STUDY REGARDING INFLUENCE OF ORGANIC FERTILIZATION ON BAKERY PRODUCTS QUALITY

Maria M. Sandric[1], Claudia E. Mosoiu[1]
[1]Institute of Food Bioresources, 6 Dinu Vintila Street, 021102, 2nd district, Bucharest, Romania
E-mail: maria.sandric@bioresurse.ro

Abstract
Organic farming is the form of agriculture that relies on crop rotation, biological pest control, and mechanical cultivation to maintain soil productivity and control pests, excluding or strictly limiting the use of synthetic fertilizers and synthetic pesticides, plant growth regulators, livestock feed additives, and genetically modified organisms. The most conventional fertilizers are based on nitrogen, potassium and phosphor, but in organic agriculture is useing organic fertilizers such as green manure, compost, rock dust, calcium from limestone, seaweeds, so on. Administration of optimal nutrients provides soil fertility, plants photosynthesis and blocks nutritive lack of poise or nitrate content in plants, in the case of overdoses.
The aim of this study is to test the influence of organic fertilization and noninput fertilization on physical and chemical quality of flour and bakery products and also to compare the quality of organic bakery products and conventional bakery products. There were carried out tests on the organic flour, regarding content of heavy metals, mycotoxines, pesticides, yeasts, and tests regarding the physical-chemical quality of this bakery products: volume, humidity, porosity,acidity,elasticity. Each bakery product obtained a note, which reflect it's quality.

Key words: Organic, Bread, Quality, Mycotoxines

1. INTRODUCTION

"Organic agriculture" is a specific agriculture system for growing plants, animals' breeding and food processing, which differs from conventional one because it is not useing GMOs and their derivates and there are restrictions regarding the use of fertilizers, growth regulators, hormones, antibiotics and intensive growing system [1]. Organic agriculture is a dynamic sector in Romania, which has known an ascending evolution for plants and animals sector. Romania has a very solid national legislation in this field; there are specific norms regarding animals' and crop production system, also regarding labeling, processing, inspection system, marketing and imports of organic agrifood products. In the last two years it was adopted a national logo for all the organic agrifood products for the distinction of this products on the market. Inspection and certification are carried out by the Inspection and Certification Bodies accreditated acording to SR EN 45011:2001 and aproved by the Ministry of Agriculture and Rural Development [2]. Marketing of organic agrifood products is done through different market channels: sellings directly from the farms, en-gros shops, speciality shops, on-line shops market or through seasonal markets. [3]

2. MATERIAL AND METHODS

In this study, raw materials were represented by conventional and organic flour. The samples were provided by the Fundulea National Research Institute. For obtaining of these samples, was used Dropia wheat, with a special growing system: the first sample (M1), was fertilized with N (90kg/ha) and P (75kg/ha), the second sample (P1) was fertilized with manure (20t/ha), and the last sample, (P2) was not fertilized [4, 5].
In this study, there were carried out some trials in order to fix the technology of organic bakery products. During the trials, the flux production of organic bakery products was separated from the conventional one [6]. Materials used in trials were:

- white flour, 550 /organic flour, 550
- iodate salt/sea salt
- conventional water/mineral water
- yeast (Saccharomyces Cerevisiae)

It was applied the following workplan:

- to determinate the physical-chemical, mycrobiological and rheological quality of this two types of flour
- to estabilish the manufacturing process for obtaining the specific bakery products
- to analyse bakery products.

The trials were made according to our national specific standards.

3. RESULTS AND DISCUSSION

Table 1 Results of physical-chemical, ycrobiological and rheological determinations of the samples

Determination		Conventional flour (M)	Organic flour (P1)	Organic flour (P2)	Measure unit
Heavy Metals	Cd	0.021	0.6	0.9	ppm
	Pb	7.9	0.04	0.02	ppm
	Cu	1.6	1.5	1.7	ppm
Bacterias		$6x10^4$	$11x10^4$	$13x10^4$	no./g
Dregs and Mildews		$1x10^3$	$9x10^3$	$11x10^3$	no./g
Mycotoxines	Aflatoxina	0	2	1.6	ppb
	Ochratoxina A	0	0	0	ppb
	Fumonizina	0	0	0	ppm
	Deoxinivalenol	0	0	0	ppm
Moisture		12.38	12.47	12.50	%
Falling Number		508	510	484	second
Wet Gluten		24.10	22.47	19.40	%
Gluten Index		86	96	96	-
Deformation Index		3	1.5	1.5	mm
Hydration capacity		58,7	61.2	59.3	%
Development time		2.4	1.7	1.7	minuts
Dough Stability		9.6	4.5	1.9	minuts
Degree of softening		27	63	74	UB
Pharinograf number		108	36	29	-

Heavy metals were detected with the method of Mass Atomic Absorbtion Spectoscopy. Organic flour registered a small content of Cd and Cu, and Pb content was almost missing, undetected with this method. The conventional flour registered a high content of Pb, (7.9 ppm), this value is not coresponding to Health Ministry Order no. 975/1998, where limit of Pb which is 1ppm.

Pests content is absent in this cases. Organic flour registered a high level of bacterias, yeasts and mildews than conventional one. In organic flour was detected aflatoxina owing to an untreated wheat culture and inadequate storageing conditions.

Organic flour has a small content of gluten and a lower amylolitic activity, it is necesarry an improvement of this flour with exogen amylases. In all cases the gluten is very elastic.

After pharinograph analyses, the conclusion was that organic flour has a high hydration capacity because of a high content of starch, hemicellulose and a lower dough stability and a small stability and development time than conventional flour.

Also, organic flours obtained small pharinograph numbers in comparison with conventional flour.

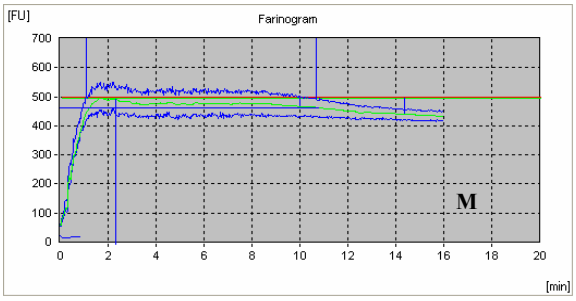

Fig. 1- M1 Pharinogram

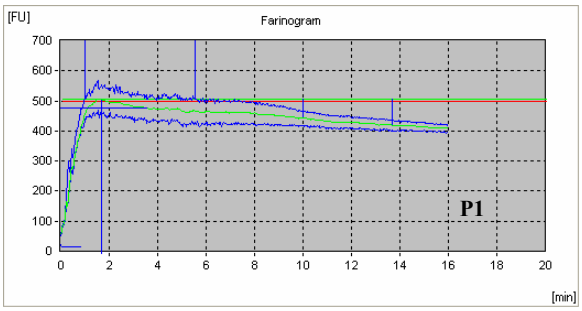

Fig. 2- P1 Pharinogram

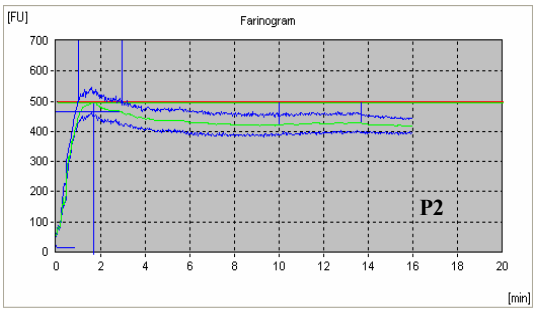

Fig. 3- P2 Pharinogram

As we can note from the overhead table, organic breads had a lower value regarding volume, porosity, elasticity and moisture than conventional breads.

Conventional breads have a good surface aspect, a high volume, uniform porosity with well developed pores, the colour of crumb is dark yellow, with ruddy crust.

Comparative with conventional products, organic products have small volume, lower developed porosity, with irregular pores and golden - yellow crust.

Table 2 Results of physical-chemical indexes of two sorts of organic bread

Quality Indexes	Conventional flour (M)	Organic flour (P1)	Organic flour (P2)
Nominal mass (g)	530	526	363
Volume, cmc/100g	312	295	265
Porosity, %	81.1	79	78
Elasticity, %	98	98	92
Acidity, degree	0.8	1.0	0.8
Moisture, %	43.24	43.57	42.74
H/D	0.73	0.68	0.46
Bread Note	**89**	**82**	**67**
Volume	20	18	16
Sideways cracks	6	5	5
Crust colour	6	5	5
Crumb colour	8	7	7
Porosity	19	19	18
Texture	20	19	8
Flavour	10	9	8

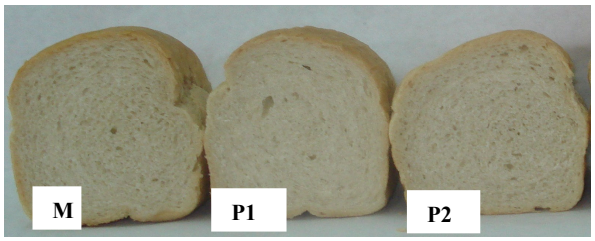

Fig. 4 - Comparison between M, P1, P2, breads physical quality

The organic bakery products, obtained lower marks comparative with conventional bakery products.

4. CONCLUSIONS

Organic bakery products have a lower physical-chemical properties than conventional ones, which is demonstrate through the notes obtained by each product, but despite of this

observation, organic bakery products can substitute successfully conventional ones.
Regarding type of fertilisation, the sample fertilized with manure obtained better physical-chemical results than the sample no fertilized.

5. REFERENCES

[1] Ion,V., Lenuta Iuliana Bucata, Diaconescu, S., Agricultura ecologică, Editura Alma Mater, 2002, Bucuresti, p. 53;

[2] Ministry of Agriculture and Rural Development, Romania, 2009. Organic Agriculture, URL: http://www.madr.ro/pages/page.php?self=01&sub=0107

[3] Murphy J. Dennis: Safety and health for production agriculture, American Society of Agriculture Engineers, Pennstate University U.S.A., 1992

[4] Bilteanu, Gh., Fitotehnie, Editura Ceres, Bucuresti, 2003, Vol. 1 – Cereale si leguminoase pentru boabe, p. 47;

[5] Sin, Gh., Managementul tehnologic al culturilor de câmp, Editura Ceres, 2005, Bucuresti, p. 19;

[6] Nedita Gabriela s.a:, Obtinerea produselor ecologice de morarit panificatie de la idee la realizare, Ed. DO&DO, 2005, Bucureşti.