CONSIDERATIONS ON THE CERNISOILS FROM THE CENTRAL EASTERN PART OF THE SOUTHERN BĂRĂGAN

Marius POPESCU

Department of Geography, „Ovidius" University of Constanta, Romania
Bd. Mamaia 124, 900527, Constanta, Romania,
Corresponding author: mariusp@univ-ovidius.ro

Abstract: *The last few decades have shown a reorientation of the geographical research towards the complex study of the geographical landscape. During the years the natural surfaces got smaller and smaller (they were replaced by agricultural or artificial surfaces) and the vegetation suffered major transformations from the structure and composition point of view. The purpose of this paper is the elaboration, with Geographical Information System (GIS) techniques, according to CORINE methodology, of the landscape spatial distribution map of Southern Bărăgan Field. The area of study, the Southern Bărăgan Field, is located in South-Eastern part of Romanian Plain, between Ialomiţa river to North, Mostiştea river to West, Borcea Branch and Danube to East and South. The relief is represented by a tabular plain, "bărăgan" type, with temperate continental climate, fertile soils as chernozems, and herbaceous vegetation associations. The inventory of the landscapes of the Southern Bărăgan Field was based on CORINE Land Cover (CLC) method presented in the "Addendum 2000") by the European Environment Agency (EPA). As a basis for analyzing landscapes we used some of the parameters derived from Digital Elevation Model of Terrain (DEMT) and the soil map. The DEMT has been obtained from 1:25,000 scale topographic map, through the following steps: - scanning and georeferencing the topographical map; - digitizing the scanned maps; - interpolation of sampling points with the help of the Topo to Raster functions from the ArcGIS 9.2. By analyzing the way land is used in the Southern Bărăgan Field, we identified the following types of landscapes: artificial surfaces, arable land, permanent crops, grass-land, heterogenous agricultural areas, forests, shrubs and herbaceous vegetation associations, wetlands and sandy areas. The report between anthropogenic landscapes and natural landscapes in the Southern Bărăgan Field tilts in favour of the first one. Correlating this map with the morphometric parameters and the pedological characteristics we emphasize the major features of the anthropogenic landscapes and the transformation suffered by the natural vegetation.*

Key words**:** *cernisoil, loess, Southern Bărăgan*

INTRODUCTION

In Bărăgan Southern Plain, the soil is the main natural resource. Most of its surface is covered by soils with a high fertility.

In the Central-Eastern Part is remarkable homogeneity of a wide range of soil, most of the area being occupied by cernisoils.

Because of parental material, which is composed mostly of surface deposits of loess and loess, coating of plain soil is relatively homogeneous, both in terms of soil profile thickness and the types of soil, most of cernisoils class.

MATERIAL AND METHODS

Across the sector plain the cernisoils occupies more than 90% of the area being represented by several types.

The research study has been conducted on cernisoils from two administrative territorial perimeters: Dragalina and Ştefan cel Mare. In this study were identified several types of chernozem and faeozem.

The soils from studied perimeters were formed exclusively on loess, under the influence of plant association grassy steppe conditions of temperature and humidity typical of temperate continental climate.

Pedological studies it has made in conformity with „Pedological studies elaboration methodology" made by ICPA – Bucharest, and soils type was established in conformity with „Romanian system of soils taxonomy – 2003".

RESULTS AND DISCUSSIONS

Basic factors that contributed to the formation of soils are microrelief, climate, parental material, vegetation, groundwater. On the territory investigated, although the large expanse that was bounded by several units of ground because of invariability pedogenetic factors in the area studied.

Parent material on which soils are formed is loess, that prints high soil fertility, deep with good drainage and a medium texture.

The soils of the administrative territories Dragalina and Ştefan cel Mare fall cernisoil class with types and subtypes characteristic, and most have epycalcaric chernozem, proxycalcaric chernozem, mezocalcaric cambic chernozem, faeozem.

Epycalcaric chernozem occupy a high share in the administrative territory perimeter of Dragalina, 4906 ha (30%), the sequence of horizons is the Am-AC-Ck-Cca and has the following characteristics:

Am horizon (0-34 cm) is clayey, dark brown closed, disturbed structure in the first 20 cm, glomerular well-developed below 20 cm, wet, common roots thin, medium plastic, adhesive medium, medium pores, without tumult, gradual transition in next horizon.

AC horizon (34-53 cm) is yellowish brown with brown spots closed, poorly structured, clayey, wet, moderately compact, settled, small pores, moderate effervescences, $CaCO_3$ in the form of efflorescences and pseudomicelles, gradual shift in the next horizon.

Ck horizon (53-73 cm) is clayey, yellow brown, unstructured, dry, friable tough, strong effervescence, $CaCO_3$ as pseudomicelles.

Cca horizon (73-108 cm) is clayey, whitish yellow, without structure, rough dry, ferment violent, $CaCO_3$ in the form of concretion friable small, rigid and friable powder.

Soil reaction within the first 20 cm is weakly alkaline (pH = 7.5), humus content is good (H = 3.0%), the supply of mobile phosphorus is average (31 ppm) and potassium mobile is good (204 ppm). $CaCO_3$ ranges 2.6-12.4% per profile.

Texture in the upper horizon is clayey, clay below 0.002 mm - 32.1%.(table 1)

In perimeter of Ştefan cel Mare, epycalcaric chernozem occupies 410 ha (20%), the sequence of horizons is the Am-AC-Ck-Cca and has the following characteristics:

Am horizon (0-35 cm) is clayey, brown dark, glomerular structure and low average, wet, thin roots, moderately compact, medium and plastic adhesive in wet, do ferment between 15-30 cm, gradual transition.

AC horizon (35-55 cm) is clayey, yellowish brown, poorly developed glomerular structure, moderately compact, rooted rare, medium and plastic adhesive in wet, average effervescence, gradual transition.

Ck horizon (55-75 cm) is clayey, yellowish brown, without structure, moderately compact, dry, with abundant efflorescence, porous, smooth transition.

Cca horizon (75-115 cm) is clayey, whitish yellow, without structure, dry, porous, moderately compact, with abundant efflorescence and concrete semi friable very much.

Soil reaction within the first 20 cm is weak acid (pH = 6.8), humus content is medium (H% = 4.0-4.5), the supply of mobile phosphorus is good (54 ppm) and potassium mobile is all good (188 ppm). $CaCO_3$ in the first 50 cm is 1.2-3.5%.

The texture is undifferentiated profile - clayey. (table 1)

Table 1

The main chemical properties of epycalcaric chernozem

Administrative territorial perimeter	Area (ha)	pH	Humus (%)	P mobile (ppm)	K mobile (ppm)	$CaCO_3$ (%)
Dragalina	4906	7.5	3.0	31	204	2.6-12.4
Ştefan cel Mare	410	6.8	4.0-4.5	54	188	1.2-3.5

Proxycalcaric Chernozem occupies the largest share in the administrative territory perimeter of Ştefan cel Mare, 1374 ha (67%), the sequence of horizons is the Am-AC-Ck-Cca and has the following characteristics:

Am horizon (0-32 cm) is clayey, dark browns, glomerular small and medium dry, rooted hair, moderate settled, medium and plastic adhesive in wet, do effervescence strong on the surface of the soil, porous, smooth transition.

AC horizon (32-58 cm) is brown, glomerular small, poorly developed, clayey, dry, moderately compact, rooted hair, rare, porous, efflorescence abundant limestone, gradual transition.

Ck horizon (58-80 cm) is clayey, yellowish brown, without structure, moderately compact, dry, strong effervescence, $CaCO_3$ in the form of efflorescence.

Cca horizon (80-110 cm) is clayey, dirty yellow, with no structure, dry, porous, moderately compact, concretion with $CaCO_3$ semi friable frequent, gradual transition.

Soil reaction within the first 20 cm is weakly alkaline (pH = 7.2-7.8), humus content is medium (H% = 2.2-2.8), the supply of mobile phosphorus is average (36 ppm) and potassium mobile is good (180 ppm). $CaCO_3$ in the first 50 cm is 3.4-3.5%.

Texture is clayey-argillaceous on 0-58 cm and clayey in depth profile. (table 2)

In the perimeter of Dragalina, proxycalcaric chernozem, occupies 6567 ha (39% of the territory), the sequence of horizons is Ap-Am-AC-Cca and has the following characteristics:

Ap horizon (0-20 cm) is clayey, brown closed structure disturbed by mechanical work, light, sensitive pores, common roots thin, dry, weak effervescence.

Am horizon (20-38 cm) is clayey, brown dark, glomerular structure, small and medium moderately developed, dry, thin roots, settled, rough dry, sensitive pores, coprolites, moderate effervescence, $CaCO_3$ in the form of spots on the horizon, winding passage in the next horizon.

AC horizon (38-56 cm) is yellowish brown, small grained structure, poorly developed, clayey, friable hard, dry, $CaCO_3$ in the form of powder and vinis friable, weak plastic and weak adhesive, gradual shift in the next horizon.

Cca horizon (56-105 cm) is clayey, whitish yellow, without structure, dried, ferment violent, $CaCO_3$ in the form of friable concretion and friable powder.

Soil reaction within the first 20 cm is weakly alkaline (pH = 7.9), humus content is good (H = 3.6%), the supply of mobile phosphorus is average (38 ppm) and potassium mobile is good (120 ppm). $CaCO_3$ ranges 8.2-12.3% per profile.

Texture throughout the profile is clayey, clay below 0.002 mm - 30.5% in 0-20 cm. (table 2)

Table 2

The main chemical properties of proxycalcaric chernozem

Administrative territorial perimeter	Area (ha)	pH	Humus (%)	P mobile (ppm)	K mobile (ppm)	$CaCO_3$ (%)
Dragalina	6567	7.9	3.6	38	120	8.2-12.3
Ştefan cel Mare	1374	7.2-7.8	2.2-2.8	36	180	3.3-4.5

Mezocalcaric cambic chernozems occupies an area of 816 ha in the perimeter of Dragalina (5%) and 68 ha in the perimeter of Ştefan cel Mare (3%).

Sequence of horizons in the perimeter of Dragalina is Am-Bv-BC-Ck and has the following characteristics:

Am horizon (0-38 cm) is clayey, the small grained, partially destroyed during the first 20 cm, moderately developed below 20 cm, moderately compact, friable hard, small pores, moderately plastic and adhesive, thin roots and frequent, clear passage.

Bv horizon (38-60 cm) is clayey-dusty, yellowish brown, polyhedral structure and grained, wet, low compact, friable, small pores, passing gradually into the next horizon.

BC horizon 60-106 cm) is clayey-dusty, yellow brown mottled, brown spots dark, poorly structured friable, moderately plastic and adhesive, effervescence poor, gradual transition.

Ck horizon (107-111 cm) is clayey, yellow-looking whitish, without structure, moist, friable hard, weak plastic and weak adhesive, strong effervescence.

Soil reaction within the first 20 cm is weak acid (pH = 6.7), humus content is low (H = 2.8%), the supply of mobile phosphorus is average (39 ppm) and potassium mobile is good (170 ppm).

Texture is clayey the upper horizon. (table 3)

Sequence of horizons within the perimeter of Ştefan cel Mare is Ap-AB-Bv-BC-Cca and has the following characteristics:

Ap horizon (0-31 cm) is clayey, brown dark, structure partially destroyed due to mechanical work, medium and plastic adhesive in wet, dry, medium compact, does not ferment, clear passage.

Ap horizon (31-40 cm) is clayey, brown, glomerular small and medium, moderately compact, medium and plastic adhesive in wet, average and large glomerular structure, porous medium, does not ferment, gradual transition.

AB horizon (40-60 cm) is clayey, brown, glomerular small and medium dry, moderately compact, thin roots and rare, gradual transition.

Bv horizon (60-90 cm) is clayey-argillaceous, closed yellowish brown, polyhedral structure, moderately compact, thin roots and rare, medium and plastic adhesive in wet, gradual transition.

BC horizon (90-102 cm) is clayey-argillaceous, yellowish brown, poorly structured, weakly compact, medium and plastic adhesive in wet, efflorescence of $CaCO_3$, gradual transition.

Cca horizon (102-130 cm) is clayey, yellowish, without structure, wet, medium and plastic adhesive in wet, concretion rigid of $CaCO_3$.

Soil reaction within the first 20 cm is weakly alkaline (pH = 7.3), humus content is medium (H% = 3.8-4.0), the supply of mobile phosphorus is average (22 ppm) and potassium mobile is very good (264 ppm).

Texture is clayey on 0-60 cm and clayey-argillaceous to profile down. (table 3)

Table 3

The main chemical properties of mezocalcaric cambic chernozem

Administrative territorial perimeter	Area (ha)	pH	Humus (%)	P mobile (ppm)	K mobile (ppm)
Dragalina	816	6.7	2.8	39	170
Ştefan cel Mare	68	7.3	3.8-4.0	22	264

Faeozems occupies low areas, 1430 ha in the perimeter of Dragalina (8.5%) and 247 ha in the perimeter of Ştefan cel Mare (10%).

Sequence of horizons in the perimeter of Dragalina is Am-AB-Bv-BC-C and has the following characteristics:

Am horizon (0-45 cm) is clayey-argillaceous, blackish brown in wet, granular structure, moderately well-developed, moderately compact, thin roots, common, small pores, wet, gradual shift in the next horizon.

AB horizon (45-67 cm) is clayey-argillaceous, dark gray brown, slightly yellowish, moderate glomerular structure developed, moist, moderately compact, friable in wet, moderately plastic and moderately adhesive, small pores.

Bv horizon (68-88 cm) is clayey-argillaceous, yellowish brown, polyhedral structure, moist, friable, gradual shift in the next horizon.

BC horizon (89-105 cm) is clayey-argillaceous, yellowish brown with dark gray spots open, poorly developed structure, moist, friable, moderately plastic and moderately adhesive, small pores, gradual shift in the next horizon.

C horizon (106-162 cm) is clayey-dusty, yellow brown, unstructured, moist, medium plastic and adhesive, makes effervescence.

Texture in the upper horizon is clayey-argillaceous, undifferentiated on profile. Soil reaction within the first 20 cm is weak acid (pH = 6.5), humus content is average (H = 3.5%), the supply of mobile phosphorus is average (34 ppm) and potassium mobile is very good (352 ppm). (table 4)

Table 4

The main chemical properties of cambic faeozem

Administrative territorial perimeter	Area (ha)	pH	Humus (%)	P mobile (ppm)	K mobile (ppm)
Dragalina	1430	6.5	3.5	34	352
Ştefan cel Mare	247	7.8	3.8	35	312

Sequence of horizons within the perimeter of Ştefan cel Mare Am-AB-Bv-BC-C and has the following characteristics:

Am horizon (0-40 cm) is clayey-argillaceous, dark, small and medium glomerular, good adhesive and plastic in wet, moist, weak compact roots, clear passage.

AB horizon (40-60 cm) is clayey-argillaceous, brown dark, glomerular small, medium compact, roots, medium and plastic adhesive in wet, gradual transition.

Bv horizon (60-98 cm) is clayey-argillaceous, dark yellowish brown, polyhedral structure, dry, moderately compact, roots thin, medium plastic and adhesive in wet, gradual transition.

BC horizon (98-125 cm) is clayey-argillaceous, yellowish brown, slightly wet, weak compact, rare roots, medium plastic and adhesive in wet, polyhedral structure, poorly developed, smooth transition.

C horizon (below 125 cm) is clayey-argillaceous, yellow, without structure, wet, loose, rare roots, medium plastic and adhesive in wet, do not ferment.

Soil reaction within the first 20 cm is weakly alkaline (pH = 7.8), humus content is average (H = 3.9%), the supply of mobile phosphorus is average (35 ppm) and potassium mobile is very good (312 ppm). Texture is undifferentiated on profile - clayey-argillaceous. (table 4)

CONCLUSIONS

Soils studied from administrative territorial perimeters were formed exclusively on loess, under the influence of plant association grassy steppe conditions of temperature and humidity, characteristics of a temperate continental climate.

Under the influence of water from rainfall is the levigation salts such as $CaCO_3$.

This in conditions of microrelief existing on flat surfaces, slightly positive, its presence on the ground, in case of proxycalcaric chernozems or at depths of 20-50 cm in case of epycalcaric chernozems. Area slightly depression, were formed cambic chernozems with levigation carbonates between 50-100 cm.

Parent material on which soils are formed as the loess which print high soil fertility, deep with good drainage and a medium texture.

Sequence of horizons is the Am-AC-C-Cca for calcaric chernozems and AB-Bv-BC-Cca for cambic chernozem. Faeozem has the same profile as cambic chernozem. It are not calcium carbonates than 125 cm below the soil and are acquiring physico-chemical and good trophicity.

Am horizon, pale brown, clayey, with texture glomerular partially destroyed due to mechanical work the horizon is crossed by plant roots, which must meet the qualities of a fertile soil, good worked, aerate.

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