Influence of management practices on soil organic matter indicators under kikuyu, ryegrass and clover pasture mixtures

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Abstract

Statement of the Problem: South African soils have long been classified as being severely degraded by the international soil reference and information centre (ISRIC, 1997). The state of the soils is even more pronounced in sandy soils that are managed for pasture production in the Tsitsikamma region. This is mainly due to the fact that these soils have poor soil organic matter (SOM) content and are therefore prone to nutrient leaching, erosion and water loss through runoff and deep percolation (Bruand et al., 2005). These soil characteristics are unfavourable because they put the farmer in a position of constantly having to maintain soil nutrients and water irrigated in order to drive production. SOM is one of the soil quality indicators that have been identified as a suitable measure that can be used to assess soil productivity. Land owners need to maintain SOM in their soil to avoid soil degradation (Du Preez et al., 2011).

Methodology & Theoretical Orientation: The study aimed to assess whether SOM indicators differed within depth and between farms as well as whether pasture management practices had any influence on the status of SOM indicators. An average of 5675 samples was taken for analysis across 10 irrigated farms situated in the upper and lower Tsitsikamma region. SOM indicators that were measured included total carbon (C), total nitrogen (N), C/N ratio, active C, PMN rate and inorganic N. Soil samples were taken in four soil layers namely, 0-15; 15-30; 30-45 and 45-60 cm respectively. The analysis of variance was measured at 99% confidence interval. Values that had significant differences had p values of < 0.001, whereas those that showed no significant difference had p values > 0.001.

For all indicators measured, with the exception of active C and inorganic N, there were significant differences when comparing the upper Tsitsikamma (UT) and lower Tsitsikamma (LT) regions. There were also significant differences for all indicators between all measured soil layers. It was also observed that the most significant differences occurred at approximately 30 cm soil layer for all measured indicators except for C/N ratio and Inorganic N.

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Biography

Portia Phohlo is a researcher for the sustainability project of Woodlands Dairy in association with Trace and Save™, an independent company which focuses on agricultural sustainability research. She holds a BSc in Agriculture degree in agronomy from Fort Hare University as well as honours degree in soil science from the University of the Free State. She is currently busy with her MSc in Agriculture (Soil Science) and her main area of research is on soil quality in kikuyu, rye-grass and clover pastures.

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