



SENSITIVITY ANALYSIS OF THE USLE SOIL ERODIBILITY FACTOR TO ITS DETERMINING PARAMETERS

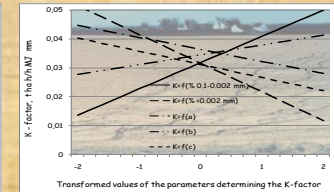
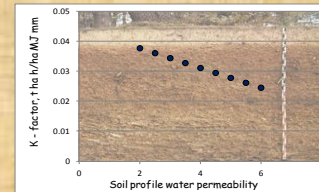
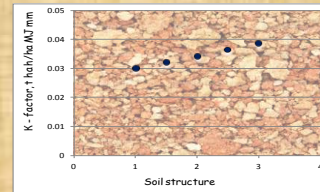
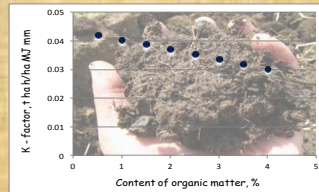
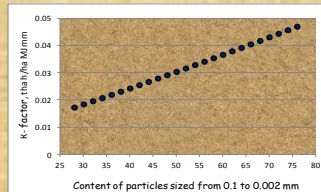
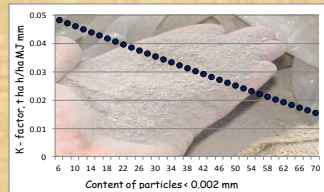
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The Universal Soil Loss Equation (USLE) is one of the most widely used models for soil erosion predictions. The Soil erodibility factor (K-factor) is one of the five USLE predictors, which evaluates the impact of soil characteristics on soil erosion predictions. Soil erodibility nomograph defines K-factor depending on soil characteristics, such as: particle size distribution (fractions finer than 0,002 mm and from 0.1 to 0.002 mm), organic matter content, soil structure and soil profile water permeability. Identifying the soil characteristics, which mostly influence the K-factor would give an opportunity to control the soil loss through erosion by controlling the parameters reducing the K-factor value. **The aim** of the poster is to present the results of analysis of the relative weight of these soil characteristics on the K-factor values.

Material and methods: The studies are based on series of statistical analyses, such as correlation and linear regression, of data from geographic database for soil erosion risk assessments in Bulgaria. Normalizing transformations of the datasets were applied because of the different dimensions and the orders of variation of the values of the various parameters.

| | % 0.1-0.002 mm | % <0.002 mm | a | b | c |
|---------|----------------|-------------|------|---|---|
| mean | 56.6 | 31.9 | 2.8 | 2 | 3 |
| minimum | 28.3 | 6.6 | 0.6 | 1 | 2 |
| maximum | 75.9 | 70.7 | 14.8 | 3 | 6 |

Results



Results of the correlation and regressions analyses of transformed values of the parameters, which determine K - factor

| x | R | r | a ₀ | a ₁ |
|-------------|---------|--------|----------------|----------------|
| 0.1 - 0.002 | 0,9998 | 0,9997 | 0,03181 | 0,00912 |
| <0.002 | -0,9998 | 0,9996 | 0,03156 | -0,00994 |
| a | -1,0000 | 1,0000 | 0,03637 | -0,00415 |
| b | 1,0000 | 1,0000 | 0,03451 | 0,00340 |
| c | -1,0000 | 1,0000 | 0,03121 | -0,00452 |

R - correlation coefficient, $r=R^2$ - coefficient of determination, a_0 - intercept of the linear regression, a_1 - slope of the linear regression

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Conclusions

The content of particles finer than 0.002 mm has the most significant relative impact on the soil erodibility, followed by the content of particles with size from 0.1 mm to 0.002 mm, the class of the water permeability of the soil profile, the content of organic matter and the aggregation class.

The relationships between the K-factor and the content of particles sized from 0.1 to 0.002 mm, and the class of aggregation are directly proportional. When the relative values of these two parameters increase with one relative unit, the K-factor values increase by 0.0091 and 0.0034 t ha h / ha MJ mm respectively.

The relationships between the K-factor and the content of particles finer than 0.002 mm, the organic matter content and the class of soil profile permeability are inversely proportional. When the relative values of these three parameters increase with one relative unit, the K-factor values decrease by 0.0099, 0.0045 and 0.0042 and t ha h / ha MJ mm respectively.