

Marco Gobetti  
Michael Gänzle *Editors*

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# Handbook on Sourdough Biotechnology

*Second Edition*

 Springer

# Handbook On Sourdough Biotechnology

**Stanley P. Cauvain**



## **Handbook On Sourdough Biotechnology:**

Handbook on Sourdough Biotechnology Marco Gobbetti, Michael Gänzle, 2023-04-24 Bread and leavened bakery products have been essential to human nourishment for millennia. Traditionally, bread production has relied on the use of sourdough as a leavening agent and to impart a characteristic quality to baked goods. In recent years, improved understanding of the biodiversity and microbial ecology of sourdough microbiota, the discovery of new species, the improved management and monitoring of its meta community, and the commercialization of innovative products have vastly expanded the potential of sourdough fermentation for making baked goods. For example, raw materials such as cereals, pseudo cereals, ancient grains, and gluten free substrates, as well as a large number of baked good varieties, e.g. typical and industrial breads, sweet baked goods, gluten free products, may benefit from advances in sourdough fermentation. In addition, biotechnological tools and culture properties have been discovered to improve both the shelf life and the sensory and textural qualities of baked goods, as well as their nutritional and health promoting properties. Now in its second edition, the Handbook on Sourdough Biotechnology remains the only book dedicated completely to sourdough biotechnology, with the contribution of the most experienced researchers from the field. It reviews the history of sourdough and the potential of sourdough fermentation in the production of bread and baked goods. A thorough discussion of the various processing steps includes the chemical properties of the raw matter, the taxonomy, diversity, and metabolic properties of starter yeasts and lactic acid bacteria, and the effects of sourdough fermentation on the shelf life and the sensory, textural, nutritional, and health promoting properties of baked goods.

**Handbook of Sourdough Microbiota and Fermentation** Fatih Ozogul, João Miguel Rocha, Elena Bartkiene, 2024-10-23 Handbook of Sourdough Microbiota and Fermentation: Food Safety, Health Benefits, and Product Development links the cereal and sourdough based microorganisms, fermentations, and microbial metabolites with food hygiene and safety, functional and health promoting properties, and their potential interest to be employed in the agro food sector and beyond. Structured in a way that provides the latest findings and most recent approaches and trends on sourdough, this book also emphasizes the biotechnological aspects such as fermentation, food processing, and the use of beneficial microorganisms and their metabolites in different ways and in different industries. Written by experts from a multidisciplinary perspective, this book is a remarkable reference to a wide range of audiences with different backgrounds: from academics and researchers in food science to industrial food engineers and technicians, food plant managers, and new product and processing developers, managers in food packaging and preservation. Covers how cereal based and sourdough microorganisms and microbial metabolites can be used to extend the shelf life of bread and other agro food products. Presents microbial safety, fermentations, ripeness of baking based products, bacterial and mold food spoilage, and the health promotion of sourdough and cereal based products. Describes how cereal and sourdough based products can contribute to convenient, nutritious, stable, natural, low processed, and healthy food. ICC Handbook of 21st Century Cereal Science and Technology Peter R.

Shewry, Hamit Koksel, John Taylor, 2023-06-30 ICC Handbook of 21st Century Cereal Science and Technology highlights the importance of cereals presenting insights into the foundational structure of cereal grains including potential contamination factors that can negatively impact cereal and grain yield Focusing on the eight major cereal crops wheat maize rice barley sorghum and millets oats rye and pseudocereals this is the only available reference to provide standardized coverage for detailed comparison Written by a global team of expert editors and contributors the book provides practical insights into the utilization of cereals grains and safety assessments This International Association for Cereal Science and Technology endorsed volume continues their commitment to international cooperation through the dissemination of knowledge conducting research and developing standard methods Provides standardized insights into cereals their grains profiles and uses Includes the 8 most utilized cereals including pseudocereals Promotes understanding of the real world use options of cereals *Handbook of Molecular Gastronomy* Róisín Burke, Alan Kelly, Christophe Lavelle, Hervé This vo Kientza, 2021-06-08 Handbook of Molecular Gastronomy Scientific Foundations and Culinary Applications presents a unique overview of molecular gastronomy the scientific discipline dedicated to the study of phenomena that occur during the preparation and consumption of dishes It deals with the chemistry biology and physics of food preparation along with the physiology of food consumption As such it represents the first attempt at a comprehensive reference in molecular gastronomy along with a practical guide through selected examples to molecular cuisine and the more recent applications named note by note cuisine While several books already exist for a general audience either addressing food science in general in a light way and or dealing with modern cooking techniques and recipes no book exists so far that encompasses the whole molecular gastronomy field providing a strong interdisciplinary background in the physics biology and chemistry of food and food preparation along with good discussions on creativity and the art of cooking Features Gives A Z coverage to the underlying science physics chemistry and biology and technology as well as all the key cooking issues ingredients tools and methods Encompasses the science and practice of molecular gastronomy in the most accessible and up to date reference available Contains a final section with unique recipes by famous chefs The book is organized in three parts The first and main part is about the scientific discipline of molecular and physical gastronomy it is organized as an encyclopedia with entries in alphabetical order gathering the contributions of more than 100 authors all leading scientists in food sciences providing a broad overview of the most recent research in molecular gastronomy The second part addresses educational applications of molecular gastronomy from primary schools to universities The third part provides some innovative recipes by chefs from various parts of the world The authors have made a particular pedagogical effort in proposing several educational levels from elementary introduction to deep scientific formalism in order to satisfy the broadest possible audience scientists and non scientists This new resource should be very useful to food scientists and chefs as well as food and culinary science students and all lay people interested in gastronomy *Sourdough Innovations* Marco Garcia-Vaquero, João Miguel F. Rocha, 2023-08-01

Sourdough fermentation was probably one of the first microbial processes employed by mankind for the production and preservation of food. This practice is still widely used worldwide due to the distinct sensorial and health properties attributed to these products. Traditional sourdough bread is achieved by spontaneous fermentations leading to natural selections of microorganisms, mainly yeast and lactic acid bacteria, with health benefits for the consumers' microbiota. However, multiple opportunities are currently underexploited through the entire sourdough value chain. *Sourdough Innovations: Novel Uses of Metabolites, Enzymes, and Microbiota from Sourdough Processing* summarizes the latest scientific knowledge and current opportunities of sourdough technology at biomass, microbiota, and enzymatic levels, described in three distinctive sections. Section I covers the fermentation process of cereals and non-cereals to produce sourdough containing compounds with health enhancement benefits. Section II includes novel advances in sourdough enzymology, and last, Section III explores various applications of sourdough microbiota as antimicrobial and probiotic microorganisms and opportunities to be included in both food and non-food applications. **Key Features:** Includes extensive information on the use of innovative or emerging technologies aiming to promote circular exploitation systems; Promotes the full use of the cereal and non-cereal sourdough metabolites; Covers the functionality of sourdough microorganisms and functional compounds and future exploitation of some of them in the field of nutraceuticals or functional foods. *Sourdough Innovations* is unique in its examination of health beneficial compounds through the downstream processing of sourdough from cereals, microbiota, and enzymes. It is a great source for academic staff and scientists within the broad area of food science who are researching, lecturing, or developing their professional careers in food microbiology, food chemistry, food processing, and food technology, including bio-process engineers interested in the development of novel technological improvements in sourdough processing.

**Basic Methods and Protocols on Sourdough** Marco Gobbetti, Carlo Giuseppe Rizzello, 2024-02-19. This volume details traditional and modern approaches to characterize sourdough and to monitor its features during production, propagation, and use through state-of-the-art analytical tools. Chapters guide the reader through procedures to prepare and propagate the mature sourdough, to analyse and monitor microbiological, biochemical, and rheology features of sourdough, sensory and nutritional attributes of baked goods. Written in the format of the *Methods and Protocols in Food Science* series, chapters list necessary materials and methods for readily reproducible protocols. Authoritative and cutting edge, *Basic Methods and Protocols on Sourdough* aims to ensure successful results in the further study of this vital field.

**Microbiology and Technology of Fermented Foods** Robert W. Hutkins, 2018-09-04. The revised and expanded text on food fermentation microbiology. With this second edition of *Microbiology and Technology of Fermented Foods*, Robert Hutkins brings fresh perspectives and updated content to his exhaustive and engaging text on food fermentations. The text covers all major fermented foods, devoting chapters to fermented dairy, meat, and vegetable products, as well as breads, beers, wines, vinegars, and soy foods. These insights are enhanced by detailed explanations of the microbiological and biochemical processes that underpin fermentation, while an account of its

fascinating history provides readers with richly contextualizing background knowledge New to this edition are two additional chapters One discusses the role that fermentation plays in the production of spirits and other distilled beverages whereas another focuses on cocoa coffee and fermented cereal products Furthermore key chapters on microorganisms and metabolism have been expanded and elaborated upon and are complemented by other relevant revisions and additions made throughout the book ensuring that it is as up to date and applicable as possible This essential text includes Discussions of major fermented foods from across the globe Background information on the science and history behind food fermentation Information on relevant industrial processes technologies and scientific discoveries Two new chapters covering distilled spirits and cocoa coffee and cereal products Expanded chapters on microorganisms and metabolism Microbiology and Technology of Fermented Foods Second Edition is a definitive reference tool that will be of great interest and use to industry professionals academics established or aspiring food scientists and anyone else working with fermented foods

**Sourdough Microbiota and Starter Cultures for Industry** Elaine Berger Ceresino, Grazina Juodeikiene, Susanne Miescher Schwenninger, João Miguel Ferreira da Rocha, 2024-04-16 Traditional sourdough bread refers to spontaneous fermentation of cereals by lactic acid bacteria and yeasts leading to natural selections of microorganisms The metabolic activity of these microorganisms promotes the formation of organic acids flavor development and leavening in food matrices which most know as sourdough bread This bread is still widely manufactured at farm level across Europe and worldwide being highly appreciated by consumers for its distinct flavor texture healthy attributes and natural origin Sourdough bread is expected to grow 6 9% annually through 2023 Once stagnant the bread market has experienced a revival specifically through sourdough bread consumption Consumers have been avoiding bread in the recent years due to the presence of extra ingredients such as chemical dough conditioners preservatives and added sugar However the increasing popularity of fermented foods and their multiple health benefits are prompting the growth of sourdough market This fast growing market has been demanding a dynamic response from industries producing starter cultures to accelerate sourdough fermented bread production in increasing quantities while keeping its made for you characteristics By bringing together top sourdough experts in Europe and beyond this book compiles the latest knowledge in all areas of sourdough starter culture and advantages in using sourdough fermentation Sourdough Microbiota and Starter Cultures for Industry supplies a biosciences audience with a hands on view of the latest advances from sourdough microbiota characterization to starter culture potentials targeting industrial application including specific techno functional and safety improvements obtained by clean labeling strategies Insights on health and improved quality shed light on new shifting consumer preferences and why choosing sourdough fermentation is a great expansion opportunity in one's portfolio as the science behind sourdough starter cultures meets improved nutrition impact opportunities This text teaches methods to exploit sourdough technology through the entire value chain from sourdough natural microflora through the development of novel starter cultures for producing

fermented food introducing the advantages that sourdough fermentation offers for improving the sensorial technological and nutritional properties of breads

**Food Stories** T. Jameson Brewer, Cleveland Hayes, 2025-03-10 Food Stories Navigating the Academy with Cultural Lessons from the Kitchen is the first volume in the series Culinary Canvas A Series on Integrating the Arts and Food into Higher Education The purpose of the series is to explore the innovative integration of arts and food into higher education Each volume aims to inspire a paradigm shift in academia advocating for a more holistic creative and inclusive approach to learning teaching researching serving and existing in the academy In the present volume Food Stories makes the case that food and the culture surrounding food is a closely held and powerful reality that shapes who we are as individuals as members of varied communities and invariably informs who we are as educators and researchers This book gives space for the authors to explore not only the impact that food and culture have had and continue to have on them as individuals how that culture and experiences impact them as members of the academy in teaching research and service but also in providing some guidance to graduate students and junior faculty In effect chapters explore navigating academic work teaching research and service through the lens of food and the transferable lessons that can be gleaned from our grandmothers mothers fathers and our own kitchens It is often the case that higher education fosters both imposter syndrome and a workaholic disposition that can be detrimental to teaching and research What this book does then is to not only explore the ways in which what may seem as non academic work such as cooking a meal can have on our work life balance but also how to incorporate the very lessons of food into who we are as educators how we teach and how we can approach the work we do more broadly Through carefully curated chapters this text presents a wide array of perspectives across food and cultural regions as well as imparting insights from the academy from authors spanning the spectrum of the career It is an important book full of valuable lessons for graduate students faculty and teachers who wish to use its content in their classrooms Perfect for courses such as Cultural Studies Culturally Responsive Pedagogy

**Bioaccessibility of Compounds in Foods and Byproducts** Marciane Magnani, Tatiana Colombo Pimentel, 2025-08-25 This volume provides detailed and comprehensive descriptions of the methodologies and procedures used to evaluate bioaccessibility in different food compounds Chapters focus on phenolics minerals carotenoids fatty acids and other bioactive molecules Written in the format of the Methods and Protocols in Food Science series chapters list necessary materials and methods for readily reproducible protocols Authoritative and cutting edge Bioaccessibility of Compounds in Foods and Byproducts aims to be comprehensive guide for researchers in the field

**Breadmaking** Stanley P. Cauvain, 2020-11-26 Bread Making Improving Quality quickly established itself as an essential purchase for baking professionals and researchers in this area Fully revised and updated and with new chapters on Flour Lipids and the dietary and nutritional quality of bread this new edition provides readers with the information they need on the latest developments in bread making science and practice The book opens with two introductory chapters providing an overview of the breadmaking process Part one focuses on the impacts of wheat

and flour quality on bread covering topics such as wheat chemistry wheat starch structure grain quality assessment milling and wheat breeding Part two covers dough development and bread ingredients with chapters on dough aeration and rheology the use of redox agents and enzymes in breadmaking and water control among other topics In part three the focus shifts to bread sensory quality shelf life and safety Topics covered include bread aroma staling and contamination Finally part four looks at particular bread products such as high fiber breads those made from partially baked and frozen dough and those made from non wheat flours With its distinguished editor and international team of contributors Bread Making Improving Quality Third Edition continues to serve as the standard reference for researchers and professionals in the bread industry and all those involved in academic research on breadmaking science and practice Discusses dough development and bread ingredients with new chapters on flour lipids and improving the nutrition and dietary quality of breads

Comprehensively updated and revised coverage outlines the latest developments in breadmaking science and practice Covers topics such as wheat chemistry wheat starch structure grain quality assessment milling and wheat breeding **Cassava**

Viduranga Waisundara,2018-01-17 Cassava is a staple food for many nations owing to its resilience for growth under various climatic conditions It is a good source of carbohydrates and is the third largest source of food carbohydrates in the tropics after rice and maize This book focuses on the morphological traits and nutritive properties of cassava and its production processes postharvest techniques and diseases that affect the growth of the crop Given its extensive usage and market value it is one of the agricultural produces for which many biotechnological interventions have been applied for ascertaining food security It is hoped that readers will gain knowledge on cassava as well as use some of the techniques mentioned herein for improvement of the production of the crop **Bioactive Compounds and Nutraceuticals from Plant Sources** Charanjit S. Riar,Parmjit S. Panesar,2024-07-05 This new volume focuses on the technology of bioactive compounds and nutraceuticals from fruit and vegetable sources from cereal grain sources and from cereal processing by products The chapters look at the extraction technologies analytical techniques and potential health prospects specifically from fruits and vegetables sources They cover plants such plantation crops roots and tubers as well as fruit and vegetable processing byproducts They also consider bioactive compounds and nutraceuticals from major and minor cereal grain sources and from cereal processing byproducts This new book provides valuable insight for food technologists and those in related areas of research Bioactive Compounds and Nutraceuticals from Plant Sources Extraction Technology Analytical Techniques and Potential Health Prospects is the companion volume to Bioactive Compounds and Nutraceuticals from Dairy Marine and Nonconventional Sources Extraction Technology Analytical Techniques and Potential Health Prospects by the same editors [In Search of the Perfect Loaf](#) Samuel Fromartz,2015-07-21 An invaluable guide for beginning bakers The New York Times An irresistible account of bread bread baking and one home baker s journey to master his craft In 2009 journalist Samuel Fromartz was offered the assignment of a lifetime to travel to France to work in a boulangerie So began his quest to hone not just his



homemade baguette which later beat out professional bakeries to win the Best Baguette of D C but his knowledge of bread from seed to table For the next four years Fromartz traveled across the United States and Europe perfecting his sourdough in California his whole grain rye in Berlin and his country wheat in the South of France Along the way he met historians millers farmers wheat geneticists sourdough biochemists and everyone in between learning about the history of breadmaking the science of fermentation and more The result is an informative yet personal account of bread and breadbaking complete with detailed recipes tips and beautiful photographs Entertaining and inspiring this book will be a touchstone for a new generation of bakers and a must read for anyone who wants to take a deeper look at this deceptively ordinary exceptionally delicious staple handmade bread     The Technology of Wafers and Waffles I Karl F. Tiefenbacher,2017-05-16 The Technology of Wafers and Waffles Operational Aspects is the definitive reference book on wafer and waffle technology and manufacture It covers specific ingredient technology including water quality wheat flour starches dextrins oils and fats and delves extensively into the manufacturing elements and technological themes in wafer manufacturing including no low sugar wafers hygroscopic wafers fillings and enrobing The book explains in detail operating procedures such as mixing baking filling cooling cutting and packaging for every type of wafer flat and shaped wafers for making biscuits ice cream cones cups wafer reels wafer sticks flute wafers and biscuit wafers It also explores the various types of European Belgian waffles and North American frozen waffles Serves as a complete reference book on wafer and waffle technology and manufacturing the first of its kind Covers specific ingredient technology such as water quality wheat flour starches dextrins oils and fats for wafer and waffles Explores wafer and waffle product types development ingredients manufacturing and quality assurance Explains the scientific background of wafer and waffle baking Informs both artisan and industrial bakers about many related areas of bakery product manufacturing     **Nutrients in Beverages** Alexandru Grumezescu,Alina Maria Holban,2019-06-07 Nutrients in Beverages Volume Twelve in the Science of Beverages series introduces the role of nutrients in beverages and provides details into the biological effects of beverage ingredients by presenting their nutritional properties and characterization This scientific reference covers both the current state of the art and future trends in the beverage industry and is designed as a comprehensive guide to this area of research Detailed research information is presented to not only help researchers and students understand the nature of the challenges associated with incorporating nutrients but to also help strengthen the knowledge transfer between research institutions and industry Includes information on the health impact of various nutrients Discusses nutrients in beverages as a potential delivery system for nutraceuticals Presents research example detection techniques to assist in identifying nutrient types and functionalities     *Yeasts: From Nature to Bioprocesses* Sérgio Luiz Alves Júnior,Helen Treichel,Thiago Olitta Basso,Boris Ugarte Stambuk,2022-03-15 Since ancient times yeasts have been used for brewing and breadmaking processes They now represent a flagship organism for alcoholic fermentation processes The ubiquity of some yeast species also offers microbiologists a heterologous gene expression

platform making them a model organism for studying eukaryotes Yeasts from Nature to Bioprocesses brings together information about the origin and evolution of yeasts their ecological relationships and the main taxonomic groups into a single volume The book initially explores six significant yeast genera in detailed chapters The book then delves into the main biotechnological processes in which both prospected and engineered yeasts are successfully employed Yeasts from Nature to Bioprocesses therefore elucidates the leading role of these single cell organisms for industrial microbiology in environmental health social and economic terms This book is a comprehensive multidisciplinary resource for general readers as well as scholars of all levels who want to know all about yeast microbiology and their industrial applications A History of the Food of Paris Jim Chevallier, 2018-06-15 Paris has played a unique role in world gastronomy influencing cooks and gourmets across the world It has served as a focal point not only for its own cuisine but for regional specialties from across France For tourists its food remains one of the great attractions of the city itself Yet the history of this food remains largely unknown A History of the Food of Paris brings together archaeology historical records memoirs statutes literature guidebooks news items and other sources to paint a sweeping portrait of the city's food from the Neanderthals to today's bistros and food trucks The colorful history of the city's markets its restaurants and their predecessors of immigrant food even of its various drinks appears here in all its often surprising variety revealing new sides of this endlessly fascinating city Encyclopedia of Food and Health, 2015-08-26 Approx 3876 pages Approx 3876 pages The Perfect Loaf Maurizio Leo, 2022-11-08 JAMES BEARD AWARD WINNER IACP AWARD WINNER NEW YORK TIMES BESTSELLER A dynamic authoritative sourdough baking bible for those looking to build confidence in the craft with a wide range of foolproof recipes from pan loaves to pizza to doughnuts by the beloved blogger and resident bread baker at Food52 Maurizio Leo has given all bread heads whether newbies or experienced bakers the ideal gift Peter Reinhart author of The Bread Baker's Apprentice and host of Pizza Quest ONE OF SAVEUR'S BEST COOKBOOKS OF THE YEAR Maurizio Leo's blog The Perfect Loaf is the go to destination on the internet for beginner sourdough bakers He now brings his impeccably detailed techniques foolproof recipes and generous teaching style to a groundbreaking debut cookbook that delves into the absolute fundamentals of sourdough plus the tools and confidence to explore beyond Recipes cover flavorful crowd pleasing favorites Essential freeform loaves Simple Sourdough Rosemary Olive Oil Extra Sour Sourdough Cranberry Walnut Demi Baguettes Pan loaves Everyday Sandwich Bread Naturally Leavened Brioche German Whole Rye Honey Whole Wheat Sandwich Bread Pizza and flatbread Roman Style Pan Pizza Focaccia Naan Flour Tortillas Pita Buns rolls and more Soft Dinner Rolls Potato Buns Ciabatta Rolls English Muffins Bagels Sweets Weekend Cinnamon Rolls Italian Doughnuts Summer Fruit Sourdough Crostata Banana Bread Cinnamon Babka Beginner bakers will have their hands held the entire way with troubleshooting sections and numerous sidebars answering almost every question they may have like how to store a sourdough starter long term how bakers percentages actually work and a visual guide to common bread fails and how to remedy them Seasoned bakers will relish

deep dives into the science behind baking processes and expert information on how to build their baker's intuition and level up by experimenting with hydration ingredient ratios freshly milled grains and specialty flours Whether you're new to bread baking or a pro *The Perfect Loaf* will be your indispensable guide in the kitchen

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