

Assessment of Regeneration Situation in natural and in plantation parts of *Elsareef* Reserved Forest, Kordofan Region, Sudan



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Introduction

The natural regeneration is considered the backbone for the continuity and sustainability of the forest (Eltahir, 2011). It is necessary to know the different life stages of regeneration for demographic study.

In forest stands that lack catastrophic disturbances, physical conditions significantly affect the temporal fluctuation of sapling population size (Connell and Green, 2000; McCarthy and Evans, 2000; Hall and Harcombe, 2001).

Mortality remains one of the least understood components of growth and yield estimation (Hamilton, 1986).

Objectives

To assess the current structure of regeneration and their demography in natural and plantation parts of *Elsareef* reserved forest (ERF) and to appraise the effect of silvicultural influences and recurrent natural disturbance on regeneration. To examine the potential effects and relationship between natural and artificial regeneration.

Study area

ERE located in North Kordofan about 133km western Elobied. It is estimated by approximately 1812.12 ha (FNC, 2009). The forest was reserved to protect the area from desertification and desert encroachment, shelter belt, and to supply the people with fuel wood, timber and NTFPs. In 2009, the forest was subjected to thunders and recurrent wind storms which resulted in falling of 132 and 73 trees of *Terminalia brownii* and *Albizia amara* respectively. The forest suffered from frequent fires and illegal grazing.

Methodology

Systematic sampling was applied; 40 square plots of 20 m² in size were spaced every 100 m along linear and parallel transects separated by 200 m from one another. Regenerations were classified in three categories (Fig. 1&3), according to age, size and morphology and according to Starfinger 1991 and Chinchilla 1994 and Siebert, 2000. Wild or domestic animal effect, browsing or grazing damage was categorized, observed and recorded. Regeneration vitality was considered as (C1: well established, C2: dying, C3: Dead).

Data Analysis

Demographic and structural analyses of the tree species were done. Demographic parameters were determined with reference to Starfinger (1991) while structural parameters were determined with reference to Lamprecht (1989). SPSS and Excel sheet were used too. Species with no regeneration and species which represented only by seedlings stage were identified and encountered too. SPSS and Excel sheet were used for analysis.

Results

There was 6 regeneration species in natural part, and 8 species were recorded in the plantation. 3 species have grown in both natural and plantation parts; *Albizia amara*, *Terminalia brownii* and *Acacia senegal*.

3 species have grown only in natural part; *Boscia senegalensis*, *Acacia tortilis*, and *Acacia nilotica*. 4 species have grown only in plantation; *Ziziphus spina-christi*, *Grewia tenax*, *Adansonia digitata* and *Tamarindus indica*. (Figure1, and Figure, 2).

Regeneration density

The 2nd regeneration classes showed the highest density of seedlings. There was low density of *Albizia amara* and *Boscia senegalensis* compared with the 2nd and 3rd classes. The seedlings density of *Terminalia brownii* was lower than *Albizia amara* and *Boscia senegalensis* (Figure,1). *Grewia tenax* showed high density for 2nd regeneration class. It scored the second position after *Acacia senegal* in plantation.

Some species have grown naturally e.g. *Tamarindus indica* and *Albizia amara* but their densities were very low (Figure 2).

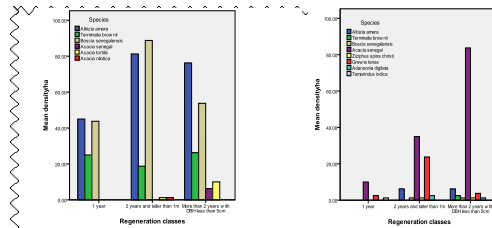


Fig 1 and Fig 2 Density of regenerations in natural (left) and in plantation (right) part of ERF

Regeneration mortality

The mortality was recorded in all life stages of regenerations; its proportion varied from species to species and it varied within one species too. The most affected species were *Albizia amara* and *Terminalia brownii*. The affected seedlings stages of *Albizia amara* and *Terminalia brownii* were the 2nd regeneration class (Figure 3). In addition, 3 species were affected *Acacia senegal*, *Ziziphus spina-christi* and *Boscia senegalensis*. Comparing the mortality in both natural and plantation, the mortality was higher in plantation than in natural part of the forest (Figure 4).

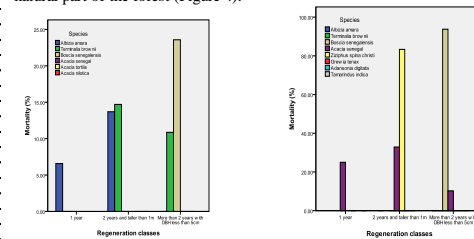


Fig 3. Mortality of regeneration in natural (left) and in plantation (right)

Conclusion

The forest is diverse in term of species structure and composition. Fabaceae is the dominant family due to the high frequency of its individuals. The forest situation is getting better because the **natural regeneration stock** is considerable. The natural part of the forest is naturally dominated by *Albizia amara* and *Terminalia brownii* while the plantation part is artificially dominated by *Acacia senegal* (Gum Arabic tree). The situation of *Acacia senegal* requires urgent silvicultural influences. *Acacia senegal* will be a promised tree if rational management could be achieved. The lowest proportions of the regeneration of other tree species indicate their rarity and poor establishment, competition, termite infection and wild animals' effect. No chance is seen for continuity and sustainability of these species in the near future. The mortality proportion was high all over the forest.