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Biotechnological
Applications of the Yeast
Yarrowia lipolytica

 Springer

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Preface

The conventional yeasts *Saccharomyces cerevisiae* and *Schizosaccharomyces pombe* have been well studied and used in biotechnological processes such as food and beverage manufacture for thousands of years. Other yeast species have been classified as nonconventional yeasts. They have recently become increasingly important in basic research and biotechnological applications.

The yeast *Yarrowia lipolytica* is one of the most interesting nonconventional yeasts. It first became of interest because of its ability to metabolize paraffin hydrocarbons and crude oils containing long-chain hydrocarbons to production of single cell protein.

The yeast degrades very efficiently hydrophobic substrates such as n-alkanes, fatty acids, fats, and oils to production of valuable biotechnological products such as organic acids, extracellular enzymes, aroma compounds, bioemulsifier, polyols, single-cell protein, single-cell oil, and so on. Furthermore, it has good potential to carry out important biotechnological activities like bioremediation, biodegradation, and bioaccumulation. This nonconventional yeast exhibits efficient platform for the production of various heterologous proteins. Up to now, more than 100 heterologous proteins were produced in *Y. lipolytica* from viruses, bacteria, fungi, plants, animals, and human. Since the *Y. lipolytica* genome has been sequenced, it is possible to use new recombinant technology and metabolic engineering in order to improve metabolic pathways involved in the production of desirable metabolites and products.

This book is a concise summary of cutting-edge researches and biotechnological applications of *Y. lipolytica* as versatile nonconventional yeast in the food, pharmaceutical, detergent, and other industries. It will create new ideas to use *Y. lipolytica* in future studies and industrial developments for scientists and researchers at universities, industries, corporations, and government agencies interested in different fields of biotechnology.

“*Yarrowia lipolytica*: An Overview” explains basic and essential data about ecology, taxonomy, physiology, metabolism, genetics, and molecular biology of the yeast *Y. lipolytica*, which may be needed to establish and develop the biotechnological processes by this yeast. “*Yarrowia lipolytica* in Biotechnological Applications” reviews recent biotechnological applications of the yeast from different aspects such as valuable metabolites production, bioconversion and biotransformation processes, food and feed applications, fine chemistry and

pharmaceutical products, heterologous proteins expression, and other miscellaneous applications.

I wish to thank members of microbial biotechnology and bioprocess engineering (MBBE) group at the University of Maragheh for their assistance and encouragement. I would like to thank Hanna Hensler-Fritton (publishing editor), Isabel Ullmann (editorial assistant), and Jutta Lindenborn (project manager) and their respective teams at Springer publisher for continued interest and support me.

Harzevil, Iran

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About the Author

Dr. Farshad Darvishi Harzevili was born in Harzevil town, Gilan province, Iran. He graduated from University of Guilan with a B.Sc. in Biology. He received his M.Sc. and Ph.D. in Industrial Microbiology and Microbial Biotechnology from University of Isfahan. Now, he is a faculty member and head of microbial biotechnology and bioprocess engineering (MBBE) group at the University of Maragheh. His main interests include biotechnological and environmental applications of the yeasts, especially the use of agro-industrial wastes and renewable low-cost substrates for the production of biotechnologically valuable products such as microbial enzymes, organic acids, single cell oils, biofuels, and so forth. He is also interested in expression of heterologous proteins, metabolic engineering and the synthetic biology of yeasts.