Unit 6

Maintain Health and Safety at the Workplace

Different workplaces have different levels of challenges especially in terms of physical hazards inherent in the nature of work or the workplace. Workplace accidents put a heavy, harmful, unfortunate, and counter-productive impact on workers, their co-workers, and their families. They suffer pain, disability, stress, and in some cases even loss of employment. Hazard is defined as a dangerous condition or event that portends or has the potential to cause injury, threaten life, damage the property, etc. Hazards in agriculture include mechanical hazards, ergonomic hazards, chemical hazards, accidents, hazards related to the occupancy of confined places, occupational diseases, and various other hazards arising from associated land, water and air. All efforts are necessary for personal safety of the workers and the users of agrochemicals and farm machinery, at all times, on ethical, health, and professional grounds.

Accidents may occur while being at work in the field, transporting animals, and crops, or by falling, slipping, tripping, drowning, machinery hits or by adopting bad or unhealthy work practices. Hazards caused by human factors, such as those caused by awkward postures, and damage to muscles and tendons, mainly due to

poorly designed tools, are of common occurrence at agricultural farms. Hazards related to confined spaces (warehouses, wells, manholes) are of great concern to the safety of workmen.

This unit will help you learn about various health and physical hazards faced by farm workers and the safe work procedures that ought to be adopted for reducing the persisting risks and preventing the occurrence of accidents.

Notes

Session 1: Safe Use of Agrochemicals

Harmful Effects of Agrochemicals

Chemical hazards in agriculture are related to the dangerous pesticides being used, as well as in the maintenance of plant protection equipment and spraying of pesticides. It has been reported by WHO that there are three million cases of agrochemical poisoning with up to 20,000 reported (unintentional) deaths in a year in developing nations. The term 'pesticides' is indeed a non-specific and broad term, and includes as diverse a group of chemicals as herbicides, fungicides, insecticides, nematicides, rodenticides, molluscicides, acaricides, plant growth regulators, and chemical fertilisers commonly used in agriculture.

Some of these pesticides can be harmless, while others can cause severe to very severe damage to the central nervous system, kidney, or increase the risk of cancer. Initial symptoms may be variable and misleading such as muscular weakness, headache, dizziness, and nausea. Continuous use of certain agrochemicals, especially pesticides with which our body comes in contact or is exposed to, results in long term damage to organs like kidney, liver, or the nervous and the endocrinal system inside our body.

Pesticides must not be found in food products but may be present due to the following reasons:

- indiscriminate and extensive use of chemical pesticides.

- non-observance of prescribed safety norms
- discriminate or indiscriminate sourcing leading to the use of unsafe or sub-standard pesticides.
- wrong advice and supply of pesticides to the farmers by vendors of agrochemicals
- leakage or lack of care in disposal of agrochemicals or its waste by-products by manufacturers
- unclean or improper maintenance of the premises of agrochemical manufacturing area.
- unclean or improper maintenance of the premises of agrochemical storage and preparation area by farmers.
- not using appropriate apparels necessary for the personal safety of the field operators and other such factors.

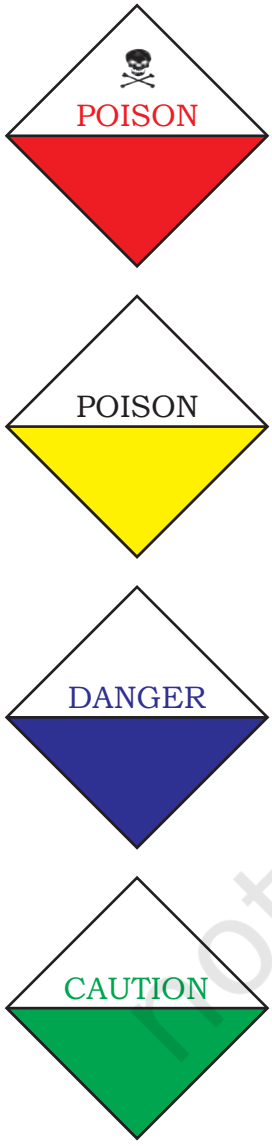

Fig. 6.1: Labels of colours showing toxicity of pesticide

Methods of Safe Use of Pesticides

Use of safety procedures

Individuals who handle and use pesticides should review safety procedures on a regular basis. These are generally exhibited on the pesticide container labels or in the literature provided with the market product.
Some important do's and don'ts:

- do not ignore, read, and follow the label information and directions.
- while working with hazardous products, do wear a clean personal protective equipment (PPE).
- remove your contact lenses before handling the pesticides.
- wash the hands after you have handled or have had a contact with a pesticide, especially and more so, before eating, drinking, smoking, or using the toilet.
- remove and wash off the contaminated clothing and any spilled pesticide on a person.
- shower and wash the hair and clean the underside of fingernails at the end of each day.
- take proper care with respect to the pesticide as per toxicity labels marked on the pesticide packing.

Selecting and buying right pesticides and in required quantity

Safety begins with choosing and buying a pesticide as per one's need only. Check out the following before buying a pesticide:

- Label shows the pesticide as approved for the intended use.
- The pesticide can be used in an integrated pest management programme.
- Purchase just as much as is needed by carefully calculating on the basis of cropped or storage area to be covered.
- Read and follow the instructions that come with the agrochemical.

Protecting oneself while using the equipment

Several articles of personal dressing or covering are essential while using hazardous chemicals or working with powered machines, viz., rubber gloves, respiratory guards or filters, full overalls but not loose fitting (with missing buttons or zips), etc.

Fig. 6.2: Safety apparel for preparing spray solutions

Safety protocol for mixing or applying a pesticide

- Pesticides should be mixed and used at prescribed or recommended rates.
- Use pesticides under favourable weather conditions only; avoid bad weather.
- Don't use muddy or unclean water for mixing with pesticide and for personal clean up.
- Whenever handling the pesticides, clean water tanks should be kept nearby.
- Never smoke or eat in between or while mixing or applying pesticides.
- Some pesticide products are flammable. Take care against fire breaking out due to smoking or any other use of matchsticks or fireplace.

- Read and follow the instructions on the user guide or label properly.
- Use correct pesticide for the pest or disease for which it is meant.

Use the recommended dose and quantity only

- For preparing the aqueous solution of the pesticide, use outdoor open space.
- Use the recommended amounts and dilutions strictly.
- Do not prepare more than the required amounts for field application on a given day only; never try to store for possible future use.

During application of pesticide

Fig. 6.3: Caution signage while pesticide spraying

Fig. 6.4: Signage for pesticide applied at field

- Don't undertake the task of pesticide spraying on a windy day.
- Position yourself in a way that the wind drift blows pesticide spray (or dust) away from your face.
- Before indoor spraying, close the doors and windows of hall or home.
- During the spray operation, keep the nozzle close to the target plants to avoid waste of solution caused by drifting.
- Spraying excess quantity will be wasteful and leave residual harmful amounts on the produce, which if consumed, will be detrimental to the health of the consumer.

While preparing the spray solution of pesticide, try to stay away from an open well used to draw drinking water.

Cleaning and Disposal of Empty Pesticide Containers

Pesticide containers should be cleaned when emptied, removing the pesticide residues before they dry. Keep the following points in mind while emptying a pesticide container:

- For liquids, transfer the pesticide into a spray tank or mixing tank. Let the last drop

get emptied. Use a strong nozzle to triple rinse or pressure rinse the metal, plastic, or glass containers, unless otherwise instructed on the label. get

- Likewise, for solids, gently shake the bag into tank or hopper until no loose foggy dust is visible. Gently rinse the bags once if possible, unless otherwise instructed on the label.

Pesticide Disposal

Disposal of concentrated pesticide

Planning your pesticide purchases will minimise the excess pesticide concentrates left over after an application or use in one season. Review the records of prior applications. Use the pesticide that is on hand before buying more. Contact the pesticide manufacturer or a local vendor to be sure that the old stocks are still effective.

It is best to prepare just the right quantity of pesticide concentrate or solution to avoid disposal problems. It is safer to prepare less quantity rather than preparing excess, which may have to be disposed off unsafely.

Unopened containers may sometimes be returned to the manufacturer or local dealer. Applicators can also contact the pesticide regulatory body for advice on proper disposal of unused pesticides. If excess quantity is left in storage, either use it yourself or let a neighbouring farmer use it, if possible.

Don't stockpile — buy and use as per need. If you have to store the pesticides, keep it out of reach of children. Do lock all the pesticides in a cabinet in a well-ventilated utility area or farm shed.

Disposal of surplus prepared mixture

- 'Prevention is better than cure' has to be the guiding principle for pesticide use.
- accurately measure the area to be treated.
- confirm the application rates of agrochemicals.
- calibrate the application equipment.
- Use all the solution or dispose it off safely.

First-Aid, Treatment and Safety Equipment

Accidents might happen in spite of all the precautions and care. It is essential for students to know about the immediate medical aid for a chemical accident, and to learn about the safety devices needed to prevent accidents.

Chemical poisoning and first-aid measures

Chemical poisoning may result from continuous contact or absorption through skin, inhalation of toxic vapour or swallowing it directly. Common symptoms of pesticide poisoning are headache, nausea, vomiting, tremors, convulsion, and difficulty in respiration. A first-aid kit with necessary antidotes should be available at the work site for each type of poisoning. Antidotes are always mentioned on the pesticide containers.

Treatment for simple chemical poisoning

Swallowed poison

If the poison has been swallowed, induce vomiting immediately. Mustard oil or table salt in a glass of warm water is good for this purpose. Touching the throat internally with finger will also induce vomiting. Vomiting process should be continued till a clear liquid starts coming out of the stomach. If the patient goes into convulsions or in unconscious state, vomiting should be induced. If the poison is due to ingestion of mercury compounds, egg white and milk should be given first, and then vomiting should be induced. At the end of inducing vomiting, soothing substances like raw egg white (mixed with water), butter, or cream milk must be given.

(i) Skin contamination

Contaminated clothes may at once be removed. Contaminated skin should be washed with soap and water and also flushed with plenty of water to reduce the extent of injury.

(ii) Eye poisoning

Eyes of the victim may be washed with plenty of water, keeping the eyelids open. A quick decisive action is

desirable as delay of a few seconds may greatly increase the extent of the injury. Refer to an eye doctor immediately.

(iii) Inhaled poison

The victim of inhaled poison must be immediately exposed to an open area with fresh air. Keep the patient quiet as far as possible. Provide a blanket to avoid chilling. If breathing stops, artificial respiration technique through mouth may be used.

Safety and protective devices

Protective and safety devices will minimise the chances of a major accident. The protective and safety equipment essentially include a gas mask, hand gloves, shoes, eye shields, headgear, protective clothing, respiratory devices, etc.

Gas mask

It is a device to protect the eyes and respiratory tract from toxic gases, and aerosols. It gives clean air to the operator by removing contamination from the ambient air by using a filter or bed of absorbent material.

Hand gloves

Always use rubberised waterproof gloves, not ones made of leather, cotton, or any fluid-absorbing material.

Fig. 6.5: Hand-gloves and headgear

Shoes

The shoes made of rubber or any synthetic waterproof material are used instead of leather or canvas shoes.

Fig. 6.6: Protective clothing

Eye shields

These must be worn to prevent eye poisoning.

Protective clothing

The skin should be protected by wearing an apron while working with treated crops. Wash clothing before reuse.

Health and safety awareness in the workplace

- Encourage seniors to keep an eye on those working at the workplace.
- Use charts and visuals to demonstrate commitment to health and safety.

- Encourage safe work practices while discouraging unsafe work practices.
- Even at the cost of repetition, communicate that safety is of prime importance while at work.
- Those new to undertaking spray or pesticide application, must be supervised or advised to report immediately about any adverse development concerning the health of the operator.
- Respond and act promptly to all health and safety concerns.
- Set an example in the use of all preventive and protective materials and practices.
- Keep young trainees away from operational area, or supervise them personally to ensure that they do not come close to a working machinery or handling devices and equipment which they are not yet trained to use.

Amenities and environment

- Train all workers rotationally in the use of first aid equipment and provide first-aid kits at easily accessible points.
- Insist on first-aid training for all the field workers.
- There should be free access to washroom and toilet facilities with running water or stored clean water.
- There should be free access to potable, clean, and cool drinking water.
- As far as possible, take steps to prevent the entry of poisonous creatures like scorpions, snakes, leeches, etc.
- Don't keep flammable materials in large quantities or in easily approachable or accessible areas prone to fire hazard.

Emergency response

- Train a task force for emergency response action for the workplace (for example, snakebite, fire, confined space entry, heat stress, or chemical spill).
- Keep safety awareness level of workers high at all times.
- Maintain emergency response equipment.

Manual tasks for personal safety

- Use appropriate restraint systems when and where required.
- Take care to avoid crush injuries to hands.
- Use aids to lift or move down the injured animals when and where possible.
- Try and minimise the risk of slips, trips and falls; provide non-slip flooring.

Practical Exercise

Activity 1

Demonstration of safety devices and measures to be followed

Material Required

First-aid kit, gas mask, protective clothing, eye shields, hand gloves, shoes, and pictorial charts

Procedure

- Identify the different types of protective devices used while handling and applying the chemicals.
- Understand their use through pictorial charts.
- Identify and understand about each item and its uses.
- Discuss the different types of chemical poisoning and its immediate symptoms.
- Demonstrate the use of different protective devices.
- Prepare a chart showing different protective devices and their use.

Check Your Progress

A. Fill in the Blanks

1. To induce vomiting, _____ can be used.
2. Contaminated skin must be _____.
3. To protect eyes and respiratory tract from toxic gases, _____ is used.
4. Hand gloves made up of _____ are used to handle chemicals.
5. For inhaled poison, first-aid can be_____.

B. Multiple Choice Questions

1. Common symptoms of pesticide poisoning are:
   (a) headache (b) vomiting and nausea
   (c) difficulty in respiration (d) All of these

2. To prevent hazards at working place, availability of following materials should be ensured:
   (a) SDS
   (b) First-aid kits
   (c) Protective clothing
   (d) All of these
3. Emergency services comprise _____.
   (a) Ambulance
   (b) Fire brigade
   (c) Both (a) and (b)
   (d) None of these
4. Potential dangerous creatures around house and office buildings include _____ .
   (a) lizards
   (b) snakes
   (c) spiders and scorpions
   (d) All of these
5. What safety measures are required during the application of pesticides to the crop?
   (a) Mixing the correct quantity of pesticide and clean water, and spraying during evening time
   (b) Use of any type of nozzle and spray mixture
   (c) Spraying of insecticides with flat nozzle against the direction of wind
   (d) Spraying at any time during the day
6. What safe pesticide handling practices are required to be followed by the farmers?
   (a) Wearing clean personal protective equipment (PPE)
   (b) Wash hands with clean water before doing any activity which involves food intake or use of area around mouth, eyes, nostrils, etc.
   (c) If an insecticide or its solution happens to fall on the clothing or body of an individual, give a proper wash to remove the pesticide completely.
   (d) All of the above

C. Subjective Questions

1. What are the first-aid treatment measures for chemical poisoning?

   _____
   _____
   _____

2. What protective devices are meant for protection in the agricultural field?

   _____
   _____
   _____

3. Define agro-chemicals.

_____

_____

_____

4. Discuss the various harmful effects of agro-chemicals.

_____

_____

_____

D. Match the Columns

A	B
1. Eye	(a) Rubber
2. Shoe	(b) Shield
3. Protective clothes	(c) Apron

SESSION 2: SAFE USE OF AGRICULTURAL MACHINERY

Agricultural field operations today are dependent on various agricultural machinery, tools and equipment. Use of machinery demands great care with all the necessary safeguards.

The accidents associated with agricultural machineries are caused due to the following reasons:

- lack of adequate or proper training to operators
- poor maintenance of tools and machinery
- using a machine that is not right or suitable for the task at hand
- failure in following proper norms of a safe system of work
- missing or defective safety devices or machine guards, thus exposing the workers to accidents
- unsafe methods for clearing blockages on the premise

Checking the Tools and Machinery Before Use

Before starting to work with a tool or machinery, one must make sure that it is in a good working condition and safe to use. While specific needs would vary with

the machine to be used, basic checks must always be adopted and exercised:

- Check the operator manual of the machine for pre-operative instructions and follow them as advised.
- Particular attention is warranted to items like brakes, wheels, moving parts of machine (if openly visible) and tires of tractors or vehicles.
- Make sure that the guards and protective covers are securely positioned so that these would not come out loose.
- Promptly repair or replace the defective or damaged parts of machine, if any.
- Stopping devices should be functioning correctly, for example, brakes, emergency stops (electric switches), etc.
- While coupling, engaging or attaching equipment or a part with the machines, make sure that the coupling or attachment is properly fit and is of appropriate size or specification and is not loose. Don't use wrong or makeshift coupling devices and pieces.
- Vehicles and moving machines must have clear rear view mirrors along with fit, fine and properly working reversing aids.
- If the guards over moving parts of a machine are missing, get them fitted out and properly covered before using the machine.

Daily or Periodic Mandatory Inspection for the Use of Machinery

1. Check water, fuel, fan belts, etc.
2. Inspect the hydraulic lines for kinks, cracks and general wear and tear.
3. Once the engine is running, check hand and air brakes, this ensures that the brakes will hold while loading.
4. Inspect the cracks in the metal which may cause equipment to break or the parts come off unexpectedly.
5. Keep a safe distance from the equipment when loading or unloading.

6. Take care if there are any overhead power lines, particularly during loading and offloading, or while lift-removing of the produce or materials.
7. Do discuss any unsafe actions that come to the notice of supervisors so that preventive measures can be taken.

Guidelines to avoid accidents and enhance safety while working with harvesting and threshing machinery

- Familiarise yourself with safety risks and measures to overcome the same.
- Harvesting and threshing machines are most prone to debilitating accidents, *viz.*, crushing, cutting, seizing of body parts, especially hands, feet and trunk. Caution the operators accordingly.
- During field operations with moving vehicles, machinery with moving parts, handling the moving part of a machine, always ensure to wear tight clothing and hair cover to avoid entanglement.
- Never clean, maintain, adjust or clear jams when the machine is on.
- Stay clear of outlets, discharges, and all moving parts of the machine.
- If an equipment breaks down, don't just improvise it, get it repaired.
- Avoid coming close to the moving parts of a powered machine
- Never leave a machine with the engine running.
- Don't let children come near a machine while at work.
- Don't refuel a machine with engine running.
- Don't let flammable articles or substances (like fuel, straw, etc.) close to the working area or machine in operation.
- Do not oil, grease, or adjust the machine during operation. Wait for the engine and moving parts to come to a full stop before doing this. Remember, the feeding area of a thresher is the most dangerous.

NOTES

Do not let your hand or a loose sleeve of shirt enter the feeding area of a thresher.

- Completely avoid working on a petrol or diesel driven machine in a closed shed or garage. Exhaust fumes are dangerous for your health.

Protective Measures during Operating Machinery

Use of protective clothing is an extra measure of protection. All workers operating the machines must wear protective clothing or personal protective equipment as a protection against accident or hazards. Also, make sure that the protective dress is safe and body fitting (not loose or with loose ends). Features of protective dress and equipment:

- good fit, appropriate, and clean or well maintained.
- safe and preventive storage to avoid damage, cuts and insect infestation
- no rough edges
- overall body coverage using overalls, aprons, vests, socks, and gloves
- prevent noise pollution while at work.
- hard hats are always desirable for head protection.
- make sure protective clothing is available for different parts of the body.
- clothes must be kept clean, fully functional, and sanitised.

Practical Exercise

Activity 1

Demonstrate general inspection for the use of machinery.

Material required

Different types of equipment, user's guide, pen and notebook

Procedure

- Identify and select the machinery.
- Check the different parts of machinery.
- Identify the open moving parts or feeding parts which pose hazard.
- Check assembling of each part of the equipment.
- Demonstrate the use of machinery after inspection.

Check Your Progress

A. Fill in the Blanks

1. During harvesting, ensure that the operators wear _____, and secure their_____to avoid entanglement.
2. Nobody should be allowed to _____ onto the machine while it is in motion.
3. Operators must wear_____clothing.

B. Multiple Choice Questions

1. What is necessary to check before starting the machinery?
   (a) Farm operations
   (b) Fill the fuel
   (c) Check the tires
   (d) Check the lights
2. What type of care is required to avoid any machinery accident?
   (a) Using a machine that is unsuitable for the task
   (b) Using casual approach for operation
   (c) Working with missing or defective guards and other safety devices
   (d) Following all the precautions during the operation.
3. Which of the following safety precautions are necessary while refueling of tractor or any other machinery?
   (a) Engine in running condition
   (b) Engine in off position
   (c) Engine in off position and no open flame nearby
   (d) All of these

C. Subjective Questions

1. Enlist the general inspection points to be observed before using the machinery.

   _____
   _____
   _____

2. Describe the health and safety points to be followed during combine harvesting.

   _____
   _____
   _____

3. Describe the use of protective clothing during machinery operations.

   _____
   _____
   _____

NOTES