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Natural Regeneration Dynamics in Different Microsites within Gaps of Different Sizes

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Abstract : Not much research has gone into the dynamics of natural regeneration of trees species in tropical forest regions. This study seeks to investigate the impact of gap sizes and light distribution in forest floors on the regeneration of Celtis mildbraedii (CEM), Nesogordonia papaverine (NES) and Terminalia superba (TES). These are selected economically important tree species with different shade tolerance attributes. The spatial distribution patterns and the potential regeneration competition index (RCI) among species using height to diameter ratio (HDR) have been assessed. Gap sizes ranging between 287 – 971 m^2 were selected at the Bia Tano forest reserve, a tropical moist semi-deciduous forest in Ghana. Four (4) transects in the cardinal directions were constructed from the center of each gap. Along each transect, ten 1 m^2 sampling zones at 2 m spacing were established. Then, three gap microsites (labeled ecozones I, II, III) were delineated within these sampling zones based on the varying temporal light distribution on the forest floor. Data on height (H), root collar diameter (RCD) and regeneration census were gathered from each of the ten sampling zones. CEM and NES seedlings (≤ 50 cm) and saplings (≥ 51 cm) were present in all ecozones of the large gaps. Seedlings of TES were observed in all ecozones of large and small gaps. Regression analysis showed a significant negative linear relationship between independent RCD and H growth variables on dependent HDR index in ecozones II and III of both large and small gaps. There was a correlation between RCD and H in both large and small gaps. A strong regeneration competition was observed among species in ecozone II in large (df 2, F=3.6, p=0.035) and small (df 2, F=17.9, p=0.000) gaps. These results contribute to the understanding of the natural regeneration of different species with regards to light regimes in forest floors.

Keywords : Celtis mildbraedii, ecozones, gaps, Nesogordonia papaverifera, regeneration, Terminalia superba
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