Mycotoxins In Food Detection And Control

Mycotoxins in Agriculture and Food Safety

Determination of Mycotoxins and Mycotoxigenic Fungi in Food and Feed

Practical Tools for Plant and Food Biosecurity

Encyclopedia of Food Mycotoxins

Mycotoxin contamination of food occurs as a result of crop invasion by field fungi such as Fusarium spp., Alternaria spp., Aspergillus spp., and Penicillium spp., which start their growth while in storage (storage fungi). In the worst case, these fungi produce secondary metabolites called mycotoxins. They can be very harmful to humans and animals, and for example they are consumed through food. Mycotoxins have various negative effects on several organs in humans and animals. The present book gives a basic overview of the main mycotoxins in food. It lists the predisposition of a foodstuff for mycotoxin contamination, the degree of contamination, concentration, and country of detection/origin for each case of mycotoxin contamination of food. Major updates to this second edition include: - More than 750 new publications concerning mycotoxins in foodstuffs (1665 literatures at all). - A single chapter overview of mycotoxin(s) in the corresponding foodstuff. - The co-occurrence of mycotoxins in a foodstuff has been listed where possible. - Numerical and alphabetical literature. - Organic and conventional foods of a publication have been listed separately where possible. - Numerous entries described in much greater detail. - Each analyzed foodstuff has a separate entry per year where possible.

Mycotoxins in Food: The evaluation of the presence of mycotoxins in different matrices is achieved through different analytical tools (including quantitative or qualitative determinations). Studies of mycotoxin isolation, using chromatographic equipment coupled to spectrometry detectors (QTrap-MS/MS, MS/MS tandem, QTOF-MS/MS), are the most useful tools to control their presence. All these studies represent key steps in the establishment of the limits of detection, limits of quantification, points of identification, accuracy, reproducibility, and repeatability of different procedures. The maximum permitted or recommended levels for mycotoxins in different matrices are within a wide range (including the levels tolerated by infants and animals). In addition, decontaminated strategies, as well as control and evaluation of exposure, are demanded by authorities and food safety systems. These authorities are not only concerned with the determination of mycotoxin presence but also with the toxicological effects of mycotoxins, and in vivo or in vitro assays are necessary for a complete evaluation. In fact, these assays are the basis for the control and prevention of population exposure to mycotoxins in dietary exposure studies. The most recent surveys focused on regulated mycotoxins (afatoxins, fumonisins, trichothecenes, and zearalenones) and emerging toxins, such as enniatins and beauvericin in adult consumers, while very few studies have monitored mycotoxin levels in infant products. This book comprises 11 original contributions and one review. New findings regarding presence of mycotoxins in aromatic and medicinal plants, mango and orange juice, juices, pulps, jams, and beer, from Morocco, Pakistan, and Portugal are reported. In these studies, innovative techniques to study their presence has been developed, including liquid chromatography coupled with time-of-flight mass spectrometry to analyse mycotoxins and conjugated mycotoxins. Novel strategies to detect mycotoxin presence and comparisons the characteristics of a rapid quantitative analysis of different mycotoxins (deoxynivalenol, ochratoxin A, patulin, sterigmatocystin, and zearalenone) are also presented using acetyl- and butyrylcholinesterases and photobacterial strains of luminescent cells. Additionally, toxicological effects of zearalenone metabolites and beauvericin on SH-SYSY neuronal cells are presented. One important point in the control of mycotoxins is related to decontaminated strategies, and in this sense the efficacy of potentially probiotic fruit-derived Lactobacillus isolates in removing afatoxin M1 (AFM1) is presented. Other mycotoxin decontaminated techniques included in this book are electron beam irradiation (EBI) and degradation of zearalenone and ochratoxin A using ozone. Finally, a review that summarizes the newly discovered...
Mycotoxins in Food Mycotoxins are made by different biosynthetic pathways, and they have an extremely wide range of pharmacological effects. This book will update readers on several cutting-edge aspects of mycotoxin research, including topics such as: new analytical methods for detection; the adoption of an ancient Mexican process for detoxification of aflatoxins; mycotoxin management in Ireland, Lithuania and South America; mycotoxin reduction through plant breeding and integrated management practices; and natural aflatoxin inhibitors from medicinal plants. Further contributions examine ochratoxins, selected trichothecenes, zearalenone, and aflatoxin-like gene clusters, as well as sclerotial development in Aspergillus flavus and A. parasiticus. Of particular interest are the chapters on the potential use of mycotoxins as bioweapons. This book will stimulate new thinking on the need to develop therapeutic as well as preventative interventions to reduce the toxicological threat of mycotoxins.

Mycotoxins in Feed and Food Chain Mycotoxins are made by different biosynthetic pathways, and they have an extremely wide range of pharmacological effects. This book will update readers on several cutting-edge aspects of mycotoxin research, including topics such as: new analytical methods for detection; the adoption of an ancient Mexican process for detoxification of aflatoxins; mycotoxin management in Ireland, Lithuania and South America; mycotoxin reduction through plant breeding and integrated management practices; and natural aflatoxin inhibitors from medicinal plants. Further contributions examine ochratoxins, selected trichothecenes, zearalenone, and aflatoxin-like gene clusters, as well as sclerotial development in Aspergillus flavus and A. parasiticus. Of particular interest are the chapters on the potential use of mycotoxins as bioweapons. This book will stimulates new thinking on the need to develop therapeutic as well as preventative interventions to reduce the toxicological threat of mycotoxins.
control them throughout the supply chain. Describes how the risk of contamination can be controlled, including the use of HACCP systems.

Mycotoxins Study

Food Safety & Mycotoxins Control of Mycotoxins provides information pertinent to the fundamental aspects of the control of mycotoxins. This book provides a review of the toxicology of aflatoxins in the food industry. Organized into 13 chapters, this book begins with an overview of the significant association between tumor-bearing and alpha-fetoprotein when a sensitive immunoautoradiographic method was used. This text then examines the methodology of assay of aflatoxins in food and feed products, as well as their application to the control of mycotoxins. Other chapters review some areas of research at the Northern Regional Research Laboratory involving the effects of insecticide treatment of sterile and unsterile wheat on the formation of aflatoxin and ochratoxin. This book discusses as well the methods for the extraction and determination of aflatoxins from cereals. The final chapter deals with the toxicological study of Fusarium toxiscases. This book is a valuable resource for chemists, microbiologists, biologists; toxicologists, nutritionists, scientists, and veterinarians.

Analysis of Food Toxins and Toxicants, 2 Volume Set This book is based on EU-funded project PLANTFOODSEC, covering intentional and unintentional threats to plant biosecurity and food safety areas. Biosecurity is a strategic and integrated approach for analysing and managing relevant risks to human, animal and plant life and health, and associated risks to the environment. Interest in biosecurity has risen considerably over the last decade in parallel with the increasing trade in food and plant and animal products; higher levels of international travel; new outbreaks of transboundary diseases. Although most diseases outbreaks have natural causes or are the result of inadvertent introductions of pathogens through human activities, the risk of a deliberate introduction of a high consequence plant pathogen cannot be excluded. Vigilance is required to identify, prevent and manage new and emerging issues that could impact on production capacity, plant biosecurity or food safety and food chain resilience.

Mycotoxins and Food Safety. Describes a range of mycotoxins occurring as contaminants in agricultural crops and animal products, and details the implementation of food safety regulations via governmental and international agencies. The book charts the progress made in mycotoxidology since the early 1990s. It also profiles recent advances in mycotoxin analysis methods.

Food Biosensors. Mycotoxins are toxins produced by aerobic, microscopic fungus under special conditions of moisture and temperature. They colonize in a variety of foods from harvest to the grocer. Mycotoxins have gained worldwide interest in recent years with the revelation of the effect of these toxins on health. A current example is the presence of ochratoxin A, a human carcinogen and nephrotoxin, in wines. The increased concern about fruit safety has led to increased studies throughout the world and enhanced awareness for stringent regulations governing mycotoxin limits in food. Presented in three defined sections, this is the first book to provide comprehensive analysis of the main mycotoxins contaminating fruits and vegetables and their derived products. The first section provides a safety evaluation of mycotoxins in fruits and vegetables, details regarding factors affecting mycotoxin production and diffusion in the fruit tissue, and recent methods for detection of mycotoxigenic fungi and mycotoxins produced by the fungi. The second part takes a critical look at the main individual mycotoxins and the third section focuses on approaches for prevention and control. * The first book dedicated to mycotoxins in fruits and vegetables * Presents mycological, mycotoxidological and phytopathological aspects of fruits and vegetables * Includes an analysis of detection, prevention and control methods for mycotoxigenic fungi and the mycotoxins they produce * Provides a complete risk assessment and safety evaluation of mycotoxins in perishable produce.

Mycotoxins From contaminated infant formula to a spate of all-too familiar headlines in recent years, food safety has emerged as one of the harsher realities behind China's economic miracle. Tainted beef, horse meat and dioxin outbreaks in the western world have also put food safety in the global spotlight. Food Safety in China: Science, Technology, Management and Regulation presents a comprehensive overview of the history and current state of food safety in China, along with emerging regulatory trends and the likely future needs of the country. Although the focus is on China, global perspectives are presented in the chapters and 33 of the 99 authors are from outside of China. Timely and illuminating, this book offers invaluable insights into our understanding of a critical link in the increasingly globalized complex food supply chain of today's world.

Mycotoxigenic Fungi

Fumonisins in Food Microbial Contamination and Food Degradation, Volume 10 in the Handbook of Food Bioengineering series, provides an understanding of the most common microbial agents involved in food contamination and spoilage, and highlights the main detection techniques to help pinpoint the cause of contamination. Microorganisms may cause health-threatening conditions directly by being ingested together with contaminated food, or indirectly by producing harmful toxins and factors that can cause food borne illness. This
Mycotoxins In Foodstuff Aflatoxin: Scientific Background, Control, and Implications discusses general problems posed by mycotoxin contamination in foods and feeds. This book is divided into 15 chapters that summarize the discovery, elaboration, chemical, and dietary aspects of aflatoxins. The introductory chapters cover the discovery, formation by Aspergillus flavus, and the chemical and structure of aflatoxins. The subsequent chapters describe the physical, chemical, and biological aspects of aflatoxin measurement, detection, and analysis. A chapter also describes the aflatoxin metabolism and the biochemical alterations associated with aflatoxin administration to animals and other biological test systems. Discussions on the acute toxicity and carcinogenic activity of aflatoxins in laboratory and farm animals are also provided, with emphasis on the recognition of aflatoxicosis, a disease condition caused by the action of the aflatoxin poison. The book goes on examining the role of spoilage molds in destroying stored crops and the tremendous capacity for toxin production of aflatoxins. It also describes successful efforts of food and feed industries to ensure a wholesome food supply, including the utilization of various detoxification processes. The last chapters deal with the regulatory provisions for aflatoxin contamination control and tolerances and the implications of fungal toxins to human health. The book is intended for scientists and manufacturers concerned with the production and processing of foods and feeds, the nutrition, and the animal and public health.

Encyclopedia of Food Mycotoxins All relevant toxin producing fungi, their natural occurrence, the possible mycotoxicosis, further the biochemical and physiological effects of mycotoxins, their chemical data and toxicity are treated here comprehensively. For each fungi, reference is given to the food at risk. All foods which have been reported to be contaminated with mycotoxins are listed, including data on the degree of contamination, the concentration of the toxins and the country of origin and/or detection of the contaminated food.

Soybean Mycotoxins are secondary metabolites produced by fungi in a wide range of foods (cereals, peanut, tree nuts, dried fruits, coffee, cocoa, grapes, spices) both in the field and after harvest, particularly during storage. They can also be found in processed foods of plant origin, or by transfer, in food products of animal (milk, eggs, meat and offal). Mycotoxins are of major concern since they can cause acute or chronic intoxications in both humans and animals which are sometimes fatal. Many countries, particularly in Europe, have set maximum acceptable levels for mycotoxins in food and feed. The book reviews the latest literature and innovations on important aspects of mycotoxins, e.g. mycotoxin producing fungi and the related ecosystems, mycotoxin occurrence, toxicity, analysis and management. Quantitative estimations of impacts of climate change on mycotoxin occurrence have been made recently, using predictive modelling. There is also a growing interest in the occurrence and toxicity of multiple mycotoxins in food and feed, including emerging or modified forms of mycotoxins. Innovative tools were also developed to detect and quantify toxigenic fungi and their toxins. In order to reduce the use of chemicals that are harmful to the environment and health of consumers, alternative methods of prevention and decontamination of mycotoxins were tested in pre- and post-harvest, using microorganisms, natural substances or radiation treatments.

Mycotoxins The first book to cover this fast developing field, Masked Mycotoxins in Food will provide a full overview of the issues relating to the toxicology of masked mycotoxins present in food products. Mycotoxins are naturally occurring chemicals produced by moulds that can grow on crops and foodstuffs. Masked mycotoxins are modified mycotoxins, due to this modification many cannot be detected using standard analytical techniques, for example HPLC and ELISA, and further research is needed to understand the health risks and threats from these modified compounds. Masked mycotoxin research is an area of toxicological research that has gained significant interest and momentum in recent years. The aim of this book is to provide a full picture of the topic, from the masked mycotoxin formation in plants to their catabolic fate in humans. The book also provides new insights and will highlight possible gaps in the knowledge base of this relatively new area. Edited and written by World renowned experts working within the field, this book is of interest to toxicologists and biochemists, but also food scientists and agricultural researchers working in industry and academia.
Control of Mycotoxins Mycotoxins - toxic secondary metabolites produced by mycotoxigenic fungi – pose a significant risk to the food chain. Indeed, they may be the most hazardous of all food contaminants in terms of chronic toxicity and legislative limits on their levels in food and feed continue to be developed worldwide. Rapid and reliable methods for the determination of both mycotoxigenic fungi and mycotoxins in food and feed are therefore essential. This book reviews current and emerging methods in this area. Part one focuses on the essentials of mycotoxin determination, covering sampling, sample preparation and clean-up and key determination techniques, such as chromatographic separation, liquid chromatography-mass spectrometry and immunochemical methods. Part two then goes on to describe quality assurance, official methods and performance criteria for determining mycotoxins in food and feed. Topics covered include laboratory accreditation, method validation and measurement uncertainty. The development and analysis of biomarkers for mycotoxins are discussed in part three. Individual chapters focus on detecting exposure in humans and animals. Part four is concerned with the processes involved in determining mycotoxigenic fungi in food and feed. It also describes the identification of genes and gene clusters involved in mycotoxin synthesis, as well as DNA barcoding of toxigenic fungi.

Finally, part five explores some of the emerging methods for mycotoxin analysis, ranging from bio-sensing to spectroscopic techniques. With its distinguished editor and international team of contributors, Determining mycotoxins and mycotoxigenic fungi in food and feed is a standard reference for all those concerned with reducing mycotoxin contamination in the food chain. Focuses on the essentials of mycotoxin determination, covering sampling, sample preparation, clean-up and key determination techniques Documents quality assurance and official methods and performance criteria for determining mycotoxins in food and feed. Explores the processes of determining mycotoxigenic fungi in food and feed including the identification of genes and gene clusters.

Mycotoxins in Food, Feed and Bioweapons

Mycotoxins in Food and Beverages Foodborne illnesses are a global public health concern with implications worldwide. Mycotoxins are naturally occurring toxins produced by microfungi that are capable of causing disease and death in living organisms. They are recognized as a major economic problem due to their impact on human health, animal productivity, and domestic and international trade. This book provides updated information about foodborne mycotoxins, their toxicities, new determination methods, prevention strategies, and regulations around the world.

Mycotoxins: Methods for Detection in Foods The book deals with mycotoxins, their presence in various types of food, and how to prevent their presence in food. In addition to well-known molecules, such as aflatoxins or fumonisins, some contributors have dealt with emerging mycotoxins (e.g., alternaria toxins, botryodiplodin). Readers of the book can also find a new approach to reducing aflatoxins and fumonisins in food. In conclusion, the book presents both new mycotoxins and new information on old mycotoxins.

Mycotoxins in Fruits and Vegetables 12.2.1.2 Receptor Binding Assay

Food Contaminants This book consists of 11 chapters, divided into four parts. The chapters are written by experts in the field of aflatoxins. Select topics are presented here to provide a snapshot of current understanding of the occurrence and metabolism of aflatoxin B1, the contamination, exposure, and detection of aflatoxin B1, and the toxicological effects and detoxification of aflatoxin. The book is intended for students and scientists working in the field of aflatoxins.

Aflatoxins This thorough volume explores the possibility of detecting and identifying toxigenic fungi, able to produce secondary metabolites known as mycotoxins, which cause severe health problems in humans and animals after exposure to contaminated food and feed, having a broad range of toxic effects, including carcinogenicity, neurotoxicity, and reproductive and developmental toxicity. Beginning with a section on fungal genera and species of major significance along with their associated mycotoxins, the book continues with sections on Polymerase Chain Reaction (PCR)-based methods for the detection and identification of mycotoxigenic fungi, PCR-based methods for multiplex detection of mycotoxigenic fungi, as well as sections on combined approaches and new methodologies. Written for the highly successful Methods in Molecular Biology series, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and practical, Mycotoxigenic Fungi: Methods and Protocols will aid researchers working in this vital field to provide insight into possible actions to reduce mycotoxin contamination of crop plants and the food/feed byproducts.

Food Safety in China This book is an outcome of the MycoGlobe conference in Accra. Most of the chapters are based on invited oral presentations made at the conference. The chapters in this book touch on issues including health, trade, ecology, epidemiology, occurrence, detection, management, awareness and policy. This book serves as a source of information on the occurrence and impact of mycotoxins on everything from trade and health to agricultural production in addition to suggesting opportunities for their management in Africa and elsewhere by researchers, policy makers and development investors.
Mycotoxins in Food, Feed and Bioweapons Soybean is an agricultural crop of tremendous economic importance. Soybean and food items derived from it form dietary components of numerous people, especially those living in the Orient. The health benefits of soybean have attracted the attention of nutritionists as well as common people.

Aspergillus-Derived Mycotoxins In The Feed And Food Chain This book is broadly divided into five sections and 17 chapters, highlighting recent advances in aflatoxin research from epidemiology to molecular genomics and control measures, biocontrol approaches, modern analytical techniques, economic concerns and underlying mechanisms of contamination processes. This book will update readers on several cutting-edge aspects of aflatoxins research with useful up-to-date information for mycologists, toxicologists, microbiologists, agriculture scientists, plant pathologists and pharmacologists, who may be interested in understanding the impact, significance and recent advances within the field of aflatoxins with a focus on control strategies.

Microbial Contamination and Food Degradation Sorghum and Millets: Chemistry, Technology and Nutritional Attributes, Second Edition, is a new, fully revised edition of this widely read book published by AACC International. With an internationally recognized editorial team, this new edition covers, in detail, the history, breeding, production, grain chemistry, nutritional quality and handling of sorghum and millets. Chapters focus on biotechnology, grain structure and chemistry, nutritional properties, traditional and modern usage in foods and beverages, and industrial and non-food applications. The book will be of interest to academics researching all aspects of sorghum and millets, from breeding to usage. In addition, it is essential reading for those in the food industry who are tasked with the development of new products using the grains. Updated version of the go-to title in sorghum and millets with coverage of developments from the last two decades of research Brings together leading experts from across the field via a world leading editorial team Published in partnership with the AACC - advancing the science and technology of cereals and grains

New Methods for the Detection of Mycotoxins in Food Containing cutting edge research on the hot topic of nanobiosensor, this book will become highly read Biosensor research has recently re-emerged as most vibrant area in recent years particularly after the advent of novel nanomaterials of multidimensional features and compositions. Nanomaterials of different types and striking properties have played a positive role in giving the boost and accelerated pace to biosensors development technology. Nanobiosensors - From Design to Applications covers several aspects of biosensors beginning from the basic concepts to advanced level research. It will help to bridge the gap between various aspects of biosensors development technology and applications. It covers biosensors related material in broad spectrum such as basic concepts, biosensors & their classification, biomarkers & their role in biosensors, nanostructures-based biosensors, applications of biosensors in human diseases, drug detection, toxins, and smart phone based biosensors. Nanobiosensors - From Design to Applications will prove a source of inspiration for research on biosensors, their local level development and consequently using for practical application in different industries such as food, biomedical diagnosis, pharmaceuticals, agriculture, drug discovery, forensics, etc. * Discusses the latest technology and advances in the field of nanobiosensors and their applications in human diseases, drug detection, toxins * Offers a broad and comprehensive view of cutting-edge research on advanced materials such as carbon materials, nitride based nanomaterials, metal and metal oxide based nanomaterials for the fast-developing nanobiosensors research * Goes to a wide scientific and industry audience Nanobiosensors - From Design to Applications is a resource for polymer chemists, spectroscopists, materials scientists, physical chemists, surface chemists, and surface physicists.

Climate Change and Mycotoxins This Edited Volume Mycotoxins - Impact and Management Strategies is a collection of reviewed and relevant research chapters, offering a comprehensive overview of recent developments in the field of Mycotoxicology. The book comprises of single chapters authored by various researchers and edited by an expert active in this research area. This book is divided into three sections. Section 1 consists of one chapter that gives an overview of the socioeconomic impact of mycotoxins. Section 2 has five chapters that address the prevention and control of aflatoxins both at pre- and post-harvest stages. Section 3 has two chapters that deal with health impact and control in the poultry industry. This publication aims at providing a thorough overview of the latest research efforts in the field and opens new possible research paths for further novel developments in addressing the problem of mycotoxins.

Aflatoxin The contents of this book are the proceedings of the ACS symposium, “Fumonisins in Food,” which was held April 4-6, 1995, at the American Chemical Society National Meeting in Anaheim, CA. This symposiQm, which was international in scope, brought together researchers from diverse backgrounds in academia, government, and industry. Thirty-three speakers discussed topics ranging from the analysis of fumonisins to toxicology and regulatory aspects. The fumonisins became the spotlight of mycotoxicology in 1988, when re searchers at the South African Medical Research Council isolated and structurally characterized the fumonisins. Since 1988, there has been an explosion in the numbers of papers dealing with fumonisin-related topics. The interest in the fumonisins has arisen for several reasons. First, fumonisins are found in measurable concentrations in corn grown throughout the world. Second, these compounds have been implicated as the causative agents in a variety of naturally occurring animal diseases. Finally, there is speCUlation that fumonisins may in part be responsible for the high incidence of esophageal cancer in regions of the world in which corn is the staple grain.
Mycotoxins and Food Safety

The first book to cover this fast developing field, Masked Mycotoxins in Food will provide a full overview of the issues relating to the toxicology of masked mycotoxins present in food products. Mycotoxins are naturally occurring chemicals produced by moulds that can grow on crops and foodstuffs. Masked mycotoxins are modified mycotoxins, due to this modification many cannot be detected using standard analytical techniques, for example HPLC and ELISA, and further research is needed to understand the health risks and threats from these modified compounds. Masked mycotoxin research is an area of toxicological research that has gained significant interest and momentum in recent years. The aim of this book is to provide a full picture of the topic, from the masked mycotoxin formation in plants to their catabolic fate in humans. The book also provides new insights and will highlight possible gaps in the knowledge base of this relatively new area. Edited and written by world renowned experts working within the field, this book is of interest to toxicologists and biochemists, but also food scientists and agricultural researchers working in industry and academia.

Masked Mycotoxins in Food

Aflatoxins are a group of highly toxic and carcinogenic substances, which occur naturally, and can be found in food substances. Aflatoxins are secondary metabolites of certain strains of the fungi Aspergillus flavus and A. parasiticus and the less common A. nomius. Aflatoxins B1, B2, G1, and G2 are the most important members, which can be categorized into two groups according to the chemical structure. As a result of the adverse health effects of mycotoxins, their levels have been strictly regulated especially in food and feed samples. Therefore, their accurate identification and determination remain a Herculean task due to their presence in complex food matrices. The great public concern and the strict legislation incited the development of reliable, specific, selective, and sensitive analytical methods for pesticide monitoring that are discussed in this book.

Aflatoxin

All relevant toxin producing fungi, their natural occurrence, the possible mycotoxicosis, further the biochemical and physiological effects of mycotoxins, their chemical data and toxicity are treated here comprehensively. For each fungi, reference is given to the food at risk. All foods which have been reported to be contaminated with mycotoxins are listed, including data on the degree of contamination, the concentration of the toxins and the country of origin and/or detection of the contaminated food.

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