International Society for Nutraceuticals and Functional Foods

**ISNFF Newsletter** **Volume 15, Issue 2**

**December 2022**

## CONTENT



## MESSAGE FROM THE ISNFF

As the 2022 year winds to a close, we are pleased to offer our best wishes for the holiday season and New Year. While many activities are returning to normal, we recognize the pandemic continues to impact the health and wellness of many of our members. We sincerely wish you the best of health and prosperity in the new year.


The society is pleased to return to an in-person meeting, the **14th International Conference and Exhibition on Nutraceuticals and Functional Foods** was held in October 2-5, 2022 at the Crowne Plaza İstanbul-Asia Hotel & Convention Center in İstanbul-Türkiye. The ISNFF 2022 Conference and Exhibition included participation of delegates from 28 different countries with 134 oral and 83 poster presentations. These were scheduled into 3 plenary, 23 regular and 1 poster sessions. The Conference gathered nearly 400 participants from around the globe. There were also 16 sponsors and exhibitors.

Many thanks to Dr. Cesarettin Alasalvar, the conference Co-chair as well as the local organizing committee. The 2022 conference of the ISNFF was organized as an activity of the Horizon 2020 – PhenolAcTwin Project, coordinated by TÜBİTAK MAM. In addition, the Food Innovation Platform of Turkey (TÜGİP), established by TÜBİTAK MAM, supported participation at the conference.

We are excited to announce the location and venue of the 2023 meeting will be the Sheraton Princess Kaiulani in Honolulu, Hawaii on December 10-14. We hope to meet you there!

Sincerely,

Dr. Fereidoon Shahidi (Principal Founder and Executive Board Members of ISNFF)
Dr. Bradley Bolling (ISNFF Chair)




## SCIENTIFIC REVIEW ARTICLES

### Cannabis Chemistry and Perspectives of Cannabis Edibles in the Food Market

Han Peng
Department of Biochemistry, Memorial University of Newfoundland,
St. John's, NL, Canada A1C 5S7

The cannabis plant is one of the oldest sources of food and textile fiber in Eurasia, but now it is globally cultivated and distributed; mainly referred to as "*Cannabis sativa*" and "*Cannabis indica*", or rarely "*Cannabis ruderalis*". The known secondary metabolites of cannabis are relatively diverse. So far, at least 120 phytocannabinoids and 445 other phytochemicals covering non-cannabinoid terpenoids, non-cannabinoid phenolics, fatty acids, polysaccharides, and alkaloids, among others, have been updated from compositional studies of cannabis.[1] The phytocannabinoids belong to a class of natural terpenophenolic compounds with skeletons consisting of one monoterpene moiety ($C_{10}H_{15}$) and one alkyl resorcinol moiety ($C_1H_3/C_3H_7/C_4H_9/C_5H_{11}/C_7H_{15}$-$C_6H_5O_2$).[2] They are the dominant secondary metabolites of cannabis, among which, the levels of two cannabinoids, namely cannabidiol (CBD) and tetrahydrocannabinol (△9-/△8-THC), have been extensively manipulated for medicinal, recreational, or functional formulations based on the primary proof of their biopotency. Worth noting, these two cannabinoids are subjected to significant non-enzymatic degradation/conversion, including decarboxylation, oxidation/oligomerization, and cyclization, all of which pose challenges to the quality maintenance of pharmaceutical and bioactive properties of cannabis edibles and need further investigation.

The △9-/△8-THC is the principal (but not the only one) psychoactive constituent dominating the content of cannabinoids and responsible for the high affinity in activating the cannabinoid receptors ($CB_1$ and $CB_2$ receptors). In contrast, CBD may antagonistically modify the effect of activation of $CB_1$ receptor taken by other agonists. The psychotropic potential of cannabinoids is generally manifested by the binding affinity as well as the binding effect on the $CB_1$ receptor. Beyond the canonical $CB_1$ and $CB_2$ receptors, cannabinoids may also activate/antagonize/inversely activate other receptors in the low nanomolar range. These include *β*-adrenoceptor, *μ*-opioid receptors, PPAR*γ* nuclear receptor. They may also inhibit/activate various channels such as GPR18/55/119 channels, 5-$HT_{1A}$/5-$HT_{3A}$ ligand-gated ion channels, TRPV1/2/3/4 cation channels, and potassium $K_v$1.2 /T-type calcium ($Ca_v$3)/sodium voltage-gated ion channels.[1, 3] Moreover, there is also plenty of *in vivo*/*in vitro* evidence to show the significant enzyme-inhibition effects, especially on cyclooxygenase-1/2 (COX-1/2), N-acylethanolamine-hydrolyzing acid amidase (NAAA), fatty acid amide hydrolase (FAAH), several phase I enzymes, and various lipases (monoacylglycerol lipase, diacylglycerol lipase α, and phospholipase A2).[4] These properties enable cannabinoids to function with positive or/and negative effects on psychophysiological performance (e.g., regulation of appetite, emotion, cognition, executive functioning) and pathophysiological status (e.g., regulation of oxidative stress, inflammation, immunity, schizophrenia, bipolar disorder, and cancer progression) in the human body.[1, 3, 5, 6] The potential of cannabis or cannabinoids as functional food or ingredients is of much interest to the food/pharmaceutical manufacturers and end consumers in today's market.

As mentioned, due to THC and CBD's bioactive properties, cannabis has been used for both pharmaceutical and recreational purposes. To date, approximately 53 countries/territories decriminalized or unenforced the minor possession/personal non-medical use of cannabis or its derivatives.[7] However, personal possession and consumption of non-medical cannabis products have only been legalized in Uruguay (2013), South Africa (2018, public consumption/sale prohibited), Georgia (2018, public consumption/cultivation/sale prohibited), Canada (2018), and Thailand (2022, plant only, related derivatives prohibited). In the scope of non-medical use of cannabis, domestic or even commercial products of cannabis food/beverage have become a popular alternative to smoking/vaping and are being consumed more than ever, despite the lack of specific laws regulating cannabis edible in most states in the US or other countries which have tolerated/decriminalized or legalized possession and use of recreational cannabis.[8-11]. In the market, cannabis edibles can be divided into edible cannabis and cannabinoids-infused edibles; Canada is the only federal government leading the systemic categorization, development, and standardization of manufacturing protocols and quality assurance of these cannabis edibles. Similarly, the result of the 2018 Canadian Cannabis Survey suggests that eating cannabis food had already become the second most popular way and was consumed by 42% of cannabis users as compared to 34% in 2017.[12] All of these data show the potential for the future cannabis edibles market.

In summary, the modernized application of cannabis and its derivatives in food and beverage has crossed the start line but is still far from maturation. The tendency to legalize recreational cannabis and cannabis food will be expected to popularize in more states/territories in Asia, Europe, and North America. Considering the emerging debates on cannabis chemistry, much more fundamental work on maintaining the consistency of levels of functional properties and sensory properties and validating the extraction/purification/analysis techniques for products' safety/authentication/discrimination is waiting to be pursued. However, caution must be exercised for cannabinoids' prisoning accidents and harmful effects of cannabis on the brain especially in the younger generation.

## References


1. Peng, H.; Shahidi, F., Cannabis and cannabis edibles: A review. *J. Agric. Food Chem.* **2021,** *69* (6), 1751-1774.
2. ElSohly, M.; Gul, W. J. H. o. c., Constituents of cannabis sativa. **2014,** *3*, 1093.
3. Pertwee, R. G., *Handbook of cannabis*. Oxford University Press, USA: **2014**.
4. Russo, E. B.; Marcu, J., Cannabis pharmacology: the usual suspects and a few promising leads. In *Advances in pharmacology*, Elsevier: **2017**; Vol. 80, pp 67-134.
5. National Academies of Sciences, E.; Medicine, The health effects of cannabis and cannabinoids: the current state of evidence and recommendations for research. **2017**.
6. Bifulco, M.; Laezza, C.; Pisanti, S.; Gazzerro, P. J. B. j. o. p., Cannabinoids and cancer: pros and cons of an antitumour strategy. **2006,** *148* (2), 123-135.
7. Wikipedia The legalization of cannabis. https://en.wikipedia.org/wiki/Legality_of_cannabis.
8. Borodovsky, J. T.; Lee, D. C.; Crosier, B. S.; Gabrielli, J. L.; Sargent, J. D.; Budney, A. J., US cannabis legalization and use of vaping and edible products among youth. *Drug Alcohol Depend.* **2017,** *177*, 299-306.
9. Friese, B.; Slater, M. D.; Battle, R. S., Use of marijuana edibles by adolescents in California. *J Prim Prev.* **2017,** *38* (3), 279-294.
10. Charlebois, S.; Somogyi, S.; Sterling, B., Cannabis-infused food and Canadian consumers' willingness to consider "recreational" cannabis as a food ingredient. *Trends Food Sci. Technol.* **2018,** *74*, 112-118.
11. Giombi, K. C.; Kosa, K. M.; Rains, C.; Cates, S. C. J. S. U.; Misuse, Consumers' perceptions of edible marijuana products for recreational use: likes, dislikes, and reasons for use. **2018,** *53* (4), 541-547.
12. Government-of-Canada Regulations Amending the Cannabis Regulations (New Classes of Cannabis): SOR/2019-206. http://www.gazette.gc.ca/rp-pr/p2/2019/2019-06-26/html/sor-dors206-eng.html (accessed 2022-11-09).





**Discovery of Novel Bioactives Elevates the Need for Recommended Intakes at a Population Level**

Jan-Willem van Klinken, Medical, Scientific & Regulatory Affairs, Brightseed, 201 Haskins Way, South San Francisco, CA, USA

**Health Benefits of Plant Bioactives:** Plant bioactives can be found in numerous plant foods and beverages. Published literature recognizes presence of more than 5000 known bioactives in plants [1].

In a study of an indigenous population in Panama, it was shown that 600-900mg of cocoa polyphenols daily helped minimize age-related increases in hypertension and cardiovascular disease (CVD). Purified epicatechin consumption (1 or 2mg/kg body weight) was demonstrated to enhance flow-mediated vasodilation (FMD) and increase microcirculation[2]. Guideline recommendations through an expert panel demonstrated moderate evidence in favor of flavan-3-ols intake (400-600 mg/d) for cardiometabolic protection[3]. A daily intake of 800 mg polyphenols/day through green-Med diet in comparison to 440 mg showed a significantly greater decline in intrahepatic fat and overall Non-alcoholic Fatty Liver Disease (NAFLD) prevalence[4]. Administration of a combination of Berberine and Fenugreek seed powder (500mg/d) was found to significantly decrease fasting insulin, HbA1C, and hs-CRP in subjects with T2D[5]. Other studies have also demonstrated neuroprotective, anti-aging, and antimicrobial properties of plant bioactives[6,7,8].

**Missing pieces of Bioactive puzzle:** Despite their noticeable role in human health, bioactives lack a universally accepted definition. Additionally, there is no consensus on the value of bioactives in human health and therefore no dietary recommendations for bioactives; it's impossible for the general population to gauge adequate intake. Although there is strong recognition of the role of bioactives in human health, bioactive compounds do not qualify for FDA's new proposal for the definition of 'healthy'.

Artificial Intelligence now enables high-throughput connection between human health and plant ingredients. Rapid discovery must be met with rapid validation for efficacy and safety.

**Filling the Gaps**: The role of bioactives needs to be brought to light by government and industry alike. Recognition of bioactives as part of the new FDA proposed 'healthy' definition is extremely important. Government's role in supporting and helping accelerate human clinical studies of bioactives is critical. Industry initiatives like upcycling agricultural waste products, optimizing sourcing and selection of common crops, and optimizing production processes can help increase nutrition value and varietal diversity and ultimately bioactive richness.




## References


1. Wallace et al. (2020) Fruits, vegetables, and health: A comprehensive narrative, umbrella review of the science and recommendations for enhanced public policy to improve intake. *Critical Reviews in Food Science and Nutrition*, 60:13, 2174-2211.
2. Schroeter et al. (2005) (-)-Epicatechin mediates beneficial effects of flavanol-rich cocoa on vascular function in humans. *PNAS*, 103(4):1024-1029.
3. Crowe-White et al. (2022) Flavan-3-ols and cardiometabolic health: First ever Dietary Bioactive Guidline. *Adv Nutr* 2022;0:1–14.
4. Yaskolka Meir A, et al. (2021) Effect of the green-Mediterranean diet on intrahepatic fat: the DIRECT PLUS randomized controlled trial. *Gut*, 70:2085–2095.
5. Nematollahi et al. (2022) The effect of berberine and fenugreek seed co-supplementation on inflammatory factor, lipid and glycemic profile in patients with type 2 diabetes mellitus: a double-blind controlled randomized clinical trial. *Diabetology & Metabolic Syndrome*, 14:120.
6. Grodzicki & Dziendzikowska (2020) The role of selected bioactive compounds in the prevention of Alzheimer's Disease. *Antioxidants*, 9:229.
7. Machida et al. (2020) Clinical effects of dietary supplementation of lutein with high bio-accessibility on macular pigment optical density and contrast sensitivity: a randomized double-blind placebo-controlled parallel-group comparison trial. *Nutrients*, 12:2966.
8. Occhipinti et al. (2016) Prevention of urinary tract infection with Oximacro®, a cranberry extract with a high content of A-type proanthocyanidins: A pre-clinical double -blind controlled study. *Miscellaneous*, 13(2):2640.





## THE ANNUAL GENERAL MEETING (AGM)

The AGM was held on October 4, 2022 with participation of members present and received the activities of the society and its current status as well as journal activities. The new members of the executive board were elected and these are as follows:

| | |
|---|---|
| **Chair** | Dr. Bradley Bolling (USA) |
| **Chair Elect** | Dr. Jianping Wu (Canada) |
| **Past Chair** | Dr. Rotimi Aluko (Canada) |
| **Treasurer** | Dr. Jerzy Zawistowski (Canada) |
| **Secretary** | Dr. Ron Pegg (USA) |
| **Director** | Dr. Fereidoon Shahidi (Canada) |
| **Awards** | Dr. Chi-Tang Ho (USA) |
| **Members-at-Large** | Dr. Cesarettin Alasalvar (Turkey) |
| | Dr. Charles Hu (USA) |
| | Dr. Amin Ismail (Malaysia) |
| | Dr. You-Jin Jeon (Republic of Korea) |
| | Dr. Kenji Sato (Japan) |
| | Dr. Rong Tsao(Canada) |
| | Dr. Rimantas Venskutonis (Lithuania) |
| | Dr. Jiankang Wang (China) |
| | Dr. Chin-Kun Wang (Taiwan) |
| | Dr. Hanny Wijaya (Indonesia) |



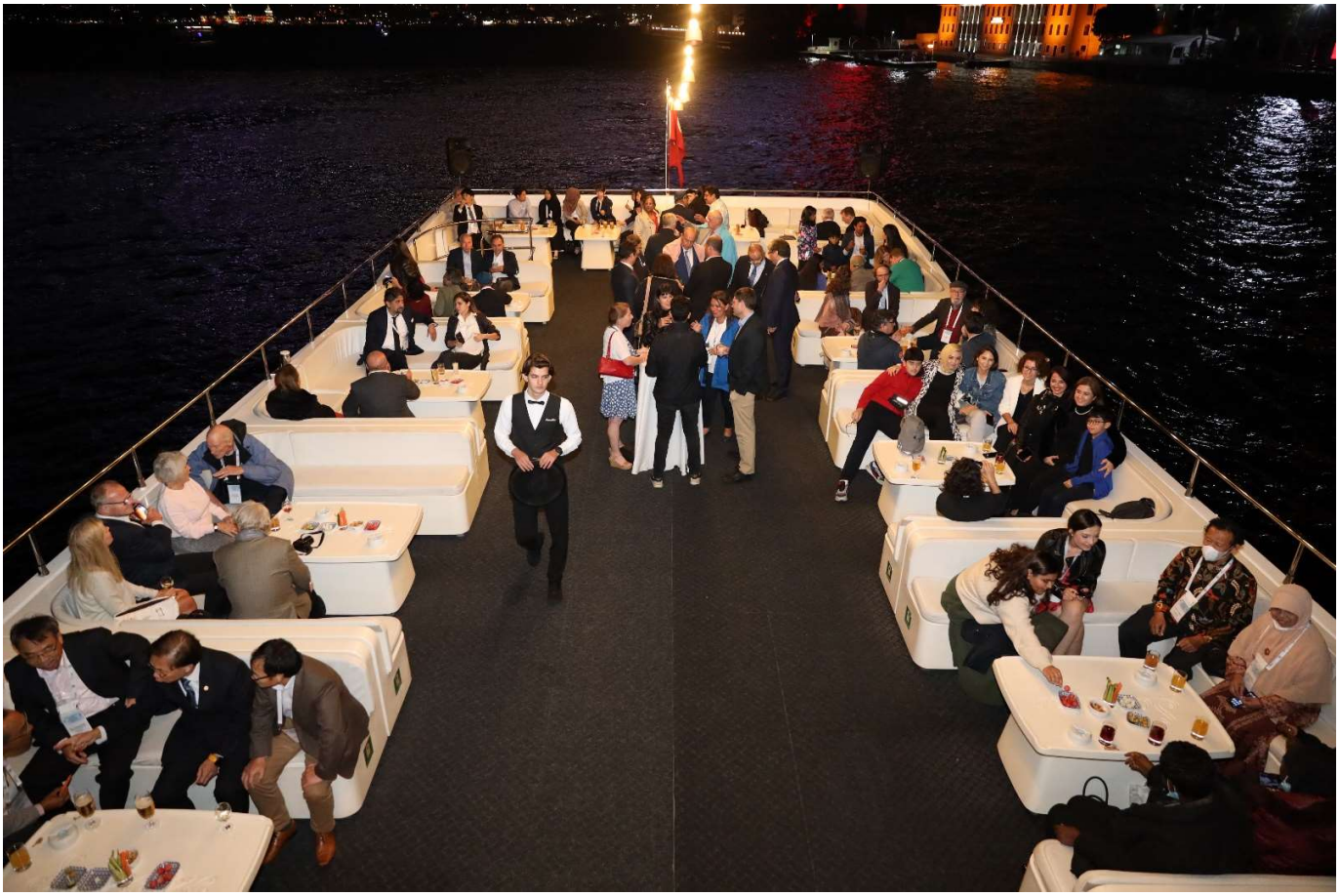

## HIGHLIGHTS FROM ISNFF 2022 ANNUAL CONFERENCE & EXHIBITION

The 2022 Conference, held in İstanbul, Türkiye, provided the opportunity to hear world-class researchers and to meet old friends and make new ones.




2022 Annua
& Ex
Functio
Nutraceutical
Products,
Supp
October 2-5, 202


ISNFF
2022 Annual Conference
& Exhibition
Functional Foods,
Nutraceuticals, Natural Health
Products, and Dietary
Supplements
October 2-5, 2022 / Istanbul - Türkiye
IUFoST







ISNFF
2022 Annual Conference
& Exhibition
Functional Foods,
Nutraceuticals, Natural Health
Products, and Dietary
Supplements
TÜGiP

## CONGRATULATIONS TO THOSE WHO RECEIVED AWARDS AT ISNFF 2022

Dr. Jerzy Zawistowski (University of British Columbia, Canada) received the **ISNFF Merit Award** for his outstanding contributions to the field of functional foods and service to the ISNFF**.**

The **ISNFF Fellow Award** is a unique professional distinction conferred only on a living person with outstanding and extraordinary qualifications and experience for overall contributions in the field of functional foods and nutraceuticals. We congratulate the awardees of this year: Dr. Amin Ismail (Universiti Putra Malaysia, Malaysia), Dr. Rotimi Aluko (University of Manitoba, Canada), and Dr. You-Jin Jeon (Jeju National University, Republic of Korea).

The **Industry Merit Award Winner** was ÜLKER, Türkiye

## CONGRATULATIONS TO THE STUDENT FLASH TALK COMPETITION WINNERS

We celebrated these awards with the student flash talk competition winners


**First place** was awarded to Julia Haarhuis (Quadram Institute Bioscience, UK). **Second Places** were awarded to Sri Wijanarti (Kyoto University, Japan), Aytül Hamzalıoğlu (Hacettepe University, Türkiye), and Nancy Asen (University of Manitoba, Canada). **Third Places** were awarded to: Nisansala Madushani Liyanage (Jeju National University, Republic of Korea), Jiamei Cui (Jeju National University, Republic of Korea), Gizem Özan (Yeditepe University, Türkiye), Thi Ty Na Ngo (Memorial University of Newfoundland, Canada), Atsuya Nagao (Kyoto University, Japan), Ayşenur Çataler Karakuş (Gebze Technical University, Türkiye), Satoshi Miyauchi (Kyoto University, Japan), Martina Minestrini (Luxembourg Institute of Science and Technology, Luxembourg), Nour Awad (Ondokuz Mayıs University, Türkiye), Beyza Vahapoğlu (İstanbul Technical University, Türkiye), Ecem Evrim Çelik (Hacettepe University, Türkiye), Cemile Yılmaz (Hacettepe University, Türkiye), and Niloofar Shekoohi (University of Limerick, Ireland).

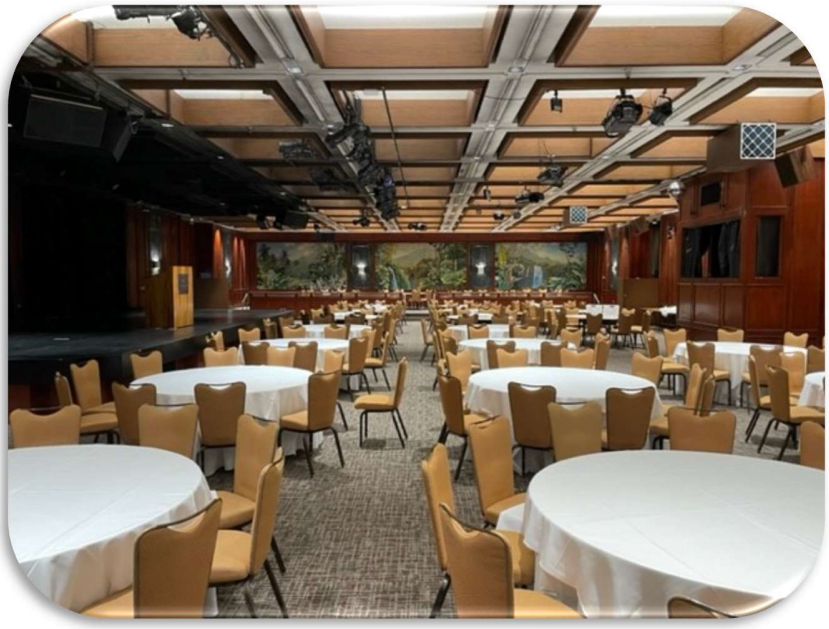
## THANKS TO ISNFF 2022 SPONSORS





## ISNFF 2023 CONFERENCE & EXHIBITION

The ISNFF 2023 will be held at the **Sheraton Princess Kaiulani Hotel**, between December 10 and 13, 2023, in Honolulu, Hawaii, USA. More information about the conference will be given in due course. Information about hotel can be found at: https://www.marriott.com/en-us/hotels/hnlks-sheraton-princess-kaiulani/overview/

## Important Dates

**Registration/abstract submission opens:** March 1, 2023
**Early-bird registration deadline:** August 1, 2023
**Abstract submission deadline:** June 30, 2023
**Regular registration deadline:** October 31, 2023

# POTANTIAL ISNFF 2023 CONFERENCE TOPICS

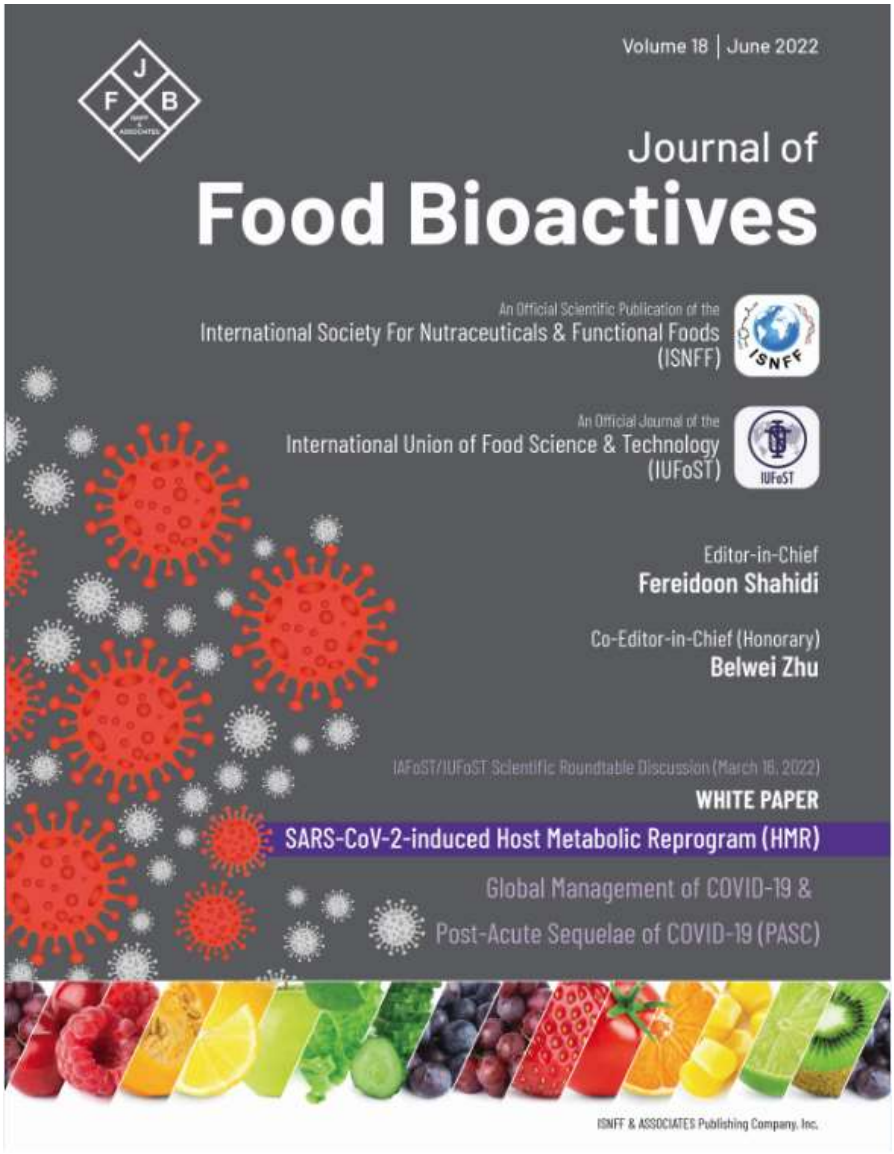
Nutraceutical and Functional Food Science from Molecular to Human Studies

| **Sources & Product** | **Food Bioactives** |
|---|---|
| Fermented Foods and Beverages<br>Fruits and Vegetables<br>Herbs and Spices<br>Marine Products<br>Tea, Coffee, and Cocoa<br>Soy and Legumes<br>Others | Human Studies of Food Bioactives<br>Bioactive Amino Acids, Peptides, and Proteins<br>Functional Carbohydrates<br>Functional Lipids<br>Carotenoids and Other Natural Pigments<br>Polyphenols<br>Sulphur Compounds<br>Probiotics, Prebiotics, and Postbiotics<br>Vitamins and Minerals<br>Others |
| **Functions & Mechanisms** | **Others** |
| Gastrointestinal Health and Diseases<br>Anti-inflammation<br>Allergy and Immune Modulation<br>Metabolic Syndrome, Obesity, and Diabetes<br>Cardiovascular Health<br>Brain, Skin, and Bone Health<br>Muscle Atrophy and Locomotive Syndrome<br>Cancer Chemoprevention<br>Nutritional Regulation of Epigenetics<br>Antioxidant and Redox Regulation<br>Molecular Targets of Food Factors<br>Chronobiology and Nutrition/Food<br>Exosome and MicroRNA<br>Autophagy<br>Hormesis<br>Others | Analytical Methods and Omics Technologies<br>Biomarkers<br>Epidemiology<br>Taste, Olfaction, and Sensory Aspects<br>R&D of Functional Foods, Nutraceuticals, and Dietary Supplements |




## UPDATES ON SOCIETY JOURNALS

**The Journal of Food Bioactives** (JFB), a dedicated publication of ISNFF, was launched in 2018 and completed another successful year with many reviews and original manuscripts. Please note that papers presented during ISNFF Conference and Exhibition may be submitted for publication consideration to the Journal of Food Bioactives <isnff-jfb.com>. To review the published manuscripts please refer to the journal web-site. The fourth issue of journal will be released later this month. We have also moved to Scholar One Software for better ease of operation.




Meanwhile, the first journal of ISNFF, the Journal of Functional Foods, a collaborative effort with Elsevier was taken over by the publisher and now renamed as JFF as an open access journal.




# UPCOMING NUTRACEUTICALS AND FUNCTIONAL FOODS EVENTS

## 2023

**January 2023**
31-2/2 Berry Health Benefits Symposium; Tampa Bay, Florida, USA

**March 2023**
26-30 American Chemical Society Spring 2023 (Hybrid); Indianapolis, Indiana, USA

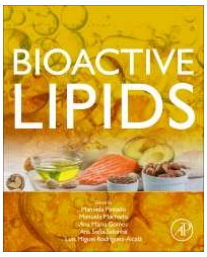
**July 2023**
3-6 XXXI International Conference on Polyphenols: Nantes, France.
16-19 IFT FIRST Annual Meeting; Chicago, Illinois, USA.
22-25 ASN Nutrition 2023; Boston, Massachusetts, USA

**August 2023**
13-17 American Chemical Society Fall 2023 Meeting; San Francisco, California, USA

**September 2023**
26-28 Polyphenols Applications 2023; Lisbon, Portugal

**December 2023**
10-14 ISNFF 2023 Annual Conference & Exhibition; Honolulu, Hawaii, USA

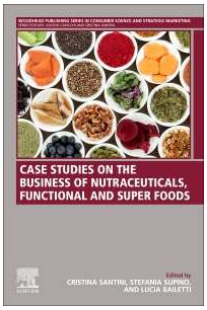
# NEW TITLES




**Bioactive Lipids**

*Manuela Pintado, Manuela Machado and others*

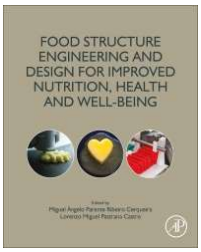
September 2022
Academic Press
978-0-12-824043-4




**Case Studies on the Business of Nutraceuticals, Functional and Super Foods**

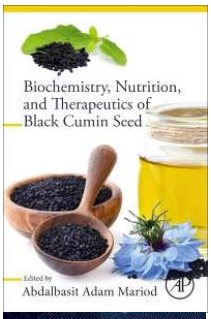
*Cristina Santini, Stefania Supino and Lucia Bailetti*

September 2022
Academic Press
978-0-12-821408-4



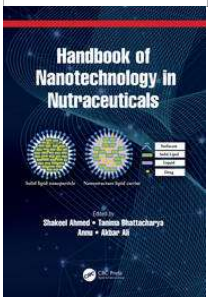

**Food Structure Engineering and Design for Improved Nutrition, Health and Well-being**

*Miguel Cerqueira and Lorenzo Pastrana Castro*
October 2022
Academic Press
978-0-323-85513-6




**Biochemistry, Nutrition, and Therapeutics of Black Cumin Seed**

Abdalbasit Adam Mariod
November 2022
Academic Press
9780323907880




**Handbook of Nanotechnology in Nutraceuticals**

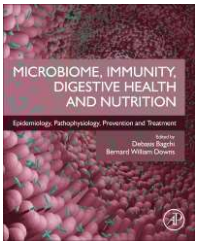
*Edited By Shakeel Ahmed, Tanima Bhattacharya, Annu, Akbar Ali*
November 2022
CRC Press
9781032127910





**Herbs, Spices and Their Roles in Nutraceuticals and Functional Foods**

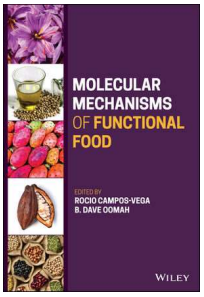
*Augustine Amalraj, Sasikumar Kuttappan and more*
November 2022
Academic Press
978-0-323-90794-1




**Microbiome, Immunity, Digestive Health and Nutrition**

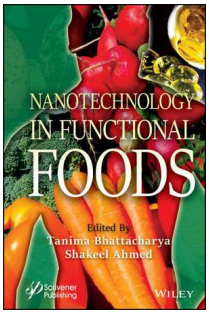
*Debasis Bagchi and Bernard William Downs*

July 2022
Academic Press
978-0-12-822239-3



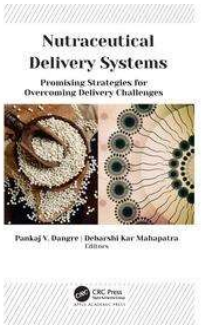

**Molecular Mechanisms of Functional Food**

*Rocio Campos-Vega (Editor), B. Dave Oomah (Editor)*
September 2022
Wiley
978-1-119-80404-8




**Nanotechnology in Functional Foods**

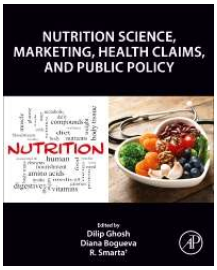
*Tanima Bhattacharya (Editor), Shakeel Ahmed (Editor)*
July 2022
Wiley
978-1-119-90503-5




**Nutraceutical Delivery Systems Promising Strategies for Overcoming Delivery Challenges**

*Edited By Pankaj V. Dangre, Debarshi Kar Mahapatra*
August 2022
CRC Press
9781774637166

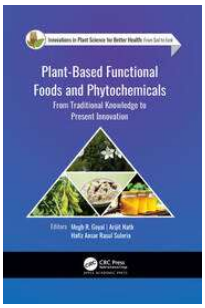



**Nutrition Science, Marketing Nutrition, Health Claims, and Public Policy**

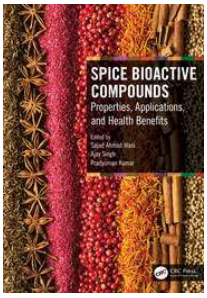
*Dilip Ghosh, Diana Bogueva and R. Smarta*

September 2022
Academic Press
978-0-323-85615-7




**Plant-Based Functional Foods and Phytochemicals From Traditional Knowledge to Present Innovation**

*Edited By Megh R. Goyal, Arijit Nath, Hafiz Ansar Rasul Suleria*
November 2022
CRC Press
9781774637784




**Spice Bioactive Compounds: Properties, Applications, and Health Benefits**

*Edited By Sajad Ahmad Wani, Ajay Singh, Pradyuman Kumar*
October 2022
CRC Press
9781032062914




International Society for Nutraceuticals & Functional Foods

## MEMBERSHIP APPLICATION 2023

| | | |
|---|---|---|
| **Last Name:** _____ **First Name:** _____ | | |
| Membership #: ISNFF- | | |
| Company / Institution / University: | | |
| Address: | | |
| | | |
| Telephone: ( ) | Fax: ( ) | |
| Email address: | | |

| | | |
|---|---|---|
| **New Membership** | | ☐ |
| **Renewal** | | ☐ |
| **Cancel Membership** | | ☐ |
| **Member** | **$95** | ☐ |
| **Student Member** | **$45** | ☐ |
| **Corporate Member** | **$2,000** | ☐ |
| **Corporate Member (Renewal)** | **$500** | ☐ |
| **Affiliate and Chapter Member** | **$2,000** | ☐ |

**Payment Method:**

Money Order: ☐

Credit Card: VISA ☐ MASTERCARD ☐

Credit Card #: _____

Card Holder: _____

Expiry Date: _____

Please complete form and return to:

ISNFF, P.O. Box 29095, 12 Gleneyre Street, St. John's, NL, A1A 5B5 Canada
Or scan and forward by Email: ISNFFsecretary@gmail.com