INFLUENCE OF LYSOMAX PHOSPHOLIPASE ON BREAD'S RHEOLOGICAL PROPERTIES

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Abstract

A phospholipase is an enzyme that converts phospholipids into fatty acids and other lipophilic substances. Phospholipases form a ubiquitous class of enzymes optimized to catalyze the hydrolysis of phospholipids. Because their products are often second messengers, they are highly regulated by the cell.
For a given ester bond, there are separate secreted as well as cytoplasmic phospholipases with different substrate specificities and modes of regulation. As it becomes available, structural information provides a view of interfacial catalysis for several of these phospholipases on a molecular level.
Keywords : *phospholipase, cytoplasmatic, enzyme, substrate.*

Introduction

In these days, our bakers are guided by necessity and request of their consumers. In bakery, we made a lot of studies especially for dough, using different methods. We have studied dough's rheological properties when we supplement with enzymes.

We appreciate dough's behavior when we supplement dough with LysoMax using an Alaska BM 2000 machine with an standard program.

Experimental

In our studies we used whole meal (Carani), dry yeast, salt, anzymes LysoMax and it's amounts are presented in table number 1. We also have to say that we have a sample without any supplement and we consider that control sample. For this analysis we have take sampling with 2.5x2.5x2.5 mm^3 and we have tested them with an JTL Janz machine. We have studied bread's rheological behaviour.

Table 1: Dough's samples with Lyso Max

Nr.	Flour (g)	Water (ml)	Salt (g)	Dry yeast	Enzyme (LysoMax)	Enzymes concentration (g/100 g flour)
0	437	247	8.8	7	0	0.00
1	437	247	8.8	7	0.437	0.10
2	437	247	8.8	7	0.874	0.20
3	437	247	8.8	7	1.311	0.30
4	437	247	8.8	7	1.748	0.40
5	437	247	8.8	7	2.185	0.50
6	437	247	8.8	7	2.622	0.60
7	437	247	8.8	7	3.059	0.70
8	437	247	8.8	7	3.496	0.80
9	437	247	8.8	7	3.933	0.90

Results and Discussions

Regarding LysoMax enzyme, variation of compression strength is almost liniar for small enzyme's amounts and for control sample. When the enzyme's amount are bigger this variation are exponential, specialy in first step of curbe.

Table 2: Bread's compression with LysoMax, concentration 0.7g/100g flour

Time (s)	**F (LM7) N**	**Time (s)**	**F (LM7) N**	**Time (s)**	**F (LM7) N**
0	0.25	15.4	2.02	31.1	5.0
1.2	0.35	16.3	2.43	32.3	5.32
2.5	0.44	17.9	2.65	33.5	5.60
3.5	0.50	19.1	2.88	34.6	5.91
4.6	0.62	20.2	3.00	35.9	6.05
5.9	0.71	21.4	3.21	37.1	6.35
7.0	0.80	22.7	3.70	38.3	6.60
8.2	1.01	24	4.01	39.4	6.69
9.3	1.13	25.1	4.22	40.6	6.91
10.1	1.31	26.5	4.42	41	7.00
11.9	1.50	27.5	4.70	43.1	7.12
13.0	1.71	28.7	4.80	44.1	7.18
14.1	1.94	30	4.90		

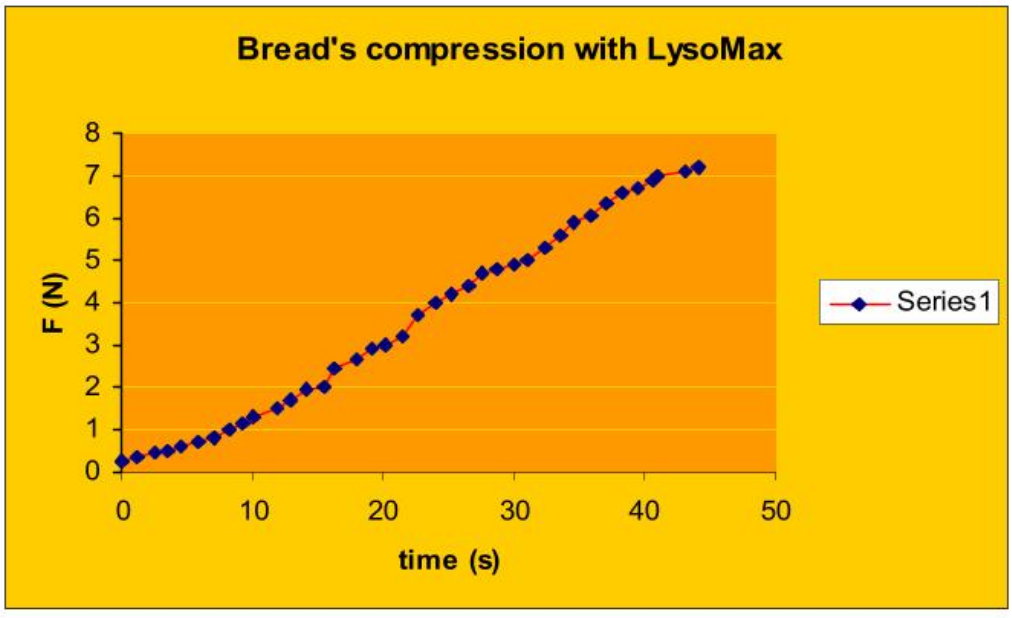

Fig. 1: Bread's compression with Lyso Max

For comparision, we also determinated the compression for control sample and we obtain the following results:

Table 3: Bread's compression with LysoMax at control sample

Time (s)	F (LM 0) N	Time (s)	F (LM 0) N	Time (s)	F (LM 0) N
0	0.34	30	2.60	56	4.85
4	0.85	32	2.93	58	4.90
6	0.90	34	3.09	60	5.0
8	1.11	36	3.41	62	5.18
12	1.30	38	3.5	64	5.30
14	1.52	40	3.70	66	5.37
16	1.75	42	3.81	68	5.50
18	1.84	44	4.07	70	5.59
20	1.93	46	4.13	72	5.68
22	2.11	48	4.40	74	5.82
24	2.20	50	4.45	76	5.88
26	2.35	52	4.62	78	5.91
28	2.48	54	4.70	80	6.11

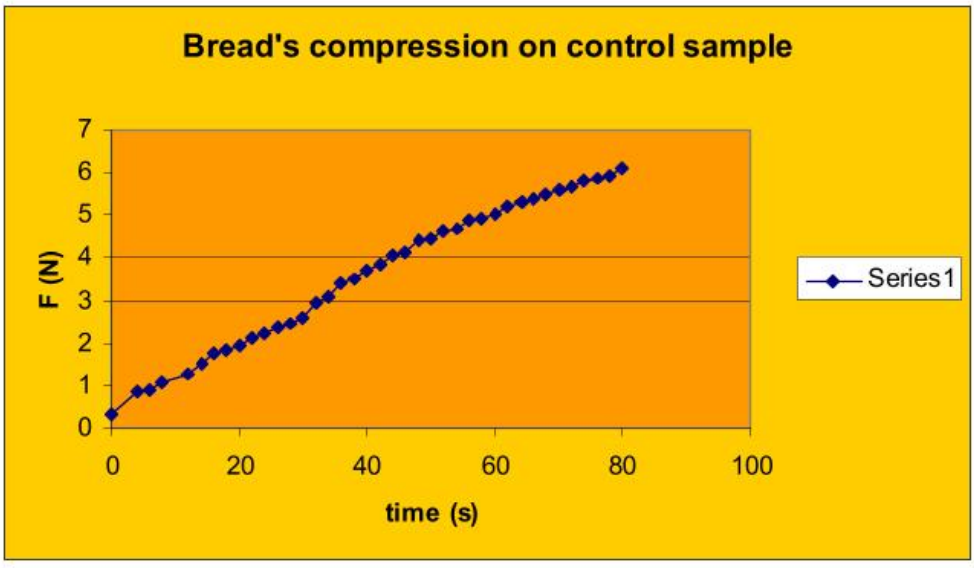

Fig. 2: Bread's at compression on control sample

We also have determinated the elasticity (Young modulus) for all ten samples (including control sample) and we descover that it wasn't varies meaningful in different enzyme's concentration (table number 3). The medium value was E = 57855 ± 469 Pa (table number 4)

Table 4: Young modulus for bread's samples with LysoMax

Nr.	$C_{LysoMax}$	F/A (N/m^2)	$L_{0\ (m)}$	Δl (m)	$\Delta l/L_0$	E (Pa)
0	0.00	11472	0.025	0.005	0.2	57360
1	0.10	11534	0.025	0.005	0.2	57660
2	0.20	11534	0.025	0.005	0.2	57660
3	0.30	11534	0.025	0.005	0.2	57660
4	0.40	11550	0.025	0.005	0.2	57760
5	0.50	11566	0.025	0.005	0.2	57840
6	0.60	11534	0.025	0.005	0.2	57680
7	0.70	11550	0.025	0.005	0.2	57760
8	0.80	11566	0.025	0.005	0.2	57840
9	0.90	11838	0.025	0.005	0.2	59200
10	1.00	11582	0.025	0.005	0.2	57920

Conclusions

After we have made this tests for study rheological behaviour on bread with LysoMax phospholiphase we can say following conclusions:

- all the samples with LysoMax have an pseudoelastic behaviour;

- is evident that compression strength varies exponential, specially in the first part of determinations;
- using LysoMax , compression can be correlate with enzyme's concentration, specially at the half and the end of determinations;
- elasticity of all samples with LysoMax and also for control sample wasn't varies meaningful in different enzyme's concentration;

References

Bordei, D. (2004). *Modern Technology in Bread Making*. AGIR Publish. House, Bucharest.
Steffe, J.F., *Rheological Methods in Food Process Engineering*, Freeman Press, East Lansing, 1996.
Deng, Z.; Tian, J; Hu, R., *The Accumulation of High Molecular Weight Glutenin Subunits and their Relation to Dough Rheological Quality in Chinese Winter Wheat*, Australian J. Agric. Res. 2006;