

Carbohydrate storage in plants: implication for stress tolerance and invasion

Kaoru Kitajima, Associate Professor, Department of Biology, University of Florida

Plants need to maintain a positive net carbon balance integrated over ecologically meaningful time. However, the balance between photosynthesis and respiration exhibit large temporary changes due to weather conditions, seasons, phenology, and various abiotic and biotic disturbances. Non-structural carbohydrates (NSC, the total of starch and simple sugars), thus, are important in order for plants to recover from the periods of negative carbon balance. The importance of NSC is well studied in relation to seasonal regrowth of deciduous species and fire adaptation. However, ecological role of carbohydrate storage is understudied for shade tolerance of both native and successful invasive exotic plants in the forest understories. Two opposing views exist about the adaptive strategies to shaded forest understories. The classical view is that shade adaptation is achieved through maximization photosynthetic light utilization efficiency to maximize net carbon gain rates. The second alternative is that shade adaptation requires conservative strategy to maintain adequate carbohydrate storage so that they can recover rapidly from accidental tissue loss, especially when instantaneous photosynthetic income is severely limited by shade. I will use large comparative datasets of neotropical tree juveniles and two ecotypes of an invasive exotic shrub, *Ardisia crenata*, in Florida as example to evaluate these contrasting views on adaptive syndromes to shade.