

Contents

List of Contributors *xiii*

Foreword *xxvii*

Jeffrey K. Brecht

About the Editor *xxix*

Introduction *xxxi*

Elhadi M. Yahia

Volume I

Part I Chemistry and Biological Functions 1

- 1 **The Contribution of Fruit and Vegetable Consumption to Human Health** 3
Elhadi M. Yahia, María Elena Maldonado Celis, and Mette Svendsen
- 2 **Anticarcinogenic Phytochemicals** 53
Adriana Cavazos-Garduño, Julio C. Serrano-Niño, Rebeca García-Varela, and Hugo S. García
- 3 **Beneficial Effects of Phytochemicals on the Endocrine System** 67
Juan Carlos Solís-S, Pablo García-Solís, Ludivina Robles-Osorio, and Hebert Luis Hernández-Montiel
- 4 **Phytochemicals Effects on Neurodegenerative Diseases** 85
Hebert Luis Hernández-Montiel, Juan Carlos Solís-S, Pablo-García Solís, Mónica López Hidalgo, Nancy Georgina Hernández Chan, Lorena Asucena García Noguez, Julián Valeriano Reyes López, Ana Gabriela Hernández Puga, Haydé Azeneth Vergara Castañeda, Lorena Méndez Villa, and Nelly Angélica Morales Guerrero
- 5 **Synthesis and Metabolism of Phenolic Compounds** 115
Mikal E. Saltveit
- 6 **Biological Actions of Phenolic Compounds** 125
Ana Elena Quirós Saucedo, Sonia Guadalupe Sáyago-Ayerdi, Jesús Fernando Ayala-Zavala, Abraham Wall-Medrano, Laura A. de la Rosa, Gustavo A. González-Aguilar, and Emilio Álvarez-Parrilla
- 7 **Flavonoids and Their Relation to Human Health** 139
J. Abraham Domínguez-Ávila, Francisco J. Olivas-Aguirre, Laura A. de la Rosa, Abraham Wall-Medrano, and Gustavo A. González-Aguilar

- 8 **Bioaccessibility and Bioavailability of Phenolic Compounds from Tropical Fruits** 155
Gustavo R. Velderrain Rodríguez, Francisco J. Blancas-Benítez, Abraham Wall-Medrano, Sonia Guadalupe Sáyago-Ayerdi, and Gustavo A. González-Aguilar
- 9 **Mangosteen Xanthoness: Bioavailability and Bioactivities** 165
Mark L. Failla and Fabiola Gutiérrez-Orozco
- 10 **Methylxanthines: Dietary Sources, Bioavailability, and Health Benefits** 183
María Raquel Mateos Briz, Beatriz Sarriá Ruiz, and Laura Bravo-Clemente
- 11 **Glucosinolates and Isothiocyanates: Cancer Preventive Effects** 199
Ahmad Faizal Abdull Razis, Asvinidevi Arumugam, and Nattaya Konsue
- 12 **Effect of Soy Isoflavones on DNA Metabolic Enzyme Inhibitory Activity and Anticancer Activity** 211
Yoshiyuki Mizushina and Shinko Hata
- 13 **Tannins in Fruits and Vegetables: Chemistry and Biological Functions** 221
Julio Montes-Ávila, Gabriela López-Angulo, and Francisco Delgado-Vargas
- 14 **Chlorophylls: Chemistry and Biological Functions** 269
Sunil Pareek, Narashans Alok Sagar, Sunil Sharma, Vinay Kumar, Tripti Agarwal, Gustavo A. González-Aguilar, and Elhadi M. Yahia
- 15 **Chemistry, Stability, and Biological Actions of Carotenoids** 285
Elhadi M. Yahia, José de Jesús Ornelas-Paz, Tatiana Emanuelli, Eduardo Jacob-Lopes, Leila Queiroz Zepka, and Braulio Cervantes-Paz
- 16 **Protective Effects of Carotenoids in Cardiovascular Disease and Diabetes** 347
Tatiana Emanuelli, Paula Rossini Augusti, and Miguel Roehrs
- 17 **Betalains: Chemistry and Biological Functions** 383
Armando Carrillo-López and Elhadi M. Yahia
- 18 **Dietary Fiber and Associated Macromolecular Antioxidants in Fruit and Vegetables** 393
Jara Pérez-Jiménez and Fulgencio D. Saura-Calixto
- 19 **Impact of Fruit Dietary Fibers and Polyphenols on Modulation of the Human Gut Microbiota** 405
Ana E. Quirós Saucedo, Ramón Pacheco-Ordaz, Jesús Fernando Ayala-Zavala, Adrián Hernández Mendoza, Aarón F. González-Córdova, Belinda Vallejo-Galland, and Gustavo A. González-Aguilar
- 20 **Lipids in Fruits and Vegetables: Chemistry and Biological Activities** 423
Ramiro Baeza-Jiménez, Leticia X. López-Martínez, Rebeca García-Varela, and Hugo S. García
- 21 **Vitamin E (Tocopherols and Tocotrienols) in Fruits and Vegetables with Focus on Chemistry and Biological Activities** 451
Ibrahim Elmadfa and Alexa L. Meyer
- 22 **Plant Vitamin C: One Single Molecule with a Plethora of Roles** 463
Ifigeneia Mellidou, Athanasios Koukounaras, Fani Chatzopoulou, Stefanos Kostas, and Angelos K. Kanellis

- 23 **Capsaicinoids: Occurrence, Chemistry, Biosynthesis, and Biological Effects** 499
Mathias Kaiser, Inocencio Higuera, and Francisco M. Goycoolea
- 24 **Flavors and Aromas: Chemistry and Biological Functions** 515
Charles F. Forney and Jun Song
- 25 **Recent Advances in Bioactivities of Common Food Biocompounactives** 541
Abdelkarim Guaâdaoui
- 26 **Biomarkers for the Evaluation of Intake of Phytochemicals and Their Bioactive Effect** 595
María Tabernero Urbieto and José C.E. Serrano
- Part II Influence of Postharvest Handling and Processing Technologies, and Analysis of Phytochemicals** 609
- 27 **Influence of Postharvest Technologies and Handling Practices on Phytochemicals in Fruits and Vegetables** 611
Elhadi M. Yahia, María Serrano, Daniel Valero, and Gustavo A. González-Aguilar
- 28 **Phytochemical Changes during Minimal Processing of Fresh Fruits and Vegetables** 629
Gustavo A. González-Aguilar, Jesús Fernando Ayala-Zavala, Laura A. de la Rosa, Emilio Alvarez-Parrilla, A. Thalía Bernal-Mercado, and Cintia Anabela Mazzucotelli
- 29 **Conventional and Novel Thermal Processing Used for the Improvement of Bioactive Phytochemicals in Fruits and Vegetables** 649
Sirithon Siriamornpun and Niwat Kaewseejan
- 30 **Non-thermal Processing Effects on Fruits and Vegetables Phytonutrients** 677
Noor Akhmazillah Mohd Fauzi and Alifdalino Sulaiman
- 31 **Chlorophylls and Colour Changes in Cooked Vegetables** 703
Maria Paciulli, Mariantonella Palermo, Emma Chiavaro, and Nicoletta Pellegrini
- 32 **Pressurized Fluid Extraction of Phytochemicals from Fruits, Vegetables, Cereals, and Herbs** 721
Marleny D.A. Saldaña, Idaresit Ekaette, Carla S. Valdivieso Ramirez, Jane S. dos Reis Coimbra, and Lucio Cardozo-Filho
- 33 **Supercritical Fluid Extraction of Bioactive Compounds from Fruits and Vegetables** 749
Raghuraj Singh, Tushar Dhanani, and Satyanshu Kumar
- 34 **The Use of Non-destructive Techniques to Assess the Nutritional Content of Fruits and Vegetables** 763
Maria L. Amodio, Muhammad M.A. Chaudhry, and Giancarlo Colelli
- 35 **Rapid Estimation of Bioactive Phytochemicals in Vegetables and Fruits Using Near Infrared Reflectance Spectroscopy** 781
Satyanshu Kumar, Raghuraj Singh, and Tushar Dhanani
- 36 **Methods for Determining the Antioxidant Capacity of Food Constituents** 803
María Janeth Rodríguez-Roque, Robert Soliva-Fortuny, and Olga Martín-Belloso

37 Enhancement of Phytochemicals Using Next-Generation Technologies for the Production of High Quality Fruits and Vegetables 817

Bhavneet Kaur, Avtar K. Handa, and Autar K. Mattoo

38 Modeling Shelf Life of Packaged, Ready-to-Eat Fruits and Vegetables with Reference to the Fate of Nutritional Compounds 833

Maria L. Amodio, Antonio Derossi, and Giancarlo Colelli

Volume II

Part III Phytochemicals in Some Fruits and Vegetables 857

39 Ackee (*Blighia sapida* Koenig) 859

Machel A. Emanuel

40 Andean Berry (*Vaccinium meridionale* Swartz) 869

María Elena Maldonado Celis, Yuly Nataly Franco Tobón, Carlos Agudelo, Sandra Sulay Arango, and Benjamin Rojano

41 Berries 883

Luca Mazzoni, Jessica Scalzo, Lucia Di Vittori, Bruno Mezzetti, and Maurizio Battino

42 Bottle Gourd (*Lagenaria siceraria*) 909

Debjani Nath, Pratyusha Banerjee, Mithun Shaw, and Manas Kumar Mukhopadhyay

43 Cacao (*Theobroma cacao* L.) 921

Alfonso A. Gardea, Mónica L. García-Bañuelos, J. Antonio Orozco-Avitia, Esteban Sánchez-Chávez, Bethzabet Sastré-Flores, and Graciela Ávila-Quezada

44 Cactus Pear Fruit and Cladodes 941

Elhadi M. Yahia and Carmen Sáenz

45 Capsicums 957

Puran Bridgemohan, Majeed Mohammed, and Ronell S.H. Bridgemohan

46 Carrots (*Daucus carota* L.) 969

Cielo D. Char

47 Chayote (*Sechium edule* (Jacq.) Swartz) 979

Oscar Andrés Del Ángel Coronel, Elizabeth León-García, Gilber Vela-Gutiérrez, Javier De la Cruz Medina, Rebeca García-Varela, and Hugo S. García

48 Cherimoya (*Annona cherimola* Mill.) 993

Luis M. Anaya-Esparza, Marco V. Ramírez-Marez, Efigenia Montalvo-González, and Jorge A. Sánchez-Burgos

49 Citrus 1003

Ahmed Ait-Oubahou, Mohamed Benichou, Maha Sagar, Amar Kaanane, and Elhadi M. Yahia

50 Dates (*Phoenix dactylifera* L.) 1023

Elhadi M. Yahia, Ahmed Ait-Oubahou, and Mohammad Al Abid

51 Grapes 1041

Alvaro Peña-Neira

- 52 **Grape Bagasse: A Potential Source of Phenolic Compounds** 1055
Fabiola C. Muñoz-De la Cruz, Frida R. Cornejo-García, Nadia M. Vázquez-Díaz, Miriam A. Anaya-Loyola, and Teresa García-Gasca
- 53 **Guava (*Psidium guajava*)** 1067
Francisco J. Blancas-Benitez, Gustavo A. González-Aguilar, and Sonia Guadalupe Sáyago-Ayerdi
- 54 **Indian Gooseberry (*Emblica officinalis* Gaertn.)** 1077
Sunil Pareek, Alexander N. Shikov, Olga N. Pozharitskaya, Valery G. Makarov, Gustavo A. González-Aguilar, Suyare A. Ramalho, and Narendra Narain
- 55 **Loquat (*Eriobotrya japonica* Lindl.)** 1107
Mostafa Z. Sultan
- 56 **Maqui (*Aristotelia chilensis* (Mol.) Stuntz)** 1127
Carolina Fredes and Paz Robert
- 57 **Pecans (*Carya illinoensis*)** 1137
Jose Alberto Gallegos-Infante, Nuria Elizabeth Rocha-Guzman, Ruben Francisco Gonzalez-Laredo, and Martha Rocio Moreno-Jimenez
- 58 **Onion (*Allium cepa* L.)** 1145
Sunil Pareek, Narashans Alok Sagar, Sunil Sharma, and Vinay Kumar
- 59 **Papaya (*Carica papaya*)** 1163
Laura E. Gayosso-García Sancho, Gilber Vela-Gutiérrez, and Hugo S. García
- 60 **Pineapples (*Ananas comosus*)** 1173
Jorge A. Sánchez-Burgos and María de Lourdes García-Magaña
- 61 **Pomegranates (*Punica granatum* L.)** 1179
Asghar Ramezani and Mustafa Erkan
- 62 **Potato and Other Root Crops** 1195
Anne Pihlanto
- 63 **Prunus** 1215
Francisco J. Luna-Vázquez, César Ibarra-Alvarado, Alejandra Rojas-Molina, Juana I. Rojas-Molina and Moustapha Bah
- 64 **Rambutan (*Nephelium lappaceum* L.)** 1227
Muhammad Tayyab Akhtar, Siti Nazirah Ismail, and Khozirah Shaari
- 65 **Rose Apple (*Syzygium jambos* (L.) Alston)** 1235
Manjeshwar Shrinath Baliga, Karkala Shreedhara Ranganath Pai, Elroy Saldanha, Vikram Singh Ratnu, Rashmi Priya, Mohammed Adnan, and Taresh S. Naik
- 66 **Soursop (*Annona muricata*)** 1243
Ana V. Coria-Téllez, Efigenia Montalvo-González, and Eva N. Obledo-Vázquez
- 67 **Sugar Apple (*Annona squamosa*)** 1253
Andrés E. León-Fernández and Efigenia Montalvo-González

- 68 **Tomato (*Solanum lycopersicum*)** 1259
*Elizabeth León-García, Oscar Andrés Del Ángel Coronel, Gilber Vela-Gutiérrez,
Javier De la Cruz Medina, and Hugo S. García*
- 69 **Wild and Cultivated Mushrooms** 1279
Pirjo H. Mattila, Pertti Marnila, and Anne Pihlanto
- 70 **Phytochemicals in Organic and Conventional Fruits and Vegetables** 1305
*Giuseppina Pace Pereira Lima, Cristine Vanz Borges, Fabio Vianello,
Luis Cisneros-Zevallos, and Igor Otavio Minatel*
- 71 **Recent Advances in Phytochemicals in Fruits and Vegetables** 1323
Fereidoon Shahidi, Priyatharini Ambigaipalan, and Anoma Chandrasekara
- Index** 1357