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A.L.L. Duchateau, W.B. van Scheppingen

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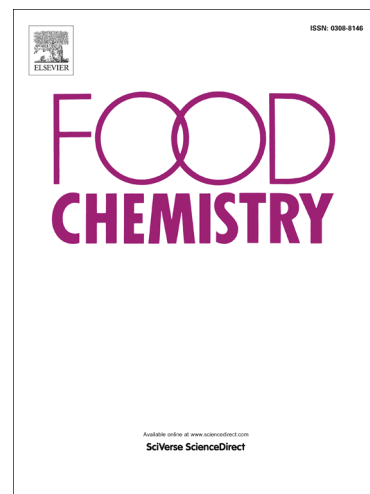
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Stability study of a nisin/natamycin blend by LC-MS

A.L.L. Duchateau* and W.B. van Scheppingen

DSM Biotechnology Center, P.O. Box 1, 2600 MA Delft, The Netherlands

*Corresponding author. Tel. +31 6 13274909

E-mail address: Lucien.duchateau@dsm.com (A.L.L. Duchateau)

ABSTRACT

Nisin and natamycin are natural preservatives used in a broad range of food products. In the present study, the stability of an aqueous nisin/natamycin blend (pH 4.0) for the beverage market was tested at room temperature (22°C) under dark conditions by means of liquid chromatography. Both an HPLC-UV and a UPLC-MS method were developed to monitor the concentration of natamycin and nisin, respectively.

After 6 months at room temperature (22°C) under dark conditions, the nisin/natamycin blend (pH 4.0) still contained 85% of the original amount of nisin and 95% of natamycin. Even after 1 year, 50% of nisin and 90% of natamycin remained in the formulation. The resulting degradation products were studied by means of high resolution mass spectrometry. For both nisin and natamycin, degradation products originating from hydration (natamycin + H₂O; nisin + H₂O) and oxidation reactions (natamycin + O; nisin + O; nisin + 2O) were observed.

Keywords: *nisin, natamycin, degradation products, high resolution MS*

1. Introduction

There is a significant need for improved food preservation methods. It has been estimated that about one quarter of the world's food supply is lost as a result of microbial spoilage, and food-borne microbial infections represent a constant and serious threat to human health. Several bacterial species that contaminate foodstuffs and crops are pathogenic or produce toxins and may cause a range of food-borne illnesses. Fungal spoilage can also lead to serious economic losses. Several food products, e.g. agricultural products, dairy and meat products, fruits and vegetables and derived products, bakery products and cosmetics, are particularly susceptible to fungal growth. Examples of such dairy products are cheese, cottage cheese, ricotta and yogurt, whilst dried cured sausages are an example of meat products susceptible to contamination. Examples of vulnerable agricultural products include crops such as cereals, nuts, fruits, vegetables and flower bulbs. Spoilage by fungi affects not only the quality of the product, but also represents a health risk. It is well known that some fungal species which grow on dairy products and sausages produce mycotoxins. Some mycotoxins are extremely dangerous to human health.

There is a clear trend toward preventing or delaying microbial growth in or on foodstuffs by means of natural preservatives. One example is the use of an antimicrobial composition, comprising natamycin as the antifungal agent and nisin as an antibacterial agent (Dutreux, de Haan & Stark, 2012; Ollé Resa, Gerschenson & Jagus, 2014; Ollé Resa, Gerschenson & Jagus, 2016). Natamycin (E 235) and nisin (E 234)

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