Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 17, Issue 1, 2017
PRINT ISSN 2284-7995, E-ISSN 2285-3952

ESTIMATIONS CONCERNING THE INCREASING OF THE WHEAT PRODUCTION IN PRAHOVA COUNTY

Daniela DANA[1], Irina-Adriana CHIURCIU[2], Valentina VOICU[3]

[1]Mihai Viteazul Technological Secondary-School, 17 Bucharest-Giurgiu, Calugareni, Giurgiu, Romania
[2]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania, irina.chiurciu@yahoo.ro
[3]National Research Institute for Soil Science, Agrochemistry and Environment Protection, 61 Marasti Blvd, District1, Bucharest, Romania

Corresponding author: irina.chiurciu@yahoo.ro

Abstract

The analysis aims to discover what methods can be applied such that the average of winter wheat production per ha would grow. The main objective of this study was to establish the mineral nutrition status of winter wheat in relation with the soil and climatic conditions in the SC Agrotehnic PAULESTI experimental plots. In order to evaluate the mineral nutrition status of plant, the macronutrients have been carried out when the plant, Renan cultivar, reached 4-5 cm height. The obtained data have been interpreted in relation with the optimum ranges of mineral content in dry matter mentioned in the specialty literature. Also, on the basis of soil data, the mineral fertilisation and lime recommendations have been established.

Key words**:** *wheat, mineral fertilisation, lime recommendations*

INTRODUCTION

In 2015, winter wheat crop covers about 36,803 ha, in Prahova County and the average production of wheat was 3,715 kg/ha. [3]
The yield increases can be considerably improved by a balanced fertilisation based on the periodical analysis of plant and soil fertility.
In these conditions, a good management concerning mineral and lime practices may be considered a main way to increase the yield of winter wheat crop. [2]

MATERIALS AND METHODS

For the study were taken and processed statistics from the National Institute of Statistics. The analysis of the production and marketing sector of winter wheat was based on a range of specific indicators, such as area cultivated with winter wheat; total production of winter wheat; average production per hectare of winter wheat.
In order to characterize the soil condition they were collected soil samples from 3 experimental parcels, in depth 0-20 cm, which were conditioned and analysed in agrochemical terms.
The plots belong to SC Agrotehnic SRL Paulesti, which is based in Prahova County and cultivates cereals.
The main analysis and determination made in soil samples were:
-soil reaction (pH), STAS 7184/13-88,
-humus total (Ht), STAS7184/21-82,
-total nitrogen (Nt), STAS 7184/285,
-exchangeable bases (SB), STAS 7184/12-88,
-hydrolytic acidity (Ah), the Kappen method,
-available phosphorus (P_{AL}) and available potassium (K_{AL}), STAS 7184/19-82, soils. In plant samples were carried out the following analytical determination of nutrient content: total N content by the Kjeldahl method, total P content by calcinations and colorimetric dosage with metavanadat and total K content by calcinations and dosing photometrically air-acetylene flame.
Analyses were carried out according to the Methodology ICPA ([4], [5]), and analytical data obtained were compared with some existing limits in specialty literature,

considered to be optimum.

RESULTS AND DISCUSSIONS

In 2015 the surface cultivated with wheat in South-Muntenia development region, in the private sector has increased by 4.88% compared to 2007, and in Prahova County with 43.64% in 2015 compared to 2007 (Table 1).

The largest area cultivated with wheat for South-Muntenia development region was recorded in 2009, of 638,938 ha, and the lowest in 2007 of 554,789 ha.

At Prahova county level, the highest wheat acreage was cultivated in 2014, of 38,567 ha, and the lowest in 2007 of 25,621 ha.

Table 1. Area cultivated with wheat in South-Muntenia Development Region and in Prahova county (ha)

	Property form	Year									2015/2007 (%)
		2007	2008	2009	2010	2011	2012	2013	2014	2015	
South-Muntenia Development Region	Private sector	554,789	608,911	638,938	625,996	595,788	632,570	594,367	587,186	581,873	104.88
Prahova County	Private sector	25,621	34,531	36,908	34,908	36,073	37,153	36,546	38,567	36,803	143.64

Source: National Institute of Statistics, Tempo-online, 2017; own calculations [3]

In Table 2 it is presented the evolution of wheat production for the private sector between 2007-2015. This recorded growths in 2015 compared to 2007, both in the Developing region, and in the County of Prahova.

Analyzing data in tables 1 and 2 it is noticed an increase in the total wheat production, although acreage does not register significant increases. This is because of the inputs used.

Table 2. Total wheat production in South-Muntenia Development Region and in Prahova county (tons)

	Property form	Year								
		2007	2008	2009	2010	2011	2012	2013	2014	2015
South-Muntenia Development Region	Private sector	691,254	2,149,755	1,485,800	1,637,340	2,276,356	1,687,009	2,240,005	2,199,886	2,350,185
Prahova County	Private sector	39,900	109,489	104,036	90,741	125,267	81,722	131,065	132,992	136,738

Source: National Institute of Statistics, Tempo-online, 2017 [3]

In terms of average production of wheat per ha, for the private sector (Table 3) in the same analyzed period, we observe significant increases of the values recorded due to the inputs used (224.15% for South-Muntenia Development Region and 138.60% for Prahova County).

Table 3. Average production of wheat in South-Muntenia Development Region and in Prahova county (kg/ha)

	Property form	Year									2015/2007 (%)
		2007	2008	2009	2010	2011	2012	2013	2014	2015	
South-Muntenia Development Region	Private sector	1,246	3,530	2,325	2,616	3,821	2,667	3,769	3,746	4,039	324,15
Prahova County	Private sector	1,557	3,171	2,819	2,599	3,473	2,220	3,586	3,448	3,715	238,60

Source: National Institute of Statistics, Tempo-online, 2017; own calculations [3]

To use the best methods that can be applied to increase average production per ha, have been made a series of ground tests in SC Paulesti SRL, on 3 Plots, as follows:

Soil agrochemical characterisation

In the SC Agrotehnic SRL Paulesti experimental plot, the soil reaction is very strong-extreme acid, Plot 1 - ph 4.75, Plot 2 - ph 4.4, Plot 3 - ph 4.79 (Figure 1); the hydrolytic acidity (Ah) is high, between 6.8 -

7.72 me/100 g soil (Fig. 2) and the sum of exchangeable bases had low values 5.59 - 6.92 me/100 g soil (Fig. 3).

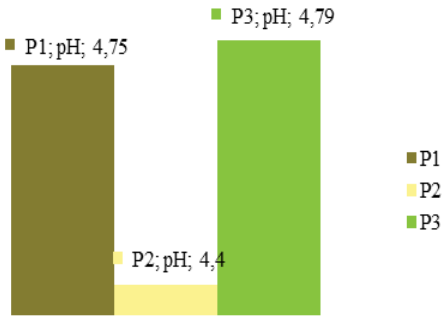

Fig. 1.Variation of pH in the experimental plots, SC Agrotehnic SRL Paulesti

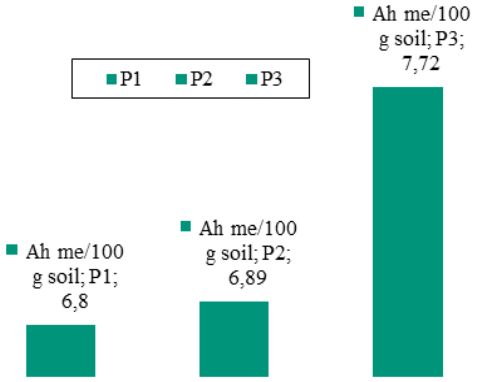

Fig. 2. Data regarding the hydrolytic acidity (Ah) in the experimental plots, SC Agrotehnic SRL Paulesti

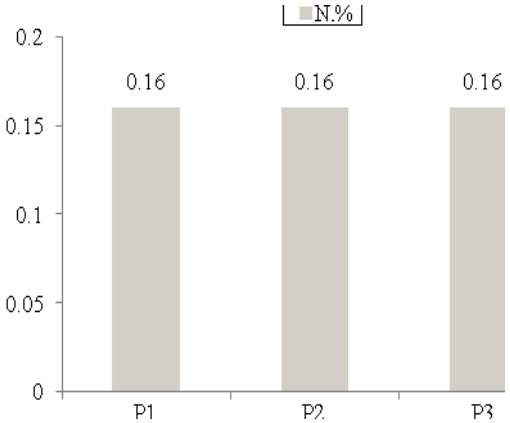

Fig. 3. Data regarding the sum of exchangeable bases (SB) in the experimental plots, SC Agrotehnic SRL Paulesti

The soil humus supply status is low (Fig. 4) and the soil nitrogen supply status is medium (Fig. 5).

The mobile phosphorus content is medium (Figure 6) and the mobile potassium content is low (Figure 7).

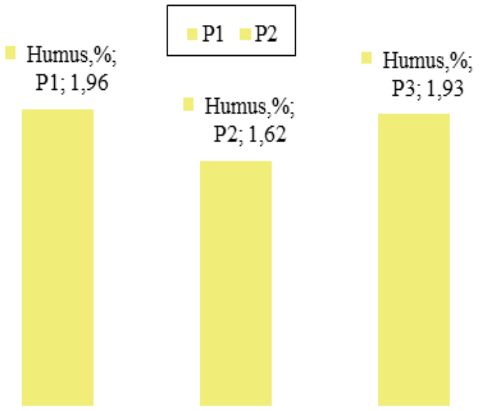

Fig. 4. Data regarding the humus content of soil in the experimental plots, SC Agrotehnic SRL Paulesti

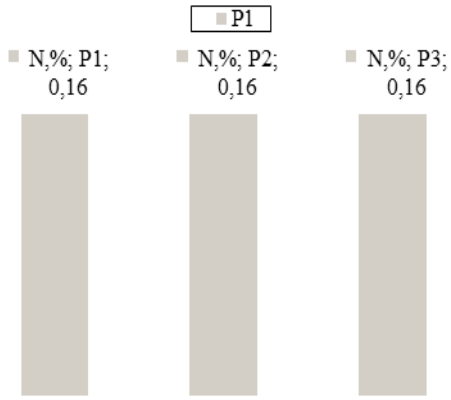

Fig. 5. Data regarding the total nitrogen content of soil in the experimental plots, SC Agrotehnic SRL Paulesti

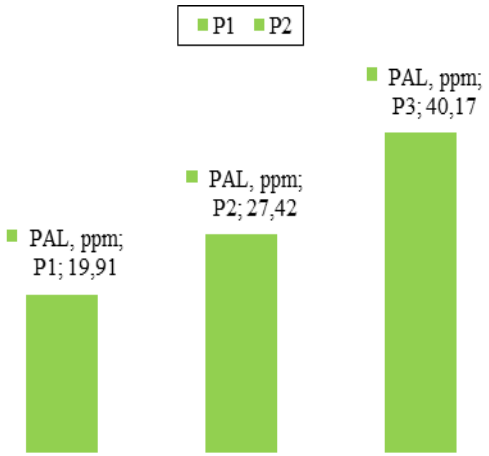

Fig. 6. Data regarding the mobile phosphorus content of soil in the experimental plots, SC Agrotehnic SRL Paulesti

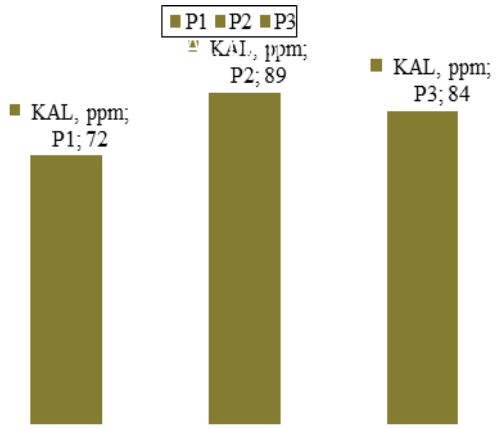

Fig. 7. Data regarding the mobile potassium content of soil in the experimental plots, SC Agrotehnic SRL Paulesti

The mineral nutrition status o winter wheat

The N and P content in dry matter vary in general, within optimal limit (Figure 8, Figure 9).

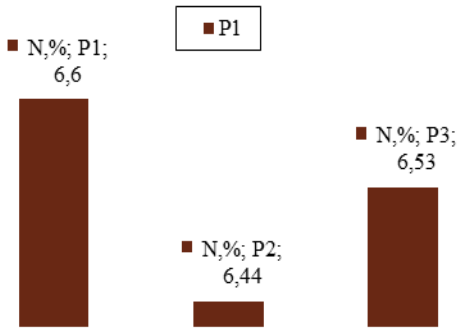

Fig. 8. Data concerning the nitrogen content in the aerial parts of winter wheat from experimental plots, SC Agrotehnic SRL Paulesti

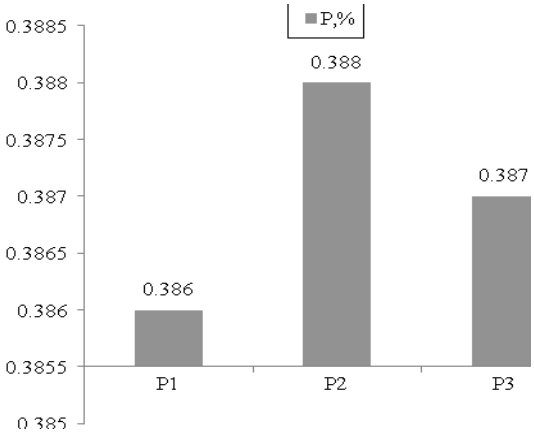

Fig. 9. Data concerning the phosphorus content in the aerial parts of winter wheat from experimental plos, SC Agrotehnic SRL Paulesti

The K content (Figure10) was below the lower optimal limit, 3.6% for K, which indicates a plant nutrition deficiency with this macronutrient [1].

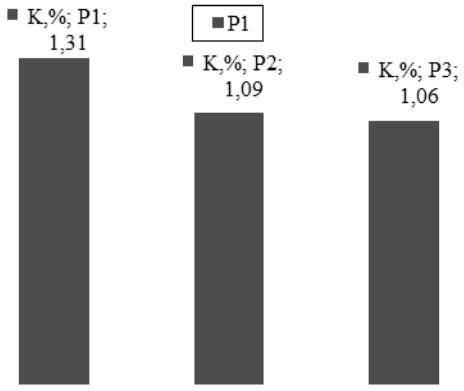

Fig. 10. Data concerning the potassium content in the aerial parts of winter wheat from experimental plots, SC Agrotehnic SRL Paulesti

The mineral fertilisation and liming recommendations for experimental plots in the SC Agrotehnic SRL Paulesti

The recommended fertilisers rates are calculated in relation to the available soil macronutrient content and expected yields (Table 4).

The liming recommendations are calculated in relation with base saturation degrees and sum of exchangeable bases (in ploughed layer, 0-25 cm) for field crops and perennial leguminous crops (Table 4).

Table 4. The fertilisation and liming recommendations for winter wheat in the experimental plots, SC Agrotehnic SRL Paulesti (expected yields 6 tons/ha)

Parcels	Available nutrient content from soil (kg/ha)			Recommended fertilisers rates (active ingredients/ha)			Liming rates ($CaCO_3$ t/ha)
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
P 1	29	104	99	167	108	119	11
P 2	28	120	112	168	92	106	11
P 3	29	138	109	167	74	109	13

CONCLUSIONS

After analysis done on experimental plots of SC Agrotehnic SRL Paulesti, for winter wheat acreage in Prahova County having the same content available macronutrients in soil, the following recommendations were made to increase the average production per ha (expected yields 6 tons/ha):

- The application of nitrogen fertiliser in rate of 160 kg N/ha,
- The application of phosphorus fertiliser in rates of 70-100 kg P_2O_5//ha,
- The application of potassium fertiliser in rates of 100-120 kg K_2O/ha.

The lime rates vary between 11 and 13 t $CaCO_3$/ha in relation with soil reaction, initial base saturation degree and initial sum of exchangeable bases.

ACKNOWLEDGEMENTS

This research work was carried out with the support of the Ministry of Education, Research and Youth, National Management Programme Centre, Project 51040- GRIFOX.

REFERENCES

[1]Bergmann, W., 1992, Nutritional disorders of plants, Gustav Fischer, New York
[2]Dan, D., Cotet, V., Anton, I., Rizea, N., Oancea, F., Chițoran, F., 2013, Results obtained using SEDEC lysimeter in experiments at S.C. AGROTEHNIC S.R.L. Paulesti. Journal of Environmental Protection and Ecology 14, No 1, 80-84
[3]Institutul National de Statistica, Tempo-online, 2017
[4]Methodology of agrochemical soil analysis for determining the needs of amendments and fertilisers. No. 13, 1981. ICPA.
[5]Methodology of analysis for assessing mineral plant nutrition.1980. ICPA.