



The Mango Industry Food Safety Training Kit Part 2

**Handling, Use and Storage of Agrochemicals
and Worker Health and Well-being**





Introduction

“Mango Industry Food Safety Training Kit” Part 2: Handling, Use and Storage of Agrochemicals and Worker Health and Well-Being provides training for the benefit of the mango industry, the workers, and the consumers. This program supplements the first four lessons included in the first “The Mango Industry Food Safety Training Kit” (Mango-FSTK).

The Mango-FSTK Part 2 is composed of two lessons. The first is designed to offer training to workers who use or have contact with agrochemicals; the handling, use, and storage of these products are covered. The second lesson of this manual provides training in the practices that workers should follow while working within the company to ensure their well-being and prevent accidents as well as some of the most basic procedures to be followed in the event of an emergency.

The Mango-FSTK Part 2 contained in this document is comprised of the following sections:

Section 1. Introduction and Instructor's Guide

Section 2. Lesson Plans

Lesson 5. Handling, Use and Storage of Agrochemicals

Lesson 6. Worker Health and Well-Being

The lesson presentations are available for use as Microsoft PowerPoint slides. These can be downloaded from the web site: www.mangofoodsafety.org



Acknowledgments

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It should be noted that all the incorrect situations that are included in the photos of this program were staged.

Disclaimer

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Section 1.
Instructor's Guide



Summary of the Mango Industry Food Safety Training Kit: Part 2

The second part of the “Mango Industry Food Safety Training Kit” was developed based on an assessment of needs for food safety in the mango industry and in the training areas established in different guidelines used in the industry. The lessons were designed to provide knowledge to the workers of the mango industry and help them develop the skills they need to minimize the risk of contamination by the use and incorrect handling of agrochemicals, to decrease cases of harmful situations to health in the work area and to train employees in the basic actions to be taken in the event of any emergency situation in the field.

Audience

The second part of the “Mango Industry Food Safety Training Kit” was developed for supervisors, quality control staff, agricultural extension agents, and/or private consultants who wish to carry out a training program on the use and management of agrochemicals and/or the health and well-being of workers in a mango farm and/or packing house.

The first lesson of this training program is specifically designed for the employees who handle, prepare, store, apply, or work in any way with agrochemicals in the company.

The second lesson of this training program is designed for all employees who may encounter health risks while working within the company.



Goals and Objectives

The overall objective of the Mango Industry Food Safety Training Kit: Part 2 is to ensure the safety of the mangos and the well-being of workers who work in the industry.

The specific objectives of the Mango Industry Food Safety Training Kit are:

- Provide training in the handling, use, and proper storage of the agrochemicals, designed specifically for the employees of the mango industry that have some contact with these products.
- Provide training in the field for worker well-being and health specifically designed for employees of the mango industry.
- Develop training materials on safety, which takes into account the practices of the mango industry.
- Help the mango industry meet the requirements of the external auditors for employee training in the correct use of agrochemicals in mango farms.



Lessons Summary

The program includes the following lessons:

Lesson 5. Handling, Use and Storage of Agrochemicals

In this lesson, the instructor will describe what agrochemicals are as well as their importance to the mango industry. In addition, some good practices will be explained for the appropriate use and storage that must be followed when working with these products to prevent mango contamination.

Lesson 6. Worker Health and Well-Being

The instructor will describe some basic concepts of worker health and well-being and their importance to the company. In addition, participants will discuss the possible harmful situations to health that may occur when working in a mango farm or packinghouse. For each of these situations, the instructor will explain and demonstrate some basic procedures and proper behavior to follow to protect workers.



How to Use the Training Kit on Food Safety for the Mango Industry (Mango-FSTK): Part 2

This training program was developed to rely on illustrations and visual aids that contain simple messages related to the correct use of agrochemicals and worker health and well-being.

This training kit includes a lesson designed to provide employees who work with agrochemicals, the knowledge and basic skills they must follow when handling these products, and another lesson relating to the health and well-being of the workers.

The information contained in the program also will help participants understand “why” certain operations are carried out in a thorough way to help reduce the risk of mango contamination.

The lesson plans can be found on the following pages. Each of the pages in the lesson plan contains a copy of a PowerPoint slide that will be seen by the participants, and on the bottom is the narrative or text that the instructor can use to explain the material. The figure on the next page shows an example of the lesson plan pages.

In this text, you may find some information within square brackets. This is addressed to the instructor and should not be read to the participants. This information is intended to enhance the learning experience of the participant.

It is not necessary that the instructor memorize the entire text. However, to make the training session more effective, it is recommended that you become familiar with and understand all the content along with the PowerPoint slides. Ideally, the instructor will use their own words to develop each of the topics contained in the manual.

The PowerPoint presentations and the PDF file of this manual can be downloaded for free from the web site: www.mangofoodsafety.org



Example of a Lesson Plan Page

Lesson 5: Handling, Use, and Storage of Agrochemicals




Copy of the PowerPoint Slide

Pesticides

Pesticides are chemicals used to control or combat some organisms considered as pests (because they can damage the fields and the mangos).

There are several types of pesticides such as herbicides, fungicides, insecticides, bactericides among others.

Let's take a look at a couple of relevant examples to the mango industry. Herbicides are used to eliminate plants or grasses that interfere with the growth of a crop. Fungicides are used to kill fungi or fungal spores. In the case of the mango farms, some herbicides and fungicides that are used frequently are glyphosate (herbicide) and copper sulfate pentahydrate with calcium hydroxide and sulfur (fungicide).

[Which of these products are you familiar with? What do you know about their handling and use?]

Slide Title

Text

The instructor can use this text to explain the material contained on the slide. *[Some slides contain text in brackets and italic letters, which include instructions on how to present a certain piece of information; this information should not be read to participants.]*

Page Number



Company Policies

Before starting the training, carefully review the company policies, familiarize yourself with them, and make sure that what you teach is consistent with these rules. For example, some companies may require the use of a specific type of protective equipment or product application equipment that may differ among the various companies. It is recommended that, when teaching the class, you try to relate the contents of the slide to your company's practices.

Documentation of the Training

If the training is not documented, the auditor will assume that it never took place. To present evidence that each and every one of the employees received training, the instructor should create and maintain an attendance list with the name of the topic discussed and the date of the training.

All participants must sign the attendance list, and it should be kept with the other documents required for the audit. You can find an example of an attendance list on the web page: www.mangofoodsafety.org



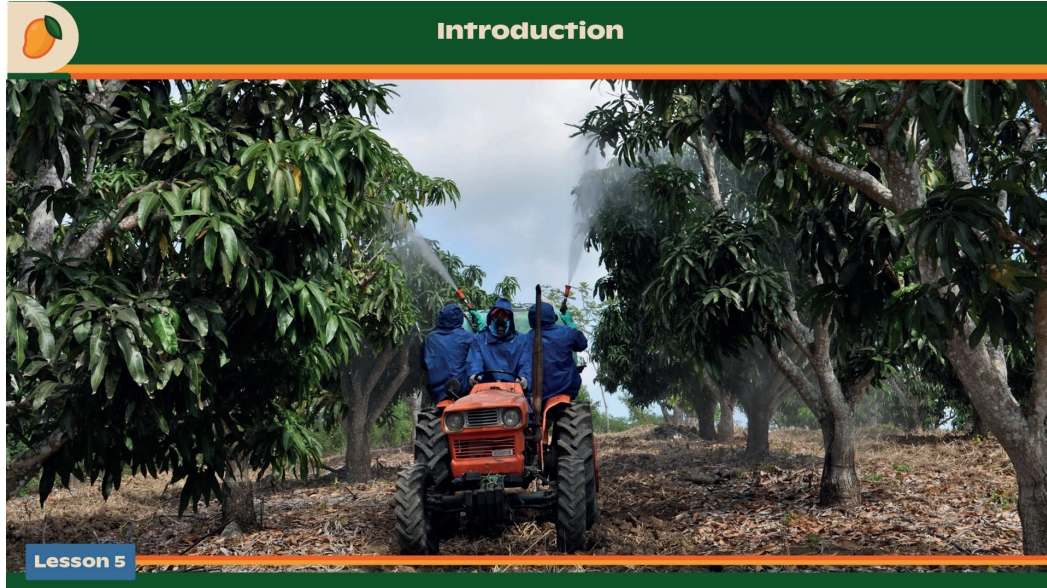
Section 2.

Lesson Plans



Lesson 5.

Handling, Use and Storage of Agrochemicals



Introduction

Using chemical pesticides and fertilizers in food production represents a great advantage to increase agricultural productivity. The mango farms are no exception, the use of pesticides and/or fertilizers is becoming more and more common in mango production operations because they protect and provide nutrients to the crops, in addition to significantly improving the production capacity of the mango farms.

The use of these substances has a rationale: correctly applied they help decrease, control, or eliminate different agents that have the potential to damage crops as well as allowing crops to more efficiently capture the nutrients they need for their development.

These products are safe for human beings when they are used according to the manufacturer's recommendations for their use and application.



Why Are We Here?

However, it is important to understand that the abuse or misuse of these products can be counterproductive in our mango farms. It is, therefore, essential to follow the recommendations, safety measures, and precautions that the manufacturer provides regarding their use.

Throughout this lesson we will learn what the basic precautions are that you need to properly use, handle, and store the different agrochemicals. Last, but not least, we will learn the proper handling of empty containers once the product has been applied.



Maximum Residue Limits (MRL)
What Is It? How Do We Measure It?

Maximum Residue Limit (MRL): What Is It?

The maximum residue level for pesticides (MRLs) or residual amount of permissible pesticide is the maximum concentration of residue of the active ingredient (A.I.) allowed in an agricultural product. This is measured in milligrams of the chemical per kilogram of mango (mg/kg) or also handled as parts per million (ppm).

It is essential that all mango production farms ensure that pesticide residues present in the mango are below the maximum permitted limits. To achieve this, it is necessary to use agrochemicals adequately and to learn how to apply them properly.



Maximum Residue Limit (MRL): How Is It Measured?

The only way to know the concentration of a chemical in the mango is to conduct a laboratory analysis of the product with a gas chromatograph to obtain the amount of residue in it. This analysis will help you to know if mangos comply with the laws of the place where they will be sold. Each country sets its own MRLs, and these may vary from country to country. For more information about MRLs limits, you can refer to the following links:

Codex Alimentarius

http://www.fao.org/fao-who-codexalimentarius/standards/pestres/es/www.codexalimentarius.net/mrls/pestdes/jsp/pest_q-s.jsp

European Union

<http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=homepage&language=EN>

United States

<https://www.gpo.gov/fdsys/pkg/CFR-2005-title40-vol23/pdf/CFR-2005-title40-vol23-part180.pdf> <https://www.epa.gov/pesticide-tolerances>
<https://www.globalmrl.com/home>

For the use of agrochemicals to be considered safe, it is necessary to always follow the manufacturer's recommendations as well as to calculate the correct dose. If this is not done, we can seriously endanger industry employees and mango consumers.



Consequences of the Excessive Use of Agrochemicals

The following are some consequences for the misuse of agrochemicals:

1. We could put the health of employees at risk by causing the absorption of the products through the skin.
2. We could put the health of consumers at risk if they consume food with agrochemicals.
3. We could put the environment at risk by discharging the products into natural effluents.
4. We could put the company at risk by potential economic losses due to rejection or withdrawal of the product from the market.

Do not forget that handling agrochemicals properly is important to us, our community, and the environment.



Food Contaminated with Chemicals

In 2014, the California Department of Public Health warned consumers about the danger of buying or using a shipment/lot of prickly pear cactus that was sold in the state because it contained a pesticide banned in the USA.

California health officials, in conjunction with the Food and Drug Administration (FDA), periodically review food shipments including fresh agricultural products. Upon detecting an organophosphate pesticide (banned since 1989) during a routine sampling, the California Department of Agrochemical Regulation withdrew all prickly pears and cactus leaves in the shipment that were in commercial establishments and notified the population in order to avoid their consumption.

In addition, in 2015 this same office fined six carriers who ignored warnings and imported from various countries and sold various fresh agricultural products with illegal pesticide residues. The fines were in the range of \$10,000 to \$20,000 for violating the pesticide laws and putting consumers at risk. The details of the legal action can be found at the following web sites:

<http://www.cdpr.ca.gov/docs/pressrls/2015/150728.htm>

http://www.cdpr.ca.gov/docs/mill/actions/pesticide_residue.htm



What Are Agrochemicals?

They are chemical substances that can be of either natural or synthetic origin and are used in mango production farms to fulfill a specific function.

There are two basic types of agrochemicals:

1. Soil amendments, fertilizers, hormones, and growth agents
2. Pesticides

It is important to bear in mind that any agrochemical product must always be handled with great care and responsibility.

From this moment, we will refer to the agrochemical products simply as agrochemicals.



Soil Amendments or Fertilizers

Soil amendments are agrochemicals designed to enhance the development and growth of agricultural products.

There are plenty of amendments. Among them, nitrogen fertilizers, phosphorus fertilizers, and potassium fertilizers stand out.

Also within soil conditioners are phytohormones or plant growth supplements.

In mango farms, different types of soil amendments are frequently used, such as:

1. Earthworm humus
2. Organic matter of earthworm leachate

[Which of these products are you familiar with? What do you know about their handling and use?]



Pesticides

Pesticides are chemicals used to control or combat some organisms considered as pests (because they can damage the fields and the mangos).

There are several types of pesticides such as herbicides, fungicides, insecticides, bactericides, among others.

Let's take a look at a couple of relevant examples to the mango industry. **Herbicides** are used to eliminate plants or grasses that interfere with the growth of a crop. **Fungicides** are used to kill fungi or fungal spores. In the case of the mango farms, some herbicides and fungicides that are used frequently are glyphosate (herbicide) and copper sulfate pentahydrate with calcium hydroxide and sulfur (fungicide).

[Which of these products are you familiar with? What do you know about their handling and use?]



Pesticides - Insecticides

Insecticides are used to kill insects that eat or damage the fruit. One insecticide that is used most often in mango farms is Malathion.

[Which of these products are you familiar with? What do you know about their handling and use?]

It is important to remember that, whenever you use any of these products, you should always follow the manufacturer's instructions to avoid contamination of the product.

Also remember that adding more product does not mean an advantage for the mango, and may even be counterproductive.



What Do We Achieve Through the Correct and Appropriate Use of Agrochemicals?

When we use the chemicals in accordance with the manufacturer's instructions, we are ensuring that they will provide the desired protection for the mango crops. However, beyond protection, there are three additional benefits when they are used correctly:

- 1. They protect the health of the applicator/fumigator.** Following and practicing the instructions and recommended techniques, we can avoid the risk of inhalation, absorption through the skin, and ingestion of substances that are harmful to health.
- 2. They protect the health of the consumer.** Following the handling instructions, you can prevent damage to the health of consumers due to pesticide residue in the product that is sent to the market.
- 3. They protect the environment.** Following the handling instructions, you can minimize the impact on the environment by avoiding the discharge of excesses into the ground and rivers.



Personal Protective Equipment (PPE)

In addition to damaging the products, some chemicals can damage people if they are handled without caution. This is why the use of personal protective equipment (PPE) becomes mandatory when using agrochemicals.

Using the proper equipment reduces the possibility of inhaling or touching agrochemicals and our eyes and skin having contact with them. In addition to the use of personal protective equipment all the instructions that are on the product label should be followed.

For this reason, it becomes essential to always use personal protective equipment when applying agrochemicals.

The photographs that you are looking at show some examples of the equipment. This may vary depending on the policies of each company.



Personal Protective Equipment (PPE)

Suitable **personal protective equipment** for the handling of agrochemicals includes:

a) Overalls or a chemical-resistant garment

These can be one or two-piece garments, manufactured from materials approved for the handling and application of agrochemicals. They usually do not have exposed seams and have elastic cuffs and ankles for greater protection. They can be reusable or disposable.

b) Gloves

There are a variety of gloves on the market that are used depending on the type of chemical you are going to work with. There are waterproof gloves, but not all of these are resistant to agrochemicals. Always wear the gloves provided by the company.

c) Boots or protective footwear

It is recommended to wear closed boots resistant to agrochemicals.



Personal Protective Equipment (PPE)

d) Aprons

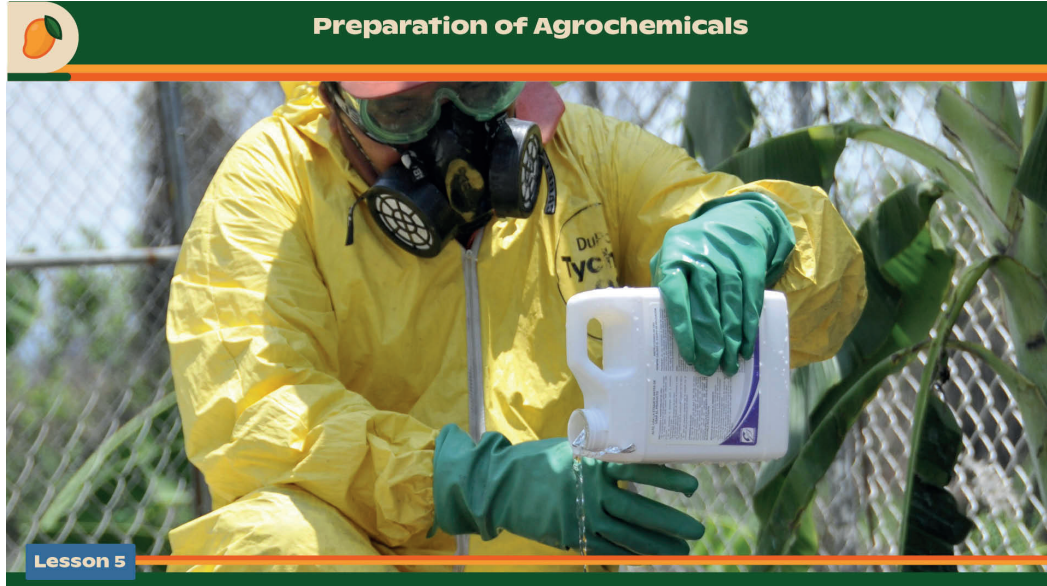
These are aprons resistant to chemical products that can protect against splashes and spills. In general, they are worn during the formulation or dosage in the spray tanks and provide protection from the neck area to the knees.

e) Goggles, masks, or safety glasses

Try to always use full face visors and goggles or safety glasses to protect yourself from splashes. The common lenses appear to provide eye protection, but in reality agrochemicals are harmful products if they come into contact with the eyes. They can even cause irreversible damage to your eyesight.

f) Hats

As well as the eyes, it is important to protect the skin and scalp. For this, it is recommended that you wear waterproof hats made of materials resistant to chemicals. Baseball caps, hats made of fabric, straw, or leather absorb and retain the agrochemicals, which could be harmful to your health. Although they are comfortable, you should avoid them.



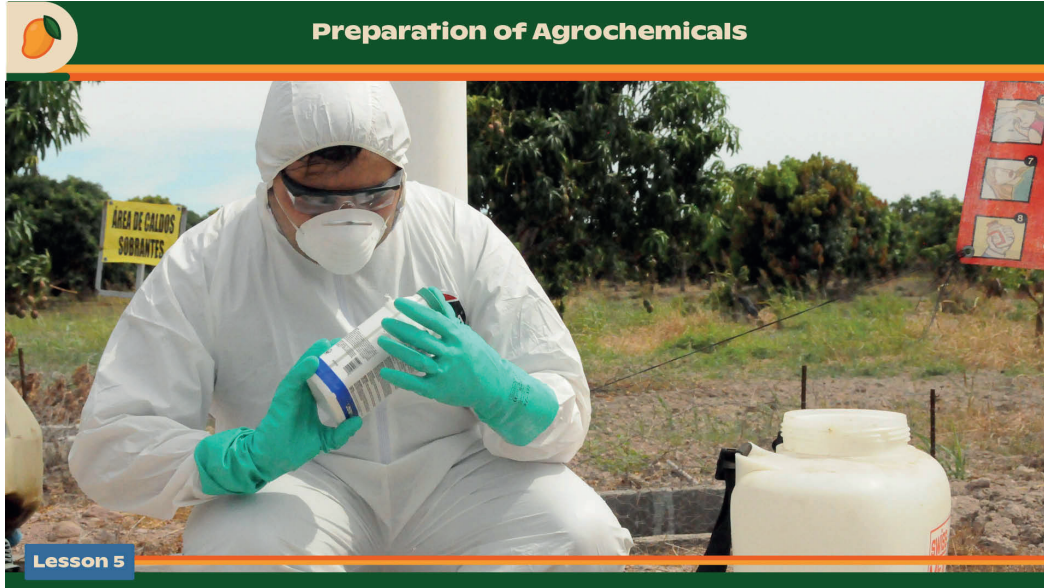
Preparation of Agrochemicals

Agrochemicals such as powders and granules usually come ready to use.

In contrast, other agrochemicals must be prepared before their implementation. They are usually mixed concentrated compounds that require the addition of water or any other diluent substance.

Therefore, the application of agrochemicals requires that you be careful.

- a) Read the label to find out how to prepare the product, what are the quantities you must use, how to apply it, and what personal protective equipment you will need.
- b) Prepare the product in the designated area, which should be a clean, ventilated place without obstacles, far away from the rest of the unused product and other workers. Make sure that the site can be adequately cleaned in case of any spill or accident.



Preparation of Agrochemicals

- c) Follow your company's procedure, which should match the information that is given on the label. This procedure will help you to get to know the dosage, the correct dilutions, and how you can achieve them with the equipment available.
- d) Fill the application equipment with the already prepared formulation. This prevents any accidental splashing or blockage of the nozzle.
- e) Carefully empty powdered agrochemical containers into the preparation containers to keep them from passing into the air and someone inhaling them.
- f) Decontaminate the containers that you used, wash them, and put them where they belong. Avoid inhaling, ingesting, or absorbing them through your skin.



Application

To use agrochemicals safely, you must pay attention to and be careful about the precautionary measures before, during, and after their implementation. In our industry, there is a lot of equipment that is used to apply agrochemicals, but it is important for your safety, the mangos and the company that you use the proper equipment based on the size of the job, the type of product and the way in which it is applied.

Remember:

- Never eat, drink, or smoke while handling or applying agrochemicals.
- When the nozzles of the equipment get clogged, remove them, clean them, and unclog them with a straw or fine wire—never, ever with your mouth.
- When you are done applying the agrochemicals, change your clothes and wash any clothes that may have contact with them.
- In the event of poisoning, immediately advise the supervisor to follow the company's contingency plan, review the instructions on the label, and immediately go to your doctor. Do not forget to bring the packaging or label of the agrochemical that was used.



Precautions Before Application

Before you begin to apply an agrochemical:

- Read and understand the instructions on the label and any other information such as the personal protective equipment, the application equipment, or protective clothing; this information could be in your company procedures.
- Assess hazards to people, animals, and the environment around the application and determine the measures to reduce or eliminate them; if you have doubts, ask your supervisor for advice.
- Make sure you understand the technical application and the precautions that you should take.
- Check your equipment to make sure it works well, that there are no leaks or spills, and that it is calibrated.

If you are not sure of something, **ASK!**



Precautions Before Application

- Verify that the protective clothing and all safety equipment are complete and in good condition.
- Verify that the weather conditions are satisfactory to the applications.
- If possible, warn the people living in the vicinity of the place where the application will take place.

If you have doubts, **ask your supervisor for advice!**

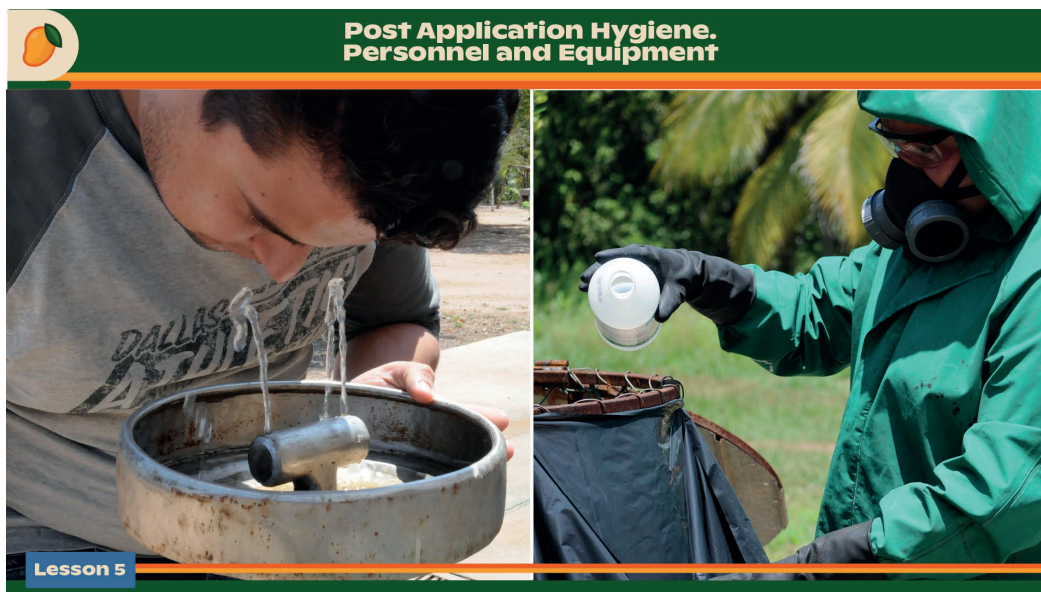


Application Equipment. Knowledge and Correct Use

In our industry, we use different methods to apply agrochemicals. It all depends on the age, size, number, and height of the trees.

When it comes to tall trees, use a sprinkler pulled by a tractor to apply the agrochemicals quickly and evenly to the top.

In contrast, if the trees are small, you can use a motorized backpack sprinker that is more practical and decreases product waste.

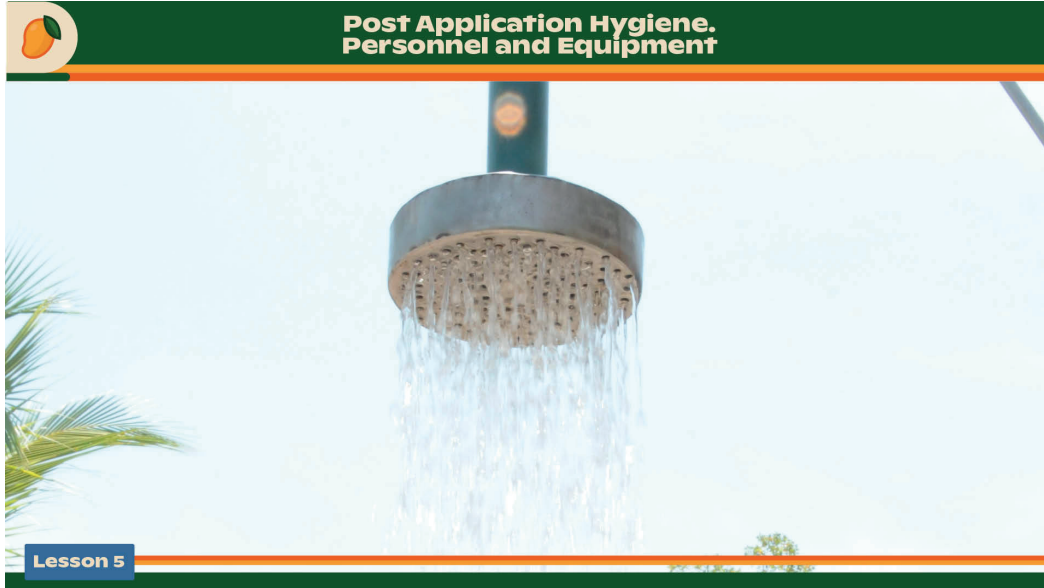


Post Application Hygiene. Personnel and Equipment

When we apply agrochemicals, it is common that we are concerned about being contaminated. This concern is normal and desirable. However, when we finish the application, it is even more important to be careful, as we generally believe that the most dangerous moment has already passed, and we let down our guard. If you are not careful, you can put your health at risk.

Immediately after the application of an agrochemical:

- Wash your hands, face, and neck thoroughly as well as the other parts of your body that could be exposed to the chemicals. If you used gloves, wash them before removing them.
- Store the products you didn't use in the designated place and safely dispose of empty containers, as well as any surplus in the equipment.
- Decontaminate the equipment, washing it thoroughly. The water used must be drained in a drain or similar chamber to be discarded under secure conditions and without risk to the environment.



Post Application Hygiene. Personnel and Equipment

- Decontaminate all clothing and protective equipment by washing thoroughly. Wash work clothes every day. Gloves should be washed inside and out and then left to dry.
- Put the mask filters in their original container or in a plastic bag to protect them.
- Fill out application logs that are required by your company. Filling out the logs is an easy task but very important because they provide the farm record.
- Remove the warning signage when it is no longer necessary.



Triple Wash of Empty Containers

When the contents of a container are used up, any residue should be minimized. This can be achieved using the **triple-wash technique**. This method is used for all containers that had agrochemicals and it is performed before they are discarded to a specialized collection center.

To perform the triple wash, it is important to put on protective clothing. The triple wash is done immediately after the contents of the container are used up because the product can solidify and impede cleaning.

How is the triple wash done?

[In addition to the slides, you can show a video that can be downloaded from www.mangofoodsafety.org. It illustrates the procedure in detail.]

Step 1.

- Fill the container 25% full with clean water. After placing the lid on it to close it well, turn it with the lid up and shake the bottle vigorously from top to bottom for 30 seconds.
- Empty the contents into the mixing tank.



Triple Wash of Empty Containers

Step 2.

- Refill the container 25% full with clean water and repeat Step 1.
- Empty the contents into the mixing tank.

Step 3.

- Refill the container 25% full with clean water and repeat Step 1 with one difference: the cap should point toward one side and shake the container from right to left.
- Empty the contents into the mixing tank.

Finally, cut and perforate the container so it cannot be reused. Store it until it can be taken to the specialized collection center.



Post-Triple-Wash Processing of Containers

After washing it is necessary to cut and make holes in the containers. The caps also must be made unusable and stored separately.

This will prevent their reuse for another purpose.

Once they are unusable, store them in appropriate containers for handling.

Their final disposal must follow local regulations for hazardous waste.

If you need more details on the disposal of the containers, **ask your supervisor.**



Handling of Surplus Formulation

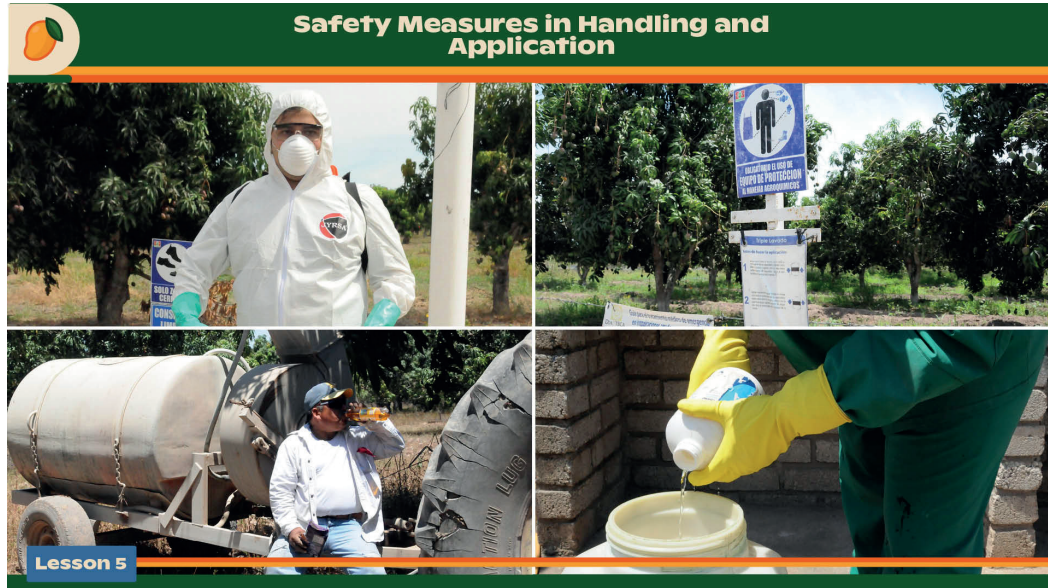
The chemicals prepared for application and that were not used, either because too much mixture was prepared or because they could not be applied in any area for whatever reason are called “surplus formulation.”

The surplus formulation must never be used on the same crop area because excess chemicals can be harmful to the mango and/or consumers.

Nor should it be emptied into sewers, rivers, or water sources because it is harmful to the environment. It is also illegal.

Surplus formulation is sprayed on roads, far away from the areas of application, in a uniform, moderate manner and allowed to dry in contact with the ground.

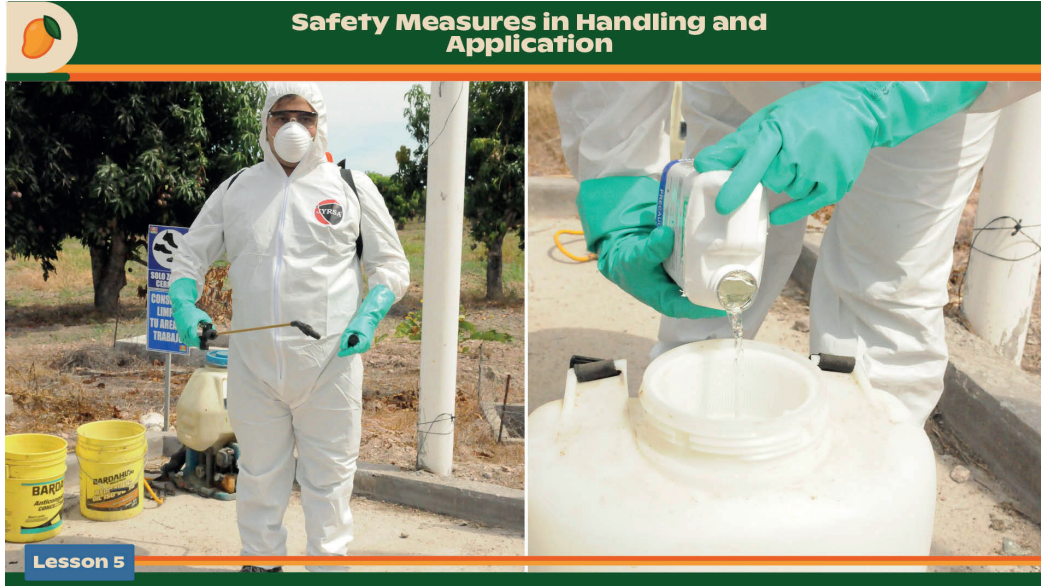
The surplus formulation must be handled with the same care and responsibility as the agrochemicals that are used on the mango trees.



Safety Measures in Handling and Application

We are going to review once again some security measures in the handling and application of agrochemicals:

- Only trained employees can apply the agrochemicals.
- Always use the necessary protective clothing.
- Do not eat, drink, or smoke while you apply the agrochemicals.
- Prevent powdered material from being dispersed into the environment. Empty the contents of the container in a slow, constant manner to reduce the danger of the particles flying into the air and being inhaled.
- Mix the correct amount of agrochemical indicated; do not prepare more product than you are going to use.
- Handle the containers with care to avoid spills.



Safety Measures in Handling and Application

- If you are going to mix two or more agrochemicals, make sure that they are compatible, and there is no risk of producing a dangerous chemical reaction.
- Never put the nozzle of the sprayer in your mouth to clean it or unblock it.
- When your protection is complemented with mechanical device, make sure that the controls are working properly.
- Uses the products only for the purpose for which they were designed and follow the application instructions and dilution on the label.
- Don't let other workers or visitors enter or remain in the field when you apply agrochemicals, especially pesticides.
- Never leave the containers or the application equipment open or neglected.



Safety Measures in Handling and Application

- Pay attention to changes in climate; for example, an increase in the speed or a shift in the wind direction can divert the chemical toward sensitive areas, causing health hazards.
- Make sure that the agrochemical is not close to cables with power because it can act as an electrical conductor, and you could be electrocuted.
- If a spill occurs, keep everyone away until you eliminate the danger by washing or using absorbent material, such as dirt or sand, to absorb the agrochemical.
- The agrochemicals supplied in aerosols or pressurized cylinders have special rules.



Re-Entry Time

“Re-entry time” is the time that must elapse after applying a chemical product before people can enter the treated area.

In practice, this time has many variables, such as the class and toxicity of the product, the climatic conditions and the surface of the treated crop.

If the entrance into an area includes a risk of skin contact, the minimum re-entry time will increase.

If it is necessary to enter a treated area before the time of re-entry, it will be necessary to use appropriate protective clothing according to the chemical used. To give us an idea of safe timing in normal conditions, we can consult the table on page 54.

When entry is forbidden to a treated area, it is important to take the necessary measures to ensure that people know what the situation is. Usually it is sufficient to place signage at the different points of access that warn of the danger.



Harvest Interval

The **time of reentry** and **harvest interval** are two different things.

The **“harvest interval”** is the period between the application of the agrochemical product and the harvesting of a crop intended for consumption.

It is necessary to remain aware to this period of time to avoid a problem with the mangos.



Physical Status of the Areas and Equipment

The equipment that we use in our work not only makes the task easier, it also makes it safer. It is therefore important that all equipment is working properly.

We should pay special attention to the processes of inspection and cleaning of application equipment. The documentation of its preventive maintenance and repair requests are essential to avoid major problems, mistakes, or even accidents.

The facilities where the agrochemicals are handled also follow a series of security protocols and maintenance to help ensure their reliability. That is why it is necessary that they all have the appropriate documentation to ensure optimal functioning.

If at any time you observe any deterioration, either in the area or in the work teams, report it to the supervisor.

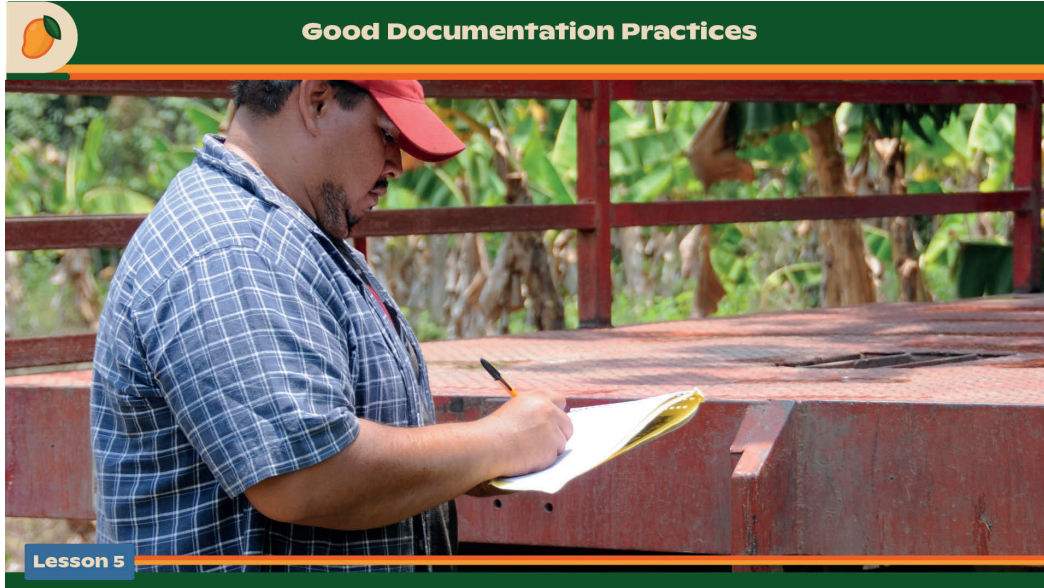


Facilities for the Good Handling of Agrochemicals

For proper handling of agrochemicals, every company must have a minimum infrastructure, which could include one or more items from the following list:

- Storage area for agrochemicals
- Storage area for personal protective equipment (PPE)
- Preparation area for agrochemicals
- Area of disposal for empty containers
- Area of elimination for surplus formulation
- Storage area for application equipment
- Area for cleaning application equipment

Each area has a special and indispensable function for maintaining control of the agrochemicals, from their storage as formulation to application and disposal.



Good Documentation Practices

To have proper control in the handling of agrochemicals, it is necessary to have updated and detailed documentation on the use and handling of these products. These documents could include:

- Inventory of chemical products
- Spraying log
- Equipment calibration
- Equipment cleanliness
- Harvest log
- Handling of empty containers
- Confinement centers
- Training records
- Log book or registration of spill containment
- Use of protective equipment
- Among others



Good Documentation Practices

These records are used to document the detailed history of a farm. If your work includes filling out any record, it is important that you perform this step using the following good documentation practices:

- Fill out records completely and use permanent ink.
- If you make a mistake, do not use correction fluid and do not completely cross out or write over it. Cross out the error with a single line, add your initials, and make the correction next to the error.
- Never falsify information, this practice can have serious consequences for your job and for the company. The falsification of records is a major deviation in a food safety audit.
- Complete each record when you have completed the task. Do not fill out the records in advance nor a long time after having completed the activity.
- If you have any questions about how to fill out any record, ask your supervisor. Do not improvise.



What Have we Learned?

To finish the lesson, we are going to do a brief review of everything we learned: [You can do a summary of each of the following points or review them in the form of questions to participants.]

- What are agrochemicals and how many types are there?
- What do we achieve through the correct and appropriate use of agrochemicals?
- What consequences might the excessive use of agrochemicals have?
- What is the personal protective equipment (PPE) that we should wear to handle agrochemicals and what are its different components and how should we be careful?
- What are application techniques, the importance of knowledge, and the proper use of application equipment?
- The triple-wash technique and the subsequent treatment of containers.
- What are the safety measures in the applications, the “re-entry times,” and the handling of the “surplus formulation”?
- Some actual cases of the uses and handling of agrochemicals.
- The good practices of documentation that must be followed when working with agrochemicals.

Do you have any questions? Thank you for your participation and please do not forget to sign the attendance list.



Agrochemical use	Agrochemical Commonly used in the mango industry	Reentry Time (Hours)*
Fungicides	Copper sulphate	12
	Azoxystrobin (Amistar)	12
	Trifloxystrobin (Tega)	12
	Pyraclostrobin (Headline)	24
	Boscalid + Pyraclostrobin (Cabrio)	3
	Cyprodinil + Fludioxonil (Switch)	12
	Chlorothalonil Mancozeb Copper	24
	<i>Bacillus subtilis</i> (Fungifree)	Once aspersion has dried
	Myclobutanil (Rally)	24
	Tebuconazole (Folicur)	12
	Thiabendazole	12
	Carbendazim	12
	Herbicides	Glyphosate
Pesticides	Buprofezin	24
	Etoxazole	12
	Fenpropathrin	48
	Fenpyroximate	12
	Imidacloprid	12
	Malathion	24
	Methidathion	48
	Pyrethrins	Once aspersion has dried
	Pyridaben	12
	Pyriproxyfen	12
	Spinetoram	24
	Spinosad	4
	Spirodiclofen	12
	Spirotetramat	12
	Thiamethoxam	24
	Zeta-cypermethrin	12
	<i>Beauveria Bassiana</i> (Organic)	Once aspersion has dried
	<i>Metarhizium anisopliae</i> (Organic)	Once aspersion has dried
<i>Isaria fumosorosea</i> (Organic)	Once aspersion has dried	
<i>Verticillium lecan</i> (Organic)	Once aspersion has dried	

* Data obtained from different product's Safety Data Sheets (SDS). This information can vary widely among different commercial products and product concentration. Always follow the instructions in the label or SDS from the product being used in your company. References for this table are found at: www.mangofoodsafety.org/references





Lesson 6.
**Worker Health,
Safety and
Well-Being**



Why Are We Here?

In all companies, the quality of life of its employees is an important part of the workday because that quality of life implies the safety, health, physical, mental, and social status of each of its individuals, which has a positive impact on the productivity of the workers.

In this lesson, you will learn the concepts, procedures, and skills needed to ensure our quality of life and well-being within the areas in which we work.



How Do We Define Well-Being?

A classic way to define well-being is to say that it is the point at which a person is satisfied with their activities and attains the happiness to carry them out.

The well-being of a company is achieved when its workers reach well-being and, with them, their families.

One of the important points for improving the quality of life has to do with safety; many companies in the mango industry seek to ensure that the activities, practices, and the operating methodology in its facilities are safe for their employees.

When the company has satisfied workers, it has committed, safe, happy personnel, integrated in their workforce who have specific goals and willingness to work as a team. All this means a greater competitiveness and benefits for the company and its employees.



Risk Assessment

A risk assessment identifies those elements that can potentially endanger workers' health and well-being. As a result, learning and knowledge are obtained about the areas of opportunity that are there to be resolved.

Certified mango companies have generally done a risk assessment. The objective of this assessment is based on three activities:

1. Identify risks in the work areas and in the different positions to reduce the risks that are under our control.
2. Make changes in the identified activities to reduce the risk of accidents or unsafe working conditions.
3. Measure and follow-up on corrective actions that are in place for safety in the company's different jobs and operations.

If we don't take the workers and operators into account when assessing risks, there is the possibility that it won't be a complete assessment because it is the employees who can better recognize situations and are widely trained to point them out.



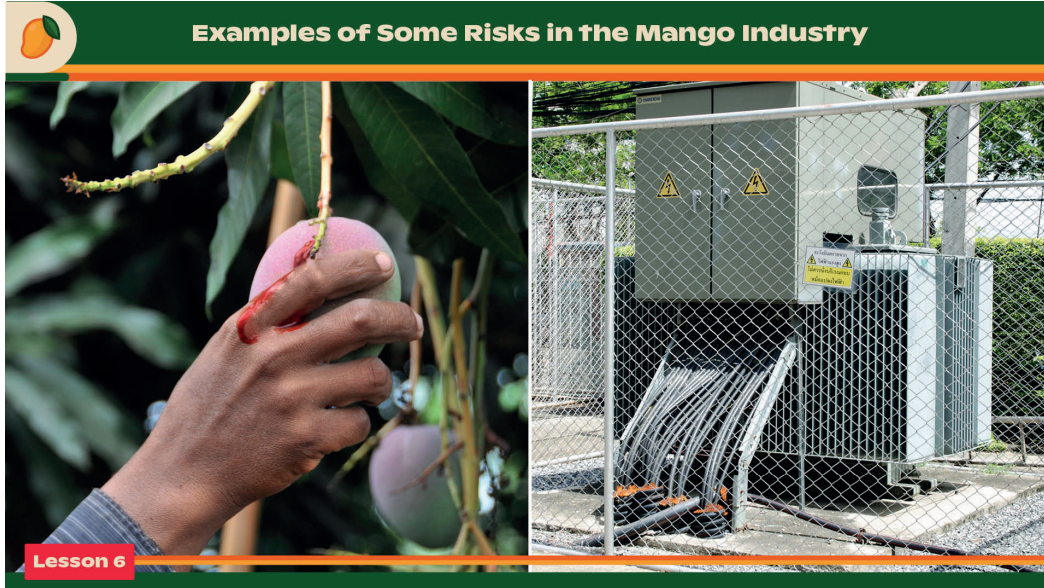
Examples of Some Risks in the Mango Industry

Risk identification requires asking the following:

- a) Is there a source of injury or harm?
- b) Who may be injured or harmed?
- c) How can the injury or harm occur?

One way to facilitate the process is to categorize these risks. For example, they can be categorized by origin: mechanical, electrical, chemical, explosions, among others.

Once identified, it is necessary to establish a control measure and have it running at all times and ensure that employees always follow the safety rules within the company.



Examples of Some Risks in the Mango Industry

These are some examples of common risks that can be found in the mango industry:

1. By exposure to chemicals
2. By poisoning
3. High voltage
4. Burns from sun exposure
5. Light-headedness or fainting due to high temperatures
6. Due to injuries caused by accidents
7. By contact with or running into animals and insects

In this lesson, we will review some of these.



Health and Safety Signs in Workplaces

Signs or visual aids within the industry help give an indication relating to the safety of or ensuring health in a work area. The signs can be in the form of a panel, a color, a lighted sign, an acoustic signal, or a verbal communication.

These can mean:

1. Warning or danger: warns of an imminent risk or danger
2. Obligation: solicit a certain behavior on the part of the employees
3. Emergency: indicates the emergency exits, first aid or rescue devices
4. Prohibition: prohibits a behavior that may cause a hazard.
5. Fire: locates equipment or fire system

It is important to be attentive to all signs or visual aids that are placed inside the company and always follow the instructions.

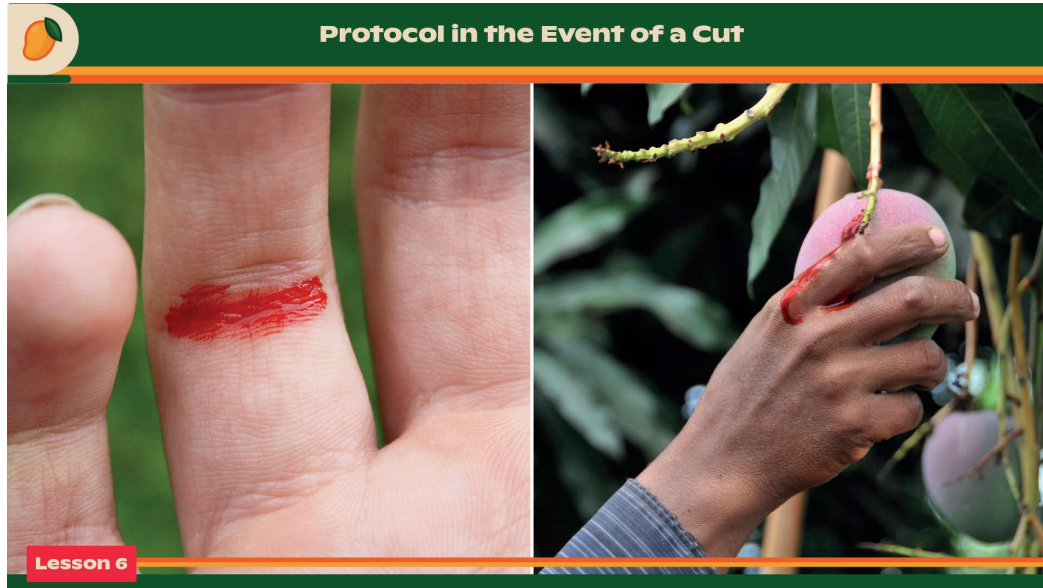


Procedures in Case of Accidents and Emergencies

It is important to have personnel trained to act in case of accidents or emergencies. The education and training of these people depend on the level and type of risk.

For the protocols to work properly, it is essential to establish documentation and procedures for the most common cases in our industry.

Below are some basic procedures in the event of accidents and emergencies. However, it is important to always follow your company's policies and to seek the help of a professional whenever necessary.



Protocol in the Event of a Cut

Wounds and cuts appear to be minor problems; however, bad practice in taking care of them can result in complications that could be avoided. Treating them properly, quickly, and efficiently is of the utmost importance.

The protocol for dealing with this type of case is as follows:

1. Alert your supervisor immediately.
2. Stop the bleeding and wash your hands or the affected area following the correct procedure to prevent an infection in the wound
3. Apply disinfectant on the hands of the person who is helping the employee
4. Wash the wound well with soap and water
5. Apply pressure on the wound with gauze or a clean bandage
6. Apply antibacterial cream or ointment to prevent infection
7. Cover the wound with a bandage or Band-Aid
8. If necessary, refer the patient to a doctor



Protocol in the Event of a Fracture

A bone fracture and its severity can vary from a simple crack to the fragmentation of the bone in several sections.

Treating a fracture properly, quickly, and efficiently is of the utmost importance.

The protocol for dealing with this type of case is as follows:

1. Communicate the situation to the supervisor and immediately contact the medical service or local emergencies.
2. Check the airway of the fractured person to make sure that you can stabilize and treat him/her adequately.
3. Keep the employee immobilized and quiet; do NOT move him/her.
4. Remove rings, bracelets, watches, or whatever is on the limb that is affected and that, in the case of sudden inflammation, can cause more pain or hinder immobilization.



Protocol in the Event of a Fracture

5. If the fracture is exposed (exposure of the bone), it should be treated immediately to prevent infection; do NOT attempt to put the bone back in place.
6. Do not breathe on the wound or insert objects into it. If possible, rinse gently to remove contaminating agents; cover with sterile gauze.
7. Immobilize the fracture, placing a sling or splint on the affected limb.
8. Transport the person to a health center or clinic to receive specialized care.



Prevention of Scorpion Stings or Spider Bites

Bites are small wounds that insects produce by injecting toxins, which can adversely affect a victim. The reaction is directly dependent on the amount of toxin and the response of the affected person. Bites rarely cause death.

In the field, we could be exposed to different animal species, insects, and arachnids such as scorpions and spiders.

There are general recommendations that we all have to follow to avoid contact with insects that could be dangerous and represent a serious problem for the health of the worker. Always take into account the following general recommendations:

- 1.** Always wear closed shoes, preferably work boots. Do not wear sandals or walk barefoot in the farms. Do not wear shorts, either. With these simple steps, your legs will be protected from insect bites.
- 2.** Don't lift rocks, stones, or growths or move weeds without caution. Watch and be attentive of what you are going to touch, even if you are going to move baskets of mangos from one place to another.



Prevention of Scorpion Stings or Spider Bites

3. Avoid crossing through weed areas, where brush and excessive grass grows. Don't sweep aside or remove the weeds with your feet because that could be a place where these animals live and hide.
4. Keep your work place clean. Avoid walking through the trash or in areas where there could be cockroaches because they are the food of some animals.
5. Never leave your clothes or uniforms on the ground; if you pick something up, look it over well before putting it away or putting it on again.
6. If you change footwear for some reason, for example to put on protective boots, check that there are no animals inside the footwear by pounding it a couple of times on the ground.

If you notice any sign of the presence of dangerous insects such as spiders or scorpions, tell your supervisor immediately to correct the conditions.



Protocol in the Event of Scorpion Stings or Spider Bites

The symptoms or manifestations can be local (pain, inflammation in the form of blister; redness and itching of the skin in the area of the bite) or general (local inflammation and intense pain; discoloration of the skin at the site of the bite, numbness of the tongue, cramps, salivation, convulsions, and even respiratory arrest or cardiopulmonary arrest).

The protocol for dealing with this type of case is as follows:

1. Tell your supervisor about the situation and immediately contact the medical service or local emergency service.
2. Keep the employee immobilized and quiet.
3. Try to keep him conscious at all times.
4. To reduce the inflammation and reduce pain, it is necessary to apply ice around the area of the bite.
5. Transport the person to a health center or clinic to receive specialized care.



Prevention of Bee or Wasp Stings

The presence of bees and wasps is always a possibility in the environment in which we work. Here are some recommendations that may help to decrease the chances of attracting them:

- 1.** Do not wear clothing of flashy or bright colors, as these colors attract this type of insect. It is advisable to wear dark colors.
- 2.** Do not use soap, shampoo, or perfumes with strong or penetrating floral or fruit fragrances. This also could attract bees and wasps.
- 3.** Use caution when pruning trees or shrubs or harvesting mangos. If you find a hive, retreat slowly avoiding sudden movements.
- 4.** Remember not to cross paths with these insects; if you see them, avoid them.
- 5.** Never throw stones at them or the hive just for fun or try to eliminate the beehive; this could prove counterproductive.
- 6.** If you find a swarm in motion, seek refuge in an enclosed place such as a cellar, bathroom, or auto and wait until it moves away from the area.

The recommendations are simple to follow. Remember: if you see a hive, bees, or wasps near your workplace let your supervisor know immediately.



Protocol in the Event of Bee or Wasp Stings

Lesson 6

Protocol in the Event of Bee or Wasp Stings

Bees or wasps stings could happen and should be taken seriously. They may even cause death to some people who have an anaphylactic reaction to their venom. Let's review the basic care steps for this type of events:

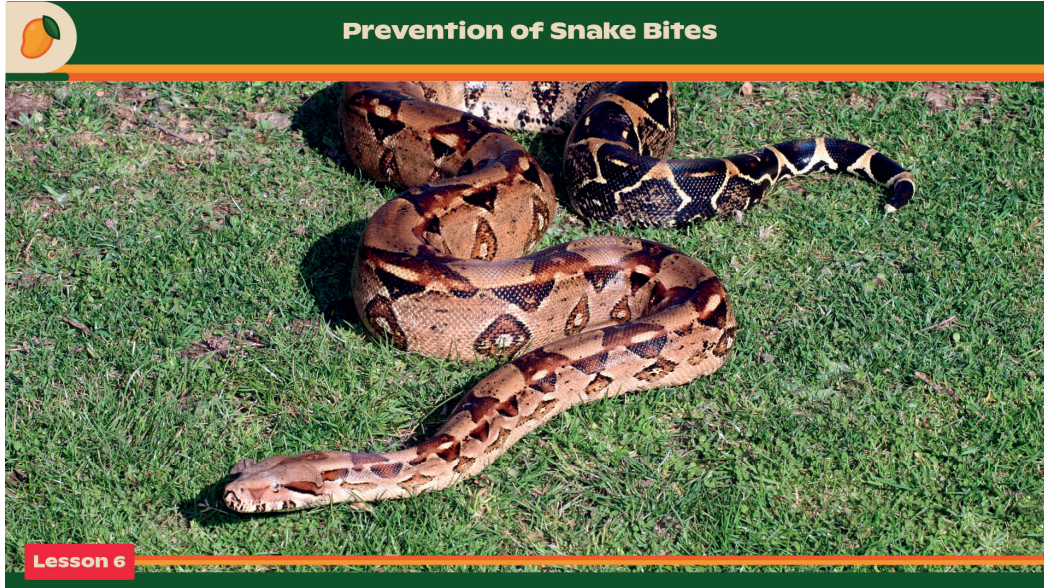
1. Alert your supervisor immediately.
2. Keep the employee calm and immobile.
3. In the shortest possible time, verify the number of bites to determine the severity.
4. If possible remove the stinger; this is done by scraping the stinger carefully in the same direction that it penetrated.
5. To reduce inflammation and pain, it may be necessary to apply ice around the area of the bite.
6. Transport the person to a health center or clinic to receive specialized care.



Prevention of Snake Bites

Snakes prefer to escape and avoid contact with human beings. However, if they feel threatened they resort to attack as a defense mechanism. The following recommendations will help you avoid crossing paths with any snakes and to avoid bites:

- 1.** Always wear closed shoes, preferably work boots. Do not wear sandals or walk barefoot in the farms.
- 2.** Inspect the area where you will be working. Do not put your hands or feet in hollow trees, under stones, or in weeds where you cannot know what you may find there.
- 3.** Keep the rodent population low on the farms and in the farms; these animals are the snakes' favorite prey, so by limiting their presence, we reduce the risk of an event with snakes.
- 4.** If you encounter a snake in the field, do not bother it, walk away slowly, and do not try to catch it; tell your supervisor about its presence and the area where you found it, so that a professional can handle the situation.



Prevention of Snake Bites

5. Snakes can bite even when they are dead; if you find a dead snake, do not handle it with your hand; use a long rod to get rid of the corpse.
6. Always turn on the light before entering a cellar, warehouse, or dark room, and look where you walk when entering; these places are often the preferred living quarters for snakes.

The most important thing is to avoid any action that provokes a snake attack.

We can live together in the field with animals, but, with knowledge and training, the risk is much lower. Remember that you must follow the instructions to make your work place a safe place for everyone!



Protocol in the Event of a Snake Bite

Before administering first aid, you must identify the type of snake that caused the bite to know the treatment you will need at the health center or clinic. The bite of a nonvenomous snake presents a series of, parallel, superficial bleeding points in a row and without swelling or pain.

In contrast, a bite from a venomous snake drastically reduces the ability to think and respond rapidly, making the speed of medical attention the difference between life and death. In the event of a bite from a venomous snake, the severity of poisoning depends on:

1. Age and size of the victim
2. General health conditions during the event
3. Species and the toxicity of the snake
4. Status of the snake's fangs and venomous glands
5. Amount of venom injected
6. Time that passes between the accident and appropriate medical attention



Protocol in the Event of a Snake Bite

The protocol for dealing with this type of case is as follows:

- 1.** Notify the supervisor and immediately contact the facility doctor or your local emergency center.
- 2.** Place the victim at rest; try to get him/her to stay calm and breathe properly.
- 3.** Decrease all physical activity: excitement accelerates circulation and increases the absorption of the venom.
- 4.** Remove jewelry and all objects that can compromise proper circulation.
- 5.** If possible, wash the affected area with plenty of soap and water, without cutting.
- 6.** Avoid common remedies as applying ice and cross cuts on the bite.
- 7.** If the person will not receive specialized medical care within 30 minutes, consider sucking the wound with sufficient knowledge of the technique, trying to not complicate the emergency situation; this practice must be done by knowledgeable personnel.
- 8.** Be alert to keep the patient from entering a state of shock.
- 9.** Transport the person to a health center or clinic to receive specialized care.



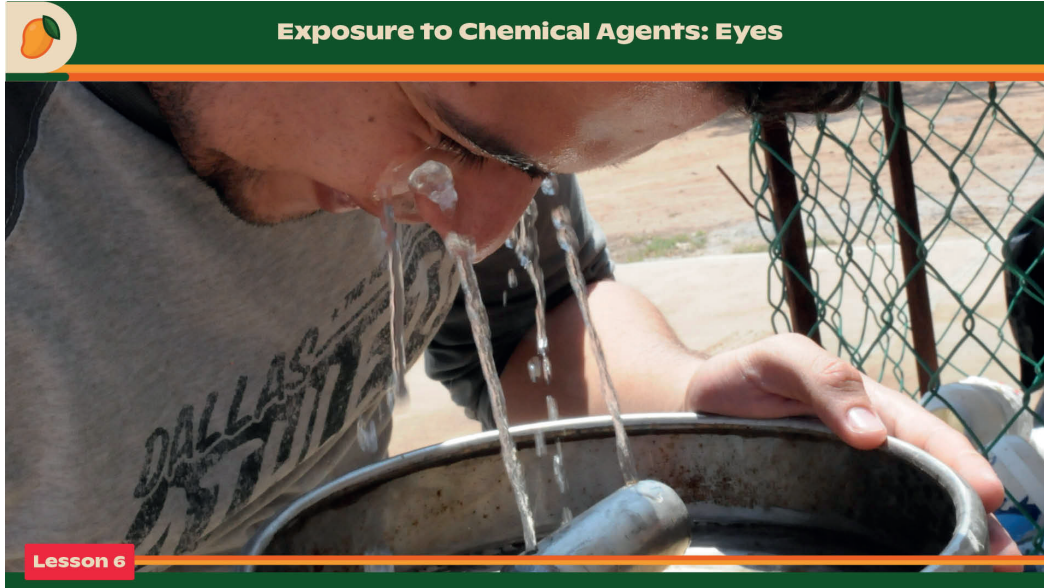
Protocol in the Event of Accident by Exposure to Chemical Agents

Chemicals can be dangerous because of their toxic, corrosive, or reagents effects. Always consider the risk when there is more than one chemical agent in storage.

There are four main ways of being poisoned with a chemical substance or agent. Each of them represents a health risk.

- Airborne: nose, mouth, lungs
- Digestive track: mouth, stomach, intestines
- Via parenteral route: a wound or sor
- Via the skin: through the skin

Never try to neutralize the chemical substance with lemon juice, vinegar, or use any self-prescribed antidote or homemade remedy, unless told to do so by expert staff or a doctor.



Exposure to Chemical Agents: Eyes

The protocol to treat exposure to chemicals in the eyes is:

1. Tell your supervisor about the situation and immediately contact the facility doctor, clinic, or local health center.
2. Identify the chemical contaminant agent; if possible, review the technical data sheet for the chemical in question.
3. Wash both eyes with plenty of clean water, if possible with a direct stream or with an eyewash.
4. Place the person face up and make the water flow from the base of the nose and toward the sides during at least 15 minutes.
5. Keep the eyes of the employee open the whole time.
6. Stretch the eyelids toward the outside while moving the eyes, continuously up, down, and to the sides so the water penetrates beneath them and cleans better.
7. Transport the person to a health center or clinic to receive specialized care.



Exposure to Chemical Agents: Skin

The protocol to treat exposure to chemicals on the skin is:

1. Tell your supervisor about the situation and immediately contact the facility doctor, clinic or local health center.
2. Identify the contaminant agent; if possible, review the technical data sheet for the chemical in question.
3. Put on protective clothing against chemical products before providing care; this way you will be protected from possible contamination.
4. Remove the affected employee from the source of contamination.
5. Immediately remove the clothing of the employee in the affected area.
6. If the technical data sheet or the safety sheet suggests it, apply water to the affected area, preferably with a shower or jet of water that counteracts the chemical's effect; do this only if indicated on the technical sheet.
7. Transport the person to a health center or clinic to receive specialized care.



Exposure to Chemical Agents: By Inhalation

The protocol to treat exposure to chemicals by inhalation is:

1. Notify the supervisor and immediately contact the facility doctor or your local emergency center.
2. Identify the substance or chemical; if possible, review the technical data sheet for the chemical product in question; check that the person really has been poisoned; some symptoms are chemical-smelling breath, burns around the mouth, difficulty breathing, vomiting, or unusual odors.
3. Do NOT give water or any other liquid if the ingested substance is unknown.
4. Never induce vomiting unless told to do so by your doctor or a qualified person within your company's safety and hygiene commission.
5. Follow the first-aid instructions that appear on the label and/or on the safety sheet.
6. If the toxic agent has splashed on the person's clothes, remove and wash them with abundant water.
7. If the victim is conscious and his/her condition permits it, have him/her recline and stay sideways; if he/she is unconscious, place the head to the side and extend the tongue outward.
8. Transport the person to a health center or clinic to receive specialized care.



Exposure to Chemical Agents: By Ingestion

The protocol to treat exposure to chemicals by ingestion is:

1. Notify the supervisor and immediately contact the facility doctor or your local emergency center.
2. Identify the substance or chemical; if possible, review the technical data sheet for the chemical product in question; check that the person really has been poisoned; some symptoms are chemical-smelling breath, burns around the mouth, difficulty breathing, vomiting, or unusual odors.
3. Do NOT give water or any other liquid if the ingested substance is unknown
4. Never induce vomiting unless told to do so by your doctor or a qualified person within your company's safety and hygiene commission.
5. Follow the first-aid instructions that appear on the label and/or on the safety sheet
6. If the toxic agent has splashed on the person's clothes, remove and wash them with abundant water.
7. If the victim is conscious and their condition permits it, have him/her recline and stay sideways; if is unconscious, place the head to the side and extend the tongue outward.
8. Transport the person to a health center or clinic to receive specialized care.



Exposure to Chemical Agents: Cuts and Wounds

In the case of a possible dermal or cutaneous exposure to chemicals, the protocol indicates the following steps:

- 1.** Notify the supervisor and immediately contact the facility doctor or your local emergency center.
- 2.** Follow the first-aid instructions that appear on the label and/or on the safety sheet.
- 3.** Wash the affected area gently and adequately with a neutral soap and water.
- 4.** To have total certainty that there will not be a secondary reaction, cover the wound with gauze or a sterilized bandage.
- 5.** If the bleeding persists or there is extreme pain, transport the person to the clinic or health center to receive specialized care for these cases.



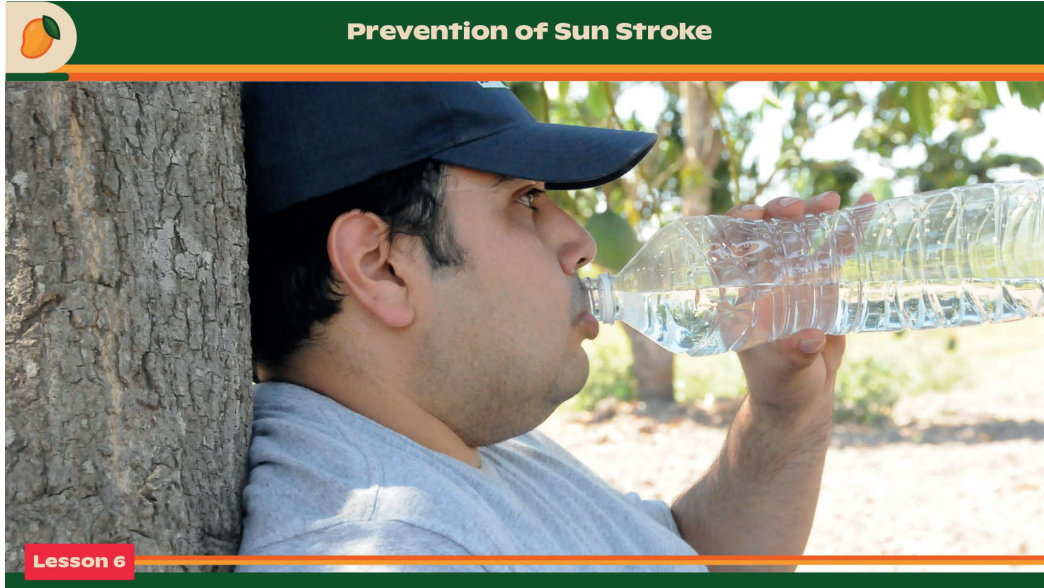
Sun Stroke

Sun stroke, also known as “heat stroke,” is a condition that can be fatal and is produced when the body cannot control its internal temperature due to prolonged exposure to the sun and conditions of very high humidity.

In the mango industry, we work outside in high-humidity conditions for long periods of time. These conditions affect the body’s ability to cool naturally through sweat. If you do not take simple precautions, heat stroke or overheating could occur and make the body temperature increase up to 40 degrees in a matter of a few minutes, which can cause a sudden collapse. This is critical because, in extreme cases, it could lead to brain damage.

Symptoms:

- Redness of the skin, first-degree burn, painful to the touch
- Rapid pulse, shallow and rapid breathing
- Fever and headache
- Second-degree burns (blisters)



Prevention of Sun Stroke

Prevent sun stroke by taking the following precautions:

1. Stay hydrated by drinking abundant quantities of water.
2. Wear light, loose clothing that is made of materials such as cotton, as these materials allow perspiration and body cooling.
3. To the extent possible, stay in cooler, less hot places and in the shade; avoid overexposure to the sun, i.e., if it is not necessary do not be directly in the sun.

Together we can avoid sun stroke events in the farm if we know how to prevent them. Do your part to have a safer working environment.



Protocol in the Event of a Sun Stroke

Regardless of the severity of the sun stroke, treatment is the same, varying only on the urgency with which you must take the victim to the doctor.

1. Place the person in a cool place, away from contact with the rays of the sun on their back with the head elevated.
2. Apply cool, wet compresses to the forehead and face; replace them as they become warm; apply compresses to the whole body also if the victim has a fever.
3. If there are no burns in the extremities from the sun stroke, massage the arms and legs.
4. Elevate the victim's feet, untie their shoes and place him/her where there is a breeze.
5. The victim should drink water at room temperature on a regular basis; and must not drink frozen liquids or alcoholic beverages.
6. In the case that the event so warrants, transport the victim to the clinic or health center to receive specialized care for these cases.



High-Voltage Electric Shock

Unfortunately, injury due to electric shocks occur in areas where employees can accidentally receive electric shocks.

The passage of an electric current through the body causes two immediate effects:

- A thermal effect, which produces burns of varying degrees and intensities
- Over stimulation of the nervous system or electrocution

It must be understood that, if you want to help another who is receiving an electric shock at the time, you should NEVER directly touch the victim because the electricity will run through your body, making you, too, a victim of the event.



Prevention of High-Voltage Electric Shock

The use of electrical equipment represents a risk of accidental electrical shock. It is up to us to adopt a series of preventative safety measures to significantly reduce the risk of electrical shock and to prevent a dangerous accident.

Preventive safety measures when handling electrical equipment:

1. Do not overload electrical installations.
2. Verify that the equipment is in good condition before use.
3. Always turn off the equipment before disconnecting it.
4. If a piece of equipment breaks down, immediately inform the supervisor and the maintenance department; do NOT fix it yourself.
5. Do not use any electrical equipment when the equipment, you or the grounds are wet or there is any amount of moisture in the area.
6. The equipment must be located in a dry place and must never get wet.
7. NEVER handle or try to repair electrical objects or installations: call for a professional.
8. Any repair work and calibration of electrical equipment must be carried out by trained personnel.

Let's take care of our well-being by following these recommendations to the letter. Remember that our family is waiting for us at home!



Protocol in the Event of High-Voltage Electric Shock

The protocol in the event of electrical shock indicates the following recommendations:

1. Notify the supervisor and immediately contact the facility doctor or your local emergency center.
2. During the communication of the event, provide clear and concise information about the place and the causes of the electric shock, as well as all the details that may be important.
3. Before assisting the victim in any way, make sure you are not wearing wet garments, do not step in puddles or on wet ground.
4. Ensure that the patient is not in contact with an electrical power source; if is in contact, find a way to cut the power; look for a switch or a cable; avoid touching the patient until there is no longer any danger.
5. If there is no way to cut the power, use an object of insulating material (wood, a tube with insulation) to separate the person from the contact
6. If it is a high-voltage line, do not come any closer than six meters, as long as there is electrical power.
7. In the case that the event so warrants, transport the victim to the clinic or health center to receive specialized care for these cases.



What Have We Learned?

To finish the lesson, we are going to do a brief review of everything we learned:
[You can do a summary of each of the following points or review them in the form of questions to participants.]

- The importance of health and safety in our work
- What is the definition of well-being and what are its benefits in our daily lives?
- What are the risks in our work place and how can we evaluate them?
- We learned how to address accidents and emergencies:
 1. Cuts
 2. Fractures
 3. Scorpion stings or spider bites
 4. Wasp or bee sting



What Have We Learned?

5. Snake bite
6. Exposure to chemical agents
7. Sun stroke
8. Electric shock
9. Poisoning

This is the end of our training session on worker health, safety, and wellbeing.

Do you have any questions?

Thank you for participating, please remember to sign the attendance sheet.



