INFLUENCE OF MANURE AND LIME RATES APLIED ON DIFFERENT NP BACKGROUNDS ON PH-VALUE OF PRELUVOSOIL FROM NORTH-WEST PART OF ROMANIA

INFLUENȚA ÎNGRĂȘĂMINTELOR ORGANICE ŞI A AMENDAMENTELOR APLICATE PE DIFERITE AGROFONDURI NP ASUPRA VALORILOR PH ALE PRELUVOSOLULUI DIN NORD-VESTUL ROMÂNIEI

GHE. CIOBANU*

**** University of Oradea, Romania***

Abstract: *In Romania was elaborated since 1968 a stationary long term experiments with fertilizers and lime in all the Agricultural Research Stations belong to Research Institute from Fundulea. The experiments was set up using a unitary scheme for knowing the evolution of soil fertility and the influence of organic – chemical fertilizers and limes rates and combinations on level and quality yield of different crops. The preluvosoil from North-West part of Romania is a medium soil, provide with the principal nutritive elements, with a weak acid reaction in the plugging horizon. In this paper are presented the results regarding the influence of manure and limes applied on different NP backgrounds on pH values of preluvosoil from North-West part of Romania.*

The research data presented show that the manure application has favorable effect on soil acidity, the pH-values remaining at the favorable level for growing and developing of the crops. Neutralization of soil acidity and completion of calcium reserve (and magnesium) trough lime application is an essential measure for increasing yield capacity of acid soils.

Rezumat: *În România au fost iniţiate după o schemă unitară, în toată reţeaua de staţiuni de cercetare, experienţe staţionare de lungă durată cu îngrăşăminte. Experienţele au fost instalate cu scopul de a urmări evoluţia fertilităţii solului şi influenţa fertilizării organo – minerale asupra cantităţii şi calităţii producţiei. Preluvosolul din partea de nord – vest a României este un sol mediu aprovizionat cu principalele elemente nutritive cu o reacţie slab acidă în orizontul arabil. În această lucrare se prezintă rezultatele privind influenţa gunoiului de grajd şi a amendamentelor aplicate pe diferite agrofonduri NP, asupra valorilor pH-ului al preluvosolului din nord vestul României. Datele de cercetare prezentate arată că aplicarea gunoiului de grajd are efect favorabil asupra acidităţii solului, valorile pH-ului rămânând la nivele favorabile creşterii şi dezvoltării plantelor. Neutralizarea acidităţii solului şi completarea rezervei de Calciu şi Magneziu prin aplicarea de amendamente este o măsură esenţială pentru creşterea potenţialului de producţie a solurilor acide.*

Key words*: long term field experiments, manure, lime, pH evolution, lime and NP fertilizers interaction*
Cuvinte cheie*: experienţe de lungă durată, gunoi de grajd, amendamente, evoluţia pH-ului, interacţiunea NP x amendamente*

INTRODUCTION

In Romania acid ploughing soils are spread on 2.0 millions ha which represent 20% from total agricultural land.

The factors which have a negative influence on growing plants are: high level concentration by H^+ and Al^{3+}, high level soil content in Fe^{2+} and Mn^{2+} and low level soil content in principal nutrients elements, low activity of micro organisms, stagnation of water, because of unsatisfactory infiltration.

Much research on white luvic soil and preluvosoil conditions (BEDO AND LANG, 1977, CIOBANU AND NAGY 1978, NEMETH 1996, STEFANESCU 2003) has shown the negative effect of

long-term application of nitrogen as ammonium nitrate on soil reaction, which became more acidic and led to growth of mobile aluminium and manganese soil content, which can determine phitotoxicity in the first part of vegetative period, with negative influence on yield level and quality.

For a better knowledge of application effect on time of manure rates on soil chemistry was set up in the network of Agricultural Research Stations from Romania, long-term field experiments in different pedoclimatic conditions.

This paper presents the results regarding the influence of NP chemical fertilizers, manure and lime on evolution of preluvosoil acidity.

MATERIAL AND METHOD

Experimental site

The research data was obtained at the Agricultural and Development Research Station Oradea, using a unique design in the all research network of Research Institute from Fundulea.

The preluvosoil reaction is acid in the ploughing A horizon, then slightly acid, and lack of $CaCO_3$ in the soil profile. The mobile Al content in the A horizon may cause poor growth of some crops (clover). The soil is well provided with mobile potassium and medium in phosphorus and humus.

The experimental factors in the field experiments with manure and limes were:

1. **Field experiment with manure and NP fertilizers was set up in 1974.**

Was used a short plant rotation winter wheat-maize

The manure was applied once at four years in autumn for maize using the rates: 0, 20, 40, 60 to/ha.

The NP rates were: N_0P_0, $N_{50}P_0$, $N_{50}P_{50}$ and $N_{100}P_{100}$,

2. **Field experiment with lime was set up in 1974 using a crop rotation:** pea, winter wheat, maize, alfalfa.

The lime rates were: 0, 3, 6, 9 to/ha applied once at 6 years.

NPK rates were differentiated:

Pea: N_0P_{80}, $N_{30}P_{80}$, $N_{120}P_{80}$, $N_{60}P_{80}$, $N_{90}P_{80}$, $N_{90}P_{80}K_{80}$,

Winter wheat: N_0P_{80}, $N_{30}P_{80}$, $N_{120}P_{80}$, $N_{160}P_{80}$, $N_{160}P_{80}K_{80}$,

Maize: N_0P_{80}, $N_{80}P_{80}$, $N_{160}P_{80}$, $N_{240}P_{80}$, $N_{240}P_{80}K_{80}$,

Alfalfa: N_0P_{100}, $N_{40}P_{100}$, $N_{80}P_{100}$, $N_{120}P_{100}$, $N_{120}P_{100}K_{80}$,

Sampling and analytical method

Soil samples from top soil (0-20cm) were collected from each experiment plot, in august 2000, after wheat harvesting.

All samples were taken to the laboratory and used for routine soil chemical analysis. pH was determined in water suspension.

RESULTS AND DISCUSSION

Influence of manure applied on different NP backgrounds on preluvosoil reaction (figure 1*)*. It is well known that the manure applied in acid soil conditions is increasing the degree of base saturation in the same time increasing the buffering capacity of the soil. On this way is possible to avoid unfavourable effect of chemical fertilizers with acid potential.

In the preluvosoil conditions the manure applied on different NP backgrounds had a significant positive effect on soil acidity. Applying manure in the rates of 20, 40 and 60 to/ha in the lack of N, P fertilizers the pH values are increasing from 6.29 to 6.76 units. In the case of the other NP backgrounds the manure determined an increase of pH values ranging between 0.4-0.6 units. The negative effect of nitrogen fertilizers application is lower in the case of manure application.

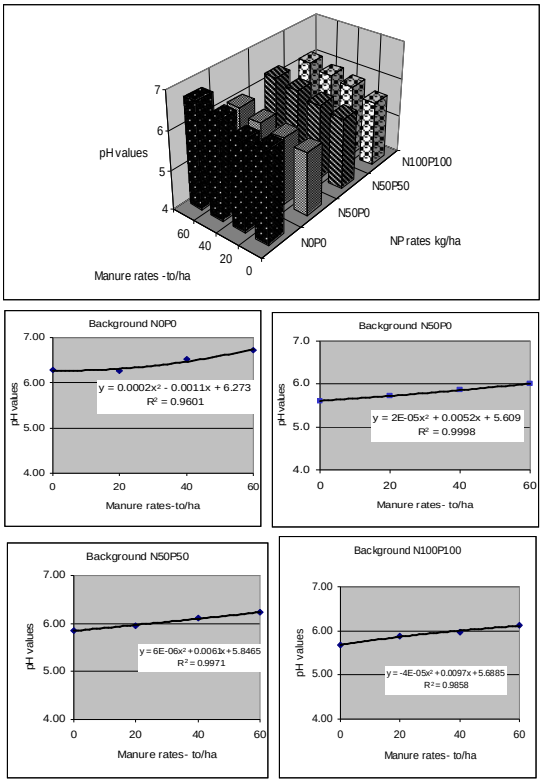


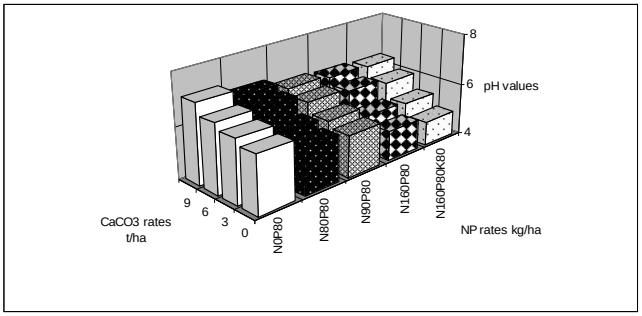
Figure 1 Influence of manure of preluvosoil reaction from North-West part of Romania

Influence of lime application on preluvosoil reaction (figure 2)

Neutralization of soil acidity and completion of calcium reserve (and magnesium) trough lime application is an essential measure for increasing yield capacity of acid soils.

In the case of preluvosoil application of lime in the rate of 3, 6 and 9 to/ha once at six years lead to increasing of pH values depending on NP background utilized.

When the lime is applied alone pH values are taking values between 6.22 and 7.08 when the lime rates are increasing from 0 to 9 to/ha.



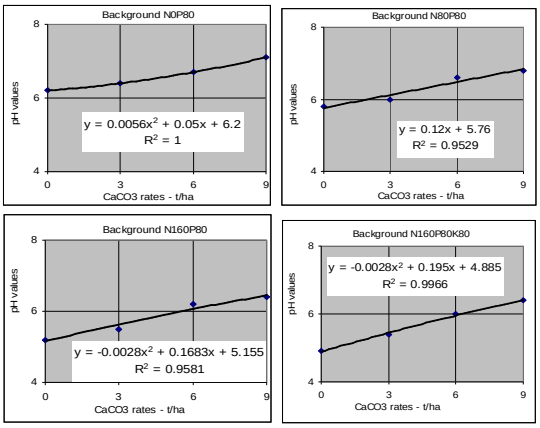


Figure 2 Influence of lime on preluvosoil reaction from Oradea

On the other NPK backgrounds the increasing of pH values are taking values between 0.9-1.42 pH units. Lime application in preluvosoil conditions is a necessary measure in the case of using NP fertilizers in high rates.

CONCLUSIONS

The soil reaction evolution is depends by fertilizers type and by the rates level applied.

The manure applied alone or associated with NP fertilizers, favourable influenced soil reaction, pH values increasing with 0.3-0.4 units if the manure rates applied are 40 to/ha respectively 60 to/ha.

For to avoid the decreasing pH values due to chemical fertilizers applied in preluvosoil conditions is necessary lime application for acidity neutralization.

Lime application once at six years in the rate of 9 to/ha maintain pH values between 6.4-7.0, which ensure optimal growing and developing condition for plants

LITERATURE

1. CRISTIAN HERA, GHEORGHE CIOBANU, CORNELIA CIOBANU, CORNEL DOMUTA, ADRIAN VUŞCAN, GHEORGHE SARCA – *Influence of chemical fertilizers, manure and lime applied in long term field experiments on pH-value of preluvosoils from north-west part of Romania*. Joint International Conference on Long – term experiments, Agricultural Research and Natural Resources, Debrecen – Nyirlugos, 31 May – 1 June, 2007, pg. 12 – 20.
2. NEMETH, T. - (1996) - *Environment friendly fertilizer recommendation for sustainable agriculture*. In: Environmental Pollution, Ed. B. Nath et. All ECRP, Queen Mary and Westfield, college, London, 99-105.