

Ontogenetic changes in carbohydrate storage and sprouting ability in pioneer tree species in Peninsular Malaysia

ABSTRACT

Sprouting ability is highly variable among different tree species. In many cases, there are trade-offs in carbon allocations between growth and storage in seedlings. However, this trade-off is likely to change with growth stages from seedling to mature plant because carbon investments in reproductive activities and/or risk of disturbance also change by species and growth stage. To examine how sprouting ability and carbohydrate storage change with growth stage, we compared two tropical secondary-forest trees, *Macaranga bancana* and *M. gigantea*, which have different ecological traits. Maximum tree size and growth rate are higher in *M. gigantea*. We monitored sprout growth and stored resources, including total non-structural carbohydrate (TNC) and nitrogen in the root, among different tree sizes for 12 months following stem-cutting treatment. Sprouting ability (total sprout mass) and TNC concentrations were significantly higher in small individuals than in larger specimens in both species. TNC concentration decreased in all size classes after stem cutting. *Macaranga bancana* had greater sprout survivorship than *M. gigantea*, which had higher sprouting ability in larger tree-size classes. Thus, sprouting ability likely depends on root TNC concentration and tree-size class in both *Macaranga* species. Higher TNC concentration and sprout survival rates in *M. bancana* may be related to greater carbon allocation in survival than in growth. This hypothesis is consistent with the ecological traits of *M. bancana*, such as its growth rate, which was lower than that of *M. gigantea*.

Keyword: Carbon allocation; Growth-survival trade-off; *Macaranga bancana*; *Macaranga gigantea*; Non-structural carbohydrate; Resprouting; Wood density