Journal of Rangeland Science

Greenhouse Gas Emissions as Impacted by Topography and Vegetation Cover in Wooded Grasslands of Laikipia County, Kenya

Document Type : Research and Full Length Article

Authors

Janeth Chepkemoi [1] ; Richard Ndemo Onwonga [2] ; Richard Nyankanga [3] ; Angela Nduta Gitau [4]

[1] University of Nairobi, department of land resource management and agricultural technology

[2] ADepartment of land resource management and Agricultural technology, University of Nairobi

[3] Department of plant Science and Crop Protection , faculty of agriculture, university of Nairobi

[4] Department of land resource management and Agricultural technology, University of Nairobi

Abstract

Global climate change has been linked to the increase in greenhouse gas (GHG) emissions. Wooded grasslands refer to an understudied landscape contributing an unknown quantity of GHGs to global climate change. The objective of this study was to determine the effects of topography and vegetation cover on carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) fluxes. The study was carried out in Ilmotiok community ranch, Laikipia County. An in-situ experiment was done in January, February, March and April of 2017. Randomized complete block design (RCBD) with split plot arrangement was used main plots topographical zones (TZ) (mid-slope (MS), foot slope (FS), and toe slope (TS)) and subplots vegetation cover (VC) (tree (T), grass (G) and bare (B)). Static chamber frames were installed for the three VC (T, G and B) in three TZ (MS, FS, and TS). GHGs were measured every 7-10 days between 0800hrs and 1200hr local time. Sampling was done at time zero (T0), 10 minutes (T1), 20 minutes (T2) and 30 minutes (T3). During the rainy season, CH4 N2O and CO2 fluxes were significantly higher than dry season. Methane fluxes ranged from -0.32 mg.m-2.h-1 to 0.24 mg.m-2.h-1 with the lowest (-0.32 mg.m-2.h-1) recorded under TS*T, whereas CO2 was highest under TS*G (47 mg.m-2.h-1) as compared to MS*G (19 mg.m-2.h-1). TZ*VC significantly

Articles in Press, Accepted Manuscript Available Online from 01 December 2021