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Post-fire regeneration strategies contribute to plant growth dynamics and habitat selection in subtropical monsoon fire-prone ecosystem

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In fire-prone ecosystems subjected to frequent fires, trees species with different post-fire regeneration strategies (PFRS) coexist at local scale. Different growth dynamics and habitat selection of species account for their coexistence. To explore how much variety is decided by the PFRS, we selected four co-occurring tree species including one Facultative seeders (FS) species and three obligate resprouters (OR) species, conducted a field investigation to measure growth dynamics at sites with different time since last fire (TSF) and recorded its living environment information in Central Yunnan Plateau. We also measured the burl size of OR species to subclassify PFRS into obligate resprouters-resprouts number (OR-N) and obligate resprouters-resprouts height (OR-H) by the growth priority to quantity or height. Generally, FS and OR species exhibited different seedlings clump density and height growth rate (HGR) and showed different temporal dynamics. OR-N species occupied post-fire gaps with rapid canopy growth and were more predominant than OR-H species and FS species at the early period of post-fire regeneration, while OR-H species had the highest HGR. However, such difference was not well explained by environmental factors (R^2 < 20%) except seedlings growth rate, while explanation increased when subclassfication was considered as random factor in linear mixed models (LMMs). Moreover, species habitat selection was also associated tightly with regeneration strategies. The result of Redundancy Analysis (RDA) indicated that Pinus (FS) dominated on sunny slope was consistent with gap-dependence model and environment-variability model, and Cyclobalanopsi (OR-H) are favored in the fertile sites that can facilitate its height growth. Resprouters species Lithocarpus which prefer growing on sunny slope in unburned areas but showed preference on shade slope in post-fire regeneration. Therefore, the impacts of regeneration strategies caused some species shift their normal distribution ranges after fire. In conclusion, different growth dynamics and habitat selection of the four tree species during the post-fire regeneration enable their coexistence. Our study provides a novel perspective that by using subclassification of regeneration strategies, the prediction power of species performance and niche partitioning can significantly increased.