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

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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 62 samples (20×30 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 .

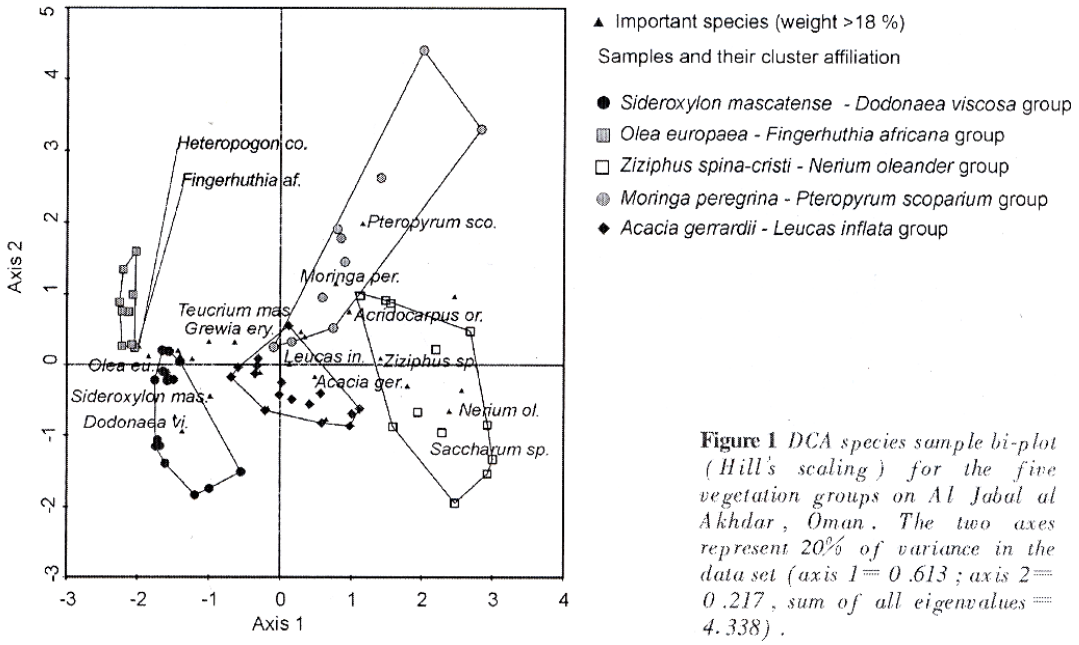

Figure 1 *DCA species sample bi-plot (Hill's scaling) for the five vegetation groups on Al Jabal al Akhdar , Oman . The two axes represent 20% of variance in the data set (axis 1= 0 .613 ; axis 2= 0 .217 , sum of all eigenvalues= 4. 338) .*

Results The five group stage of the cluster analysis was the most informative , with the maximum number of significant indicators (67) . 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 *Sideroxylon mascatense-Dodonaea viscosa* group on grazed and the *Olea europaea-Fingerhuthia africana* group on ungrazed plateau sites at 2 000 m a .s .l . , the *Ziziphus spina-cristi-Nerium oleander* group on wadi sites , and the *Moringa peregrina-Pteropyrum scoparium* 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 .