



processes

Advances in Microbial Fermentation Processes

Edited by

Maria Tufariello and Francesco Grieco

Printed Edition of the Special Issue Published in *Processes*

Advances in Microbial Fermentation Processes

Advances in Microbial Fermentation Processes

Editors

Maria Tufariello
Francesco Grieco

MDPI • Basel • Beijing • Wuhan • Barcelona • Belgrade • Manchester • Tokyo • Cluj • Tianjin



Editors

Maria Tufariello
CNR-ISPA
Italy

Francesco Grieco
CNR-ISPA
Italy

Editorial Office

MDPI
St. Alban-Anlage 66
4052 Basel, Switzerland

This is a reprint of articles from the Special Issue published online in the open access journal *Processes* (ISSN 2227-9717) (available at: https://www.mdpi.com/journal/processes/special_issues/Processes_Fermentation).

For citation purposes, cite each article independently as indicated on the article page online and as indicated below:

LastName, A.A.; LastName, B.B.; LastName, C.C. Article Title. *Journal Name* **Year**, *Volume Number*, Page Range.

ISBN 978-3-0365-4009-2 (Hbk)

ISBN 978-3-0365-4010-8 (PDF)

© 2022 by the authors. Articles in this book are Open Access and distributed under the Creative Commons Attribution (CC BY) license, which allows users to download, copy and build upon published articles, as long as the author and publisher are properly credited, which ensures maximum dissemination and a wider impact of our publications.

The book as a whole is distributed by MDPI under the terms and conditions of the Creative Commons license CC BY-NC-ND.

Contents

About the Editors	vii
Preface to "Advances in Microbial Fermentation Processes"	ix
Maria Tufariello and Francesco Grieco Advances in Microbial Fermentation Processes Reprinted from: <i>Processes</i> 2021 , 9, 1371, doi:10.3390/pr9081371	1
Xinxin Wang, Jiachen Zhao, Jianye Xia, Guan Wang, Ju Chu and Yingping Zhuang Impact of Altered Trehalose Metabolism on Physiological Response of <i>Penicillium chrysogenum</i> Chemostat Cultures during Industrially Relevant Rapid Feast/Famine Conditions Reprinted from: <i>Processes</i> 2021 , 9, 118, doi:10.3390/pr9010118	5
Siti Helmyati, Karina Muthia Shanti, Fahmi Tiara Sari, Martha Puspita Sari, Dominikus Raditya Atmaka, Rio Aditya Pratama, Maria Wigati, Setyo Utami Wisnusanti, Fatma Zuhrotun Nisa' and Endang Sutriswati Rahayu Synbiotic Fermented Milk with Double Fortification (Fe-Zn) as a Strategy to Address Stunting: A Randomized Controlled Trial among Children under Five in Yogyakarta, Indonesia Reprinted from: <i>Processes</i> 2021 , 9, 543, doi:10.3390/pr9030543	21
Ida Bagus Agung Yogeswara, Suwapat Kittibunchakul, Endang Sutriswati Rahayu, Konrad J. Domig, Dietmar Haltrich and Thu Ha Nguyen Microbial Production and Enzymatic Biosynthesis of γ -Aminobutyric Acid (GABA) Using <i>Lactobacillus plantarum</i> FNCC 260 Isolated from Indonesian Fermented Foods Reprinted from: <i>Processes</i> 2021 , 9, 22, doi:10.3390/pr9010022	33
Xinxin Li, Xiuhong Wang, Xiangyuan Shi, Baoping Wang, Meiping Li, Qi Wang and Shengwan Zhang Antifungal Effect of Volatile Organic Compounds from <i>Bacillus velezensis</i> CT32 against <i>Verticillium dahliae</i> and <i>Fusarium oxysporum</i> Reprinted from: <i>Processes</i> 2020 , 8, 1674, doi:10.3390/pr8121674	51
Kwanruthai Malairuang, Morakot Krajang, Jatuporn Sukna, Krongchan Rattanapradit and Saethawat Chamsart High Cell Density Cultivation of <i>Saccharomyces cerevisiae</i> with Intensive Multiple Sequential Batches Together with a Novel Technique of Fed-Batch at Cell Level (FBC) Reprinted from: <i>Processes</i> 2020 , 8, 1321, doi:10.3390/pr8101321	65
Jeferyd Yepes-García, Carlos Caicedo-Montoya, Laura Pinilla, León F. Toro and Rigoberto Ríos-Esteba Morphological Differentiation of <i>Streptomyces clavuligerus</i> Exposed to Diverse Environmental Conditions and Its Relationship with Clavulanic Acid Biosynthesis Reprinted from: <i>Processes</i> 2020 , 8, 1038, doi:10.3390/pr8091038	91
Krešimir Mastanjević, Brankica Kartalović, Leona Puljić, Dragan Kovačević and Kristina Habschied Influence of Different Smoking Procedures on Polycyclic Aromatic Hydrocarbons Formation in Traditional Dry Sausage <i>Hercegovačka kobasica</i> Reprinted from: <i>Processes</i> 2020 , 8, 918, doi:10.3390/pr8080918	109

Kwanruthai Malairuang, Morakot Krajang, Rapeepong Rotsattarat and Saethawat Chamsart Intensive Multiple Sequential Batch Simultaneous Saccharification and Cultivation of <i>Kluyveromyces marxianus</i> SS106 Thermotolerant Yeast Strain for Single-Step Ethanol Fermentation from Raw Cassava Starch Reprinted from: <i>Processes</i> 2020 , <i>8</i> , 898, doi:10.3390/pr8080898	117
Chao Wang, Lin Sun, Haiwen Xu, Na Na, Guomei Yin, Sibol Liu, Yun Jiang and Yanlin Xue Microbial Communities, Metabolites, Fermentation Quality and Aerobic Stability of Whole-Plant Corn Silage Collected from Family Farms in Desert Steppe of North China Reprinted from: <i>Processes</i> 2021 , <i>9</i> , 784, doi:10.3390/pr9050784	133
Chao Wang, Hongyan Han, Lin Sun, Na Na, Haiwen Xu, Shujuan Chang, Yun Jiang and Yanlin Xue Bacterial Succession Pattern during the Fermentation Process in Whole-Plant Corn Silage Processed in Different Geographical Areas of Northern China Reprinted from: <i>Processes</i> 2021 , <i>9</i> , 900, doi:10.3390/pr9050900	149
Panagiota Stamatopoulou, Juliet Malkowski, Leandro Conrado, Kennedy Brown and Matthew Scarborough Fermentation of Organic Residues to Beneficial Chemicals: A Review of Medium-Chain Fatty Acid Production Reprinted from: <i>Processes</i> 2020 , <i>8</i> , 1571, doi:10.3390/pr8121571	169
Sandra Pati, Maria Tufariello, Pasquale Crupi, Antonio Coletta, Francesco Grieco and Ilario Losito Quantification of Volatile Compounds in Wines by HS-SPME-GC/MS: Critical Issues and Use of Multivariate Statistics in Method Optimization Reprinted from: <i>Processes</i> 2021 , <i>9</i> , 662, doi:10.3390/pr9040662	195

About the Editors

Maria Tufariello Researcher at the Institute of Sciences of Food Production of the National Research Council, is involved in:

- 'Omic' approaches (GC-MS, HPLC-DAD, HPLC-FL, HPLC-HRMS) in understanding phenomena related to the biology of lactic bacteria, yeasts and moulds of agri-food interest;
- Extraction, identification and quantification of volatile organic compounds associated with fermentation processes;
- Evaluation of food sensory profile through quantitative–descriptive analytical methods;
- Study and characterization of phenolic profiles of some fermented food and beverages;
- Evaluation of the development of biogenic amines in food and development of extraction techniques;
- Application of multivariate statistical analysis techniques for data processing.

Francesco Grieco, Senior Researcher at the Institute of Sciences of Food Production of the National Research Council, is involved in: i) the study of membrane transport proteins of *Saccharomyces cerevisiae*; ii) the study of microbial populations present in grape must; iii) the selection of autochthonous *Saccharomyces* isolates of high oenological value to be used as starters for industrial fermentation; iv) the selection of indigenous yeast isolates to be used for biological control of ochratoxigenous fungi on wine and table grapes; and v) the heterologous expression of fungal proteins of agro-industrial interest in *S. cerevisiae*. He qualified as a professor of the first and second ranks in the Competitive Sector 07/I1 and he is member of the Italian Society of Agrarian, Food and Environmental Microbiology. He is the author of 247 publications in national and international journals with referees, communications to national and international conferences, and two patents.

Preface to "Advances in Microbial Fermentation Processes"

Fermentation processes are under the spotlight of scientific research in order to improve the quantitative and qualitative properties of the final products. In the food industry, microbial-based fermentation has traditionally been used to obtain edible foods and beverages denoted by extended shelf life and relevant nutritional properties. Furthermore, numerous helpful microorganisms are able to prevent pathogens/spoilers growing and to inactivate undesirable compounds, such as biogenic amines and mycotoxins. Fermented foods can enhance human health by interactions with live microbes (probiotic effect) or indirectly, thanks to the ingestion of microbial metabolites of fermentative origin (biogenic effect).

An incessant investigation concerning microbial diversity is underway, in order to describe and exploit innovative microbial-based biotechnological approaches for the utilization of novel foodstuff to address the current worldwide food crisis. Moreover, numerous micro-organisms have been suggested as cell factories for the synthesis of different desired compounds such as antimicrobial, antioxidants, vitamins and other bioactive molecules, and for use as initial substrate different agro-industrial wastes.

This book, "Advances in Microbial Fermentation Processes", collects the accounts of different investigations concerning the study and the application of new fermentation approaches mediated by microorganisms of industrial interest. In particular, the chapters include innovative studies about the microbial production of valuable compounds: penicillin production by *Penicillium chrysogenum* under different physiological conditions; the synthesis of GABA using purified recombinant GAD from *L. plantarum*; the antibiotic biosynthesis in *S. clavuligerus* strains; and medium-chain fatty acids by using both pure cultures and mixed microbial communities.

Different studies are also reported that investigate the roles of volatile compounds associated with ascomycete/bacteria interaction in fighting plant pathogens, and improving bread and wine quality. Novelty in the microbial-mediated production of a fermented milk-derived food to promote growth in stunted children and of traditional meat-derived foods are also described here. Two interesting chapters show innovative results obtained by the assessment of novel protocols for the production of *Saccharomyces cerevisiae* and *Kluyveromyces marxianus* biomasses. The assessment of biodiversity of microbial communities in whole-plant corn silages is included in two different chapters.

This volume contributes to the development of knowledge regarding microbial fermentation processes, by describing the newest applications for the exploitation of microorganism biodiversity in different biotechnological fields.

Maria Tufariello and Francesco Grieco

Editors