Sunflowerseed Oil Waxes as the Component of Protective Films on Food Surface

Žarko VRBAŠKI, Ksenija VRANAC, Mariana CARIĆ and Jovan TURKULOV
University of Novi Sad, D. Obradovića 3, 21000 Novi Sad (Yugoslavia)

Abstract

The protective film applied to the surface of certain food products (cheese, sausages) decreases the moisture loss. This film can be produced on the basis of acetylated monoacyl glycerole. The addition of some additives (for example bees wax) improves the characteristics of protective films. The waxes separated from the stearine after sunflower oil dewaxing decrease also the water vapour permeability of the film made of acetylated monoacyl glycerol. The mass used for the production of protective film contained 8 and 16% of sunflower waxes. Besides sunflower waxes, bees wax or paraffine wax was also one of the components. The results obtained confirmed that the waxes decrease the water vapour permeability and point to a new possibility of application of waxes which are a by-product of sunflower oil processing.

Key words: sunflowerseed waxes, protective film, permeability, acetylated monoacyl glycerol

Introduction

Edible protective films can regulate the water (water vapour) migration through the food surface thus improving the quality and shelf life. These films affect the transport of other gasses (oxygen, carbon dioxide) as well. The application of protective films for the food is a rather old procedure, and it was used in China in the XII century (the use of waxes on citrus fruit). The intensive research started 30-40 years ago (Guilbert, 1986). The protective films are interesting from an other standpoint also. Namely, their application enables the introduction of different food additives (antimicrobial agents and antioxidants) to the food on specific locations (food surface). In this way a strong functional effect of additives is enabled, and the permitted limit value is not exceeded (Guilbert, 1985).
The lipid protective films (e.g. chocolate coatings, waxing on fruit, protective films on cheese, sausages) are produced on the basis of acetylated monoacyl glycerol, waxes and surfactants (Feuge, 1955; Vicnair, 1954). The introduction of natural waxes (e.g. bees wax) improves significantly the film characteristics at high moisture content (Kester and Fennema, 1989). The aim of the latest investigations are the two-component and composite protective films made of different lipid materials (Kester, 1988).

Materials and methods

Acetylated monoacyl glycerol (AcMG) was prepared from commercial 1-mono-acyl glycerol by acetilation with acetic anhydride and used as the basis for film production. Bees wax (BW) was used as the additive. Sunflower oil waxes (SW) were separated from the stearin obtained by sunflower oil dewaxing. The blend for the film was heated to 80°C and applied on colagen casing (as the substrate). Since the water vapour permeability of colagen casing is much higher than of the film, colagen is a very good support. The film thickness depends on the application conditions (time of application, time and temperature of dripping of the surplus material for the film) and ranges from 0,2 to 0,4 10^{-3} m. The water vapour permeability of the film was determined by modified gravimetrical method.

Results and discussion

The addition of 8% and 16% of sunflower oil waxes (SW) to the film on the basis of acetylated monoacyl glycerol (AcMG) slowers the transmission of water vapour through the formed film (Figure 1).

Figure 1

The film containing 8 and 16% of bees wax acts in the similar way (Figure 2).

Figure 2

We investigated also a more complex system (Figure 3) containing both sunflower oil waxes and bees wax. The decrease of water vapour permeability was recorded in this case also.

Figure 3

Taking into consideration the oscillations of film thickness, it was found that the addition of ca 8% of sunflower oil waxes (SW) to the film forming mass, causes a 40% decrease of water vapour permeability.

Conclusion

The water vapour permeability of film on the basis of acetylated monoacyl glycerol (AcMG) can be decreased with the introduction of sunflower oil waxes (SW) as the additive. The introduction of 8% (mass ratio calculated on the AcMG) results in a 40% decrease of permeability. The composition of the film can be modified with the mixture of bees wax and sunflower oil waxes. The results point to a new possibility of application of sunflower oil waxes, as the additive for the modification of lipid protective films in the food industry.

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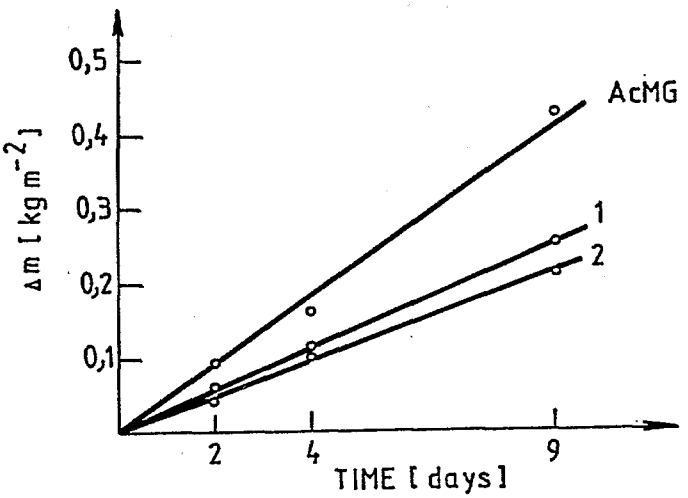

Fig. 1. Water vapour permeability of films on the basis of acetylated monoacyl glycerol (AcMG) with the addition of sunflower oil waxes
1 - 92% AcMG + 8% SW
2 84% AcMG + 16% SW

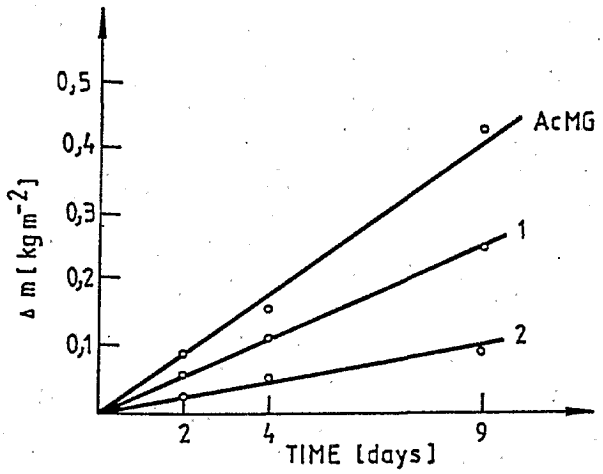

Fig. 2. Water vapour permeability of films on the basis of acetylated monoacyl glycerol (AcMG) with the addition of bees waxe (BW)
1 - 92% AcMG + 8% SW
2 - 84% AcMG + 16% SW

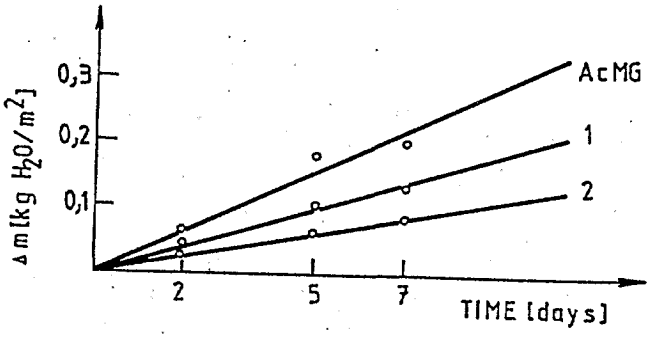

Fig. 3. Water vapour permeability of films on the basis of acetylated monoacyl glycerol (AcMG) with the addition of sunflower oil waxes (SW) and bees was (BW)
1 - 76% AcMG + 8% SW + 16% BW
2 - 76% AcMG + 16% SW + 8% BW