

Savanna plants show high physiological resilience to extreme drought

February 3 2023, by Zhang Nannan



An aerial view of the dry-hot valley savanna ecosystem. Credit: Yang Da

Extreme drought events can affect the physiological function and growth

of plant. Understanding the physiological mechanisms of how plants respond to extreme drought is crucial for predicting plant performance under future climate change. In 2019, a valley savanna in Yuanjiang, China experienced an extreme drought. It provided a unique opportunity to test how woody plants of different functional groups respond physiologically to natural extreme drought.

In a study published in *Science of The Total Environment*, researchers from the Xishuangbanna Tropical Botanical Garden (XTBG) of the Chinese Academy of Sciences investigated how hydraulic traits and gas exchange parameters of savanna plants with different leaf habits (deciduous, semi-deciduous and evergreen) or growth forms (tree and shrub) responded to the extreme drought in 2019 in Yuanjiang.

The researchers measured the hydraulic conductance of leaves, stems and whole-shoots, leaf gas exchange, and leaf mass per area of 18 common woody species during three rainy-seasons from 2019 to 2021 in a dry-hot valley savanna in Yaunjiang. They also compared the leaf gas exchange during and after the drought with that of a normal pre-drought year (2014).

They found that leaf stomatal and hydraulic conductance and maximum photosynthetic rate were significantly lower during the 2019 drought than in the wetter years. In 2019, all plants studied maintained stomatal conductance at the observed minimum level, which could be related to high vapor pressure deficits.

After extreme drought leaf stomatal conductance and photosynthesis recovered. The photosynthetic recovery could be related to the maintenance of hydraulic integrity in the stem xylem. Furthermore, the physiological response to extreme drought was similar between leaf habits and growth forms.

"Our study reveals a high physiological resilience of savanna plants to extreme drought in terms of recovery of leaf photosynthesis. It provides important physiological results for understanding how savanna [plants](#) of different [leaf](#) habits and growth forms respond to natural [extreme drought](#), which may help predict the response of savanna ecosystems to future climate change," said Zhang Jiaolin of XTBG.

More information: Da Yang et al, Physiological response and photosynthetic recovery to an extreme drought: Evidence from plants in a dry-hot valley savanna of Southwest China, *Science of The Total Environment* (2023). [DOI: 10.1016/j.scitotenv.2023.161711](https://doi.org/10.1016/j.scitotenv.2023.161711)

Provided by Chinese Academy of Sciences

Citation: Savanna plants show high physiological resilience to extreme drought (2023, February 3) retrieved 25 April 2024 from <https://phys.org/news/2023-02-savanna-high-physiological-resilience-extreme.html>

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