

SAFE USE GUIDE



*FOR CROP
PROTECTION
PRODUCTS*



- /// Product Label
- /// Risk and Exposure
- /// Personal Protection Equipment
- /// Disposal of Empty Containers
- /// Application
- /// Principles of First Aid

Product Label

ALWAYS READ THE PRODUCT LABEL BEFORE USE

The label provides the user with all the essential information about the product and how to use it safely and effectively.

ALL LABELS HAVE THE APPROPRIATE HAZARD COMMUNICATION (Symbols, signal words, statements, etc.) according to hazard classification of the product.

To minimize any risks of using the product, important advice is given on the label in regard to:

- /// General precautionary statements and/or warnings
- /// Relevant personal protective equipment (PPE)
- /// Precautions when handling the concentrate
- /// Precautions during and after application
- /// Environmental precautions during and after application
- /// Disposal of empty containers after use

Depending on the toxicity of the product the World Health Organization (WHO) classifies all crop products into either of the 4 colour codes:

Class Ia/Ib The colour code is red and denotes that the product is extremely hazardous.

Class II Yellow

Class III Blue

Class IV Green

Just by looking at the label the farmer should be able to tell the classification of the product.

Hazard colour band

WHO – Acute Toxicity (and for a limited number of pesticides also chronic toxicity).

Hazard class colour indicators				
Class Ia Extremely hazardous	Class Ib Highly hazardous	Class II Moderately hazardous	Class III Slightly hazardous	Class IV Unlikely to present acute hazard in normal use

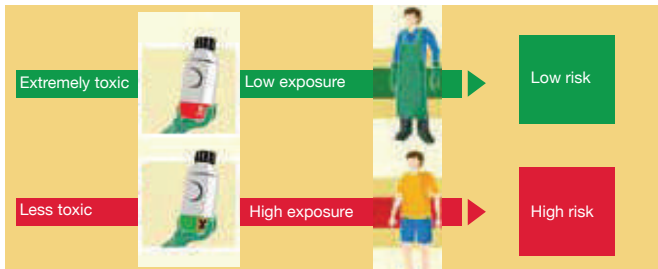


Risk and Exposure

RISK is the likelihood of potentially getting harmed through hazard exposure depending on the conditions related to the use of crop protection products.



Hazard and exposure determining the actual risk.



Actual risks can be driven down by reducing exposure.

AREAS OF POSSIBLE EXPOSURE

DERMAL/SKIN

Occurrence may be rapid in case of unprotected arms, hands, feet and face. High temperature and perspiration of the skin increase the penetration. Skin exposure and absorption of plant protection products are the main hazards associated with application. This can easily happen if arms, hands, feet and the face are not covered/protected.

ORAL/MOUTH

When eating, drinking or smoking during application or mixing.

INHALATION/BREATHING

By breathing (inhalation).



Exposure depends on how the operator handles and uses the product. Further exposure is influenced by the crop to be treated (density, height, field, greenhouse, etc), application techniques, application equipment, application conditions (weather, topography, etc), use of suitable PPE, treatment duration etc.



Personal Protection Equipment (PPE)

TYPES OF PPEs



Long-sleeved shirts and trousers



Apron



Nitrile gloves



Boots/sturdy footwear



Goggles



Face shield



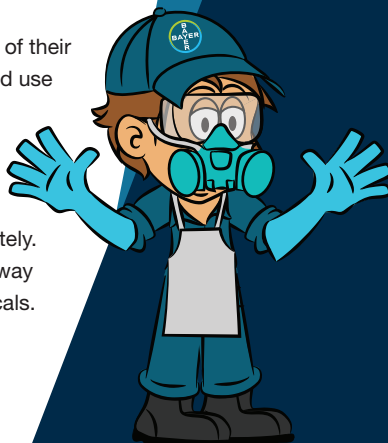
Filter mask



Hard hat

Important points when using PPE:

- /// Regularly renew PPE (long-sleeved shirt and trousers, gloves, boots, masks, goggles and aprons).
- /// If gloves are contaminated, smell, or if you are not sure of their protective properties, dispose of them in a safe way and use a new pair.
- /// Replace masks and filters regularly, verify the date of expiry of the filters. Replace the mask if it does not adjust itself well.
- /// Replace broken or damaged elements of PPE immediately.
- /// All personal protective equipment must be stored far away from crop protection products and/or any other chemicals.



PERSONAL HYGIENE

Hands are the most exposed part of your body. Protect them!

Not all gloves are suitable for handling crop protection products:

Wear Nitrile Gloves specific for the purpose.

NEVER USE DAMAGED GLOVES

Control before putting on gloves:

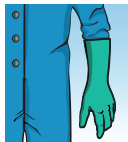
- Are my hands clean and dry?
- Do my gloves show any visible damage such as lumps, small holes or imperfections?
- Are there leaks in my gloves?

To test:

- Capture air in the glove (do not blow)
- Roll up and squeeze the inflated glove to check whether there are leaks



Always use gloves when handling a crop protection product!



Tuck gloves outside shirt sleeves



When reading the label



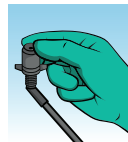
During opening



During filling/mixing



During rinsing



During maintenance

REMEMBER, ALWAYS WASH THE GLOVES BEFORE REMOVING THEM



Store the gloves in a suitable place, NOT in direct sunlight and NOT in same place as PPP storage!

PROPER CLEANING OF PPE

PPE	RECOMMENDATIONS
Reusable coveralls	Wash contaminated clothing twice in succession.
Gloves	Always wash them with water before taking them off.
Boots	Wash them with water after each working day and inspect them regularly.
Masks	Clean the interior of the mask with a damp cloth or towel (mild detergent).
Goggles	Do not wash them under water. Clean the interior with a damp cloth or towel.
Aprons	Wash with water after each working day.

Always follow the manufacturer's washing instructions.

Wash work clothing separately after each use with soap or detergent.

Keep all PPE elements well maintained.

PERSONAL HYGIENE

- /// DO NOT TOUCH the face or bare skin with contaminated hands or gloves.
- /// WASH GLOVES WITH WATER each time after using them and before taking them off.
- /// ALWAYS WASH YOUR HANDS before you eat, drink, smoke or go to the toilet.
- /// DO NOT SMOKE, DRINK OR EAT whilst handling, mixing, filling, spraying CPPs and monitoring crops.
- /// WASH ANY CHEMICAL SPILLS from skin and eyes with clean water immediately.

CONSIDERATIONS WHEN MEASURING AND MIXING CROP PROTECTION PRODUCTS

- /// Always wear proper personal protection equipment.
- /// Always read the label before measuring and mixing.
- /// Use a measuring cylinder.
- /// Pour with care to avoid any splashes.
- /// Ensure the application equipment is calibrated and in good working condition.
- /// Mixing should be done close to field and far away from children, animals, water sources.
- /// Always use clean water for mixing.
- /// Mixing should be done in an area where there is good air circulation.
- /// Mixing should be done in an area where in case of spillage, it can be easily contained and cleaned.
- /// After spraying, always wash the equipment and store it away from children and animals.
- /// First-aid equipment and emergency telephone numbers should be within ease of reach.

DEALING WITH SPILLAGE:

THE 3-STEP-CONTROL PROGRAMME

CONTROL THE SPILL

- If the container is leaking, turn it so that the point of leakage is facing upwards
- Put a smaller leaking container into a larger one
- Close valves tightly



CONTAIN THE SPILL

- Use a shovel to create a raised berm of soil
- Spread absorbents (e.g., fine sand or sawdust) onto the area of spillage
- Prevent the spilled materials from contaminating water!



CLEAN UP THE SPILL

- Neutralize the spillage with a water/bleach solution and scrub the area using a coarse broom
- Add further absorbent material to soak-up the cleaning solution
- Dispose of the contaminated absorbents safely



SPILLAGE is a risk and all possible efforts should be made to avoid it. Always wear your **PPE** when handling spills!

Disposal of Empty Containers

GENERAL CONSIDERATIONS

- /// Triple-rinse empty containers with clean water, then pour rinsing liquid into the mixing tank. This avoids an unnecessary waste of product.
- /// After triple-rinsing the container, puncture the bottom and sides so that it cannot be used again.
- /// Do not throw away empty chemical containers (in fields, rivers, streams or ditches).
- /// Do not burn empty product containers.
- /// Never reuse empty crop protection product containers for any other purpose.

Procedure for triple rinsing

- /// Fill the container with water to a quarter of its capacity.
- /// Close the container and shake vigorously for a few seconds.
- /// Pour the water into the mixing tank.
- /// Repeat the procedure twice.
- /// Leave the container in an upside down position to drip off where the rinsing water is carried to a collection point.

Application

BEFORE APPLICATION

- /// Ensure you are using a product registered on the target crop and pest.
- /// Always read the label and use protective equipment!
- /// Prepare the required quantity to avoid leftovers.
- /// Mixing should be done close to the application location; but always away from children, animals and water sources.
- /// When pouring from a large container avoid spilling.
- /// Open product containers carefully and close them immediately as soon as you finished.
- /// Always put receptacles, containers, measuring cups/cylinders on an even and safe surface to reduce risk of spillage.

DURING APPLICATION

- /// Always wear protective clothing.
- /// Stop spraying if the nozzle is clogged and clean with water (do not blow out with your mouth).
- /// In case of any leak, stop spraying and fix it immediately.
- /// Children and pregnant women are not allowed to apply CPPs.
- /// Keep out workers, passers-by or animals from the area to be treated, also after application!
- /// Don't eat, drink or smoke when applying pesticides.

AFTER APPLICATION

- /// Mark the treated plot and observe pre-harvest and re-entry intervals.
- /// Store remaining products safely.
- /// Check your equipment for any damage, clean it inside/outside.
- /// Wash yourself and the protective clothing and store it in a dedicated place on the farm.
- /// If you feel sick or unwell after applying the CPPs, seek medical help immediately. Always bring the label of the product used.



APPLICATION TECHNOLOGY

Crop protection products can be applied in different ways.

Common application methods include:

- A. Foliar Spray Application
- B. Trunk Application
- C. Soil Drench

The decision on which method to use depends on the specific requirements and purpose.

A. Foliar Spray Application: Is the most common method of applying insecticides and fungicides to crops where the product is applied to the leaves.

Main types of foliar spray applications:

1. **Light Cover Spray:** Where sprays are applied at low volume and with a light covering of the crop canopy. The droplet size is small; therefore, the application of CPP is usually done by aerial spraying at low volume.
3. **Medium Cover Spray:** Most common form of application. It wets the foliage of the crop to the point of run-off.
2. **Full Cover Spray:** Designed to thoroughly wet the crop canopy and penetrate the inside of the canopy. The volume of spray material applied per crop during spraying varies, depending on crop size and shape.

B. Trunk Application: Where the CPP is applied directly to the trunk. These CPPs are systemic, are absorbed through the bark/trunk and translocated within the crop to the area where they are required.

C. Soil Drench: Where the CPP is diluted in water and poured onto the soil around the crop, where it is absorbed by the roots and translocated within the crop. These CPPs are also systemic. Certain CPP can also be applied through a drip irrigation system, which allows its uptake by the roots.

Be careful not to use a knapsack for the application of insecticides after it was used for the application of herbicides as damages to the crop might occur.

Once the method of a foliar spray application has been determined, the equipment required for application must be identified and checked. Application equipment and measuring equipment are required during most applications.

Choosing the equipment requirements requires consideration of:

- /// The area or number of crops to which the chemical must be applied.
- /// The time period in which the application must be completed.
- /// The number of farm workers available.

All equipment must be in good working condition as breakdown during application may cause delays resulting in ineffective pest and disease control. The application equipment required is specific to the application method.

KNAPSACK SPRAYERS

Types of sprayers

Knapsack sprayers are mostly used. A good quality Knapsack sprayer should be safe, convenient, reliable, repairable and capable of being used repeatedly and effectively under field conditions.

Manual knapsack sprayers are continually pumped by hand to maintain spray pressure. A regular rate of pumping should be maintained.

The cost of these sprayers ranges from cheap to moderately expensive. The cheaper versions should be avoided as they have a very short life-cycle and are very prone to breakdowns and leaks.

The most effective method of use of the hand lance provided with the sprayer is to spray sideways into the foliage or “up and under” the leaf surfaces. For spot spraying in tall orchard trees, an extension can be fitted to the hand lance.

Lever Knapsack Sprayer

/// Simple to use and maintain, but training is necessary.

Tank volume mostly 15 – 20 ℓ

/// Pressure provided by the operator

Advantages: Suited for treating small areas,

/// Spare parts and accessories, low costs!

/// Shoulder straps for comfort

/// Independent of power source

Disadvantages: Big influence of operator skills

/// Constant pumping.



Motorized Knapsack Sprayer

/// Pressure provided by a petrol engine

/// Best suited for a boom application

/// Diaphragm pump

Advantages: Increased pressure range

/// No manual pumping

/// Increased comfort for operator

/// Flow is less “pulsed”

Disadvantages: More complex, requires more maintenance

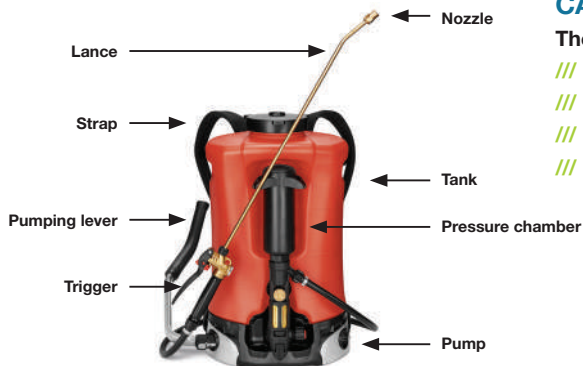
/// Higher investment costs

/// Heavier

/// Noise and exhaust fumes (Ear protection required)



PARTS OF KNAPSACK SPRAYERS



NOZZLES AND SPRAYER CALIBRATION

The nozzle is the key part for:

- /// An even distribution
- /// The appropriate spray pattern
- /// The droplet size
- /// The spray volume

The larger the hole of the nozzle and the lower the pressure, the larger the size of the droplets produced.

Distribution of the spray liquid on the target depends strongly on:

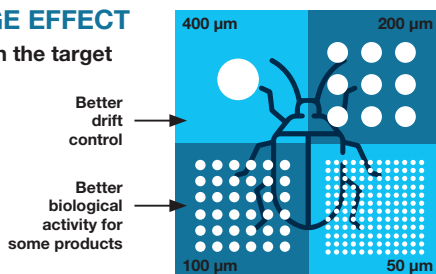
- /// The nozzle type
- /// The quality of the nozzle
- /// The right orientation of the nozzle (especially flat fan nozzles)
- /// The spray height above target (for both, single nozzle and multi-nozzles boom application)
- /// The equal speed and pressure
- /// The uniform movement using a single nozzle

Good distribution and calibration are essential to ensure that the correct amount of product (according to law) and the correct amount of water is used in the target area.

DROPLET SIZE COVERAGE EFFECT

Distribution of the spray liquid on the target depends strongly on:

- /// Pump pressure
- /// High pressure, small droplets
- /// Low pressure, bigger droplets
- /// Viscosity of final formulation
- /// Surfactants in adjuvants
- /// Water quality



EQUIPMENT CALIBRATION

Calibration involves measuring the output of the sprayer, the width of the spray pattern produced and the speed at which the spray operator is walking or the tractor is moving.

Factors required to calculate the exact spray volume per hectare.

1. Walking speed m/min
2. Spray width cm
3. Nozzle flow rate l/min

$$\begin{aligned} \text{SPRAY VOLUME (L/HA)} \\ &= \\ &\text{NOZZLE FLOW RATE} \\ &\text{(L/MIN) X 10000} \\ &\div \\ &\text{SPRAY WIDTH (M) X WALKING} \\ &\text{SPEED (M/MIN)} \end{aligned}$$

Spray volume per hectare is determined by walking speed, spray width and nozzle flow rate.

Spray width depends on:

- /// Nozzle type
- /// Spray angle
- /// Distance between nozzle and ground/top of the crop

SETTING NOZZLE FLOW RATE

Distribution of the spray liquid on the target depends strongly on:

Using a graduated cylinder: Spray in this cylinder for one minute, then measure the volume of the applied liquid volume in ℓ : 1 = flow rate in ℓ /minute.

Using the total tank capacity of the knapsack sprayer:

Fill the sprayer completely – spray empty – measure the volume over a specific area:
time needed for spraying = flow rate in ℓ /minute.

Once these three factors are known, the amount of spray mix applied to the target area can be calculated. If needed, adjustments can be made to one or more of the controlling factors to ensure that the correct amount of crop protection product is applied.

APPLICATION EFFICIENCY

To achieve product efficiency:

- /// Do not apply sprays when it's windy as this could result in poor control and spray drift to non-target areas.
- /// Do not apply when crops are wet or during rainy weather as the spraying material is diluted hence less effective.
- /// Do not spray when temperature is above 25-30 °C and/or humidity below 40%.

MINIMIZING THE RISK OF SPRAY DRIFT

Carry out a risk assessment before spraying by considering the following important factors:

- /// Product
- /// Awareness zones
- /// Buffer zones
- /// Weather conditions
- /// Spray equipment

Principles of First Aid

First Aid is the initial effort made to assist a victim while medical help is being sought. The victim must in the end be seen by a qualified doctor. Speed is essential in the treatment of any contamination case to prevent it leading to poisoning.

IN CASE OF CONTAMINATION:

- /// Take off work clothing contaminated by accidental splashing immediately.
- /// Do not smoke after an accidental contamination – avoid drinking milk and/or alcohol in any case!
- /// Contaminated clothes should be disposed of.
- /// In case of eye contact with CPP, rinse the eyes with large quantities of clean water for at least 10 minutes.
- /// Seek medical advice immediately.



IN CASE OF SKIN CONTACT:

- /// Instantly wash affected skin zones rigorously with large quantities of water and soap.
- /// In case of heavy contamination take an extensive shower as quickly as possible.
- /// Put on completely clean clothing after shower.



IMMEDIATELY APPLY FIRST AID AND CALL THE AMBULANCE:

- /// Place the person in recovery position to prevent suffocation if vomiting should occur.
- /// Clear the person's face to facilitate breathing.
- /// Remove the contaminated clothes carefully.
- /// Wash body parts and skin affected with lots of clean water.
- /// Do not allow the person to smoke or to drink anything other than water.
- /// Call the ambulance or take the person to the closest medical facility.



Place an unconscious patient on his/her side with the head bent backwards.



Get person to a doctor and take product label along. It contains the necessary information for adequate treatment.

Don't forget to take the product label or container to the doctor for identification purposes!

Please note: Pesticide users are reminded to read and follow instructions on the product label for details of pesticide product use before application at all times.

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