Bailey's Industrial Oil & Fat Products

SIXTH EDITION

VOLUME 6

Industrial & Nonedible Products from Oils & Fats

EDITED BY

Fereidoon Shahidi

BAILEY'S INDUSTRIAL OIL AND FAT PRODUCTS

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Fereidoon Shahidi

Memorial University of Newfoundland

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Volume 6

BAILEY'S INDUSTRIAL OIL AND FAT PRODUCTS, 6E

Contributors

R. G. Ackman: Canadian Institute of Fisheries Technology, Dalhousie University, Halifax, Nova Scotia, Canada, *Fish Oils.*

Yvonne T. V. Agustin: *Coconut Oil.*

Klaus A. Alexandersen: *Margarine Processing Plants and Equipment.*

Dan Anderson: *A Primer on Oils Processing Technology.*

Yusof Basiron: *Palm Oil.*

María Luz J. Bendaño: *Coconut Oil.*

Anthony P. Bimbo: International Fisheries, Kilmarnock, Virginia, *Rendering.*

Michael J. Boyer: AWT-Agribusiness and Water, Cumming, Georgia, *Environmental Impact and Waste Management.*

D. D. Brooks: Oil-Dri Corporation, Chicago, Illinois, *Adsorptive Separation of Oils.*

Michael R. Burke: *Soaps.*

Elias C. Canapi: *Coconut Oil.*

Vance Caudill: *Packaging.*

Armand B. Christophe: Ghent University Hospital, Ghent, Belgium, *Structural Effects on Absorption, Metabolism, and Health Effects of Lipids.*

Michael M. Chrysan: *Margarines and Spreads.*

W. De Greyt: De Smet Technologies & Services, Brussels, Belgium, *Deodorization.*

Nurhan Turgut Dunford: Oklahoma State University, Stillwater, Oklahoma, *Germ Oils from Different Sources.*

Sevim Z. Erhan: National Center for Agricultural Utilization Research, Peoria, Illinois, *Vegetable Oils as Lubricants, Hydraulic Fluids, and Inks.*

N.A.M. Eskin: University of Manitoba, Winnipeg, Manitoba, Canada, *Canola Oil.*

S. Eswaranandam: University of Arkansas, Fayetteville, Arkansas, *Edible Films and Coatings From Soybean and Other Protein Sources.*

WALTER E. FARR: Walter E. Farr & Associates, Olive Branch, Mississippi, *Hydrogenation: Processing Technologies.*

DAVID FIRESTONE: United States Food and Drug Administration, Washington, DC, *Olive Oil.*

BRENT D. FLICKINGER: Archer Daniels Midland Company, Decatur, Illinois, *Diacylglycerols.*

GREGORIO C. GERVAJIO: *Fatty Acids and Derivatives from Coconut Oil.*

MARIA A. GROMPONE: *Sunflower Oil.*

FRANK D. GUNSTONE: *Vegetable Oils.*

MONOJ K. GUPTA: MG Edible Oil Consulting International, Richardson, Texas, *Frying of Foods and Snack Food Production*; *Frying Oils.*

ÖZLEM GÜÇLÜ-ÜSTÜNDAĞ: University of Alberta, Edmonton, Alberta, Canada, *Supercritical Technologies for Further Processing of Edible Oils.*

MICHAEL J. HAAS: Eastern Regional Research Center, Agricultural Research Service, Wyndmoor, Pennsylvania, *Animal Fats.*

EARL G. HAMMOND: Iowa State University, Ames, Iowa, *Soybean Oil.*

RICHARD W. HARTEL: University of Wisconsin, Madison, Wisconsin, *Crystallization of Fats and Oils.*

BERNHARD HENNIG: University of Kentucky, Lexington, Kentucky, *Dietary Lipids and Health.*

ERNESTO HERNANDEZ: Texas A&M University, College Station, Texas, *Pharmaceutical and Cosmetic Use of Lipids.*

P. B. HERTZ: Agriculture and Agri-Food Canada, Saskatoon, Saskatchewan, Canada, *Vegetable Oils as Biodiesel.*

NAVAM S. HETTIARACHCHY: University of Arkansas, Fayetteville, Arkansas, *Edible Films and Coatings From Soybean and Other Protein Sources.*

DAVID HETTINGA: *Butter.*

STEVEN E. HILL: *Cooking Oils, Salad Oils, and Dressings.*

CHI-TANG HO: Rutgers University, New Brunswick, New Jersey, *Flavor Components of Fats and Oils.*

LUCY SUN HWANG: National Taiwan University, Taipei, Taiwan, *Sesame Oil.*

LAWRENCE A. JOHNSON: Iowa State University, Ames, Iowa, *Soybean Oil.*

LYNN A. JONES: Collierville, Tennessee, *Cottonseed Oil.*

AFAF KAMAL-ELDIN: SLU, Uppsala, Sweden, *Minor Components of Fats and Oils.*

Y.K. KAMATH: *Leather and Textile Uses of Fats and Oils.*

RAKESH KAPOOR: Bioriginal Food and Science Corp., Saskatoon, Saskatchewan, Canada, *Conjugated Linoleic Acid Oils*; *Gamma Linolenic Acid Oils.*

M. KELLENS: De Smet Technologies & Services, Brussels, Belgium, *Deodorization.*

TIMOTHY G. KEMPER: *Oil Extraction.*

C. CLAY KING: Texas Women's University, Denton, Texas, *Cottonseed Oil.*

DAVID D. KITTS: University of British Columbia, Vanuouver, British Columbia, Canada, *Toxicity and Safety of Fats and Oils.*

XIAOHUA KONG: Agri-Food Materials Science Centre, University of Alberta Edmonton, Alberta, Canada, *Vegetable Oils in Production of Polymers and Plastics.*

S. SEFA KOSEOGLU: Extraction and Refining Program, A Division of Filtration and Membrane World LLC, College Station, Texas, *Membrane Processing of Fats and Oils.*

R. G. KRISHNAMURTHY: *Cooking Oils, Salad Oils, and Dressings.*

PAUL KRONICK: *Leather and Textile Uses of Fats and Oils.*

YONG LI: Purdue University, West Lafayette, Indiana, *Dietary Lipids and Health.*

K. F. LIN: *Paints, Varnishes, and Related Products.*

LAN LIN: Extraction and Refining Program, A Division of Filtration and Membrane World LLC, College Station, Texas, *Membrane Processing of Fats and Oils.*

GARY R. LIST: Iowa State University, Ames, Iowa, Storage, *Handling, and Transport of Oils and Fats.*

JERROLD W. LITWINENKO: University of Guelph, Guelph, Ontario, Canada, *Fat Crystal Networks.*

EDMUND E. LUSAS: *Fats and Oils in Feedstuffs and Pet Foods.*

JESSE L. LYNN, JR.: *Detergents and Detergency.*

T. MAG: University of Manitoba, Winnipeg, Manitoba, Canada, *Canola Oil.*

LINDA J. MALCOLMSON: Canadian International Grains Institute, Winnipeg, Manitoba, Canada, *Flavor and Sensory Aspects.*

ALEJANDRO G. MARANGONI: University of Guelph, Guelph, Ontario, Canada, *Fat Crystal Networks.*

NOBORU MATSUO: Kao Corporation, Tochigi, Japan, *Diacylglycerols.*

W. W. MCCALLEY: Agriculture and Agri-Food Canada, Saskatoon, Saskatchewan, Canada, *Vegetable Oils as Biodiesel.*

D. JULIAN MCCLEMENTS: The University of Massachusetts, Amherst, Massachusetts, *Lipid Emulsions.*

B.E. MCDONALD: University of Manitoba, Winnipeg, Manitoba, Canada, *Canola Oil.*

THOMAS A. MCKEON, USDA-ARS Western Regional Research Center, Albany, California, *Transgenic Oils.*

SERPIL METIN: Cargill Inc., Minneapolis, Minnesota, *Crystallization of Fats and Oils.*

DOUGLAS J. METZROTH: *Shortenings: Science and Technology.*

HOMAN MIRALIAKBARI: Memorial University of Newfoundland, St. John's, Newfoundland, Canada, *Tree Nut Oils.*

ROBERT A. MOREAU: United States Department of Agriculture, Agricultural Research Service, *Corn Oil.*

EVANGEKUBE A. MORO: *Coconut Oil.*

HARIKUMAR NAIR: Bioriginal Food & Science Corp., Saskatoon, Saskatchewan, Canada, *Gamma Linolenic Acid Oils.*

SURESH S. NARINE: Agri-Food Materials Science Centre, University of Alberta, Edmonton, Alberta, Canada, *Vegetable Oils in Production of Polymers and Plastics.*

RICHARD D. O'BRIEN: Plano, Texas, *Cottonseed Oil*; *Shortenings: Types and Formulations.*

FRANK T. ORTHOEFER: *Rice Bran Oil.*

JOHN W PARRY: University of Maryland, College Park, Maryland, *Oils from Herbs, Spices, and Fruit Seeds.*

HAROLD E. PATTEE: North Carolina State University, Raleigh, North Carolina, *Peanut Oil.*

ECONOMICO PEDROSA, JR.: *Coconut Oil.*

M. D. PICKARD: *By-Product Utilization.*

A. PROCTOR: University of Arkansas, Fayetteville, Arkansas, *Adsorptive Separation of Oils.*

ROMAN PRZYBYLSKI: University of Manitoba, Winnipeg, Manitoba, Canada, *Canola Oil*; *Flax Oil and High Linolenic Oils.*

COLIN RATLEDGE: Lipid Research Centre, University of Hull, Hull, United Kingdom, *Oils from Microorganisms.*

MARTIN REANEY: Bioriginal Food and Science Corp., Saskatoon, Saskatchewan, Canada, *Conjugated Linoleic Acid Oils.*

M. J. T. REANEY: Agriculture and Agri-Food Canada, Saskatoon, Saskatchewan, Canada, *Vegetable Oils as Biodiesel.*

MIAN N. RIAZ: Texas A&M University, College Station, Texas, *Extrusion Processing of Oilseed Meals for Food and Feed Production.*

GEOFFREY G. RYE: University of Guelph, Guelph, Ontario, Canada, *Fat Crystal Networks.*

KIYOTAKA SATO: Graduate School of Biosphere Science, Hiroshima University, Higashi-Hiroshima, Japan, *Polymorphism in Fats and Oils.*

K. M. SCHAICH: Rutgers University, New Brunswick, New Jersey, *Lipid Oxidation: Theoretical Aspects.*

KEITH SCHROEDER: CC Engineering Ltd., *Glycerine.*

CHARLIE SCRIMGEOUR: Scottish Crop Research Institute Dundee, Scotland, *Chemistry of Fatty Acids.*

S. P. J. NAMAL SENANAYAKE: Martek Biosciences Corporation, Winchester, Kentucky, *Dietary Fat Substitutes*; *Modification of Fats and Oils via Chemical and Enzymatic Methods.*

FEREIDOON SHAHIDI: Memorial University of Newfoundland, St. John's, Newfoundland, Canada, *Antioxidants: Regulatory Status*; *Antioxidants: Science, Technology, and Applications*; *Citrus Oils and Essences*; *Dietary Fat Substitutes*;

Flavor Components of Fats and Oils; *Lipid Oxidation: Measurement Methods*; *Marine Mammal Oils*; *Modification of Fats and Oils via Chemical and Enzymatic Methods*; *Novel Separation Techniques for Isolation and Purification of Fatty Acids and Oil By-Products*; *Quality Assurance of Fats and Oils*; *Tree Nut Oils*.

JOSEPH SMITH: *Safflower Oil.*

VIJAI K.S. SHUKLA: International Food Science Center, Lystrup, Denmark, *Confectionery Lipids.*

VIJAI K.S. SHUKLA: Iowa State University, Ames, Iowa, *Storage, Handling, and Transport of Oils and Fats.*

CLYDE E. STAUFFER: *Emulsifiers for the Food Industry*; *Fats and Oils in Bakery Products.*

CAIPING SU: Iowa State University, Ames, Iowa, *Soybean Oil.*

BERNARD F. SZUHAJ: Szuhaj & Associates LLC, Fort Wayne, Indiana, *Lecithins.*

DENNIS R. TAYLOR: DR Taylor Consulting, Port Barrington, Illinois, *Bleaching.*

FERAL TEMELLI: University of Alberta, Edmonton, Alberta, Canada, *Supercritical Technologies for Further Processing of Edible Oils.*

MICHAL TOBOREK: University of Kentucky, Lexington, Kentucky, *Dietary Lipids and Health.*

SATORU UENO: Graduate School of Biosphere Science, Hiroshima University, Higashi-Hiroshima, Japan, *Polymorphism in Fats and Oils.*

PHILLIP J. WAKELYN: National Cotton Council, Washington, DC, *Cottonseed Oil.*

PETER J. WAN: USDA, ARS, New Orleans, Lowsiana, *Cottonseed Oil.*

P. K. J. P. D. WANASUNDARA: Agriculture and Agri-Food Canada, Saskatoon Research Center, Saskatoon, Saskatchewan, Canada, *Antioxidants: Science, Technology, and Applications*; *Novel Separation Techniques for Isolation and Purification of Fatty Acids and Oil By-Products.*

UDAYA N. WANASUNDARA: POS Pilot Plant Corporation, Saskatoon, Saskatchewan, Canada, *Novel Separation Techniques for Isolation and Purification of Fatty Acids and Oil By-Products.*

TONG WANG: Iowa State University, Ames, Iowa, *Soybean Oil*; *Storage, Handling, and Transport of Oils and Fats.*

BRUCE A. WATKINS: Purdue University, West Lafayette, Indiana, *Dietary Lipids and Health.*

JOCHEN WEISS: The University of Massachusetts, Amherst, Massachusetts, *Lipid Emulsions.*

NEIL D. WESTCOTT: Bioriginal Food and Science Corp., Saskatoon, Saskatchewan, Canada, *Conjugated Linoleic Acid Oils.*

PAMELA J. WHITE: Iowa State University, Ames, Iowa, *Soybean Oil.*

MAURICE A. WILLIAMS: Anderson Corporation, Cleveland, Ohio, *Recovery of Oils and Fats from Oilseeds and Fatty Materials.*

JAMES P. WYNN: Martek Biosciences Corporation, Columbia, Maryland, *Oils from Microorganisms.*

LIANGLI (LUCY) YU: University of Maryland, College Park, Maryland, *Oils from Herbs, Spices, and Fruit Seeds.*

YING ZHONG: Memorial University of Newfoundland, St. John's, Newfoundland, Canada, *Antioxidants: Regulatory Status*; *Citrus Oils and Essences*; *Lipid Oxidation: Measurement Methods*; *Marine Mammal Oils.*

KEQUAN ZHOU: University of Maryland, College Park, Maryland, *Oils from Herbs, Spices, and Fruit Seeds.*

Preface

Oils and fats are important components of foods, and they, or their derivatives and products thereof, play an important role in non-food applications. In food, oils and fats provide a concentrated source of energy as well as a carrier of fat-soluble components. They also serve as a heat transfer medium for food processing and render desirable texture and flavor as well as mouthfeel to products. Oils and fats originate from plant and animal sources. Although plant sources include oilseeds, tropical fruits, and alga, the latter may originate from land-based animals, fish, marine mammals, and derived sources. The main components of food lipids are triacylglycerols, but minor components are also important for quality characteristics, stability, and application areas. Both the type of fatty acids and their degree of unsaturation as well as the type and content of minor components affect the keeping quality of the oil, and certain minor components such as phytosterols might also be used for fingerprinting and authentification of the source materials.

The physical state of fats and oils and their crystal structures are important for application of such products. In addition, formulation of products for special applications such as bakery, confectionary, frying, salad dressing, margarines, and spreads requires special characteristics that make the products suitable for such purposes. Thus, each source material will be important for its physical and chemical characteristics and hence suitability as a food component.

Recent developments in the area of oils and fats has led to the production of specialty lipids from novel sources such as fruit seeds, nuts, and other minor plant sources. In addition, preparation of structured lipids for a myriad of applications has been of interest. Minor components of oils and fats may be isolated during processing and used as nutraceutical and functional food ingredients. Examples are lecithin, phytosterols, tocopherols, and tocotrienols, among others. Obviously, the health-promoting potential of such products is also of interest.

The processing technologies employed for production of fats and oils, and associated components, to make them shelf-stable with acceptable sensory characteristics and flavor as well as secondary processing technologies for production of specific products are important considerations in this area. Food commodities

may be produced, and some components may also be used in animal feed and other applications. There are many areas where oils and fats are used for non-food purposes. Thus, detergents, soaps, glycerine and polymers, inks, lubricants, and biodiesel may be derived from fatty acids and their derivatives. Many applications would provide alternatives to the use of synthetic material or environmentally friendly substitutes in non-food applications.

The sixth edition of Bailey provides a comprehensive description of topics relevant to the oils and fats industry in six volumes as compared with five volumes in the fifth edition. The additional volume (volume 3) is mainly on specialty oils and fats and their byproducts or minor components as well as on those of low-calorie fat substitutes and structured lipids. An article on fish oils and one on marine mammal oils are also included in this volume. However, the material covered in other volumes is often substantially different from the available in the fifth edition as new articles are introduced, and when the title appears the same, substantial updating of the references and introduction of new material has occurred; new authors in some cases have made these contributions. Thus, the first volume includes three new articles on crystallization and physical properties of oils and fats. There are also new articles on antioxidant theory and regulatory status as well as on mechanisms and measurements of lipid oxidation. A new article has been introduced on quality assurance of oils and fats. Meanwhile, the second volume presents the main sources of food lipids, and new articles on sesame oil and rice bran oil have been introduced. The fourth volume provides a description of application areas, and here again new articles on confectinary lipids as well as on frying oils and snack food production have been added. The fifth volume on processing technologies introduces new articles on supercritical, membrane, and extrusion technologies. Finally, the sixth volume on nonedible uses of fats and oils has new articles on biodiesel, hydrolic fluids, lubricants, inks, as well as pharmaceutical and cosmetic uses of lipids. An article on the use of soybean oil in edible film and adhesive production is also included. Thus, the sixth edition is substantially different from what was available in the fifth edition.

I am indebted to many authors for their state-of-the-art contributions as well as to primary and secondary reviewers for different articles. The advisory committee members served an important role in providing invaluable comments. In addition, staff from John Wiley and Sons provided considerable help in different aspects related to production and assembly of the work. This series serves as a primary source of and as a compendium of information on oils and fats for the industry, academia and government scientists, and technical personnel, and as a reference for senior undergraduate and graduate students in food science, nutrition, dietetics, biochemistry, and related disciplines. An integrated table of contents allows better search of materials of interest, and the last volume has a cumulative index. Extensive bibliography throughout the series also provides the reader with the opportunity to consult primary references for additional information.

FEREIDOON SHAHIDI

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