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The effect of fire on soil oribatid mites (Acari: Oribatida) in a South African grassland*

ELIZABETH A. HUGO-COETZEE[1] & NICO L. AVENANT[1,2]
[1]*National Museum, PO Box 266, Bloemfontein, 9301, South Africa;*
E-mail: Lhugo@nasmus.co.za
[2]*Centre for Environmental Management, University of the Free State, PO Box 339, Bloemfontein, South Africa*

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Abstract

Fire is a natural disturbance factor in southern African grasslands, and has become an important management tool for conservation of these habitats. Information on the impact of fire on any aspect of biodiversity will assist land managers to make more informed decisions on a fire regime that will conserve biodiversity in these grasslands. This is the first study to examine the responses of mite assemblages to fire disturbance in South African grasslands. The study was conducted in the Erfenis Dam Nature Reserve in central South Africa. An area of the Reserve was burned with a fast, hot fire while another area was left unburned as a control. Soil oribatid mites were collected over a period of one year from the burned and control areas. Oribatid assemblages exhibited seasonal patterns, with species richness and abundance slightly higher in early and late autumn and early spring. Four months after fire, there was no residual effect of fire on total abundance and species richness. However, species composition and the seasonal relative abundances of particular species, e.g. *Multioppia wilsoni* Aoki, 1964, *Scheloribates confusia* Coetzer, 1968 and *Anellozetes auriculatus* (Mahunka, 1984), differed between burned and control plots, demonstrating how targeted species can be investigated as indicators of post-fire recovery.

Key words: Soil arthropods, Acariformes, burning effect, conservation, indicators.

Introduction

The Grassland Biome constitutes 28% of the vegetation of South Africa, Lesotho and Swaziland (Rouget *et al*., 2006). It is also the most threatened biome in South Africa (Mucina *et al*., 2006). Only 2.2% of grassland vegetation is currently protected in parks and reserves, ca. 35% has been lost through habitat transformation and degradation, and the rest is under threat from agricultural activities (Mucina *et al*., 2006).

Fire is important for the conservation and management of grasslands (Swanepoel, 1981; Parr *et al*., 2004; Mucina *et al*., 2006), with the frequency, seasonality and intensity of fires being fundamental attributes determining its effects on biota (Mucina *et al*., 2006). Fire removes litter and promotes new nutritious growth of grasses, which results in improved feeding conditions for mammalian grazers and other herbivores including arthropods (Lubin & Crouch, 2003; Barratt *et al*., 2006). Burning also prevents the incursion of woody plants (Lubin & Crouch, 2003). Fire exclusion studies in southern Africa have indicated that in the absence of fire there was a successional trend towards shrub- or forest- vegetation (Mucina *et al*., 2006).

The optimal burning frequency in grasslands in South Africa differs according to the rate of litter accumulation, which in turn is largely determined by the annual rainfall (Manry & Knight, 1986). In general, managed grasslands in South Africa are control-burned every one to four years in late winter, from July to September (Mucina *et al*., 2006). Fire frequency is mainly responsible for the current distribution of terrestrial plant communities in South Africa (Manry & Knight, 1986) but less is known about its effects on faunal diversity. In a study on African savanna ants,

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