Characteristics of lactic acid bacteria strains isolated from salad dressing

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Characteristics of lactic acid bacteria strains isolated from salad dressing. *The reproductive and acidforming ability of four Lactobacillus plantarum strains isolated from salad dressings was determined. The changes in the titratable acidity and the concentration of viable cells for 48 hours at two different temperatures - 30ºC and 37ºC were monitored.*

Key words: *lactic acid bacteria, salad dressings*

INTRODUCTION

The diet of modern man includes functional food products, enriched with beneficial microorganisms.

The demand for healthy and balanced diet made salads popular among consumers. A good salad needs a good dressing. This presents the challenge to produce a variety of dressings, including dressings with low fat content, in order to satisfy users' needs [1, 4].

It has been shown that lactic acid bacteria have a beneficial effect on human health. They maintain the balance in the gastrointestinal tract, improve and enhance the flavor of food. Application of probiotics and prebiotics in functional foods is important for the health of the consummer [3]. In the composition of probiotics and probiotic foods are included strains of microorganisms with probiotic properties [2].

The purpose of the present research was to study the reproductive and acidforming ability of strains isolated from salad dressings at two temperature regimes.

MATERIALS AND METHODS

Microorganisms

Four strains of lactic acid bacteria isolated from salad dressings were identified using the kit system for rapid identification of lactobacilli API 50 CHL (BioMerieux SA, France) and subsequent software processing with apiweb®. Three of them were identified as *Lactobacillus plantarum* strains (*Lactobacillus plantarum* D2, *Lactobacillus plantarum* JH1, *Lactobacillus plantarum* DS1) and one – as a *Lactobacillus pentosus* strain (*Lactobacillus pentosus* D1).

Media

MRS-broth

Composition (g/dm^3): peptone from casein - 10; yeast extract - 4; meat extract - 8; glucose - 20; K_2HPO_4 - 2; sodium acetate - 5; diammonium citrate - 2; $MgSO_4$ - 0.2; $MnSO_4$ - 0.04; Tween 80 - 1 cm^3/dm^3; pH = 6.5. The medium was sterilized for 15 minutes at 118ºC.

LAPTg10-agar

Composition (g/dm^3): peptone - 15; yeast extract - 10; tryptone - 10; glucose - 10. pH was adjusted to 6.6 - 6.8, and Tween 80 was added - 1cm^3/dm^3, agar – 1.5%. The medium was sterilized for 20 minutes at 121ºC.

Saline solution

Composition (g/dm^3): NaCl - 5. The medium was sterilized for 20 minutes at 121ºC.

Methods

Determination of the titratable acidity

The Thorner method was used to determine the acidforming ability of the lactic acid bacteria. One °T equals 1cm^3 0,1 N NaOH, needed for the neutralization of an equivalent

amount of organic acids contained in 100 cm^3 of the culture medium.

The method is based on the titration of the sample with 0,1 N NaOH. For this purpose, 10 cm^3 of each of the samples (bacteria developed in a liquid culture medium) was mixed with 20cm^3 of distilled water. The mixture was titrated with 0,1 N NaOH using phenolphthalein as an indicator until the appearance of pale pink color that persists for one minute.

Determination of the concentration of viable cells of lactic acid bacteria

Lactic acid bacteria strains were cultured for 48 hours at a certain temperature (30±1°C or 37±1°C). Appropriate tenfold dilutions of the cultures were prepared, followed by spread plating on LAPTg10-agar medium. The inoculated Petri dishes were incubated for 72 hours at the optimum temperature for the growth of the lactobacilli strains until the appearance of countable single colonies.

RESULTS AND DISCUSSION

In a series of experiments the reproductive and the acidforming ability of four strains isolated from salad dressings at two different temperature regimes - 30ºC and 37ºC were examined. The experimental data shown on Fig. 1 and Fig. 2 indicate that the strains *Lactobacillus pentosus* D1 and *Lactobacillus plantarum* D2 grew equally well at 30ºC and 37ºC - for 24 hours of incubation the concentration of viable cells was more than 10^{13}cfu/cm^3. *Lactobacillus plantarum* DS1 also developed at both temperatures, but the concentration of living cells for 24 hours of incubation was 3 log N lower. *Lactobacillus plantarum* JH1 demonstrated better growth at 37°C, the concentration of viable cells being 10^{13}cfu/cm^3 for 24-hour development, while at 30°C it was about 10^{10}cfu/cm^3 for 48-hour development.

The rapid development of *Lactobacillus pentosus* D1 and *Lactobacillus plantarum* D2 was connected to the formation of larger amounts of lactic acid. At both temperatures of development for 24 hours the acidity of the cultures changed to 160°T (Fig. 3 and Fig. 4). The other two strains, *Lactobacillus plantarum* DS1 and *Lactobacillus plantarum* JH1 changed the titratable acidity of the medium to 80 - 100°T for 24 or 48 hours at both temperature regimes (Fig. 3 and Fig. 4).

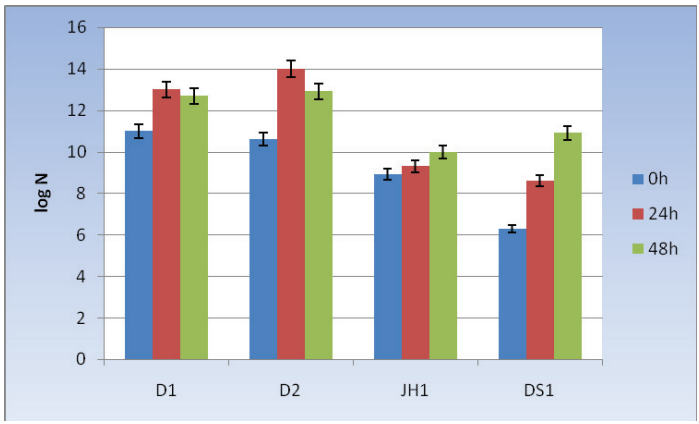

Fig. 1. Reproductive ability of the *Lactobacillus* sp. strains isolated from salad dressings at 30±1°C

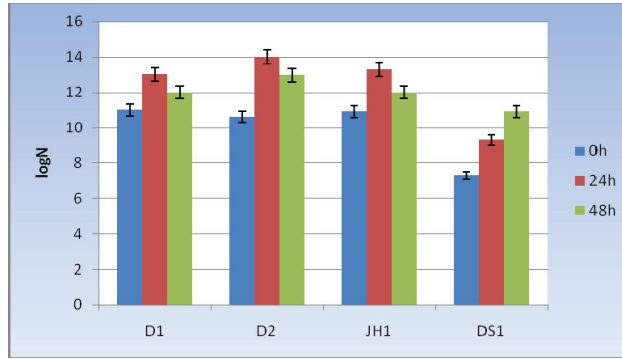

Fig. 2. Reproductive ability of the *Lactobacillus* sp. strains isolated from salad dressings at 37±1°C

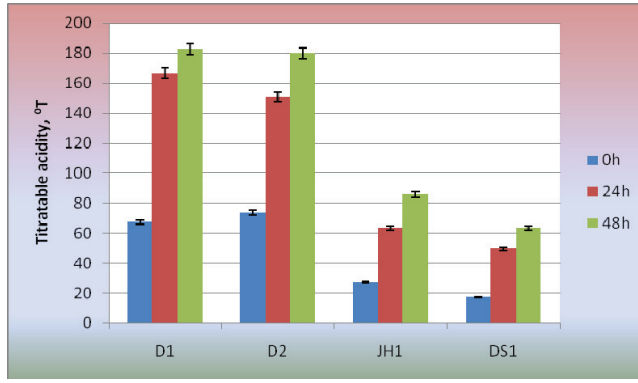

Fig. 3. Acidforming ability of the *Lactobacillus* sp. strains isolated from salad dressings at 30±1°C

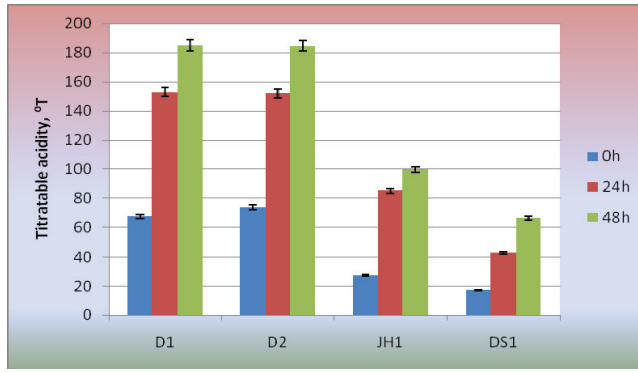

Fig. 4. Acidforming ability of the *Lactobacillus* sp. strains isolated from salad dressings at 37±1°C

CONCLUSION

The high concentration of viable *Lactobacillus* cells and the moderate titratable acidity of the medium make the strains *Lactobacillus plantarum* JH1 and *Lactobacillus plantarum* DS1 suitable for incorporation in functional foods. The high concentration of viable cells and the high titratable acidity of the medium make them suitable for incorporation in the composition of probiotic preparations as well.

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This paper has been reviewed