



***Patterning and pioneer processes of the herbaceous front  
in a tiger bush***

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ensely vegetated arcs parallel to the contour alternating with zones of bare soil are widespread in South West Niger. Seen from the air, this typical pattern resembles a tiger fur, hence its common name of tiger bush. Due to the occurrence of impervious soil crusts, the bare interband acts as the source of run-on for the downslope band. Therefore, the fringe between runoff and runon zones has been hypothesized as crucial for the dynamics of the system. This paper aims (i) to present a detailed characterisation of this peculiar ecotone, (ii) to infer some insights on the dynamics of the tiger bush system.

The zone of study was located 70 km East of Niamey and consisted of a rectangular of 60 m long and 30 m wide, perpendicular to a typical wavelength. The survey included microtopography using a laser topometer, surface features (crusts, termite mounds, etc.), herbaceous and woody vegetation. Soil moisture (neutron probe) was monitored over four years along a transect and related to the dynamics of the herbaceous layer.

The pioneer zone is occupied by annual grasses (predominantly *Michrochla indica*), and further down the slope by shrub (*Guiera Senegalensis*) underlain by an herbaceous layer of *Cyanotis lanata*. The mean slope gradient (0.3[ across the bare interband) gradually decreases in the vegetated arc. However, the upslope herbaceous pioneer zone does not present a straight edge but local convexities (named salients or capes) and concavities (pockets or bays). In the capes, the pioneer *Guiera senegalensis* were most often associated

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with micromounds which might be ascribed to increased soil porosity (root and faunal activity) and dust accumulation. In contrast, topography of the bay was flattened due to the accumulation of surface wash deposits as testified by the extension of sedimentation crusts. Furthermore, bays offered greater water resource availability than the capes. A minimum threshold water storage of 20 mm within the upper soil 20 cm was determined to enable the colonisation by *Michrocloa indica*. However, the colonization the bare interband by this herbaceous layer was not constrained only by water availability because this threshold has been exceeded in the bare interband during most wet rainy seasons. Such limitation could be attributed rather to a low seed stock in the bare ground and to erosion and gravel crusts which are much more resistant to seedling emergence than sedimentation crusts.

These results suggest that the contrast between capes and bays induce feedback processes. The microtopography of the capes tend to deviate the overland flow to the bays favouring thus the gradual levelling of these pockets by surface wash deposits, the water supply of the central zone of the arc and the colonisation of the bays by herbaceous species. This herbaceous layer tends in turn to attract termites and to prepare better environmental conditions for the establishment of pioneer shrub. Whenever these processes lead a bay to catch up with the line of the capes, these latter are turned into bays and the cycle can start again. This strongly support the hypothesis of upslope migration of the arcs, as a result of a preferential colonization of bays.