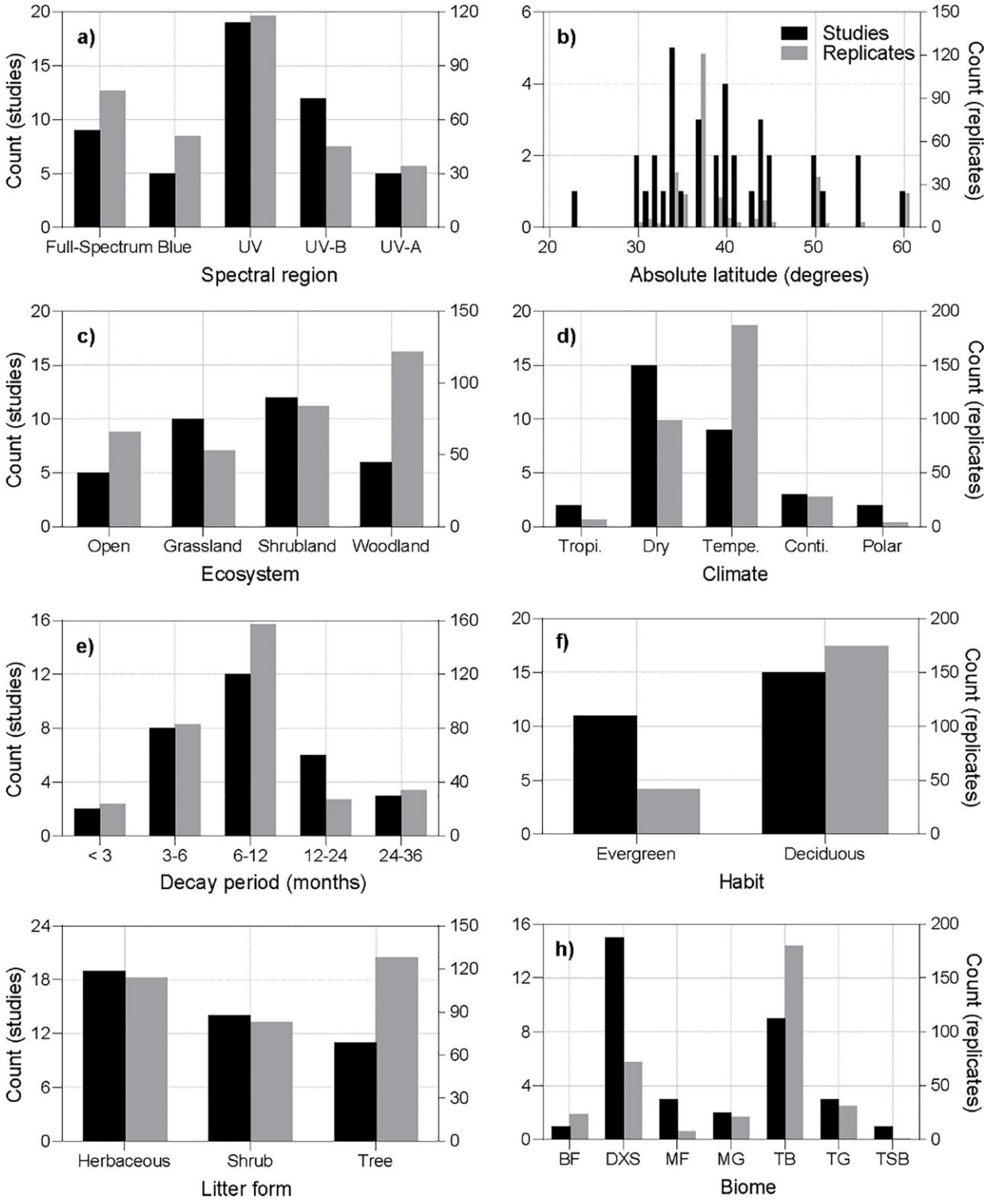
Blue light is the key factor affecting leaf litter photodegradation

August 25 2022, by Li Yuan



Bias representation: number of studies and replicates by a) each spectral region, b) absolute latitude of the field sites of the studies, c) ecosystem type; d) climatic zone (see ESM Appendix-5 for more details about the climate classification); e)

decay period (months), f) litter habit, g) litter form and h) biome type. The climate are: Tropical climate (Tropi.); Dry climate; Temperate climate (Tempe.); Continental climate (Conti.); Polar climate. The biomes are: Boreal forests / Taiga (BF); Deserts and xeric shrublands (DXS); Mediterranean Forests, Woodlands and Scrub (MF); Montane grasslands and shrublands (MG); Temperate broadleaf and mixed forests (TB); Temperate grasslands, savannas and shrublands (TG); Tropical and subtropical moist broadleaf forests (TSB). The repilcates are not repeated measures, but represent the number of independent treatments (e.g. field sites) of one species. Credit: *Plant and Soil* (2022). DOI: 10.1007/s11104-022-05596-x

Sunlight impacts litter decomposition in terrestrial ecosystems through the process of photodegradation. Previous studies on litter photodegradation focused on the effects of ultraviolet (UV) radiation, and only recently have the photodegradation effects of other spectral regions of sunlight (e.g., blue and green light) been addressed.

Dr. Wang Qingwei from the Institute of Applied Ecology (IAE) of the Chinese Academy of Sciences (CAS), together with his colleagues, has revealed that blue light is the key factor affecting litter photodegradation.

The study was published in *Plant and Soil*.

The researchers reviewed the research on photodegradation. Through meta-analysis, they investigated the photodegradation processes of leaf litter of 110 plant species under ambient sunlight.

"Compared to darkness, the full spectrum of sunlight increased rates of litter decomposition by 15% on average across all studies, and blue light alone accounted for approximately 90% of this increase," said Dr. Wang. UV radiation, including UV-A and UV-B, were generally not

responsible for global photodegradation in spite of its importance in particular environments.

The researchers also revealed that the rates of photodegradation could be affected by initial litter traits, for example, carbon and lignin contents, lignin to nitrogen ratio and specific leaf area.

The study confirmed that photodegradation is a major driver of litter decomposition, and highlighted that blue light is the predominant driver of plant litter photodegradation across biomes.

More information: Qing-Wei Wang et al, The crucial role of blue light as a driver of litter photodegradation in terrestrial ecosystems, *Plant and Soil* (2022). DOI: 10.1007/s11104-022-05596-x

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