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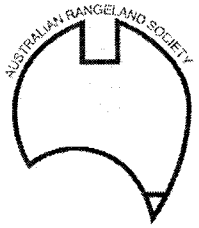


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# TERMITES AS 'LITTER TRANSFORMERS' IN MULGA LANDSCAPES OF WESTERN NEW SOUTH WALES

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## INTRODUCTION

Soil biodiversity plays a critical role in maintaining effective soil-based processes although direct links between soil biodiversity and rates and efficiency of various functions are still unclear. Dysfunctional landscapes are characterised by a reduction in the size, density and variety of these small-scale patches resulting, in turn, in a reduction in the diversity of organisms dependent on such surface heterogeneity (Noble *et al.* 1999). Detailed surveys of the abundance and distribution of termite pavements and feeding sites (i.e. soil hummocks formed around fallen mulga trees) on a site selected for a major grazing experiment at "Lake Mere", a property northwest of Louth, New South Wales. The density of circular pavements built by the ubiquitous harvester termite (*Drepanotermes perniger*) was found to range from 30 to 100 pavements per hectare, the lowest density being recorded in the mulga groves (Noble *et al.* 1989). Total number of log-hummocks on the study site was estimated to be 27,468 (*c.* 137/ha).

While termites also act as 'ecosystem engineers' by constructing either pavements of aerial mounds, their primary 'ecosystem service' lies more in their role as 'litter transformers'. These soil mesofauna have the capacity to develop an 'external rumen' that interacts with microflora thereby facilitating breakdown of litter and subsequent nutrient cycling (Noble *et al.* 1999). This paper will briefly discuss preliminary results obtained from decomposition studies undertaken on "Glenora", a property adjoining "Lake Mere", with and without termites present.

## TERMITE DECOMPOSITION EXPERIMENTS

Termites were removed from replicate plots following the application of a termiticide (Dursban PC®). One experiment was located in a runon zone where the herbage was dominated by a perennial $C_3$ species, bandicoot grass or mulga mitchell (*Thyridolepis mitchelliana*), the other in a runoff site where the dominant grass was woollybutt (*Eragrostis eriopoda*), a perennial $C_4$ species.

### (i) Grass Tussocks

Initially, studies focussed on the decomposition of individually tagged tussocks of both species that had been killed after sparaying with Roundup® (360 g $L^{-1}$ glyphosate). Weight loss of individual tussocks was estimated periodically using a double sampling technique. Although tussocks of mulga mitchell decayed more rapidly than woollybutt tussocks (275 cf. 13 kg $ha^{-1}$ $month^{-1}$), there was little difference between minus termite treatments and controls for the first three years (Noble 1993). Once tussock mass reached quite low levels however, decomposition was significantly faster where termites were present.

### (ii) Faecal Pellets

Replicate samples of previously counted and weighed faecal pellet samples of both kangaroos and sheep were randomly located within control and termiticide-treated plots in both grass communities. Individual pellet groups were placed underneath fibreglass gauze squares nailed into the surface-soil at each corner and their comparative decomposition monitored thereafter over time. Pellets disappeared more rapidly in those plots where termites had not been removed although after five years elapsed, differences between the termiticide and control treatments had declined markedly, especially in the woollybutt plots (fig. 1).

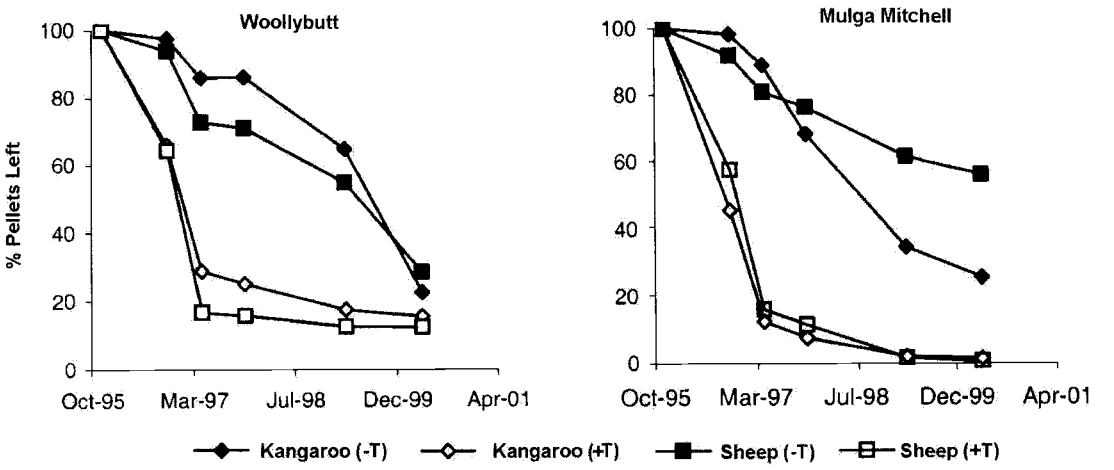


Fig. 1. Decomposition of kangaroo and sheep faecal pellets, with and without termites present, in two grassland communities on "Lake Mere".

## CONCLUSIONS

These preliminary data indicate that termites have the potential to physically transform a range of litter forms prior to subsequent soil mineralisation and are therefore important in providing a fundamental service by enhancing nutrient cycling in mulga ecosystems. Where there are abundant sources of cellulose available, as was the case with the grass tussocks following good seasonal rains, other decomposition processes, particularly ultra-violet radiation, are likely to play a dominant role in decomposition. In relatively wet seasons, other decomposers such as fungi may become more important.

## ACKNOWLEDGEMENTS

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