# INFLUENCE OF CHEMICAL FERTILIZATION ON BAKERY QUALITIES OF SOME AUTUMN WHEAT RACES (TRITICUM AESTIVUM), IN S.D.E. TIMISOARA PEDOCLIMATIC CONDITIONS

# INFLUENTA APLICARII INGRASAMINTELOR CHIMICE ASUPRA CALITATII PANIFICABLE LA UNELE SOIURI DE GRAU DE TOAMNA (TRITICUM AESTIVUM) IN CONDITIILE PEDOCLIMATICE DE LA S.D.E. TIMISOARA

**LADISLAU WAGNER, VALERIU TABĂRĂ**

*Agricultural and Veterinary University of the Banat, Timişoara, Romania*

*Abstract: The present paper reveals the carried experiments that had as main goal the establishment of autumn wheat optimum fertilization doses and also the bakery quality testing for some of wheat races that were under the influence of different fertilization doses.*
*From the experimental data results that the best wheat races for bakery have been: Ciprian, Alex Baika and Lv 34 .Comparing the four fertilization doses it results that the optimum nitrogen fertilization dose is* **100** *kg/ha A. S.*

*Rezumat: Lucrare de faţă a fost elaborat în vederea stabilirii dozelor optime de fertilizare a grâului de toamnă şi testarea calităţii panificabile sub influenţa diferitelor doze de îngrăşăminte aplicate câtorva soiuri de grâu luate în studiu.*
*Din datele experiment rezultă că cele mai bune soiuri de grâu panificare au fost: Ciprian, Alex, Baika şi Lv 34. Din cele patru doze de fertilizare reiese că doza optimă de fertilizare cu azot este de* **100** *kg/ha S.A.*

*Key word: wheat, varieties, fertilization, dose, quality*
*Cuvinte cheie: grâu, soiuri, fertilizare, doze, calitate*

### INTRODUCTION

The wheat lucrativeness and the market value is provided by a lot of factors like race, fertilizatiion and baking quality. For a proper cropping of the new introducet races, it is necessary to knew the ecologic and technologic requirements and also the qualitative characteristics of the cultivated variety.

### MATERIALS AND METHOD

In the present paper, we have evaluated wheat yields in terms of quality considering the researches performed at S.D.E in the study year 2006. In order to test autumn wheat varieties in field conditions, we have organized field experiments involving two experimental factors:

A factor – Fertilization
- a1- N60 P60 K60
- a2 - N 80 P60 K60
- a3 - N100 P60 K60
- a4 - N140 P 60 K60
- a5 N60 P60 K60 + foliar fertilization in the skin bag phase.

B factor – variety with 7 graduations:
- b1- ALEX;
- b2- LV34;
- b3- CIPRIAN;

- b4-SERINA;
- b5-G.K. OTHALOM;
- b6-G.K. GOBE;
- b7-BAIKA.

The studied wheat varieties consisted of native and foreign varieties originating from Serbia and Hungary. The previously mentioned wheat varieties are cultivated on large areas in the West Field regions of Romania.

The surface planted with one cultivar on one agrofond was 124m2.
- The total surface of one cultivar in one experience was 620m2.
- One agrofond surface was 868 m2.
- The yielding surface of one plot/ repetition was 30.27 m2.
- The experimental factors occupied surface was 4340 m2.
- The roads and bands surface was 3250 m2.
 The entertainment of experience:
Chemical nutrients with nitrogen were applied as the experimental variants requested.

The control of the weeds was made using the herbicide MUSTANG

There were no treatments against diseases.

Treatments against leaf pests were made using SUPERSECT 25 CE commercial product.

The yielding was made using an experimental field combine. From each experimental variant plant, probes were collected for biometrical measurements and grain probes for the physical characteristics analyze and for determining the main bakery characteristics.

Analyses consisting of bakery quality were carried out at SC VITAL SA- institution that dispose of high class equipments witch are suitable for determining the bakery quality of wheat.

## WHEATEAR CONDITIONS

The agricultural year 2006-2007 was climatic characterized by a not favorable environment for wheat culture, explaining the lower productions achieved in 2007 for the majority of wheat cultivars comparing whit the past few years.

By analyzing this season it can be noticed that in the largest part of vegetation period the temperature is highest then the before years average (february, march, may, june).

Concerning the precipitations, this year is characterized by a first part deficit (autumn) witch has lead to a delay in rising and in a weak in fraternity process. The exes of precipitations in february and in march is not sufficient for compensate this water deficit.

*Table 1*

Monthly mean temperatures ($^0$C) registered at Timisoara Meteorological Station in the period 2006-2007 comparing with multiyear means

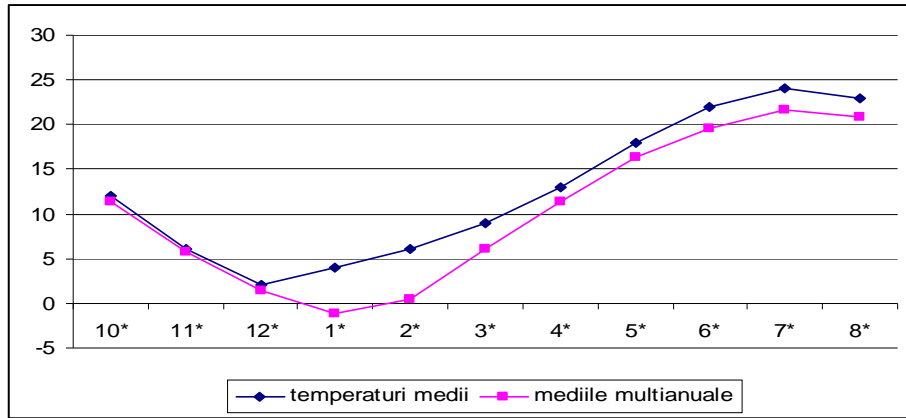| Specification | X | XI | XII | I | II | III | IV | V | VI | VII | VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|
| year 2006/2007 | 12 | 6 | 2 | 4 | 6 | 9 | 13 | 18 | 22 | 24 | 23 |
| Multiyear average | 11,3 | 5,7 | 1,4 | -1,2 | 0,4 | 6,0 | 11,3 | 16,4 | 19,6 | 21,6 | 20,8 |

Figure.1 Monthly mean temperatures ($^0$C) registered at Timisoara Meteorological Station in the period 2006-2007 comparing with multiyear means

Monthly mean precipitation (mm) registered at Timisoara Meteorological Station in the period 2006-2007 comparing with multiyear means

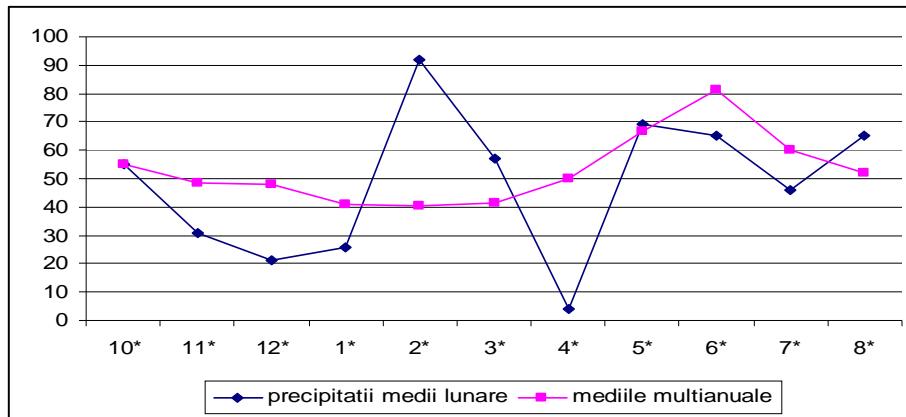| Specification | X | XI | XII | I | II | III | IV | V | VI | VII | VIII |
|---|---|---|---|---|---|---|---|---|---|---|---|
| year  2006/2007 | 54.8 | 31 | 21 | 26 | 92 | 57 | 4 | 69 | 65 | 46 | 65 |
| Multiyear average | 54,8 | 48,6 | 47,8 | 40,9 | 40,2 | 41,6 | 50,0 | 66,7 | 81,1 | 59,9 | 52,2 |



Figure.2 Monthly mean precipitation (mm) registered at Timisoara Meteorological Station in the period 2006-2007 comparing with multiyear means

### RESULTS AND DISCUSSION

Hectoliter mass is presentet in table 3.

From analyzing the results concerning the hectoliter weight it can be noticed that the agrofond has a small influence upon that character.

Hectoliter mass average values (MH – kg/hl) depending on race and agrofond for year 2007

| Nr. crt. | Races | B Factor Race | | | | | MH race average | | |
| | | A0 $N_{60}P_{60}K_{60}$ | A1 $N_{80}P_{60}K_{60}$ | A2 $N_{100}P_{60}K_{60}$ | A3 $N_{140}P_{60}K_{60}$ | A4 $N_{60}P_{60}K_{60+}$ fol | Average | MH relative value % | Dif. ± |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ciprian | 79.2 | 78.9 | 77.5 | 78.9 | 78.3 | 78.56 | 102 | 1,78 |
| 2 | Alex | 75.3 | 77.4 | 76.8 | 77.4 | 77.0 | 76.78 | 100 | MT |
| 3 | Serina | 74.0 | 73.9 | 73.9 | 73.8 | 72.0 | 73.52 | 96 | -3,26 |
| 4 | LV34 | 76.4 | 76.6 | 78.0 | 77.1 | 74.1 | 76.44 | 99 | -0,34 |
| 5 | GK. Göbe | 76.2 | 76.8 | 76.5 | 75.6 | 74.0 | 75.82 | 98 | -0,96 |
| 6 | GK.Öthalom | 72.5 | 75.8 | 75.6 | 76.5 | 75.1 | 75.10 | 97 | -1,68 |
| 7 | Baika | 74.8 | 74.9 | 77.6 | 77.5 | 74.8 | 75.92 | 98 | -0,86 |
| | agrofond MH average | 75.48 | 76.32 | 76.55 | 76.68 | 75.0 | | | |
| | MH relativevalue (%) | 100 | 101 | 101 | 101 | 99 | | | |
| | Differnce ± | MT | 0,84 | 1,07 | 1,2 | -0,48 | | | |

.

From the cultivars the highest value of MH are accomplice at: CIPRIAN – 78.56 kg /hl, ALEX – 76.78 kg /hl. Generally, all of experimented cultivars can be framed in bakery good and very good groupes.

   **MMB Value** is presented in table 4

MMB average values  depending on race and agrofond for year 2007

| Races / Agrofond | B Factor Race | | | | | | | Agrofondului MMB Average | | |
| | Alex | Ciprian | Lovrin 34 | GK. Göbe | GK. Öthalom | Serina | Baika | Average | MMB relativeValue % | Diff. ± |
|---|---|---|---|---|---|---|---|---|---|---|
| A0 $N_{60}P_{60}K_{60}$ | 43,82 | 44,23 | 47,57 | 34,56 | 42,18 | 40,63 | 36,05 | 41,29 | 100 | MT |
| A1 $N_{80}P_{60}K_{60}$ | 44,34 | 43,54 | 53,26 | 30,48 | 42,26 | 35,40 | 40,29 | 41,36 | 100 | 0.07 |
| A2 $N_{100}P_{60}K_{60}$ | 43,13 | 43,17 | 52,30 | 33,49 | 39,69 | 37,14 | 38,19 | 41,01 | 99 | -0.28 |
| A3 $N_{140}P_{60}K_{60}$ | 43,73 | 42,50 | 50,83 | 33,24 | 41,46 | 58,84 | 42,15 | 44.67 | 108 | 3.38 |
| A4 $N_{60}P_{60}K_{60}$ + fol | 44,47 | 44,10 | 47,20 | 36,81 | 46,84 | 42,76 | 39,61 | 43.11 | 104 | 1.82 |
| MMB Average A Factor Race | | | | | | | | | | |
| MMB Race average | 43.89 | 43.50 | 50.23 | 33.71 | 42.48 | 42.95 | 39.25 | | | |
| MMB relative value a % | 100 | 99 | 114 | 75 | 96 | 97 | 89 | | | |
| Difference ± | MT | -0.39 | 6.34 | -10.18 | -1.41 | -1.41 | -4.64 | | | |

From the experimented cultivars the biggest value of MMB average have been achieved in Lovrin 34 with 50,53 g.

From analyzing the results concerning the MMB it can be noticed that the agrofond has a no influence upon that character.

 **Falling index (FN)** is presented in table 5.

The values of falling index of all experimented cultivars, is showing that them can be placed in SATISFACTORY category.

The highest values of falling index have been accomplished by cultivars: CIPRIAN- 388 sec., ALEX-376 sec.

 The values for humid gluten are presented in table 6.

*Table 5.*

Falling index  (FN – sec.)   average values  depending on race and agrofond for year 2007

| | B Factor Race | | | | | | | Agrofond FN Average | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Soiuri / Agrofond | Alex | Ciprian | Lovrin 34 | GK. Göbe | GK. Öthalom | Serina | Baika | Average | FN relative value % | Differance ± |
| A0 $N_{60} P_{60} K_{60}$ | 373 | 390 | 266 | 316 | 335 | 336 | 338 | 336 | 100 | MT |
| A1 $N_{80} P_{60} K_{60}$ | 379 | 383 | 327 | 352 | 343 | 352 | 365 | 357 | 106 | 21 |
| A2 $N_{100} P_{60} K_{60}$ | 372 | 396 | 371 | 336 | 347 | 343 | 346 | 358 | 106 | 22 |
| A3 $N_{140} P_{60} K_{60}$ | 410 | 406 | 341 | 346 | 377 | 372 | 370 | 374 | 111 | 38 |
| A4 $N_{60} P_{60} K_{60}$ + fol | 347 | 367 | 236 | 299 | 323 | 318 | 344 | 319 | 94 | -17 |
| FN average A Factor Race | | | | | | | | | | |
| FN race average | 376 | 388 | 308 | 329 | 345 | 344 | 352 | | | |
| FN relative value % | 100 | 103 | 81 | 87 | 91 | 91 | 93 | | | |
| Difference ± | MT | 12 | -68 | -47 | -31 | -32 | -24 | | | |

*Table 6.*

Humid glutenului (GU %)  average values for 7 wheat races depending on agrofond for year 2006

| | B Factor Race | | | | | | | Media GU a Agrofondului | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Races / Agrofond | Alex | Ciprian | Lovrin 34 | GK. Göbe | GK. Öthalom | Serina | Baika | Average | relative value GU% | Difference ± |
| A0 $N_{60} P_{60} K_{60}$ | 25,0 | 29,2 | 17,8 | 21,7 | 24,6 | 22,8 | 23,3 | 23,48 | 100 | MT |
| A1 $N_{80} P_{60} K_{60}$ | 32,0 | 31,9 | 24,8 | 27,2 | 26,3 | 26,9 | 24,6 | 27,67 | 117 | 4,19 |
| A2 $N_{100} P_{60} K_{60}$ | 37,7 | 35,9 | 29,0 | 27,7 | 29,5 | 31,0 | 30,3 | 31,58 | 134 | 8,1 |
| A3 $N_{140} P_{60} K_{60}$ | 32,7 | 35,9 | 30,3 | 33,8 | 29,4 | 29,3 | 29,7 | 31,58 | 134 | 8,1 |
| A4 $N_{60} P_{60} K_{60}$ + fol | 20,8 | 25,2 | 17,8 | 23,2 | 22,8 | 20,0 | 18,4 | 21,17 | 90 | -2,31 |
| GU Average Factor A Race | | | | | | | | | | |
| GU race average | 29,64 | 31,62 | 23,94 | 26,72 | 26,52 | 26,0 | 25,26 | | | |
| GU Relative value % | 100 | 106 | 80 | 90 | 89 | 87 | 85 | | | |
| Difference ± | MT | 1,98 | -5,7 | -2,92 | -3,12 | -3,64 | -4,38 | | | |

By analyzing the results we can conclude that the nitrogen has a semnificative positive influence upon humid gluten, the essential element in wheat bakery.

On agrofond N60P60K60 – the medium content of gluten is 23,48%, compared with agrofond N140P60K60 having the value 31,58% humid gluten.

Regarding The humid gluten content it can be observed that among the experimented cultivars there are values of humid gluten highest then 30%, such as CIPRIAN – 31,62%, and also, near to 30% level, such as ALEX cultivar that has a medium content of humid gluten meaning 29,64%.

Considering the cultivar-agrofond interaction, the highest humid gluten contenthave been achieved in ALEX cultivar (37, 7%), on N100P60K60 Agofond.

The values for **Gluten index (GI)** are presented in table 7.
By analyzing the data it can be concluded that the agrofond do not influence the gluten index. From studied variants it can be distinguish cultivars that posses high values of gluten index: BAIKA – 97,20%, Alex – 89%, CIPRIAN 83,80%.

However there are cultivars that even if them have a reduced humid gluten content, the value of gluten index is high, providing them a high baking value.

In conclusion, among the cultivars that are cultivated in Banat Plain, can be found high bakery indexes, making them extremely values for Bakery market and industry.

Gluten index (GI %) average values for 7 wheat races depending on agrofond for year 2006

| | B Factor Race | | | | | | | GI Agrofond Average | | |
| Races / Agrofond | Alex | Ciprian | Lovrin 34 | GK. Göbe | GK. Öthalom | Serina | Baika | Average | GI relative value % | Difference ± |
|---|---|---|---|---|---|---|---|---|---|---|
| A0 $N_{60} P_{60} K_{60}$ | 90 | 90 | 97 | 75 | 82 | 77 | 98 | 87 | 100 | MT |
| A1 $N_{80} P_{60} K_{60}$ | 87 | 85 | 94 | 61 | 79 | 79 | 96 | 83 | 95 | -4 |
| A2 $N_{100} P_{60} K_{60}$ | 80 | 75 | 89 | 73 | 88 | 74 | 97 | 82 | 94 | -5 |
| A3 $N_{140} P_{60} K_{60}$ | 91 | 75 | 89 | 65 | 83 | 72 | 97 | 81 | 93 | -6 |
| A4 $N_{60} P_{60} K_{60}$ + fol | 97 | 94 | 97 | 94 | 95 | 90 | 98 | 95 | 109 | 8 |
| Average GI Factor A Race | | | | | | | | | | |
| GI race average | 89 | 83,8 | 93,2 | 73,6 | 79,4 | 78,4 | 97,2 | | | |
| GI relative value % | 100 | 94 | 104 | 82 | 89 | 88 | 109 | | | |
| Difference (±) | MT | -2,5 | 42 | -15,4 | -9,6 | -10,6 | 8,2 | | | |

**REFERENCES**

1.BÎLTEANU, GH. - Fitotehnie, VOLUMUL I, Editura Ceres, Bucureşti, 2003

2.BORCEAN, I., BORCEAN, A., DAVID, GH. — Cultura şi protecţia cerealelor, Editura Agroprint, Timişoara, 2002

3.CEAPOIU, N. — Metode statistice folosite in valorificarea experienţelor de câmp, Editura Agro - Silvică, Bucureşti, 1968

4.HERA, C. — Cercetări privind infIuenţa îngrăşăminteIor asupra producţiei unor soiurii şi Iinii de grâu, Anualele ICCPT Fundulea, VOLUMUL CIV, Bucureşti, 1983