INFLUENCE OF SEA BUCKTHORN FORTIFICATION ON SENSORY, PHYSICAL AND RHEOLOGICAL CHARACTERISTICS OF YOGURT

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REZUMAT. Există o cerere mare de produsele lactate fortificate cu catină albă, deoarece ele pot servi ca un vehicul ideal pentru transportul deficit de vitamine şi minerale îndeplinind nevoile nutriţionale, dar este nevoie de a genera informaţii cu privire la efectul de fortificare de cătină albă privind fizic, proprietăţile senzoriale ale acestor produse. În studiul de faţă, iaurtul a fost pregătit după fortificaţie din iaurt pasteurizat cu fructe de 5,10 mg buckthorn/140 ml de iaurt, acest nivel fiind selectat dintr-un studiu preliminar de evaluare senzorială. Fata de catina alba, în iaurtul s-a determinat un cheag consistent, cremos, nicio bula de gaz din iaurt nu a fost mai mare decât iaurtul de control pe a7-a zi cat si a 14-a zi de stocare. Aceste caracteristici senzoriale, fizic, chimic obtinut arata ca iaurtul îmbogăţit cu cătină albă îşi păstrează toate calităţile naturale, în plus, există o imbunatatire vizibila de culoare, cu o caracteristică de gust placut de cătină albă, acru cat si răcoritor.

Cuvinte cheie: iaurt, catina alba, fortificare, produse naturale bioactive, textura.

ABSTRACT. There are a great demand of sea buckthorn fortified dairy products as they can serve as an ideal vehicle for carrying deficiency of vitamins and minerals fulfill the nutritional needs but there is need to generate information on the effect of fortification of sea buckthorn on the physical,sensory properties of these products. In the present study, the sea buckthorn enriched yogurt was prepared after fortification of pasteurized yogurt mix with 5,10 mg fruit of sea buckthorn/140 ml of yogurt, this level selecte from a preliminary study of sensory evaluation. Adition by the sea buckthorn in yogurt caused a consistent curd, creamy, no bubbles of gas of yogurt was higher than control yogurt on 7th and 14th day of storage. These sensory characteristics, physically-chemically obtained show that yogurt fortified with sea buckthorn retains all its natural qualities, in addition there is a noticeable improvement in color with a pleasant taste characteristic of sea buckthorn, sour and refreshing.

Keywords: yogurt,Sea Buckthorn,fortification,bioactive natural products,texture

1. INTRODUCTION

Yogurt is a fermented dairy product resulting from the symbiotic growth of Streptococcus thermophilus and Lactobacillus bulgaricus to produce a smooth viscous gel with a desirable cultured flavor. Various styles of yogurt are now targeted for a variety of different consumer groups from children to geriatrics, and the variety of products depends on the properties and microbiology of starter cultures used in their production. In this study I used S. thermophilus and L. bulgaricus strains for production of yogurts with distinctive nutritional or physical characteristics.

The control of the color of dairy products is particularly attractive with several dessert product varieties Due to the possibility to vary the concentration of fruit preparations as well as natural dyes added, the color properties (hue, saturation, brightness) can be chosen deliberately within certain limits. As to yogurt-based desserts, color plays a dominant role in influencing the purchasing behavior of consumers. For example, a sharp drop of consumption was observed with fruit-flavored yogurts when they were marketed without added colorants, proving the influence of color on identification and acceptance of the (Calvo, Salvador, & Fiszman, 2001). It is well documented that the color of fruit yogurts and related products may be influenced by several technological parameters such as fat content, heating and storage conditions and, basically, by the amount of fruits added.

Recommendations concerning the concentration of fruit preparations as given by the manufacturers of these food ingredients are not only based on sensory attributes, but also aim at obtaining a distinct coloration of the final product (Ulberth, 1993).

Some pigments of sea buckthorn not only have coloring properties but could also have some beneficial impact on health.

The International Organization for Standardization (International Organization for Standardization, 1992) defines food texture as "all the rheological and structural (geometric and surface) attributes of the product perceptible by means of mechanical, tactile, and, where appropriate, visual and auditory receptors."

When it comes to yogurt, various factors such as total solids, milk composition, homogenization, type of culture, acidity, degree of proteolysis, and heat pretreatment of milk influence the rheological properties of yogurt (Biliaderis, Khan, & Blank, 1992; Harwalkar & Kalab, 1986)

Yogurt is a non-Newtonian pseudoplastic material, with a highly time-dependent behavior. Texture is one of the most important characteristics that define the quality of yogurt and affects its appearance, mouth feel, and overall acceptability. The most frequent defects related to yogurt texture, leading to consumer rejection, are apparent viscosity variations and the occurrence of syneresis (Kroger, 1976) . These changes may be due to variations in milk composition, as well as changes in processing, incubation, and storage conditions. Yogurt texture characterization is important for product and process development, quality control, and to ensure consumer acceptability (Benezech & Maingonnat, 1994). The objectives of the present study were to determine the influence of fruits sea buckthorn enrichment of yogurt on its sensory characteristics and various physical and rheological properties, acidity, pH.

2. MATERIALS AND METHODS

1. Yogurt fermentation

I observed more technology schemes to ensure fresh sea buckthorn fruit yogurt and maintaining stability of vitamins in a viable state as long as possible.

That scheme involves the preparation of yogurt at the end of thermostatic adding fruit, as most vitamins are destroyed during pasteurization and thermostatic.

For yogurt preparation frozen I used DVS YC-087 culture bought (Chr. Hansen Inc., Milwaukee, WI).It contains active strains of Streptococcus thermophilus, Lactobacillus delbrueckii subsp. Bulgaricus according to the technological sheet. For inoculation, 125 g of frozen culture pellets were first thawed (in a sterile container) in the water bath at 25 1C. The first dilution was made by adding 10 g of thawed DVS culture to 90 g of cold milk (Tiţa M, Tiţa O, & Oprean, 2003). The control of sea buckthorn yogurt mix was then inoculated with 2 ml/l of first dilution of YC-087 culture. The fruit yogurt mix was then poured into incubation cups and these cups were then incubated at 42 C until the acidity reached to 85 ºT. The fruit sea buckthorn yogurt samples were immediately stored at 2–5 C for 14 days.

2. Rheological characteristics

Yogurt gels inside a cup were stirred by manually rotating them very slowly (ca. 2–3 s each rotation) 10 times with a tablespoon. The yogurt samples appeared visually homogeneous after this step. The following tests were performed with Viscoanalyser rheometer (ATS Rheosystemss, Bordentown, NJ) using a plate and plate geometry (P30CCE) with 2mm gap setting and at 25 1C constant temperature, the determinations were made in compliance with the method or the steps described by (Vercet, Oria, Marquina, Crelier, & Lopez-Buesa, 2002)

3. Titratable acidity

Titratable acidity of the yogurt samples was expressed in degrees using the method Thorner (Tita 2002) using the following formula:

T = Vx10 acidity, º T

In which:

V-volume of sodium hydroxide, 0.1 N solution used in titration, in ml.

10-volume of product .

º T-grade Thorner.

4. Sensory evaluation

The sensory evaluation was done with method principle in compliance with the method described by (Tita M. 2002)

Aspect, in the existing packaging.
Color, to direct light of the day.
Odor, bring the product to 8 .. 12C.
Taste, bring the product to 8 .. 12C (Tita 2002)

3. RESULTS AND DISCUSSION

Titratable acidity

Fig.1 represents the effect of storage on acidity of yogurt fortified with sea buckthorn. The acidity of yogurt with sea buckthorn did not show any statistical difference ($P<0.05$) on 1st and 14th day. On 7th day, acidity of control (94 T) was statistically higher than that of yogurt (90 T).Even though the difference was statistically significant, it was minimal.

Effect of storage on acidity of control and yogurt with sea buckthorn was found to be significant.

On the 1st day, the acidity of control and yogurt fortified with sea buckthorn was 87 T and 85 T respectively, which significantly increased on day 7 by 7 T and 6 T, respectively. Titratable acidity further increased on storage and on 14th day it reached 97 T and 95 T for control and yogurt with sea buckthorn, respectively, which was significantly higher than at 1st and 7th day.

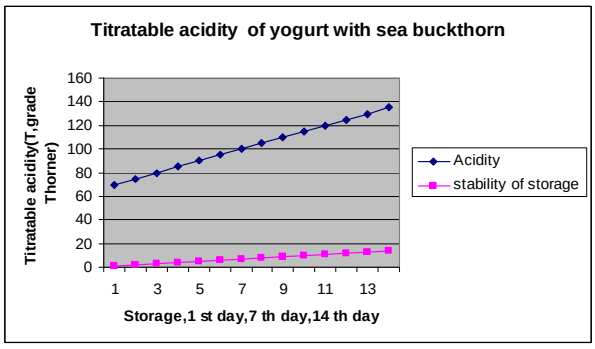

Fig. 1. *Titratable acidity of yogurt fortified with sea buckthorn on 1st, 7th and 14th day of storage .Values are mean S.E. for n = 3. Values are significantly greater than the corresponding value at 1st day (Po0.001). Values at given day with different letters are significantly different (Po0.05).*

Sensory evaluation

Preliminary sensory evaluation done on 4,5,7,10 mg fruit of sea buckthorn /140 yogurt showed that sensory characteristics were perceived at 4 mg and 5 mg fruit of sea buckthorn /140 yogurt fortification levels. At 7 and 10 mg/140 ml, there were observed a few changes in quality. For further investigation, 10 mg of sea buckthorn /140 ml were compared with the control.

Table no 1 shows the results as mean value of sensory score for the control and sea buckthorn fortified yogurt. Statistical analysis shows that there was no difference in the control and sea buckthorn enriched fruit yogurt when compared using four different characteristics, flavor, body and texture, appearance and overall acceptability observed similar results in their study of fortification of plain yogurt with others fruits. They fortified plain yogurt with 5.10 mg sea buckthorn /140 ml and observed for consistency, taste, color and smell.

Tabel no.1.*Sensory evaluation of control and yogurt fortified with sea buckthorn*

Parameters	Control	Sea Buckthorn Fortified
Flavor	6.6771+.00a	7.007+0.82a
Body and Texture	7.337+0.35a	6.337 +0.71a
Appearance	7.007+0.25a	7.337+0.38a
Owerall acceptability	7.677+1.00a	7.007+0.82a

Values are mean SE for n n= 11. Means within same row not sharing common superscript letter (a) differ significantly (Po0.05).

But it is possible that the appearance could be faulty due to excessive quantities of fruit being added and mixed into the yogurt mass, because adding more than 10 g fruit /140 ml yogurt shall not ensure stability. There were no changes reported in relation with small quantities in sensory characteristics of fortification yogurt.

Color

Regarding yogurt color modification during post-processing, a first study investigated the relationship between color parameters and the syneresis and

titrable acidity (Cais-Sokolinska & Pikul, 2006). Regardless of storage time, yogurts with an initial pH of 4.35 had the lowest values, while the yogurts with an initial pH of 4.45 had the highest. Storage time exerted a significant influence on the decrease in the color lightness value.

4. CONCLUSIONS

Texture is a critical aspect of consumer acceptability of yogurt (Muir & Hunter, 1992) . Rheological properties of yogurt have been empirically evaluated by measuring gel hardness and viscosity of stirred products.

Fundamental rheological testing has the advantage over empirical methods in that it reveals structural characteristics of yogurt gels, especially in set-type yogurt

The rods begin to develop rapidly once the pH drops below the 4.8–5.0 range, and it is only at or below a pH of 4.5–4.6 that the characteristic ‘‘nutty’’ yogurt flavor begins to be expressed. Most yogurts are considered ‘‘ripe’’ somewhere in the pH range of 4.0–4.5, depending on how strong or mild a product is preferred. A lower pH than 4.0 is undesirable, since L. bulgaricus tends to produce excessive lactic acid, acetaldehyde, and proteolytic by-products in this pH range.

This culture can help maintain a product pH of 4.1–4.3 throughout shelf life, thereby maintaining a mild flavor and a pleasant product appearance

Fruit of sea buckthorn in yogurt can be increased up to 10 mg fruit per 100 ml by addition of bioactive naturals products without any negative influence on the organoleptic properties.

Addition of sea buckthorn like as a source of vitamins and minerals to yogurt causes an increase of this micronutrients by on 1st day on 7th and 14th day of storage.

Present findings in this study indicate a critical role of sea buckthorn in the formation of yogurt gel structure. Addition of sea buckthorn an increase led

a large increase in fibers and which resulted of viscosity is higher comparatively to simple yogurt.

Yogurt has achieved stability in turn much lower after 1.7 and 7 days, but still presented a curd consistency right, no gas bubbles in the porcelain breaking aspect, characteristic sour taste, refreshing.

Color is a very important for consumers and because of carotenoid pigments of sea buckthorn , yogurt will have a nice color, orange yellow.

Body and texture defects in yogurt are caused by many different factors, but quite often, they may be prevented and/or minimized by following proper and recommended yogurt manufacturing processes.

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