THE LONG TERM EFFECT OF FERTILIZATION ON THE CONTENT OF SOIL MICRONUTRIENTS

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ABSTRACT

This work paper shows the research results of the statesupplyingsoil with micronutrients(iron, boron andzinc)after38years fertilizationwith nitrogenand phosphorus. The analyses wereperformed onsoil samplestaken from one long termexperimentwithfertilizerfromResearch StationofAgricultural DevelopmentofValuTraian, Constanta.

The applying the increasing dosesof nitrogenand phosphorushavenegatively influencedthe soilcontentinmicronutrients iron andboron.These are between inthe normal limits of supply to themost variantsexperienced.

Itfoundalowlevel ofzincsupplyover0.5ppmbut less than 1ppminall variantsof fertilizationwith nitrogenand phosphorus.

The application ofhigh doses ofphosphorus (in particular) andnitrogencausedadecreaseinzinccontentof the soil.

INTRODUCTION

Although found in plants, each of them in proportion to <0.01%, the microelements plays a complex and important role in physiological processes in the plants. The lack of them or excess can cause disturbing processes of plant for growth and development. Also, the lack or excess content of microelements in plants can cause toxicities in the plants and some diseases to animals and humans.

The microelementsare found in the soilinquantitiesrangingfrom one area toanother and fromonesoil typeto another, depending on parentrock, stagechemical processesof alterationminerals, how tousethe land. It was found that the clay soilshave ahighercontentinmicronutrientsthansandy soils.

MATERIALANDMETHODOFRESEARCH

The researcheswereperformed atthe Research Station for Agriculture and DevelopmentValu luiTraianin along termexperiencewith chemical fertilizerswith nitrogenand phosphorus. The experiment was setin 1970by Mr.DoctorHoriaSimota. The researchgoalsin theseexperimentsare very interestingtodaytheytargeting that

- The study of effects about usingfertilizerson soil,plants andthe environment.
- To identify the factorswhich leading tolimityields.
- The studyon the qualityof the harvest.
- Performing the nutrient survey
- Getting theinformation about the biology ofsoil, the microorganismsactivity as a result ofdifferent techniques oftillage,crop rotationandfertilization.
- knowing therateof mineralization oforganic matteras a result ofthe differenttechniquesoftillage,crop rotationandfertilization
- to ground a system of crop fertilization for steppe conditions from Dobrogea area, which ensureshigh yieldsand quality

These goalsare common to alllong termexperiment placedinagriculturalresearch stationslocatedinareas withsoilsand climaterepresentativein the country.
Inthe experimental fieldhave beenlocatedlaidexperimentsby the methodtwo-wayrandomized blockswithplotsinthreereplications. The surfaceofthe experimentalvariantswas 60m2.

The experiment factors:

Factor A -The dose ofphosphorus (kg / haP2O5)

a1 – P0
a2 – P50
a3 – P100
a4 – P150
a5 – P200

FactorB-The dose ofnitrogen (kg / haN)

b1 – N0
b2 – N50
b3 – N100
b4 – N150
b5 – N200

From the combinationof these two graduations factors were resulted twenty-five variationsand experiment.
It used the ammonium nitrate and superphosphate. Phosphorus fertilizers were applied each year before making plowing. Nitrogen fertilizers were applied each year before spring time.
The soil samples were takenfromfieldandwerepreparedfor analysis.Extraction anddeterminationof trace elementswas donebySTAS: for ironextractionwas donein0.1NHCland thendeterminingAAanalyzes; the borondetermined byASTM-sulfuric acid methodcarmine; the zincwas obtainedby extractionin0.05 MNa2EDTAanddetermined byAA.
Soiltype isVerma Chernozem and it has the followingphysicochemical characteristics:
The texture issandyloam; clay contentis34.7%and37.0% of AP1inAp2h(25-30cm), decreasing to 26.4% inCn2k(130-160 cm).
The main hydroindexesare frommediumto large; CHdecreases from8.8% -9.0% inthe first 30cm(Ap1 -Ap2h) from 8.6% to6.2%inAmkandCn2k; Co., from 10.2%-13.5% inAp1andAp2hdecreasesinAmk12.9%and9.3%inCN2; DChas values of26.8% -25.1%inAand24.3% -22.0% inC.

- The humus contentis relatively highto mediuminA (3.5% -Ap1, 2.7% -Ap2h, and2.6%-Amk) and decreasesinA /Ck(1.9%) andC(1,Cc1%-0.5% Cn2k).
- Thenitrogen index (IN) has a value of3.5inAp1.
- Thebase saturation(V) isvery high values:93.9%-100%. Exchangeablehydrogen(SH) hasvery low values(6.1 to 5.4 me /100gsoil).
- The neutralreaction isslightly alkaline(pH7.8 to 8.4).

RESULTS

The Ironcontentinthe soilafter38 yearsof application of Nitrogenand phosphorus fertilizers
The Iron is necessaryfor its role inmaintainingplantchlorophyllincondition.Heis active for enzymesand is involvedinredoxprocessesfromplants.
The low iron is showing byreducedgrowth plant andappearanceof yellow leaves. The iron is foundinthe Earth's crustup to4-5%. Insoilwe have threeforms ofiron: unchangeable, exchangeable andsoluble. Wedetermined thesoluble form. Theseformsof iron areinfluenced by thepHof the soil, the supplying withthecalcium carbonate, potassium and

manganese of soil. In the control variant(N0P0) has a lowest iron supply(0.8ppm). Applyingincreasing dosesof nitrogenand phosphorusit haven't anegatively impact onsoilironcontent, that been in the normal limits supplyinmost variantstested(fig. 1).

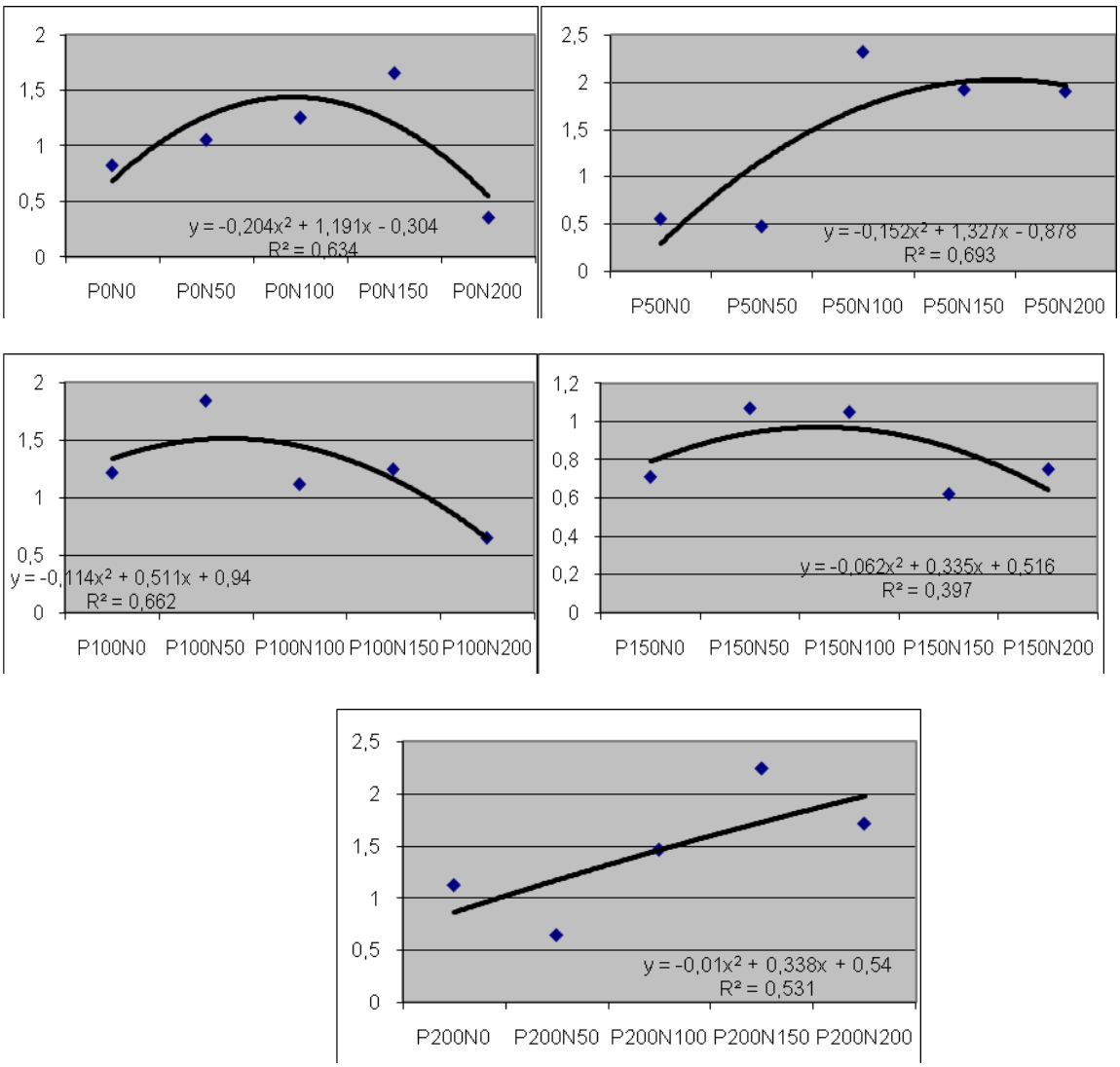

Fig. 1 -The Evolution oftheironcontent ofthe soilunder the influence ofincreasing of nitrogenand phosphorus doses

The Boroncontentinsoilafter38 yearsof application of Nitrogenand phosphorus fertilizers

The Boron isan important elementtoensure abetter protectionof plantsagainst diseases. The Borondeficiencycausesdestruction ofthe main stemapex, shootsdevelopment and apex deathin a shorttime,turningleaves,etc. The Borondeficiencyoccurs when solubleboron soil contentisunder0.4-0.5ppm.

Inour experimentthesupplyofboronsoilafter38 yearsof application of fertilizerswith nitrogenand phosphorus, isinthe normal range(fig. 2).

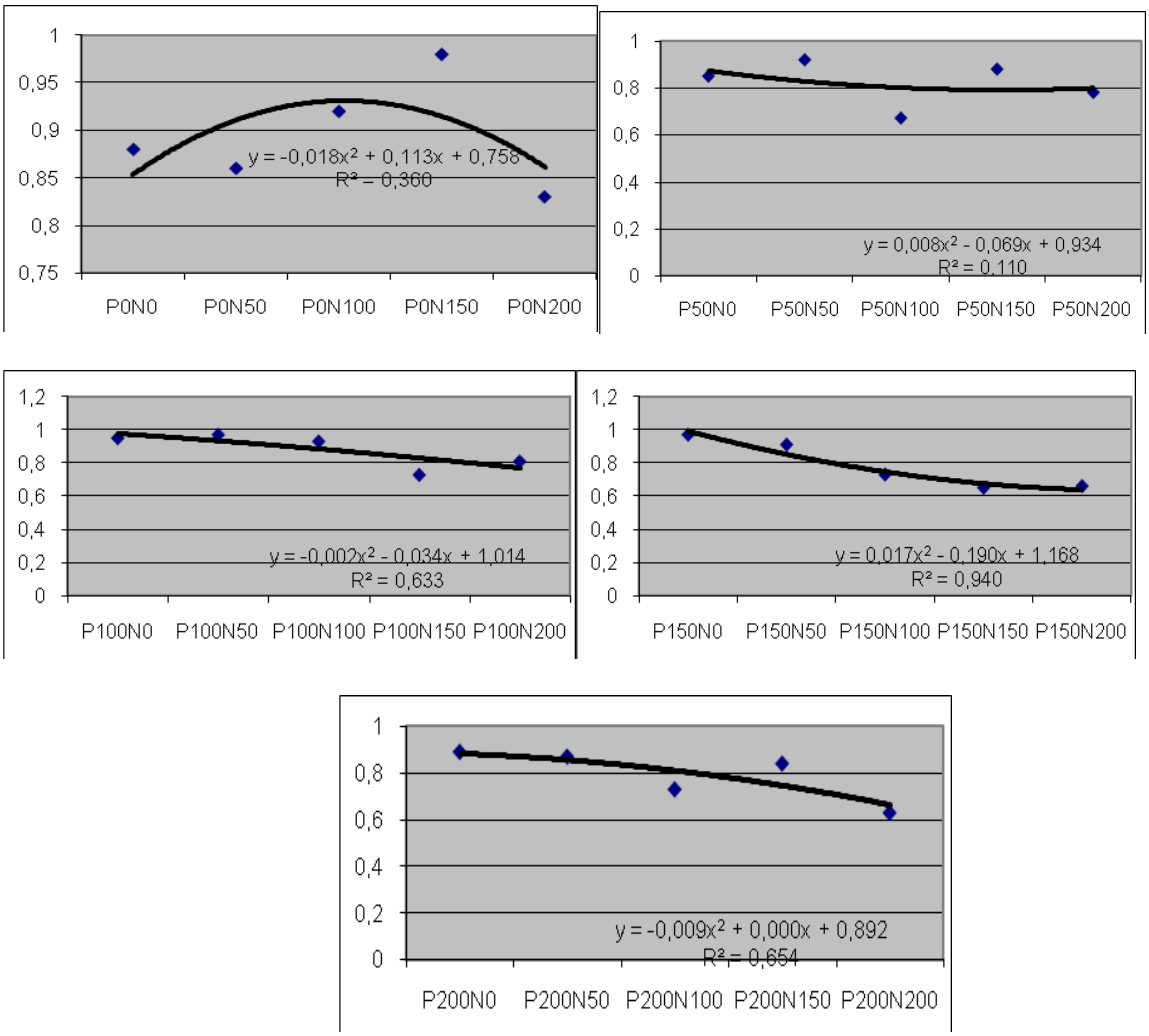

Fig. 2 -The evolution of soilboroncontent under the influence ofincreasing nitrogenand phosphorus doses

The Zinccontentfromsoilafter38 yearsof application of f Nitrogenand Phosphorus fertilizers

Generally, the Zinc is animportantelementinplant lifeandespecially for grain, corn and vegetables. It is intothe compositionof a lot ofenzymes andtake part incatalysisof compoundsthatparticipate inplant growth. The Zincdeficiencyis showed bystopof plant growth, reducinginternodes, small leavesarranged in arosette, leafchlorosis, plantstunting, etc.

Followingthe evolutionofzinccontentinsoilinexperimental variantssee thatthesupplyis low,below1 ppminall variants. Zinccontentinsoilunder the influence ofphosphorusdoseisalmost the same(Figure 3), whateverof them size.

The application ofhigh doses ofphosphorus (in particular) andnitrogen for a long time caused thedecreasedzinccontentfrom the soil.

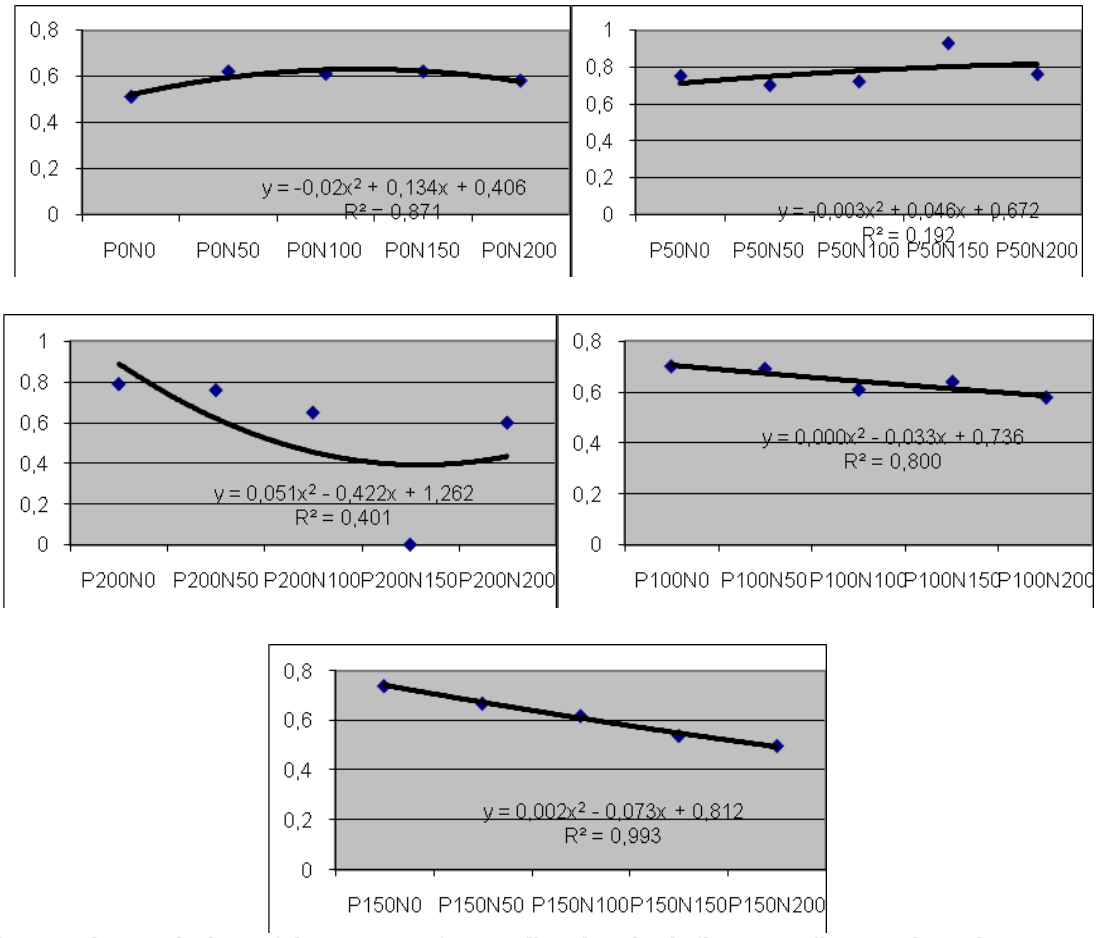

Fig. 3 - The evolution ofzinccontent fromsoilunder the influence ofincreasing nitrogenand phosphorusdoses

CONCLUSIONS

The application ofincreasing dosesof nitrogenand phosphorushavenegatively influencedthe soilcontentinmicroelementsiron andboron,those areinthe normal range of supplyinmost variantsof experiment. We found a low level of zinc supply, over 0.5 ppm but less than 1 ppm in all variants of nitrogen and phosphorus fertilization. The application of high doses of phosphorus (in particular) and nitrogen on long term decreased the zinc content from the soil.

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