THE WHEAT YIELD QUALITY WITH DIFFERENT FERTILIZERS AND PESTICIDES APPLYING WHEN USED TO THE WHEAT CROP ON CAMBIC CHERNOZEM FROM ARDS CARACAL

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Within the long term experiments with different fertilizers with N, P, K that were set up at ARDS Caracal in 2008 there was researched the wheat yield quality.

The nitrogen content from wheat kernels and, respectively, the raw protein content has shown differences in function of the phosphorus fertilization. In this manner, there can be noticed an increase of the nitrogen content along with the increase of the phosphorus doses from 2.22% with P_0 to 2.47% with P_{120}, the protein content being between 13.87% with P_0 and 15.44 with P_{120}.

The nitrogen fertilization has determined an increase of the nitrogen content of the wheat kernels from 1.85% with N_0 and 2.86% with N_{200}. The protein content has been between 11.56% with N_0 and 17.87% with N_{200}.

The gluten content has been influenced by the different fertilizer doses. The higher the nitrogen doses, the lower the gluten content.

According with LMA of the literature, the results are under these values and that proves that the wheat yield has not accumulated pesticides over the limits and those present in the wheat grains are not harmful for humans.

Key words: *fertilizers, protein quality, pesticides, gluten*

The mineral and organic fertilizers, the amendaments or other substances used in agriculture significantly influence the quality features of the vegetal production and the knowing of these issues of this domain offer practical instruments for controlling of the quality of the yield by fertilization as important as the one referring to the quantitative results of the fertilization [Borlan I. and Hera Cr., 1984].

The optimal agrochemical fertilization ensures yield and biomass outputs as well as increased quantities of mineral elements and nutrients for the surface unit as a result of the quantity of applied nutrients on the quantity of chlorophyll pigment that is synthesized durin the period og growing and accumulation of the dry matter [Buruh, 2002].

The optimal fertilization and nutrition by macro and micro elements without insufficient or excess stages favor a normal dynamic of the accumulation of the nutritive elements and dry matter.

Of this normal parallelism (nutrient – dry matter) we can trace the obtaining of high and quality yields [Hera Cr., 1987].

The fertilization significantly determines the protein quantity per surface unit, especially through nitrogen fertilizers. Even though the phosphorus do not influence as much as the nitrogen the yield quantity and the protein content it sustains the nitrogen effect and alleviate the negative influence of high nitrogen doses on the quality and quality of the protein determining a better assimilation and metabolisation of the absorbed nitrogen forms [Rusu, 2005].

MATERIAL AND METHOD

In order to study the effect of different doses of fertilizers on the quality of wheat yield there were researched in 2008 within long term experiments from ARDS Caracal the following grain quality indicators:

- the nitrogen content and protein quantity;
- the potash and phosphorus content;
- the gluten content;
- pesticide residues.

RESULTS AND DISCUSSIONS

The nitrogen and protein content has recorded variations in function of the phosphorus fertilization. In this way there can be observed an increase of the nitrogen content along with the increasing with the phosphorus applied doses from 2.22% with P_0 to 2.47% with P_{120}. The protein content follow the same track being between 13.87% with P_0 and 15.44% with P_{120}.

The nitrogen fertilization has determined the increasing of the nitrogen content from the wheat grain, the values being between 1.85% with the case of not fertilization N_0 and 2.86% with the N_{200} fertilization.

The nitrogen content and the protein quantity decrease as a result of potash fertilization, 2.42% with K_0 and 2.36% with K_{80}, the protein quantity has, also, decreased from 15.72% to 14.75%.

Table 1

The influence of different nitrogen, phosphorus and potash doses on the nitrogen and protein content of the wheat kernels

Specification	Fertilizer dose								
	P_0	P_{40}	P_{80}	P_{120}	N_0	N_{100}	N_{200}	K_0	K_{80}
Nitrogen %	2.22	2.46	2.39	2.47	1.85	2.46	2.86	2.92	2.36
Protein %	13.87	15.37	19.94	15.44	11.56	15.37	17.87	15.12	14.75

The phosphorus content has been influenced by the phosphorus doses that were applied. The lowest phosphorus content was recorded when nu phosphorus is applied, of 0.27%. By applying P_{40} dose it increases to 0.36% reaching the

maximal value of 0.42% with the P_{80} dose. With the P_{120} dose the phosphorus content records a slightly reduced value (table 2).

In function of the nitrogen fertilization, the phosphorus content remains the same for N_0 and N_{100} (0.35%) recording an increase only to N_{200} dose (0.38%). In function of potash fertilization, the phosphorus content from the wheat kernel has been of 0.37% with K_0 and 0.35% with K_{80}.

Table 2

The influence of different nitrogen, phosphorus and potash doses on the phosphorus content from the wheat grains

Specification	Fertilizer dose								
	P_0	P_{40}	P_{80}	P_{120}	N_0	N_{100}	N_{200}	K_0	K_{80}
Phosphorus %	0.27	0.36	0.42	0.40	0.35	0.35	0.38	0.37	0.35

The potash content of the wheat grain has recorded the highest value, 0.38% with the case when no nitrogen was applied. The applying of doses of N_{100}, respectively N_{200} has determined a potash content of 0.37%. The applying of a dose of K_{80} has conducted to a potash content of 0.38%, that is 0.1% higher than when no potash was applied.

Table 3

The influence of different nitrogen, phosphorus and potash doses on the potash content of the wheat grain

Specification	Fertilizer dose								
	P_0	P_{40}	P_{80}	P_{120}	N_0	N_{100}	N_{200}	K_0	K_{80}
Potash%	0.33	0.37	0.41	0.37	0.38	0.37	0.37	0.37	0.38

The gluten content

Among the nitrogenous substances that comprises the wheat grain, gliadin and glutein are the most important. They form together with water a elastic mass called gluten that give to the bread special features [Huntley, 1997].

The results of the gluten analysis are given in the *table 4.*

The gluten quantity has been influenced by the applied fertilizer doses. All doses have conducted to the increasing of the gluten content from 1.86% to 12.2%. The lowest increase has been obtained with $N_0P_0K_{80}$ dose. Important increases of the gluten content have been obtained with $N_{100}P_0K_{40}$ dose (23.88%), $N_{200}P_{40}K_0$ (23.66%), $N_{200}P_{40}K_{40}$ (23.56%), $N_{200}P_{40}K_{80}$ (24.12%), $N_{120}P_{120}K_0$ (23.89%). There results that high gluten content is obtained when apply high nitrogen doses of N_{200} sustained by moderated phosphorus doses of P_{40} and P_{80}.

Table 4

The gluten content of the wheat grain as influenced by different fertilizer doses

#	Variant	Gluten content %	Difference over control
1	$N_0P_0K_0$ (Mt)	12,08	Mt
2	$N_{100}P_0K_0$	22,62	10,06
3	$N_{200}P_0K_0$	22,36	10,28
4	$N_0P_0K_{80}$	13,94	1,86
5	$N_{100}P_0K_{80}$	20,12	80,41
6	$N_{200}P_0K_{80}$	23,70	11,62
7	$N_0P_0K_{40}$	17,80	5,72
8	$N_{100}P_0K_{40}$	23,88	11,83
9	$N_{200}P_0K_{40}$	24,28	12,22
10	$N_0P_{40}K_0$	16,36	4,28
11	$N_{100}P_{40}K_0$	21,34	9,26
12	$N_{200}P_{40}K_0$	23,66	11,58
13	$N_0P_{40}K_{80}$	14,00	1,92
14	$N_{100}P_{40}K_{80}$	20,16	8,08
15	$N_{200}P_{40}K_{80}$	24,12	12,04
16	$N_0P_{40}K_{40}$	16,56	4,48
17	$N_{100}P_{40}K_{40}$	22,22	10,14
18	$N_{200}P_{40}K_{40}$	23,56	11,48
19	$N_0P_{80}K_0$	15,62	3,58
20	$N_{100}P_{80}K_0$	23,48	11,40
21	$N_{200}P_{80}K_0$	23,46	11,38

Pesticide residues

The analysis of some pesticide residues of the wheat grains as a result of using herbicides emphasizes the following:

- the low value of the carbendazim pesticide between 0.02 – 0.04 mg/100 g soil were recorded with not fertilized variant and with the most of the fertilized variants, even with the highest fertilizer dose, $N_{200}P_{120}K_{80}$;

- high values of this residues were recorded with the following variants: $N_{100}P_0K_{40}$, $N_{200}P_0K_{80}$, $N_{200}P_{120}K_0$, $N_0P_{120}K_{80}$ in this way observing that there is no correlation between the carbendazin quantity and the fertilizer doses, the essential factor being the soil [Leetta, Mark, 2000].

- The clorsulphuron and tribenuron metal that are presented in the table 5 emphasize the fact that in all these situations the values are under 0.01 mg/kg. According to maximal admissible limit from the specialty literature [Document Sonca M 10232/2006] these results are under the limits that indicates the wheat yield did not accumulate pesticides harmful quantities of pesticides that can affect the human health.

Table 5

The pesticide residues in the wheat grains in 2008 year

Variant	Carbendazim residues mg/kg	Chlorsulphuron residues mg/kg	Tribenuron residues mg/kg
$N_0P_0K_0$	< 0,02	< 0,01	< 0,01
$N_{100}P_0K_0$	0,04	< 0,01	< 0,01
$N_{200}P_0K_0$	< 0,02	< 0,01	< 0,01
$N_0P_0K_{80}$	< 0,02	< 0,01	< 0,01
$N_{100}P_0K_{80}$	< 0,02	< 0,01	< 0,01
$N_{200}P_0K_{80}$	0,05	< 0,01	< 0,01
$N_0P_0K_{40}$	0,04	< 0,01	< 0,01
$N_{100}P_0K_{40}$	0,07	< 0,01	< 0,01
$N_{200}P_0K_{40}$	0,07	< 0,01	< 0,01
$N_0P_{40}K_0$	0,04	< 0,01	< 0,01
$N_{100}P_{40}K_0$	< 0,02	< 0,01	< 0,01
$N_{200}P_{40}K_0$	< 0,02	< 0,01	< 0,01
$N_0P_{40}K_{80}$	< 0,02	< 0,01	< 0,01
$N_{100}P_{40}K_{80}$	0,03	< 0,01	< 0,01
$N_{200}P_{40}K_{80}$	0,03	< 0,01	< 0,01
$N_0P_{40}K_{40}$	0,03	< 0,01	< 0,01
$N_{100}P_{40}K_{40}$	0,05	< 0,01	< 0,01
$N_{200}P_{40}K_{40}$	0,04	< 0,01	< 0,01
$N_0P_{80}K_0$	0,04	< 0,01	< 0,01
$N_{100}P_{80}K_0$	< 0,02	< 0,01	< 0,01
$N_{200}P_{80}K_0$	< 0,02	< 0,01	< 0,01

CONCLUSIONS

The applied fertilizers doses have influenced the yield harvest, respectively, the nitrogen and protein, phosphorus and potash, gluten, in the following way:

- the nitrogen and protein content is directly influenced by the different nitrogen applied doses recording the highest increases as a result of increasing the nitrogen dose, the phosphorus dose increase to P_{40}, P_{80}, P_{120} has contributed to the increasing of the nitrogen content and protein yet less;

- the phosphorus content has been favorably modified only by the phosphorus doses, the nitrogen doses maintain the phosphorus content at the same level and the potash ones decreases it;

- the potash content has only increased when K_{80} dose was applied;

- the gluten content of the wheat grain has increased with all fertilized variants, higher increases being obtained were the high nitrogen doses of N_{100} and N_{200} are applied along with moderate phosphorus doses of P_{40} and P_{80}.

- the carbendazin, chlorsulphuron and tribenuron residues are not influenced by the fertilized doses yet the way they accumulates into the soil. All three residues are under the admissible limits.

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