TERRACE CONSTRUCTION EFFECTS ON SOIL FERTILITY, TEXTURE AND APPARENT ELECTRICAL CONDUCTIVITY

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ABSTRACT

The Midwestern United States is dominated by sloping terrains, where terraces are recognized as a tool to minimize soil erosion. The process of terrace construction involves heavy machinery and extensive soil profile manipulation, which may alter soil fertility and texture. This study evaluated the changes in soil fertility, texture, and apparent electrical conductivity (ECa) following the construction of eight broad-based terraces in northern Missouri. Geo-referenced soil samples were collected before and after terrace construction from three topographic positions (shoulder, backslope, and footslope) at four depths (0-15, 15-30, 30-45, and 45-60 cm). Averaged over depth and topographic positions, total exchange capacity, sulfur, magnesium, potassium, sodium, and iron significantly increased, whereas soil pH and boron decreased by 0.17 units and 45%, respectively, post-terracing. Similarly, averaged over depths, Mehlich-3 extractable nutrients were significantly higher at depositional position of the terrace compared to the shoulder position following terrace construction. A significant soil textural shift was also observed with sand and clay content increasing by 32 and 29 g kg-1, respectively, and silt decreasing by 60 g kg-1 for the whole soil profile, post terracing. About 19-36% reductions were observed in four ECa readings (ECa-H0.5, ECa-H1, ECa-V0.5, and ECa-V1) recorded with an EM38-MK2. These findings suggest that terracing substantially alters soil fertility, texture, and ECa through soil mixing and redistribution. Long-term monitoring is recommended under better management systems to determine whether these alterations persist or change further, compared to pre-terraced conditions.