

Saproxylic beetle assemblages of three managed oak woodlands in the Eastern Mediterranean

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Abstract. Oak woodlands belong to the natural vegetation in most Mediterranean regions but have suffered from a long history of woodland devastation and overgrazing. The remaining woodlands have been managed in different ways, and we expected this to have effects on the fauna associated with trees. We investigated three different sites in the Eastern Mediterranean with flight-interception traps to analyse the impact of woodland management on dead wood and tree structures and the relevance for saproxylic beetle assemblages. Our results show significant differences in trunk diameter, stem density and dead wood diversity between the three sites. Old oaks in semi-open woodland are characterised by diverse stages of dead wood and harboured most saproxylic species (74 species out of a total of 98) and most individuals. With regard to rarefied species richness, we found that coppice woodland with a high stem density and medium-sized trees has the most diverse beetle assemblage (19.7 species per 100 individuals). Species richness was in general strongly associated with the diameter of the oaks, but, surprisingly, was also of the same level as species numbers reported from studies in Central Europe. The large number of singletons, which made up 40 % of the entire sample, may indicate a considerable number of species that were not trapped. We discuss the impact of different management options on tree shape and woodland structure, issues which are also important for the saproxylic beetle assemblage associated with Mediterranean oaks. We conclude that oak woodlands in the Middle East – and especially those woodlands that have been used and managed in a sustainable way – represent a valuable resource for insect diversity.

Key words. *Quercus calliprinos*, Palestine Oak, Middle East, Israel, Mediterranean, dead wood, woodland structure, biodiversity.

Introduction

Historical documents indicate that woodlands in the Mediterranean basin have been over-exploited by man since Roman and Byzantine times, resulting in degraded forms of woodland and widespread regions cleared of mature woody vegetation (NAVEH & DAN 1973, GROVE & RACKHAM 2003, KANIEWSKI et al. 2007). Anthropogenic disturbances such as grazing, fire management and agricultural techniques are the factors which have influenced the external shape and type of these woodlands (RUNDEL 1998). Traditional land-use with goats, sheep and other livestock meant that it was not possible for the woodlands to recover until modern economic pressures lowered the number of livestock and thus the grazing pressure on the landscape. Nevertheless, historical paintings indicate the persistence of single trees and groups of trees in pasture landscapes (e.g. SCHULER 1999). Moreover, a few sacred oak trees have survived the hazards of historical land use. The graves of holy men in the shade of these trees fosters the Moslems' belief that a curse will fall on anyone who cuts down the trees, and this idea has afforded such trees efficient protection for centuries. Thus,