JAP&T
TPA-Timişoara

Available online at www.japt.tpa.usab-tm.ro

Journal of Agroalimentary Processes and Technologies 2009, *15* (4), 564-566

Journal of Agroalimentary Processes and Technologies

Research regarding the effect of low temperature storing of flamura 85 wheat on the rheological properties of dough

Octavian Barna, Romulus Marian Burluc, Octavian Baston

[1]*Biochemistry Department, Faculty of Food Science and Engineering, Galati, ,,Dunărea de Jos'' University, 111 Domneasca St., 800201 Galati,, Romania*

Received: 20 Octomber 2009; Accepted: 30 November 2009

Abstract

The After harvesting the great quantities of cereals obtained must be preserved until they are ready to be processed. One method that is raising more and more interest from specialists is the preservation of cereals through cooling. The method of preservation of the cereal at low temperatures accomplished through their aeration using artificial cold and dehumidified air removes the ecological disadvantages. The preservation effect relies on the reduction of the activity of insects and micro organisms at low temperatures and on the inhibition of the respiratory processes of the grains, without causing damage on the environment. Even though the method was tested in Germany and USA concerning the relation between the temperature and the preservation time of cereal, the effects of preservation through cooling upon the technological properties have not been studied until now. This papers goal is to establish the link between the temperature and the storage time and the rheological properties of the dough obtained from wheat flour. The purpose of the research is to establish an optimal temperature regime for storing the cereal concerning the rheological properties of the dough.

Keywords: wheat, rheological properties, low temperatures storage

1. Introduction

It is After harvesting the great quantities of cereals obtained must be preserved until they are ready to be processed. Nowadays many countries use aeration using atmospheric air with the help of ventilators followed by treatment with fumigators against pests for the preservation of cereals[1]. Considering the fact that the obtained results of this method depends on the ability of the atmospheric air to realize the temperature and humidity control of the stored cereals, we also have to take into account that the use of fumigators is costly and non environmentally friendly.

One method that is raising more and more interest from specialists is the preservation of cereals through cooling. The method of preservation of the cereal at low temperatures accomplished through their aeration using artificial cold and dehumidified air removes the ecological disadvantages listed above.

The preservation effect relies on the reduction of the activity of insects and micro organisms at low temperatures and on the inhibition of the respiratory processes of the grains, without causing damage on the environment [2]. Even though the method was tested in Germany and USA concerning the relation between the temperature and the preservation time of cereal, the effects of preservation through cooling upon the technological properties have not been studied until now.

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 brought to the same humidity of 14,5%, kept at rest for an equal amount of time and ground at the Buhler laboratory mill[3].

Corresponding author: *e-mail:* octavian.barna@yahoo.com

The resulting flour was analyzed by means of Brabender Farinograph type 921069. The necessary quantities of flour were weighed by means of a technical scale with internal calibration type 320 XT model 1200C made by Precisa Instruments AG Switzerland.

The reading of the farinograms was done by means of Brabender valuemetric Ruler in order to determine the following parameters: flour's hydration capacity (CH), forming of dough (FD) (in minutes), stability of dough (SD) (in minutes), softening of dough (SD) (BU – Brabender units) and flour strength (FS) (CU – conventional units)[4].

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 flour's hydration capacity (CH) at 14% humidity. The results were centralized in the graph of figure 1.

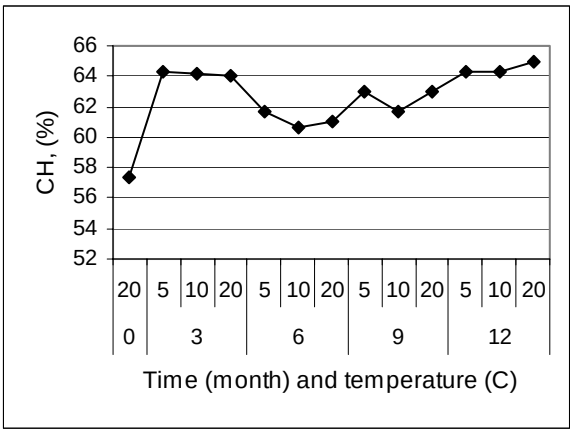

Figure 1. Flour's hydration capacity variation with storage period and temperature

From the graph in figure 1 we can notice that after 3 months of storage the HC increases compared to the initial value, after 6 months it decreases reaching minimal values subsequently slightly increasing reaching maximum values after 12 months of storage. In the same time of storage there are no significant changes to HC as a function of the storage time and temperature.

The second analyzed parameter was the forming of the dough. The experimental data were processed in the graph of figure 2.

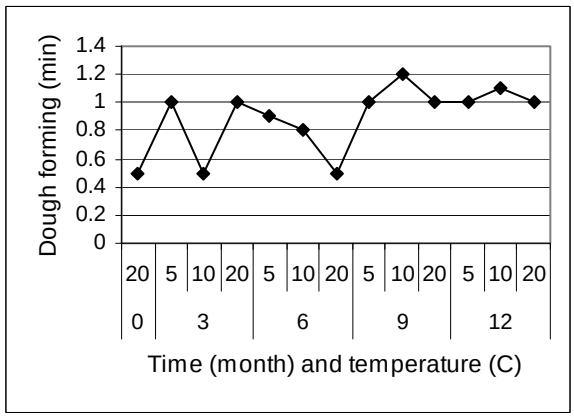

Figure 2. Time of dough forming variation with storage period and temperature

In figure 2, we notice that the time of dough forming has an uneven variation during the first 6 months although in the second part of the time interval after 9 and 12 months its value increases compared to the initial value at 10˚C.

The reading of the farinograms allowed us to determine the dough's stability, the data being synthetically expressed in figure 3.

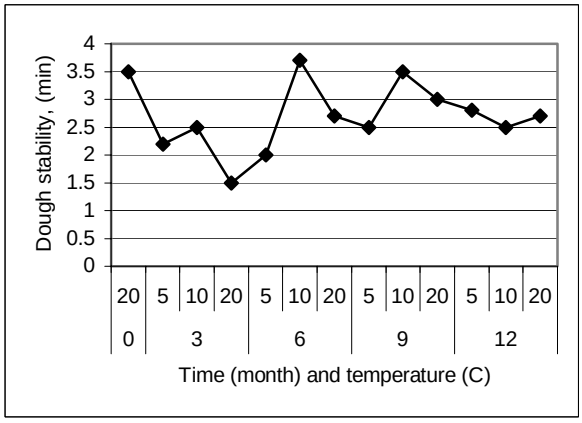

Figure 3. Dough's stability variation with storage period and temperature

In the graph of figure 3, we can notice that the stability of the dough decreases at all temperature levels, the minimum values being reached when stored at 20˚C.

After 6 and 9 months the dough's stability increases reaching maximal values at 10˚C. In the last part of the storage time, after 12 months, the dough's stability values level thus no significant difference due to the used temperature level are noticed.

The fourth analyzed parameter was the dough's softening. Its variation with storage period and temperature can be traced in figure 4.

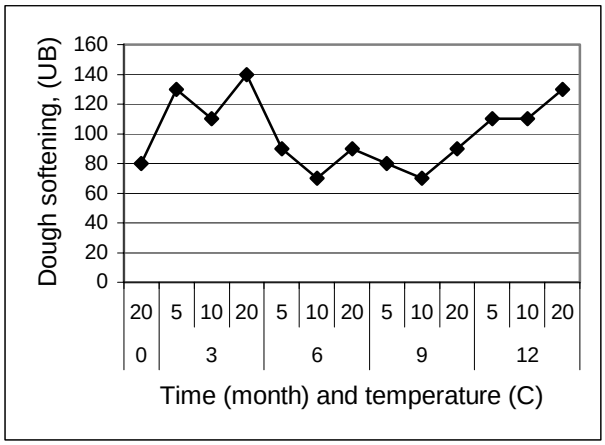

Figure 4. Dough's softening variation with storage period and temperature

The dough's softening has a sinusoidal evolution in time, maximal values being reached after 3 months storage at 10 and 20˚C, followed by minimal values reached after 6 and 9 months storage at 10˚C subsequently increasing after 12 months.

Analyzing the temperature's influence we can see that the maximal values of the dough's stability have been reached by the samples stored at 20˚C.

The last characteristic read on farinograms was the flour's strength. Its evolution during the experiments can be followed in figure 5.

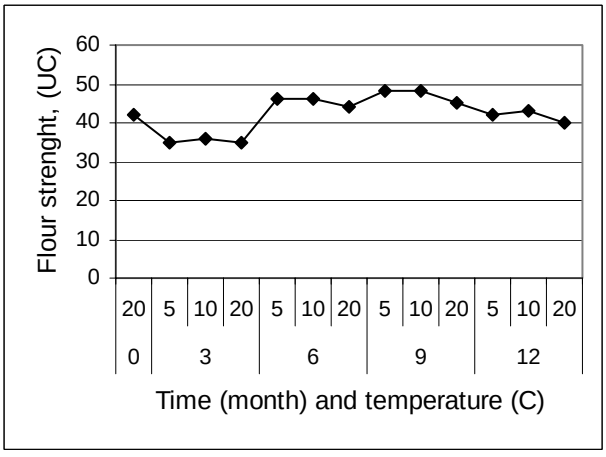

Figure 5. Flour's strength variation with storage period and temperature

From the data presented in figure 5 we can see that that flour's strength slightly decreases after the first three months of storage and after 6 and 9 months the registered values are higher than the initial values at all temperature levels considered. After 12 months of storage the flour's strength has values close the initial ones. Analyzing the temperature's influence we can see that the maximal values of the analyzed parameter correspond to the 10˚C temperatures, equaled at times by the values of the flour's strength which correspond to the samples stored at 5˚C.

4. Conclusions

It results from the presented data that the storage temperature within the 5^0-20^0 C interval has a moderate influence upon the rheological properties of the dough. The analysis of the graphs leads to the conclusion that, from the viewpoint of the storage temperature, values of the studied indices closer to the initial ones can be obtained in the case of grain preservation at 10^0 C for the majority of time intervals that were analyzed. In the case of hydration capacity, storage at 10^0 C led to even the increase of this index as compared to the initial values. Consequently, we can consider the thermal level of 10^0 C as the optimum grain preservation temperature by cooling from the viewpoint of dough's rheological properties.

Acknowledgments

We wish to thank Mr Alin Mădălin Giurea, PhD, General Manager of SC PAMBAC SA, for the support given in allowing the practical part of this paper to take place in the Central Laboratory of SC PAMBAC SA, Bacău.

References

1. Brunner, H. Conservation de cereals par le froid dans les zones tropicales. *Revue technique Sulzer*. 1989,Nr. 4.
2. Haumberger, K. et all, . Grain chiling as natural preserving method, *Muhle + Mischfutter*, 2003,vol. 9, p. 264-267.
3. Barna, O., Moraru, C., Tofan, I. Researches on the low temperature storage influence on wheat milling properties. The Annals of the University „Dunarea de Jos" of Galati, 2004.
4. Bordei, D., Burluc, R. *Tehnologia şi controlul calităţii în industria panificaţiei. Îndrumar de laborator.* Editura Fundaţiei Universitare „Dunărea de Jos", Galaţi, 2003.