THE MOBILE PHOSPHORUS SUPPLY OF SOME CHERNOZEM SOILS FROM DOLJ COUNTY

STAREA DE APROVIZIONARE CU FOSFOR MOBIL ÎN UNELE SOLURI DE TIP CERNOZIOM DIN JUDEȚUL DOLJ

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Abstract. *This research was carried out in 2006-2007 period, on Dolj county soil, respective in Băileşti Plain which occupies the central part of Oltenia Plain. There were analyzed 76 probes sampled from 18 profiles. Chernozem soils occupy about 80% form Băileşti Plain soils, being typical, vermic and cambic. On these soil types were determined the P_2O_5 mobile quantity (mg/100 g) and a series of physicochemical analyses, meaning pH, carbonates (%), humus (%), clay (%), Nitrogen total (%), K_2O mobile (mg/100 g), SB, SH (me). It resulted that there is a direct correlation between the mobile phosphorus and pH. Thus, the total concentration of phosphorus drops significantly with the rising of pH level above 7,5 and below 5,5, being top between 6,3-6,5. On these soil types it can be observed a good supply with phosphorus for vegetables crop, the intensive fruit yard and vineyard, and very good, excessively for field crops.*

Rezumat. *Studiul a fost efectuat în perioada 2006-2007, pe teritoriul județului Dolj, respectiv Câmpia Băileştiului care ocupă partea centrală a Câmpiei Olteniei. S-au efectuat 18 profile din care s-au recoltat 76 de probe care au fost analizate. Cernoziomurile ocupă aproximativ 80% din solurile Câmpiei Băileştiului, fiind tipice, vermice şi cambice. Pe aceste tipuri de sol a fost determinat conținutul de P_2O_5 mobil (mg/100 g) şi o serie de analize fizico-chimice, respectiv pH, carbonați (%), humus (%), argilă (%), azot total (%), K_2O mobil (mg/100 g), SB, SH (me). S-a constat că există o corelație directă între fosforul mobil şi argilă, între fosforul mobil şi humus (R = 0.967) şi o corelație invers proporțională între fosforul mobil şi pH. Astfel, concentrația totală a fosforului scade semnificativ cu creşterea pH-ului la valori peste 7,5 şi cu scădere sub 5,5, fiind maximă între 6,3-6,5. Pe aceste tipuri de soluri se observă o foarte bună aprovizionare în fosfor atât pentru culturile de legume, plantațiile intensive de pomi fructiferi şi viță de vie, cât şi foarte bună, excesivă pentru culturile de câmp.*

The present study focus on the determination of mobile phosphorus from soil, which is mainly compose from mineral occluded phosphates, from those absorptive bounded but labile to the clay minerals and from those with organic provenience, respective mineralized from humus. The optimal condition for the phosphates mobilization and maintenance in liquid phase in mineral soils are meeting in low acid domain reaction. In moderate and strong acid domain, as well as in those neutral and alkaline take place a decrease of phosphorus concentration from the soil solution and their fixation in low soluble forms. Another factor that determines indirect the phosphorus mobility is represented by the soil texture. The

particle sizes that determine the soil texture influence differentiated, after the presence or absence of colloids, the absorption and the mobility of nutrients. The mobile phosphorus increase direct proportional with the organic matter.

MATERIAL AND METHODS

The research carried out in 2006-2007 period focused on the establishing of the mobile phosphorus quantity in chernozem soil type from Oltenia Plain. There were sampled soil probes on the depth, determining the soil type (soil profile) and the physicochemical analyses: pH, carbonates, humus, total nitrogen, mobile phosphorus, mobile potassium and the clay quantity. The used methodology is according to the ICPA Bucureşti standards.

RESULTS AND DISCUSSIONS

In this paper we are taking into account the soil of two town, representative for the Oltenia Plain: Calafat and Băileşti. Thus, the typical cambic chernozem from Calafat presents the next physicochemical characteristics:

Table 1

The physicochemical characterization (average values) on the depth

Horizon and depth cm	Ama	Amn	AB	Bv	Cca
	0-20	20-40	40-60	60-80	80-120
pH	7,3	6,1	7,1	7,3	8,3
Carbonates %					13,8
Humus %	12,56	1,44	2,96		
N_t %	0,160	0,150	0,100		
P_2O_5 mobile mg/100g	62,2	41,6	11,1		
K_2O mobile mg/100 g	66	31	86		
Clay	20,9	22,2	23,0	22,4	16,3

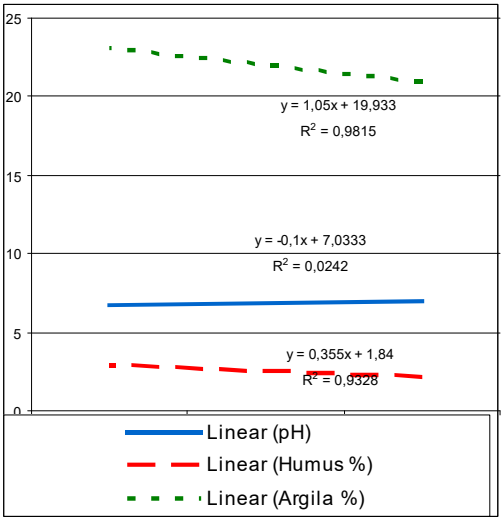

Fig. 1. The relation between pH, humus and clay and the mobile phosphorus quantity on typical cambic chernozem from Calafat

The soil reaction (pH) on arable layer is low acid. The humus quantity in the arable layer is middle, and the total nitrogen quantity is moderate. The mobile phosphorus (ppm) in arable layer points a good supply. The mobile potassium (ppm) in arable layer points a poor supply.

As it can be observe, there is a insignificant relation between pH and P_2O_5 quantity (R^2 = 0,0242), due to the low acid – neutral pH, the phosphorus being immobilized in the soil solution. The other relation are distinct significant.

On the typical low decarbonated chernozem we meet the next physicochemical characteristics:

Table 2

The physicochemical characterization (average values) on the depth

Horizon and depth cm	Ap	Am	AC	Cca
	0-20	20-40	40-60	60-120
pH	6,53	7,88	8,17	8,28
Carbonates %	-	0,3	7,8	15,2
Humus %	2,42	1,46	-	-
N_t %	0,140	0,083	-	-
P_2O_5 mobile mg/100g	162,4	41,2	31,6	-
K_2O mobile mg/100 g	105	70	-	-
Clay	22,4	19,8	17,2	15,6

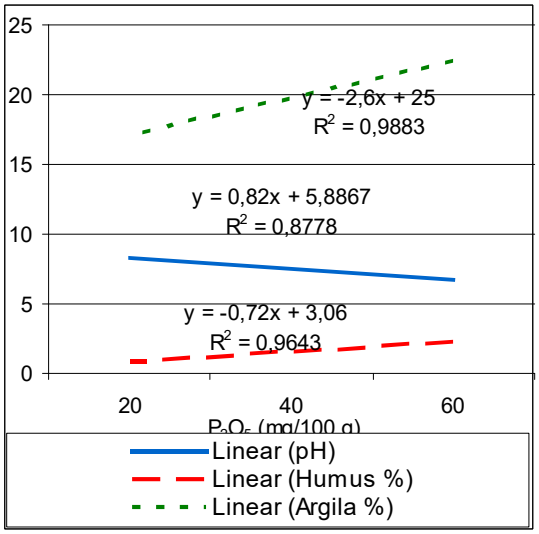

Fig. 2. The relation between pH, humus and clay and the mobile phosphorus quantity on the typical low decarbonated chernozem soil from Băileşti

The soil reaction is low acid to neutral on the depth. The humus quantity is small. The nutrients supply is like: the total nitrogen is good; the mobile phosphorus is good and the potassium mobile is poor. The carbonates quantity is higher on the depth.

Between pH, humus and clay and the P_2O_5 quantity there is distinct significant relations.

On the typical wet underground chernozem soil from Băileşti, we meet the next physicochemical characteristics:

Table 3

The physicochemical characterization (average values) on the depth

Horizon and depth cm	Ap	Am	AC	Cca
	0-20	20-40	40-60	60-120
pH	6,35	7,90	8,10	8,27
Carbonates	-	3,8	6	13,5
Humus %	2,48	1,6	1,2	-
N_t %	0,140	0,087	0,067	-
P_2O_5 mobile mg/100g	141,1	14,0	-	-
K_2O mobile mg/100 g	110	62	31	-
Argilă	17,6	15,1	13	10,2

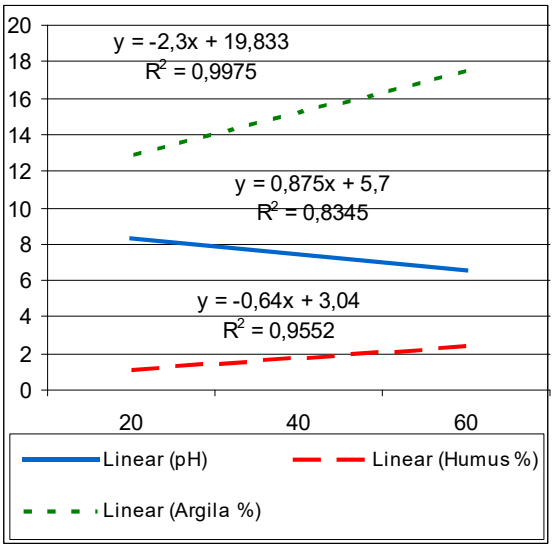

Fig. 3. The relation between pH, humus and clay and the mobile phosphorus quantity on the wet underground typical chernozem from Băileşti

The soil reaction is low acid to low alkaline. The humus quantity is middle. The main nutrient have the next supply: the total nitrogen is small, the mobile phosphorus is big, the mobile potassium is small. The carbonates horizon is higher on the depth.

From the figure, we can observe significant and distinct significant relation for the parameters taking into account.

There are, also, both insignificant and significant relation between the studied parameters and the phosphorus quantity, on the three layers. Thus, in

figure no. 4 we are represented the existing relation on the 0-20 cm layer. The figures no. 5 and 6 correspond to the 20-40 cm layer, respective 40-60 cm layer.

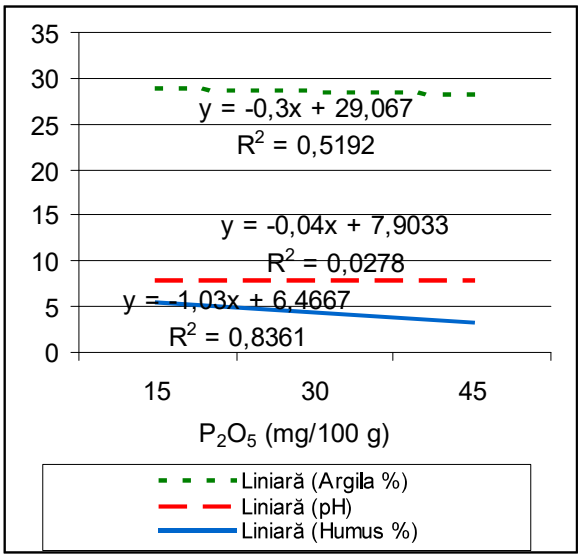

Fig. 4. The relation between pH, humus and clay and the phosphorus quantity on 0-20 cm layer, to the vermic typical chernozem from Băileşti

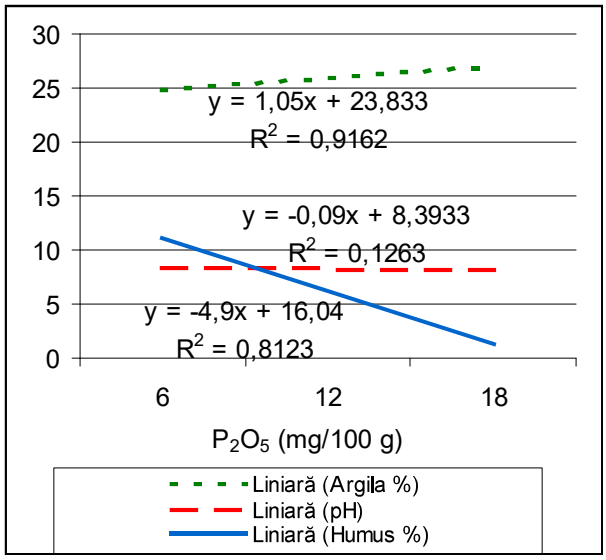

Fig. 5. The relation between pH, humus and clay and the phosphorus quantity on 20-40 cm layer, to the vermic typical chernozem from Băileşti

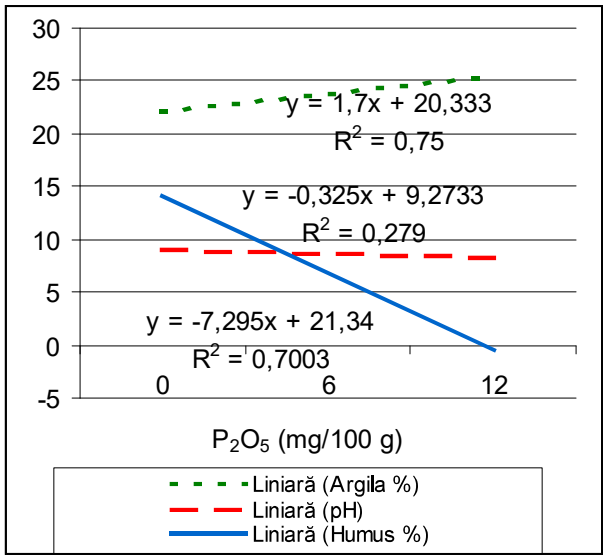

Fig. 6. The relation between pH, humus and clay and the phosphorus quantity on 0-20 cm layer, to the vermic typical chernozem from Băileşti

In the soil dynamic on the depth, it can be observed significant relation on the 20-40 cm layer, comparative with the other two layer, where the values fluctuation leads to low significant regression coefficients.

CONCLUSIONS

From the study of the fourth chernozem soil types results that the most significant relation exists between the humus and clay quantity and the total phosphorus. The pH vary depending by the chernozem type.

The profile depth doesn't influence the relation between the studied parameters and the phosphorus quantity.

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