STUDY REGARDING THE INFLUENCE OF CHEMICAL FERTILIZERS OF THE QUALITY OF AUTUMN WHEAT

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Abstract: *The research from the topic announced was conducted in an experimental field of Soil Sciences discipline which is located in B.U.A.S.M.V. "King Michael I of Romania" in Timişoara Didactic Station from Timişoara and after that in the research laboratory of the Soil Science Department from the Faculty of Agriculture. The field experiments have a factorial design with two factors, with wheat – corn- sunflower rotation. Each plot is sub-divided in four replicates, linear, with the size of 10 x 3 m (30 m^2). The experiment was made about wheat using the zoned variety in the West Plain of the country, namely Alex Variety. The mineral fertilization has the best efficacy if is merged harmonious, and under analytic agrochemical control with the other agrophytotechnical measures which enhances the results of fertilizers application.*

Keywords: *wheat, chemical fertilizers, experiment, raw protein.*

INTRODUCTION

The presence of nutritive elements in plants has not to be regarded at a simple accumulation, but their concentration must be linked with their physiological and biochemical purposes in plants metabolism.

All the essential nutritive elements have crucial roles in plants life, each one of them fulfils a role that they cannot replace. Wheat contains a large amount of starch (65-70%), the main component of grain, and some fermentable sugars (maltose, sucrose). All of this has a very important role in energy.

Wheat is rich in proteins (7-22%), which are represented by the provitamins (35-45%), glutenin (35-40%), globulin (15-20%) and albumin (2-5%). They ensure growth and development of the body and play an important biocatalytic and energetic purpose. Wheat contains almost the full range of essential amino acids; however, of these, lysine, methionine, threonine, and tyrosine are found in an insufficient amount for human needs.

Of all agricultural crops, wheat was always accounted for, and in the future will be the most important cultivated species.

MATERIALS AND METHOD

The experience has a two factorial design (4x5) with four replicates, and is placed in sub-divided plots.

Factor fertilization with phosphorus and potassium fertilizer (annually)

a_1 -P_0K_0 - Martor
a_2 -$P_{50}K_{50}$ - (P_2O_5 kg/ha, K_2O kg/ha)
a_3 - $P_{100}K_{100}$ - (P_2O_5 kg/ha, K_2O kg/ha)
a_4 - $P_{150}K_{150}$ - (P_2O_5 kg/ha, K_2O kg/ha)

Factor B -fertilization with nitrogen (annually)

b_1 - N_0 - Martor
b_2 - N_{50}- (N kg/ha)
b_3 - N_{100}- (N kg/ha)
b_4 - N_{150}- (N kg/ha)
b_5 - N_{200}- (N kg/ha)

Fertilizers used in the experiments are complex mineral fertilizer and ammonium nitrate 15:15:15.

Experiments once conducted were kept under observation in terms of changes that may emerge in the plant. From the field experiences, were gathered plant samples for laboratory analysis to diagnose changes as an effect of treatments applied.

Laboratory analysis methods are as commonly used in agricultural chemistry laboratory work:

- Total nitrogen was determined by Kjeldahl methodl.
- Raw protein was determined by calculus: $P_B(\%)=N_t*F_c$.

Production results were recalculated to STAS in effect and were processed by analysis of variance.

RESULTS AND DISCUSSIONS

From all the nutritive elements, the nitrogen has the greatest influence on wheat grain production; second in order is phosphorus and then potassium. Beside the direct effect, in most of the cases a benefic interaction between nitrogen and phosphorus it is visible. The nitrogen is the nutritive element responsible of production; it has a favorable influence on the rooting and the sprouting of the plants; also it increases the weight and the number of the grains in the ear and their content of proteins (DORNEANU A, 1984)

In the plant nitrogen is needed on the formation of organic substances. It is well known that the plants raised on a environment rich in nitrogen have a dark-green volour, they sprout more and develops an abundant vegetation.

As it can be seen in table 1, in the first year of research 2011-2012, the total amount of nitrogen from a wheat grain varies between 1,96% in case of the witness and 2,60% in the varinat where $N_{200}P_{100}K_{100}$ was applied with an increase of 40,6%. The values of raw protein are ranging between 12,28% in the witness variant and 16,25% in the case of 200 kgN/ha fertilization in the $P_{100}K_{100}$ agrofond.

Table 1

The influence of chimical fertilizers on the total amount of nitrogen "N_t" and raw protein from the wheat grain, in 2011-2012 agricultural year

variant		**Nt%**	**PB%**
martor		1,96	12,28
$P_{50}K_{50}$	N_{50}	2,22	13,89
	N_{100}	2,30	14,35
	N_{150}	2,44	15,28
	N_{200}	2,55	15,96
$P_{100}K_{100}$	N_{100}	2,44	15,26
	N_{150}	2,53	15,84
	N_{200}	2,60	16,25
$P_{150}K_{150}$	N_{150}	2,48	15,47
	N_{200}	2,53	15,83

As it can be seen from "figure 1" the dinamic of total amount of nitrogen has high correlation coeficient and it can be seens a good conection between experimental data and theoretical curve.

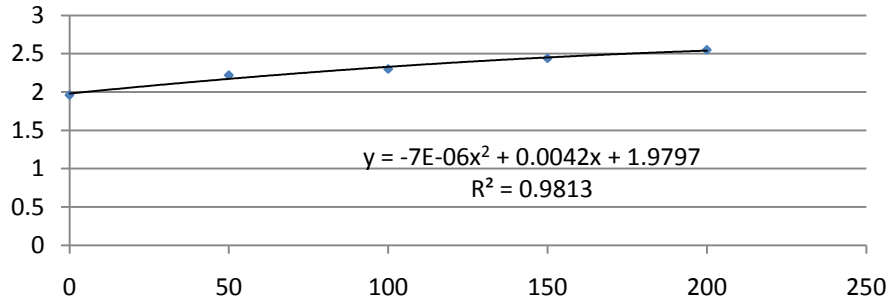

Figure 1 The dinamic of total amount of nitrogen in 2013

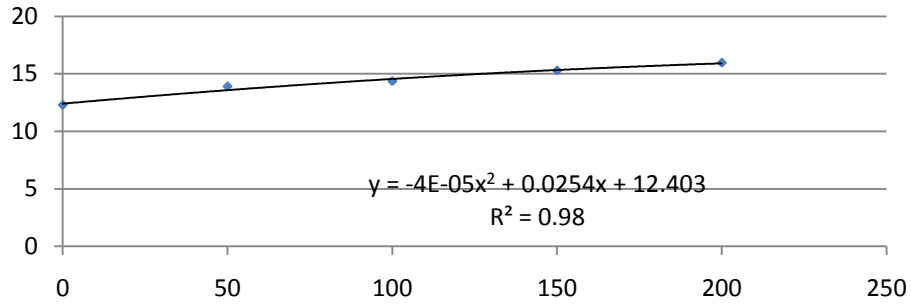

Figure 2The dinamic of raw protein content in the wheat in 2013

In the second experimental year 2012-2013 (tab.2), the content of total nitrogen is ranging between 1,99% and 2,65%. Like in the first year, the highest values are determined by the maximum dose of nitrogen; the P and K ferilizers slightly infuencing the values. The determined values of raw protein are higher than the precedent year wit a maximum of 16,55% in $N_{200}P_{100}K_{100}$ variant.

Tabel 2

The dynamics of increased production and crude protein from maiz grains depending on total dose of nitrogen in 2014

Variant		Nt%	PB%
martor		1,99	12,43
$P_{50}K_{50}$	N_{50}	2,25	14,05
	N_{100}	2,34	14,62
	N_{150}	2,48	15,47
	N_{200}	2,62	16,35
$P_{100}K_{100}$	N_{100}	2,48	15,47
	N_{150}	2,55	15,92
	N_{200}	2,65	16,55
$P_{150}K_{150}$	N_{150}	2,51	15,70
	N_{200}	2,55	15,95

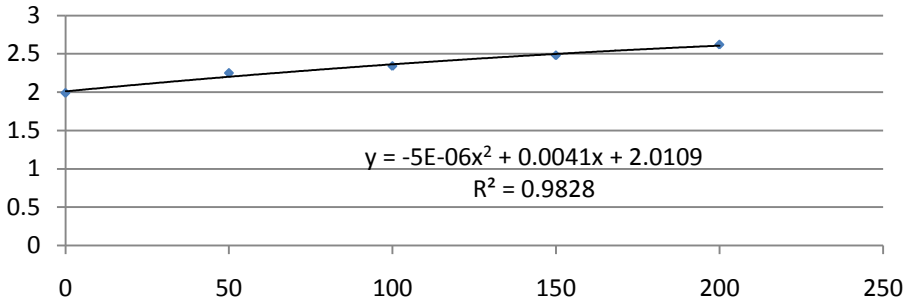

Figure 3 The dinamic of total amount of nitrogen in 2014

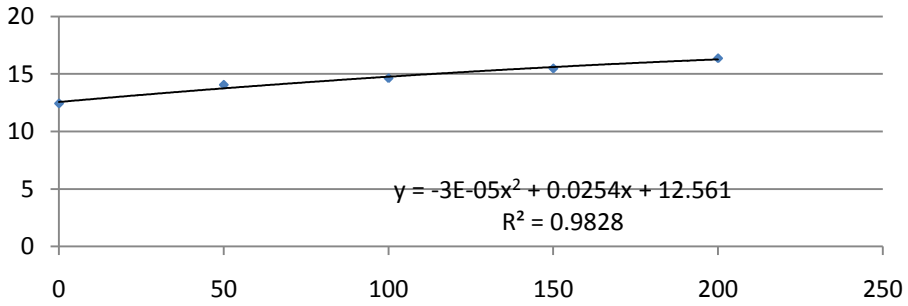

Figure 2The dinamic of raw protein content in the wheat in 2014

After the researches on the content of protein from the wheat grain it conclude that fertilization, especially the one with N determines an increase on the content of protein. Although phosphorus does not influence the protein content as much as nitrogen does it sustains this effect of nitrogen and determines a better asimilation of the nitrogen forms that are absorbed.

Nitrogen fertilization registred the best results on an agrofond withe lowest dose of phosphorus and potassium. Between N and K there is an antagonic relation, the aplication of high potasic could determine a low content of nitrogen in the grains.

In these two years of research we noticed that at high doses of P and K the content of raw proteind is low. This droping of raw protein content can be explained with the fact that these elements stimulates the glucid synthesis and transportation.

CONCLUSIONS:

After this two year of research on the influence of mineral fertilization on wheat crops we can observe these conclusions:

- In the first year, the total amount of nitrogen from the grains ranges between 1.96% and 2,60 with an increse of 40.6%. Raw protein has values between 12,28 and 16,25%.
- In the second research year the total amount of nitrogen is ranging between 1,99% in the witness variant and 2,65% with a dose of 200 kg N/ha on 100 kg/ha P_2O_5 and K_2O agrofond.

- In the second year we noticed higher values of raw protein with a maximum of 16,55% in $N_{200}P_{100}K_{100}$ variant.
- After the research results we concluded that fertilization , especially the nitrogen one determines a high amount of raw protein in the grains
- Although phosphorus does not influence, so much as nitrogen the content of raw protein, it supports the effect of nitrogen , leading to a better assimilation and metabolism of absorbed nitrogen forms .
- Application of nitrogen fertilizer gave the best results on the agrofond with the lowest dose of phosphorus and potassium. Between nitrogen and potassium appear to be an antagonistic action , the application of high doses of potassium fertilizer can cause low potassium content of the grain .
- In the two years of experience 2011-2012 , 2012-2013 , the application of high doses of phosphorus and potassium has been a decrease in raw protein content . This decrease in the content of raw protein can be explained by the fact that although potassium and phosphorus are necessary for plant growth and protein biosynthesis , these intensely stimulates carbohydrate synthesis and movement rather than the synthesis of nitrogen substances . Therefore when applying large amounts of potassium fertilizer is leading to increases carbohydrate synthesis and movement of other organs to seeds and protein content decreases.

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