INFLUENCE OF SOIL AND CROP MANAGEMENT SYSTEMS IN EROSION CONTROL IN AN ANDISOL OF COLOMBIA

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In Latin American Andean region, the low fertility of soils together with the high slopes in which land is cultivated, has lead to a strong degradation of soils by erosion, which has caused fall of yields, abandonment of farms and migration of small farmers to more populated areas that do not guarantee their survival. In Colombia, also the use of steep slope soils is being intensifying, without making a good use of conservationists practices. Eigthy three percent of this area has already problems of erosion, in this region lives almost 80% of the country population. Traditional projects of soil and water conservation in slope areas have been focused fundamentally in the control of volume and velocity of runoff. This approach, has caused that the farmers did not appreciate the direct benefits of conservation practices in the short term and little enthusiasm by farmers to accept soil conservation practices. A more holistic approach, objective of this study, looks for integrating soil and crops management systems, in such a way, that good economic yields can be achieved while at the same time the soil quality is improved and the soil is protected against erosion. To test this approach and to understand the behavior of soil and crop factors involved in these concepts, an experiment was settle down in 1989 and continued until 1998, in a volcanic ash soil located in the Municipality of Mondomo, Department of Cauca, Colombia. The experiment consisted in comparing the influence of two tillage (conventional and minimum-tillage) systems and three practices of crop management systems (type of crop, crop rotations and live barries) in erosion control. The parameters of the Universal Soil Loss Equation (USLE), were used to compare treatments agains a standard bare soil plot (22 m long, 8 m wide, 9% slope). The treatment plots were 16-m long, 4 m wide and had a slopes between 13-20%. The average annual erositivity for the 12 years of study was 9.016 MJ ha^{-1} mm^{-1} h^{-1} with extreme values of 4.900 and 14.500 MJ ha^{-1} mm^{-1} h^{-1}. The soil erodibilidad ranged from 0.03 to 0.1 and was affect by changes in water infiltration capacity and aggregate stability due the incorporated treatments. In the bare plot, soil losses were variable. After removing the original prairie the losses were almost null, but they increased gradually until reaching values of 240 $Mg.ha^{-1}$. Finally, when the selective process of the erosion had made its effects, soil losses varied between 20.3 $Mg.ha^{-1}$ and 12.5 $Mg.ha^{-1}$, due to changes in erodibility. Soil losses, of cassava under minimum tillage system averaged 0.54 $Mg.ha^{-1}$, the crop rotation Cassava-Maize and Beans, averaged losses of 0.93 $Mg.ha^{-1}$ and the system of rotation with live barriers of vetiver 0.55 $Mg.ha^{-1}$. Cassava under monocropping system showed the highest losses (58 $Mg.ha^{-1}$), in the period 1995-96. The system under legumes had good soil erosion control, but as they grew, they compited by water and nutrients with the main crop which lead to lower yields. The experiences gained in this research showed that is it possible to reduce soil losses by appliying good soil management in combination with good soil cover and crop management.

Keywords: *erosion, erosibility, erodibility, crop systems, USLE*

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