SOIL EROSION AND ITS EFFECTS FROM THE REGION OF THE NEGREA VILLAGE

Olesea COJOCARU[1]

e-mail: olesea.cojocaru@bk.ru

Abstract

This article shows that the effects of the erosion process on soil characteristics in the investigated region of the Negrea village are varied. It is known that soil erosion is a complex phenomenon, highly spread in various forms. The purposes our researches consist in appreciation of the situation of the danger of erosion in the investigated region and recommend appropriate measures to diminish the negative consequences. The execution of the works on researched territory should be made on the basis of sound scientific projects. Erosion measures of researched soil will be planned within a crop rotation – an elementary necessity of agricultural lands. All humanity must be informed that a centimeter of soil is formed in the best condition of management on a the rock of loess in about 12 years, in terms of agricultural practices normal in about 40 years, and in a somewhat normal (natural) situation soil formation it may take some from 200 to 1000 years. The soil cover in the village Negrea consists of ordinary chernozems of various degrees of erosion and delluvial soils. Methods of conducting of pedological researches in the field and of laboratory testing included: - detailed the soil cover mapping at 1:5000 according to the instructions in force; - location and morphological description of soil profiles, determining morphometric indices of soils, collecting samples of soil for laboratory analysis; - determining the degree of soil erosion degraded of the village Negrea region based on data summary the thickness of humiferous profile with humus content greater than of 1.00%, etc.

Key words: agrosistem, crop rotation, landscape, soil erosion, Negrea village

Motto: ”*The soil as a limited resource - is one of the most valuable objects indispensable of humanity.* ” Jean Dorst.

Soil is a complex system within which it carries out a set of processes of transformation and transfer of substances and energy. Most soils reduce their year after year production capacity lose their nutritional elements and organic matter a higher proportion than takes place the process to complete them, which eventually leads to their depletion.

The erosion is the process of detachment and transport of material from the soil surface driven process and influenced by a number of agents and erosive factors. By erosion the soil loses it’s, usually, fertile horizon or loses and the other horizons, suffering a partial or total destruction, with serious implications for its fertility.

Detachment and transportation of material from the surface of the soil on sloping lands are due the greatest extent to water, as in the form of rain drops as well as in the form of dispersed or concentrated currents (Newsletter of ecopedologic monitoring, 1996; Neamtu T., 1996).

Extremely numerous investigations made in this direction have established the degree of change through erosion of the main physico-chemical and hydrophysical indicators of the soil (Voloshchuk M.D., 1978; Zaslavsky M.N., 1966; Sobolev S.S., 1961).

Also the soil is considered as natural resource basic of any agricultural system effectively, productively and sustainably, while being limited and more complex than air and water, representing the essential life support (Berca M., 2008). Throughout time the concept of soil and its functions evolved. Soil properties may evolve over time under the influence of climatic, biological and anthropogenic factors (Florea N., 2003).

Environmental protection in our country represent a matter of national interest in order to preserve the ecological balance, maintain and improve the quality of natural factors, to ensure conditions of living and working ever better present and future generations. Unfortunately, after application of the *Land Law no.18/1991*, returning to the traditional culture in the direction of hill-valley as well as continuous fragmentation of lands has fostered an acceleration of soil erosion.

Most often due to soil erosion, there is a redistribution of the fertile upper horizons of soils

[1] State Agrarian University of Moldova, Chisinau, Republic of Moldova

towards lower areas, having serious consequences on agricultural productivity. Whether the majority of lands located on the hills or on the slopes are affected by surface erosion, on base of the slopes were formed a series of *colluvial* deposits. Most often the transition from the surface of the slopes from the *alluvial* plains is not suddenly, but by means of a connection surface called glacis that have a spread almost generalized.

Preservation and maintenance of natural soil fertility have been and are supported and promoted by researchers and practitioners concidering the current requirements for sustainable agriculture. Deposition sedimentary material (*loess*) held in the meadow area and river terrace (Cerbari V.V. *et al*, 1994, 2010; Ursu A., 2011; Gennadiev A.N. *et al*, 2002).

The erosion of the widespread of soils, such as has been mentioned, is the second peculiarity of the hilly area on the left side of Prut.

Further we present the analysis of information published concerning history of the problem of soils erosion, classification of eroded soils, drawing up anti-erosion measures and diminishing negative consequences (Newsletter of ecopedologic monitoring., 1996). It should be emphasized that any eroded soil is the result of a balance between the pedogenesis permanent process and it's of physical deterioration process by erosion (Cojocaru O.I., 2015). In the case of fallow lands, denudation processes (natural or geological erosion) resulting slow (Cerbari V.V. et al, 2010; Cojocaru O.I., 2014, 2015; Ursu A., 2011) and is formed soils of various degrees of evolving.

MATERIAL AND METHOD

Soil erosion is a complex phenomenon of destruction and removal of soil and is produced by water that is leaking or the wind. Soil erosion (erosion accelerated) is linked to the anthropogenic factor influence on land fund and now has become the main process of deterioration, degradation and desertification of agricultural lands (Berca M., 2008; Florea N., 2003; Neamtu T., 1996; Soil-forming processes, 2006; Soil processes and spatio-temporal organization of soils, 2006).

The main cause of the spread of large-scale of soil erosion in Republic of Moldova also refers to of region of Prut (Cerbari V.V. *et al*, 2010; Cojocaru O.I., 2014, 2015).

Among those mentioned:

- excessive capitalizing of lands with the inclusion of as arable those with high degree of inclination;
- increased share of hoeing agricultural crops on slopes;
- terraced condition of steep slopes without consideration of the geological and lithology structure of the territory;
- soil tillage and conduct of the technological operations of cultivation of agricultural crops with severe deviations from the general direction of contours;
- the lack of the simplest of erosion control agro- and phytotechnical measures on slopes.

RESULTS AND DISCUSSIONS

Erosion caused by water is manifested on lands situated on the slopes. Surface leakage on the slope, precipitation water, washed soil in its path and carrying it.

At the core of the fight against erosion must be made mandatory"ecologic limit of the territory" that characterize the limit of the environment auto-generation. The first scholar to shown the existence of eroded soils was the founder of soil science, the renowned Russian scientist Dokuceaev V.V. (Fedotov V.S., 1980; Constantinov I.S., 1987).

The contemporary's researchers of the erosion processes (*Tables 1 and 2*) the Republic of Moldova territory that developed complex anti-erosion measures were: Zaslavskii M.M., Fedotov V.S., Constantinov I.S., Voloşciuk M.D. and others.

Majority of the researchers of the erosion processes were of the opinion that the materials pediology large-scale and detailed of soil coverage local reception basin forms the basis of initial information necessary for successful designing and implementing of complex measures to combat erosion in the case these units of land (Cojocaru O.I., 2015; Florea N., 2003; Neamtu T., 1996; Voloşciuk M.D., 1978).

Table 1

The classification eroded rich chernozems, under Sobolev S.S. (Sobolev S.S., 1961)

The degree of soil erosion	Diagnostic criteria
weakly	is washed up to 50 % of the A horizon
moderately	is washed more than 50 % or the entire A horizon
strongly	is washed partly or wholly B horizon

Table 2

The classification the Moldovan rich chernozems, by the degree of erosion, under Zaslavskii M.N. (Zaslavskii M.N., 1966)

The degree of soil erosion	The color of the surface horizon	The degree of erosion of genetic horizons	Decreasing the thickness of humus generating profile,%	Decreasing the reserve of humus in the layer 0-50 cm, %
weakly	very weak light	less than 50 % of A horizon	less than 30	less than 20
moderately	moderately light	more than 50 % or the entire A horizon	30 - 60	20 - 50
strongly	light	partially or entirely B horizon	more than 60	more than 50

Over time, damaged lands become sterile, ridden by wheel track cutting and ravines and are therefore removed from agricultural use. The main factors that favor erosion by water are: the relief, precipitations, rocks, vegetation, living organisms, how to use of lands.

Relief. The higher the relief is tilted, the faster the water flows and the erosion is stronger, as the length of the slope is greater the more water are gathered from rainfall and therefore its force of destruction is higher. Located on the northern slopes of the hills being less sunny are moistened even more of grass silage and therefore more preserved from erosion than those exposed to the south which furthermore acting and spring runoff caused the from the melting of faster snows.

Rain fall. It is a stable aggregate structure and is looser, allowing water infiltration and hence flow on slopes is reduced. On the contrary, soils without structure and less permeable are more easily eroded by water that drains. The rocks as are softer, they cedes to grinding and are therefore faster eroded.

Vegetation has an important role in soil protection. The leaves stop water droplets as they do not directly smash the soil; the stems are like obstacles to the water, decreasing the flow velocity and as a result water has more time to infiltrate into the soil; roots fixed the soil and the erosion is reduced. As the vegetation is more concluded with the so much the erosion is reduced.

The way the *land is used* capable of favoring or impede the process of erosion. For example where the soil works are made the direction of the slope, that is to say from the hill in the valley, the water gently flows through the grooves of furrows, or where it destroys vegetation cover is triggered the erosion. On the contrary, the incorrect work as shown, established erosion (Newsletter of ecopedologic monitoring., 1996; Soil-forming processes, 2006; Soil processes and spatio-temporal organization of soils, 2006).

Also, because of the erosion process were investigated leakages of liquid and solid of soil. Leakage of liquid and solid of soil within the different degree of erosion were determined in control plots of land with an area of 3 m^2. On these plots were simulated artificial rainfalls of certain intensity with using device portable sprinkler irrigation. The water supply of artificial rain was carried out in the tank with the volume 3,000 liters.

Duration of artificial rain has made for 30 minutes it with an intensity of 2 mm/min. In order to maintain stable over time the flow of 6 l/min the sprinkler irrigation device has been connected to the water control. The amount of water elapsed from the plot was determined by the volumetric method. The amount of washing soil was estimated by determining the turbidity of the samples over 5 minutes in balloons with a volume of 500 cm^3 (Cojocaru O.I., 2015).

As a result of unclogging in the layer 0-60 cm of type of soil molic humiferous profile and normal distribution of genetic horizons deep was derogated. Was produced mixing of the material of soil and reversal of horizons, what is quite clearly visible in the investigated recently arable soil profile in the region Negrea village.

Any project of erosion prevention in the framework of river basins should be conceived through research, design and implementation of the measures of erosion prevention in the local reception basins which are a component part independent of all basins of accumulation (Newsletter of ecopedologic monitoring., 1996; Ursu A., 2011; Gennadiev A.N. *et al*, 2002; Cerbari V.V. *et al*, 1994).

According to conducted research in the reception basin lands ”Negrea” from the region Negrea village, in the years 1971-1975 were completely rutted at a depth of 60 cm and used in vineyards and orchards. As a result of soil erosion processes were intensified. However, proper organization compared of the territory and micro-terracing between rows of trees and stumps vines stopped the in some measure the erosion. Acceleration of the processes of soil erosion occurred after the years 1991-1995 when the vineyard plantations and orchards have been in mass grubbed up without being designed and implemented a complex system of protection of arable land used.

As the study of soil cover in the doctoral program theme provides for conducting detailed of pedological mapping of the soil cover of the reception basin ”Negrea”, it was necessary to find a system of classification of sloppy eroded soils. For this purpose has selected a variant of the classification system of eroded soils developed taking into consideration the depth sloppy, derogated layer composition and the genesis horizon under the layer sloppy (Cerbari V.V. *et al*, 1994; Cojocaru O.I., 2014, 2015).

The problem of monitoring of the erosion processes and diminishing their negative impact is primary for agricultural lands in the region of the village of Negrea with relief and soil favorable conditions for showing their extensive (Cerbari V.V. *et al*, 2010; Cojocaru O.I., 2015; Ursu A., 2011).

CONCLUSIONS

According to existing information the reception basins soils in the region Negrea village is characterized by the following features that influence their condition of quality and production capacity:

- predominance in the granulometric composition of dust coarse and/or fine sand;
- formation of the soil cover in conditions of the erosion processes assessment;
- unclog of soils on the entire territory of the reception basin.

The particulars referred led to the formation within the reception basins of a complex cover of soil.

According to conducted research in the reception basin lands ”Negrea” from the region Negrea village, in the years 1971-1975 were completely rutted at a depth of 60 cm and used in vineyards and orchards.

As a result of unclogging in the layer 0-60 cm of type of soil molic humiferous profile and normal distribution of genetic horizons deep was derogated.

Successful realization of measures to combat of erosion and other soil degradation processes is only possible through the design and implementation of pedo-improvement measures developed based on research of pedological materials on a large scale or detailed.

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