ABS-00077

Overcoming arrested succession in secondary, low-diversity tropical forest: Inferences from an enhancement planting experiment utilising artificial canopy gaps in Hong Kong

M.L. Cheuk[*], J. Zhang, H. Zhu, F. Cardoso, and S.W. Gale

Kadoorie Farm and Botanic Gardens, Hong Kong SAR, China

[*]Corresponding author email: mlcheuk@kfbg.org

Keywords: arrested succession, artificial forest gap, *Machilus chekiangensis*, secondary tropical forest, seedling survival and growth, species selection

The recruitment of mid- and late-successional tree species can be limited in low-diversity secondary forests and plantations due to the combined effects of a closed, single-age canopy and the absence of vertical structuring. Identifying the factors that determine the performance of seedlings in the understorey, and understanding the means by which they do so, is critical to overcome arrested succession for canopy enhancement in the context of forest restoration. To investigate this topic in the Asian tropics, we established eight 20 × 20 m plots in naturally regenerated secondary forest dominated by *Machilus chekiangensis* (Lauraceae) in Hong Kong. The plots were fenced and selected *M. chekiangensis* stems were removed from each to create canopy gaps of 2–250 m^2. A total of 1,280 tree seedlings representing 45 native species were then planted randomly in the understorey under varying levels of canopy openness. Gap size was monitored using drone imagery, and seedling survivorship and height were surveyed annually from 2020 to 2022. We examined species survivorship between plots as well as in relation to canopy openness. We also tested whether growth rate differed between species, plot location, topography and light conditions. Generalised additive models were used to test whether non-linear relationships existed between growth rate, canopy openness, slope and curvature, and to assess whether performance could be explained by selected functional traits. Results revealed that survivorship varied significantly by species and plot location, and that growth rate was significantly influenced by gap size and plot location, but not slope, curvature or functional trait. We synthesise a list of native species that appear suitable for enhancement planting in forest gaps in South China and conclude that this approach is a practical way to break arrested succession in a low-diversity secondary landscape.