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VARIATION OF MICROBIAL BIOMASS NITROGEN CONTENT AND MICROBIAL INDICES IN DIFFERENT LAND-USE TYPES IN THE NORTH TEMPERATE ZONE

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Abstract

Soil microbial biomass is a key biological indicator for assessing soil quality, significantly influencing organic matter decomposition, nutrient cycling, and plant nutrient availability. This study aimed to determine microbial biomass nitrogen (N_{mic}) and selected physical, chemical, and microbial indicators in soils under three land-use types—forest, rangeland, and cropland—within the Bartın Stream Basin. N_{mic} was measured using chloroform fumigation extraction, and microbial indices such as microbial biomass carbon (C_{mic}) to (N_{mic}) ratio (C_{mic}/N_{mic}) and the ratio of microbial biomass nitrogen to total nitrogen (N_{mic}/N_{total}) were derived. Organic carbon (C_{org}) and total nitrogen (N_{total}) contents of the soils varied with land use, and both significantly influenced N_{mic} ($p < 0.05$). Rangeland soils had the highest average N_{mic} ($126.93 \mu\text{g g}^{-1}$), with N_{mic} showing strong positive correlations with C_{org} ($r = 0.542$) and N_{total} ($r = 0.585$). The lowest N_{mic}/N_{total} values were found in forest and rangeland soils, indicating limited N immobilization, while cropland soils showed higher values. The C_{mic}/N_{mic} ratio was lowest in rangeland soils (3.92), suggesting bacterial dominance, and was negatively associated with N_{total} and soil pH. Overall, microbial N dynamics and related indices varied significantly with land use, reflecting changes in soil organic matter and nutrient status.

Key words: C_{mic}/N_{mic} ratio, land-use type, legumes, N_{mic}/N_{total} percentage, organic matter, *Rhizobium* bacteria

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