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EFFECT OF PLANT-BASED STABILIZERS ON THE QUALITY CHARACTERISTICS OF YOGURT

Florina RADU[1], Georgeta-Sofia POPESCU[1*], Mariana-Atena POIANA[1], Daniela STOIN[1], Diana MOIGRADEAN[1]

[1]University of Life Sciences King 'Mihai I' from Timisoara, Faculty of Food Engineering, Department of Food Technologies,
email: florinaradu@usvt.ro

Abstract: *This study evaluated the impact of adding three types of plant-derived stabilizers — modified tapioca starch (MTS), pectin (PC), and flax seeds mucilage (FSM) — at a proportion of 0.25mg/100 g on the physico-chemical, sensory, and rheological properties of yogurt during three week storage period.*

• Introduction

Yogurt is a product obtained through a biological method of food preservation (fermentation), or more precisely, through the spontaneous or controlled acidification of milk. The acidification of the product occurs when lactose, the sugar in milk, separates into two simpler components, glucose and galactose, with the production of lactic acid. Plant-based stabilizers have gained significant attention in yogurt manufacturing due to their ability to enhance texture, improve water-holding capacity, and reduce syneresis while meeting consumer demand for clean-label, natural ingredients. Market analyses confirm that plant-based stabilizers dominate globally, representing approximately 58% of stabilizer use in high protein yogurt formulations, driven by consumer preference for natural, vegan friendly additives.

• Material and method

Cow's milk was standardized to 3.2% protein and 3.0% fat, then subjected to a heat treatment of 90 °C for 10 min to ensure whey protein denaturation and improved gel firmness. The milk was cooled to 42 ± 1 °C, after which stabilizers (pectin, starch, gums) were added at concentrations between 0.25 (mg/100 g).The mixtures were homogenized using a magnetic stirrer to ensure complete dispersion of stabilizers. Yogurt starter culture (Streptococcus thermophilus and Lactobacillus delbrueckii subsp. bulgaricus) was added at 2.5% (v/v). The inoculated milk was filled into identical polypropylene cups (diameter 45 mm, height 55 mm), sealed, and incubated at 42 °C until reaching pH 4.6 ± 0.05. A control sample was also obtained, in which the yogurt was produced in the same way described above, but without the use of stabilizers. All samples were stored at 4 °C for 24 h prior to analysis to allow complete gel setting.

Table 1. Experimental design of yogurt samples with the addition of different types of stabilizers

Sample code	MTS [mg/100 g]	PC [mg/100 g]	FSM [mg/100 g]
M1	**-**	**-**	**-**
M2	**0.25**	**-**	**-**
M3	**-**	**0.25**	**-**
M4	**-**	**-**	**0.25**
M5	**0.08**	**0.08**	**0.08**

• Results and discussions

Table 2. Physicochemical properties of yogurts with the addition of stabilizers

Sample Code	pH	Acidity % Acid Lactic	Density g/mL
M1	4.54 ± 0.01 [a]	0.85 ± 0.005 [a]	1.06 ± 0.00 [a]
M2	4.55 ± 0.01 [a]	0.84 ± 0.005 [a]	1.07 ± 0.00 [a]
M3	4.57 ± 0.01 [a]	0.83 ± 0.005 [a]	1.08 ± 0.00 [a]
M4	4.56 ± 0.05 [a]	0.83 ± 0.005 [a]	1.07 ± 0.00 [a]
M5	4.57 ± 0.01 [b]	0.82 ± 0.005 [a]	1.07 ± 0.00 [a]

Results are expressed as mean ± standard deviation. Different letters in the same row express statistically significant differences ($p < 0.05$).

Table 3. Physicochemical properties of yogurts with the addition of stabilizers Acceptable index (AI) of the yogurt samples for rating and taste rating by consumers

Acceptable index (AI) (%)	Treatment				
	T1	T2	T3	T4	T5
Taste	62	53.4	53.4	47.5	57.6
Texture	54.3	53.4	56.6	53.1	56.6
Aroma	55.85	51.9	53.4	47.5	51.3
Appearance	54.1	45.5	63.5	57.9	67.3
Color	61.1	61.1	66	68	68.4
Sweetness	92.1[a]	62.7	57.6	52.4	57.9
Sourness	44.5	58.4	48.6	44.1	54.6
Mouthfeel	53.8	56.2	55.2	51	66.4
Viscosity	56.9	51.3	63.1	54.1	65.2
Overall liking	53.7	51.3	57.2	52.4	57.9

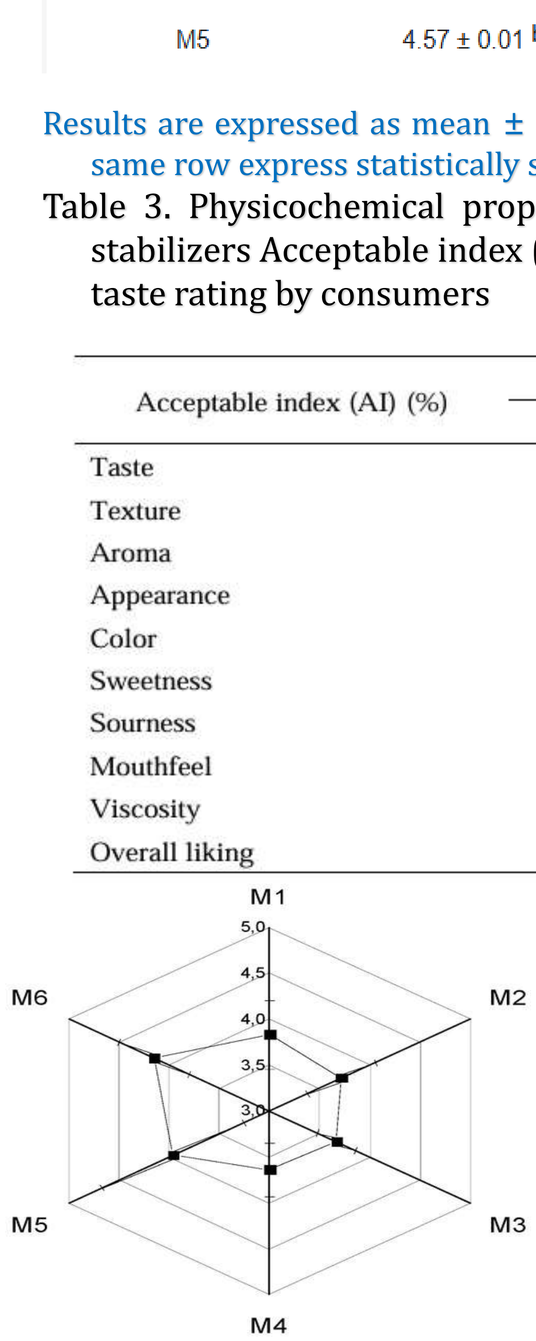

Figure 1. Global quality of yogurts with additions of different stabilizers

•Conclusions

The pectin-treated yogurt samples were superior in sensory properties compared to all others. In conclusion, a variety of plant- based stabilizers can be used to improve the textural properties of yogurt.