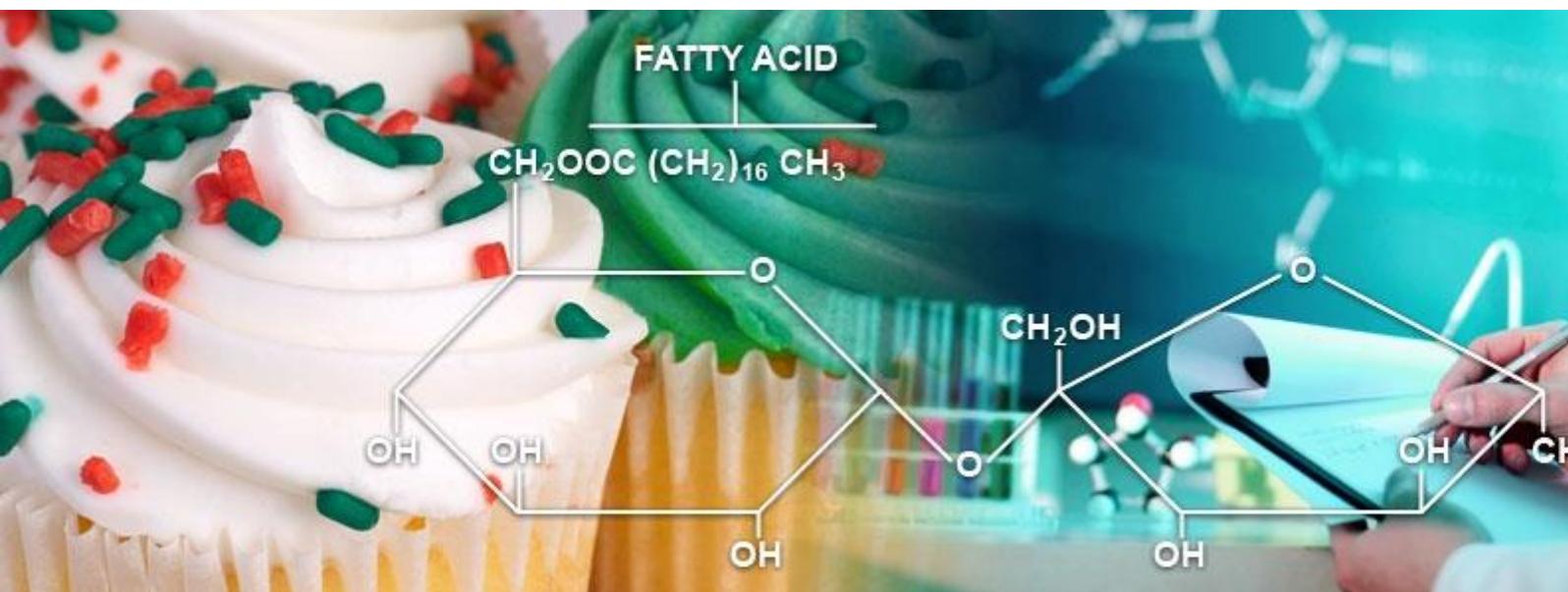


ANTI-MICROBIAL EFFECT OF SUCROSE ESTERS



INTRODUCTION

It has long been known that fatty acids and fatty acid esters can have an inhibiting effect on the growth of certain micro-organisms. The effectiveness of the inhibition depends on the chain length of the fatty acids and on the degree of substitution. The most relevant sucrose esters in this respect are Sisterna PS750 and Sisterna SP70 because of their high level of mono-esters.

MICRO-ORGANISMS

The inhibitory effect of sucrose esters depends strongly on the type of micro-organism:

Gram +	Inhibition
Gram -	No Inhibition
Yeast	Yes / No
Fungus	Yes / No

IN VITRO TEST

The effectiveness of Sisterna SP70 and PS750 on several bacteria, yeast and fungi was determined in vitro by inoculating TYFA medium containing different types of sucrose esters at a concentration of 1.600 mg/l medium. The plates were inoculated with 100 µl culture and cultured overnight at 37°C. Visual evaluation of colony formation was carried out by a panel of experts. From the results, it can be concluded that SP70 and PS750 are effective in inhibiting the growth of the species mentioned below.

Micro-organism	SP70	PS750	Application
Penicillium camemberti	+++	+++++	Bread
Asparagillus versicolor	0	100%	Bread
Penicilium roqueforti	+	+++++	Bread
Bacillus sporothermodurans	100%	100%	Milk drinks
Alicyclobacillus acidoterrestris	+	100%	Fruit drinks
Bacillus cereus	+++	+++	-

0 : is 0% reduction CFUs
 + : is 0-20% reduction CFUs
 ++ : is 20-40% reduction CFUs
 +++ : is 40-60% reduction CFUs
 ++++ : is 60-80% reduction CFUs
 +++++ : is 80-100% reduction CFUs
 100 : is 100% reduction CFUs

FLAT-SOUR SPOILAGE

Flat-sour spoilage of canned food is caused by microorganisms that survive heat treatment. They are classified as thermophilic, heat-loving. *Bacillus stearothermophilus* is well known for causing flat-sour spoilage.

Added %	0	0.01	0.02	0.03	0.05
Sisterna PS750	+	+	-	-	-
Sisterna SP70	+	+	-	-	-
Sisterna SP50	+	+	+	-	-

+ Blackening due to sulphate reducing power of *Bacillus stearothermophilus*

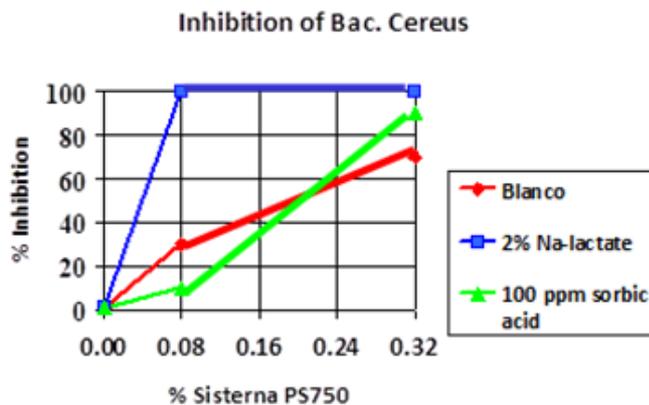
SYNERGISTIC EFFECTS

It should be stressed that Sisterna sucrose esters are not general applicable bactericides and cannot be used primarily to preserve food products. On the other hand, there are some interactions shown between sucrose esters and some commonly used ingredients like Na-lactate and sorbic acid. The theory behind the synergistic effect can be found in the way sucrose esters effect the cell-membrane of micro-organisms. High mono-esters tend to attach to the cell-membrane and change the permeability in such a way that different kind of molecules can easily enter the micro-organisms. Whereas this happens the micro-organism cannot grow and multiply anymore. Preservatives, added to food products, are most effective if they can penetrate into the micro-organism and stop growth.

Sisterna investigated the synergistic inhibitory effect of Sisterna PS750 on *Bacillus cereus* in combination with:

- EDTA
- Citric acid
- Acetic acid
- Sorbic acid
- Nisin
- Sodium lactate

In all cases a synergistic inhibitory effect was found.



Several articles have been published that describe the synergistic effect of sucrose esters and nisin against Gram-positive bacteria. Synergistic effect was found against:

Listeria monocytogenes
Bacillus cereus (both cells and spores)
Bacillus subtilis
Bacillus licheniformis
Lactobacillus plantarum
Staphylococcus aureus

HURDLE TECHNOLOGY

As sucrose esters only have selective anti-microbial properties, they cannot be considered as preservatives. Sucrose esters can be used successfully as part of hurdle technology, which works by combining several approaches. These approaches can be thought of as hurdles the spoiling micro-organism has to overcome if it is to remain active in the food. The right combination of hurdles can ensure that all micro-organisms become harmless in the food product.

Warranty

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