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Effects of nitrogen addition on foliar traits of the dominant tree species in two subtropical evergreen forests in eastern China

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As important components of leaf economic spectrum (LES), specific leaf area (SLA), chlorophyll (Chl) content, and foliar nutrient content are crucial plant functional traits (PFT) and essential parameters in most earth system models. Among those, SLA, Chl, foliar carbon (C), nitrogen (N), phosphorus (P) content and their stoichiometry are key indicators which are frequently focused on due to their application in predicting vegetation dynamics and ecosystem productivity in response to anthropogenic perturbations, especially atmospheric N deposition increase. With the hotspot of global N deposition transferred to subtropical and tropical regions, how forest ecosystem changes in these ecoregions response to N deposition has attracted great attention during the past decades. Hence, we established a network of nutrient enrichment experiments in eastern China's forests (NEECF) for exploring the effects of N deposition in 2010.

To evaluate the effect of long-term N addition on foliar traits, we conducted field sampling of the dominant tree species (i.e., *Castanopsis eyrie* and *Castanopsis sclerophylla*) in two subtropical forests on the platform of NEECF in August, 2020. 100 kg N ha^{-1} yr^{-1} were applied in each forest with 3 replications of plots, respectively. The adults and seedlings of the two dominant species were sampled to make a contrast. Through the subsequent detection and analysis, we found that: (1) leaf-trait syndrome of the dominant species in two subtropical forests followed the predictions of global LES, and the growth strategy of the old-aged *C.eyrie* forest was more conservative than the middle-aged C.*sclerophylla* forest; (2) N addition had no significant effect on leaf N contents and C:N ratios of both species, but significantly reduced SLA and Chl content of *C. eyrie* adults and increased C content of *C. sclerophylla* seedlings. Moreover, both species showed a more consistent trend of decreasing P content and a corresponding increase of C:P and N:P ratios. (3) N addition shifted the C~P scaling relationship of both species and SLA~P scaling relationship of *C. sclerophylla*.

Our results verified the existence of LES patterns among closely related species at the local scale. Moreover, we found that N addition showed varied effects on different leaf traits and trait-pairs relationship of subtropical evergreen plants. 10 years' N addition of high dosage significantly aggravated P limitation in subtropical evergreen forests, which led to a more conservative growth strategy, especially in middle-aged C.*sclerophylla* forest. Our work through site-level case study provided data support for connecting foliar functional traits with earth system models, which

will contribute to enhance the predictions of ecosystem function and vegetation dynamics in the context of increasing global N deposition.