Food

1- Antibiotics and Food Safety in Aquaculture

By:
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Abstract

Antibiotics are widely used in aquaculture. Intensive farming drives indiscriminate use of antibiotics, which results in residues of antibiotics in cultured aquatic products and bacterial resistance. This perspective attempts to present a brief update on usage, regulations, residues, and potential human health risk of antibiotics used in aquaculture. Through the comprehensive literature review, we provide a view that the safety of aquatic products still requires further attention and more rigorous risk assessment. Finally, we make a few suggestions for future research directions: reduce the use of antibiotics to bring down the speed of resistance development and monitor resistant pathogens and genes, strictly manage the environmental sanitation of aquaculture and pay attention to the quality of water bodies introduced into aquaculture, seek international cooperation to establish an information bank of antibiotic residues and antibiotic-resistant genes, and set up a quantitative model to assess the risk of antibiotic resistance associated with the antibiotic residues.

Keywords
Author Keywords
antibioticsfood safetyaquaculture
Keywords Plus

Food

HEALTH-RISK ASSESSMENTCULTURED FISHTAI LAKEANTIMICROBIAL RESISTANCEVETERINARY ANTIBIOTICSANALYTICAL STRATEGIESAQUATIC ENVIRONMENTTISSUE DISTRIBUTIONWITHDRAWAL PERIODNILE TILAPIA

Food

2- Active and intelligent biodegradable packaging films using food and food waste-derived bioactive compounds: A review

By:
Bhargava, N (Bhargava, Nitya) [1] ; Sharanagat, VS (Sharanagat, Vijay Singh) [1] ; Mor, RS (Mor, Rahul S.) [1] ; Kumar, K (Kumar, Kshitiz) [2]
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Abstract

Background: The growing environmental concern of plastic packaging disposal has led to the innovation of biodegradable biopolymers. Consumer demand and health concern further necessitate the emergence of active and intelligent packaging system to monitor the quality of packed food. Whereas, the use of chemical dyes as an indicator in smart packaging is not suitable for food packaging because of their high toxicity and harmful effects on human health and the environment. Hence, the researchers are focused on natural pigments derived from plants and food waste as indicating substance in biodegradable packaging and also for the valorization of food waste.

Scope and approach: This paper summarizes the research on the utilization of naturally derived food- and food waste-based pigments (anthocyanins, curcumin, betalains, carotenoids, chlorophyll, brazilin, quercetin, etc.) with biopolymeric matrices (starch, cellulose, chitin, gums, agar, etc.) to fabricate "smart biodegradable films", for effective monitoring of spoilage and quality of meat products, seafood, milk, and others.

Key Findings and Conclusions: The results show that the smart packaging material developed by the biopolymers with plant-based pigment has the potential to replace the traditional plastic packaging materials. The extracted from food and food waste act as an indicator in smart packaging and promotes the valorization of food waste. The biodegradable packaging is economical, safe, non-toxic, sensitive, and natural pigments act as a quality indicator in packaging systems. Further, these packaging films can be

optimized and commercialized and to be employed as active and intelligent packaging for visual quality evaluation of fresh food products.

Keywords
Author Keywords
Active packagingIntelligent packagingFood wasteBioactive compounds
Keywords Plus
PH-SENSITIVE FILMSKAPPA-CARRAGEENANCASSAVA STARCHANTIOXIDANT PROPERTIESROSELLE ANTHOCYANINSPHENOLIC-COMPOUNDSPOLYVINYL-ALCOHOLOXIDATIVE STRESSRED CABBAGENATURAL DYE

3- The future of food from the sea

By:
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Abstract

Global food demand is rising, and serious questions remain about whether supply can increase sustainably(1). Land-based expansion is possible but may exacerbate climate change and biodiversity loss, and compromise the delivery of other ecosystem services(2-6). As food from the sea represents only 17% of the current production of edible meat, we ask how much food we can expect the ocean to sustainably produce by 2050. Here we examine the main food-producing sectors in the ocean-wild fisheries, finfish mariculture and bivalve mariculture-to estimate 'sustainable supply curves' that account for ecological, economic, regulatory and technological constraints. We overlay these supply curves with demand scenarios to estimate future seafood production. We find that under our estimated demand shifts and supply scenarios (which account for policy reform and technology improvements), edible food from the sea could increase by 21-44 million tonnes by 2050, a 36-74% increase compared to current yields. This represents 12-25% of the estimated increase in all meat needed to feed 9.8 billion people by 2050. Increases in all three sectors are likely, but are most pronounced for mariculture. Whether these

production potentials are realized sustainably will depend on factors such as policy reforms, technological innovation and the extent of future shifts in demand.
Modelled supply curves show that, with policy reform and technological innovation, the production of food from the sea may increase sustainably, perhaps supplying 25% of the increase in demand for meat products by 2050.

Keywords
Keywords Plus
AQUACULTUREFISHFISHERIESGROWTH

Food

4- Essential oils as additives in active food packaging

By:
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Abstract

Food packaging can be considered as a passive barrier that protects food from environmental factors such as ultraviolet light, oxygen, water vapour, pressure and heat. It also prolongs the shelf-life of food by protecting from chemical and microbiological contaminants and enables foods to be transported and stored safely. Active packaging (AP) provides the opportunity for interaction between the external environment and food, resulting in extended shelf-life of food. Chemoactive packaging has an impact on the chemical composition of the food product. The application of natural additive such as essential oils in active packaging can be used in the forms of films and coatings. It has been observed that, AP helps to maintain temperature, moisture level and microbial and quality control of the food. This review article provides an overview of the active packaging incorporated with essential oils, concerns and challenges in industry, and the effect of essential oil on the packaging microstructure, antioxidant and antimicrobial properties.

Keywords
Author Keywords
Essential oilsFood packagingActive food packagingShelf lifeAntimicrobial activityAntioxidant propertyFood safety
Keywords Plus
EDIBLE FILMSINCLUSION COMPLEXANTIOXIDANTEXTRACTIONCELLULOSECOATINGSNANOEMULSIONSMIGRATIONCINNAMONBIO FILMS

Food

5- Applications of cyclodextrins in food science. A review

By:
Matencio, A (Matencio, Adrian) [1] ; Navarro-Orcajada, S (Navarro-Orcajada, Silvia) [1] ; Garcia-Carmona, F (Garcia-Carmona, Francisco) [1] ; Lopez-Nicolas, JM (Manuel Lopez-Nicolas, Jose) [1]
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Abstract

Background: The food industry is constantly attempting to develop better products that will have a positive effect on health (commonly known as functional foods). In this respect, cyclodextrins (CDs) could be of interest because they are tasteless, non-caloric and odourless molecules with several valuable characteristics, such as a capacity to separate chiral compounds and solubilize or stabilize bioactive compounds (BaC).
Scope and approach: This review represents a revision of the state-of-the-art of CDs and their uses in the food industry.
Key findings and conclusions: We analysed their metabolism and regulatory aspects of current applications of CDs: as carriers, for removing components, to produce or extract BaC, their use as nanosensors or in food packaging. We study how inclusion complexed are formed referring to the most common techniques and parameters Moreover, how inclusion complexes are formed will be studied with reference to the most common techniques and parameters. In conclusion, their applications in the food and other industries will increase in the coming years without a doubt.

Keywords
Author Keywords
CyclodextrinsFood industryNutraceuticalsPackaging"Free products"Nanosensor
Keywords Plus
HYDROXYPROPYL-BETA-CYCLODEXTRINTHYMOL/CYCLODEXTRIN-INCLUSION COMPLEXMOLECULAR-DYNAMICS SIMULATIONSENHANCED THERMAL-STABILITYMETHYL-JASMONATEWATER

Food

SOLUBILITYANTIMICROBIAL PROPERTIESSCHARDINGER DEXTRINSCHOLESTEROL REMOVALCONTROLLED-RELEASE

Food

6- Biobased materials for active food packaging: A review

By:
Atta, OM (Atta, Omar Mohammad) [1] , [2] ; Manan, S (Manan, Sehrish) [1] ; Shahzad, A (Shahzad, Ajmal) [1] ; Ul-Islam, M (Ul-Islam, Mazhar) [3] ; Ullah, MW (Ullah, Muhammad Wajid) [1] , [4] ; Yang, G (Yang, Guang) [1]
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Abstract

A large portion of food is lost due to the damage caused by different environmental factors such as moisture, oxidation, irradiation, microbial contamination, and others. Thus, food should be protected from such damages by developing strategies, such as packaging, to enhance its quality, stability, and shelf-life. The usage of con-ventional petroleum-based packaging materials is a great risk to health and environmental safety. In contrast, the utilization of biobased films and coatings for food packaging applications could be a safe approach, both from human health and environmental perspective. This review briefly overviews the desired properties of biobased packaging materials. It mainly discusses the potential of different natural (polysaccharides, lipids, and proteins) and synthetic polymers for their film and coating-forming abilities considering their abundance, biological properties (biocompatible, biodegradable, non-toxic), and morphological and physiological features. It also discusses the role of different additives and nanomaterials for their potential to impart additional structural and functional properties to packaging materials.

Keywords
Author Keywords
Food safety and stabilityBiopolymersEdible films and coatingsBiosafetyFood packaging
Keywords Plus

Food

WATER BARRIER PROPERTIESCINNAMON ESSENTIAL OILOREGANO ESSENTIAL OILWHEY-PROTEIN ISOLATESHELF-LIFE STABILITYEDIBLE FILMSBACTERIAL CELLULOSESILVER NANOPARTICLESSOY PROTEINMECHANICAL-PROPERTIE

7- Food consumption behavior during the COVID-19 pandemic

By:
Chenarides, L (Chenarides, Lauren) [1] ; Grebitus, C (Grebitus, Carola) [1] ; Lusk, JL (Lusk, Jayson L.) [2] ; Printezis, I (Printezis, Iryna) [1]
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Abstract

We conducted an online consumer survey in May 2020 in two major metropolitan areas in the United States to investigate food shopping behaviors and consumption during the pandemic lockdown caused by COVID-19. The results of this study parallel many of the headlines in the popular press at the time. We found that about three-quarters of respondents were simply buying the food they could get due to out of stock situations and about half the participants bought more food than usual. As a result of foodservice closures, consumers indicated purchasing more groceries than normal. Consumers attempted to avoid shopping in stores, relying heavily on grocery delivery and pick-up services during the beginning of the pandemic when no clear rules were in place. Results show a 255% increase in the number of households that use grocery pickup as a shopping method and a 158% increase in households that utilize grocery delivery services. The spike in pickup and delivery program participation can be explained by consumers fearing COVID-19 and feeling unsafe. Food consumption patterns for major food groups seemed to stay the same for the majority of participants, but a large share indicated that they had been snacking more since the beginning of the pandemic which was offset by a sharp decline in fast food consumption.

Keywords
Author Keywords

Food

coronavirusdeliveryfood consumptiongrocery shoppingpandemicpick-up

Keywords Plus

SHOPPING BEHAVIOR

Food

8- Impact of COVID-19 on the food supply chain

By:
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Abstract

A pandemic is not a new event encountered in the history of humanity because mankind has faced various pandemics in history. The common point of pandemics is their serious negative effects on the global economy. Considering the food supply chain, one of the most important sectors of the economy, it has been seen that COVID-19 has an impact on the whole process from the field to the consumer. In the light of recent challenges in food supply chain, there is now considerable concern about food production, processing, distribution, and demand. COVID-19 resulted in the movement restrictions of workers, changes in demand of consumers, closure of food production facilities, restricted food trade policies, and financial pressures in food supply chain. Therefore, governments should facilitate the movement of workers and agri-food products. In addition, small farmers or vulnerable people should be supported financially. Facilities should change the working conditions and maintain the health and safety of employees by altering safety measures. Food protectionist policies should be avoided to prevent an increase in food prices. In conclusion, each country must realize the severity of the situation and sometimes should tighten or loosen the measures according to the spread of the pandemic. The supply chain also should be flexible enough to respond to the challenges in the food supply chain. The purpose of this review is to evaluate the impact of COVID-19 on the agriculture and food sector and to summarize the recommendations required to reduce and control the effect of the pandemic.

Keywords
Author Keywords

Food

pandemicCOVID-19agriculturefoodsupply chain

Keywords Plus

EMERGING TECHNOLOGIESMANUFACTUREPROSPECTSSECURITYRISKS

Food

9- Scientific Guidance for the submission of dossiers on Food Enzymes

By:
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Abstract

Following a request from the European Commission, EFSA developed an updated scientific guidance to assist applicants in the preparation of applications for food enzymes. This guidance describes the scientific data to be included in applications for the authorisation of food enzymes, as well as for the extension of use for existing authorisations, in accordance with Regulation (EC) No 1331/2008 and its implementing rules. Information to be provided in applications relates to source, production and characteristics of the food enzyme, toxicological data, allergenicity and dietary exposure estimation. Source, production and characteristics of the food enzyme are first considered only for enzymes of microbial origin and subsequently for those enzymes derived from plants and for enzymes from animal sources. Finally, the data requested for toxicology, allergenicity and dietary exposure applies to all food enzymes independent of the source. On the basis of the submitted data, EFSA will assess the safety of food enzymes and conclude whether or not they present a risk to human health under the proposed conditions of use. (C) 2021 European Food Safety Authority. EFSA Journal published by John Wiley and Sons Ltd on behalf of European Food Safety Authority.

Food

Keywords
Author Keywords
food enzymesguidanceapplications
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DNA-DNA HYBRIDIZATIONGENOME

Food

10- Edible packaging: Sustainable solutions and novel trends in food packaging

By:
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Abstract

Novel food packaging techniques are an important area of research to promote food quality and safety. There is a trend towards environmentally sustainable and edible forms of packaging. Edible packaging typically uses sustainable, biodegradable material that is applied as a consumable wrapping or coating around the food, which generates no waste. Numerous studies have recently investigated the importance of edible materials as an added value to packaged foods. Nanotechnology has emerged as a promising method to provide use of bioactives, antimicrobials, vitamins, antioxidants and nutrients to potentially increase the functionality of edible packaging. It can act as edible dispensers of food ingredients as encapsulants, nanofibers, nanoparticles and nanoemulsions. In this way, edible packaging serves as an active form of packaging. It plays an important role in packaged foods by desirably interacting with the food and providing technological functions such as releasing scavenging compounds (antimicrobials and antioxidants), and removing harmful gasses such as oxygen and water vapour which all can decrease products quality and shelf life. Active packaging can also contribute to maintaining the nutritive profile of packaged foods. In this review, authors present the latest information on new technological advances in edible food packaging, their novel applications and provide examples of recent studies where edible packaging possesses also an active role.

Keywords
Author Keywords
Edible coatingsEdible filmsBioactive compoundsNutraceuticalsNanotechnologiesActive packaging
Keywords Plus

Food

CINNAMON ESSENTIAL OILOPUNTIA-FICUS-INDICAGREEN TEA EXTRACTLISTERIA-MONOCYTOGENESBARRIER PROPERTIESSHELF-LIFEFILMSCOATINGSCHITOSANINACTIVATION

11- Resilience of local food systems and links to food security - A review of some important concepts in the context of COVID-19 and other shocks

By:
Bene, C (Bene, Christophe) [1]
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Abstract

The objective of this review is to explore and discuss the concept of local food system resilience in light of the disruptions brought to those systems by the 2020 COVID-19 pandemic. The discussion, which focuses on low and middle income countries, considers also the other shocks and stressors that generally affect local food systems and their actors in those countries (weather-related, economic, political or social disturbances). The review of existing (mainly grey or media-based) accounts on COVID-19 suggests that, with the exception of those who lost members of their family to the virus, as per June 2020 the main impact of the pandemic derives mainly from the lockdown and mobility restrictions imposed by national/local governments, and the consequence that the subsequent loss of income and purchasing power has on people's food security, in particular the poor. The paper then uses the most prominent advances made recently in the literature on household resilience in the context of food security and humanitarian crises to identify a series of lessons that can be used to improve our understanding of food system resilience and its link to food security in the context of the COVID-19 crisis and other shocks. Those lessons include principles about the measurement of food system resilience and suggestions about the types of interventions that could potentially strengthen the abilities of actors (including policy makers) to respond more appropriately to adverse events affecting food systems in the future.

Food

Keywords
Author Keywords
Food systemsResilienceFood securityCOVID-19Shocks
Keywords Plus
LIVELIHOOD RESILIENCECOMMUNITY RESILIENCEADAPTIVE CAPACITYPOVERTY TRAPSHOUSEHOLDADAPTATIONIMPACTRISKHUMANITARIANREFLECTIONS

12- Sustainable management and recycling of food waste anaerobic digestate: A review

By:
Dutta, S (Dutta, Shanta) [1] ; He, MJ (He, Mingjing) [1] ; Xiong, XN (Xiong, Xinni) [1] ; Tsang, DCW (Tsang, Daniel C. W.) [1]
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Abstract

Anaerobic digestion (AD) is a widely used technology to valorise food waste for biogas production yet a considerable amount of digestate remains under-utilised. Sustainable management and recycling of the nutrientrich food waste anaerobic digestate (FWD) is highly desirable for closing resource loop and actualising circular economy. This work reviews the distinct properties of FWD and the existing treatment technologies. FWD shows great prospects as a nutrient source for microalgal cultivation and biofuel production. Emerging technologies such as thermal conversion (e.g., pyrolysis and hydrothermal treatment) of FWD into value-added products such as functionalised biochar/hydrochar with diverse applications would be attractive and warrant further research investigation. Integrated AD with subsequent valorisation facilities is highly encouraged to achieve complete utilisation of resources and reduce carbon emissions.

Keywords
Author Keywords
Hydrochar productionEngineered biocharPyrolysisHydrothermal carbonisationBioenergy recovery
Keywords Plus
SOLID-STATE FERMENTATIONHYDROTHERMAL CARBONIZATIONBIOWASTEVALORISATIONTECHNOLOGIESFEEDSTOCKFRACTIONLAND

Food

13- Metal-organic frameworks (MOFs) based chemosensors/biosensors for analysis of food contaminants

By:
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Abstract

Background: As a critical topic of international concern, food safety has received great attention in recent years. The hazardous substances (such as antibiotics, heavy metal ions, food additives, and foodborne bacteria) in foodstuffs would cause threat to human health and economic losses in food industry. Despite of high sensitivity, accuracy, and reliability of conventional techniques for analysis of food contaminants, they often require complicated apparatus, well-trained personalized operation, and laborious and time-consuming procedure. In this regard, new sensing strategies for convenient, fast, and sensitive detection of food contaminants should be developed for food safety. Scope and approach: Metal-organic frameworks (MOFs), as a large category of porous crystalline materials, could be used as efficient platforms for constructing diverse chemosensors and biosensors, for their high porosity, adjustable compositions or structures, and good stability. A variety of MOFs, MOFs-based composites, and MOFsbased derivatives show excellent fluorescence (FL), chemical functionality, and strong bioaffinity toward probes (DNA, aptamers, or antibodies), exhibiting great potentials as FL emitters, electrode materials, or platforms of biosensors for selective and sensitive detection of hazard analytes in foodstuffs. By coupling with different determination techniques such as FL, electrochemical (EC), photoelectrochemical (PEC) or surface-enhanced Raman spectroscopy methods, MOFs-based materials

have shown promising applications for detecting diverse analytes. Furthermore, the current challenges and future developments of MOFs-based materials for analysis of food contaminants have been discussed. Key findings and conclusions: Although some reviews on the applications of MOFs in food packing and food safety have been documented, this comprehensive review will provide new insights to the construction of chemosensors and biosensors with MOFs-based materials for determination of food contaminants toward food safety monitoring.

Keywords
Author Keywords
Metal -organic frameworks (MOFs)BiosensorsChemosensorsFood safetyAnalysis of food contaminants
Keywords Plus
HIGHLY EFFICIENTELECTROCHEMICAL APTASENSORULTRASENSITIVE DETECTIONSELECTIVE DETECTIONANTIBIOTICSRESIDUESREMOVALSENSORASSAYCO

14- The persistent threat of emerging plant disease pandemics to global food security

By:
Ristaino, JB (Ristaino, Jean B.) [1] ; Anderson, PK (Anderson, Pamela K.) [2] , [3] ; Bebber, DP (Bebber, Daniel P.) [4] ; Brauman, KA (Brauman, Kate A.) [5] ; Cunniffe, NJ (Cunniffe, Nik J.) [6] ; Fedoroff, NV (Fedoroff, Nina, V) [7] ; Finegold, C (Finegold, Cambria) [8] ; Garrett, KA (Garrett, Karen A.) [9] , [10] ; Gilligan, CA (Gilligan, Christopher A.) [6] ; Jones, CM (Jones, Christopher M.) [11] ;
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Abstract

Plant disease outbreaks are increasing and threaten food security for the vulnerable in many areas of the world. Now a global human pandemic is threatening the health of millions on our planet. A stable, nutritious food supply will be needed to lift people out of poverty and improve health outcomes. Plant diseases, both endemic and recently emerging, are spreading and exacerbated by climate change, transmission with global food trade networks, pathogen spillover, and evolution of new pathogen lineages. In order to tackle these grand challenges, a new set of tools that include disease surveillance and improved detection technologies including pathogen sensors and predictive modeling and data analytics are needed to prevent future outbreaks. Herein, we describe an integrated research agenda that could help mitigate future plant disease pandemics.

Keywords
Author Keywords
emerging plant diseaseplant pathologyfood security
Keywords Plus
PRECISION AGRICULTURECLIMATE-CHANGECROP PESTSPATHOGENSNETWORKSTRADERISKSURVEILLANCEAMERICABIOLOGY

Food

15- Food systems are responsible for a third of global anthropogenic GHG emissions

By:
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Abstract

Data on GHG emissions from the food system are mostly scattered across sectors and remain unavailable in many countries. EDGAR-FOOD, a globally consistent food emission database, brings together emissions from food-related land use and land-use change, production, processing, distribution, consumption and residues over 1990-2015 at country level.

We have developed a new global food emissions database (EDGAR-FOOD) estimating greenhouse gas (GHG; CO2, CH4, N2O, fluorinated gases) emissions for the years 1990-2015, building on the Emissions Database of Global Atmospheric Research (EDGAR), complemented with land use/land-use change emissions from the FAOSTAT emissions database. EDGAR-FOOD provides a complete and consistent database in time and space of GHG emissions from the global food system, from production to consumption, including processing, transport and packaging. It responds to the lack of detailed data for many countries by providing sectoral contributions to food-system emissions that are essential for the design of effective mitigation actions. In 2015, food-system emissions amounted to 18 Gt CO2 equivalent per year globally, representing 34% of total GHG emissions. The largest contribution came from agriculture and land use/land-use change activities (71%), with the remaining were from supply chain activities: retail, transport, consumption, fuel production, waste management, industrial processes and packaging. Temporal trends and regional contributions of GHG emissions from the food system are also discussed.

Food

Keywords
Keywords Plus
GREENHOUSE-GAS EMISSIONSENVIRONMENTAL IMPACTSCLIMATE-CHANGEAGRICULTUREPRODUCERS

16- The impact of COVID-19 on destination visit intention and local food consumption

By:
Dedeoglu, BB (Dedeoglu, Bekir Bora) [1] ; Mariani, M (Mariani, Marcello) [2] , [3] ; Shi, FF (Shi, Fangfang) [4] ; Okumus, B (Okumus, Bendegul) [5]
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Abstract

Purpose This paper aims to investigate the relationships between motivation and intention to consume local food and between intention to consume local food and intention to visit the destination of that food's origin while examining the moderating effect of risk perception associated with coronavirus disease 2019 (COVID-19). Design/methodology/approach Data were collected from two samples of potential Chinese tourists in the contexts of Italian and Thai food. Data obtained from 264 Chinese respondents for Italian food and 277 Chinese respondents for Thai food were analyzed. Partial least squares structural equation modeling was utilized to test the research model. Findings The results indicate that, while motivational factors such as cultural experience, novelty and sensory appeal influence potential Chinese tourists' intention to consume Italian food, motivational factors such as cultural experience, health concern, novelty and sensory appeal influence tourists' intention to consume Thai food. The authors found that intention to consume local food positively influences tourists' intention to visit both destinations (Italy and Thailand). Moreover, tourists' risk perceptions of COVID-19 negatively moderate the effect of cultural experience and novelty on the intention to consume Italian food. Regarding the

intention to consume Thai food, the authors found that tourists' risk perceptions have a diminishing effect on all motivational factors. Originality/value This pioneering study examines the role of COVID-19-related risk perception on the relationships among motivation of local food consumption, intention of local food consumption and destination visit intention in the context of two destination countries. It reveals cross-country differences of the negative effect pertaining to the risk perceptions of COVID-19, which has important implications for international destination marketing.

Keywords
Author Keywords
COVID-19Local food consumptionDestination visit intentionRisk perception
Keywords Plus
IMAGEFAMILIARITYMOTIVATIONMODEL

17- The Water, Energy, Food, and Sustainability Nexus Decision Environment: A Multistakeholder Transdisciplinary Approach

By:
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Abstract

The water, energy, and food (WEF) nexus has gained particular attention in the sustainable development community. Making effective decisions in this environment is difficult. Entwinement from multiple sustainability dimensions and various stakeholder perspectives contribute to this difficulty. Stakeholders have differing goals, interests, and preferences for potential technological and developmental solutions that address WEF nexus concerns. A holistic sustainable management approach with supporting decision support can address these concerns. This article introduces such a holistic framework to address WEF-sustainability (WEFS) concerns. Using a joint neighborhood rough set, interval-valued hesitant fuzzy set, and regret theory technique, this article introduces a multistakeholder transdisciplinary method to support WEFS nexus decisions. An illustrative example integrates the multiple stakeholder and WEFS nexus factors. The illustrative example provides insights into the modeling effort and data requirements. Research, practical implications, along with limitations of the study-which are all discussed-provide a foundation for future research directions in this socio-environmentally important field.

Keywords
Author Keywords
StakeholdersSustainable developmentDecision makingEconomicsOrganizationsAgricultureWater resourcesHesitant fuzzy setregret theory (RT)rough set theorystakeholder theorysustainabilitywater-energy-food (WEF) nexus
Keywords Plus

Food

MANAGEMENTPERFORMANCEREGRETSETS

18- Recent advances in carbon nanomaterials-based electrochemical sensors for food azo dyes detection

By:
Karimi-Maleh, H (Karimi-Maleh, Hassan) [1] ; Beitollahi, H (Beitollahi, Hadi) [2] ; Kumar, PS (Senthil Kumar, P.) [3] ; Tajik, S (Tajik, Somayeh) [4] ; Jahani, PM (Jahani, Peyman Mohammadzadeh) [5] ; Karimi, F (Karimi, Fatemeh) [6] ; Karaman, C (Karaman, Ceren) [7] ; Vasseghian, Y (Vasseghian, Yasser) [8] , [9] ; Baghayeri, M (Baghayeri, Mehdi) [10] ; Rouhi, J (Rouhi, Jalal) [11] ;
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Abstract

Azo dyes as widely applied food colorants are popular for their stability and affordability. On the other hand, many of these dyes can have harmful impacts on living organs, which underscores the need to control the content of this group of dyes in food. Among the various analytical approaches for detecting the azo dyes, special attention has been paid to electro-analytical techniques for reasons such as admirable sensitivity, excellent selectivity, reproducibility, miniaturization, green nature, low cost, less time to prepare and detect of specimens and the ability to modify the electrode. Satisfactory results have been obtained so far for carbon-based nanomaterials in the fabrication of electrochemical sensing systems in detecting the levels of these materials in various specimens. The purpose of this review article is to investigate carbon nanomaterial-supported techniques for electrochemical sensing systems on the analysis of azo dyes in food samples in terms of carbon nanomaterials used, like carbon nanotubes (CNT) and graphene (Gr).

Keywords
Author Keywords
Azo dyesCarbon nanomaterialsCarbon nanotubesGrapheneElectrochemical sensorFood analysis
Keywords Plus

Food

REDUCED GRAPHENE OXIDESIMULTANEOUS VOLTAMMETRIC DETERMINATIONSUNSET YELLOWFUNCTIONALIZED GRAPHENESYNTHETIC COLORANTSPASTE ELECTRODEFOLIC-ACIDIONIC LIQUIDALLURA REDSPECTROPHOTOMETRIC ANALYSIS

19- Film formation and deposition methods of edible coating on food products: A review

By:
Suhag, R (Suhag, Rajat) [1] ; Kumar, N (Kumar, Nishant) [1] ; Petkoska, AT (Petkoska, Anka Trajkovska) [2] ; Upadhyay, A (Upadhyay, Ashutosh) [1]
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Abstract

The greatest challenge encountered by the food manufacturer is the loss of quality of food products during storage, which eventually adds to the waste. Edible packaging is known as a potential alternative to protecting food quality and improving shelf life by delaying microbial spoilage and providing moisture and gas barrier properties. Developments in edible packaging and technology have shown promising results in enhancing the shelf life of food products. In 2016, the edible packaging market was valued at $697 million and by 2023 is expected to hit $1097 million growing at a compound annual growth rate (CGAR) of 6.81% from 2017 to 2023 at global level. In global edible packaging markets specific industries including MonoSol LLC, Tate & Lyle Plc, WikiCell Designs Inc., JRF Technology LLC, Safetraces, Inc., BluWrap, Skipping Rocks Lab, Tipa Corp., Watson Inc., and Devro plc have played a key role. Edible packaging can be applied in two forms: (i) edible coating applied directly on the food product or (ii) preformed film wrapped around the food product. The aim of this study is to review different methods of film formation and edible coating depositions. Edible films can be produced using two methods, wet (casting) and dry (extrusion) processes; and methods such as dipping, spraying, fluidized-bed, and panning are used for deposition of edible coatings on the surface of food product. Casting and dipping methods for film formation and coating deposition, respectively, are easy to use and are preferred methods on a lab scale; whereas extrusion and spraying are preferred methods for film formation and coating deposition, respectively, on a commercial scale. This work can help researchers and industries to select an efficient and cost-effective method for the development of edible film/coating for specific application.

Food

Further study and evaluation of practical applications of methods of edible packaging should be carried out within the main purpose of keeping food safe with acceptable quality for extended period of time.

Keywords

Author Keywords

Edible coating/filmDeposition of edible coatingFilm formationFood quality and shelf lifeFood preservation

Keywords Plus

SHELF-LIFE EXTENSIONMECHANICAL-PROPERTIESALOE-VERABARRIER PROPERTIESFUNCTIONAL-PROPERTIESPOSTHARVEST QUALITYEXTRUSION PROCESSFRUIT-QUALITYESSENTIAL OILLACTOPEROXIDASE SYSTEM

20- Impact of COVID-19 on logistics systems and disruptions in food supply chain

By:
Singh, S (Singh, Sube) [1] ; Kumar, R (Kumar, Ramesh) [2] ; Panchal, R (Panchal, Rohit) [3] ; Tiwari, MK (Tiwari, Manoj Kumar) [1] , [4]
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Abstract

An outbreak of deadly COVID-19 virus has not only taken the lives of people but also severely crippled the economy. Due to strict lockdown, the manufacturing and logistics activities have been suspended, and it has affected the demand and supply of various products as a result of restrictions imposed on shopkeepers and retailers. Impacts of COVID-19 are observed ubiquitously in every type of units from different sectors. In this study, a simulation model of the public distribution system (PDS) network is developed with three different scenarios to demonstrate disruptions in the food supply chain. Difficulties have been increased in matching supply and demand in a vast network of PDS because of changing scenarios with the growth of infected cases and recovery. This paper also highlights the importance of a resilient supply chain during a pandemic. Our proposed simulation model can help in developing a resilient and responsive food supply chain to match the varying demand, and then further assist in providing decision-making support for rerouting the vehicles as per travel restrictions in areas. Paper has been summarised with significant highlights and including future research scope for developing a more robust food supply chain network.

Food

Keywords
Author Keywords
Supply chain disruptionsupply chain resiliencefood supply chainpandemicCOVID-19simulation
Keywords Plus
OPTIMIZATIONRESILIENCEDISEASEDESIGNMODEL

Food

21- Metabolism Characteristics of Lactic Acid Bacteria and the Expanding Applications in Food Industry

By:
Wang, YQ (Wang, Yaqi) [1] ; Wu, JT (Wu, Jiangtao) [1] ; Lv, MX (Lv, Mengxin) [1] ; Shao, Z (Shao, Zhen) [1] ; Hungwe, M (Hungwe, Meluleki) [1] ; Wang, JJ (Wang, Jinju) [1] ; Bai, XJ (Bai, Xiaojia) [1] ; Xie, JL (Xie, Jingli) [2] ; Wang, YP (Wang, Yanping) [1] ; Geng, WT (Geng, Weitao) [1]
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Abstract

Lactic acid bacteria are a kind of microorganisms that can ferment carbohydrates to produce lactic acid, and are currently widely used in the fermented food industry. In recent years, with the excellent role of lactic acid bacteria in the food industry and probiotic functions, their microbial metabolic characteristics have also attracted more attention. Lactic acid bacteria can decompose macromolecular substances in food, including degradation of indigestible polysaccharides and transformation of undesirable flavor substances. Meanwhile, they can also produce a variety of products including short-chain fatty acids, amines, bacteriocins, vitamins and exopolysaccharides during metabolism. Based on the above-mentioned metabolic characteristics, lactic acid bacteria have shown a variety of expanded applications in the food industry. On the one hand, they are used to improve the flavor of fermented foods, increase the nutrition of foods, reduce harmful substances, increase shelf life, and so on. On the other hand, they can be used as probiotics to promote health in the body. This article reviews and prospects the important metabolites in the expanded application of lactic acid bacteria from the perspective of bioengineering and biotechnology.

Keywords
Author Keywords
lactic acid bacteriadegradationproductsmetabolism characteristicsexpanding applications
Keywords Plus

Food

I-CONVERTING-ENZYMELACTOCOCCUS-LACTISMOLECULAR CHARACTERIZATIONINHIBITORY PEPTIDESPROTEOLYTIC SYSTEMSPHENOLIC-COMPOUNDSFOLATE PRODUCTIONSHELF-LIFELACTOBACILLUSFERMENTATION

22- Risk to human health related to the presence of perfluoroalkyl substances in food

By:
Schrenk, D (Schrenk, Dieter) ; Bignami, M (Bignami, Margherita) ; Bodin, L (Bodin, Laurent) ; Chipman, JK (Chipman, James Kevin) ; del Mazo, J (del Mazo, Jesus) ; Grasl-Kraupp, B (Grasl-Kraupp, Bettina) ; Hogstrand, C (Hogstrand, Christer) ; Hoogenboom, L (Hoogenboom, Laurentius (Ron)) ; Leblanc, JC (Leblanc, Jean-Charles) ; Nebbia, CS (Nebbia, Carlo Stefano) ;
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Abstract

The European Commission asked EFSA for a scientific evaluation on the risks to human health related to the presence of perfluoroalkyl substances (PFASs) in food. Based on several similar effects in animals, toxicokinetics and observed concentrations in human blood, the CONTAM Panel decided to perform the assessment for the sum of four PFASs: PFOA, PFNA, PFHxS and PFOS. These made up half of the lower bound (LB) exposure to those PFASs with available occurrence data, the remaining contribution being primarily from PFASs with short half-lives. Equal potencies were assumed for the four PFASs included in the assessment. The mean LB exposure in adolescents and adult age groups ranged from 3 to 22, the 95th percentile from 9 to 70 ng/kg body weight (bw) per week. Toddlers and 'other children' showed a twofold higher exposure. Upper bound exposure was 4- to 49-fold higher than LB levels, but the latter were considered more reliable. 'Fish meat, 'Fruit and fruit products' and 'Eggs and egg products' contributed most to the exposure. Based on available studies in animals and humans, effects on the immune system were considered the most critical for the risk assessment. From a human study, a lowest BMDL10 of 17.5 ng/mL for the sum of the four PFASs in serum was identified for 1-year-old children. Using PBPK modelling,

this serum level of 17.5 ng/mL in children was estimated to correspond to long-term maternal exposure of 0.63 ng/kg bw per day. Since accumulation over time is important, a tolerable weekly intake (TWI) of 4.4 ng/kg bw per week was established. This TWI also protects against other potential adverse effects observed in humans. Based on the estimated LB exposure, but also reported serum levels, the CONTAM Panel concluded that parts of the European population exceed this TWI, which is of concern. (C) 2020 European Food Safety Authority. EFSA Journal published by John Wiley and Sons Ltd on behalf of European Food Safety Authority.

Keywords

Author Keywords

PFASfoodexposuremixturesimmune systemPBPKrisk assessment

Keywords Plus

PERFLUOROOCTANE SULFONATE PFOSACTIVATED-RECEPTOR-ALPHAPERSISTENT ORGANIC POLLUTANTSPERFLUORINATED ALKYL ACIDSMAMMARY-GLAND DEVELOPMENTCARBON-CHAIN LENGTHENDOCRINE-DISRUPTING CHEMICALSSPRAGUE-DAWLEY RATSATTENTION DEFICIT/HYPERACTIVITY DISORDER8-2 FLUOROTELOMER ALCOHOL

23- Soil heavy metal pollution and food safety in China: Effects, sources and removing technology

By:
Qin, GW (Qin, Guowei) [1] ; Niu, ZD (Niu, Zhaodong) [2] ; Yu, JD (Yu, Jiangdong) [3] , [4] ; Li, ZH (Li, Zhuohan) [4] ; Ma, JY (Ma, Jiaoyang) [5] ; Xiang, P (Xiang, Ping) [5]

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Abstract

Soil plays a fundamental role in food safety and the adverse effects of contaminants like heavy metal (loid)s on crop quality have threatened human health. Therefore, it is important to focus on the food safety and agricultural soil pollution by heavy metals, especially for China where the demand for food production is increasing. This review comprehensively introduced the current status of agricultural soil pollution by heavy metals in China, analyzed the main sources of contaminants, including the applications of pesticides and fertilizers, atmospheric deposition related to vehicle emissions and coal combustion, sewage irrigation and mining. Food safety and agricultural soil pollution by heavy metals, the removal technologies for soil remediation such as soil amendments, phytoremediation and foliar sprays were also introduced. The review can provide significant insights for policymakers, environmental engineers, and agro-technicians regarding soil contamination control and management strategies and technologies. (C) 2020 Elsevier Ltd. All rights reserved.

Keywords
Author Keywords
Agricultural soilHeavy metalsFood safetySoil remediationPhytoextraction
Keywords Plus
HEALTH-RISK ASSESSMENTAGRICULTURAL SOILSWASTE-WATERRICE GRAINCADMIUMLEADCDCONTAMINATIONACCUMULATIONPHYTOREMEDIATION

24- Toxic metals and metalloids: Uptake, transport, detoxification, phytoremediation, and crop improvement for safer food

By:
Zhao, FJ (Zhao, Fang-Jie) [1] ; Tang, Z (Tang, Zhong) [1] ; Song, JJ (Song, Jia-Jun) [1] ; Huang, XY (Huang, Xin-Yuan) [1] ; Wang, P (Wang, Peng) [1]
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Abstract

Agricultural soils are under threat of toxic metal/metalloid contamination from anthropogenic activities, leading to excessive accumulation of arsenic (As), cadmium (Cd), lead (Pb), and mercury (Hg) in food crops that poses significant risks to human health. Understanding how these toxic metals and their methylated species are taken up, translocated, and detoxified is prerequisite to developing strategies to limit their accumulation for safer food. Toxic metals are taken up and transported across different cellular compartments and plant tissues via various transporters for essential or beneficial nutrients, e.g. As by phosphate and silicon transporters, and Cd by manganese (Mn), zinc (Zn), and iron (Fe) transporters. These transport processes are subjected to interactions with nutrients and the regulation at the transcriptional and posttranslational levels. Complexation with thiol-rich compounds, such as phytochelatins, and sequestration in the vacuoles are the common mechanisms for detoxification and for limiting their translocation. A number of genes involved in toxic metal uptake, transport, and detoxification have been identified, offering targets for genetic manipulation via gene editing or transgenic technologies. Natural variations in toxic metal accumulation exist within crop germplasm, and some of the quantitative trait loci underlying these variations have been cloned, paving the way for marker-assisted breeding of low metal accumulation crops. Using plants to extract and remove toxic metals from soil is also possible, but this phytoremediation approach requires metal hyperaccumulation for efficiency. Knowledge gaps and future research needs are also discussed.

Food

Keywords
Author Keywords
toxic metalsmetalloidsheavy metalstransportersdetoxificationphytoremediationfood safety
Keywords Plus
INORGANIC ARSENIC CONTENTSHOOT CD TRANSLOCATIONRICE AQUAPORIN LSI1FERN PTERIS-VITTATAORYZA-SATIVA L.PHOSPHATE TRANSPORTERCADMIUM ACCUMULATIONSUBCELLULAR-DISTRIBUTIONGEOGRAPHICAL VARIATIONMEDIATES UPTAKE

Food

25- Curcumin and its uses in active and smart food packaging applications-a comprehensive review

By:
Roy, S (Roy, Swarup) [1] ; Priyadarshi, R (Priyadarshi, Ruchir) [1] ; Ezati, P (Ezati, Parya) [1] ; Rhim, JW (Rhim, Jong-Whan) [1]
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Abstract

Active and intelligent food packaging is an innovative technology to prevent food contamination and ensure food quality and safety. Active packaging protects the food from microbial contamination, while smart or intelligent packaging enables monitoring the freshness of the food or quality change in real-time. Curcumin, one of the most well-known natural colorants, has received a lot of attention for its excellent functional properties and ability to change color with changes in pH. Curcumin, the golden component of turmeric, a spice widely used in food since ancient times, is a cost-effective and abundant biomaterial with various biological properties such as antioxidant, antibacterial, antiviral, antitumor, and anti-inflammatory. Recently, active packaging or intelligent packaging systems have been actively developed using the functional properties of curcumin. In this review, we briefly reviewed curcumin's basic biological functions and discussed comprehensive and recent progress in using curcumin in various polymer-based active and smart food packaging applications.

Keywords
Author Keywords
CurcuminBiological activityColor indicatorPackaging filmActive &Smart packaging
Keywords Plus
ANTIOXIDANT ACTIVITYRELEASE KINETICSCHITOSAN FILMSEDIBLE FILMSDEMETHOXYCURCUMINMECHANISMANALOGSCELLULOSEALCOHOLBISDEMETHOXYCURCUMIN

26- Food Quality Inspection and Grading Using Efficient Image Segmentation and Machine Learning-Based System

By:
Hemamalini, V (Hemamalini, V) [1] ; Rajarajeswari, S (Rajarajeswari, S.) [2] ; Nachiyappan, S (Nachiyappan, S.) [2] ; Sambath, M (Sambath, M.) [3] ; Devi, T (Devi, T.) [4] ; Singh, BK (Singh, Bhupesh Kumar) [5] ; Raghuvanshi, A (Raghuvanshi, Abhishek) [6]
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Abstract

One of the most critical aspects of quality assurance is inspecting products for defects before they are sold or shipped. A good product is more vital than having more of the same item for a customer's enjoyment. The client has a significant role in determining the quality of a product. Another way to think about quality is as the total of all the characteristics that contribute to the creation of items that the client enjoys. Recently, the application of machine vision and image processing technology to improve the surface quality of fruits and other foods has increased significantly. This is primarily because these technologies make significant advancements in areas where the human eye falls short. This means that, by utilizing computer vision and image processing techniques, time-consuming and subjective industrial quality control processes can be eliminated. This article discusses how to check and assess food using picture segmentation and machine learning. It is capable of classifying fruits and determining whether a piece of fruit is rotten. To begin, Gaussian elimination is used to remove noise from images. Then, photos are subjected to histogram equalization in order to improve their quality. Segmentation of the image is carried out using the K-means clustering technique. Then, fruit photos are classified using machine learning methods such as KNN, SVM, and C4.5. These algorithms determine if a fruit is damaged or not.

Keywords
Keywords Plus
CLASSIFICATION

27- A critical review on intelligent and active packaging in the food industry: Research and development

By:
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Abstract

The emergence of many new food products on the market with need of consumers to constantly monitor their quality until consuming, in addition to the necessity for reducing food corruption during preservation time, have led to the development of some modern packaging technologies such as intelligent packaging (IP) and active packaging (AP). The benefits of IP are detecting defects, quality monitoring and tracking the packaged food products to control the storage conditions from the production stage to the consumption stage by using various sensors and indicators such as time-temperature indicators (TTIs), gas indicators, humidity sensors, optical, calorimetric and electrochemical biosensors. While, AP helps to increase the shelf-life of products by using absorbing and diffusion systems for various materials like carbon dioxide, oxygen, and ethanol. However, there are some important issues over these emerging technologies including cost, marketability, consumer acceptance, safety and organoleptic quality of the food and emphatically environmental safety concerns. Therefore, future researches should be conducted to solve these problems and to prompt applications of IP and AP in the food industry. This paper reviews the latest innovations in these advanced packaging technologies and their applications in food industry. The IP systems namely indicators, barcoding techniques, radio frequency identification systems, sensors and biosensor are reviewed and then the latest innovations in AP methods including scavengers, diffusion systems and antimicrobial packaging are reviewed in detail.

Keywords

Author Keywords

Intelligent packagingActive packagingFoodQuality monitoringSafety promotionShelf-life extension

28- Micro(nano)plastics Prevalence, Food Web Interactions, and Toxicity Assessment in Aquatic Organisms: A Review

By:
Benson, NU (Benson, Nsikak U.) [1] ; Agboola, OD (Agboola, Omowumi D.) [1] ; Fred-Ahmadu, OH (Fred-Ahmadu, Omowunmi H.) [1] ; De-la-Torre, GE (De-la-Torre, Gabriel Enrique) [2] ; Oluwalana, A (Oluwalana, Ayodeji) [3] ; Williams, AB (Williams, Akan B.) [1]
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Abstract

Plastic pollution is a fast-rising environmental catastrophe. Microplastics and nanoplastics (MNPs) are ubiquitous components of most aquatic environments, and their burgeoning prevalence is endangering aquatic organisms. Recent studies have documented the entanglement of marine and freshwater biota by plastic litters, particularly ghost fishing gear, resulting in suffocation, drowning, or starving to death. Numerous reports have shown that aquatic organisms readily ingest and accumulate these emerging contaminants in their digestive systems. Given experimental evidence that contaminants-laden MNPs can persist in the gastrointestinal tract for considerable durations, investigations have documented a high probability of lethal and sublethal toxicological effects associated with direct and indirect MNPs ingestions. These include chronic protein modulation, DNA damage, embryotoxicity, gastrointestinal toxicity, genotoxicity, growth inhibition toxicity, histopathotoxicity, liver toxicity, neurotoxicity, oxidative stress, reproductive toxicity, and tissue damage. Today, reports have proven the transfer of MNPs across the aquatic food web to humans. However, the mechanisms of multiple contaminants-laden MNPs-induced toxicities, size-dependent toxicity, and the comprehensive mode-of-action and alterations of digestive, reproductive, and neurological systems' functionality in marine organisms are still unclear. Thus, this review mainly addresses the prevalence, food web interactions, and toxicity assessment of micro(nano) plastics in marine and freshwater organisms. It summarizes documented studies based on the following broad objectives: (1) the occurrence and prevalence of micro(nano) plastic particles in

marine and freshwater environments; (2) the ingestion of MNPs by aquatic biota and the food web exposure routes and bioaccumulation of contaminated MNPs by higher trophic entities; (3) the adsorption and desorption of persistent organic pollutants, metals, and chemical additives on/from micro(nano)plastics; and (4) the probable ecotoxicological effects of micro(nano)plastics ingestion on aquatic biota.

Keywords
Author Keywords
microplasticsnanoplasticsemerging contaminantsfood chaintrophic transferecotoxicological effects
Keywords Plus
WATER TREATMENT PLANTSSMALL PLASTIC PARTICLESLOGGERHEAD SEA-TURTLESZEBRAFISH DANIO-RERIOMYTILUS-EDULIS L.POLYSTYRENE MICROPLASTICSFRESH-WATERMARINE-ENVIRONMENTWASTE-WATERCARETTA-CARETTA

Food

29- Harnessing the diversity of small-scale actors is key to the future of aquatic food systems

By:
Short, RE (Short, Rebecca E.) [1] ; Gelcich, S (Gelcich, Stefan) [2] , [3] ; Little, DC (Little, David C.) [4] ; Micheli, F (Micheli, Fiorenza) [5] , [6] ; Allison, EH (Allison, Edward H.) [7] ; Basurto, X (Basurto, Xavier) [8] ; Belton, B (Belton, Ben) [7] , [9] ; Brugere, C (Brugere, Cecile) [10] ; Bush, SR (Bush, Simon R.) [11] ; Cao, L (Cao, Ling) [12] ;

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Abstract

Small-scale fisheries and aquaculture (SSFA) provide livelihoods for over 100 million people and sustenance for ~1 billion people, particularly in the Global South. Aquatic foods are distributed through diverse supply chains, with the potential to be highly adaptable to stresses and shocks, but face a growing range of threats and adaptive challenges. Contemporary governance assumes homogeneity in SSFA despite the diverse nature of this sector. Here we use SSFA actor profiles to capture the key dimensions and dynamism of SSFA diversity, reviewing contemporary threats and exploring opportunities for the SSFA sector. The heuristic framework can inform adaptive governance actions supporting the diversity and vital roles of SSFA in food systems, and in the health and livelihoods of nutritionally vulnerable people-supporting their viability through appropriate policies whilst fostering equitable and sustainable food systems.

Keywords
Keywords Plus

Food

FISH CONSUMPTIONCLIMATE-CHANGEVALUE CHAINSAQUACULTUREFISHERIESCERTIFICATIONCOMMUNITIESGOVERNANCESTRATEGIESMANAGEMENT

30- Agriculture-Food Supply Chain Management Based on Blockchain and IoT: A Narrative on Enterprise Blockchain Interoperability

By:
Bhat, SA (Bhat, Showkat Ahmad) [1] ; Huang, NF (Huang, Nen-Fu) [2] ; Sofi, IB (Sofi, Ishfaq Bashir) [3] ; Sultan, M (Sultan, Muhammad) [4]
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Abstract

Modern-day agriculture supply chains have evolved from sovereign and autonomous local stakeholders to a worldwide interconnected system of multiple participants linked by complicated interactions, impacting the production, processing, transportation, and delivery of food to end consumers. Regular instances of fraudulent acts reveal a lack of openness in agriculture supply chains, raising worries about financial losses, eroding customer trust, and lowering corporate brand value. To develop an efficient and reliable trading environment, several fundamental modifications in the present supply chain architecture are required. There is broad consensus that blockchain can improve transparency in agriculture-food supply chains (agri-food SCs). Consumers now demand safe, sustainable, and equitable food production processes, and businesses are using blockchains and the internet of things to meet these needs. For enhanced responsiveness in agri-food SCs, new concepts have evolved that combine blockchains with various Industry 5.0 technologies (e.g., blockchain technology, big data, internet of things (IoT), radio frequency identification (RFID), near field communication (NFC), etc.). It is critical to cut through the hype and examine the technology's limits, which might stymie its acceptance, implementation, and scalability in agri-food supply chains. This study presents Agri-SCM-BIoT (Agriculture Supply Chain Management using Blockchain and Internet of things) architecture to address the storage and scalability optimization, interoperability, security and privacy issues security, and privacy of personal data along with storage concerns with present single-chain agriculture supply chain systems. We also discussed the classification of security threats with IoT infrastructure and possible available blockchain-based defense mechanisms.

Finally, we discussed the features of the proposed supply chain architecture, followed by a conclusion and future work.

Keywords
Author Keywords
precision agriculturesupply chainblockchaininternet of thingstraceabilitysmart contracts
Keywords Plus
BIG DATATRACEABILITYSYSTEMARCHITECTURESECURITYFRAMEWORKINSIGHTSSUPPORTSCHEMEAREAS

31- Applying blockchain technology to improve agri-food traceability: A review of development methods, benefits and challenges

By:
Feng, HH (Feng, Huanhuan) [1] , [2] ; Wang, X (Wang, Xiang) [1] , [2] ; Duan, YQ (Duan, Yanqing) [3] ; Zhang, J (Zhang, Jian) [4] ; Zhang, XS (Zhang, Xiaoshuan) [1] , [2]
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Abstract

Traceability plays a vital role in food quality and safety management. Traditional Internet of Things (IoT) traceability systems provide the feasible solutions for the quality monitoring and traceability of food supply chains. However, most of the IoT solutions rely on the centralized server-client paradigm that makes it difficult for consumers to acquire all transaction information and to track the origins of products. Blockchain is a cutting-edge technology that has great potential for improving traceability performance by providing security and full transparency. However, the benefits, challenges and development methods of blockchain-based food traceability systems are not yet fully explored in the current literature. Therefore, the main aim of this paper is to review the blockchain technology characteristics and functionalities, identify blockchain-based solutions for addressing food traceability concerns, highlight the benefits and challenges of blockchain-based traceability systems implementation, and help researchers and practitioners to apply blockchain technology based food traceability systems by proposing an architecture design framework and suitability application analysis flowchart of blockchain based food traceability systems. The results of this study contribute to better understanding and knowledge on how to improve the food traceability by developing and implementing blockchain-based traceability systems. The paper provides valuable information for researchers and practitioners on the use of blockchain-based food traceability management and has a positive effect on the improvement of food sustainability.

Keywords

Author Keywords

TraceabilityBlockchain technologySecurity and transparencyFood sustainability

Keywords Plus

CHAIN MANAGEMENTINFORMATIONFUTUREINTEGRATIONSECURITYINTERNETFRAMEWORKCONSUMERSROLES

32- A critical review on biochar for enhancing biogas production from anaerobic digestion of food waste and sludge

By:
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Abstract

The conversion of food waste and sludge into biogas via anaerobic digestion technology is gaining attention in recent years, which plays a significant role in waste valorization into bioenergy and promotes environmental sustainability. Biochar is a carbonaceous material produced via thermochemical conversion of biomass waste, and tailoring biochar for diverse environmental applications adheres to the principle of circular economy. The emerging application of biochar as an additive in the anaerobic digestion of food waste and sludge has been intensively investigated in the last few years. However, a comprehensive understanding of multifunctional roles of biochar and its mechanisms in the production of biogas via miscellaneous/complex anaerobic digestion process is yet to be attained. This review scrutinizes the key roles of biochar as an additive and emphasizes the influences of biochar characteristics on the anaerobic digestion processes and their capability to address the foremost challenges. This review also evaluates the techno-economic and environmental impacts of biochar synthesis and its emerging application for biogas production via anaerobic digestion to make the integrated process more economical and environmentally sustainable, and identifies challenges and prospects for future studies.

Keywords
Author Keywords

Food

Waste valorizationPyrolysisBlack carbonBiomethane productionCircular economyEnvironmental sustainability

Keywords Plus

INTERSPECIES ELECTRON-TRANSFERMUNICIPAL SOLID-WASTELIFE-CYCLE ASSESSMENTMICROBIAL COMMUNITYMETHANE PRODUCTIONSEWAGE-SLUDGECO-DIGESTIONAMMONIA INHIBITIONSEMICONTINUOUS OPERATIONPOTENTIAL ENHANCEMENT

33- UV illumination-enhanced ultrasensitive ammonia gas sensor based on (001)TiO2/MXene heterostructure for food spoilage detection

By:
Zhang, DZ (Zhang, Dongzhi) [1] ; Yu, SJ (Yu, Sujing) [1] ; Wang, XW (Wang, Xingwei) [1] ; Huang, JK (Huang, Jiankun) [2] ; Pan, WJ (Pan, Wenjing) [1] ; Zhang, JH (Zhang, Jianhua) [1] ; Meteku, BE (Meteku, Benjamin Edem) [2] ; Zeng, JB (Zeng, Jingbin) [2]
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Abstract

Ammonia has been used as an important marker to indicate the extent of food spoilage. However, current gas sensors for ammonia suffer from either insufficient sensitivity and selectivity or unsatisfactory levels of automation, impeding their practical application for on-site and real-time monitoring of food quality. To overcome these limitations, we propose here the design of a sensing material by in-situ growing (001)TiO2 onto a two-dimensional transition-metal carbide (Ti3C2Tx, MXene). In this design, TiO2 with a highly active (001) crystal plane provides efficient photogeneration under UV irradiation, while Ti3C2Tx can store holes through Schottky junction formed at the interface with TiO2, which greatly promotes the separation of electron-hole pairs, thereby enhancing ammonia sensing performance. By further introducing UV light for electron excitation, the (001)TiO2/Ti3C2Tx based sensor shows 34 times higher sensitivity for ammonia (30 ppm) than that of Ti3C2Tx. The density functional theory further revealed that the (001) plane of TiO2 and Ti3C2Tx composite configuration exhibited the highest adsorption affinity towards ammonia. Finally, an integrated circuit alarm system including near-field communication and a micro-controller system was designed to detect the decay process of fresh pork, fish, and shrimp. We believe such a sensing technology holds great promise in food quality monitoring.

Food

Keywords
Author Keywords
(001)TiO2/Ti3C2Tx heterostructureAmmonia gas sensorUV illuminationDensity functional theoryNFC molecule
Keywords Plus
TI3C2TX MXENE

34- Air quality, nitrogen use efficiency and food security in China are improved by cost-effective agricultural nitrogen management

By:
Guo, YX (Guo, Yixin) [1] ; Chen, YF (Chen, Youfan) [2] ; Searchinger, TD (Searchinger, Timothy D.) [1] ; Zhou, M (Zhou, Mi) [2] ; Pan, D (Pan, Da) [3] ; Yang, JN (Yang, Junnan) [1] ; Wu, L (Wu, Liang) [4] ; Cui, ZL (Cui, Zhenling) [4] ; Zhang, WF (Zhang, Weifeng) [4] ; Zhang, FS (Zhang, Fusuo) [4] ;
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Abstract

China's gains in food production over the past four decades have been associated with substantial agricultural nitrogen losses, which contribute to air and water pollution, greenhouse gas emissions and damage to human health. Here, we explore the potential to improve agricultural production practices that simultaneously increase yields while addressing these environmental challenges. We link agronomic research with air quality modelling for an integrated assessment of four improved nitrogen management strategies: improved farm management practices with nitrogen use reductions; machine deep placement of fertilizer; enhanced-efficiency fertilizer use; and improved manure management. We find that simultaneous implementation of the four strategies provides the largest benefits, which include: reductions in PM2.5 concentrations and associated premature deaths; increases in grain yields and grain nitrogen use efficiency; reductions in NO3- leaching and runoff and greenhouse gas emissions. Total benefits of US$30 billion per year exceed the US$18 billion per year in costs. Our findings indicate that policies that improve farmers' agricultural nitrogen management in China will improve both food security and public health while addressing multiple environmental challenges. Similar increases in attention on agricultural policy around the world are likely to provide large benefits in food security, environmental integrity and public health.

Keywords

Food

Keywords Plus

GREENHOUSE-GAS EMISSIONSPARTICULATE MATTERREACTIVE NITROGENAMMONIA EMISSIONSCLIMATE-CHANGELIVESTOCK PRODUCTIONMANAGING NITROGENUNITED-STATESEAST CHINAPART I

35- COVID-19 implications on household income and food security in Kenya and Uganda: Findings from a rapid assessment

By:
Kansiime, MK (Kansiime, Monica K.) [1] ; Tambo, JA (Tambo, Justice A.) [2] ; Mugambi, I (Mugambi, Idah) [1] ; Bundi, M (Bundi, Mary) [1] ; Kara, A (Kara, Augustine) [3] ; Owuor, C (Owuor, Charles) [4]

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Abstract

This study assessed implications of the Coronavirus Disease 19 (COVID-19) pandemic on household income and food security in two East African countries - Kenya and Uganda, using online survey data from 442 respondents. Results show that more than two-thirds of the respondents experienced income shocks due to the COVID-19 crisis. Food security and dietary quality worsened, as measured by the food insecurity experience scale and the frequency of consumption of nutritionally-rich foods. The proportion of food insecure respondents increased by 38% and 44% in Kenya and Uganda respectively, and in both countries, the regular consumption of fruits decreased by about 30% during the COVID-19 pandemic, compared to a normal period (before the pandemic). Results from probit regressions show that the income-poor households and those dependent on labour income were more vulnerable to income shock, and had poorer food consumption during the COVID-19 pandemic compared to other respondent cate-gories. As such, they were more likely to employ food-based coping strategies compared to those pursuing alternative livelihoods, who generally relied on savings. Farmers were less likely to experience worsened food security compared to other respondent categories who depended to a great extent on market sources for food. In both countries, participation in national social security schemes was less likely to mitigate respondents' income shock during the COVID-19 period. Conversely, membership savings and loan groups was correlated with less likelihood of suffering income shocks and reduction in food consumption. The results suggest that ongoing and future government responses should focus on structural changes in social security by developing responsive packages to cushion members pushed into poverty by such pandemics while building strong financial institutions to support the recovery of

businesses in the medium term, and ensuring the resilience of food supply chains particularly those making available nutrient-dense foods.

Keywords
Author Keywords
COVID-19Coping strategiesDietary qualityFood securityProbit modelSocial security
Keywords Plus
IMPACT

36- Global food system emissions could preclude achieving the 1.5 degrees and 2 degrees C climate change targets

By:
Clark, MA (Clark, Michael A.) [1] , [2] ; Domingo, NGG (Domingo, Nina G. G.) [3] ; Colgan, K (Colgan, Kimberly) [3] ; Thakrar, SK (Thakrar, Sumil K.) [3] ; Tilman, D (Tilman, David) [4] , [5] ; Lynch, J (Lynch, John) [6] ; Azevedo, IL (Azevedo, Ines L.) [7] , [8] ; Hill, JD (Hill, Jason D.) [3]
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Abstract

The Paris Agreement's goal of limiting the increase in global temperature to 1.5 degrees or 2 degrees C above preindustrial levels requires rapid reductions in greenhouse gas emissions. Although reducing emissions from fossil fuels is essential for meeting this goal, other sources of emissions may also preclude its attainment. We show that even if fossil fuel emissions were immediately halted, current trends in global food systems would prevent the achievement of the 1.5 degrees C target and, by the end of the century, threaten the achievement of the 2 degrees C target. Meeting the 1.5 degrees C target requires rapid and ambitious changes to food systems as well as to all nonfood sectors. The 2 degrees C target could be achieved with less-ambitious changes to food systems, but only if fossil fuel and other nonfood emissions are eliminated soon.

Keywords
Keywords Plus
GREENHOUSE-GAS EMISSIONSENVIRONMENTAL IMPACTSMANAGEMENTDEMANDHEALTH

37- First Report on the Bioaccumulation and Trophic Transfer of Perfluoroalkyl Ether Carboxylic Acids in Estuarine Food Web br

By:
Li, YN (Li, Yanan) [1] , [2] ; Yao, JZ (Yao, Jingzhi) [3] ; Zhang, J (Zhang, Jian) [1] , [2] ; Pan, YT (Pan, Yitao) [3] ; Dai, JY (Dai, Jiayin) [3] ; Ji, CL (Ji, Chenglong) [1] ; Tang, JH (Tang, Jianhui) [1]
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Abstract

As novel alternatives to legacy poly- and perfluor-oalkyl substances (PFAS), perfluoroalkyl ether carboxylic acids(PFECAs) have been widely detected in the environment;however, there is limited information and knowledge regardingtheir bioaccumulation and trophic transfer behavior along the foodchain. This research presents thefirst known published data on thebioaccumulation and trophic transfer characteristics of PFECAs ina source-impacted estuary. Elevated PFECA concentrations wereobserved in organisms (for instance, conch, with perfluoro-2-methoxyacetic acid (PFMOAA) concentration reaches up to16 700 ng/g dry weight (dw)), indicating exposure risks to theconsumers. Conch can be acted as a potential environmentalbioindicator of PFMOAA. PFMOAA, hexafluoropropylene oxidetrimer acid (HFPO-TrA) and PFOA were predominant detected in biotas. On the basis of trophic magnification factors (TMFs),PFECAs with >= 6 perfluorinated carbons (HFPO-TrA, hexafluoropropylene oxide tetramer acid (HFPO-TeA) and perfluoro (3, 5, 7,9, 11-pentaoxadodecanoic) acid (PFO5DoA)) could be biomagnified along the food chain (TMF > 1), while PFMOAA with theleast perfluorinated carbons undergone biodilution (TMF < 1). As seafood is an important dietary source of protein to human, thereis a potential health risk related to the consuming polluted aquatic products.

Keywords
Author Keywords

Food

poly- and perfluoroalkyl substances (PFAS)perfluoro-2-methoxyacetic acid (PFMOAA)biomagnificationbiodilutionXiaoqing River

Keywords Plus

POLYBROMINATED DIPHENYL ETHERSSULFONIC-ACIDSPOLYFLUOROALKYL SUBSTANCESPOLYFLUORINATED COMPOUNDSPERFLUORINATED COMPOUNDSBOHAI BAYCONTAMINANTSMAGNIFICATIONLEGACYCHINA

Food

38- Guidance on risk assessment of nanomaterials to be applied in the food and feed chain: human and animal health

By:
More, S (More, Simon) ; Bampidis, V (Bampidis, Vasileios) ; Benford, D (Benford, Diane) ; Bragard, C (Bragard, Claude) ; Halldorsson, T (Halldorsson, Thorhallur) ; Hernandez-Jerez, A (Hernandez-Jerez, Antonio) ; Bennekou, SH (Bennekou, Susanne Hougaard) ; Koutsoumanis, K (Koutsoumanis, Kostas) ; Lambre, C (Lambre, Claude) ; Machera, K (Machera, Kyriaki) ;
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Abstract

The EFSA has updated the Guidance on risk assessment of the application of nanoscience and nanotechnologies in the food and feed chain, human and animal health. It covers the application areas within EFSA's remit, including novel foods, food contact materials, food/feed additives and pesticides. The updated guidance, now Scientific Committee Guidance on nano risk assessment (SC Guidance on Nano-RA), has taken account of relevant scientific studies that provide insights to physico-chemical properties, exposure assessment and hazard characterisation of nanomaterials and areas of applicability. Together with the accompanying Guidance on Technical requirements for regulated food and feed product applications to establish the presence of small particles including nanoparticles (Guidance on Particle-TR), the SC Guidance on Nano-RA specifically elaborates on physico-chemical characterisation, key parameters that should be measured, methods and techniques that can be used for characterisation of nanomaterials and their determination in complex matrices. The SC Guidance on Nano-RA also details aspects relating to exposure assessment and hazard identification and characterisation. In particular, nanospecific considerations relating to in vitro/in vivo toxicological studies are discussed and a tiered framework for toxicological testing is outlined. Furthermore, in vitro degradation, toxicokinetics, genotoxicity, local and

systemic toxicity as well as general issues relating to testing of nanomaterials are described. Depending on the initial tier results, additional studies may be needed to investigate reproductive and developmental toxicity, chronic toxicity and carcinogenicity, immunotoxicity and allergenicity, neurotoxicity, effects on gut microbiome and endocrine activity. The possible use of read-across to fill data gaps as well as the potential use of integrated testing strategies and the knowledge of modes or mechanisms of action are also discussed. The Guidance proposes approaches to risk characterisation and uncertainty analysis. (C) 2021 European Food Safety Authority. EFSA Journal published by John Wiley and Sons Ltd on behalf of European Food Safety Authority.

Keywords

Author Keywords

nanoparticlephysico-chemical characterisationdietary exposurenanotoxicologysafety assessmenttesting strategy

Keywords Plus

IN-VITRO DIGESTIONTITANIUM-DIOXIDE NANOPARTICLESGASTROINTESTINAL-TRACTLABORATORY VALIDATIONSILVER NANOPARTICLESMICRONUCLEUS ASSAYSURFACE-PROPERTIESIPCS FRAMEWORKDRUG DELIVERYBIOACCESSIBILITY

39- Graphene-based electrochemical sensors for antibiotic detection in water, food and soil: A scientometric analysis in CiteSpace (2011-2021)

By:
Fu, L (Fu, Li) [1] ; Mao, SD (Mao, Shuduan) [2] ; Chen, F (Chen, Fei) [1] ; Zhao, SC (Zhao, Shichao) [1] ; Su, WT (Su, Weitao) [3] ; Lai, GS (Lai, Guosong) [4] ; Yu, AM (Yu, Aimin) [5] ; Lin, CT (Lin, Cheng-Te) [6]
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Abstract

The residues of antibiotics in the environment pose a potential health hazard, so highly sensitive detection of antibiotics has always appealed to analytical chemists. With the widespread use of new low-dimensional materials, graphene-modified electrochemical sensors have emerged as an excellent candidate for highly sensitive detection of antibiotics. Graphene, its derivatives and its composites have been used in this field of exploration in the last decade. In this review, we have not only described the field using traditional summaries, but also used bibliometrics to quantify the development of the field. The literature between 2011 and 2021 was included in the analysis. Also, the sensing performance and detection targets of different sensors were compared. We were able to trace not only the flow of research themes, but also the future areas of development. Graphene is a material that has a high potential to be used on a large scale in the preparation of electrochemical sensors. How to design a sensor with selectivity and low cost is the key to bring this material from the laboratory to practical applications.

Keywords
Author Keywords
AntibioticsElectrochemical sensorGrapheneCitespaceNanocomposite
Keywords Plus
MOLECULARLY IMPRINTED POLYMERGLASSY-CARBON ELECTRODESENSITIVE DETECTIONGOLD NANOPARTICLESBETA-CYCLODEXTRINPALLADIUM NANOPARTICLESOXIDE NANOPARTICLESFACILE FABRICATIONAPTASENSORCHLORAMPHENICOL

40- A meta-analysis of projected global food demand and population at risk of hunger for the period 2010-2050

By:
van Dijk, M (van Dijk, Michiel) [1] , [2] ; Morley, T (Morley, Tom) [1] ; Rau, ML (Rau, Marie Luise) [1] ; Saghai, Y (Saghai, Yashar) [3] , [4]
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Abstract

Quantified global scenarios and projections are used to assess long-term future global food security under a range of socio-economic and climate change scenarios. Here, we conducted a systematic literature review and meta-analysis to assess the range of future global food security projections to 2050. We reviewed 57 global food security projection and quantitative scenario studies that have been published in the past two decades and discussed the methods, underlying drivers, indicators and projections. Across five representative scenarios that span divergent but plausible socio-economic futures, the total global food demand is expected to increase by 35% to 56% between 2010 and 2050, while population at risk of hunger is expected to change by -91% to +8% over the same period. If climate change is taken into account, the ranges change slightly (+30% to +62% for total food demand and -91% to +30% for population at risk of hunger) but with no statistical differences overall. The results of our review can be used to benchmark new global food security projections and quantitative scenario studies and inform policy analysis and the public debate on the future of food.

Across 57 global food security projection and quantitative scenario studies that have been published in the past two decades, the total global food demand is expected to rise from +35% to +56% between 2010 and 2050, and the population at risk of hunger is expected to change by -91% to +8%. Both ranges are substantially lower than previous projections.

Food

Keywords

Keywords Plus

CLIMATE-CHANGE MITIGATIONSCENARIOAGRICULTURESYSTEMSECURITYMODELS

41- Polydopamine nanoparticle-dotted food gum hydrogel with excellent antibacterial activity and rapid shape adaptability for accelerated bacteria-infected wound healing

By:
Zeng, QK (Zeng, Qiankun) [1] , [2] ; Qian, YN (Qian, Yuna) [1] , [2] ; Huang, YJ (Huang, Yijing) [1] ; Ding, F (Ding, Feng) [3] ; Qi, XL (Qi, Xiaoliang) [1] , [2] ; Shen, JL (Shen, Jianliang) [1] , [2]
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Abstract

Most commonly used wound dressings have severe problems, such as an inability to adapt to wound shape or a lack of antibacterial capacity, affecting their ability to meet the requirements of clinical applications. Here, a nanocomposite hydrogel (XKP) is developed by introducing polydopamine nanoparticles (PDA NPs) into a food gum matrix (XK, consisting of xanthan gum and konjac glucomannan, both FDA-approved food thickening agents) for skin wound healing. In this system, the embedded PDA NPs not only interact with the food gum matrix to form a hydrogel with excellent mechanical strength, but also act as photothermal transduction agents to convert near-infrared laser radiation to heat, thereby triggering bacterial death. Moreover, the XKP hydrogel has high elasticity and tunable water content, enabling it to adapt to the shape of the wound and insulate it, providing a moist environment suitable for healing. In-vivo skin wound healing results clearly demonstrate that XKP can significantly accelerate the healing of wounds by reducing the inflammatory response and promoting vascular reconstruction. In summary, this strategy provides a simple and practical method to overcome the drawbacks of traditional wound dressings, and provides further options when choosing suitable wound healing materials for clinical applications.

Keywords
Author Keywords

Food

Wound healingPolydopamine nanoparticlesFood gum hydrogelShape adaptabilityPhotothermal treatment

Keywords Plus

CONDUCTIVE HYDROGELSKONJAC GLUCOMANNANADHESIVETHERAPYRELEASEXANTHANGELS

Food

42- Turmeric and Its Major Compound Curcumin on Health: Bioactive Effects and Safety Profiles for Food, Pharmaceutical, Biotechnological and Medicinal Applications

By:
Sharifi-Rad, J (Sharifi-Rad, Javad) [1] ; El Rayess, Y (Rayess, Youssef El) [2] ; Rizk, AA (Rizk, Alain Abi) [2] ; Sadaka, C (Sadaka, Carmen) [3] ; Zgheib, R (Zgheib, Raviella) [4] ; Zam, W (Zam, Wissam) [5] ; Sestito, S (Sestito, Simona) [6] ; Rapposelli, S (Rapposelli, Simona) [6] ; Neffe-Skocinska, K (Neffe-Skocinska, Katarzyna) [6] , [7] , [8] ; Zielinska, D (Zielinska, Dorota) [8] ;
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Abstract

Curcumin, a yellow polyphenolic pigment from theCurcuma longaL. (turmeric) rhizome, has been used for centuries for culinary and food coloring purposes, and as an ingredient for various medicinal preparations, widely used in Ayurveda and Chinese medicine. In recent decades, their biological activities have been extensively studied. Thus, this review aims to offer an in-depth discussion of curcumin applications for food and biotechnological industries, and on health promotion and disease prevention, with particular emphasis on its antioxidant, anti-inflammatory, neuroprotective, anticancer, hepatoprotective, and cardioprotective effects. Bioavailability, bioefficacy and safety features, side effects, and quality parameters of curcumin are also addressed. Finally, curcumin's multidimensional applications, food attractiveness optimization, agro-industrial procedures to offset its instability and low bioavailability, health concerns, and upcoming strategies for clinical application are also covered.

Keywords
Author Keywords
Curcuma longaLcurcumaturmericspicecurcuminoidspharmacological effectsbiotechnological applications
Keywords Plus

Food

FACTOR-KAPPA-BHUMAN BREAST-CANCERI CLINICAL-TRIALDOWN-REGULATIONANTIMICROBIAL ACTIVITYANTIINFLAMMATORY ACTIVITYSIGNALING PATHWAYANTIOXIDANT ACTIVITIESCHEMOPREVENTIVE AGENTTISSUE DISTRIBUTION

43- A review on insoluble-bound phenolics in plant-based food matrix and their contribution to human health with future perspectives

By:
Zhang, B (Zhang, Bing) [1] , [2] ; Zhang, YJ (Zhang, Yujing) [1] ; Li, HY (Li, Hongyan) [1] ; Deng, ZY (Deng, Zeyuan) [1] ; Tsao, R (Tsao, Rong) [2]
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Abstract

Background: Diets rich in phenolics are associated with multiple health benefits. The majority of related studies have focused nearly exclusively on soluble free and conjugated phenolics in plant-based foods, whereas a large amount of insoluble phenolics bound to food matrix in the remaining solid residues are neglected. The fate of bound phenolics in human digestive tract and health implications are not well understood.

Scope and approach: In this review, we provide a thorough literature review regarding the occurrence, chemistry and potential health implications of the insoluble-bound phenolics in food matrix. Research gaps were identified and future perspectives on insoluble-bound phenolics have been proposed.

Key findings and conclusions: Significant amount of phenolic compounds occurs in insoluble forms through covalently binding to cell wall structural components in plant food matrix. These bound phenolics must be released by various pretreatments such as hydrolysis by enzyme, alkali and acid, or other assisted technologies before they can be identified and characterized, and there is no standard method currently. The health benefits of insoluble-bound phenolics are not only largely governed by their intrinsic content in food matrix, but their bioaccessibility and bioavailability in human body. Insoluble-bound phenolics obtained via hydrolysis possess antioxidant and anti-inflammatory activities in vitro, and have been implicated in different health benefits. Recent studies have suggested their involvement in modulating gut microbiota and intestinal immune response as a dietary component; however, the roles of bound phenolics and phenolic metabolites in intestinal inflammation and gut health and the interplay mechanisms are still poorly understood. This contribution provides an update on the insoluble-bound phenolics in food matrix and new perspectives for future studies.

Food

Keywords

Author Keywords

Insoluble-bound phenolicsBioaccessibilityBioavailabilityBioactivityFood matrixIntestinal health

Keywords Plus

PULSED ELECTRIC-FIELDSULTRASOUND-ASSISTED EXTRACTIONLOW-DENSITY-LIPOPROTEINANTIOXIDANT ACTIVITYFERULIC ACIDGUT MICROBIOTAWHEAT BRANANTIPROLIFERATIVE ACTIVITIESALKALINE-HYDROLYSISCOLONIC METABOLITES

44- The European Union Summary Report on Antimicrobial Resistance in zoonotic and indicator bacteria from humans, animals and food in 2018/2019

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Abstract

Data on antimicrobial resistance (AMR) in zoonotic and indicator bacteria from humans, animals and food are collected annually by the EU Member States (MSs), jointly analysed by the EFSA and the ECDC and reported in a yearly EU Summary Report. The annual monitoring of AMR in animals and food within the EU is targeted at selected animal species corresponding to the reporting year. The 2018 monitoring specifically focussed on poultry and their derived carcases/meat, while the monitoring performed in 2019 specifically focused on pigs and calves under 1 year of age, as well as their derived carcases/meat. Monitoring and reporting of AMR in 2018/2019 included data regarding Salmonella, Campylobacter and indicator Escherichia coli isolates, as well as data obtained from the specific monitoring of presumptive ESBL-/AmpC-/carbapenemase-producing E. coli isolates. Additionally, some MSs reported voluntary data on the occurrence of meticillin-resistant Staphylococcus aureus in animals and food, with some countries also providing data on antimicrobial susceptibility. This report provides an overview of the main findings of the 2018/2019 harmonised AMR monitoring in the main food-producing animal populations monitored, in related carcase/meat samples and in humans. Where available, data monitoring obtained from pigs, calves, broilers, laying hens and turkeys, as well as from carcase/meat samples and humans were combined and compared at the EU level, with particular emphasis on multidrug resistance, complete susceptibility and combined resistance patterns to critically important antimicrobials, as well as Salmonella and E. coli isolates possessing ESBL-/AmpC-/carbapenemase phenotypes. The outcome indicators for AMR in food-producing animals such as complete susceptibility to the harmonised panel of

antimicrobials in E. coli and the prevalence of ESBL-/AmpC-producing E. coli have been also specifically analysed over the period 2015-2019. (C) 2021 European Food Safety Authority and European Centre for Disease Prevention and Control. EFSA Journal published by John Wiley and Sons Ltd on behalf of European Food Safety Authority.

Keywords
Author Keywords
antimicrobial resistancezoonotic bacteriaindicator bacteriaESBLMRSA
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STAPHYLOCOCCUS-AUREUS MRSASALMONELLA-ENTERICA SEROVARMETHICILLIN-RESISTANTESCHERICHIA-COLIMULTIDRUG-RESISTANTKLEBSIELLA-PNEUMONIAECAMPYLOBACTER-COLIPIGSIMPACTCOLONIZATION

45- AIEgens enabled ultrasensitive point-of-care test for multiple targets of food safety: Aflatoxin B-1 and cyclopiazonic acid as an example

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Abstract

Food safety is currently a significant issue for human life and health. Various fluorescent nanomaterials have been applied in the point-of-care test (POCT) for food safety as labeling materials. However, previous fluorescent nanomaterials can cause aggregation-caused quenching (ACQ), thus reducing the detection sensitivity. Conversely, aggregation-induced emission luminogens (AIEgens) are promising candidates for POCT in the food safety field because they can enhance detection sensitivity and throughput. Mycotoxins, such as aflatoxin B1 (AFB1) and cyclopiazonic acid (CPA), are a primary threat to human life and health and a significant food safety issue, and their on-site detection from farm to table is needed. Herein, an ultrasensitive point-of-care test was developed based on TPE-Br, a blue-emissive tetraphenylethylene derivative AIEgen. Under optimal conditions, this AIEgen-based lateral-flow biosensor (ALFB) allowed for a rapid response of 8 min toward AFB1 and CPA detection, with considerable sensitivities of 0.003 and 0.01 ng/mL in peanut matrices, respectively. In peanut matrices, the recoveries were 90.3%?110.0% for both mycotoxins, with relative standard deviations (RSDs) below 6%. The ALFB was further validated via UPLC-MS/MS using spiked peanut samples. AIEgens open an avenue for on-site, ultrasensitive, high-throughput detection methods and can be extensively used in point-ofcare tests in food safety.

Keywords

Food

Author Keywords
Aggregation-induced emissionLateral flowPoint-of-care testCyclopiazonic acidFood safety
Keywords Plus
AGGREGATION-INDUCED EMISSIONLATERAL FLOW IMMUNOASSAYSILICA NANOPARTICLESMYCOTOXINSSTRIPGOLD

Food

46- Recent advances in Ponceau dyes monitoring as food colorant substances by electrochemical sensors and developed procedures for their removal from real samples

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Abstract

Ponceau dyes are one of the food coloring materials that are added to various pharmaceutical, health and food products and give them an appearance. These dyes contain contaminants such as Benzidine, 4-Aminobiphenyl, and 4-Aminoazobenzene that are safe in small amounts, but they are not approved by the US Food and Drug Administration (US-FDA) for human consumption. This study comprehensively was reviewed the properties, applications, chemistry, and toxicity of Ponceau dyes as food colorant substances. Electroanalysis of Ponceau dyes was discussed in detail, and the various electrochemical sensors used to detect and monitor these dyes as food colorant were examined. The applied methods of removing and degradation of these dyes in municipal and industrial wastes were also discussed. Conclusions and future perspectives to motivate future research were also explored.

Keywords
Author Keywords
Ponceau dyesFood colorantElectrochemical sensorDegradationRemoval
Keywords Plus
REACTIVE BLACK 5AZO-DYEWASTE-WATERPHOTOCATALYTIC DEGRADATIONALLURA REDAQUEOUS-SOLUTIONSIONIC LIQUIDSOFT DRINKSCHITOSAN/POLYAMIDE NANOFIBERSSTRIPPING VOLTAMMETRY

47- The Impact of COVID-19 on Health Behavior, Stress, Financial and Food Security among Middle to High Income Canadian Families with Young Children

By:
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Abstract
The COVID-19 pandemic has disrupted many aspects of daily life. The purpose of this study was to identify how health behaviors, level of stress, financial and food security have been impacted by the pandemic among Canadian families with young children. Parents (mothers,n= 235 and fathers,n= 126) from 254 families participating in an ongoing study completed an online survey that included close and open-ended questions. Descriptive statistics were used to summarize the quantitative data and qualitative responses were analyzed using thematic analysis. More than half of our sample reported that their eating and meal routines have changed since COVID-19; most commonly reported changes were eating more snack foods and spending more time cooking. Screen time increased among 74% of mothers, 61% of fathers, and 87% of children and physical activity decreased among 59% of mothers, 52% of fathers, and 52% of children. Key factors influencing family stress include balancing work with childcare/homeschooling and financial instability. While some unhealthful behaviors appeared to have been exacerbated, other more healthful behaviors also emerged since COVID-19. Research is needed to determine the longer-term impact of the pandemic on behaviors and to identify effective strategies to support families in the post-COVID-19 context.

Food

Keywords
Author Keywords
COVID-19familyhealth behaviorstressfood insecurity
Keywords Plus
CHILDHOODQUALITYPARENTSINDEXRISK

48- Essential Oils and Their Major Components: An Updated Review on Antimicrobial Activities, Mechanism of Action and Their Potential Application in the Food Industry

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Abstract
A novel alternative to synthetic preservatives is the use of natural products such as essential oil (EO) as a natural food-grade preservative. EOs are Generally Recognized as Safe (GRAS), so they could be considered an alternative way to increase the shelf-life of highly perishable food products by impeding the proliferation of food-borne pathogens. The mounting interest within the food industry and consumer preference for "natural" and "safe" products means that scientific evidence on plant-derived essential oils (EOs) needs to be examined in-depth, including the underlying mechanisms of action. Understanding the mechanism of action that individual components of EO exert on the cell is imperative to design strategies to eradicate food-borne pathogens. Results from published works showed that most EOs are more active against Gram-positive bacteria than Gram-negative bacteria due to the difference in the cell wall structure. In addition, the application of EOs at a commercial scale has been minimal, as their flavour and odour could be imparted to food. This review provides a comprehensive summary of the research carried out on EOs, emphasizing the antibacterial activity of fruit peel EOs, and the antibacterial mechanism of action of the individual components of EOs. A brief outline of recent contributions of EOs in the food matrix is highlighted. The findings from the literature have been encouraging, and further research is recommended to develop strategies for the application of EO at an industrial scale.

Keywords
Author Keywords
essential oilpeelantibacterialantimicrobialmechanism of actionpreservation

Food

Keywords Plus

CINNAMON ESSENTIAL OILTHYME ESSENTIAL OILPEEL ESSENTIAL OILSANTIBACTERIAL ACTIVITYCHEMICAL-COMPOSITIONIN-VITROESCHERICHIA-COLILISTERIA-MONOCYTOGENESSTAPHYLOCOCCUS-AUREUSQUALITY ATTRIBUTES

49- Modeling Rumor Diffusion Process With the Consideration of Individual Heterogeneity: Take the Imported Food Safety Issue as an Example During the COVID-19 Pandemic

By:
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Abstract
At present, rumors appear frequently in social platforms. The rumor diffusion will cause a great impact on the network order and the stability of the society. So it's necessary to study the diffusion process and develop the rumor control strategies. This article integrates three heterogeneous factors into the SEIR model and designs an individual state transition mode at first. Secondly, based on the influencing factors such as the trust degree among individuals, an individual information interaction mode is constructed. Finally, an improved SEIR model named SEIR-OM model is established, and the diffusion process of rumors are simulated and analyzed. The results show that: (1) when the average value of the interest correlation is greater, the information content deviation is lower, but the rumor diffusion range will be wider. (2) The increase of the average network degree intensifies influence of rumors, but its impact on the diffusion has a peak. (3) Adopting strategies in advance can effectively reduce the influence of rumors. In addition, the government should enforce rumor-refuting strategies right after the event. Also, the number of rumor-refuting individuals must be paid attention to. Finally, the article verifies the rationality and effectiveness of the SEIR-OM model through the real case.

Keywords
Author Keywords
individual heterogeneityrumor diffusionSEIR-OM modelrumor controlCOVID-19 pandemic
Keywords Plus
EVOLUTIONARY GAMEGLOBAL DYNAMICSCOMPLEX

Food

50- The Role of Diet Quality in Mediating the Association between Ultra-Processed Food Intake, Obesity and Health-Related Outcomes: A Review of Prospective Cohort Studies

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Abstract

Prospective cohort studies show that higher intakes of ultra-processed food (UPF) increase the risk of obesity and obesity-related outcomes, including cardiovascular disease, cancer and type 2 diabetes. Whether ultra-processing itself is detrimental, or whether UPFs just have a lower nutritional quality, is debated. Higher UPF intakes are inversely associated with fruit, vegetables, legumes and seafood consumption. Therefore, the association between UPFs and poor health could simply be from excess nutrient intake or from a less healthful dietary pattern. If so, adjustment for dietary quality or pattern should explain or greatly reduce the size of the significant associations between UPFs and health-related outcomes. Here, we provide an overview of the literature and by using a novel approach, review the relative impact of adjusting for diet quality/patterns on the reported associations between UPF intake and health-related outcomes in prospective cohort studies. We find that the majority of the associations between UPFs, obesity and health-related outcomes remain significant and unchanged in magnitude after adjustment for diet quality or pattern. Our findings suggest that the adverse consequences of UPFs are independent of dietary quality or pattern, questioning the utility of reformulation to mitigate against the obesity pandemic and wider negative health outcomes of UPFs.

Keywords
Author Keywords
obesitydietultra-processed foodNOVA classificationdiet qualitydietary patternnon-communicable disease

Food

Keywords Plus

ALL-CAUSE MORTALITYTOTAL-ENERGY INTAKECARDIOVASCULAR-DISEASECONSUMPTIONRISKMETAANALYSISPRODUCTSHYPERTENSIONPOPULATIONNUTRIENTS

51- Update of the list of QPS-recommended biological agents intentionally added to food or feed as notified to EFSA 15: suitability of taxonomic units notified to EFSA until September 2021

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Abstract

The qualified presumption of safety (QPS) approach was developed to provide a generic pre-evaluation of the safety of biological agents. The QPS approach is based on an assessment of published data for each agent, with respect to its taxonomic identity, the body of relevant knowledge and safety concerns. Safety concerns are, where possible, confirmed at the species/strain or product level and reflected by 'qualifications'. The QPS list was updated in relation to the revised taxonomy of the genus Bacillus, to synonyms of yeast species and for the qualifications 'absence of resistance to antimycotics' and 'only for production purposes'. Lactobacillus cellobiosus has been reclassified as Limosilactobacillus fermentum. In the period covered by this statement, no new information was found that would change the status of previously recommended QPS taxonomic units (TU)s. Of the 70 microorganisms notified to EFSA, 64 were not evaluated: 11 filamentous fungi, one oomycete, one Clostridium butyricum, one Enterococcus faecium, five Escherichia coli, one Streptomyces sp., one Bacillus nakamurai and 43 TUs that already had a QPS status. Six notifications, corresponding to six TUs were evaluated: Paenibacillus lentus was reassessed because an update was requested for the current mandate. Enterococcus lactis synonym Enterococcus xinjiangensis, Aurantiochytrium mangrovei synonym Schizochytrium mangrovei,

Schizochytrium aggregatum, Chlamydomonas reinhardtii synonym Chlamydomonas smithii and Haematococcus lacustris synonym Haematococcus pluvialis were assessed for the first time. The following TUs were not recommended for QPS status: P. lentus due to a limited body of knowledge, E. lactis synonym E. xinjiangensis due to potential safety concerns, A. mangrovei synonym S. mangrovei, S. aggregatum and C. reinhardtii synonym C. smithii, due to lack of a body of knowledge on its occurrence in the food and feed chain. H. lacustris synonym H. pluvialis is recommended for QPS status with the qualification 'for production purposes only'.

Keywords
Author Keywords
Aurantiochytrium mangroveiChlamydomonas reinhardtiiEnterococcus lactisHaematococcus lacustrisPaenibacillus lentusQPSSchizochytrium aggregatum
Keywords Plus
SCHIZOCHYTRIUM-MANGROVEISP NOV.ASTAXANTHINTOXICITYCULTUREALPHACELLS