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THE INFLUENCE OF LAND FERTILIZATION WITH FERTILIZERS FROM ANIMAL MANURE ON HYDRIC SOIL EROSION

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Abstract: *Plants in agricultural crops begin to develop rapidly in the spring and need the food supplement provided by fertilizers. Carrying out the basic fertilization is necessary together with the works for the preparation of the germinal bed in view of the spring sowing. On pastures, especially those that are to be used for both grazing and forage, it is also important to apply fertilizers in early spring. According to the Code of Good Agricultural Practices, starting from March 15, the spreading of solid organic fertilizers on arable land and pastures is also allowed. Liquid, semi-liquid and solid manures from animal farms as well as effluents from silos contain large amounts of nutrients. For this reason, the application of fertilizers derived from them have, in addition to the positive effects of increasing the fertility of the land and increasing the organic matter content of the soil, and a very important negative one, namely the acceleration of the eutrophication of surface waters in the case of their penetration into the bodies of water, even small amounts of these substances. The paper analyses these aspects of soil fertilization with fertilizers from animal manure, respectively the influence of this process on hydric soil erosion on watershed hillslopes. The Water Erosion Prediction Project software, developed by USDA-ARS, USA, was used for the soil loss study.*

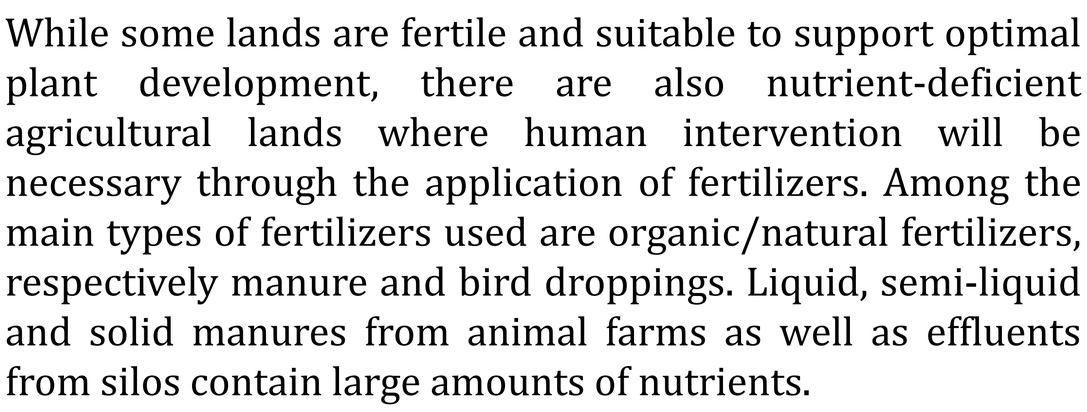
• Introduction

While some lands are fertile and suitable to support optimal plant development, there are also nutrient-deficient agricultural lands where human intervention will be necessary through the application of fertilizers. Among the main types of fertilizers used are organic/natural fertilizers, respectively manure and bird droppings. Liquid, semi-liquid and solid manures from animal farms as well as effluents from silos contain large amounts of nutrients.

Manure is one of the most used types of natural fertilizers, being used especially in vegetable cultivation. It is normally applied to the soil with autumn fertilization, but the process can be repeated later if it has been missed.

• Material and method

The Water Erosion Prediction Project (WEPP) software was used for the soil loss study and for studying the influence of soil composition in organic matter on soil losses through hydric soil erosion. For the soil loss study was chosen one hillslope from Topla Valley hydrographical basin with area 60,69 ha, hillslope length 473 m, width 1283 m.

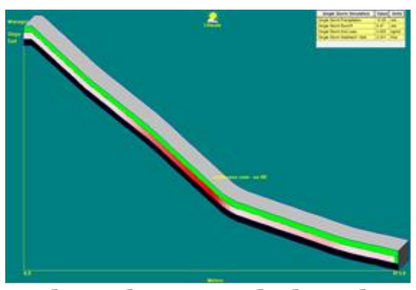


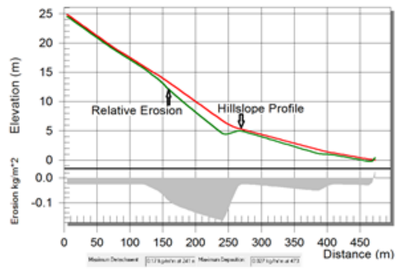
WEPP model was applied for the calculus of the soil loses on hillslope during the torrential rain, in four hypotheses, which have resulted from the torrential rain distribution charts with the 10% assurance and having a duration of 5, 15, 30, 60 minutes.

For the study of the influence of soil organic matter content from manure fertilization on soil losses, 7 hypotheses were considered, which consisted of increasing by 0.5% the organic matter content of the first three soil layers, starting from initial values.

• Results and discussions

28 simulations were carried out (4 hypotheses of the production of torrential rains x 7 hypotheses of degrees of soil fertilization). In Figures 4 and 6 you can see the input data and the simulation results in 2 hypotheses out of 28, for the torrential rain lasting 5 minutes, for the initial state of the soil and after fertilization, when the content in organic matter increased from 0.001% to 3.100%.

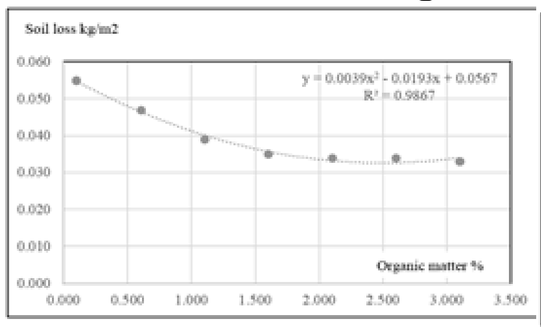


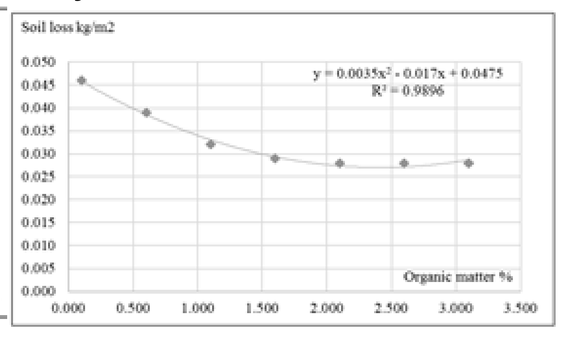


It can be observed that both the soil losses and the sediment yield decreased from 0.055 to 0.033 kg/m2, respectively from 0.541 to 0.334 t/ha.

The most intense erosions occur in areas with a change in slope, approximately 241 m from the top of the hillslope

Figures show the soil loss variations in the 4 torrential rain production scenarios, respectively the correlations between soil losses and the degree of fertilization. The best correlation is the polynomial one of order 2. The best effect of fertilization on soil losses is observed in the case of torrential rains with high intensity.





• Conclusions

The organic fertilizer contains elements that are important for maintaining soil fertility, increasing the amount of humus and improving the structure and texture of the soil, therefore increasing the resistance of the soil both to the water erosion of runoff water from precipitation and to wind erosion.