

**A STUDY ON THE DEPRECIATION OF THE BREAD-MAKING WHEAT
QUALITY AS A RESULT OF THE ATTACK BY SOME PESTS
IN THE MAIN WAREHOUSES IN THE COUNTY OF TIMIȘ**

**STUDIUL PRIVIND DEPRECIEREA CALITĂȚII GRÂULUI PANIFICABIL
ÎN URMA ATACULUI UNOR DĂUNĂTORI
ÎN PRINCIPALELE DEPOZITE DIN JUD. TIMIȘ**

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Rezumat: *Lucrarea urmărește să evidențieze modificările calitative ale grâului panificabil, create de prezența dăunătorilor în depozit, cât și importanța modului de păstrare a produselor, respectiv a grâului. Au fost studiate 6 depozite din jud. Timiș în lunile ianuarie – februarie 2006, iar analizele de laborator au fost realizate la moara Carani. Structura populației dăunătorilor cât și condițiile de depozitare și-au pus amprenta asupra calității grâului din silozurile urmărite.*

Abstract: *In this paper the authors highlight the changes in the bread-making wheat quality caused by the presence of pests in warehouses, as well as the importance of the way produce (i.e. wheat) are kept. We studied 6 warehouses in the County of Timiș between January and February 2006, and laboratory analyses were carried out at the Carani Mill. The structure of pest population as well as storing conditions has had an impact on wheat quality in the silos we monitored.*

Key words: *warehouse, wheat, pest, infestation, and quality*
Cuvinte cheie: *depozit, grâu, dăunător, infestare, calitate*

INTRODUCTION

In cereal warehouses there are often specific pests that damage it both quantitatively and especially qualitatively.

Stored wheat is a living organism that breathes, a process resulting in the changing of starch into CO₂ and water, together with heat release.

Wheat grains are hygroscopic and bad heat conductors: as a result, there occur heating spots that later on spread, and where temperature reaches dangerous values of over 60°C. Cereal heating can also be caused by the presence of moulds or pests in abundance.

Storing cereals at 13-14% moisture and 10-12°C is not a problem; but if these values are overrun, there are conditions for the appearance and development of warehouse pests such as cereal ladybugs (*Sitophilus granaries*, *Sitophilus oryzae*, *Rhizopertha dominica*), mites, as well as cereals moths (*Sitotroga cerealella*), etc.

The presence of pests, their propagation and attack degree very much depend on the way cereals (wheat) are kept and on the type of deposit.

MATERIAL AND METHOD

We used wheat samples from warehouses in accordance with STAS 1068-75.

- we identified and established seed lots;
- we took elementary samples with the help of a cylindrical probe from different points, evenly distributed both at the surface and in the depth of the storing layer, so that the whole mass of seed be sampled;
- we reunited and then homogenized elementary samples to constitute the compound sample;

- we constituted the sample necessary to measure moisture, testing at random at least 10 points of the compound sample by reducing the compound sample with the divisor homogeniser;
- we measured the visible form of wheat infestation: we weighed the lab sample and we sieved through 2 superposed sieves (nr. 2.5 R and 1.5 R, STAS 1078-73), we then examined the three separate portions of the sample (photo 1 a. and 1.b):
 - on sieve nr. 2.5 R there are larger insects (Mauritania bug, moths, etc.) in their larval, nymph, or adult stages;
 - on sieve nr. 1.5 R there are wheat ladybug, flour beetles, etc.;
 - dead and living mites go through the sieve;



Photo 1 a



Photo 1.b.

- we measured the attack by cereal bugs (*Eurygaster* spp., *Aelia* spp. and *Sitotroga cerealella*) with the help of sodium hypochlorite;
- we measured the hidden form of wheat infestation with *Sitophilus* spp. and *Sitotroga cerealella* with the help of the gentian violet method;
- we sampled 300 g of grit (Preten mills) to measure gluten content with the help of a glutometer.

Assessing gluten is done through physical and chemical tests, such as the deformation index and the Gluten-Index index.

The deformation index is assessed by measuring a gluten sphere before and after it is maintained for an hour in a thermostat at a temperature of 35⁰C.

The Gluten-Index index is a measure of gluten quality given by the gluten percentage that remains on a standardised sieve after centrifugation and that is measured in the GLUTOMATIC 2000 system.

RESULTS AND DISCUSSION

Following the analyses of wheat seeds in the 5 warehouses we studied we could see the following (Table 1):

A. In January 2006 there was an infestation with *Sitophilus granaries* in the warehouses in Belint, Deta, and Periam. Bug depreciated grains were present in all the 5 warehouses we controlled. We can mention that in Belint and Deta the whole amount stored was infested, while in Periam only half of it was in this situation (1,075 t). The largest percentage of grains attacked by bugs was in the warehouse in Dudeştii Vechi (0.6%), and the smallest one in Deta (0.2%). Between the percentage of grains attacked by bugs and hectolitic volume there is a significant negative correlation, i.e. with the increase of grain percentage eaten by the bugs there is a significant decrease of the hectolitic volume (Figure 1).

Table 1

Wheat quantity and quality in January 2006 in a few warehouses in the County of Timiș

| Silo base | Stock (t) | Amount infested to GV (t) | Bug attack (%) | Maximal temperature (°C) | Average moisture (%) | Hectolitic mass (kg) | Musty grains | Gluten content | Index of deformation | Gluten Index |
|-----------------------|-----------|---------------------------|----------------|--------------------------|----------------------|----------------------|--------------|----------------|----------------------|--------------|
| BELINT | 323 | 323 | 0,4 | 20 | 14,5 | 74 | 0,2 | 20 | 12 | 26 |
| DETA | 252 | 252 | 0,2 | 10 | 17,5 | 79,5 | 0,5 | 24,5 | 20 | 29,5 |
| PERIAM | 2025 | 1075 | 0,2 | 20 | 15 | 79 | 0,1 | 23,7 | 18 | 29 |
| DUDEȘTII VECHI | 250 | - | 0,6 | 15 | 13,6 | 72 | - | 18 | 10 | 21 |
| JAMU MARE | 69 | - | 0,3 | 18 | 14 | 78 | - | 22,5 | 10 | 28 |

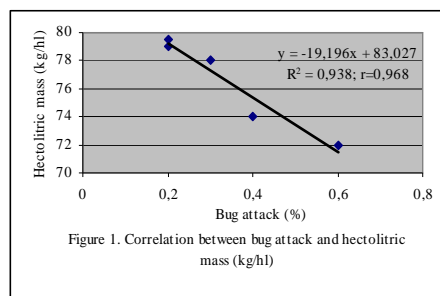


Figure 1

As a result of depreciation in the grains by the bugs, bread-making indices (gluten content, deformation index, and gluten index) also show a significant decrease (Figure 2 a, 2.b.)

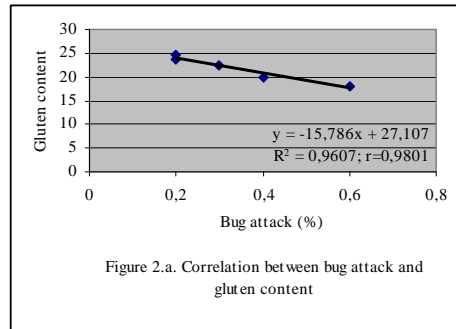


Figure 2.a. Correlation between bug attack and gluten content

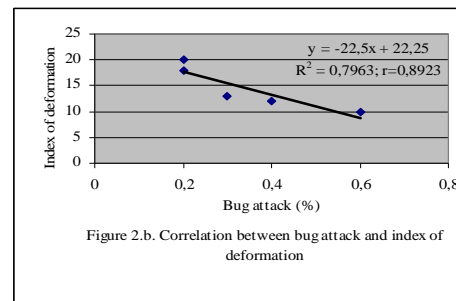


Figure 2.b. Correlation between bug attack and index of deformation

Figure 2 a) and b)

B. In February 2006, of the 5 warehouses analysed we could see that in only 2 there was infestation with *Sitophilus granaries*, i.e. in Deta and Periam (Table 2). There was no infestation at all in Belint. In all the 5 warehouses there were nevertheless grains attacked by the bugs. The largest percentage (0.7%) was in Periam. The smallest percentage of depreciated grains was in Deta and Jamu Mare (0.3%). Hectolitic volume and gluten index decrease with the percentage of grains attacked by the bugs.

Table 2

Wheat quantity and quality in February 2006 in a few warehouses in the County of Timiș

| Silo base | Stock (t) | Amount infested to GV (t) | Bug attack (%) | Maximal temperature (°C) | Average moisture (%) | Hectolitic mass (kg) | Musty grains | Gluten content | Index of deformation | Gluten Index |
|-----------------------|-----------|---------------------------|----------------|--------------------------|----------------------|----------------------|--------------|----------------|----------------------|--------------|
| BELINT | 188 | - | 0,4 | 18 | 12,8 | 73 | 0,2 | 20 | 12 | 22 |
| DETA | 252 | 248 | 0,3 | 10 | 14,0 | 78 | 0,5 | 23,5 | 10 | 28 |
| PERIAM | 400 | 400 | 0,7 | 18 | 12,0 | 71,5 | - | 17 | 8 | 22 |
| DUDEȘTII VECHI | 240 | - | 0,6 | 16 | 14,5 | 72 | - | 19 | 10 | 20,5 |
| JAMU MARE | 69 | - | 0,3 | 16 | 17,2 | 74 | - | 22,5 | 13 | 27,5 |

- C. If we compare the 5 warehouses in January and February, we can see the following:
- In Belint, 100 t of wheat seeds were taken out of the warehouse, i.e. the lot strongly infested with weevils. They applied treatments (gassing) to the amount left (188 t), and as a result there was no more infestation with *Sitophilus* in February.
 - In Deta, the seeds stock was constant, the *Sitophilus* infestation was also constant, and so was the percentage of the grains attacked by the bugs. There was no gassing to remove the weevils.
 - In Periam, in February there was only 1/5 of the seed stock (400 t). They delivered lots not infested with bugs or the least infested. As a result, we can see that the entire amount is infested, and the average percentage of infestation reached 0.7% (compared to 0.2% in January). The whole amount stored is attacked by *Sitophilus*. There was no treatment to control weevils; as a result the attack persists in the whole lot, particularly since the wheat was from not infested lots, the remaining one being infested.
 - In the warehouses in Dudestii Vechi and Jamu Mare, we can see that there is no delivery in February. Due to the maintenance of hygiene, temperature, and proper aeration, there was not attack by the weevils in January and February. The percentage of grains attacked by the bugs is the same as in January. There are timely disinfections in the 2 warehouses.

CONCLUSIONS

We can see that in the warehouses where there are timely controls, followed by treatments or by the removal of the wheat stocks infested, there are no particular problems with the warehouses.

We can say that in Dudestii Vechi, Periam, and Belint, there were strong attacks in 2005 by bugs, resulting in a high percentage of attacked wheat.

Physical and chemical analyses carried out in the laboratories in Carani certify that in weevil attack warehouses, particularly in those where there is a high percentage of grains attacked by bugs (0.6-0.7%), hectolitic volume and gluten indices considerably decrease.

Efforts by the warehouse personnel to maintain storing areas clean, to disinfect before a new campaign, to apply treatments (by sprinkling or gassing), to maintain them in accordance with the standards in the field, temperature, moisture, and aeration are justified.

There should be no infested seeds and, during storage, seeds should be kept at standard moisture level.

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