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THE EFFECT OF FIRE FREQUENCY AND LAND USE ON TERMITE (ISOPTERA) ASSEMBLAGE COMPOSITION AND FUNCTIONAL DIVERSITY IN A SEMI-ARID SAVANNAH, SHANGANI, ZIMBABWE.

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ABSTRACT

Fire is one of the most important drivers in ecological changes in semi-arid savanna ecosystems. It affects biodiversity either through direct destruction of organisms or through depletion of resources. Fire can be an important management tool in rangelands when administered under a specific fire burning regimes. The effect of fire frequency on underground biodiversity is not fully understood, hence this study was set to investigate changes in termite species richness, abundance and diversity in response to low fire, moderate and to high fire burning frequency treatments under two different land use systems. The study was carried out in the Debshan ranch (privately managed) and in the adjacent Insiza Communal land. The relationship between termite species distribution and environmental variables (soil and vegetation) were also studied. Fire frequency map was generated from MODIS Terra & Aqua satellite images from 2001 to 2016. Random sample points were generated using ArcGIS software for all treatments. 24 plots (50 × 50 m) were surveyed in the communal areas and 18 plots (50 × 50 m) in the private ranch (no high frequency treatment). Termites were sampled using the plot based method. Termites were collected, preserved and identified to species level. Results showed that from 403 encounters, there were three families (Kalotermidae, Hodotermidae and Termitidae) and 19 species represented in the area. Private ranch had high species abundance and diversity than Communal area. Fire frequency had an effect on termite assemblages within sites but no significant effect across the two sites. The interaction of land use and fire frequency showed a significant effect on the termite species diversity. Functional groups and nesting types responded differently across the fire regimes and land use. Soil and fungus-growing wood feeders were the most sensitive groups. Variation in species abundances was significantly correlated with only two environmental variables (soil OC and herbaceous cover). Termite species assemblages are influenced by land use and fire frequency. The private ranch has to develop a management practice that uses the historic fire-grazing model to manage the ecosystems.

Keywords: Termite diversity, fire frequency, Debshan ranch, Insiza Communal land, land use, sampling protocol, semi-arid savanna