

THE EFFECT OF FROST/FREEZE EVENTS ON MOPANE TREES

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There are many studies that suggest frost as a possible driver of savanna structure and function, without actually showing how this impact occurs. This study shows that *Colophospermum mopane* (Mopane Tree) is affected by frost/freeze events and this could be related to the unique distribution pattern of this species. Frost is an umbrella term for all natural weather events that result in temperatures falling below the freezing point (0°C). A freeze event, however, describes a severe cooling event which results in the extracellular water within a cell freezing, often killing the impacted material. Advection frost events occur when large-scale cool air-masses move over an area and cause temperatures to plummet rapidly, resulting in widespread frost and freeze damage to exposed biota. The nature and extent of individual damage was attained through an analysis of leaf and branch damage after a severe freeze event in June 2010. The study compared *C. mopane* along a gentle gradient in the Venetia Limpopo Nature Reserve, Limpopo Province. As predicted, lower elevation areas where temperatures would be coldest, had the most severe evidence of freeze damage with smaller, coppicing individuals sparsely distributed across this region of the study site. In comparison, at high elevations where temperatures were comparatively warmer, trees displayed very little damage and were larger, forming dense woodland stands. By monitoring the recovery of the damaged individuals, the patterns of damage were further explored. At lower elevations, topkill was evident and is the likely driver for the observed height differences across the slope, where smaller trees are trapped in what can be termed a “freeze trap”. This freeze trap was measured below four meters in vertical height, with the severest damage occurring between 1.5 to 2.5 m. Any individuals taller than this four meter cut-off have an advantage over smaller trees, as they can continue to grow tall, whilst unhindered by the death of some of their lower branches. From the observed height differences, growth forms and densities across the slope, we can infer that over a long-term period frost can have a significant influence on the shape of *C. mopane* populations and potentially other savanna species as well. The clear southern boundary of *C. mopane* suggests that frost may be a contributing factor in the exclusion of this species at cooler southern latitudes.