Classification of rangeland vegetation and modelling of vegetation patterns at the Jabal al Akhdar mountain, northern Oman

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Key words: Hajar mountains, rangeland vegetation, species indicator analysis, two way cluster analysis, discriminant analysis.

Introduction The species diversity and the levels of endemism within the northern mountains of Oman are particularly high. Despite some earlier work, data are lacking about the distribution and ecology of different plant species, and also the vegetation response to environmental conditions and land use, particularly grazing. The aim of this study therefore was to describe the species composition, floristic diversity and vegetation patterns of open woodlands at Al Jabal al Akhdar along an altitudinal and a grazing gradient.

Materials and methods The species composition and several environmental variables such as browsing / grazing intensity, sward structure and distance to the settlement were investigated for 60 samples (20 x 30 m) using a nested plot design. Classification analysis (two-way cluster analysis and indicator species analysis) and ordination methods (DCA) was used to define vegetation types and to identify underlying environmental gradients. The species diversity and the functional diversity were calculated to show the effects of grazing intensity and altitude on biodiversity. A modelling approach based on discriminant analysis and the GIS were used to model the distribution of vegetation types within the study area.

![Figure 1 DCA species sample bi-plot (Hill’s scaling) for the five vegetation groups on Al Jabal al Akhdar, Oman. The two axes represent 20% of variance in the data set (axis 1 = 0.613: axis 2 = 0.217, sum of all eigenvalues = 4.328).](image)

Results The five group stage of the cluster analysis was the most informative, with the maximum number of significant indicators (37). Floristic and structural differences between groups were mainly due to altitude, followed by topographic location and grazing intensity. Groups were defined on the basis of the dominant species: the Sideroxyylon moscatense-Dodonaea viscosa group on grazed and the Olea europaea-Fingerhuthia africana group on ungrazed plateau sites at 2000 m a.s.l., the Ziziphus spina-cruci-Nerium oleander group on wadi sites, and the Moringa peregrina-Pteroporus scoparius group at 1200, and the Acacia gerrardii-Leucas inflata group at 1700 m. The plant species richness followed a unimodal distribution along the altitudinal gradient with the highest number of species in the intermediate altitudinal belt. Altogether 27% of the species showed a high degree of grazing damage.

Conclusions The main environmental factors, altitude and topographic location, surmounted the grazing effects on plant species richness in the present investigation. Future work should attempt to quantify more clearly the grazing effects with the successional shift in species composition and the regeneration ability.