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Kinetic of induced honey crystallization and related evolution of structural and physical properties

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ABSTRACT

Induced crystallization is carried out by adding fine crystals to the liquid honey in order to increase the rate of the process and to obtain a uniform and stable product. The aim of this research was to describe the kinetic of crystallization of honey and the evolution of its physical properties on the basis of different fructose/glucose ratio. To three honey samples selected on the basis of increasing fructose/glucose ratios, 5% of fine crystals have been added, before storage at 14°C until complete crystallization. During storage, kinetic of crystallization were determined by differential scanning calorimetry and microstructure by a polarising microscope. Moreover, variations of water activity, colour and texture parameters were evaluated during storage.

The Avrami equation was found to well describe the crystallization kinetic, although the relation of the Avrami parameters with the nucleation and crystal growth is not entirely clear.

The composition of honey was found to influence not only the rate of crystallization, but also the qualitative parameters of sample texture and colour, leading to more pronounced changes during honey storage as the amount of crystallized glucose increased.

Key words: honey; induced granulation; crystallization kinetic; crystal size

INTRODUCTION

Honey is a supersaturated solution constituted mainly by glucose and fructose and smaller percentages of other carbohydrates. The crystallization or granulation of honey is a natural process that involve only glucose and represents a complex phenomenon, which mechanism is still scarcely understood, since a high number of variables are involved.