Research Application Summary

Spatial variability in subterranean termite assemblage on grazing lands in semi-arid Nakasongola, Uganda

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Abstract

Surges in termite activity and the associated destructive behavior have resulted into enormous deterioration of grazing lands in semi-arid Nakasongola in the drylands of central Uganda. Termites frequently attack and severely damage grasses and legumes in pasture swards. Understanding the nature and the variability in termite assemblage structure across varying ecosystem conditions is pertinent in elucidating the ecological drivers of termite behavior, as well as in developing ecologically sustainable termite management interventions. The study is therefore establishing the spatial variability in termite assemblage across vegetation types on grazing lands in semi-arid Nakasongola. The study is investigating the structure of assemblages and their spatial variability.

Key words: Pasture, swards, termites, Uganda

Résumé

Les mouvements dans l'activité des termites et le comportement associé destructrices ont résulté en une détérioration considérable de terres de pâturage dans Nakasongola, dans les zones arides du centre de l'Ouganda. Les termites attaquent fréquemment et les herbes nuisent gravement à la légumineuse dans les pelouses de pâturages. Comprendre la nature et la variabilité de la structure des peuplements de termites dans l'état des écosystèmes variables est pertinente dans la compréhension du comportement des conducteurs écologiques de termites, ainsi que dans le développement écologiquement durable de gestion des interventions contre les termites. L'étude est donc de démontrer la variabilité spatiale dans l'assemblage de termites dans les types de végétation sur les terres de pâturage dans les zones semi-arides de Nakasongola. L'étude fait l'enquête de la structure des assemblages et de leur variabilité spatiale.

Mots clés: le Pâturage, les pelouses, les termites, l'Ouganda

Background

The deterioration of the rangeland ecosystem attributable to overgrazing and deforestation has resulted into surges in termite activity in semi-arid Nakasongola, a dryland cattle area in central Uganda (NEMA, 2007). The escalation in termite activity is associated with destruction of grazing lands by termites. Termites frequently attack and severely damage both herbaceous and woody components of the ecosystem resulting into loss of ground herbaceous vegetation, expansion of bare surfaces and hence driving the ecosystem to extreme degradation. The end result is reduced forage availability, poor animal performance, high livestock mortalities, food insecurity, escalating conflicts over pasture resources and high levels of poverty among pastoral communities. Termites have also frustrated vegetation restoration efforts by devastating seedlings once bare surfaces are reseeded (Mugerwa *et al.*, 2008).

Despite the enormous damage on pasture swards by termites, limited efforts have been directed to establish the termite assemblages responsible for the destruction. Understanding the nature and the variability in termite assemblage structure across varying ecosystem conditions is pertinent in elucidating the ecological drivers, termite behaviour, as well as in developing ecologically sustainable termite management interventions. This study will therefore establish the spatial variability in termite assemblage across vegetation types on grazing lands in semi-arid Nakasongola.

Literature Summary

Maliha *et al.* (1999) noted that the relative abundance of subterranean termites vary among sites due variations in soil types among different sites. They further noted that the relative abundance was related to changes in vegetation. Jones and Prasetyo (2002) noted that vegetation types produced drastic changes in species composition and richness due to variations in soil temperature among the different vegetation types. Eggleton *et al.* (2002) also noted that overall species richness showed a significant correlation with vegetation type. These aspects will be examined in this study.

Study Description

The research will be conducted in Nakasongola District ($55^0$140'N,$32^0$50'E).The mean daily maximum temperature is 30^0C. Rainfall ranges between 500mm-1000mm per annum and soils are relatively homogeneous and strongly weathered with high sesquioxide content (*Haplic Ferralsols*) (FAO, 1998). The natural vegetation in Nakasongola is dominantly open savannah woodland with tall grasses. In this study, line transects were

laid across three vegetation cover types (bare ground, herbaceous and woody vegetation) in three randomly selected ranches. Sampling for termite species was done in 20m by 20m plots established at every 30m interval.

Research Application

A total of 19 termite species have so far been found. The collection consisted of one family (Termitidae), three sub-families (Macrotermitinae, Termitinae and Nasutitermitinae) and seven genera (Table 1). All the three genera (microtermes, odontotermes and macrotermes) of termites known to be important pests to vegetation in Uganda were found on grazing lands. Overall species richness showed a strong correlation with vegetation types. Highest and lowest number of species from the sub-family macrotermitinae was recorded from bare and herbaceous vegetation cover types, respectively (Fig. 1). *Nasusitermes* spp. were only recorded in the herbaceous vegetation cover type of Site C. The relative abundance of the three sub-families was highly correlated with vegetation types. Highest and lowest relative abundance occurred in the woody vegetation and bare ground, respectively.

The study is still on-going to define how termite assemblage varies with ecosystem disturbances (anthropogenic influence)

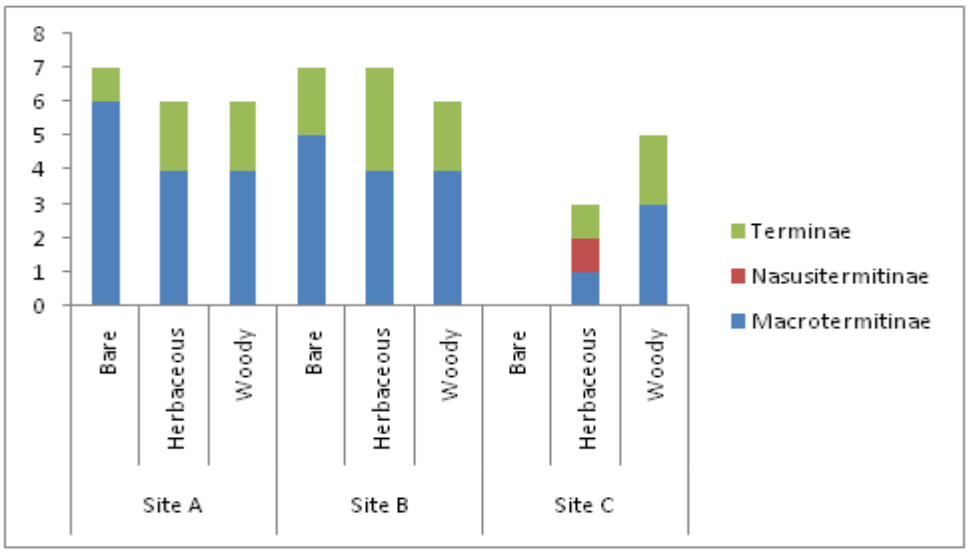

Figure 1. Species richness of termite species collected from three sites in semi-arid Nakasongola.

as well as to determine the ecological predictors of foraging behaviour. The results shall be used to develop ecologically sustainable termite management interventions that mitigate termite-induced ecosystem degradation.

Table 1. Relative abundance (no. of species encounters) of 19 species collected from three sites (ranches) In semi-arid Nakasongola. Feeding groups are II = wood, litter and grass feeders; IV = true soil feeders. Nesting groups are: w = nesting in wood; s= subterranean nests, e = epigeal mound, a = arboreal nest. The sites are: Ranch highly infested with termites (site A); Moderately infested with termites (site B) and low termite infestation (site C).

Termitidae	Feeding group	Nesting group	Site A			Site B			Site C	
			bare	Herb	woody	bare	Herb	woody	Herb	woody
Macrotermitinae										
Macrotermes spp A	II	s	3	15	15	3	10	18	0	0
Macrotermes spp B	II	e	3	12	42	15	22	3	12	12
Macrotermes spp C	II	w	3	0	9	0	0	12	0	0
Macrotermes spp D	II	a	0	4	0	0	0	0	0	0
Macrotermes spp E	II	s	0	0	0	0	0	6	0	0
Odontotermes spp A	II	e	0	0	0	0	18	0	0	0
Odontotermes spp B	II	w	0	0	0	0	0	0	0	0
Odontotermes spp C	II	s	0	6	15	0	0	0	0	12
Odontotermes spp D	II	s	3	0	0	0	0	0	0	0
Microtermes spp A	II	e	0	0	0	3	0	0	0	0
Microtermes spp B	II	a	0	0	0	6	0	0	0	0
Ancistrotermes spp 1	II	s	0	0	0	3	0	0	0	6
Ancistrotermes spp 2	II	e	0	0	0	0	0	0	0	0
Termitinae										
Cubitermes spp A	IV	e	0	87	0	27	124	6	24	24
Cubitermes spp B	IV	w	0	0	15	3	4	0	0	0
Cubitermes spp C	IV	s	3	0	15	0	10	9	0	0
Cubitermes spp D	IV	s	0	0	0	0	0	9	0	0
Procubitermes spp A	IV	e	0	12	0	0	0	9	0	6
Nasutitermitinae										
Nasutitermes spp A	II	e	0	0	0	0	0	9	8	0

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