

## A Research Note

# Influence of Potassium Sorbate on Growth of *Pseudomonas putrefaciens*

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### ABSTRACT

The effect of potassium sorbate on growth of two strains of *Pseudomonas putrefaciens* (*Alteromonas*)<sup>1</sup> was studied. Addition of 0.2% sorbate to trypticase soy broth (pH 6.0) inactivated strain P19X and resulted in a 3-log cycle reduction in number of viable cells of strain P5LIN through 6 days of incubation at 24 C.

*Pseudomonas putrefaciens* produces hydrogen sulfide and trimethylamine from refrigerated fish and poultry (2,3,6). *P. putrefaciens* can grow in the range of -2 C up to 30 C (3,5). Although *P. putrefaciens* makes up only 10-14% of the spoilage flora of fresh poultry (1,3,7), it must be considered a vital fraction of the flora due to its low-temperature growth and ability to produce strong off-odors (4).

Sorbic acid and potassium sorbate are both generally recognized as safe (GRAS) and have been widely used as food preservatives for over 30 years. Robach (7) reported that the spoilage flora of fresh broilers dipped in a 5% potassium sorbate solution did not contain any *P. putrefaciens* in the 1-cm<sup>2</sup> sample after 20 days of storage at 3 C. The same author observed that *P. putrefaciens* comprised 14% of the spoilage flora of the control broilers stored at the same temperature.

This investigation was undertaken to determine the effect of potassium sorbate on growth of two strains of *P. putrefaciens* in broth at a pH near that of fresh poultry.

### MATERIALS AND METHODS

#### Test organisms

Two strains of *P. putrefaciens* were obtained from Dr. R. E. Levin, Department of Food Science and Technology, University of Massachusetts, Amherst. Strain P19X was isolated from haddock and strain P5LIN from hamburger. The cultures were prepared by inoculating a 250-ml shake flask containing 50 ml of sterile TSB with a loop of a slant culture of the appropriate organism. The flask was incubated in a shaker water bath (American Optical, Buffalo, N.Y.) for 24 h at 24 C.

#### Growth studies

The growth medium was trypticase soy broth (TSB;BBL) adjusted to pH 6.0 with 5 N HCl. Growth studies were done using 250-ml shake flasks containing 50 ml of sterile TSB. Filter-sterilized potassium

sorbate was added aseptically to the cooled, sterile broth.

The TSB was then inoculated with sufficient of the 24-h-old culture of the appropriate test organism to contain approximately 10<sup>4</sup> cells/ml. Flasks were incubated at 24 C in the shaker water bath at 175 cycles per minute. Samples were withdrawn at appropriate intervals, and serial dilutions were made in sterile 0.1 M potassium phosphate buffer (pH 7.2). Organisms were enumerated by pour plating with trypticase soy agar (TSA; BBL). Plates were incubated for 48 h at 24 C before counting.

### RESULTS AND DISCUSSION

Addition of 0.10% potassium sorbate to the TSB resulted in growth of strain P19X being slowed, and total cell numbers reaching a maximum one log cycle lower than the control (Fig. 1). When 0.20% sorbate was added to the TSB, an initial decrease in number of viable cells

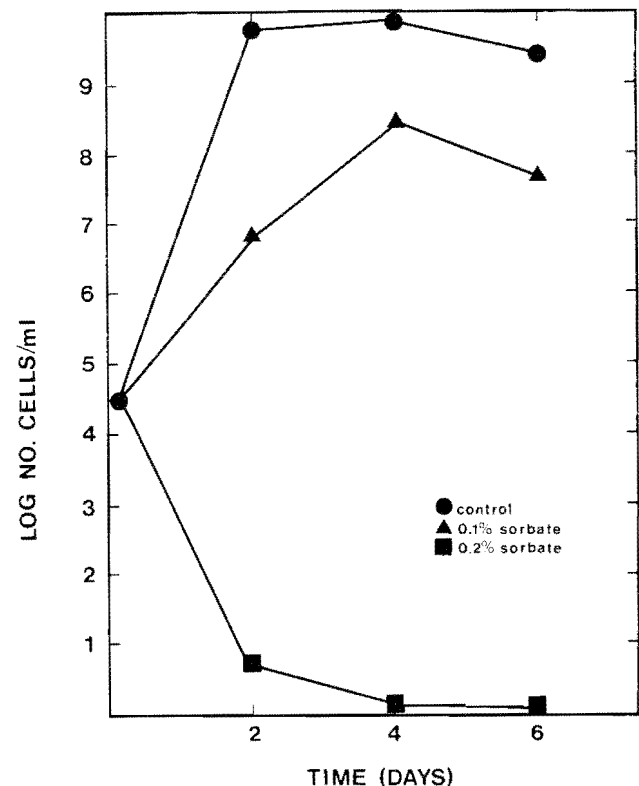


Figure 1. Effect of potassium sorbate on the growth of *Pseudomonas putrefaciens* P19X in trypticase soy broth (pH 6.0) at 24 C.

<sup>1</sup>British nomenclature.

of strain P19X resulted, and after 6 days of incubation no viable cells could be recovered upon subculturing (Fig. 1).

The same trend was observed for strain P5LIN. When 0.10% sorbate was incorporated into the TSB a slower

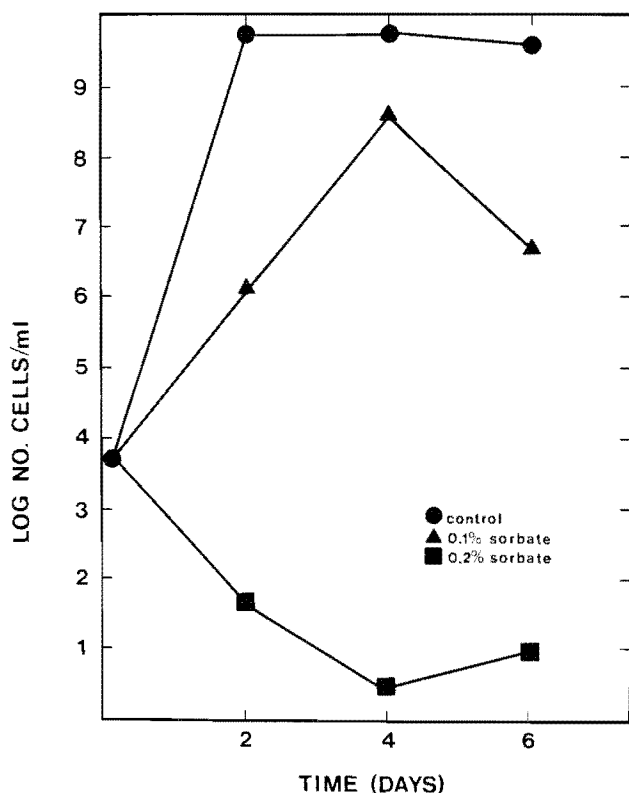


Figure 2. Effect of potassium sorbate on the growth of *Pseudomonas putrefaciens* P5LIN in trypticase soy broth (pH 6.0) at 24 C.

growth rate and a lower maximum cell population in comparison to the control were observed (Fig. 2). Addition of 0.20% sorbate to the TSB resulted in a steady decline of viable cells of strain P5LIN through 4 days, after which a slight increase in cell population was observed (Fig. 2).

Results of this study suggest that potassium sorbate inhibits growth and inactivates *P. putrefaciens* in broth. These results also help explain the disappearance of *P. putrefaciens* from the spoilage flora of whole broilers treated with sorbate. The results obtained are in line with the report that potassium sorbate inhibits growth of *Pseudomonas fluorescens* in broth (8). Further studies are under way to more fully investigate the antibacterial functionality of potassium sorbate.

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