

Preface

“Ce sont les microbes qui ont le dernier mot”

(Louis Pasteur)

Archaeology, genetics, ancient literature studies (*Epic of Gilgamesh*, ca. 2000 BC), paleobotany and linguistics point to the Neolithic period (ca. 8000 BC) as the time when domestic grape growing (*Vitis vinifera vinifera*) and wine making began, most probably in Transcaucasia (P. E. McGovern, 2003). For ages wine has been an essential part of the gracious, cultured and religious way of life.

Starting at the heartlands of Middle East, winemaking techniques have been empirically improved since neolithic times, expanding into experimental and scientific viticulture and oenology in our days. Despite these long traditions in wine making it was only 1857 that significant contributions of Louis Pasteur on alcoholic and lactic acid fermentation, as well as on acetic acid formation, proved that the conversion of grape juice into wine was a microbiological and not a purely chemical process.

Up to now, bounteous knowledge about wine making techniques and procedures has been accumulated, which was already found in several books about wine microbiology, biotechnology and laboratory practices. Especially in the last two decades, our knowledge about the role of microbes and their application as starter culture has been greatly increased.

Therefore, the aim of this book is to focus on the ecological and biological aspects of the wine-associated microbiota, starting from grape-colonising to wine-spoiling microbes. Purely technical aspects of winemaking are not a subject of this publication.

Growth in the must and wine habitat is limited by low pH values and high ethanol concentrations. Therefore, only acid- and ethanol-tolerant microbial groups can grow in grape juice, must and wine, which include lactic acid and acetic acid bacteria, yeasts and fungi. The most important species for wine-making are *Saccharomyces cerevisiae* and *Oenococcus oeni*, which perform the ethanol and malolactic fermentation, respectively. These two species are also applied as starter cultures. However, the diverse other microorganisms growing on grapes and must have a significant influence on wine quality.

The book begins with the description of the diversity of wine-related microorganisms, followed by an outline of their primary and energy metabolism. Subsequently, important aspects of the secondary metabolism are dealt with, since these activities have an impact on wine quality and off-flavour formation. Then chapters about stimulating and inhibitory growth factors follow. This knowledge is helpful for the growth management of different microbial species. During the last twenty years, significant developments have been made in the application of the consolidated findings of molecular biology for the rapid and real-time identification of certain species in mixed microbial populations of must. Basic knowledge was acquired about the functioning of regulatory cellular networks, leading to a better understanding of the phenotypic behaviour of the microbes in general and especially of the starter cultures as well as of stimulatory and inhibitory cell-cell interactions during winemaking. In the last part of the book, a compilation of some modern methods round off the chapters.

This broad range of topics about the biology of the microbes involved in the vinification process could be provided in one book only because of the input of many experts from different wine-growing countries. We thank all the authors for offering their experience and contributions. Finally, we express our special thanks to Springer for agreeing to publish this book about wine microbes.

We hope that this publication will help winemakers as well as scientists and students of oenology to improve their understanding of microbial processes during the conversion of must to wine.

Mainz
June 2008

Helmut König
Gottfried Unden
Jürgen Fröhlich

Biology of Microorganisms on Grapes, in Must and in
Wine

König, H.; Uden, G.; Fröhlich, J. (Eds.)

2009, XVIII, 522 p., Hardcover

ISBN: 978-3-540-85462-3