PREHARVEST FOOD SAFETY
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Assuring the safety of the world’s food supply continues to be a priority, a necessity, and a challenge. The challenges are created by increasing globalization, reductions in trade barriers, and an ever-growing human population that has developed a craving for fresh, diverse foods. Foodborne pathogens may enter the food supply at the preharvest or harvest phases of the farm-to-fork continuum. However, classic control measures and regulations are instituted primarily at the postharvest phase. High-profile outbreaks still occur, from E. coli O157:H7 in ground beef and spinach and Listeria in cantaloupes to Salmonella in tomatoes, affecting morbidity and mortality. The economic impact of foodborne outbreaks is vast, with significant impact on humans, industry, and our society as a whole.

We turned our attention to the work being done to prevent food contamination in the preharvest phase, which has been increasingly recognized as an important step in the food continuum. Preharvest food safety encompasses the measures that are taken to ensure that food products are produced in a safe and wholesome manner on the farm, thereby ensuring an optimally safe commodity all the way to slaughter, packing, and/or processing. Because many enteric pathogens enter the food chain during production, and some can even proliferate during this phase, it is crucial to understand their preharvest ecology and epidemiology in order to identify and evaluate appropriate intervention strategies. Preharvest control measures have expanded and improved, so it is timely to summarize the recent developments and consider the needs and opportunities for the future in the preharvest food realm.

Our goal in creating this book is to provide the scientific community and stakeholders in the food industry with a knowledgeable resource that discusses the developments and challenges of preharvest food safety, focusing on a variety of microbiological hazards in a variety of foods. The chapters in this book address the current state of knowledge and practice, emerging issues, and emerging solutions, with a focus on both research and control measures. A key aspect of the book is the inclusion of multiple food commodities e.g., food animals, produce, grains, and seafood, and the relevant pathogens for each commodity. In so doing, this book will serve as a comprehensive volume that can be used by food safety scientists in general, as well as those focused on a particular commodity. An important objective of this work is to facilitate understanding of the importance of complex
microbial ecology dynamics to preharvest food safety. In the past, little effort was made to undertake an ecological or systems-based approach to understand the broad issues relating to food safety with specific examples, and this book aims to remedy that. Indeed, it is obvious that many of the emerging food safety pathogens or the manifested outbreaks are directly (or indirectly) related to changes in the agri-food systems themselves over the past several decades.

The first section of this book examines the issues associated with preharvest food safety in broad agriculture sectors. We identify major foodborne pathogens of concern for specific products; what is known about the source, prevalence, and transmission of these pathogens in the candidate products; discuss multiple control measures; and identify critical data gaps for the development of future targeted controls. There is information about a vast array of pathogens, including bacteria, viruses, fungi, and protozoa, that are relevant to each of the major commodity types.

In the middle section, we address the emerging issues that impact the preharvest food safety area. We discuss the use of antimicrobials as growth promotants in the food animal industry and its implications. The critical role of the environment, including the potential impact of global climate anomalies on the emergence and transmission of foodborne pathogens, is also highlighted. Finally, we address the growth and challenges of the organic production system. State-of-the-art information on risk assessment, risk management, and emerging preharvest food safety issues in both developed and developing countries is included.

The third and final section aims to provide information on emerging solutions and novel intervention methods that can be employed at the preharvest level to reduce the burden of foodborne pathogens and other potential hazards. We focus not only on the challenges in preharvest food safety, but also on intervention and pathogen reduction strategies, e.g., Good Agricultural Systems, testing, HACCP. We take a holistic approach that treats production agriculture as a system with complex interactions between the environment, the microbe, and the food that are largely driven by ecological considerations and the actions of humans and animals.

This collection will be of use to scientists whose research includes foodborne pathogens, those working in the food industry seeking the latest verified research on food safety, and those interested in our food supply and its environmental impact.

This work required a deep well of knowledge, so sought out and we recruited the very best experts in preharvest food safety to contribute. We are deeply indebted to our many colleagues who worked diligently to write their reviews in spite of their busy schedules. This book would not have been possible without their invaluable input and participation. We also thank ASM Press for being patient with us during this process.

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