Scientific Papers, USAMV Bucharest, Series A, Vol. LII, 2009, ISSN 1222-5339

SOME CHARACTERISTICS OF RHODIC-DYSTRIC CAMBISOLS FROM AMPOI BASIN, APUSENI MOUNTAINS

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Keywords: *rhodic, dystric, cambisols, Ampoi*

Abstract

The studied soil is located in the Ampoi basin, in the Southeastern part of Apuseni Mountains. Cambisols are the most wide-spreaded soils in the studied area (around 75.6%).

The paper presents some physic-chemical characteristics of the Rhodic-Dystric Cambisols, a particular subtype in Dystric Cambisols in the area.

Rhodic-Dystric Cambisols are located on the sloped moderate-strongly versants, over 500 m altitude, both Northern and Southern side of the Ampoi River. The parent materials are represented by sandy-loam deluvium derived from polimictic conglomerates and Tortonian brick-reddish sandstones with intercalation of magmatic rocks (Neogen quartzite amphibole andesite).

The reddish colour of the parent material induces red colour of the soil and further their rhodic character.

From the morphological point of view, these soils belong to the Dystric Cambisols. The chemical data showed a very high depletion of bases ($V_{\%}$=6-8%), specific to Spodisols. These chemical characteristics are strongly induced by the acid rains.

INTRODUCTION

The studied soils are located in the Ampoi basin, in the South-Eastern part of Apuseni Mountains. Cambisols are the most representative soils from Ampoi Basin and are located on 36520 ha, represented 76% from this area. Dystric Cambisols are spread on 13680 ha (28%). Them are occurring on narrow crest and moderate-strongly sloped versants, over 500 m altitude, both northern and southern side of the Ampoi River. Them are represented by Dystric Cambisols associate with Lepti-dystric Cambisols and Dystric-lithic Leptosol; Rhodi-dystric cambisols associate with Lithic-rhodi-dystric Cambisols.

The paper presents some morphological, physical and chemical characteristics of the Rhodic-Dystric Cambisols, a particulars subtype in Dystric Cambisols in this area.

MATERIAL AND METHODS

Research was carried out during 2001-2004, by field studies. The assignment of work itineraries was made according to ICPA Methodology (vol. I) for mountain relief. Soils samples were collected on genetic horizons, the soil profile was characterized by soil texture and basic chemical properties (pH_{H2O}, cation exchange capacity, content of organic carbon, nitrogen, available phosphorus and potassium, base saturation percentage).

Soil reaction (pH) was determined potentiometric method, in water suspension (1:2.5). The values of the percentage base saturation ($V_{8.3}$, %) were determined by calculation as a percentage ratio between the content of exchangeable bases (EB, me/100 g soil – Kappen procedure) and the total cation exchange capacity ($T_{8.3} = BE + A_{8.3}$).

Organic carbon content (Corg, %) was determined by wet combustion procedure (Walkley-Black method modified by Gogoaşă).

The available phosphorus and potassium contents were determined by the Egner-Riehm-Domingo procedure, by extraction the ammonium lactate acetate, in soils were rated as per the principles and criteria of WRB-SB (1998).

RESULTS AND DISCUSSION

Rhodic-Dystric Cambisols occur on the sloped moderate-strongly versants with gullies, over 500 m altitude, both Northern and Southern side of the Ampoi River.

The parent materials consist of sandy-loam deluvium derived from polymictic conglomerates and Tortonian brick-reddish sandstones with intercalation of magmatic rocks (Neogen quartzite amphibolic andesites). Natural global drainage is excessive. Bioclimatic province belong to broad-leaved trees-*Fagus sylvatica* forest floor. Soil profile is of Ao-AB-Bv-BC-Cn. The soils are semi-deep to moderately deep (51-100 cm). The soils are primarily used as forest.

Morphological characterization

Ao1 0-10 cm; loam with coarse fragments (5%) from amphibolic andesites in different stages of weathering; dark reddish brown (5 YR 3/4) in moist state; reddish brown (5 YR 4/4) in dry state; weak granular structure; weak compact; dry; hard in dry state; friable in moist state; thin grassy roots; gradually transition.

Ao2 10-25 cm; loam with coarse fragments (5%) from amphibolic andesites in different stages of weathering; reddish brown (5 YR 4/4) in moist state; light reddish brown (5 YR 6/3-6/4) in dry state; subangular blocky structure; friable inmoist state; thin grassy roots; slightly moist; compact; gradually transition.

AB 25-42 cm; loam with coarse fragments (10%) from amphibolic andesites in different stages of weathering; reddish brown (2.5 YR 4/4-5/4) in moist state; light

reddish brown (5 YR 6/4) in dry state; strong-moderate blocky structure; friable in moist state; hard in dry state; thin grassy roots; compact; gradually transition.

Bv 42-60 cm; loam with coarse fragments (15%) from amphibolic andesites in different stages of weathering; reddish brown (2.5 YR 4/4-4/6) in moist state; light red (2.5 YR 6/6-7/6) in dry state; massive structure; very tough in dry state; friable in moist state; compact; slightly moist; gradually transition.

BC 60-75 cm; sandy loam with coarse fragments (20%) from weathered amphibolic andesites; red (2.5 YR 4/6-5/6) in moist state; red-light red (2.5 YR 5/8-6/8) in dry state; massive structure; hard in dry state, friable in moist state.

Physical Properties (table 1). Analitical data show uniformly distribution of clay (<0.002 mm) along the soil profile (21.3-23.4%). From the pedological point of view there is not texture differentiation.

The content of silt (0.02-0.002 mm) decreases from 23.6% in Ao1 horizon to 20.5% in BC horizon; fine sand (0.2-0.02 mm) increase from 38.4% in Ao1 to 40.3% in BC and coarse sand (2.0-0.2 mm) is constant along profile with low values (14.8-16.8%). The textural class is loamy-sandy loamy.

Table 1

Physical properties of Rhodic-Dystric Cambisols

Horizon	UM	Ao_1	Ao_2	A/B	Bv	B/C
Depth	cm	0-10	10-25	25-42	42-60	60-75
Skeleton	% g/g	5	5	10	15	20
Coarse sand (2.0-0.2 mm)	% g/g	15.5	14.8	15.1	16.8	15.8
Fine sand (0.2-0.02 mm)	% g/g	38.4	39.8	42.6	39.4	40,3
Silt (0.02-0.002 mm)	% g/g	23.6	22.8	21.0	20.2	20.5
Clay (<0.002 mm)	% g/g	22.5	22.6	21.3	23.6	23.4

Chemical properties (table 2). Soil reactions is strong acid (pH 3.9-4.4) on the whole profile. Cation exchange capacity (CEC) is very low (8.6-9.7 me/100 g soil) in Ao1, Ao2, AB, Bv and low (14.3 me/100 g soil) in BC horizon. The adsorption complex is dominated by the exchangeable hydrogen with very high values (8-12 me/100 g soil). The exchangeable base sum is extremely low (0.6-2.2 me/100 g soil). The percentage of bases saturation (V, %) is extremely oligobasic (6.8-8.3%) along Ao1, Ao2, Bv horizons and oligobasic (15.5%) in BC horizon, consequently the soil is extremely debasified. Organic carbon content is low (1.6%) in Ao1 horizon, very low (0.87%) in Ao2 horizon and extremely low (0.3-0.6%) along the AB, Bv and BC horizons. Total nitrogen content is very low (0.032-0.068%) along the whole profile. Available phosphorus content is extremely low (2 $mg.kg^{-1}$) along

the profile and available potassium content is low (73 mg.kg-1) in Ao1 horizon, very low (59 mg.kg^{-1}) in Ao2, AB horizons and low in (86 mg.kg^{-1}) in subjacent horizon.

Table 2

Chemical properties of Rhodic-Dystric Cambisols

Horizon	**UM**	**Ao_1**	**Ao_2**	**A/B**	**Bv**	**B/C**
Depth	cm	0-10	10-25	25-42	42-60	60-75
Humus (Cx1.72)	%	1.60	0.87	0.67	0,53	0.25
Total N	%	0.068	0.049	0.046	0,032	0.040
pH in H_2O	pH unit.	3.88	4.08	4.14	4,20	4.42
SB	me/100 g sol	0.61	0.56	0.67	0.72	2.22
T	me/100 g sol	9.74	8.56	8.62	8.75	14.27
$V_{8.3}$	% (T=100)	6.0	7.0	8.0	8.0	16.0
P-m	mg.kg^{-1}	2	2	2	2	2
K-m	mg.kg^{-1}	73	59	59	86	86

CONCLUSIONS

1. The reddish colour of the parent material induces the red colour of the soil and further their rhodic character and this subtype is not mentioned in SRTS, 2003.
2. The data showed a very high depletion of bases ($V_{\%}$<10<; pH_{H2O}=3.9-4.4), specific to Spodisols; these chemical characteristics were strongly induced by the acid rains. Also, the bioclimatic conditions are not specified to Spodisols.
3. From the morphological point of view, these soils belong to the Dystric Cambisols.

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