ASSESSMENT OF ERODED AGRICULTURAL LAND IN IZGAR, CARAS SEVERIN COUNTY

Mazăre Romina[1], Duma Copcea Anișoara[1], Mazăre Veaceslav[1*], Țiței Victor[2].

King Michael I University of Life Sciences, Calea Aradului 119, Timișoara
Moldova State University Alexandru Ciubotaru Natl Bot Garden Inst Academy of Sciences of Moldova, Chișinău,
author email: *m.romina1994@gmail.com*

corresponding author email: *viaceslavmazare@usvt.ro*

Abstract

Soil erosion represents an urgent, acute and extremely threatening problem, not only for agriculture, but also for the entire national economy, but also for the state of landscapes and the environment in which man lives. Consequently, not only the agronomic and economic effects of soil erosion will be further analyzed, but also the ecological effects, which have been neglected until now. In essence, we can point out that soil erosion makes the soil water regime more unfavorable, generally affecting water runoff conditions and the hydrological situation of the area; a particular phenomenon called erosional drought is manifested. In order to effectively and rationally implement measures to protect the soil against erosion, it is essential to know its causes, both natural and anthropogenic, the laws of its manifestation and development, its geographical extent, and its classification by type and degree. It is necessary to emphasize, in all its complexity, the immense, multilateral and, in many cases, irreversible damage that land erosion causes to the nation. Without awareness of this reality, the owners or beneficiaries of agricultural land will not fully perceive their responsibility for the condition of soils and their defense against erosion.
Key words: natural erosion, anthropogenic erosion, surface erosion.

MATERIALS AND METHODS

The field research aimed to identify some physical and chemical parameters, which will define some measures of improvement and conservation of the eroded soils of Izgar. For solution identification, 1:10,000, 1:200,000 L-34-XXVIII, 1:1000,000 updated synthesis N. Florea 2008 were used. Soil profiles (main) 4 in number, were placed in accordance with the rules in force. Soil samples were collected on genetic horizons in the natural assay.

RESULTS AND DISCUSSIONS

The surface of the earth's crust is permanently under the influence of two groups of diametrically opposed natural processes: internal or endogenous (orogeny, neochtonic, volcanism) and external or exogenous (influence of gravity, water and air). This group of processes is sometimes referred to in terms of "denudation" or "exogenesis". Gravity and solar energy serve as the energetic basis of exogenous processes, i.e. this is where the connection of terrestrial and cosmic forces is made.

Figure. 1 Izgar Erosion (Coordinates: 45°33′16″N 21°38′58″E)

Soil erosion is the detachment and displacement from the slope, under the influence of flowing water, of material from their superficial genetic horizons, i.e. the most humiferous, fertile and ecologically valuable; depositing it at the foot and on the trains of the slopes, in the neighboring valleys, in the floodplains of the rivers, partially ending up in the river network, from where it enters lakes and seas. The enormous layers of marine sedimentary rocks, with the exception of limestone and

gypsum, are a result of the eternal, albeit slow, natural process of water-induced erosion of soils and surface rocks. The latter denote a much weaker erosion resistance than soils. Because of this, when the soil cover does not yet exist, the erosional processes were more intense. The emergence and subsequent formation of soils, thanks to their special physical state (degree of aggregation, permeability, water capacity), reduced the speed of the erosion process. The erosional distance on some sections of the researched area reaches up to 120 m in length, affecting the access roads as well as the related crops.

The total area of Izgar is 1781 ha of which:

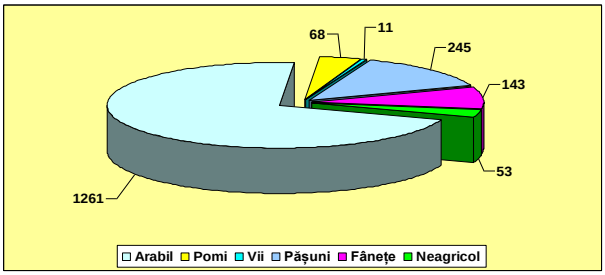

Figure. 2 Categories of use of agricultural land in Izgar (ha)

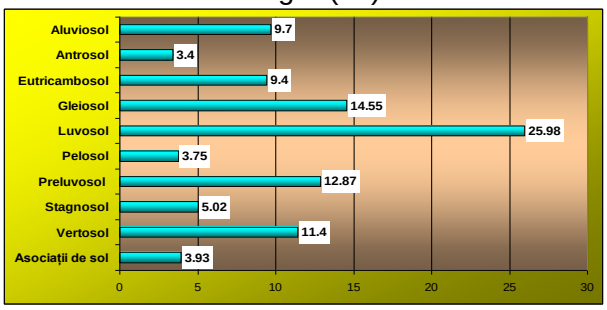

Figure. 3 The main dominant soil types in Izgar

As agriculture appears and progressively develops, the situation on sloping land changes essentially, of course in cases where the soils on the slopes are subject to deforestation. When cultivating agricultural crops, especially plough crops, such a pedoprotective factor as vegetation is excluded or, in any case, strongly weakened.

The humus content and physical value of soils decrease. Here we are talking about the transition from natural erosion to anthropogenic erosion, when the solification process already lags behind the exogenesis of the slopes and the process of soil erosion begins, its depth is reduced at the beginning at the expense of the best, according to its chemical and physical essence, cumulative horizon A, and subsequently, – also of the genetic horizons B1 and B2, located deeper.

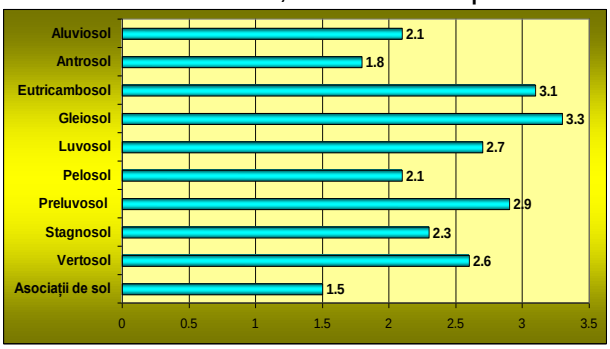

Figure. 4 Humus content in the soils of Izgar

For the correct evaluation (credit-worthiness) of the soils on the slopes, the choice of the assortment of agricultural crops for them and the organization of a rational rotation, the determination of the possibilities of some or other soil tillage technologies is very important for making the correct comparison of flat lands (plateaus) and slopes according to their similar genetic belonging. In the depth of the soils, essential differences between the eastern and western slopes, which predominate here, have not been observed. Under the influence of the slope of the slope, the thickness changes, increasing from 70 cm on the plateaus to 90 cm on the slopes with a slope of 1–4°.

Soil erosion caused by water is divided into two main types:

- surface or pedological, when the soil cover of the slope is more or less uniformly affected by erosion;

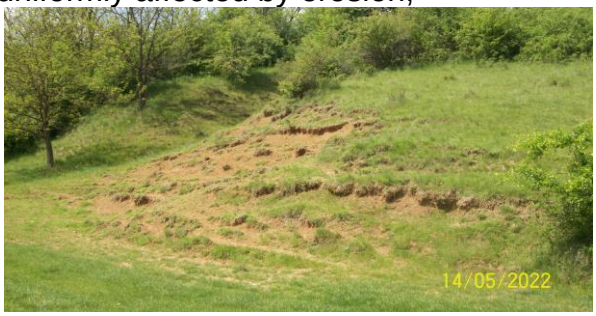

Figure. 5 Slope slightly affected by erosion in Izgar

- linear or ravenar (and furrowed by gutters), when the washing, followed by

soil erosion, occurs on linear boundaries, as a result forming gutters oriented along the slope, which can later turn into ravines.

Figure. 6 Erosion channels oriented in the direction of the Izgar slope

In the case of their significant development, these two types of erosion: surface and deep (linear) do indeed manifest themselves as obviously different phenomena. At the initial stages of the erosion process, however, the image has a completely different appearance.

Figure. 7 Transportation of parental material by erosion from Izgar

It should be noted that although it is an area prone to high rainfall, sometimes it varies dramatically on the ground. In recent years, variations in precipitation in the form of torrents have been observed, which can reach amounts of up to 80-90 l/m^2.

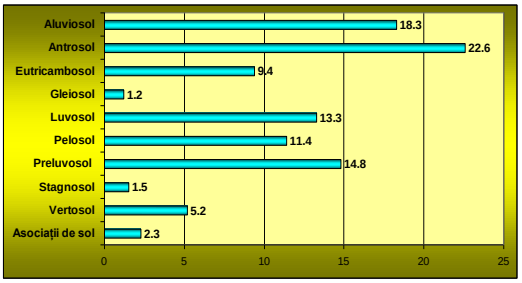

Figure. 8 Degree of soil damage erosion in Izgar (%)

Figure. 9 Heavily eroded anthropol from Izgar (Coordinates:45°33′16″N 21°38′58″E)

Ploughing, and if possible, cultivation in the transverse direction of the slope or at a certain angle to it, creating irregularities – small earth waves and macro-depressions, interrupts the drainage limits, increases the penetration of water into the soil and reduces erosion.

The duration and repeatability of these phenomena per passing year condition, as a summary effect, the passage of microlinear soil erosion into the surface erosion, when already on the slope, in the form of a mass of porridge, large quantities of soil begin to move (slide). The visible inhomogeneity of the soils located on the slopes according to the degree of their damage by erosion confirms the outlined mechanism of soil erosion on sloping lands.

One of the main negative peculiarities of the soil erosion process is its irreversibility, which, having a cumulative-cumulative character, takes place in only one part – the direction of intensification. No natural force is able to return the eroded soil material to its original place. Erosion can be stopped, but returning the process in the opposite direction is impossible. Agriculture must take this into account and tend towards such ways of capitalizing and technologies of tillage of soils located on sloping lands, which can minimize erosion up to certain limits.

According to the degree of manifestation of the negative influence on the soil cover, the correlation of the natural and anthropogenic process and other characteristics, soil erosion has clear regional and even local features. Two neighboring regions can endure, in absolutely different degrees, erosion

processes, but one of which is located on a plain (plateau), and the other on the neighboring slopes.
However, the climatic factor, the precipitation, in particular, its falling character, must be placed in the first place, because the direct force, the energy engine of the erosion process is the water that runs off.
The relief of the land must be placed in second place, given the fact that the speed and strength of the currents of the flowing water depend on its structure, the fixation of these phenomena on certain surfaces and linear alignments.

Figure. 10 Aspects of the relief in Izgar

An important factor in the manifestation of erosion is the character of the soils, their degree of resistance to erosion and the water absorption capacity. Under normal natural conditions, of course, a great positive role is played by natural vegetation: forest, hayland, steppe, desert, which, in descending order, protects the soil from erosion in case of equality of all other factors.
A role is also played by the character of the parent rocks (surface), since their properties are mostly inherited by the soils that are formed on them.

Figure. 11 The appearance of some parental rocks in Izgar

Human economic activity can exert a very strong influence on erosion processes: in most cases this influence is negative, which demonstrates the experience of world agriculture on sloping lands, but it can also be positive in cases when, permanently and persistently, soil erosion protection works are carried out.
It is known that, under the influence of erosion, the productivity of the soil decreases, and this means that the degradation of its bospheric and ecological functions occurs. This undeniable fact in itself must be supported by quantitative data in order to be able to appreciate the parameters of this degradation. One of the peculiarities of the soil water erosion process, we can say its paradox, consists in the fact that the process as such is purely mechanical (material transport), theoretically elementary, but its consequences, on the contrary, are very complicated, being felt in the strongest way on all components of the ecological multifunctionality of the soil.
Strongly and totally eroded soils lose their appearance as soil as a special natural body: fertile soil with a high ecological potential turns into an almost sterile rock, in which the current biosphere ceases to exist.

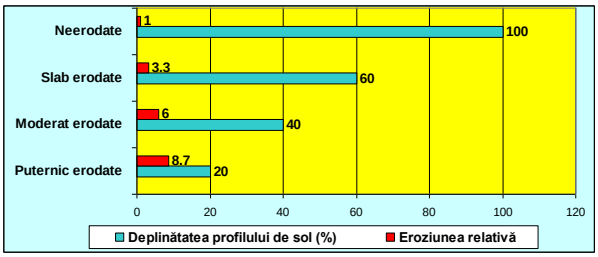

Figure. 12 Dependence of soil erosion on the degree of erodibility in Izgar

Erosion phenomena thus exert a strong and multilateral degradational influence on the soil cover. Soil erosion influences their hydrological functions, but they can be attenuated by natural vegetation.
The amount of hydrostable aggregates at the transition from non-eroded to heavily eroded soil is more than doubled (44–20%), bulk density increases (1.29–1.43), porosity and water capacity decreases, all of which, as a whole, strongly reduce soil

permeability and increase runoff and erosion.

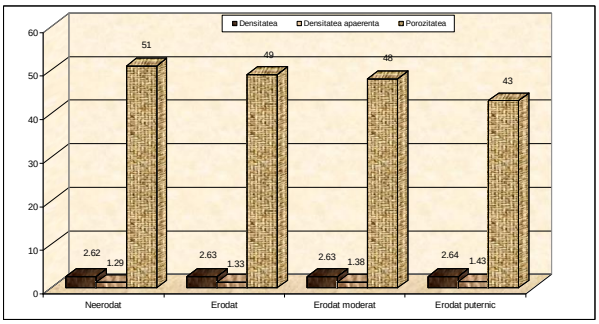

Figure. 13 Physical characteristics of soils with varying degrees of erosion in Izgar

The anti-erosion role of tillage in the direction of contour contours in fall tillage depends on the size of the slope. On slopes below 2° fresh soil completely prevents erosion, on steeper slopes tillage loses its anti-erosion role to a certain degree and additional measures are needed.

CONCLUSIONS

Soil analysis and field measurements show the following:

- The agricultural lands located within the radius of Izgar, Caras Severin County are affected by erosion in different forms. The most prone to erosion are the sloping soils with a texture prone to erosion.
- From an agricultural point of view they are annually processed, except that the measurements are inadequate for the explantation. Maintenance work should be done perpendicular to the contour lines, except that farmers with small areas of land do not have the possibility. The land has been improperly put in possession. The costs of these works are usually higher.

The anti-erosion role of tillage in the direction of contour contours in fall tillage depends on the size of the land slope. On slopes with slopes below 2° freshly ploughed soil completely prevents erosion. On slopes with higher slopes tillage loses its anti-erosion role to a certain degree and additional measures are necessary. On moderately (4-6°) and heavily (6-8°) eroded soils, subsoiling and recessed ridging ploughs are recommended to prevent the removal of less productive subsoils or soil-forming rocks.

- The nutrient supply rates are low indicating a higher investment to raise the productive capacity of these soils.
- Planting of buffer strips, trees and shrubs to prevent erosion and landslides are necessary.
- Directing torrents of water through canals bypassing agricultural land and storing them for irrigation in dry years.
- Avoiding agricultural works that involve land subsidence, land subsidence, unwarranted multiple passes through the land.

REFERENCES

BLAGA GH., RUSU I., UDRESCU S., VASILE D., 1996 – **Pedologie**, Ed. Didactică şi Pedagogică R.A. Bucureşti

CANARACHE A., 1990 – **Fizica solurilor agricole**, Ed. Ceres, Bucureşti

DÎRJA M., (2000), **Combaterea eroziunii solului**, Ed. Risoprint, Cluj-Napoca.

DÎRJA M., (2007), **Corectarea torenţilor**, Ed. Todesco, Cluj Napoca

DOMUTA C., (2011) **Eroziunea terenurilor în pantă**, Ed. Universității din Oradea

DRĂGAN I., 1990 – **Solurile României**, Litografia U.S.A.M.V.B. Timişoara

FLOREA N., MUNTEANU I., 2003 – **Sistemul Român de Taxonomie a Solurilor,** Ed. Estfalia, Bucureşti

IANOŞ GH., 1995 – **Geografia solurilor**, partea I, Pedologie, Ed. Mirton, Timişoara

IANOŞ GH., 1997 – **Solurile lumii**, Ed. Mirton, Timişoara

IANOŞ GH., 1999 – **Pedogeografia**, Ed. Mirton, Timişoara

JITĂREANU G., RAUS L., BUCUR D., (2007), **Ameliorarea, conservarea și valorificarea solurilor degradate prin intervenţii antropice**, Ed. Ion Ionescu de la Brad

LUCA E., ONCIA Silvica (2000), **Combaterea eroziunii solului**. Ed. Alma Mater Cluj-Napoca

MOŢOC M., (2002), **Realizări și perspective privind studiul eroziunii solului și combaterea ei în România,**

Secolul XX - Performanţe în agricultură, Editura Cereş,Bucureşti

PARICHI M., (2007), **Eroziunea și combaterea eroziunii solurilor**, Ed. Fundaţiei România de Mâine, Bucureşti

SEVESTEL M., (2014), **Curs de combaterea eroziunii solului**, Ed. Bren, Bucureşti

ŢĂRĂU D., 2003 – **Cartarea şi bonitarea solurilor**, Ed. Marineasa

xxxx, 1987 – **Metodologia elaborării studiilor pedologice**, I.C.P.A., Bucureşti

xxxx, 2021 – **Arhiva OSPA** Timiș.