Soil and surface runoff losses in perennial coffee plantation in Southern Brazil

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Abstract: Perennial coffee plantations are frequently cultivated on steep slopes in South America, and soil erosion can be considerable when coffee plants do not have adequate shade or when plant density is low. In South Brazil, soil erosion in areas of coffee cultivation is exacerbated when the soil under the canopy is cleared prior to harvest, and following periodic pruning. This study measures soil and surface runoff losses for a coffee plantation in South Brazil over a period of twenty-two years (1976 to 1998). Soil and surface runoff annual losses, K-factor and C-factor from USLE equation were evaluated under natural rainfall erosion plots (3.5 x 11 m, and 3.5 x 22 m) in a well-drained Oxisol (>80% clay) with 6% slopes. Three different treatments (with two replicates) were compared: (a) bare soil plots with slope length 22 m; (b) bare soil plots with slope length 11 m; (c) coffee (Coffea *sp.*) plots with slope length 11 m planted downhill (4 m between plants and 2 m between row plants). Results showed soil and surface runoff losses for the coffee treatment plot were 49 t ha^{-1} y^{-1} and 128 mm, respectively for an average annual precipitation of 1645 mm. The C-factor and the K-factor from USLE equation were estimated at 0.255 and 0.0172 t. ha h ha^{-1} MJ^{-1} mm^{-1}. Our findings suggest that coffee plantations in southern Brazil are highly susceptible to soil erosion, requiring soil conservation practices that can be applied during harvest and pruning periods.

Key words: natural rainfall erosion plots, conservation agriculture, Oxisols

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