Influence of Listeria innocua on the growth of Listeria monocytogenes

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INTRODUCTION

Listeria monocytogenes represents an important foodborne pathogen which causes listeriosis, a serious invasive illness in humans (Farber and Peterkin, 1991). Its detection is crucial within the food industry because consumption of contaminated raw and/or processed food products such as meat, poultry, seafood, dairy products and vegetables, is the cause of 99% of all listeriosis cases (Schlech, 2000). It usually involves selective enrichment procedures however, several research reports have demonstrated that the presence L. innocua may mask L. monocytogenes, leading to a false negative result for the presence of L. monocytogenes (Comu et al. 2002).

The aim of the present work was to evaluate the influence of L. innocua on the growth of L. monocytogenes.

METHODOLOGY

➢ Monitoring growth of L. monocytogenes strains in the presence of L. innocua in three different mixtures:

A) L. monocytogenes_1339 and L. innocua_11288
B) L. monocytogenes_1340 and L. innocua_11288
C) Six strains of L. monocytogenes (1339, 1340, 1334, 1792, 999, 1336) and L. innocua_2030c

Enumerate: Aliquots of the different mixtures that were obtained at each defined interval were serially diluted in food matrix (pasteurized milk) artificially contaminated with different conditions undergoing enrichment culturing according to ISO 11290-1 reference method (Anonymous, 2004).

L. monocytogenes (10^4 cfu/ml) and L. innocua (10^3 cfu/ml)

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<th>Condition</th>
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<tr>
<td>1</td>
<td>L. monocytogenes (10^4 cfu/ml) and L. innocua (10^3 cfu/ml)</td>
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<td>2</td>
<td>L. monocytogenes (10^4 cfu/ml) and L. innocua (10^3 cfu/ml)</td>
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<td>3</td>
<td>L. monocytogenes (10^4 cfu/ml) and L. innocua (10^3 cfu/ml)</td>
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<td>4</td>
<td>L. monocytogenes (10^4 cfu/ml) and L. innocua (10^3 cfu/ml)</td>
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➢ Detection of any inhibitory activity produced by L. innocua against L. monocytogenes was screened by the spot on lawn method (Tagg et al., 1976).

RESULTS AND DISCUSSION

➢ Growth curves in non-selective medium:

Fig. 1 Growth curves in TSBYE of L. monocytogenes_1340 with L. innocua_11288. Error bars indicate variability between assays (○ - L. innocua in mixture; □ - control of L. innocua; ■ - L. monocytogenes in mixture; ▲ - control of L. monocytogenes).

➢ Growth Curves in food matrix artificially contaminated undergoing enrichment culturing

Fig. 2 Monitoring the number of viable cells in pasteurized milk: a) L. monocytogenes_1339 with L. innocua_11288; b) L. monocytogenes_1340 with L. innocua_11288; c) combination of all 6 strains of L. monocytogenes with L. innocua_2030c; ○ - L. monocytogenes (10^4 cfu/ml); ■ - L. monocytogenes (10^4 cfu/ml); □ - L. innocua (10^3 cfu/ml); ▲ - L. innocua (10^3 cfu/ml).

Except for condition 3, in all the mixtures, it was observed the inhibition of L. monocytogenes in the presence of L. innocua (Fig 2). However, it was more significant when L. innocua was presented in higher concentration (condition 4).

Previous studies only refer the inhibition of L. monocytogenes in the presence of L. innocua however, in this study, in the case of mixture C, it was also verified inhibition of L. innocua when L. monocytogenes was presented in higher concentration (condition 3).

➢ Detection of inhibitory activity produced by Listeria strains:

No inhibitory activity of L. innocua against L. monocytogenes or L. monocytogenes against L. innocua was observed in the spot-on-lawn assays. However many authors (Yokoyama et al. 2005; Besse et al. 2005) demonstrated that Listeria species may produce inhibitory compounds such as bacteriocins that are active against other Listeria isolates.

REFERENCES


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