



5^e Congrès mondial d'agroforesterie

En **transition** vers
un **monde viable**

Québec • 17-20 juillet 2022

Inverted phenology of *Faidherbia albida* paced with the dynamics of the water table

Olivier Roupsard, CIRAD, Senegal

Waly Faye, UCAD, Senegal

Sidy Sow, ISRA, Senegal

Djim M.L. Diongue, UCAD, Senegal

Didier Orange, IRD, Senegal

* Frederic C. Do, IRD, Senegal

Christophe Jourdan, CIRAD, France

Christine Stumpp, Institute for Soil Physics and Rural Water Management, University of Natural Resources and Life Sciences Vienna, Austria

Serigne Faye, UCAD, Senegal

Faidherbia albida is an emblematic species of agro-sylvo-pastoralism in African semi-arid areas. It combines inverted phenology (strong growth, N-fixation and production of highly palatable fodder during the dry season, ideal for livestock), defoliation during the rainy season (ideal for minimizing competition with crops) and use of deep resources mainly (riparian in its natural habitat, phreatophyte in parklands, deeply rooted, avoiding drought stress, using mostly groundwater (isotopic evidence), ideal for recycling). What could drive the inverted phenology then? Past research most often sought to correlate its peculiar phenology with climate variables, but hardly considered its deep roots and phreatophyte behavior. We set up a collaborative observatory (Faidherbia-Flux) in a Senegal parkland in 2018 and monitored the foliar phenology of 15 adult trees (LAI2000), radial growth, sap flow and wood water content (capacitive probes). We also monitored the dynamics of soil humidity (TDR profiles) and water table fluctuations (5-6 m, piezometers). Drainage did reach the water table, but its maximum level was delayed till the end of the wet season, corresponding to the time when *Faidherbia* emitted new leaves. 100% foliage was maintained until the end of December, concurrently with a maximum growth, sap flow and water table level. From January to July (driest period), we observed a slow decrease in the water table level, foliage and transpiration, all reaching minima by the end of July (start of the defoliated phase), but no drought stress. Interestingly, wood rehydrated till end of the rainy season (September-October). Considering such coincidences between deep hydrological (delayed rewatering), wood rehydration and phenological phases (inverted phenology), we suggest that this deeply rooted and phreatophyte species adjusts its phenology according to the water table and wood water content, shedding leaves when those levels reached minimum and bursting only when they resumed to maximum.