Leaf economic spectrum and structural defenses are coupled in spiny species

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Previous studies have shown that spines are associated with resource acquisitive life-history strategies. However, the studies included both spiny and non-spiny species (i.e. species that never produce spines), potentially masking subtler variation among different spiny plants in their productivity–defense trait relationships.

In a study published in *Oikos*, researchers from Xishuangbanna Tropical Botanical Garden (XTBG) conducted a large-scale common garden study to examine the links between the leaf economic spectrum (LES), structural defenses (spines, leaf fiber and lignin content), quantitative chemical defense (condensed tannins) and sapling growth rate of spiny species.

The researchers grew 42 spiny species, from diverse environments, under common garden conditions for 15 weeks and measured LES (leaf N, SLA and assimilation rate), defense and growth traits.

Given that spines derived from distinct organs likely have differential effect on leaf morphology and physiology, they also tested whether species with different spine types partitioned out along the LES given.

The results demonstrated that structural defense traits (spines, leaf lignin and fiber content) are coupled with the LES but are decoupled from quantitative chemical defense.

Importantly, their analyses disclosed positive synergies between spines

and leaf structural defense traits (fiber and lignin) whereas leaf structural defense traits were less integrated with condensed tannins (a measure leaf chemical defense)

"Our study shows that the LES and structural defenses are coupled in spiny species such that constitutive growth—defense strategies range from fast-growing species with low allocation to defenses to slow-growing species that invest heavily in structural defenses (dominated by leaf spiny species)", said Dr. Kyle W. Tomlinson, principal investigator of the study.

More information: Mohammed Armani et al. Structural defence is coupled with the leaf economic spectrum across saplings of spiny species, *Oikos* (2020). DOI: 10.1111/oik.06960

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