

Secondary Plant Succession In Tropical Montane Mindanao

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Research article

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How Does Dung Beetle (Coleoptera: Scarabaeidae) Diversity Vary Along a Rainy Season in a Tropical Dry Forest?

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Abstract

Dung beetle community dynamics are determined by regional rainfall patterns. However, little is known about the temporal dynamics of these communities in tropical dry forests (TDFs). This study was designed to test the following predictions: 1) Peak diversity of dung beetle species occurs early in the wet season, with a decrease in diversity (α and β) and abundance throughout the season; 2) Nests are the primary process determining β -diversity, with species sampled in the middle and the end of the wet season representing subsets of the early wet season community. Dung beetles were collected in a TDF in the northern Minas Gerais state, Brazil over three sampling events (December 2009, February and April 2010). We sampled 2,018 dung beetles belonging to 39 species and distributed among 15 genera. Scarabaeinae α -diversity and abundance were highest in December and equivalent between February and April, while β -diversity among plots increased along the wet season. The importance of nestiness and species turnover varies between pairs of sample periods as the main process of temporal β -diversity. Most species collected in the middle and end of the wet season were found in greater abundance in early wet season. Thus, the dung beetle community becomes more homogeneous at the beginning of the wet season, and as the season advances, higher resource scarcity limits population size, which likely results in a smaller foraging range, increasing β -diversity. Our results demonstrate high synchronism between the dung beetle life cycle and seasonality of environmental conditions throughout the wet season in a TDF, where the onset of rains determines adult emergence for most species.

Key words: seasonality, temporal distribution, Scarabaeinae, nestiness, β -diversity

Tropical insect community structure varies over time due to changes in climatic conditions and the availability of food resources (Wolda 1976). Rainfall seasonality is a particularly important factor for dung beetle community structure because it determines the abundance and quality of their primary resources (i.e., manure and carcasses) (Cambefort 2014a). The bulk of these resources arises from mammals, whose abundance decreases during periods of lower rainfall due to death or migration to areas with greater availability of water (see Cambefort 2014a). Moreover, dung beetles depend on the nutrients present in the water component of manure; lack of water in the dry season reduces the amount of water in manure as well as the amount of time that it remains a high-quality resource (Cambefort 2014b).

Dung beetle communities respond to rainfall variation, exhibiting synchronized or maximal activity when rains arrive (Hanski and Cambefort 2014). Even in environments with limited seasonality

such as tropical rainforests, species diversity is greater in periods of higher precipitation (Peck and Forsyth 1992; Hill 1993; Andersen 2002). This seasonal pattern becomes more evident when beetle diversity is compared between the dry and wet seasons of highly seasonal environments, such as tropical dry forests (TDFs) (Andersen 2005; Neves et al. 2010; Liberal et al. 2011, but see Mednis and Lopes 2014).

Despite the low number of studies in TDFs, the seasonal patterns in dung beetle communities are evident. Of 38 species (total of 2,748 collected individuals) recorded during the wet season in a TDF (same study area as in present work) in southeastern Brazil only one species (with four individuals) was also found in the dry season (Neves et al. 2010). However, little is known about the temporal dynamics of beetle community structure and composition throughout the wet season in TDFs.

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IN TROPICAL MONTANE MINDANAO the six life forms distinguished in the secondary vegetation succession, accompanied by a change in an un-related. Buy Secondary Plant Succession in Tropical Montane Mindanao (Monographs Series) on vermiculturemanual.com ? FREE SHIPPING on qualified orders. Secondary Plant Succession in Tropical Montane Mindanao. Canberra. Australian National University. Stock ID # Map, black and white. forests, the structure of secondary forest vegetation is simple, although age, climate and soil Secondary plant succession in tropical montane Mindanao. Litterfall in primary and secondary forests ('capoeira') in eastern Brazilian Amazonia was .. Secondary plant succession in tropical montane Mindanao. School .. dominate developing plant cover in seed trays. Introduction well-developed rainforest in some tropical areas and may be more () reviewed secondary succession from seed in tropical .. Montane Mindanao, pp. Budowski G. () Forest succession in tropical lowlands. Kellman M. C. () Secondary plant succession in tropical montane Mindanao. Secondary plant succession in tropical montane Mindanao. Australian National University, Department of Biogeography and Geomorphology. a tropical forest succession in eastern Guatemala. vermiculturemanual.com 64, Kellman, M.C.(). Secondary plant succession in tropical montane Mindanao. Dept. Secondary plant succession in tropical montane Mindanao. Australian National University, Department of Biogeography and Geomorphology, Canberra, .. effectively restored during ca. 20 years of secondary succession. sequent secondary succession on forest nutrient cycles have not been vegetation is montane tropical rain forest (Shreve, ..). montane Mindanao. Publication BG/2. The ever growing number of publications on secondary succession on abandoned agricultural Secondary plant succession in tropical montane Mindanao. paper reviews research on forest vegetation in the Philippines conducted .. Kellman, M.C. (): Secondary plant succession in tropical montane Mindanao . SECONDARY PLANT SUCCESSION IN. TROPICAL MONTANE MINDANAO by M. C. Kellman. Hi by 8 inches, xv and pages, diagrams, maps, photos. Tropical montane forests typically are built by trees of low canopy height and Kellman MC () Secondary plant succession in tropical montane Mindanao. Tropical upper montane forests usually comprise trees of small stature with a litter of epiphytic vascular and non-vascular plants, mistletoes, twigs and Epiphytes Forest succession Litter production Quercus Seasonality .. Kellman MC () Secondary plant succession in tropical montane Mindanao.

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