

Worker and Tool Safety

Chapter Outcomes

After studying this chapter, you will be able to:

- Discuss the history of employee safety and government regulating agencies.
- Describe various types of hazards.
- Recognize strategies for preventing accidents and promoting workplace safety.
- Practice safety in the workplace.
- Identify horticultural tools and equipment and describe their use and maintenance.
- Investigate labor laws related to employee rights and safety.
- Explore careers related to horticultural safety compliance.

Words to Know ➔

biological hazard
Centers for Disease Control and Prevention (CDC)
chemical hazard
discrimination
ergonomic hazard
general safety hazard
harassment

material safety data sheet (MSDS)
migrant worker
National Institute of Occupational Safety and Health (NIOSH)
Occupational Safety and Health Administration (OSHA)

personal protective equipment (PPE)
physical hazard
safety data sheet (SDS)
safety hazard
strain
stress

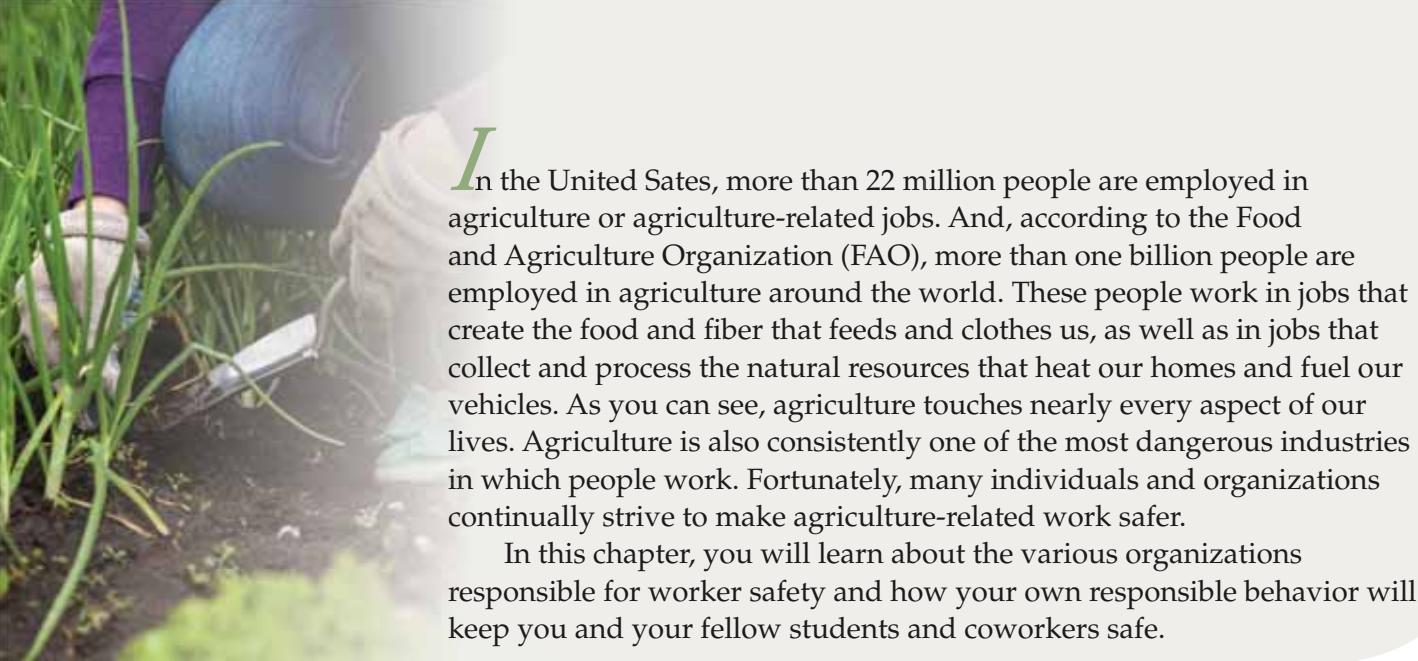
Before You Read

Look at the *Words to Know* list above. Write what you think each term means. Then look up the term in the glossary and compare your definition to the textbook definition.



While studying this chapter, look for the activity icon  to:

- **Practice** vocabulary terms with e-flash cards and matching activities.
- **Expand** learning with the Corner Questions and interactive activities.
- **Reinforce** what you learn by completing the end-of-chapter questions.



In the United States, more than 22 million people are employed in agriculture or agriculture-related jobs. And, according to the Food and Agriculture Organization (FAO), more than one billion people are employed in agriculture around the world. These people work in jobs that create the food and fiber that feeds and clothes us, as well as in jobs that collect and process the natural resources that heat our homes and fuel our vehicles. As you can see, agriculture touches nearly every aspect of our lives. Agriculture is also consistently one of the most dangerous industries in which people work. Fortunately, many individuals and organizations continually strive to make agriculture-related work safer.

In this chapter, you will learn about the various organizations responsible for worker safety and how your own responsible behavior will keep you and your fellow students and coworkers safe.

“Before the reward there must be labor. You plant before you harvest. You sow in tears before you reap joy.”
—Ralph Ransom

Did You Know?

According to the US Census of 1900, more than 2 million children were employed in coal mines, textile mills, and manufacturing facilities.

Early American Labor

In the late 1800s and early 1900s, it was not uncommon for working conditions to be hazardous to employees. Workers had little or no say regarding the amount they were paid nor about the length of their work day. Children often worked at an early age as indentured servants or as apprentices, learning a trade. There were no regulations in place regarding age restrictions, working conditions, or fair wages.

Industrial Revolution

As the Industrial Revolution gained momentum in the early 1900s, a larger workforce was needed and child labor was used to fill the void. Children worked long hours on dangerous tasks for little pay, **Figure 6-1**.



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Figure 6-1. A common job in the city for children was selling newspapers. These “newsies” would work long hours (often 12 hours a day) with few breaks six days a week.

Many children worked on assembly lines operating equipment with very little knowledge about safe ways to do so. Child workers were exposed to harsh chemicals and toxins and often experienced crippling injury and death. The child workers received little or no education. Several attempts were made in the early 1900s to pass legislation regarding labor regulations, but it was not until 1938 that advocates succeeded and Congress passed the Fair Labor Standards Act (FLSA).

Did You Know?

The publication of the book *The Jungle* (1906) by Upton Sinclair was a catalyst for reform in working conditions and production methods.

Fair Labor Standards Act (FLSA)

The Fair Labor Standards Act (FLSA) set rules establishing a minimum wage, granted overtime pay, and prohibited the employment of most minors in industrial jobs. It also set rules on the number of hours an employee can work. The FLSA sets rules to protect employees of all ages and to ensure fair treatment and wages. Since the earlier part of the twentieth century, the FLSA has made a difference in labor conditions and has helped improve the quality of life for many Americans. The FLSA also set the stage for several government organizations created to ensure safe working conditions, provide safety education and training, and promote equal opportunity for employment.

“Safety doesn’t happen by accident.”
—Unknown

Did You Know?

According to the CDC, twelve Americans die every day in a work-related accident.

Safety and Health Agencies

As employee safety became a growing concern for employers and the public, the American government responded with legislation, regulation, and the establishment of agencies such as the Centers for Disease Control and Prevention (CDC), the National Institute of Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration (OSHA), and the US Department of Labor.

History Connection Cesar Chavez

In the later part of the twentieth century, a man named Cesar Chavez (an American of Mexican ancestry) was a migrant farm worker in California. (A **migrant worker** is a person who moves from place to place to do seasonal work.) He traveled with his family to vineyards and farms across the state to work. Chavez quit school in the seventh grade to focus entirely on farm work to help support his family.

After serving in the US military, Chavez returned to California where he became the voice for migrant workers. He created the United Farm



Workers (UFW) in 1962 and helped to stage worker strikes to improve farm labor wages and working conditions. Chavez also successfully demonstrated against the use of certain pesticides in the vineyards. These pesticides were causing health problems for the farm workers and their children.

The UFW still exists following Chavez's death in 1993. The UFW and the state of California made it legal for farm workers to form unions. The farm worker unions continue the struggle to maintain fair wages and ensure safe working conditions.



deepblue-photographer/Shutterstock.com

Figure 6-2. When there is cause, the CDC will move in quickly to determine the source of contamination and ensure proper protocol is followed to eliminate the source and prevent additional contamination.

Did You Know?

Labor Day is the first Monday in September. It is a US holiday created to recognize the efforts and accomplishments of the American labor force. It honors the contributions workers have made to this country. The first Labor Day celebration took place in 1882 in New York City.

Corner Question

How many federal OSHA safety inspectors help keep American workers safe?

Centers for Disease Control and Prevention (CDC)

The *Centers for Disease Control and Prevention (CDC)* is a unit of the Department of Health and Human Services. The CDC monitors safety and security risks and health hazards in the United States and abroad. The CDC protects people from health threats, conducts critical research, and delivers health information that protects the United States against expensive and dangerous health hazards. It also responds quickly when the need arises, **Figure 6-2**.

National Institute of Occupational Safety and Health (NIOSH)

In 1970, Congress created the *National Institute of Occupational Safety and Health (NIOSH)*. NIOSH conducts research and makes recommendations dealing with workplace safety, injury, and illness. This federal agency solves health-related safety issues in American workplaces.

NIOSH and the CDC have joined forces and created the CDC-NIOSH Agricultural Safety and Health Centers. These centers are strategically located at eight universities and two additional sites around the country. The safety and health centers were established to conduct research, provide education, and establish prevention projects to address the nation's agricultural health and safety issues.

Occupational Safety and Health Administration (OSHA)

The *Occupational Safety and Health Administration (OSHA)* was established in 1970 by the US Congress to ensure safe and healthy working conditions for Americans. This government agency sets and enforces standards for business and industry. It also performs research and provides training and education. OSHA is part of the Department of Labor.

United States Department of Labor (DOL)

The mission of the US Department of Labor (DOL) is to “foster, promote, and develop the welfare of the wage earners, job seekers, and retirees of the United States; improve working conditions; advance opportunities for profitable employment; and assure work-related benefits and rights.” The DOL develops or oversees many programs, including:

- Minimum wage.
- Unemployment insurance.
- Work regulations.
- Disability.
- Equal employment opportunities.

The DOL works hand in hand with all the other worker safety agencies that are regulated by the US government.

Safety Hazards

The moment workers enter their job sites they must take time to identify potential safety hazards to prevent injury and illness for themselves and others, **Figure 6-3. Safety hazards** are anything on a job site that can cause injury, illness, or death. Common occupational safety hazards include:

- **Physical hazards** are conditions or substances within the work environment that may cause a person harm. Examples include radiation, noise, temperature extremes, falling, electrocution, and receiving cuts or abrasions.
- **Chemical hazards** are toxic substances that can cause a wide range of harmful effects. Examples include cleaning products, fuels, dusts, fertilizers, and pesticides.
- **Biological hazards** are organisms that can cause harm to another living organism. Examples include molds, viruses, bacteria, toxic plants, insects and other pests, animals, and bodily fluids that may contain disease-causing organisms.
- **General safety hazards** are safety hazards that are common among various industries. Examples include slipping on wet floors, falling from heights, injuries from machinery, electrical shocks, and catching a virus from a coworker.
- **Ergonomic hazards** are repetitious movements or positions that may lead to physical stress. **Stress** is a short-term impact of a pressure or tension. Examples include repetitive lifting or keying data.
- Work organization hazards are those caused by emotional or mental stresses.

According to the Department of Labor, these safety hazards cause millions of injuries and illnesses in workers each year. Safe practices are more likely to take place when employees recognize the dangers of their workplace and have proper and up-to-date training in personal protection.

“Working without safety is a dead-end job.”
—Unknown

Safety Note

Get enough rest! Aside from health issues that arise from lack of sleep, excessive sleepiness also contributes to a greater than twofold higher risk of sustaining an occupational injury!

“Tomorrow is your reward for acting safely today.”

—Robert Pelton



Arthur Eugene Preston/Shutterstock.com

Figure 6-3. To prevent physical injury and possible damage to machinery, landscape and turfgrass workers must follow the manufacturer's safety protocol as well as their employer's safety rules.

Corner Question

How many American workers are employed full time in production agriculture?



Did You Know?

Approximately 3 million leaf blowers are sold in the United States annually.

Physical Hazards

All jobs, regardless of location or type of work performed, include physical hazards. Recognizing these hazards is the first step in avoiding injury, illness, or death. Physical hazards are conditions or substances within the work environment that can injure a worker. Examples of physical hazards include:

- Perpetual loud noises.
- Long exposure to sunlight or other sources of radiation.
- Extreme temperatures.
- Wet floors with no tread.



ChameleonsEye/Shutterstock.com

Figure 6-4. A worker using a leaf blower should wear hearing protection. Continual use of loud equipment can create long-term damage to hearing.

Physical hazards impact many individuals in horticultural occupations. In many horticultural jobs, such as in landscaping and nursery work, individuals are continually exposed to the sun and changes of weather. In addition, landscape and nursery workers use equipment that can be extremely loud and can lead to hearing loss with continued exposure, **Figure 6-4**.

Chemical Hazards

Most horticultural and agricultural businesses have chemicals onsite that may be hazardous to employees and the environment. These chemicals are used to promote growth (fertilizers); control or combat diseases, insects, and animal pests

(pesticides); and fuel or service equipment (gasoline/diesel fuel). These chemicals may be synthetic or organic and may come in liquid, vapor, or granular form. Exposure to these chemicals may cause a wide range of physical harm.

Safety Note

Leaf Blower Safety

A leaf blower or chain saw produces about 115 decibels of sound and can cause permanent hearing damage after just 30 seconds. It is important to always wear proper ear protection to ensure that you will not suffer temporary or permanent hearing loss. This is a physical hazard to which many landscape and turfgrass professionals are exposed.



Corner Question

What safety precautions should be taken by horticulture workers who are exposed to the harmful UV rays of the sun?

Safety Note

Vapor and Gases

Vapors and gases can be odorless and colorless but deadly. In 2011, two brothers, ages 16 and 22, died while cleaning an organic waste drainage system at a composting facility in California. High levels of hydrogen sulfide were in the area where the workers were flushing out the drain pipes. The younger brother was overcome by the hydrogen sulfide gas and fell into a shaft. His brother tried to rescue him and also died from the gas. The two young men were unaware of the gas and were not wearing the proper equipment to protect them from this dangerous and ultimately fatal situation.



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Workers may be exposed to chemical hazards while:

- Applying chemicals to the soil or plants, **Figure 6-5**.
- Cultivating or harvesting plants, vegetables, and fruits.
- Disposing of plant materials.
- Servicing or cleaning machinery.
- Fueling machinery.

When used and stored properly, these chemicals are relatively safe. To avoid misuse or accidental exposure, all chemicals must be identified and stored properly. If chemicals are not in their original containers, they must be properly labeled and the original informative labeling must be readily available. Access and use must also be limited to those authorized and trained to apply or distribute the materials.

The proper personal protective equipment must also be worn while working with the chemicals. **Personal protective equipment (PPE)** includes materials and devices worn to provide a shield or defense from dangers. PPE includes earplugs, gloves, respirators, masks, goggles, specific clothing, shoes, and sunblock.



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Figure 6-5. When working with pesticides, workers must follow every detail of instruction on the pesticide label before, during, and after application.



Peter Waters/Shutterstock.com

“Safety is something that happens between your ears, not something you hold in your hands.”
—Jeff Cooper

Biological Hazards

Biological hazards are presented by organisms that are or were once living and which can cause harm to another living organism. These hazards are encountered when employees work with animals, plants, bacterial or viral cultures, tissue samples, diseased or infected plant material, compost, manure, and even people who are sick and contagious.

**B**

neil hardwick/Shutterstock.com

**C**

Eric Isselee/Shutterstock.com



Figure 6-6. Workers need to be aware of natural dangers they may encounter when working outdoors and what actions should be taken if they are bitten by venomous animals. A—Black widow spider. B—Io moth stinging caterpillar. C—Rattlesnake.

Animals

Depending on the area of the country in which they are working, employees may encounter wild or feral animals, ranging from field mice to barn cats to alligators, when they are working outdoors. Some animals pose physical as well as biological hazards. For example, mice may defecate and urinate in and around tools and machinery stored in a barn or shed, as well as bite a hand when startled. Feral cats may carry disease or be infested with ticks and fleas and may also bite if they are startled or feel threatened.

Additional biological hazards from animals include bites or stings from venomous spiders, stinging caterpillars, and venomous snakes, **Figure 6-6**. Spiders, such as the venomous black widow, are often found inside potting sheds and irrigation covers, and venomous snakes may be found between landscaping rocks, in tall grass, and in heavy underbrush. Employees should be instructed on how to handle possible situations involving animals and what steps to take if someone is stung or bitten.

Plants

Workers must also be aware of their environment and pay close attention to where their hands, feet, and body are in relation to plants that may cause allergic reactions. Poison ivy, poison oak, and stinging nettle can cause dermatitis or allergic reactions, **Figure 6-7**. These reactions can be very severe, causing extreme itching and lesions in those who are allergic. These types of plants may be encountered when maintaining existing landscaping or when clearing an area for planting.

Special care should also be taken when handling diseased or infected plant materials. Diseased or infected plant materials must be disposed of properly to prevent spreading of the disease or infection.

**A**

Stuart Monk/Shutterstock.com

**B**

@iStock/Derek_Neumann

**C**

@iStock/toxawww

Figure 6-7. Plants that can be toxic to human beings vary by region and may be found in both cultivated and uncultivated areas. A—Poison ivy. B—Poison oak. C—Stinging nettle. **Do you know how to treat skin that has come in contact with toxic plants?**

Tools and clothing that come in contact with poisonous and diseased or infected materials should also be thoroughly cleaned and possibly disinfected.

Compost and Manures

In addition to plant material that may be diseased or infected with pests, workers often work with decomposed organic matter, such as compost and manures, which are used to amend soils. These materials may contain harmful bacteria that may cause illness or disease. The best defense against biological hazards is to keep work areas, tools, and equipment as clean as possible, and to regularly wash your hands after handling any biological materials.

General Hazards

General hazards are common dangers that many employees encounter while working at their job site. These hazards can cause illness, injury, or death and are the result of:

- Tripping or slipping on wet surfaces.
- Falling from a height.
- Coming in contact with unguarded machinery.
- Coming in contact with moving machinery parts.
- Receiving shocks or other injuries from electrical cords or improper wiring.
- Becoming trapped or suffocating in a confined space.
- Being run into or bumped by a forklift, tractor, conveyor belt, or vehicle, **Figure 6-8**.

These common hazards can easily be avoided by making the worker's welfare a priority. Always keeping safety in mind will help you avoid illness, injury, or death from workplace accidents.

Ergonomic Hazards

Have you ever done something physical that was repetitive and found that you had muscle cramps or soreness the following day? Maybe you were keying text for an extended period of time and your wrists began to ache, or perhaps you were practicing the guitar and your fingertips became numb. These ergonomic hazards (repetitive motions or positions leading to physical stress) cause temporary and sometimes permanent damage. Examples of ergonomic hazards in the horticulture workplace include:

- Bending over flower or garden beds for long periods of time.
- Kneeling for extended periods of time.
- Hunching over a table while sowing seeds.
- Repeatedly planting or digging.
- Frequently lifting heavy loads.
- Keying or doing computer work.

These tasks, if repetitive and done without following proper safety rules, can lead to acute muscle soreness and fatigue. There can also be lifelong impacts to your physical health.

Corner Question

How many venomous snake bites occur each year?



LUCARELLI TEMISTOCLE/Shutterstock.com

Figure 6-8. When operating large equipment like a tractor, eyes and ears must be open and attentive to the surroundings.

“The safety of the people shall be the highest law.”

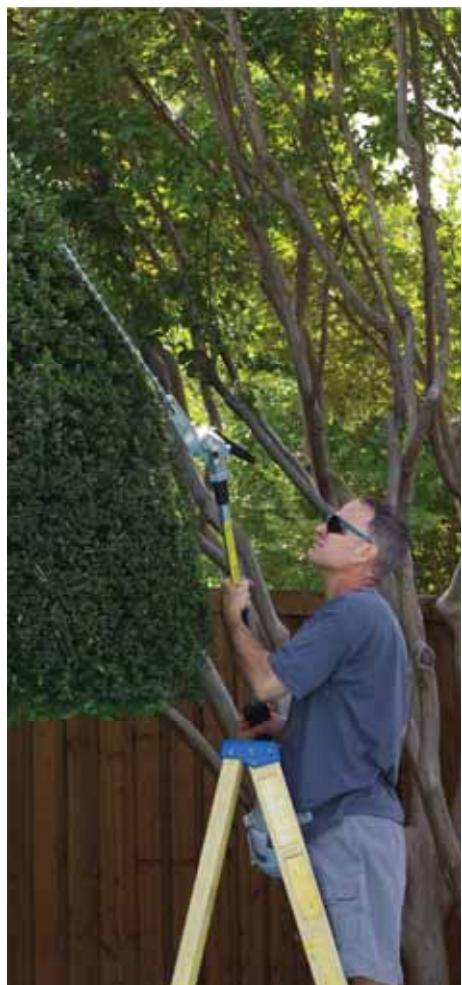
—Cicero

Work Organization Hazards

Some hazards at a workplace do not always result in physical injuries. Sometimes emotional issues associated with a job lead to stress and *strain* (the long-term impact of a pressure or tension) on one’s mental and physical health. These hazards are handled differently by each person. They vary at all jobs just as other physical, chemical, biological, and ergonomic hazards do. Work organization hazards can include:

- Workplace demands.
- Social relationships.
- Lack of respect.
- Emotional stress.
- Violence.
- Pace of work.

Accidents or catastrophic events at a job site can also contribute to stresses or strains of jobs. Exercise and emotional releases can ease the effects of a stressful incident. If strain is occurring, then changes must be made to the workplace environment to improve conditions.



A.Punpleng/Shutterstock.com; thieury/Shutterstock.com

Figure 6-9. Pruning, especially at great heights, must take into account the stability and safety of the worker. **Do you know how to safely use a ladder?**

Preventing Accidents

Once safety hazards have been identified, businesses, employers, and employees can begin the process of accident prevention. Preventing and controlling hazards can be accomplished by:

- Maintaining equipment and monitoring and recording maintenance at regular intervals.
- Ensuring that all employees have been trained about safety on the work site.
- Ensuring all personnel are aware of safety procedures associated with all equipment.
- Ensuring all personnel have been trained to operate the equipment, **Figure 6-9**.
- Supplying and training personnel in the use of personal protective equipment (PPE).
- Certifying that employees know how to acquire or implement first-aid treatment for accidents, injuries, and illnesses.

Preventing accidents is much easier than treating injuries or illnesses. Knowing the ABCs of accident prevention can make the workplace a healthier and safer environment for all workers.

ABCs of Accident Prevention

Employers and workers should follow the ABCs of accident prevention to ensure the safety of everyone on a work site. The ABCs stand for *administration, barriers, and communication*.

A Is for Administration

Follow the rules and procedures established by employers, equipment manufacturers, and government agencies. Wear the correct personal protective gear, regulate workloads, and

Thinking Green

Plant a Tree, Relieve Stress, and Save the Planet

Getting outside and planting a tree can alleviate stress. Physical exercise releases serotonin and endorphins that help to make people feel happier. Increased oxygen intake and deeper breathing help to provide a euphoric or happier feeling. Since planting a tree will help reduce the greenhouse effect, filter the air, control erosion, and release oxygen into the air, this is a win-win situation. So breathe it all in. Oxygen can make you feel better, and planting a tree is a great way to ensure we will have cleaner air to breathe.

Make it a family affair and teach your younger siblings the benefits of planting trees. There are often special deals on trees for Arbor Day (the last Friday in April). Many companies or communities sponsor free tree giveaways.



JackF/iStock

rotate jobs. Safety rules were made to prevent injuries and illnesses. Read all warnings and labels before beginning any task.

B Is for Building Barriers

Safety shields should be created to help prevent accidents or harm. These shields include personal protective equipment (PPE) such as hearing protection, eye protection, respiratory protection, specific clothing, gloves, shoes, and sunblock, **Figure 6-10**. Barriers may also be created by locking cabinets or storage facilities that contain chemicals or dangerous materials. Shields and guards should be placed around stationary equipment to prevent injury. Employers and workers should be vigilant and monitor barriers to ensure they are fully functional.



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Figure 6-10. Workers use personal protective equipment, such as hardhats, on the job site to prevent injuries.

Safety Note

Machine Safety Devices

A 16-year-old produce market worker in New York City was working alone in a basement using a machine to crush cardboard for disposal. While working, he was caught by the machine's hydraulic arm. Another employee found the worker and called 911; however, the young man could not be revived. He had been crushed by the machine. An inspection of the machine revealed that a safety device had been disarmed to speed up the work process. If the safety device had not been tampered with, the young man would likely still be alive.

It requires a great deal of force to bale cardboard and paper so tightly. Never modify machinery to bypass safety features—it could be a deadly mistake.



drevalyusha/iStock



wavebreakmedia/Shutterstock.com

Figure 6-11. Learning how to lift objects properly may be part of an employee's safety training. **Do you know how to lift objects properly?**

“If you talk to a man in a language he understands, that goes to his head. If you talk to him in his language—that goes to his heart.”
—Nelson Mandela

Corner Question

What personal protective equipment (PPE) should be worn to mow grass?

C Is for Communication

All parties involved must share knowledge about safety and accident prevention. Businesses are required by law to teach their employees to complete all tasks safely, **Figure 6-11**. Employees have a duty to ask questions when they have a concern dealing with safety. Communication about safety also must be in the language that employees understand. If any workers speak another language, safety materials should be provided in a language that the employees will understand. This practice safeguards all individuals and ensures that everyone understands safety procedures at the workplace.

Workplace Safety Documents

By law, each place of business must have certain safety and employee information posted so that it is visible to all employees. When applicable, these postings may be in multiple languages. The posted documents may state safety or evacuation procedures, explain machine operation, or list who to contact in case of emergency. Other documents, such as safety data sheets, inform people about hazardous substances that are used at the workplace.

Safety Data Sheets

A *safety data sheet (SDS)* is a document that contains information on the potential health impacts of a chemical or other dangerous substance. An SDS outlines the chemistry of the material, identifies potential safety hazards, lists proper handling and storage procedures, explains what to do in case of exposure or ingestion, and explains how to safely handle a spill and cleanup.

Safety Note

Weather Hazards

A 17-year-old Florida landscape worker was unloading rock from a truck bed with his coworkers. There was light rain and some thunder in the distance. Suddenly, there was a lightning strike. The boy was electrocuted, and all the coworkers were injured. The landscape company had not instructed the workers to seek cover when they could hear thunder. If the company had advised the employees of this rule, the teenager's life might have been saved.

Always seek cover during lightning storms. Keep in mind that it does not have to be raining where you are standing for lightning to strike. If you hear thunder or see lightning, find a safe location to wait out the storm.



Sportactive/iStock

All materials that are used on site must have an SDS available. A safety data sheet was formerly referred to as a *material safety data sheet (MSDS)*.

Pesticide Labels

In addition to the required SDS, all pesticides must have a manufacturer label that is regulated by the Environmental Protection Agency (EPA). The pesticide label serves as a legal agreement for the individual applying the pesticide. When an individual applies a pesticide, he or she is agreeing to read and follow the directions for safe application, storage, and disposal.

Practicing Safety

Greenhouses, nurseries, farms, golf courses, vineyards—each horticultural location will have its own unique safety hazards, **Figure 6-12**. Workplace conditions will vary, but accident prevention and safety practices should always be of the utmost concern for employers and employees.

SAFE Working Conditions

Practicing safety is easy when you remember to apply the acronym SAFE. SAFE stands for *see the safety issue, ask for help, find a solution, and extend optimism*.

S: See the Safety Issue

Recognize the safety issue. In horticulture, the issue could be the improper storage of leftover pesticides, low tire pressure on a golf cart, or a dull edge on a pruning saw. Whatever the issue may be, the first step is to identify the hazard.

A: Ask for Help

Know who to ask for help. There are people at your workplace who are responsible for safety just as there are at your school. Find out who is responsible for safety issues by speaking with parents, coworkers, school officials, and human resources personnel. If you do not find the answer to your question, contact the Department of Labor, OSHA, CDC, or NIOSH for assistance. A simple search on the Internet may also answer your questions or provide you with a contact number for the government's health and safety agencies.

F: Find a Solution

You may need to approach supervisors, human resources personnel, or employers about safety issues. It is always helpful to approach these individuals with a possible solution to the safety issue if you have one to suggest.



CoolR/Shutterstock.com



J. Bicking/Shutterstock.com

Figure 6-12. Each horticultural or agricultural operation will have its own unique hazards. **What types of unique hazards would you find in a vineyard or tree nursery?**

“Safety is a cheap and effective insurance policy.”
—Unknown

E: Extend Optimism

Discuss safety situations in a positive manner when talking with an employer or supervisor. For example, you might say, “Should we get a new outlet for that broken electrical switch?” This is a great way to suggest a solution as compared to saying, “You need to buy a new electrical switch or somebody is going to get killed.” Your employer will prefer that you ask for help instead of making negative comments. As a result, there will be no animosity, and everyone can benefit from the situation.

Maintaining Tools and Equipment

All tools and equipment can be dangerous if they are not maintained well or are used improperly. Even simple tools, such as screwdrivers, can be dangerous. Many of the tools used by horticulturists are for cutting, digging, planting, and moving; they can be very dangerous. Everyone, employers and employees, should do their part to maintain a safe work environment.

Keep the following guidelines in mind to help prevent accidents and injury at school, at work, and at home:

- Read the instruction manual before operating any machine or device.
- Ask for training from your supervisor on how to operate or use machinery or equipment.
- Check all equipment for safety issues before using.
- Maintain and store all equipment and machines properly, **Figure 6-13**.
- Keep records of maintenance on all equipment and machinery.
- Be mindful of all power lines before digging. Call 811 before digging anywhere.
- Be aware of people, vehicles, objects, and road or area conditions around you in all directions while driving any vehicle or machine.
- Do not disarm any safety guards or devices on equipment.
- Wear proper personal protective equipment (PPE).
- Employ SAFE practices as described earlier.



Konstantin Sutyagin/Shutterstock.com

Figure 6-13. Properly storing tools helps keep tools in good condition, makes them easily accessible, and also allows for accurate inventory.

“Chance takers are accident makers.”
—Unknown

Checking and Maintaining Equipment

Equipment such as lawn mowers, leaf blowers, weed trimmers, chain saws, rototillers, skid steers, and other machines must be cared for to ensure that they can be used safely. Before using any machinery, take steps to determine if it is operable.

- Read the owner’s manual. Pay particular attention to anything in the manual associated with the words *hazard, caution, warning, or danger*.
- Wear the proper PPE while servicing any engine.

Safety Note

Call 811 Before You Dig

A federally mandated “call before you dig” number is 811. You can call from anywhere in the United States, and you will be directed to your local 811 center. These individuals will help you make contact with local electrical, gas, and other utility providers. These providers will indicate areas on the site where you should not dig because of underground lines. This free service helps ensure safety for you and avoids interruption of service for others. No matter how big or small the job is, you must call 811 before you dig.



micke_ovesson/iStock

- Disconnect spark plugs and battery cables while servicing engines.
- Check cooling fins and make sure nothing is obstructing movement of the blades.
- Check tire pressure for rototillers, tractors, and other machines with wheels.
- Check the oil and fuel levels. Fill as needed with the appropriate oil and fuel.
- Check belt tensions and chains. Adjust as needed.
- Check and replace air filters after every 25 hours of operation (sooner if in dusty conditions) or according to owner’s manual.
- Check for dull, nicked, unbalanced, or broken blades. Sharpen blades (using a grinder) if needed according to owner’s manual or approximately at a 45° angle, **Figure 6-14**.
- Check that the lawn mower blade is balanced.
- Perform all routine maintenance according to the owner’s manual suggestions. Record the date of service and what was done.



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Figure 6-14. Lawn mower blades must be kept sharp to keep the mower efficient and consistent. Although blades may be sharpened with a file, it is more efficient to use a grinder. **What PPE should be worn when sharpening blades?**

FFA Connection Nursery/Landscape CDE Equipment and Supplies Identification

Some states offer a Career Development Event (CDE) called Tool Identification. Although this event does not take place on a national level, many local and state FFA chapters host this contest. Students correctly identify a tool that is commonly used in agricultural practices. Students determine the correct purpose and use of the tool as an additional component of this CDE. Because this CDE is offered as a local option, check with your FFA advisor to determine if this CDE is an opportunity for you and your school’s participation.

Thinking Green

Electric Lawn Mowers

An electric lawn mower is an excellent way to reduce emissions into the environment. There are battery-operated or electric lawn mowers to choose from. Many of them are not as powerful as a gas-powered lawn mower; however, they can easily cut a maintained lawn. These machines are more suitable for urban and suburban lawns. They reduce both carbon emissions and noise pollution.

Keep in mind that electric mowers are not usually as powerful as gas-powered mowers. If you are using an electric mower, do not allow the lawn to grow too long. Your mower will be much less efficient.



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When the operator has determined that the machine is ready for operation, then she or he is ready to suit up with any needed PPE. The operator must first determine any safety hazards in the area where she or he will be working before work can begin. The operator should start the machine according to directions in the owner's manual. When finished, he or she must properly shut off, clean, maintain, store, and secure the machine to prevent future operation error or injury.

Maintaining Tools

Countless tools hang in the storage areas of horticultural businesses. Pruning saws of every shape and size, grafting tools, shovels, rakes, and cultivators are some of the tools that make a horticulturist's job easier. These tools must be maintained for continued safe use. Follow these guidelines when maintaining tools:

- Wear the appropriate PPE.
- Clean leather parts with glycerin bars or other cleaners made specifically for cleaning leather.
- Clean wood parts, sand if needed, and rub with an oil or sealant to protect them.
- Remove all grease, oil, and rust from metal parts with a solvent or wire brush. Sharpen blades with a file or grinder.
- Coat metal with a medium weight oil and apply a rust-preventive material.

Labor Laws

Workers need to know their rights. Understanding worker rights is just as important as worker safety. Laws and regulations set forth by the US government exist to protect workers. These laws go hand-in-hand with safety.

Corner Question

How many stitches does the average chain saw injury require?

Minimum Wage and Hours Worked

The US Department of Labor's Wage and Hour Division administers the federal minimum wage law. This law states the minimum amount that covered employees must be paid per hour. (Some states also have minimum wage laws.) Additionally, this agency also enforces federal laws pertaining to work hours.

These rules are more complicated for youth workers (those under 18 years of age) than for adults.

The hours that a youth worker may work can vary from state to state. In general, youth who are 16 or 17 years of age and are attending school may work as many hours as they choose but only until 11 pm and not before 5 am. Children who are 14 or 15 years old may only work three hours a day during the week between 7 am and 7 pm. They may work eight hours a day on Saturday and Sunday. These students can work no more than 18 hours a week during a school term and no more than 40 hours a week during the summer.

Job Duties for Workers under 18

Youth workers are more limited in job duties than those who are 18 or older. Several laws are in place that prohibit those who are under 18 years old from:

- Operating machinery or power equipment.
- Roofing (any and all things dealing with a roof, both on the ground and on a roof).
- Logging or working at a sawmill.
- Being exposed to radiation.
- Handling, serving, or selling alcohol.
- Driving a forklift.
- Driving as a main part of the job.
- Working in demolition.

Employees at Least 16 Years Old

Employees must be 16 years old to load or unload trucks and work in some construction or manufacturing jobs. In addition, employees must be 16 years old to bake. These jobs are sometimes considered hazardous. A 16-year-old may only be able to work at these sites in limited capacities to comply with OSHA and the Fair Labor and Standards Act provisions dealing with youth employment.

Employees 14 or 15 Years Old

According to the Fair Labor Standards Act, youth must be at least 14 years old to work. Youth workers can do many jobs, but labor laws set some limits. Youth who are 14 or 15 can cook only with electric or gas grills. They are not allowed to:

- Work at dry cleaning or with commercial cleaners.
- Load or unload a truck.
- Work on a ladder or scaffold.
- Build, work construction, or work in manufacturing.

These rules and regulations standardize youth labor to ensure all employees are safe and that hazards are avoided whenever possible. As workers age, more work responsibilities and opportunities are available. These rules are in place because of a history of youth worker accidents. This historical information helps lawmakers determine how to safeguard all workers. It is important that young workers know what types of jobs are legal for them to work, based on their ages.

Young Worker Responsibility

Did You Know?

Today's 20-year-old has a 3 in 10 chance of becoming disabled before he or she reaches retirement age.

Injury prevention can be difficult, especially for teens. Unsafe work behaviors are often the result of teens trying to work faster and be more productive. Youth will often equate working fast to earning more money. However, working faster or using unsafe methods to increase production may lead to more accidents. Safety should never be disregarded to reach work goals. If a work or production goal conflicts with safety, then there must be a discussion with a supervisor or employer to address the unsafe conditions. Safety laws that are in place to protect workers from illness, injury, or death should always be regarded.

Employees must seek additional information or help when safety rules or precautions are faulty. Workers must use their decision-making skills to avoid work-related accidents. Recognizing risky behaviors and avoiding dangers will lead to better mental and physical health. When supervisors and employers work together to combat safety hazards, everyone at the workplace will benefit.

Taking Action

Workers may be called to take action against hazards at some point in their early careers. These workers must talk with the appropriate people to ensure their safety and that of others. You should always be an advocate for yourself.

Harassment and Discrimination

“I believe discrimination still exists in our society, and we must fight it in every form.”

—Andrew Cuomo

No employee should ever feel harassed or discriminated against on a job site. **Harassment** is repeated treatment that bothers or annoys another person. **Discrimination** is unfair treatment of another person. It may be based on factors such as age, gender, ethnicity, the presence of a disability, religion, or culture. Harassment and discrimination must never be tolerated. Employees must be their own advocates. They should speak out against individuals, whether coworkers or supervisors, who are bullying, sexually harassing, or otherwise negatively impacting their work environment with emotional, mental, or physical aggression. When in doubt, report the incident. Contact your human resources department or talk to a supervisor or another adult about anything you experience at work that makes you feel uncomfortable.

Employees who feel that they are being discriminated against or note discrimination at their workplace should also contact supervisors or employers about these occurrences. An employee can contact the US federal agencies, such as OSHA, NIOSH, or the Department of Labor, to report discriminatory practices.

Did You Know?

Employers are not allowed to discriminate against employees who have exercised their right to file a workplace complaint.

Horticultural Safety Careers

Most employers will agree that safety is a number one priority. A safe workplace ensures fewer accidents, which means more hours working and higher productivity. There are positions within businesses that regulate compliance and train workers to maintain safety standards.

Horticultural Risk Consultant

A horticultural risk consultant or manager helps businesses and the industry to understand risk management. A risk consultant explains to employers and employees how to manage and minimize risks at the workplace. These risks may involve worker safety, weather and climate changes, market fluctuations, and financial threats. A risk consultant may also help a business evaluate insurance opportunities. A risk consultant also crafts solutions to all the previously mentioned issues. A risk consultant must be an excellent problem solver and communicator and must have an educational background in business, finance, or an agricultural-related field.

Horticultural Safety Manager

A horticultural safety manager serves as the leadership supervisor for local or regional safety concerns within horticultural companies. This individual focuses on compliance with government agencies, such as OSHA, NIOSH, EPA, CDC, and DOT (Department of Transportation). A safety manager must be proactive, a good educator and communicator, and a motivator. He or she must pay particular attention to preventing safety accidents while promptly handling those that occur in the workplace. A safety manager promotes strategies to decrease workplace illness, injuries, and death. Many companies consider worker safety as the most important variable within the company, making the safety manager an extremely valuable employee.

Career Connection

Kurt Bland Landscape Company Owner

Kurt Bland, the president of Bland Landscaping, is responsible for the safety of his employees. When his employees enter the building, they are greeted with a series of safety reminders before they leave for their job site. In the shop are murals of employees in personal protective equipment with safety standards and expectations. The walls of every room in the building have safety reminders along with OSHA postings. Finally, as the employees exit to their vehicles, they are reminded of vehicle safety and driving rules.

Kurt celebrates with his team of landscape professionals every 100 days of work without any accident. He rewards his employees for their attention to safety. This system promotes a culture of attention to safety. When his employees are safe, with few or no accidents, there are more gains for his company and the employees.

The National Association of Landscape Professionals, or NALP, encourages safety in all facets of the landscape business. This organization and insurance agencies for landscape companies encourage companies such as Bland Landscaping to have a safety committee. A company's safety committee consists of employees from each department. The safety committee helps direct safety decisions and education. Kurt and his employees realize that safety is a priority during the entire day of work. Steering and maintaining this culture of safety is Kurt's responsibility and a duty he gladly accepts.



Kurt Bland, Bland Landscaping

Chapter Summary

- Employee safety has been a major concern of industry, the government, and the public since the early part of the twentieth century. Before this time, child labor was considered a normal practice. After the Fair Labor and Standards Act was passed, several government agencies were established to safeguard workplaces. These agencies are the CDC, OSHA, NIOSH, and the US Department of Labor.
- Types of safety hazards at agricultural workplaces include physical, chemical, biological, general, ergonomic, and work organization hazards.
- Preventing accidents at the workplace is as easy as knowing your ABCs. ABC stands for *administration, barriers, and communication*.
- Practicing safety can be facilitated by creating a SAFE workplace. SAFE is an acronym that stands for *see the safety issue, ask for help, find a solution, and extend optimism*.
- There are countless tools and equipment that can be used while working in the horticulture industry. Always read safety manuals and employ safe practices before, during, and after operation, use, and maintenance.
- Employee safety laws, especially those impacting youth workers, are important. The US government regulates youth labor. There are strict laws regarding what can and cannot be completed by youth on a work site as well as how many hours can be worked.

Words to Know ➔

Match the key terms from the chapter to the correct definition.

- | | | |
|---|---|--|
| A. biological hazards | G. harassment | K. personal protective equipment (PPE) |
| B. Centers for Disease Control and Prevention (CDC) | H. migrant worker | L. physical hazards |
| C. chemical hazards | I. National Institute of Occupational Safety and Health (NIOSH) | M. safety data sheet (SDS) |
| D. discrimination | J. Occupational Safety and Health Administration (OSHA) | N. safety hazards |
| E. ergonomic hazards | | O. strain |
| F. general safety hazards | | P. stress |

1. Repetitious movements or positions that may lead to physical stress.
2. A government agency created to ensure safe and healthy working conditions for Americans.
3. Organisms that can cause harm to another living organism.
4. A government agency that conducts research and makes recommendations dealing with workplace safety, injury, and illness.
5. Anything on a job site that can cause injury, illness, or death.
6. Materials or devices worn to provide a shield or defense from dangers.
7. Short-term impact of a pressure or tension.
8. Toxic substances that can cause a wide range of harmful effects.
9. Repeated treatment that bothers or annoys another person.
10. An operating unit of the Department of Health and Human Services that monitors safety risks and health hazards in the United States and abroad.
11. A document that contains information on the potential health impacts of a chemical or other dangerous substance.
12. Common dangers that most employees encounter at work, such as slipping on wet floors, falling from heights, or electrical shocks.
13. Unfair treatment of another person based on factors such as age or gender.
14. A person who moves from place to place to do seasonal work.
15. Long-term impact of a pressure or tension.
16. Conditions or substances (i.e., radiation, noise) within the work environment that can hurt a person.

Know and Understand ➔

Answer the following questions using the information provided in this chapter.

1. What purpose does the FLSA serve American workers?
2. Who was Cesar Chavez?
3. List the government agencies that are concerned with employee safety.

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4. What are six types of common occupational safety hazards?
 5. What are three ways to prevent a safety hazard?
 6. What are the ABCs of accident prevention?
 7. What is an SDS?
 8. What does the safety acronym SAFE stand for?
 9. What are three actions you can perform to help prevent an accident when using equipment?
 10. What is the purpose of the Call 811 service?
 11. What are three words you should pay close attention to in any equipment or tool manual?
 12. What should be done to maintain the metal parts of machinery and equipment?
 13. How does using an electric lawn mower help the environment?
 14. How many hours can a student who is 16 or 17 years old work while in school?
 15. Can a person who is 16 years old work on a roofing or construction job site?
 16. What should you do if you observe or are targeted for harassment or discrimination?
 17. What type of work does a risk consultant do for a horticultural business?
 18. What are the job duties of a horticultural safety manager?

Thinking Critically

1. Imagine that you and your class have been outside the classroom working on a hot day. One of your classmates collapses. Your teacher is not nearby. What are your first steps in this emergency situation?
2. You are a 15-year-old employee, and your employer has just informed you that one of your coworkers quit without notice. He says that he needs you to work until closing at 10 pm. You walk to work, so transportation is not an issue. Your employer says he will have to pay you *under the table*, or *off the books*, for those extra hours because you were only supposed to work from 4 pm to 7 pm. What should you do in this situation?

STEM and Academic Activities

1. **Science.** Your home may have pesticides and chemicals that sit on a shelf in your garage or other storage area. Catalog those chemicals and determine the proper storage and handling for each one. If your chemicals have not been stored properly, create a system that will ensure safety for these items.
2. **Technology.** Develop an online tool inventory list for your class. Upload an image of each tool, a description, the quantity, and directions of how to use the tools. This will create a helpful database for your school and can be a potential SAE project.
3. **Social Science.** Find an area at home, work, or school that has a potential safety hazard. How can this situation be improved? Describe the solution. Present this information to the person that could make this solution a reality. Ask how you could help to remove this safety hazard using your solution.

4. **Social Science.** Contact a local horticultural business and ask someone to tell you about one recent workplace accident. What could the workers or managers have done to prevent this incident? What steps have been taken to prevent similar issues in the future? Share your information with the class and compare stories of local workplace accidents.
5. **Language Arts.** Recall a time when you had an accident. Write a letter to your younger self explaining what the accident was, the implications, and how to avoid a similar unfortunate event in the future.

Communicating about Horticulture

1. **Writing and Speaking.** Make a series of safety posters for working in various areas on a farm, greenhouse, or nursery. Posters may cover working with machinery, driving a tractor, loading and unloading materials, using an ATV, working with pesticides, or other areas of your choosing. Explain your posters to the class.
2. **Reading and Speaking.** As the foreman in charge of a work crew, it is your responsibility to ensure the safety of your workers in the event of a fire. You must post signs in the work area to educate your workers on the different types of fires and how to extinguish them. Research the types of fires and categorize them as Class A, Class B, or Class C. Create your signs in the form of a presentation. Share the presentation with the class, as though the class were your crew. Ask for and answer any questions your crew may have.

SAE Opportunities

1. **Exploratory.** Talk to your agricultural education teacher about having an OSHA inspector visit your classroom. As an alternative, interview an OSHA inspector. The interview can be in person or by phone or e-mail.
2. **Improvement.** Conduct a safety inspection at your school, classroom, farm, work site, or home. Create a plan to improve safety at the facilities or site and implement the plan.
3. **Exploratory.** Investigate a horticultural safety topic. Create a presentation or a video to discuss unsafe methods and demonstrate how to work in a safe manner.
4. **Exploratory.** Do research to identify and learn about common pesticides or chemicals used while gardening. Create an informational poster to describe their proper storage and disposal.
5. **Placement.** Find a job (paid or unpaid) in the horticulture industry. Before you begin work, get safety training from your employer.



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