

## YEASTS AND MOLDS

### EVALUATION OF PRESERVATIVES TO CONTROL THE GROWTH OF MOLDS CAPABLE OF PRODUCING 1,3-PENTADIENE

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It was discovered in the mid 1960s that some *Penicillium* species are capable of growing in cheese containing potassium sorbate at concentrations as high as 7,100 µg/g. These penicillia degrade sorbic acid and produce 1,3-pentadiene, a volatile compound with an unpleasant hydrocarbon-like odor. More recently, *Aspergillus* and other molds have been reported to be capable of degrading sorbic acid and producing 1,3-pentadiene in a variety of foods and beverages. The use of preservatives other than sorbate to control the growth of molds in foods and beverages would eliminate problems associated with the production of 1,3-pentadiene. Reduced levels of sorbate in combination with propionate, benzoate, natamycin, and/or ethylenediaminetetraacetic acid (EDTA) offer an approach toward achieving that goal. While the concentration of sorbate effective in preventing the growth of some species of 1,3-pentadiene-producing molds in specific types of foods and beverages stored under certain time-temperature conditions may be known, the effectiveness of reduced concentrations of sorbate, in combination with other antimicrobials, has not been defined. We did a study to evaluate potassium sorbate, sodium benzoate, calcium propionate, disodium EDTA, and natamycin, alone and in combination, for their effectiveness in preventing the growth of five molds isolated from Parmesan cheese and a lemon-flavored drink. These products were subjectively judged to contain 1,3-pentadiene. Growth of *Penicillium brevicompactum*, *Penicillium roqueforti*, *Paecilomyces variotii*, *Aspergillus niger*, and *Cephalosporium fragrans* on agar media containing Parmesan cheese (20% [w:v] plus 1.5% agar) and lemon-flavored drink (LD) agar (2.0%) supplemented with antimicrobials was studied. All molds grew well at 21°C on Parmesan cheese agar (PRM, pH 5.5) containing potassium sorbate (3,500 µg/ml), calcium propionate (3,000 µg/ml), or natamycin (20 µg/ml). Combinations of potassium sorbate (250 - 1,000 µg/ml), calcium propionate (250 - 1,000 µg/ml), and/or natamycin (10 - 18 µg/ml) greatly inhibited or prevented the growth of test molds in PRM agar. Molds grew on LD agar (pH 3.5) not containing preservatives. Three of the five molds grew on LD agar containing potassium sorbate or sodium benzoate at a concentration of 200 µg/ml. Growth did not occur within 70 days on LD agar containing 30 µg/ml EDTA in combination with potassium sorbate and sodium benzoate at 50 and 175 µg/ml, respectively, or 175 and 50 µg/ml, respectively. These preliminary studies using Parmesan cheese- and lemon drink-based agar model systems reveal that preservative systems containing a reduced concentration of potassium sorbate, in combination with other antimicrobials, have potential for controlling the growth of molds capable of producing 1,3-pentadiene in foods and beverages.