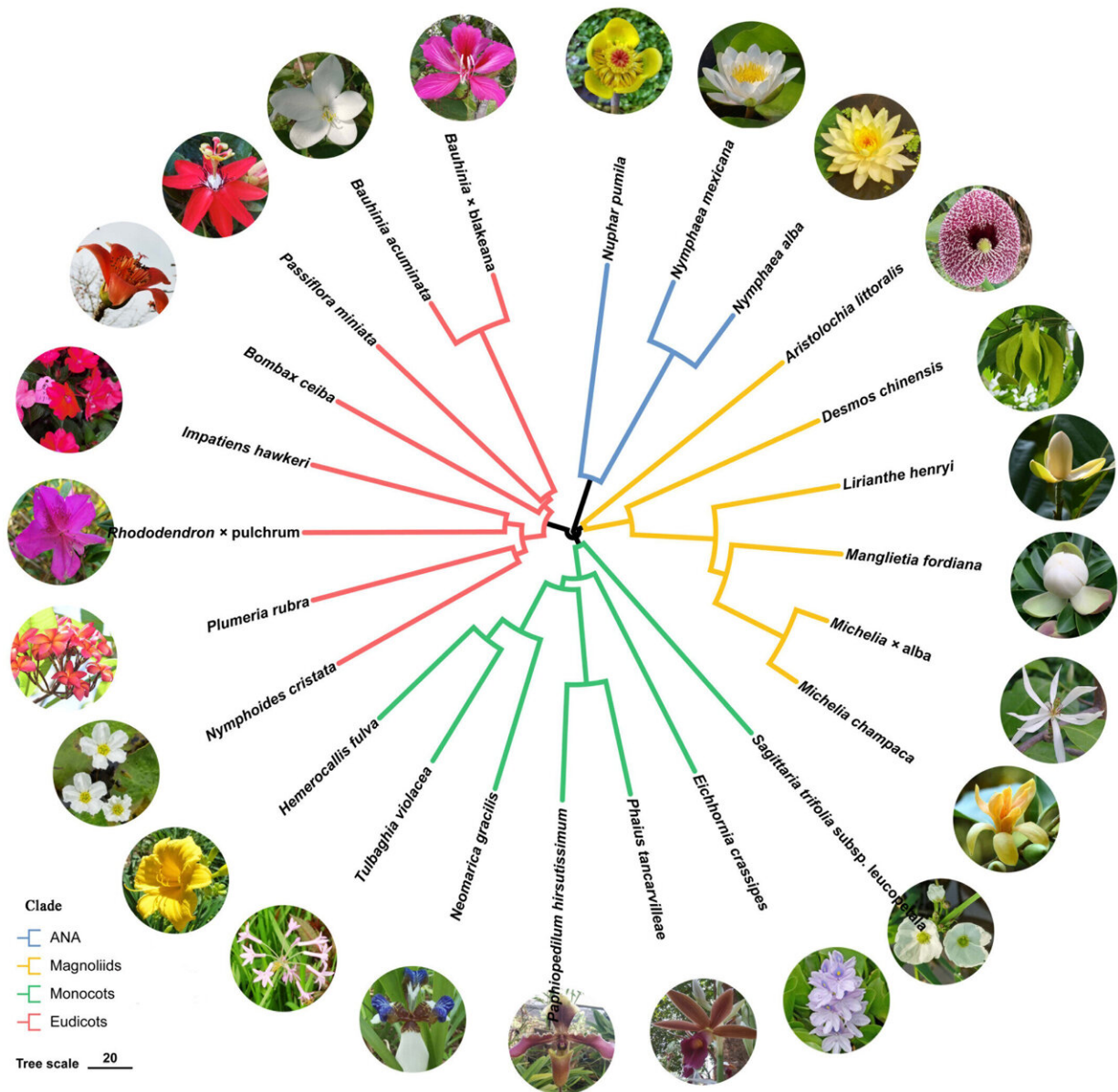


How flowers maintain water balance across different angiosperm branches

March 22 2024, by Zhang Nannan



Phylogenetic relationships of the 24 species studied. Branches were color-coded to represent different clades: blue for ANA clade, yellow for magnoliids, green for monocots, and red for eudicots. Credit: Ke Yan

Flowers play an essential role in maintaining a species' genetic stability. Understanding how flowers regulate water use strategies to adapt to their environment is crucial for better understanding floral evolution and plant-pollinator-environment interactions. However, the mechanisms by which flowers maintain water balance are poorly understood across angiosperm branches.

In a study published in [*Plant Biology*](#), researchers from the Xishuangbanna Tropical Botanical Garden (XTBG) of the Chinese Academy of Sciences investigated the differences in flower water use strategies between basal angiosperms and derived groups (monocots and dicots).

They measured 29 floral traits related to water transport, storage, and loss in 24 species from the ANA [Amborellales (A), Nymphaeales (N), Austroballeyales (A)] grade, magnoliids, monocots and eudicots.

They found that there is a strong relationship between flower hydraulic structure and function, but this relationship differs between basal angiosperms and monocots/eudicots. Basal angiosperms exhibited floral traits associated with higher water and carbon costs, such as petal stomatal density, stomatal pore area index, pedicel hydraulic diameter, maximum vessel diameter, and theoretical hydraulic conductivity.

Conversely, monocots and eudicots had higher values for traits associated with lower carbon costs, with higher values for traits such as petal epidermal cell size, petal adaxial epidermis thickness, and pedicel

vessel wall reinforcement.

Furthermore, there were significant differences in the coordination and trade-offs among floral traits in basal angiosperms, monocots, and eudicots. The correlation between pedicel theoretical hydraulic conductivity and pedicel vessel density was negative only in basal angiosperms, while the correlation between pedicel theoretical hydraulic conductivity and vessel wall reinforcement was negative only in monocots and eudicots.

In addition, there were strong correlations between reproductive and hydraulic traits in [flowers](#), suggesting that changes in water resource availability can significantly affect plant reproduction.

The researchers thus concluded that basal angiosperms maintain water balance with high water availability, while monocots and eudicots maintain a more conservative [water balance](#).

"Our results systematically reveal the variation in economic and hydraulic traits of flowers from different [angiosperm](#) branches, deepening our understanding of flower water use strategies among these plant taxa," said Zhang Jiaolin of XTBG.

More information: Y. Ke et al, Monocots and eudicots have more conservative flower water use strategies than basal angiosperms, *Plant Biology* (2024). [DOI: 10.1111/plb.13637](https://doi.org/10.1111/plb.13637)

Provided by Chinese Academy of Sciences

Citation: How flowers maintain water balance across different angiosperm branches (2024, March 22) retrieved 29 April 2024 from <https://phys.org/news/2024-03-angiosperm.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.