Research Note

K VALUES OF THE SOILS OF PUERTO RICO[1]

Wischmeier and a team of USDA and Purdue University scientists developed the universal soil loss equation[2, 3] which is widely used in the United States and other countries. The equation is as follows:

$$A = RKLSCP$$

where A is the calculated mean annual soil loss/unit area; R, the erosive force of rainfall; K, the inherent susceptibility of soils to erode; L, the slope length; S, the slope gradient; C, the ratio of soil loss under cropping to that from land tilled but under continuous fallow; and P, the degree of protection provided by supporting practices. The K factor is the resultant of soil properties that affect the infiltration rate and hydraulic conductivity, and the transporting force of runoff. Texture, organic matter and aggregate stability are key factors. The K factor and the equation as a whole are related to Soil Taxonomy at the series level.

The USDA Soil Conservation Service, Caribbean Office, has developed a list of K values for the soil series of Puerto Rico. Information on the methodology used to estimate K values can be obtained elsewhere.[4] In the present paper the K values are grouped according to the orders of the U.S. Soil Taxonomy.

The data for mineral soils are summarized in the following tabulation:

Soil order	*Mean K value*
Oxisols	0.04
Ultisols	.09
Spodosols	.10
Inceptisols	.15
Mollisols	.18
Alfisols	.19
Entisols	.19
Vertisols	.24

[1] Submitted to Editorial Board June 4, 1981.

[2] Wischmeier, W. H., 1971. The erosion equation—A tool for conservation planning, Proc. 26th Annu. Meet. Soil Conserv. Soc. Am., Ankeny, Ia, pp. 73–8.

[3] Wischmeier, W. H. and Smith, D. D., 1961. A universal soil-loss estimating equation to guide conservation farm planning, Trans. 7th Cong. Intl. Soil Sci. Soc. 1:418–25.

[4] USDA Soil Conservation Service, Caribbean Area, Universal Soil Loss Equation Guide, Rev. Nov. 1980.

Oxisols are the least susceptible to erosion. Six K values out of 8 are 0.02; however, the values for the Cotito and Rosario soils are 0.10. Ultisols are slightly erodible. Ten soils have K values of .02; 12 of 0.10; 6 of 0.17; and 1 of 0.24. The only two Spodosols identified in Puerto Rico have a K value of 0.10. Values for Inceptisols, Mollisols, Alfisols and Entisols range from 0.10 to 0.24. Of the 44 Inceptisols included in the calculations, 24 have a K value of 10; 8 of 17, and 12 of 24. These data are in agreement with data of other investigators, which reported K values of 0.17 for Inceptisols of Hawaii.[5] Seventeen out of 22 Mollisols have K values of 0.17; 2 of 0.10; and 3 of 0.24. Moresco and Gray[6] report K values for selected Oklahoma Mollisols that range from 0.19 to 0.57, a threefold variability. K values for the 14 Alfisols are as follows: 0.10 in 1 case; 0.17 in 8 cases and 0.24 in 5 cases. Of the 21 Entisols, 7 have K values of 0.10, and 14 of 0.24. K values for all Vertisols are 0.24; i.e., they are the most erosive soils. Mean K values reported for Vertisols of Hawaii are 0.30.[5]

The Universal Soil Loss Equation is being used in several countries besides the United States, but frequently there are no data available to estimate K.

Given inherent limitations, the data summarized in this paper, by orders of the U.S. Soil Taxonomy, might nonetheless be useful in planning agricultural programs in other areas where insufficient basic data on erodibility are available for prediction of more accurate values. However, precise data should be obtained on erodibility at the soil series level to permit adequate land use and conservation planning at specific sites.

It should be kept in mind that the K value is but one of the 6 factors which, according to Wischmeier, determine soil loss. Consequently, knowledge about the other factors is required to assess erosion hazards properly.

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[5] El-Swaify, S. A. and Dangler, E. W., 1977. Erodibilities of selected tropical soils in relation to structural and hydrologic parameters, Proc. Intl. Conf. on Soil Erosion, pp 105-13, May 24-26, 1976, West Lafayette, Indiana.

[6] Moresco, R. F. and Gray, F., 1977. Determining the soil erodibility factor for selected Oklahoma Mollisols, Proc. Intl. Conf. on Soil Erosion, May 24-26, 1976, 2 pp. 127-34, West Lafayette, Indiana.