

# Oregon Wine Advisory Board Research Progress Report

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## The Use of Nisin Resistant Strains of *Leuconostoc oenos* to Control Malolactic Fermentation and to Prevent the Growth of Spoilage Bacteria in Oregon Wines

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### INTRODUCTION AND OBJECTIVES

Our objective is to develop methodologies to allow winemakers to precisely control the malolactic fermentation and to prevent spoilage of wines by undesirable bacteria.

### RESULTS AND DISCUSSION

Nisin, a bactericidal polypeptide produced by *Lactococcus lactis*, has been shown to be active against gram-positive bacteria, but not gram-negative bacteria or yeast. These antimicrobial properties have proven effective for inhibiting the lactic acid bacteria during winemaking. Adding nisin in combination with a nisin-resistant strain of *Leuconostoc oenos* may provide winemakers with a means of controlling the malolactic fermentation.

Nisin may have the potential to replace (or reduce) sulfiting agents traditionally added to wines to prevent the growth of spoilage lactic acid bacteria. This may be valuable since sulfates are believed to cause toxic responses in sensitive individuals. As a result, the U.S. Food and Drug Administration withdrew the GRAS (generally recognized as safe) status of sulfiting agents in 1986 and required their declaration on labels when concentrations present exceeded 10 ppm.

Extensive studies have shown that nisin is a safe, non-toxic antimicrobial agent that is non-allergenic to humans. It has been affirmed as GRAS by the U.S. Food and Drug Administration (Federal Register, April 6, 1988) for use in pasteurized cheese spreads at levels up to 250 ppm to prevent the growth and toxin production of *Clostridium botulinum*. Nisin has not yet been approved for use in wines, however, petitions are currently pending.

Our research efforts have progressed to the point where we are now ready to proceed with winery-scale evaluations. Recent conversations with representatives from the company (Integrated Ingredients Inc.) that distributes nisin were encouraging about the likelihood of nisin being approved for broad use approval. Past objections by FDA for broader use approval were based on an interpretation of toxicological data. In addition, a process known as "self-affirmation" will help us expedite the approval process. Essentially, self-affirmation is when a food or beverage processor sends a letter to FDA stating that they are planning to use an ingredient or food processing aid that has "GRAS" (generally recognized as safe) in their product. FDA will receive the letter and either will not allow it or not respond. In any event, FDA will not respond with an approval. All liability will be assumed by the processor and FDA will not go on record as having given approval. More information regarding how to proceed with self-

affirmation will be given to us from attorneys representing Integrated Ingredients, Inc. in the near future.

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## **PUBLICATIONS AND PRESENTATIONS: 1992**

Bower, C.K., B.T. Watson and M.A. Daeschel. 1992. Applications of bacteriocins in controlling bacterial spoilage and malolactic fermentation of wine: Interactions between the bacteriocin nisin and components of red wine. Proceedings 3rd Intl. Symp. Innovations in wine technology. Deutscher Weinbauverband, Heussallee 6, D-5300 Bonn. May 25-27. Stuttgart. pp. 102-109.

Daeschel, M.A., C.K. Bower and B.T. Watson. 1992. The use of nisin to control spoilage bacteria and malolactic fermentation in wines. Advanced Science and Technology Institute. Executives Conference. May 4-5. Portland, Oregon.

Daeschel, M.A. 1992. Use of nisin as a substitute for sulfur dioxide to control bacterial spoilage and malolactic fermentation. Current topics in wine production management workshop. May 13. Oregon State University.

Daeschel, M.A. 1992. Past, present and future of the Oregon wine industry. I lth Annual New Mexico Growers and Winemakers Conference. April 10-12. Albuquerque, NM.

Daeschel, M.A. 1992. Controlling malolactic fermentation. II th Annual New Mexico Growers and Winemakers Conference. April 10-12. Albuquerque, NM.

Daeschel, M.A., C.K. Bower and B.T. Watson. 1992. Applications of bacteriocins in controlling bacterial spoilage and malolactic fermentation of wine: Interactions between the bacteriocin nisin and components of red wine. 3rd Intl. Symp. Innovations in wine technology. May 25-27. Stuttgart, Germany.

Daeschel, M.A., C.K. Bower and B.T. Watson. 1992. Factors affecting the activity of nisin on wines. 3rd Intl. Cool Climate Symposium. Forschungsanstalt Geisenheim-University of Mainz, Mainz, Germany. June 8-11.

Daeschel, M.A., C.K. Bower and B.T. Watson. 1992. Use of the bacteriocin nisin in controlling bacterial spoilage and malolactic fermentation in wines. Pacific Northwest Chap., Amer. Soc. of Enology and Viticulture Annual Meeting. Kelowna, British Columbia. Aug. 13-16.