

# What benefits do early-leafing trees gain over facultative-leafers in an African savanna?

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African savannas are complex and their phenological patterns are no exception. The objective of our research is to determine whether a known early-leafing species, *Burkea africana* (wild seringa), has gained any growth benefits over a co-habiting facultative-leafing species, *Terminalia sericea* (silver cluster-leaf or silver terminalia), in the Nylsvley Nature Reserve, Limpopo Province. For this purpose we are monitoring the trees weekly over two consecutive growing seasons and comparing their phenology, physiology, nutrient uptake, and invertebrate herbivory levels.

Several theories have been proposed suggesting that early-leafers benefit by earlier access to available soil nutrients over their grassy competitors. We are testing this theory through a mineralization study coupled with a nitrogen tracer. This enables us to take isotope samples from different parts of the trees and their grassy neighbours over the season and determine when and where the tracer nitrogen is being used.

Another theory is that early-leafers have a longer, more productive growing season. This theory is being tested through weekly assessments of phenology, photosynthetic rates and chlorophyll content and fluorescence.

The final theory being tested in our research is that early-leafers avoid herbivory through production of new leaves during the dry season when invertebrate activity is at its lowest. We are monitoring herbivory levels at a canopy and leaf scale. We are also assessing whether new leaves are more susceptible to herbivory than mature leaves.

Environmental conditions are being monitored throughout the study to understand how they may influence the phenological patterns of our species. An irrigation experiment has been designed to test the influence of water on the green-up processes of both species. In the first season, we had no early-leafing occurring as the seasonal rainfall started too early. However, this provided us with the opportunity to study the green-up rates in *Burkea africana* and *Terminalia sericea* under the same conditions. We are beginning our second season of fieldwork and are hoping to see early-leafing occur, but we will wait to see what happens with this season's rainfall first. By the end of this season we hope to bring some consensus to the debate over the benefits of early-leafing in an African savanna.



**Left:** A *Burkea africana* shoot emerging at the start of the green-up period. **Middle:** A fully greened *B. africana* with *Terminalia sericea* in the background. **Right:** Puss moth larvae (*Epicerura* spp.) feeding on a *T. sericea* leaf during the green-up period.