**CHAPTER-2**

**INTRODUCTION**

Fruit and vegetable agricultural products have excellent production advantages in China, which is a large agricultural country with superior climate conditions and abundant species resources. According to data from the National Bureau of Statistics of China [1], the total output of fruit and vegetable agricultural products in 2019 was 995.03 million tons, accounting for 54.48% of all agricultural products (1826.55 million tons). Fruit and vegetable agricultural products have the characteristics of green, healthy and high nutritional value [2], which are deeply loved by people. However, the short storage time and the low storage temperature of storage requirements for fruit and vegetable agricultural products, leading to food safety incidents are extremely prone to occur [3].

In recent years, domestic and international safety incidents of fruit and vegetable agricultural products have occurred frequently. Such as ‘‘poisonous ginger’’ incident in China [4], Hami melon contamination by listeria in United States [5], and the outbreak of E. coli in Germany [6], which have greatly harmed the health of the majority of people. As a result, the state attaches great importance to the traceability of food supply chain, and countries strengthen management of traceability by issuing relevant laws and regulations. The General Food Law promulgated by the European Union in 2002 [7] stipulates that a comprehensive traceability system must be established in the food industry in order to recall targets in a timely and accurate manner and transmit information to consumers. The Food Safety Law implemented by China in 2009 [8], which provides that food producers and operators should establish a food safety traceability system to ensure food traceability. ‘‘Traceable’’ has become a challenge for all food and food-related companies and the traceability system has become an effective means of quality management in the agricultural product supply chain [9]–[11].

**2.1 LITERATURE SURVEY**

# 1. Title: Traceability of fruits and vegetables

### Author: V Fabrice

# Abstract: Food safety and traceability are nowadays a constant concern for consumers, and indeed for all actors in the food chain, including those involved in the fruit and vegetable sector. For the EU, the principles and legal requirements of traceability are set out in Regulation 178/2002. Currently however the regulation does not describe any analytical traceability tools. Furthermore, traceability systems for fruits and vegetables face increasing competition due to market globalization. The current challenge for actors in this sector is therefore to be sufficiently competitive in terms of price, traceability, quality and safety to avoid scandal and fraud. For all these reasons, new, flexible, cheap and efficient traceability tools, as isotopic analysis, [DNA](https://www.sciencedirect.com/topics/chemistry/deoxyribonucleic-acid) fingerprinting and [metabolomic](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/metabolomics) profiling coupled with [chemometrics](https://www.sciencedirect.com/topics/chemistry/chemometrics) are needed..

# 2. Title: Surveillance of foodborne disease outbreaks in China

# Author: [D.Arya](https://ieeexplore.ieee.org/author/37088900893)

# Abstract: [Foodborne disease](https://www.sciencedirect.com/topics/food-science/food-borne-disease) remains a major public health problem worldwide. To understand the epidemiology and changes of foodborne disease in China, data reported to the National Foodborne Disease Outbreak Surveillance System during 2003–2017 were collected. A total of 19,517 outbreaks, which resulted in 235,754 illnesses, 107,470 hospitalizations, and 1,457 deaths, were reported in this period. Of the 13,307 outbreaks with known etiology, 31.8% of outbreaks were caused by poisonous mushrooms, followed by [Vibrio](https://www.sciencedirect.com/topics/food-science/vibrio) parahaemolyticus (11.3%), saponin (8.0%), Salmonella (6.8%), nitrite (6.4%), pesticide (4.8%), [Staphylococcus aureus](https://www.sciencedirect.com/topics/food-science/staphylococcus-aureus) (4.2%) and [Bacillus cereus](https://www.sciencedirect.com/topics/food-science/bacillus-cereus) (3.0%). Among 18,955 outbreaks with reported setting, 46.6% were associated with food prepared in a household, followed by 22.5% with food prepared in a restaurant, and 18.4% prepared in a canteen. Of the 13,305 outbreaks associated with a single food category, fungi (mainly poisonous mushroom) were the most commonly implicated food category, followed by meats, vegetables, aquatic animals, [condiments](https://www.sciencedirect.com/topics/food-science/condiment), poisonous plants (such as saponin, tung oil or seed, aconite) and grains (such as rice, noodle, rice noodle). Analysis of foodborne disease outbreaks can provide insight into the most important causative agents and sources of foodborne disease, and assist public health agencies determine the high-risk etiology and food pairs, specific points of contamination and settings to reduce foodborne disease illnesses.

# 3. Title: Changing epidemiology of Listeria monocytogenes outbreaks, sporadic cases, and recalls globally

# Author: AN Desai

# Abstract: The purpose of this study was to identify global trends in Listeria monocytogenes epidemiology using ProMED reports. ProMED is a publicly available, global outbreak reporting system that uses both informal and formal sources. In the context of Listeria, ProMED reports on atypical findings such as higher than average case counts, events from unusual sources, and multinational outbreaks.

### 4. **Title**: [**The case of the European Escherichia coli outbreak from sprouts**](https://www.sciencedirect.com/science/article/pii/B9781782420187500252)

### **Author:Luber**

# Abstract: This chapter describes an investigation into the European Escherichia coli outbreak in May– June 2011. An outbreak caused by the pathogenic Shiga-toxin-producing E. coli O104: H4 occurred in Germany, causing the highest reported cases of haemolytic-uremic syndrome in humans associated with a single outbreak. From the start of the outbreak, fresh produce had been suspected as the cause; however, special efforts and tools were needed to narrow the list of suspicious vegetables to sprouts. A second small outbreak caused by the same

### 5. **Title**:[Changing epidemiology of Listeria monocytogenes outbreaks, sporadic cases, and recalls globally](https://www.sciencedirect.com/science/article/pii/S1201971219301924)

### Author: AS.Omar

**Abstract**: Background The purpose of this study was to identify global trends in Listeria  
monocytogenes epidemiology using ProMED reports. ProMED is a publicly available, global outbreak reporting system that uses both informal and formal sources. In the context of Listeria, ProMED reports on atypical findings such as higher than average case counts,  
events from unusual sources, and multinational outbreaks. Methods Keywords “Listeria” and “listeriosis” were utilized in the ProMED search engine covering the years 1996–2018