

Food Safety for Farm Workers

Spices and Dried Aromatic Herbs



Trainer's Manual



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Introduction

The Joint Institute for Food Safety and Applied

Nutrition (JIFSAN) created this Training Manual to prepare trainers to educate workers about the key practices related to preventing foodborne disease throughout farm production. These practices help **protect the health** of workers, their families, and those consuming the spices they grow. In addition, they help to ensure that final spice product is of **export quality**.

Since familiarity with the subject matter is important for conducting effective education sessions, trainers should allow adequate time to review the information provided in this manual when preparing the logistics for an outreach or education session.

International Food Safety Standards: "Codex"

The Codex Alimentarius Commission is an intergovernmental body that coordinates the development and acceptance of food standards at the international level. This course fulfills the strategic objectives of JIFSAN and Codex's recommendation for farm employee training to keep spices and dried aromatic herbs safe from contamination.

This manual includes:

Scientific Background: briefs trainers on the overall subject matter and prepares them to be ready for discussion and questions that may arise when educating workers.

Training Modules: contain the core information to be presented to workers.

Easy-to-Understand Graphic Handouts: present module content with pictures and simple text workers will understand. Handouts should be used during training sessions and printed for workers/posting in appropriate farm locations. Graphic templates for translation are available on the JIFSAN education portal: <u>https://portal.jifsan.umd.edu/</u>

Planning an Education Session: features practical information for preparing to speak with field workers, a suggested agenda, and preparation tools.

Food Safety Glossary, Appendix and References: provide resources for relevant terminology, the international food safety infrastructure, and review articles.

Why Training Is Important

Workers are employed to help with every step of spice production. Many of the tasks are performed manually.¹

In recent years, there has been a growing recognition of the importance of worker training for ensuring safe food production and handling. In fact, training of farm workers is a **key step** in ensuring the safety of spices and dried aromatic herbs and the health of farmers, workers, the community, and consumers of spices and aromatic herbs.³



For many years, spices and dried aromatic herbs were believed to be at low risk for bacterial contamination. This is because bacteria cannot survive and grow without water, and spices and dried aromatic herbs contain very little water – in other words, they are a low-moisture food.⁵

But in recent years, **spice-associated outbreaks of foodborne illness** have been reported with increasing frequency.²

A recent report from the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) identified 28 outbreaks of foodborne illness associated with consumption of contaminated spices or dried aromatic herbs.¹

Most illnesses are caused	by:
Salmonella spp	77%
Bacillus cereus	20%
Clostridium	
perfringens	3%
(FAO/WHO, 2014)	

While the complex supply chain for spices and dried aromatic herbs makes it difficult to identify specific points at which contamination occurs, microbial contamination of spices and dried aromatic herbs **can occur at any time during farm production**: growing, harvesting, drying, or packing.¹



This manual is designed for use to educate farm workers about **food safety and proper hygiene practices** throughout farm production of spices and aromatic herbs to help prevent **bacterial and chemical (mold toxin) contamination** that can cause foodborne illness.

Spices and Foodborne Illness

Spices are produced in many different countries using a wide variety of growing, harvesting, drying and packing practices. International trading of spices began with the earliest civilization and continues as an important food commodity in global commerce.⁴

Foodborne Illness Is Underreported

Many people become ill with foodborne illness without ever knowing that contaminated food was the cause. These sporadic cases of foodborne disease are not reported — and therefore, they are not counted, even in countries with advanced disease surveillance systems. Even in large disease outbreaks, the ability to identify and tally the total number of affected individuals requires that all of these actions occurred:

- The sick person visited a medical facility;
- The healthcare provider collected a sample for diagnosis of the causative agent;
- The laboratory performed the correct diagnostic test; and
- The results got reported to the national disease surveillance network.

In countries with advanced disease surveillance systems, it is sometimes possible to discover the pathogenic agent, link individuals that share the illness and determine the offending food. But even then, all affected individuals are never identified because most individuals *do not seek medical attention.*²

The U.S. Centers for Disease Control and Prevention has noted that spice-related disease outbreaks occur for one of two reasons:

- Insufficient processing of the food products containing spices, or
- *Post-processing contamination* of ready-to eat products due to the addition of contaminated spices

When spices are added to food prior to cooking, the cooking process may kill the bacteria and other microbiological contaminants. However, when a contaminated spice or dried aromatic herb is added to food *after the food is cooked* — or is added to a food that is *served uncooked* — the risk of becoming ill increases.²

Spice-Borne Illness Is Especially Challenging

Identifying foodborne illnesses associated with contaminated spices or dried aromatic herbs is even more challenging. A small amount of contaminated spice product may be added to a variety of different foods; also, pathogenic bacteria are never uniformly distributed in the contaminated spice product. In addition, the contaminated spice products can have a long shelf-life, and bacteria can survive during this period.³

Given the limitations of disease surveillance, **prevention of product contamination** remains the best public health strategy.

Codex Definition of Spices and Dried Aromatic Herbs

Spices and dried aromatic herbs are dried, fragrant, aromatic or pungent edible plant substances that impart flavor, aroma and/or color to food. Spices are made from many parts of the plant, including bark, berries, buds, bulbs, leaves, roots, seeds, fruits and plant tops (CAC/RCP 42-1995, rev. 2014).

Bacteria Commonly Found in Spices

Bacillus cereus (B. cereus)

Bacterial growth results in production of toxins that can cause two types of illness: one type is characterized by diarrhea and the other type is characterized by nausea and vomiting. Foodborne illness occurs due to survival of bacterial spores when food is improperly cooked.

- Cooking at temperatures under 100 °C (212 °F) allow some spores to survive.
- The problem is compounded when the food is then improperly refrigerated. Under these conditions, the spores germinate and bacteria grow.

Clostridium perfringens (C. perfringens)

C. perfringens is one of the most common causes of foodborne disease in the United States. These bacteria produce toxins harmful to humans. The bacteria and its toxins are found everywhere in the environment, but human illness usually occurs due to consumption of contaminated food.

- The illness is usually not severe, and is often mistaken for the 24-hour flu.
- Most outbreaks occur when food is kept between 21 °C (70 °F) and 60 °C (140 °F), a temperature where the bacteria are not be killed but likely to grow.

Crops that are grown in untreated or improperly treated manure are more susceptible to contamination by bacteria.

Salmonella spp

While *Salmonella* infections (also called "Salmonellosis") are usually associated with the consumption of undercooked poultry and meat, raw eggs and fresh produce, most foodborne illness outbreaks associated with contaminated spices and dried aromatic herbs have been linked to the consumption of foods containing spices or died aromatic herbs contaminated with *Salmonella spp*.

- These non-spore-forming bacteria are facultative anaerobes, i.e., capable of surviving *with or without oxygen*.
- Most healthy domestic and wild animals carry *Salmonella* in their digestive tracts and shed the bacteria in their feces. *Salmonella spp* are also found in the feces of sick and apparently healthy people, in the environment and water.
- Thorough handwashing after contact with animals and human and animal feces is recommended to prevent *Salmonella* transmission.

Chemicals

Chemical Contamination of Food

Pathogens are not the only cause of foodborne disease. People also get sick from eating food contaminated with harmful chemicals.

Harmful chemicals that can contaminate spices and dried aromatic herbs include:

- Pesticide residues
- Heavy metals
- Industrial pollutants
- Natural toxins produced by molds

Reducing Illness From Pesticides

Pesticides used to kill pests that damage crops can contaminate source plants or spice products that are dried outside. Pesticides can cause illness in farm workers who are exposed to them when working.

When using pesticides, simple preventive measures must be taken to protect the health of workers and minimize/prevent contamination of source plants and spice products. These actions include:

- · Awareness among staff of time and place of pesticide application
- · Avoiding areas where pesticides are being applied
- · Washing hands and changing clothes after handling chemicals
- Choosing sites for growing, drying and processing spices and dried aromatic herbs with a low chance of chemical contamination

Preventing Chemical Contamination

Prevention of certain types of **chemical contamination**, especially heavy metals and industrial pollutants that enter the environment through waste emissions and chemical spills, is generally *beyond the control of farm workers*. However, farm workers *can* help control **mold growth**.

How Mold Causes Foodborne Disease

There is a long-standing concern about the safety of spices and dried aromatic herbs due to **mycotoxin-producing molds**, which can grow when the plants or dried products are mishandled.¹ Mold is a type of **fungus** that is found everywhere in the environment.

Mold growth on food commodities is a major public health concern because mold destroys the food product and can produce chemical toxins that cause disease in humans and animals. Mold growth is a common problem on corn, spices and nuts produced in hot, humid climates.⁶

- Molds form spores to survive harsh environmental conditions.
- Molds grow when it is warm and damp.

For spices and dried aromatic herbs produced in countries with tropical climates, i.e., high humidity, temperature and rainfall, the risk of mold contamination is much greater. Three molds – *Aspergillus flavus, Aspergillus parasiticus* and *Aspergillus nomius* – are of particular concern because these molds produce a group of **very toxic** chemicals known as **aflatoxins**. The

Organic crops that are not treated with fungicides appear to be more susceptible to contamination with aflatoxins.

presence of molds does not always indicate that harmful levels of aflatoxin are present, but does indicate a significant risk. The **Aspergillus molds** are common in soil, decaying vegetation, hay, and grains.⁶

Aspergillus molds can invade, colonize and contaminate spice plants before harvest and during storage, especially following prolonged exposure to a high-humidity environments. The most toxic member of the family, **aflatoxin B1**, is acutely poisonous, highly mutagenic, hepatoxic and a potent carcinogen.

- Exposure to **high levels** of aflatoxin produces liver damage that can result in death due to acute liver failure
- Chronic exposure to **lower levels** of aflatoxin increases the risk of developing fatal liver cirrhosis and cancer.
- Once present in the food, aflatoxins are very stable and can survive the high temperatures used in cooking.⁶

Improper storage, extended drying times and elevated moisture content promote the development of aflatoxins in spices and dried aromatic herb products. The best approach for controlling aflatoxin is to **prevent mold** using the following techniques:

- Prevent contamination of the crops in the field
- Dry crops immediately after harvest
- Store dried product in containers the do not allow moisture or insects to contact the product.

Five to 10% of the world's agricultural products are contaminated by molds to the extent that these products cannot be eaten by man or animals.⁶ Given the limitations of disease surveillance, **prevention of product contamination** remains the best public health strategy.

Training Modules

These modules are to be used to train farm workers. They include information about hygienic practices throughout farm production. Collectively, they cover the following topics:

- Basic information about foodborne disease and how contamination can occur
- Key principles of personal hygiene for all workers
- Key hygiene practices for spice farming that are important when growing, harvesting, drying, and/or packing spices



Special Feature

Each module includes "**Teachable Moments**," suggesting appropriate times for discussing the information with workers.

Module 1 Understanding Foodborne Disease

This Module explains the basics of microbial and chemical contamination as an introduction to understanding how proper hygienic practices help minimize contamination.

Learning Outcomes

Workers in the growing fields have a critical role in preventing foodborne disease. Practicing prevention begins with understanding what foodborne disease is. At the end of Module 1, workers will be able to:

- Explain that you cannot see pathogenic bacteria or dangerous mold without a microscope
- · Identify the causes and symptoms of foodborne disease
- Describe how microbial and mold contamination occurs
- Recognize their role in preventing contamination throughout farm production

Every year, millions of people become ill – or even die – from the food they eat. This illness is known as **foodborne disease**. Foodborne diseases are caused by **germs or chemicals** that can contaminate spices and dried aromatic herbs. Eating food seasoned with contaminated spices and dried aromatic herbs.

Symptoms of Foodborne Disease

The symptoms of foodborne disease are similar to the symptoms of many other illnesses. In addition, the symptoms vary depending on the cause.

When foodborne illness is caused by **pathogens**, the most common symptoms are:

- Stomach pains
- Vomiting
- Diarrhea



These symptoms usually occur 24 to 72 hours after the food is eaten and last for several days or a couple of weeks. Some foodborne diseases caused by pathogens can be passed from person to person or from one person to another by contamination of food or water.

When illness is caused by **mold toxins**, the disease symptoms depend on the amount of toxin consumed. Long-term low level exposures cause immune deficiency, malnutrition and liver cancer. Sudden high level exposures produce a loss of energy, appetite, and fever followed by vomiting, abdominal pain and yellow skin color, and death.

Food Safety Training for Farm Workers: Spices and Dried Aromatic Herbs

Germs

Germs are a type of microorganism that can cause disease. Microorganisms are very small living things that can only be seen with a microscope. Most microorganisms are harmless, but some are dangerous (i.e., "pathogens," or "germs") and can contaminate spices and dried aromatic herbs at any point in the supply chain.

Most germs in food do not change the appearance, smell, or taste of the food – which means that you usually cannot tell whether food is contaminated by looking at, smelling, or tasting it. But germs in food can still make you sick.

Germs Multiply Quickly

Microorganisms grow by multiplication. To multiply, microorganisms need food, water, and warm temperatures.

- High temperatures, like those used in cooking or composting manure, kill microorganisms.
- Cool temperatures, like in refrigeration, slow the growth of microorganisms.

However, germs can survive for long periods of time — even months — on the surface of plants, in soil and in water; and in spices and dried aromatic herbs. When these germs gain access to food, water, and warm temperatures, they can multiply to levels that can cause illness.

Germs Can Contaminate Crops

All animals, including humans, carry germs in their mouth, in their gut, and on their skin. In turn, many germs are excreted in human and animal feces. The germs in feces can contaminate spices and aromatic herbs directly or indirectly at any point from source plants to the consumer. On the farm, the key contamination points include growing, harvesting, drying and packing.

I. Direct Contamination

Direct contamination occurs when bacteria in feces are transferred to:

• Spice or aromatic herb plants ("source plants") during growing or harvesting

- or-

• Harvested spices or aromatic herb plants ("spice products") during drying, packing, storage or transport







II. Indirect Contamination

Germs can also contaminate source plants and spice products **indirectly** at any time during farm production, because germs are often moved by someone or something. For example:

- Worker's hands can become contaminated with germs. These germs are then transferred to source plants or spice products when touched by the workers.
- **Contaminated water** can contaminate spice products at any point along the supply chain, up to and including during meal preparation.
 - -or-

- or-

• **Source plants** can be contaminated when grown in contaminated soil, or when contaminated water is used for irrigation or washing equipment or hands in the growing fields.

-or-

- **Tools/harvesting equipment** can become contaminated with germs. These germs can be **transferred** to source plants or spice products when touched by the contaminated item or surface. Potential contamination points include:
 - Gloves and clothing
 - Blades and wheels/tires on field equipment
- Harvest bags
 Drying surfaces, tarps, etc.

- Packing surfaces

- Hand tools, such as hoes, pruners, or rakes
- Packing vessels/storage containers



Fecal Contamination Routes

Note: Modules 2 through 6 discuss the many steps workers can take to prevent contamination throughout the supply chain.

Mold Toxins

Molds: Poor hygienic conditions and high moisture levels (such as humid weather) during drying and processing can promote the growth of molds and the production of harmful/poisonous mold toxins. Practicing good hygiene at all stages of spice and dried aromatic herb production helps prevent mold growth and toxin production.

The Danger of Mold

Environmental molds are a type of fungus commonly found in spices. Some molds produce harmful toxins.

- Exposure to **high levels** of these toxins damages the liver and can result in death due to acute liver failure
- Chronic exposure to **lower levels** increases the risk of developing fatal liver cirrhosis and cancer

Molds that produce dangerous toxins are commonly found in soil, decaying vegetation, hay, and grains.

Improper storage, extended drying times and elevated moisture content promote the development of toxins in spices and dried aromatic herb products. The best approach for controlling toxins is to prevent mold using the following techniques:

- Prevent contamination of the crops in the field
- Dry crops immediately after harvest
- Store dried product in containers that do not allow moisture or insects to contact the product.



Foodborne Illness Should Be Prevented Throughout Farm Production



Preventing contamination is the best way to prevent foodborne disease and improve your health and that of your family and community. Practicing good personal cleanliness and product hygiene throughout farm production reduces the risk of contamination, improves spice safety, and decreases the risk of disease.

Teachable Moments to Reinforce Learning

Understanding Foodborne Disease

Trainers have many opportunities to educate workers. In fact, education can take place in a variety of venues and settings, both inside and outside a formal training session.

Any opportunity to have an informative discussion with a worker can be viewed as a "teachable moment." These can be planned conversations or spontaneous and informal ones. Being very familiar with the entire content of this training program will enable trainers can take advantage of these moments whenever they arise.

Teachable moments on the topic of understanding foodborne disease can include:

- Any time a worker is ill
- When there is an incidence of illness in the area
- · When food safety or foodborne illness is in the news



This Module discusses specific personal hygiene practices and how to implement them as daily habits/procedures.

Learning Outcomes

Research has shown that workers are more likely to follow good personal hygiene practices when they understand that these practices protect themselves and their families from illness. At the end of Module 2, workers will be able to:

- Explain the importance of good personal hygiene practices to prevent the contamination of food and the spread of illness
- · Identify barriers to practicing good personal hygiene
- Demonstrate strategies for encouraging family, friends and the community to adopt good personal hygiene practices



Education Tip

Good Hygiene Protects Workers' Families

To promote adoption of the hygienic practices, trainers are encouraged to reinforce the benefits of hygienic practices for improving the health of the workers and their families.

In addition to following proper hygiene practices when working with source plants, workers can also follow these steps at home to protect the family:

- Wash hands after work
- Wash hands after touching animals
- Remove work clothing before entering the home

Module 2: Personal Hygiene Practices

Disease-causing microorganisms, or germs, are found in human and animal feces. They can contaminate food and water and cause human illness. Exposure to dangerous levels of pesticides and other environmental chemicals can also cause illness in workers.

Good personal hygiene practices help prevent the spread of infectious germs and harmful chemicals, and decrease the chance that farm workers and their families will get sick.

The personal hygiene practices that prevent the spread of disease and keep workers safe include:

- Proper toileting
- Basic handwashing
- Precautions when sick
- Protecting themselves from infection

I. Follow Proper Toileting Procedures

Human feces on plants DIRECT WDIRECT Hands to plants

Contamination Via Poor Hygiene Practices

To prevent the spread of germs, **workers must use toilets**, latrines or other contained sanitary facility for defecation and urination. Workers should never defecate or urinate in the field or anywhere near the areas used for spice and dried aromatic herb production.



Module 2: Personal Hygiene Practices

II. Practice Frequent Handwashing

To prevent the spread of germs to other people and to spices and dried aromatic herbs throughout farm production, **workers must wash their hands** with soap and water and dry their hands with a clean towel before entering the field or processing area.

In addition, critical handwashing times include:

- After using the toilet
- Before and after eating



III. Take Precautions When Sick

Workers who are ill with an **infectious disease** can spread germs via saliva, sputum, urine and feces, and by contamination of their hands and clothing.

Care should be taken to prevent ill workers from infecting spices and dried aromatic herbs throughout farm production.



IV. Protect Worker's Own Health

It is also important for workers to protect their own health and prevent infections. Open sores on the hands **can become infected** when working with soil or agricultural water. Workers may also be exposed to **germs and dangerous chemicals** in and around the farm. Wearing work clothes home from the farm can put the worker's family at risk for illness.

Steps To Prevent Infection and Illness

 Workers with open sores on their hands should avoid working in areas where they will contact source plants, spice product or food contact surfaces. If working with an open hand sore cannot be avoided, the sore should be covered with a clean waterproof bandage to prevent infection of the wound.



Teachable Moments to Reinforce Learning

Personal Hygiene

Teachable moments on the topic of personal hygiene can include:

Handwashing

- · Conversations at the start of the work day, when workers are preparing to enter the field
- Food-related occurrences, such as worker breaks or at lunch time
- The end of the workday or at a shift change, when workers have returned from the field or harvest duties and are preparing to leave the farm

Toileting

- In small gatherings of workers, when the topic of farm toileting facilities arises
- With single-gender groups (women only or men only) to avoid awkwardness or embarrassment, given the sensitivity of the topic
- One-on-one, especially if that a worker is defecating or urinating in the field

Preventing the Spread of Germs/Staying Healthy

- At worker meetings, where topics such as sick days or health inspections may arise
- New worker orientation
- When the topic of family arises, as proper worker hygiene helps ensure that the worker's family stays healthy

Module 3

Protect Source Plants In Growing Fields

This Module discusses how animals and humans roaming or working in the growing fields can be a source of foodborne germs that can contaminate source plants directly or indirectly by contaminating soil or water.

Learning Outcomes

Animals in the growing fields can contaminate source plants, either directly or indirectly. At the end of Module 3, workers will be able to:

- Explain why animals should be kept away from water sources and out of growing fields
- Recognize items that attract animals into the growing fields
- Identify the signs of animal intrusion

Farm Production

Focus on: Growing

Protection of source plants in the growing field is important for preventing contamination of spices and dried aromatic herbs at the beginning of the farming process.



Education Tip

Prevent Humans from Harming Source Plants, Too

While the steps discussed in Module 3 address protecting source plants from **animal** contamination and destruction, it is important to note that **humans** can have a negative impact on source plants, too.

• For example: people can leave behind trash/litter; unknowingly trample young source plants; or be unfamiliar with proper personal hygiene steps as described in Module 2.

Contamination by Animals

Wild and domestic animals roaming in growing fields can contaminate plants through:

- Feces
- Other body fluids

Feces of domestic and wild animals can contaminate crops directly and indirectly by contaminating soil or water. Animal feces contain bacteria that can cause illness when the plants are touched by workers or eaten by humans.



Direct and Indirect Contamination by Animal Feces

Destruction by Animals

Wild and domestic animals also damage plants by eating or **walking on them**. Damaged source plants:

- Result in decreased yields
- Can attract rodents, insects and other pests, which further damage other plants and promote growth of germs or mold.





How To Protect Source Plants

It is not possible to prevent all animals from entering the growing fields. But limiting the **number of animals** that enter the field, the **number of times** they enter, and the **time they remain in the field** can minimize the risk of fecal contamination and crop damage. Workers should follow these guidelines to protect source plants.

1. Keep animals out of the growing fields

Trash, food and standing water in fields attract animals; in addition, free roaming domestic animals can easily wander into the growing field. Use these steps to deter them:

- Place items that look scary or make noise (such as a scarecrow or windmill) around the outside of the growing fields
- · Remove trash from in and around the growing field
- · Fill puddles of standing water with dirt
- Tie, fence or pen domestic animals to prevent their entering growing fields

2. Monitor growing fields for animal intrusion

Workers have many opportunities to see the signs of animal intrusion or destruction of plants.

- Mark and isolate plants contaminated with feces to prevent their harvest
- · Remove plants damaged by animals

3. Keep animals away from agricultural water

Feces of domestic and wild animals can contaminate crops indirectly by contaminating agricultural water. Agricultural water is water used for:

- Irrigation
- Preparing crop sprays
- Harvesting, packing, and cleaning/processing source plants
- Cleaning of equipment and food contact surfaces.

Water used for irrigation should be stored in a closed container, fenced pond or other method that limits animal access.

Teachable Moments to Reinforce Learning

Protection of Plants

The actions workers take as part of their daily roles on the farm can offer targeted opportunities for trainers to educate on the topic of **protecting source plants** in the growing field.

- Trainers can remind workers that any time they **enter the field** e.g., to plant, prune, irrigate, weed, survey or harvest they have an opportunity to monitor fields for animal intrusion.
- Conversations about (or visits by) family members, pets and non-workers offers trainers an
 excellent opportunity to remind workers to limit field access by anyone who is not working in
 the fields, and any animals or pets that are not integral to planting or growing source plants.









Module 4 Maintaining Cleanliness During Harvest

This Module discusses how humans (and animals) harvesting the plants can cause contamination, and the hygienic procedures that should be practiced to limit product contamination.

Learning Outcomes

It is common for plants to become contaminated with disease-causing (pathogenic) microorganisms (germs) or toxin-producing molds during harvest. This can occur through contact with contaminated hands, clothing, soil, harvest equipment or containers. At the end of Module 4, workers will be able to:

- Identify the steps for ensuring a clean harvest to prevent contamination
- Describe how to conduct pre-harvest, harvest and post-harvest activities in a hygienic manner
- Explain the order of harvest that minimize the risk of product contamination

Farm Production

Focus on: Harvest

Proper hygiene practices before, during and after harvest are critical for preventing contamination of spices and dried aromatic herbs.



Before Harvest

Fecal matter in the fields and soil can contaminate plants during harvest. Wet containers will promote the growth of dangerous germs and toxin-producing molds, which in turn will decrease product quality and safety. Workers should inspect and prepare the fields and harvesting equipment in preparation of the harvest to ensure the harvested product is safe and high quality.

- 1. Remove dropped product that is not suitable for harvest
- Inspect the field and harvest-ready plants for fecal matter, insect damage or unintended contact with soil
- 3. Mark potentially contaminated or damaged plants as "not for harvest"
- 4. Cover soil under the plants with a clean plastic sheet or straw
- 5. Establish a clean area off the ground for harvest containers
- 6. Wash harvest containers and equipment with clean agricultural water and dry thoroughly

During Harvest

The number of plants harvested should be limited to the amount that can be processed in one day. Workers should start with tasks such as personal cleanliness that help limit contamination and end with tasks such as removing soil and debris that are more likely to contaminate hands and clothes. Workers must not harvest plants when ill since this can contaminate the plants.

- 1. Ensure workers are in good health
- 2. Wear clean work clothes and footwear
- 3. Wash hands with soap and clean water and dry with clean towel
- 4. Cover sores and wounds on hands with a clean waterproof bandage
- 5. Take clean containers and harvest equipment to the designated clean area and place on tarp or platform off the ground; do not let the harvested product, containers or equipment contact the soil
- 6. Remove soil and debris from the harvested plant before adding product to containers



If needed, also review Module 1: Understanding Foodborne Disease *and* Module 2: Personal Hygiene *for reinforcement of the importance of and steps for maintaining good personal hygiene throughout the supply chain.*



Indirect Contamination During Harvest

Animals Used in the Harvest

When **animals** are used in the harvest, care must be taken to ensure that the animals do not become a source of contamination.

Develop procedures for marking and avoiding animal feces in the field to minimize contamination of harvested product.

After Harvest

The harvested product should be removed from the field before workers clean equipment and the growing area. (Harvested product can be transported to the drying area, or properly stored in advance of drying. For proper drying procedures, see Module 5: Maintaining Cleanliness During Drying.)

After harvest, workers should follow these procedures:

- 1. Transport containers to a clean location
- **2.** Assemble product in the drying area or store it temporarily on a raised platform (off the ground)
- **3.** Clean all harvest containers and equipment with clean water and allow them to air dry
- 4. Clean growing area by removing:
 - a. Animal feces
 - b. Plants with visible fecal contamination
 - c. Product that has fallen on the ground



Protection of Source Plants

The actions workers take before, during and after plant harvest can offer targeted opportunities for trainers to educate on the topic of **clean harvesting**.

- As workers prepare to **enter the field** at harvest time, trainers can remind workers to monitor the fields for fecal contamination and avoid touching the area during the harvesting process.
- Conversation about clean harvesting can take place in the area where plants and **equipment** are washed, or where plants are stored and/or prepared for drying.
- Any time a trainer sees **unhygienic conditions** such as fecal matter near plants, wet harvest containers or unclean harvesting tools there is an opportunity to discuss and reiterate the key procedures for a safe and clean harvest.





Module 5 Maintaining Cleanliness During Drying

This Module discusses the proper procedures for the drying of aromatic herbs and spices to limit product contamination.

Learning Outcomes

Plants can become contaminated if proper hygiene principles and drying practices are not followed before, during and after drying. At the end of Module 5, workers will be able to:

- · Identify the sources of contamination during drying
- Explain the proper handling procedures to ensure sanitary drying
- Demonstrate good personal hygiene while working with spice products



Workers must maintain good personal hygiene (including proper handwashing and the wearing of clean clothes) when touching any part of the dried spice plants during the drying process.

In addition, the following principles can protect plants from contamination during drying.



Contamination of Spices and Spice Product During Drying

Use Proper Drying Techniques

It is important to follow proper drying procedures for the spice product. These procedures differ depending on whether the specific spice product should be exposed to sunlight or shade, dried on the ground, or dried hanging from the ceiling/under a roof.

However, in every scenario, it is important for workers to follow good hygienic procedures including:

Before:

- 1. Clean outside of harvest containers before moving them into the area where plants will be prepared for drying
- 2. Wear clean clothes
- 3. Wash hands before preparing plants for drying
- 4. Separate the plant parts to be dried (for example, the fruit or leaves) from other parts of the plant

During:

- 1. Do not place drying plants on the bare ground. Soil can be contaminated with pathogenic microorganisms and mold, which damage the crop and can cause illness. Instead, use one of these methods:
 - **a. For drying on the ground:** Place source plants on clean elevated racks, clean concrete floors, clean mats or clean tarps.
 - **b.** For drying by hanging: Tie plants into small bundles and hang them under a non-leaking roof and high above the bare ground

or

- 2. Limit access of animals, birds and humans within the drying area.
 - **a.** Animals and birds are a source of contamination of crops, due to transfer of germs from their feces, feet, mouth or skin onto the plants.
 - **b.** Animals in the drying area can damage plants by eating them or walking on them, thus lowering safety, quality and yield.
- 3. Place a roof or tarp over the drying platforms
 - a. Preserve essential oils
 - b. Prevent re-wetting by rainfall
 - c. Catch dust and other dirt
 - d. Limit contamination from birds







und. Soil can be contaminated which damage the crop and e methods:

Reduce Drying Time

Fast drying times limit the growth of bacteria and mold. Workers can reduce drying time by creating optimal drying conditions.

- **1. For spices dried on racks or covered ground:** arrange plants in a single layer with pathways that allow workers to rake and turn the plants without walking on them.
- 2. For spices dried in bundles: make the plant bundles small enough to permit air circulation into the middle for uniform drying. Hang bundles upside down in a warm, well-ventilated place.



Teachable Moments to Reinforce Learning

Cleanliness During Drying

The actions workers take after harvest can offer targeted opportunities for trainers to educate on the topic of **hygienic drying**.

- As workers prepare to **lay out/bundle plants for drying**, trainers can remind workers to wash hands before touching plants, to monitor the drying area for animal presence and/or fecal contamination, and to avoid touching soil or other dirty surfaces.
- Conversation about hygienic drying can take place in the drying area(s) on the farm.
- Any time a trainer sees a potentially unhygienic scenario such as animals or fecal matter near drying plants, drying plants laying on bare ground, or dried plants placed on bare ground, there is an opportunity to discuss and reiterate the key procedures for a safe and clean drying of spices and aromatic herbs.

Maintaining Cleanliness During Packing

This Module discusses the proper procedures for packing aromatic herbs and spices to limit product contamination.

Learning Outcomes

Spices and dried aromatic herbs can become contaminated if proper hygiene principles are not followed during packing. At the end of Module 6, workers will be able to:

- · Identify the sources of potential contamination during packing
- Explain the proper procedures for ensuring sanitary packing
- Demonstrate good personal hygiene while working with spice products



Workers must maintain good personal hygiene (including proper handwashing and the wearing of clean clothes) when touching any part of the dried spice product during the packing process.



Indirect Contamination of Packed Spices

The following principles can protect plants from contamination during packing.

- 1. Wash and dry hands with a clean towel before touching the dried spice product.
- 2. Do not place dried spice product directly on the bare ground.
- 3. Place dried spices and aromatic herbs into **new**, **clean bags** that prevent moisture and are marked with food-grade ink.
- 4. Store packed bags off the bare ground in a covered area that will prevent re-wetting of the spice product.
- 5. Limit access of animals, birds and humans within the packing and storage area. Animals and birds are a source of direct contamination of dried spice product with germs in their feces, feet, mouth or skin.



Teachable Moments to Reinforce Learning

Cleanliness During Packing

The actions workers take after harvest can offer targeted opportunities for trainers to educate on the topic of **hygienic packing**.

- Conversation about hygienic packing can take place in the packing areas on the farm.
- Any time a trainer sees a potentially unhygienic scenario such as animals or fecal matter near dried spice product, dried spice product placed on bare ground prior to packing, or dirty packing containers, there is an opportunity to discuss and reiterate the key procedures for a safe and clean drying and packing of spices and aromatic herbs.



Illustrated Handouts

Module 1: Understanding Foodborne Disease

- You Can't See Foodborne Contamination
- Germs Can Cause Foodborne Disease
- Mold Can Cause Foodborne Disease

Module 2: Personal Hygiene Practices

- Handwashing and Toileting
- Practice Good Personal Hygiene

Module 3: Protect Source Plants in Growing Fields

Module 4: Maintaining Cleanliness During Harvest

Module 5: Maintaining Cleanliness During Drying

Module 6: Maintaining Cleanliness During Packing

You Can't See Foodborne Contamination







Germs and dangerous molds are microscopic.

You can't see them without a microscope, but they can contaminate food. Foodborne contamination does not change the look, smell or taste of food. But contaminated food can cause serious illness, or even death.



Dangerous germs from human and animal feces can be transferred to spices from hands, soil or water.

L Foodborne Disease ·



Mold can grow on harvested spices in hot, humid climates. Some molds produce dangerous chemicals known as **toxins**.

Foodborne Disease

Handwashing and Toileting

Handwashing Procedure

- Wet hands under clean, safe running water.
- 2. Add soap.

3. Wash hands, wrists, in between fingers and under nails. Continue to rub hands together with soap for at least 20 seconds.

4. Rinse hands under clean, safe running water.

 Dry hands with clean (paper) towel.

Toileting Procedure

1. Always use a toilet or latrine to urinate and defecate.

2. Dispose of all used toilet tissue and feminine hygiene products in a sanitary receptacle, i.e., the toilet, latrine or covered bucket.

3. Wash hands with clean water and soap after toileting.

- Personal Hygiene Practices

- Personal Hygiene Practices

Protect Plants in Growing Fields

Use a toilet or latrine.

Keep animals away from source plants.

Remove trash and debris from growing fields.

- Plants in Growing Fields

Use clean equipment.

Mark source plants that should not be harvested.

Prevent Contamination During Harvest

Practice proper handwashing.

Place clean tools and equipment on a clean tarp.

Harvest

Prevent Contamination and Mold During Drying

Dry plant bundles under a protected overhang.

Allow air flow in hanging plants.

When drying on tarps, spread plants in rows to allow for easy turning.

- Drying

Prevent Contamination During Packing

Wear clean clothing.

Practice proper handwashing.

Use clean storage sacks.

Packing

Keep equipment and storage areas clean.

Planning an Education Session

This section includes suggestions and a general framework to use when preparing for and planning an educational session with workers. Once the modules have been thoroughly reviewed, the next step for the trainer is to plan and conduct worker training. The following guidelines are important planning elements to aid in education success.

Consider the Order of Presentation

When planning an education session, it is important to note that Modules 1 and 2 are general for all workers, and Modules 3 through 6 are based on workers' specific roles in farm production.

Modules 1 and 2:

The food safety information contained in Module 1 and the personal hygiene practices described in Module 2 should be **included in all education sessions**. These sections are relevant to all workers, regardless of their role/position in farm production.

Modules 3 through 6:

Subsequent modules follow the steps in farm production in sequence, i.e, growing, harvest, drying, and packing. This offers flexibility for trainers to present only the modules that are applicable to specific groups of workers and their roles/duties in the growing, harvesting, and transportation processes -- particularly if training time is limited. Trainers may also choose the order of presentation based upon time of year/or the current stage of farm production: growing, harvesting, drying, or packing.

Prepare to Deal with Sensitive Subject Matter

This training course covers basic food safety, good personal hygiene, and control of contamination during growing, harvesting, drying, and packing. Given the important role **personal hygiene** plays in farm production, it will be necessary for trainers to discuss topics that some might find to be awkward or embarrassing.

It is critical for trainers to be aware of this situation and prepared to handle the sensitive topic of personal hygiene carefully. In some cases, smaller sessions with homogenous groups will be more effective for discussing issues such as toileting and cleanliness, as factors such as **gender** and **role or position on the farm** can influence adoption. If barriers to adoption are not identified, the effectiveness of the education will be decreased.

For example:

- Women may be less willing to speak openly about hygiene practices in front of men.
- Employees may hesitate to speak up in front of their supervisor.

Trainers should also be aware of the various **customs and work practices** that could affect communication with workers.

For example:

- Standard operating procedures may limit the ability of workers to make changes to the standard practices or equipment.
- A farmer/farm owner's willingness to adopt new practices during busy times, such as during planting and harvest periods, may be limited.

Other factors to consider in planning the education session include:

- Longstanding practices, attitudes and social taboos
- Education and prior training
- Infants/children in the fields, packing and drying areas
- Diversity of the audience (cultural, social, traditions)
- Educational level
- Language/dialects

	Examples of Potential Barriers/Solutions
Barrier:	If soap and water are not located near toilet facilities, hand washing after toileting is difficult to practice.
Solution	In this instance, a solution could be to move soap and water near the toilet.
Barrier:	Some cultures are not comfortable discussing personal hygiene topics in mixed groups.
Solution.	For sensitive topics, such as the discussion of proper toileting practices, trainers may prefer to separate the group by sex and age.

Choose the Training Location

There are various places that can serve as a good location for training. It is important to choose a location where it is **easy to make presentations** that everyone can see and hear, and where engaged group discussions can take place easily.

If the farm itself does not offer a quiet room or gathering space, trainers should explore the availability of training locations in the larger community, including such options as:

Clinics/health facilities

Places of worship

• Community centers

Sheltered outdoor settings

Schools

Once a location is identified, trainers are urged to visit the facility in advance, or reach out to someone who is familiar with the setting to determine its characteristics and plan the logistics for the education session. Trainers should determine the resources available to conduct the training, such as easels/flip charts, computers, copying machines, and break rooms. This will confirm what is provided and what a trainer may need to supply/prepare in advance.

Know The Role of Community Leaders

If a training session will occur at a location other than at a specific farm, it is important to consider community dynamics and traditions.

In some communities, it may be appropriate and/or customary for a trainer to visit with health professionals, teachers, or political or religious leaders to obtain their support before setting up a training program. These community leaders often serve as decision-makers for overall programming/education in the community, and it may be necessary to gain their approval prior to reaching out to individual workers and community members.

For One-on-One Discussions

Trainers may also have the opportunity to discuss module content with individual field workers. Trainers can observe workers in action and be prepared to discuss hygiene practices when they observe a scenario or setting that is conducive to this type of discussion.

These impromptu opportunities are referred to as "Teachable Moments." Teachable moment ideas are highlighted in each content module, with suggestions that are specific to that module's subject matter.

Learn About The Participants

Learning about the workers who will attend an education session is a key element of success. In many cases, being aware of cultural nuances and social status of the workers with whom a trainer may be meeting will aid in the workers' subsequent adoption of recommended hygienic practices.

Trainers can:

- Watch current practices to see what behaviors are being followed prior to the training
- Participate or listen in on daily conversations to gauge opinions and beliefs, and to decipher potential barriers

Being aware of current practices and potential challenges will also help to ensure that the education session will meet workers' needs. Trainers will thus be able to offer ideas that make it easier for people to incorporate the new practices into their daily lives.

When learning about the workers, there are some basic questions to consider. These will enable the trainer to plan the most effective and successful experience for the group.

Questions/Considerations:	
1. Who are the members of the group?	
Consideration: Gender, age, and work status (e.g., new employee or seasoned worker) will affect how you present the materials and messages.	
2. Where are they located?	
Consideration: Can workers travel offsite for a training session, or does the trainer need to go to them?	
3. How many workers are attending?	
Consideration: Plan the space (size, seating, presentation equipment) and hand-out materials accordingly.	
4. What language(s) do the workers speak?	
Consideration: Prepare/translate the discussion points and hand-out materials as needed.	
5. What is the group's reading level?	
Consideration: Determine whether written materials and a presentation that includes text will be understood, or if it is more appropriate to use a spoken or visual/graphic presentation and illustrated/word-free hand-out materials.	

Create the Training Agenda

On the day of the education session, trainers will find it helpful to follow a specific agenda to ensure that all the important material is covered. A set agenda better enables trainers to stay on track with amount of time allocated for each section, and allows allocation of specific time segments for question and answer sessions, which are an important aspect of worker engagement.

The suggested agenda below follows the format of the course and allows for the fullest use of the on-line materials.

- The program can be completed in one sitting; however, it is possible to divide the material into short sections that are more appropriate for different groups of workers, e.g., if different teams are responsible for harvesting and packing.
- Trainers may adjust the timing to meet presentation parameters (such as how long there will be access to the meeting facility) and content focus.
- Trainers are reminded to schedule time for breaks in the agenda, and anticipate some additional time for impromptu informal discussion.

Suggested Agenda

1. Welcome and Introductions

(30 minutes to one hour)

The beginning of the training session should allow trainers to introduce him/herself and make the participants feel comfortable.

- A few general questions and answers (asking about the current growing season, an informal poll of how long the group has been working in the growing fields, etc.) will help to set the tone for open discussion.
- Setting the tone for open discussion will also serve to increase group participation and facilitate learning.

2. Presentation of Module(s)

(30 minutes to one hour, depending on discussion/Q & A)

As noted above, it is recommended that all individuals involved in growing, harvesting, drying, and packing spices and dried aromatic herbs learn the food safety information contained in Module 1 and the personal hygiene practices described in Module 2. The remaining modules can be covered with the entire group, or tailored to the duties of the participants.

Easy-to-Access Graphics Approach

To facilitate ease of use *and* teaching efficacy, the information contained in the six training modules is presented in a **simple graphic format.**

This format is designed to:

- Be easy for workers to understand and identify with
- Facilitate rapid and easy translation
- Enable easy download/printing to provide a visual reminder of the information

For Each Module:

- **Present the Information for Workers.** Trainers should use the information contained in the six learning modules to guide the presentation of the **Illustrated Handouts**. Posting the handouts in appropriate work areas also serves to reinforce the practice of good hygiene *after* the training session.
- Emphasize the benefits for the workers. Workers are more likely to adopt the recommended practices when they understand that these hygienic practices will improve their health and that of their families. See "Tips" on next page.) In addition, these practices help ensure that final spice product will be of export quality; this benefit will be of interest to the farm worker and the farm owner.
- Conduct a Question and Answer Session. After the information for presentation of the modules is covered, trainers should hold a question and answer session. If there is confusion about a particular concept, it should be clarified during this time. The *Food Safety and Hygiene Glossary* offers simple definitions to prepare trainers for potential questions and providing correct answers.

Food Safety Training for Farm Workers: Spices and Dried Aromatic Herbs

Tips for Discussing Worker Health

Awareness of the health of workers who are exposed to other workers and to source plants throughout the supply chain is an important component of preventing the spread of illness. As trainers assess the farm for hygienic practices and potential challenges, it is important to be aware of certain situations that could lead to contamination.

1. Infectious Disease

Workers who are ill with an infectious disease are much more likely to spread pathogenic microorganisms than healthy workers. Germs can be spread through their saliva, sputum, urine and feces, and by contamination of their hands and clothing.

Trainers who are communicating with workers should be familiar with the farm's policies regarding working while ill. If ill workers are allowed to work, encourage them to:

- Avoid touching the source plants and food products
- Wash and dry hands frequently throughout the day
- Wash hands after using the toilet

2. Open Sores

Open sores on the hands can easily become infected when working with soil or agricultural water. Trainers should be aware of the farm's policies regarding working with open sores on the hands.

- It is best for workers with open sores on their hands to avoid working in areas where they will contact source plants or spices.
- If working with an open hand sore cannot be avoided, the sore should be covered with a clean waterproof bandage to prevent infection of the wound.

3. Contaminated Clothing

Workers may be exposed to environmental pathogens and dangerous chemicals in and around the farm. This can happen via contact with animals or contaminated water, soil and feces. Trainers should be aware of the farm's policies regarding the availability of protective clothing, including boots, gloves and clothing.

It is important for workers to understand that:

- Clothing should be changed at the end of the work day. Wearing work clothes home from the farm can put the worker's family at risk for illness.
- Soiled clothing should be washed frequently; ideally, soiled clothes should be laundered after every wearing, and clean clothes worn each day.

4. Hydration

Hydration is important for worker health.

• Encourage the drinking of potable water while working to help maintain worker health and prevent dehydration.

Schedule location	n/facility:
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- Onsite contact person: _____
- Confirm available on-site technology
- Plan Presentation Structure
- Download for overhead projection, or
- Print for group presentation
- Number of Participants:
 - Plan Agenda
 - Modules to be presented: _____
 - Print Module Information and Food Safety and Hygiene Glossary for reference
- Prepare Handout Materials (one set per participant)
- Prepare contact information for followup worker questions, when appropriate
- Plan refreshments, if applicable
- Prepare Reminder Flyer showing date and time of training

Announcement: Education Session for Workers

You are invited to the Education Session to learn important new information.

Refreshments will be provided.

Food Safety Glossary

This section is provided to facilitate correct definitions for those terms that may come up during training discussions and Question and Answer portions of the program.

- Agricultural Water: Clean water used in the growing, harvesting, cleaning of sources plants and spices and dried aromatic herbs where it is intended to, or is likely to, contact the source plants or food-contact surfaces. This water is low in microbiological and chemical contaminates but of lower quality than drinking (potable) water. National standards to the quality of agricultural water vary.
- Clean Water: Water that does not compromise food safety in the circumstances of its use.
- **Export Quality:** Product produced to the high standard of quality and safety demanded by the international marketplace. These products usually command a higher price.
- Farm Worker: Any person involved with one or more of the following activities: growing, harvesting, packing, storage, drying or transport of source plants.
- Feces: Solid waste excreta of humans or animals.
- **Food Safety:** All measures to ensure that food will not cause harm to the consumer when it is produced, prepared and/or consumed according to its intended use.
- **Foodborne Disease:** Any disease or illness caused by eating contaminated food. Sometimes referred to as *food poisoning*.
- **Germs:** Microscopic organisms such as bacteria, yeasts, molds, viruses and parasites that may be found in the environment, in food and in or on animals, including humans. Germs can cause disease when consumed in food (i.e., cause foodborne disease).
- **Hygiene:** Cleaning performed to maintain good health; personal hygiene includes cleaning of the hands, body, and hair.
- Latrine: A standalone apparatus or receptacle such as a toilet or pit in the earth, designed for urination and defecation.
- **Personal Protective Equipment:** Clothing/garments and equipment used to prevent substances contacting the wearer's body, including gloves, masks and hats.
- Sanitation: The provision of facilities and services for the safe disposal of human urine and feces. Inadequate sanitation is a major cause of disease worldwide, and improving sanitation has a significant beneficial impact on health. The word *sanitation* also refers to the maintenance of hygienic conditions, through such actions as proper handwashing and disposal of garbage.
- Source Plant: Any non-dried plant from which spices or dried aromatic herbs are derived.
- **Spices and Dried Aromatic Herbs:** Dried components or mixtures of dried plants used in food for flavoring, coloring and imparting aroma. The term applies to whole, broken, ground and blended forms.

Food Safety Primer

This section includes an overview of international food safety roles and responsibilities.

Food Safety Infrastructure:

Modern food production and commerce is a multifaceted and complex enterprise. Individuals wishing to provide field worker training may not be familiar with the numerous international organizations, trade agreements, national laws and regulations, and programs that have been developed for producers and processors to meet food safety requirements for products in the complex global marketplace. This primer is designed to provide an overview and additional resources for the food safety aspect of agribusiness. Those who are familiar with the Codex Alimentarius, World Trade Organization, National Food Control laws/regulations, and Good Hygienic Practices should be able to use the training manual directly. Others are encouraged to review the online resources referenced in this primer.

International Food Safety Standards:

The United Nations (UN) promotes safe food trade through an intergovernmental body, the Codex Alimentarius Commission (CODEX), founded in 1962 and co-sponsored by the Food and Agricultural Organisation (FAO) and the World Health Organization (WHO). http://www.fao.org/fao-who-codexalimentarius/en/

Codex Alimentarius Commission:

The Codex Alimentarius Commission is an intergovernmental body that coordinates the development and acceptance of food standards at the international level. As a whole, Codex Alimentarius (Codex) consists of the Commission (187 Member States), Executive Committee and subsidiary bodies. The work of the Codex Alimentarius Commission focuses on developing international food standards, implementing the scientific recommendations of the FAO/WHO Expert Committees, developing guidelines and recommendations, and responding to emerging issues. The Codex Alimentarius Commission develops, facilitates and coordinates international work on food standards by forming subsidiary bodies including Committees, taskforces and workgroups.

The Commission is the decision-making body. It meets annually to provide a forum for debate and agreement on the work of the subsidiary bodies, recommendations of the Expert Bodies of WHO and FAO scientists and issues of concern to the Members.

For approximately the first 30 years of its existence, the Codex standards were voluntary and Committees worked rapidly and through consensus. More recently the work of the Codex has gained importance because of the recognition of Codex standards by the Sanitary and Phytosanitary Agreement. More information on the Codex System and how it works is available online at http://www.fao.org/docrep/008/y7867e/y7867e05.htm#TopOfPage. (accessed November 2017)

Modern International Trade Agreements:

A fundamental requirement for imported (as well as domestic) food products is safety. To ensure food safety and to avoid the introduction of diseases and pests through trade, countries routinely imposed trade restrictions designed to protect human and animal health (sanitary measures) and plant health (phytosanitary measures). Early modern trade agreements recognized the need for these restrictions on trade. The 1947 General Agreement on Tariffs and Trade (GATT) rules covered trade restrictions to protect human, animal or plant life or health. GATT Members had the right to make these protections provided they were not an arbitrary or unjustifiable discrimination between countries, or a disguised trade restriction. However, under the GATT, as tariffs were reduced, the use of sanitary and phytosanitary restrictions to protect domestic industries became more common. These trade restrictions based on sanitary and phytosanitary concerns became viewed as non-tariff trade barriers.

The misuse of sanitary and phytosanitary restrictions as a barrier to trade was addressed in the Uruguay Round of trade negotiations, and resulted in the creation of the World Trade Organization (WTO) in 1995.

World Trade Organization (WTO):

The WTO is the only global international organization dealing with the rules of trade between nations. It represents most of the world's trading nations and most of the world's international trade agreements. The functions of the WTO include 1) administration of WTO trade agreements; 2) providing a forum for trade negotiations; 3) handling of trade disputes; 4) monitoring national trade policies; 5) providing technical assistance and training for developing countries; and 6) cooperating with other international organizations.

The WTO implements and administers three Multilateral Trade Agreements

- Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement): concerns with measures that protect human and plant health
- Agreement on Technical Barriers to Trade (TBT Agreement): covers technical regulations and conformity assessment procedures for all commodities, including food
- Agreement on Agriculture: deals mainly with issues of market access, domestic support, and export subsidies for agricultural products.

Sanitary and Phytosanitary Measures (SPS Agreement):

The primary trade agreement dealing with the safety of food states that Members have the right to adopt SPS measures to achieve their self-determined level of health protection; however this level of protection must be 1) applied only to the extent necessary to protect life or health; 2) based on scientific principles (except emergency or provisional measures); and 3) not unjustifiably discriminate between national and foreign supply sources. In developing measures to protect health, Members must comply with the provisions of the SPS Agreement, including 1) scientific justification; 2) harmonization; 3) equivalence; 4) disease-free areas; 5) transparency; and 6) technical assistance. All of these provisions (except disease-free areas) apply to food. More information on each of these provisions is available at https://www.wto.org/english/tratop_e/sps_e/spsund_e.htm. (Accessed November 2017)

National Food Control:

According to the Guidelines for strengthening national food control systems developed by FAO/WHO, food control is the "mandatory regulatory activity of enforcement by national or local authorities to provide consumer protection and ensure all food during production, handling, storage, processing and distribution are safe, wholesome and fit for human consumption; conform to safety and quality requirements; and are honestly and accurately labeled as prescribed by law" (document is available online at http://www.fao.org/docrep/006/y8705e/y8705e00.htm). (Accessed November 2017)

According to this definition, the foremost responsibility of food control is to enforce the food laws that protect the consumer against unsafe, impure and fraudulently presented food. National food laws vary among different nations, but traditionally consist of legal definitions for unsafe food, prescribe enforcement tools for removing unsafe food from the market, and outline punishments for producers and processors that market contaminated food products. Among the elements needed for a functional food control system, FAO/WHO guidelines describe food control management, inspectional services, laboratory services, and communication, education and training in addition to the laws and regulations.

- Food Control Management refers to all the leadership and administrative structure needed to develop and implement the food control strategy outlined in the laws including setting standards, conducting risk analysis, issuing product recalls, taking enforcement actions.
- Inspectional Service covers the on-site examination of food facilities that produce, handle, store, process and distribute food.
- Laboratory Services refers to the ability to measure food for physical, chemical and microbiological contamination for monitoring and surveillance purposes.
- A modern food control system must communicate with and have programs provide education programs for stakeholders.

Guidelines for strengthening national food control systems were written to encourage countries to enact relevant and enforceable food laws and regulations and it places a lot of emphasis on the importance of Food Laws and Regulations. In fact given the complexity of food production, handling, storage, processing and distribution, it unrealistic to think that national and local governments can assure the safety of the food supply without the cooperation, active participation and support of the food industry.

Food Safety References

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