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MINT ESSENTIAL OIL EFFECT UPON DAIRY PRODUCTS PRESERVATION

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Abstract

Different substances are known to be use in dairy products industry as preservatives: ascorbic acid, sodium sorbate, calcium lactate, lactic acid, nisine, notamicine, propionic acid, calcium propionate, sodium propionate, p-hidroxibenzoate esters.

Yet, the above-mentioned substances are additives with different toxicity levels and a limited range of action.

This paper work presents the possibilities both to extend the self-life and to offer a pleasant aroma for dairy products.

The mint essential oil effectiveness in self-life extension and proper flavoring of yogurt were tested.

KEY WORDS:
mint oil, inhibitory effect, diffusion technique

1. INTRODUCTION

Most of the acid dairy products trade in our country (yogurt, kefir, sana, etc.) has a guaranteed self-life that exceeds 72 hours (some weeks). This prolonged keeping quality is due to the presence of different preservatives.

This experiment, prove the mint essential oil preserving effect upon yogurt, due to the inhibiting action against the spoilage microorganisms (yeasts and moulds).

The aim of this experiment was to establish if there is any preserving effect of mint essential oil upon yogurt, due to the inhibiting action against the spoilage microorganisms (yeasts and moulds).

2. MATERIALS AND METHOD

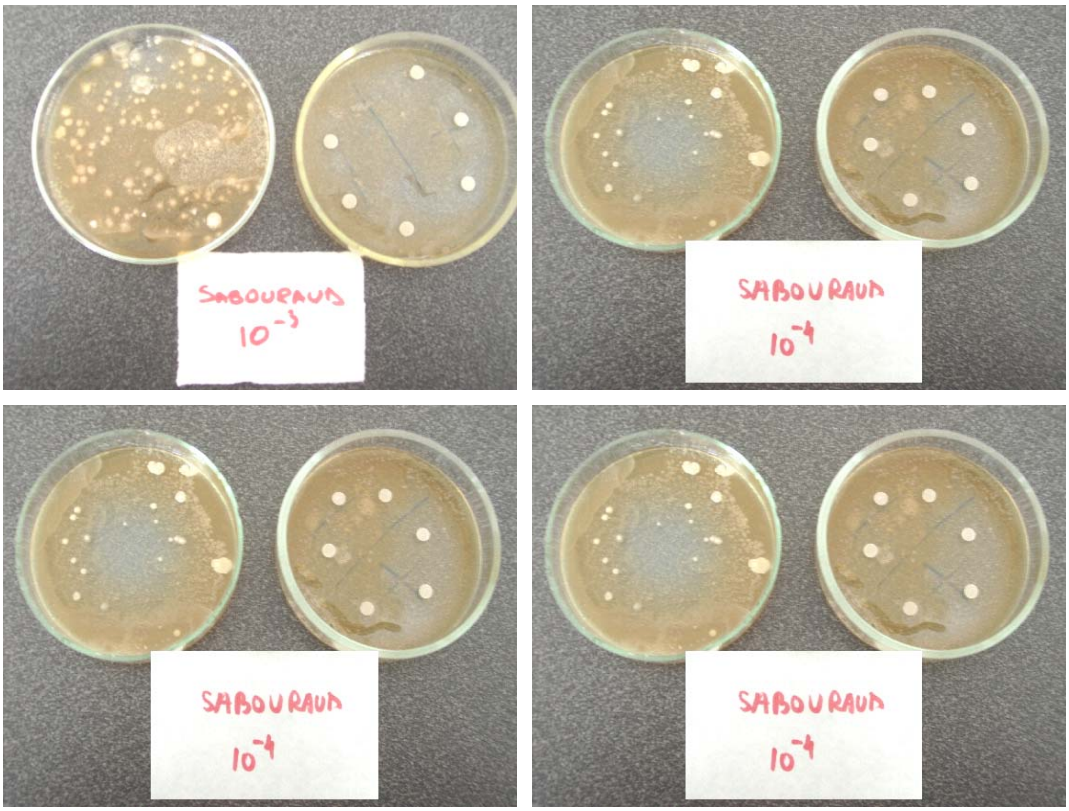
The diffusion technique was used to test the preserving capacity of mint essential oil. The discs were impregnated with an established amount of mint essential oil and were applied firmly to the medium (Sabouraud, Czapeck-Dox) to ensure proper contact and thus even diffusion.

Previously, the media were inoculated with spoilage moulds like: Oidium lactis (sin. Geotrichum candidum) and Penicillium notatum [4].

This method relies on the linear relationship that exists between the diameter of the inhibition zone and the minimum inhibitory concentration[2]. Convenient materials and tools were: sterile Petri dishes with appropriate media for moulds; tested moulds, isolated from a spoiled yogurt; sterile pipettes and spreaders for spread plating; sterile discs impregnated with established amount of mint essential oil; fine pointed forceps and dissecting needles for a proper appliance of discs; an incubator set at 25°C. The technique described by Zarnea G. and coworkers [7] was followed step-by-step:

- Liquefied sterile media (Sabouraud, Czapeck-Dox) were poured into the sterile Petri dishes in a 4 mm thick layer and were left to cool and solidify on a plane surface;
- The tested moulds cultures were spread plated on the media;
- Discs, impregnated with an established amount of mint essential oil were applied firmly to the media to ensure proper contact and thus even diffusion (30 mm between discs using a pattern placed under the Petri dish);
- Incubation at 25°C for 5 days;
- Inhibition zones were measured using a rule;

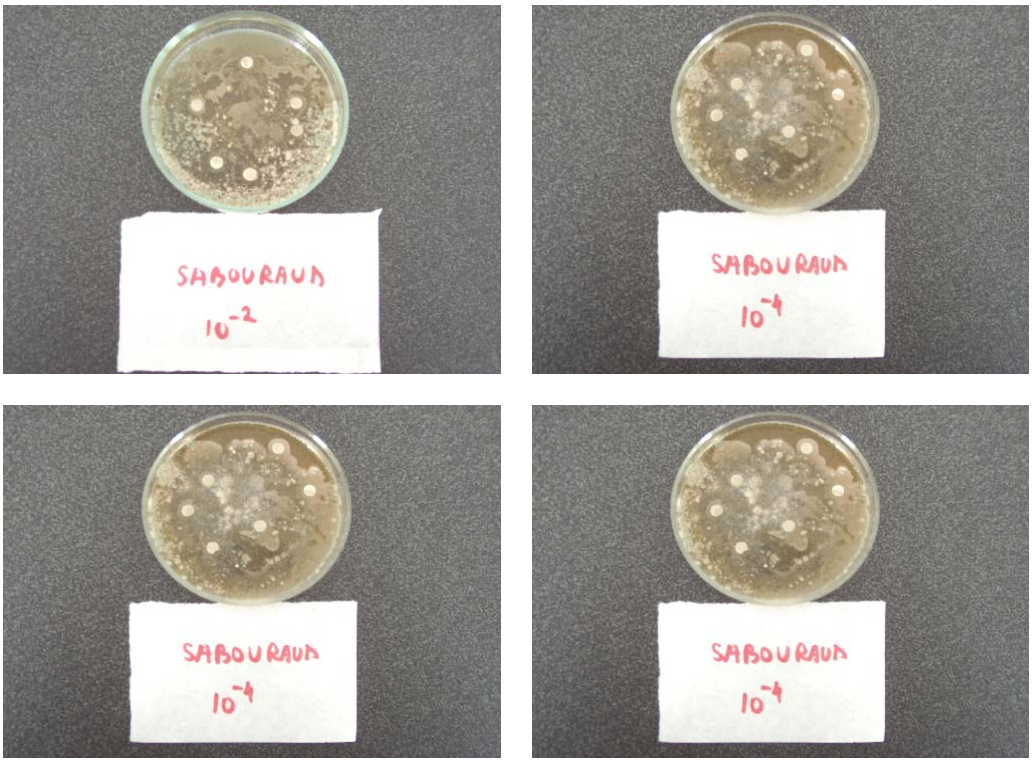
In a first part of this experiment were used mould cultures in doses that can be harvested with an inoculating loop (3 mm diameter) and suspended in 10 ml or 100 ml sterile NaCl 0, 08% solution (final concentration will be 10^{-3} and 10^{-4}). For each mould cultures concentration were used 2 Petri dishes with Sabouraud and 2 Czapeck-Dox Petri dishes.



The discs were impregnated with 10^{-1} concentration mint oil. On each Sabouraud Petri dish and Czapeck-Dox Petri dish were applied discs impregnated with essential oil mint at the upper half and 10^{-1} concentration mint oil at the half below. 0,2 ml mould cultures were inoculated both for 10^{-3} and 10^{-4} inoculums concentrations.

Blind samples were made both for Sabouraud and Czapeck-Dox media inoculated with mould cultures (there were not placed any mint oil impregnated discs).

In a second part of this experiment essential mint oil was diluted at 10^{-2}, 10^{-3} and 10^{-4}. The 0,2 mould cultures spread plated had the same 10^{-2} concentration. This time, for each medium type was used 4 Petri dishes: a blind sample (without mint oil discs) and three other samples with discs impregnated with 10^{-2} 10^{-3} and 10^{-4} concentration of mint oil.



3. RESULTS AND DISCUSSIONS

The first picture set shows that essential oil discs and those with 10^{-1} mint oil completely inhibited moulds growing on Sabouraud and Czapeck-Dox media, both for 10^{-4} and 10^{-3} mould concentration.

The second picture set shows that under 10^{-2} mint oil concentrations are no longer inhibitory for tested moulds.

For Sabouraud medium, the inhibition zone is 10-13 mm for a concentration of 10^{-2} mint oil. At the same mint oil concentration, on Czapeck-Dox medium, the inhibition zone is 8-10 mm.

At a concentration of 10^{-3} mint oil, on Sabouraud medium a thin inhibition zone of 5-7 mm appears round the discs, but on Czapeck-Dox there is no inhibition zone. At a concentration of 10^{-4} mint oil, on both media there are no inhibition zones.

5. CONCLUSIONS

Considering the above-mentioned results we may conclude that the minimum inhibitory concentration of mint oil against the tested 10^{-4} concentrated mould culture is 10^{-2} (1 ml essential mint oil + 99 ml sterile water/NaCl 0,08% solution).

At the end, we compared 2 Helvetika yogurts (3,5% fat); one of them was added with 0,2 ml 10^{-2} concentrated mint essential oil. Samples were incubated for 5 days at 25°C. Blind sample (without mint oil) was first to show spoilage (Oidium lactis mycelia developed on the surface), which certifies the preserving action of mint oil.

We also have to mention the cooling effect of the mint yogurt that pleases the buyer's senses in a warm season.

LITERATURE CITED:

1. Banu C si al., 2000. Aditivi si ingrediente pentru industria alimentara, Ed. Tehnica, Bucuresti.
2. Bularda D. M., 2001. Lucrari practice de microbiologie generala, Editura Universitatii Cluj-Napoca, Cluj.
3. Barzoi D., Apostu S., 2002. Microbiologia produselor alimentare, Ed. Risoprint, Cluj-Napoca.
4. Druga M., 1999. Controlul calitatii laptelui si produselor lactate, Ed. Mirton, Timisoara.
5. Dan Valentina, 1999. Microbiologia produselor alimentare, vol. I si II, Ed. Alma, Galati.
6. Zarnea G., si al, 1992. Principii si tehnici de microbiologie generala, vol. I, Ed Universitatii Bucuresti.