RESERCH REGARDING THE EFFECT OF STORING FLAMURA 85 WHEAT AT LOW TEMPERATURES UPON THE MILLING PROPERTIES

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Abstract
Preserving wheat is one of the great problems of the world grain producers. Finding a method of ensuring the maintenance of the grain quality over a significantly long period of time by means of a technology that does not change their nutritional value or their technological properties represents a constant task for those envolved in this field. Cold preserving is one of the methods that are mentioned more and more by world-level specialists Under these circumstances, the present paper aims at studying the influence of storage temperature and lenght upon the granulosity of the fractions resulted after milling the wheat and at offering some information on the optimum grain storage thermal regime from this point of view.
The milling properties were further analyzed by determining the milling balance and the following indices: smooth module, milling rate and the uniformity modulus , determinations followed by a comparative analysis of the results obtained.
The data we obtained corroborated with those in the specialized literature recommend the temperature of 10^0 C as the optimum temperature of grain storage from the viewpoint of preserving the granulometrical features during long-term storage of grains.

Keywords:wheat, milling properties, low temperatures storage

1. INTRODUCTION

Preserving wheat is one of the great problems of the world grain producers. Finding a method of ensuring the maintenance of the grain quality over a significantly long period of time by means of a technology that does not change their nutritional value or their technological properties represents a constant task for those envolved in this field[2]. Cold preserving is one of the methods that are mentioned more and more by world-level specialists [3]. Under these circumstances, the present paper aims at studying the influence of storage temperature and lenght upon the granulosity of the fractions resulted after milling the wheat and at offering some information on the optimum grain storage thermal regime from this point of view.

2. MATERIALS AND METHODS

The raw material used in the experiments was Flamura 85 wheat. The wheat samples were stored at temperatures of 5^0, 10^0 and 20^0 C for 3, 6, 9, and 12 months. After being stored at the mentioned temperatures, the samples were ground at the Buhler laboratory mill type MCK-61887 . The fractions resulted in the case of breaks 1, 2, 3 and mill 1, 2 and 3 were collected and analyzed separately through sifting by means of a mechanical sieve equiped with a series of sieves numbered 250, 160 and 125 [1].
The milling properties were further analyzed by determining the milling balance and the following indices: smooth module, milling rate and the uniformity modulus , determinations followed by a comparative analysis of the results obtained.
The experimentally obtained data were graphically presented using Microsoft Excel from the Microsoft Office 2000 kit.

3. RESULTS AND DISCUSSION

The first analyzed parameter was the fineness module characterizing (FM) the granulometrical composition according to the medium diameter of the granules [4].

After analyzing the the fractions rezulted at break 1 of the Buhler milling machine, the fineness module for each sample was calculated separately and the data were centralized in the graph of figure 1.

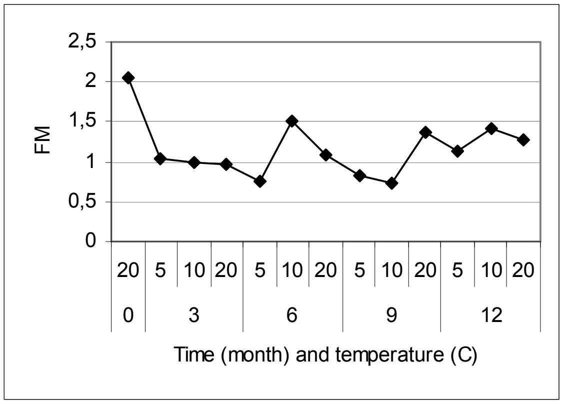

Figure 1. Fineness module variation according to storage temperature and length for the flour taken from break 1

In the graph shown in figure 1 we can see that the fineness module of the fractions collected from break 1 reaches maximum value after 6 and 9 month storage at a temperature of 5^0 C. These values are close but slightly lower as compared to the values of the fineness module recorded before storage. After 12 months of storage, we can notice values close to the maximum ones for the samples stored at 10^0 C.

The analysis of the fractions collected from break 2 and the calculation of the fineness module for each and every sample have led to the results shown in the graph of figure 2.

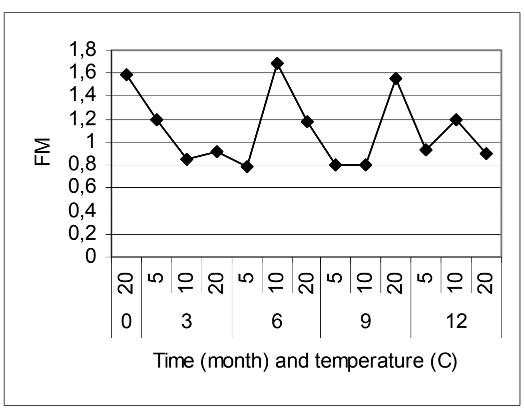

Figure 2. Fineness module variation according to storage temperature and length for the flour taken from break 2

In the case of flour particles from break 2, the maximum values of the fineness module are reached after 9 months of storage at temperatures of 10^0 and 20^0 C.

Values similar to the maximum ones were recorded in the case of 12 months storage period at a temperature of 10^0 C.

The results obtained after processing the samples from break 3 are highlighted in the graph of figure 3.

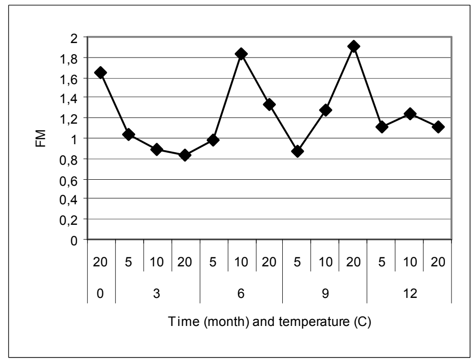

Figure 3. Fineness module variation according to storage temperature and length for the flour taken from break 3

In the case of the flours from break 3, the maximum values of the fineness module are reached after 12 months of storage at 10^0 C, and similar values after 9 months at 5^0 and 20^0 C. The minimum values are recorded after 6 months of storage at 20^0 C.

The fractions collected from mill 1 were analyzed and the data processing led to the representation in figure 4.

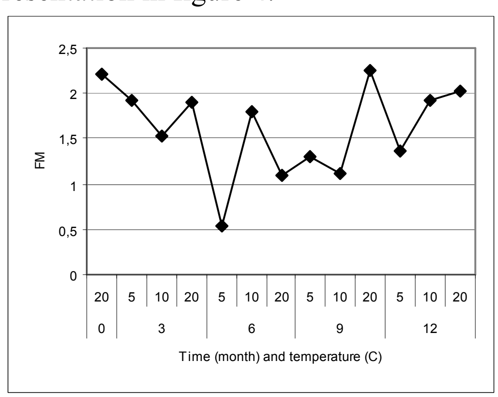

Figure 4. Fineness module variation according to storage temperature and length for the flour taken from mill 1

This time, the maximum limits of the parameter under study were noticed after 9 months of storage at 10^0 C and close values after 3 months at 20^0 C and after 12 months at 10^0 C. The minimum values were reached after 6 months at 20^0 C.

The study of the fractions from mill 2 led to the results sinthetically expressed in the graph of figure 4.

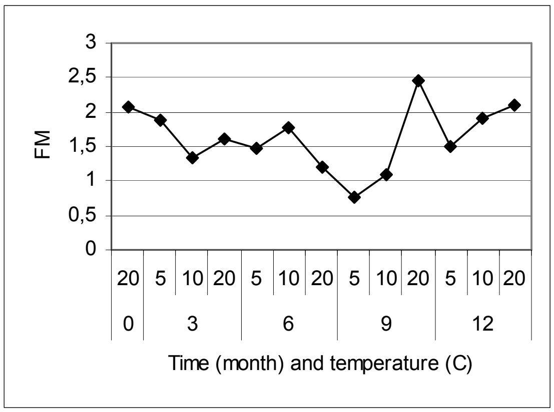

Figure 5. Fineness module variation according to storage temperature and length for the flour taken from mill 2

In this case the maximum values of the fineness module are reached after 9 months of storage at 10^0 and 20^0 C and the minimum after 6 months at 20^0 and 5^0 C.

The analysis of the last fractions, those from mill 3, led to the results graphically expressed in figure 6.

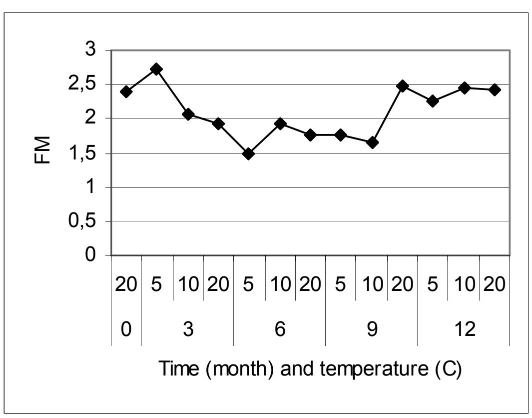

Figure 6. Fineness module variation according to storage temperature and length for the flour taken from mill 3

In the case of the break products taken from mill 3, the fineness module reached maximum values after 9 months at 20^0 C and after 12 months at 10^0 C, and values close to the maximum ones after 9 months at 10^0 C and after 12 months at 20^0 C. The minimum values were recorded after 6 months at 20 and at 5^0 C.

The second analyzed parameter was the uniformity module (UM) which is expressed by the ratio of three numbers whose sum is equal to 10 and provides information about the granulometrical distribution of the particles from the analyzed sample (Banu, 2004). R stands for the rejections and C for the siftings from the sieve that were used. The number coming immediately after R or C indicates the number of that particular sieve.

The values of the uniformity module recorded for the samples taken from break 1 are shown in the graph of figure 7.

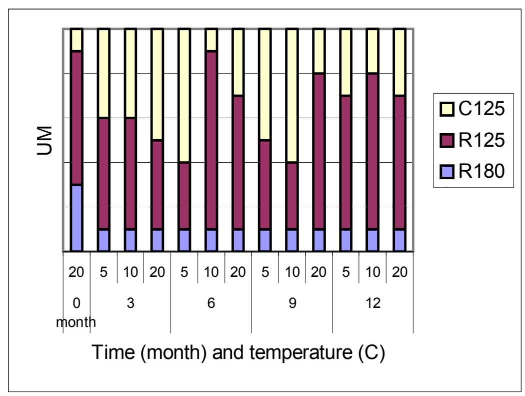

Figure 7. Uniformity module variation according to storage temperature and length for the flour taken from break 1

We can see from the graph that the rejections on sieve 180 have close values. The samples that were analyzed contained particles of maximum dimensions both at the beginning, and after 9 months of storage at 5^0 C and 6 months at the same temperature.

The analysis of the samples from break 2 of the Buhler milling machine yielded the values of the uniformity module sinthetically expressed in figure 8.

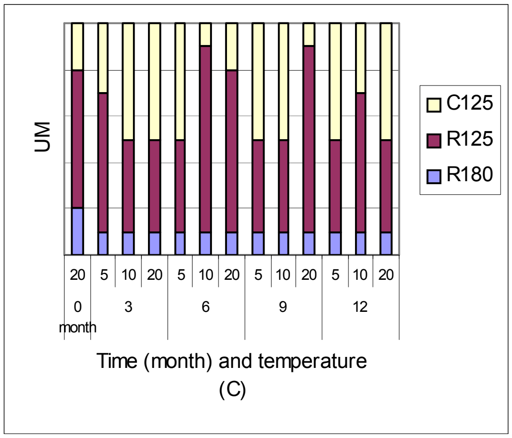

Figure 8. Uniformity module variation according to storage temperature and length for the flour taken from break 2

In this case, particles of maximum dimensions were recorded in a greater percentage after 9 months of storage at temperatures of10^0 and 20^0 C.

The samples collected from break 3 shown the granulometrical distribution expressed in figure 9.

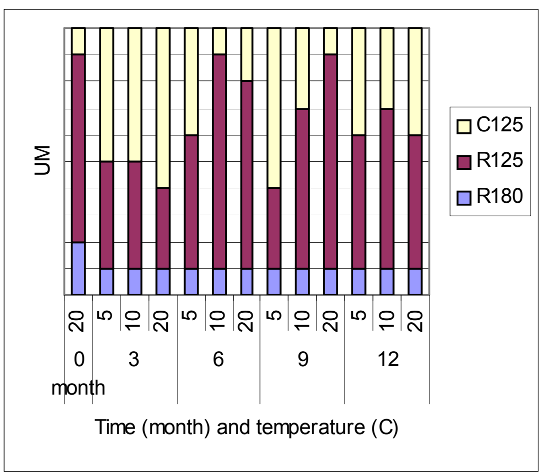

Figure 9. Uniformity module variation according to storage temperature and length for the flour taken from break 3

This time, the measurements have shown that the incidence of the large particles was maximum after storage for 9 and 12 months at 5^0 and 10^0 C, respectively.

The uniformity module variation of the samples from mill 1 is graphically expressed in figure 10.

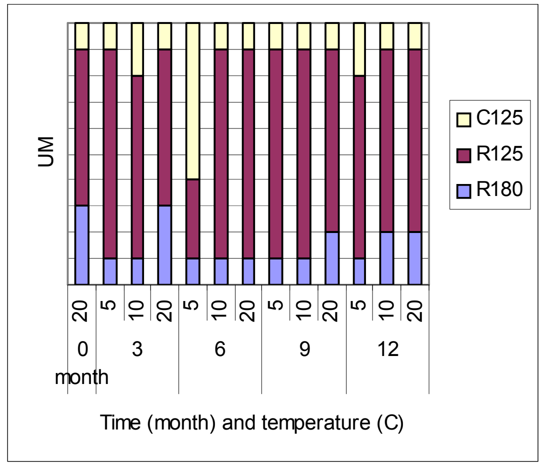

Figure 10. Uniformity module variation according to storage temperature and length for the flour taken from mill 1

In this case, the incidence of the particles of small dimensions was maximum after storing the wheat for 6 months at 20^0 C and 10^0 C, as well as after 9 months at 5^0 C..

The analysis of the samples taken from mill 2 led to the results expressed in figure 11.

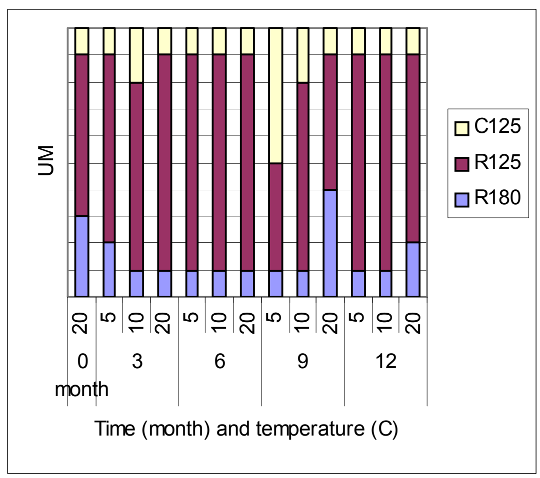

Figure 11. Uniformity module variation according to storage temperature and length for the flour taken from mill 2

As it can be seen in the graphical representation, in the case of mill 2, particles of small dimensions were obtained when milling the wheat stored for 6 months at 20^0 C and 5^0 C, respectively, and particles of large dimensions in the case of storage at 10^0 C and 20^0 C, respectively, for 9 months.

In the case of the last analyzed fraction, mill 3 displayed the distribution of the particles dimensions shown in figure 12.

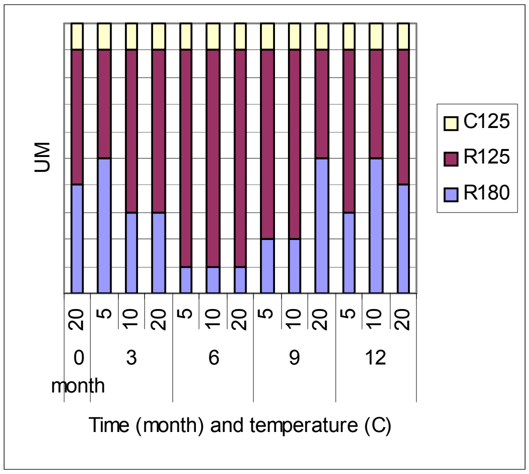

Figure 12. Uniformity module variation according to storage temperature and length for the flour taken from mill 3

From the data graphically presented we can see that the milling process led to obtaining flour particles with large granulation after 9 months of storage at 5^0 C, the rest of the storage periods leading to obtaining smaller particles irrespective of the thermal regime employed.

4. CONCLUSIONS

Analyzing the fineness module's variation in the case of the breaks we can first notice a decrease of the value of this indicator followed by an increasing tendency after 9 months of storage. As far as the influence of the temperature is concerned, relatively higher values were noticed after storage at 5^0 C in the 0 to 9 months interval and, after 12 months, the wheat stored at 10^0 C had maximum values of the fineness module for all 3 fractions that were taken into account.

For the fractions taken from the mill, there is an initial decrease of the fineness module's value, the minimum being reached after 6 months of storage at 20^0 C, after which there is a sudden increase up to the maximum values, reached after 9 months at 10^0 C, and a slight decrease after 12 months of storage.

By comparing the uniformity module's values of the breaks we can notice that the share of the large dimension particles increases only after 9 months of storage at 5^0 C but even in this case it does not rise to the initial values of the analyzed parameter. Particles of medium dimensions are found in a larger proportion in the samples ground after 9 months of storage at 5^0 and 10^0 C and after 12 months at 10^0 C. The small dimension particles are found especially in the samples stored at 20^0 C irrespective of the storage period. The samples taken from the mill contain large dimension particles in a higher proportion only in the case of storing the wheat for 9 months at 10^0 and 20^0 C. Small dimension particles are found mainly in the samples that were stored for 6 months at 20^0 C. From the analysis of the above experimental data we can draw the conclusion that, from the granulometric features perspective, parameters with values close to the initial ones are reached after 9 months of storage at temperatures of 10^0 C, the analyzed indices displaying close values that are still maintained in the majority of the fractions even after 12 months at the same temperature of 10^0 C. The data we obtained corroborated with those in the specialized literature recommend the temperature of 10^0 C as the optimum temperature of grain storage from the viewpoint of preserving the granulometric features during long-term storage of grains.

5. REFERENCES

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