



PARIJAT
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PARIJAT CROP PROTECTION TRAINING MANUAL FOR FARMERS



**SAFE HANDLING, CORRECT APPLICATION,
DISPOSAL, ANIMAL SAFETY & FIRST AID**



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PARIJAT CROP PROTECTION TRAINING MANUAL FOR FARMERS

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FOREWORD

Crop Protection forms an integral and vital aspect of modern farming methods. Handling of Pesticides at all stages from manufacture to final use requires specialized procedures to ensure safety of handlers and the environment.

This handbook is designed as a trainer's manual specially for farmers and end use handlers of Crop Protection Chemicals.

The Editors welcome suggestions or improvements from users and readers of this Handbook. Parijat Industries is a manufacturer of Crop Protection Chemicals with products sold worldwide.

Parijat Industries India Pvt Ltd is deeply committed to the cause of Health Safety and Environment . We are engaged in Dissemination Training Mentoring proper handling of Crop Protection Chemicals by farmers as well as various other sections of stake holders in India .

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Vikram Anand
Director
Parijat Industries (India) Pvt. Ltd.



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CHAPTER:1

INTRODUCTION TO SPRAYERS

Sprayer is a device used to atomize the spray fluid into small droplets and eject with little force for distributing it properly. It also regulates the amount of Pesticide to be used to avoid excessive application.



MOUNTED BOOM



DRONE

There are different types of Sprayers such as Dusters, Knapsack Sprayer, Foot Sprayer, Aerial Sprayers (such as Drones), etc. Sprayer are also classified as following on the basis of Volume of spray required per hectare the application is categorized



KNAPSACK

HV : High Volume = More than 150 l/ha.

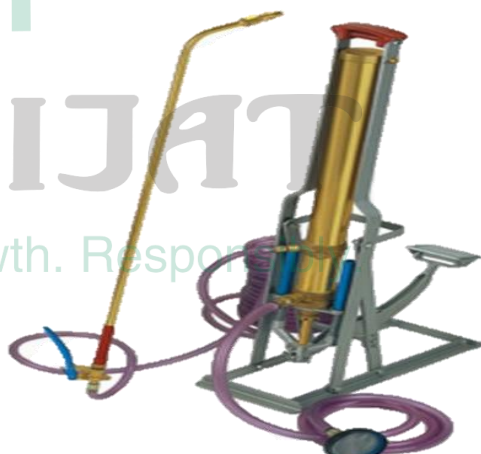
Suitable for insecticides, fungicides, herbicides.

LV : Low Volume = Approx. 10-150 l/ha.

Suitable for insecticides, fungicides.

ULV : Ultra Low Volume = Approx. 1-5 l/ha.

Suitable for insecticides.



FOOT SPRAYER

PESTICIDES APPLICATION EQUIPMENTS CARE (GENERAL)



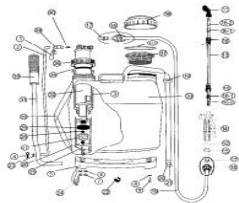
➤ Sprayer should be well maintained during the spraying season. Checking and preparation should commence well before the beginning of the season.

➤ It is of paramount importance to clean both inside and outside of sprayer after each day's work, even if the same chemical is being used the next day.

➤ Sprayer should be lubricated thoroughly and regularly,

especially all moving parts, before starting the work.

PARTS DIAGRAM



PARTS LIST

- 1 Handle securing ring
- 2 Connecting rod
- 3 Guide bushing
- 4 Split pin
- 5 Tank base
- 6 Washer
- 7 Nut
- 8 Washer
- 9 Screw
- 10 Strap buckle
- 11 Nozzle assembly
- 12 Washer

- 13 Lance
- 14 Trigger valve
- 15 Adaptor
- 16-1 Locking sleeve
- 16-2 O-ring
- 17 Hose barb
- 18 Hose nut
- 19 Hose
- 20 Carrying strap end fitting
- 21 Carrying strap hook
- 22 Pump handle attachment clip
- 23 Washer
- 24 Carrying strap attachment
- 25 Pump
- 26 Valve ball
- 27 Valve seal
- 28 Valve ball
- 29 Cup washer
- 30 Carrying strap
- 31 Pump handle
- 32 Air chamber
- 33 Pesticide tank
- 34 Felt sealing washer
- 35 Pump handle grip
- 36 Air chamber lid
- 37 Pesticide tank filling filter
- 37-1 Sealing washer
- 38 Pesticide tank lid
- 39 Handle & lance retaining clip
- 40 Split pin

KS-16 KNAPSACK SPRAYER INSTRUCTION MANUAL



FEATURES

The KS-16 lever operated knapsack sprayer is a high quality robust and durable general-purpose sprayer.

- Proven reliability – tested to over 40,000 operations without failure.

- 16 litre ergonomically designed HDPE tank.
- Large filling aperture with filter.
- Leak-proof valve on tank lid.
- Lightweight and profiled for maximum operator comfort.
- Internal piston pump.
- Internal agitation of liquid.
- Operating pressure range 1 – 4 bar (15 – 60 PSI).
- Adjustable straps with low absorbency of liquid.
- Metal lance and trigger valve handle for maximum durability.
- Hytrel™ pump seal and Viton™ valve and hose seals for maximum resistance to aggressive spray liquids.
- Retaining clip for handle & lance.
- Supplied with interchangeable nozzle tips for herbicide and insecticide/fungicide application.
- Optional constant flow valve.

- No matter how well the sprayer is designed and equipped, even if it is new, all sprayers wear out and deteriorate.
- All parts should be inspected. Worn out, broken and damaged parts should be replaced.
- If nozzle is worn out and delivers a 10 % overdose, chemical wastage in a couple of hours would cover the cost of a new one.
- A detailed instruction book giving simple advice and illustrated drawing of component and assemblies are provided with each new sprayer.
- Extra time should be devoted in cleaning of the sprayer at the end of the spraying season, before it is kept in the store.
- Sprayer should be cleaned thoroughly, since residual chemical if left over for several months will corrode parts of sprayer. Filters and Nozzles should also be cleaned thoroughly. Corroded parts should be painted. The pump should be greased, and operating / moving parts should be well oiled.

CHAPTER:2

MAJOR SPRAYER TYPES USED IN INDIA (DUSTERS)



Duster is an appliance by which Pesticides that are in dust form are applied on the crops. They use of air streams to carry pesticides in fine particles over the crops. They are not very common in present era as dusting of chemicals results in inhalation by the man applying the chemicals and thus have adverse health effects on him.

MAJOR SPRAYER TYPES USED IN INDIA (FOOT SPRAYER)



Foot Sprayer is a modified version of rocker sprayer. The pump is fixed in a vertical position with necessary braces. The plunger moves up and down when operated by the pedal. A ball valve is provided in the plunger assembly itself to allow the fluid to cross the plunger and getting pressurized in the pressure vessel. It is majorly used in Orchards.

MAJOR SPRAYER TYPES USED IN INDIA (KNAPSACK)



Knap Sprayer is an appliance that applies pesticides in droplets form. They have wide coverage and are most common in practice. They are of different types such as Manually Operated, Power Operated, Hand Sprayer, Knapsack Sprayer, Traction Sprayer, Rocker Sprayer, Ultra Low Volume Sprayer, Foot Sprayer or Pedal Pump, etc.

CHAPTER:3

KNAPSACK SPRAYER (INTRODUCTION)



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Knapsack spraying apparatus consisting of a knapsack tank together with pressurizing device, line, and sprayer nozzle, used chiefly in spraying pesticides. A Knapsack sprayer is the most commonly used sprayer for the field crops It is essential to know the parts of these sprayer before spraying

IMPORTANT SPRAYERS (NOZZLES)

HOLLOW CONE

These are used primarily where plant foliage penetration is essential. This is used for **Insecticide and Fungicide**



FLAT FAN

These are used largely for spraying, where foliar penetration and coverage are not essential. This is used for **Herbicide**



FLOOD JET

These are ideal for high application rates and speeds, because they produce a wide-angle, flat fan pattern. This is used for **Herbicide**



CHAPTER:4

MOST COMMON FORMULATIONS

FORMULATION	NAME	APPLICATION
DS	Powder for dry seed treatment	SEED/HAND DRESSING
GR	Granule	BROADCASTING
EC	Emulsifiable concentrate	SPRAY
EG	Emulsifiable Granule	BROADCASTING
ES	Emulsion for seed treatment	SEED/HAND DRESSING
SC	Suspension concentrate	SPRAY
SD	Suspension concentrate for direct application	SPRAY
SE	Suspo-emulsion	SPRAY
SG	Water soluble granule	SPRAY
SL	Soluble concentrate	SPRAY
SO	Spreading oil	SPRAY
SP	Water soluble powder	SPRAY
ME	Micro-emulsion	SPRAY

FORMULATION	NAME	APPLICATION
ST	Water soluble tablets	SPRAY
SU	Ultralow volume (ULV) suspension	SPRAY
VP	Vapour releasing product	SPRAY
WG	Water dispersible granule	SPRAY
WP	Wettable powder	SPRAY
WT	Water dispersible tablets	SPRAY
ZC	A mixed formulation of CS and SC	SPRAY
ZE	Mixed formulation of CS and SE	SPRAY
ZW	Mixed formulation of CS and EW	SPRAY
FS	Flowable concentrate for seed treatment	HAND/SEED DRESSER
OD	Oil dispersion	SPRAY

CHAPTER:5

PURCHASE INSTRUCTIONS



Before purchase read the labels for instructions of Recommendations, Direction of Use, Date of Expiry, Acceptability Claims, Symptoms of Poisoning and First Aid Measures. Purchase the Pesticides only with authentic bills.

CHAPTER:5

CARRYING INSTRUCTIONS



- Keep the container below your waist to avoid spillage.
- Use a sharp knife to open the pesticide bags; do not tear them with teeth or tear the label.
- Mix the pesticides outdoors, in a place where there is good light and ventilation.
- Never carry excessive pesticides on neck, shoulder or back. If you are carrying the product in a two-wheeler, use proper baggage for the same

STORAGE INSTRUCTIONS



- ✓ Avoid storage of the pesticides in the house premises.
- ✓ Keep in the original intact sealed container and never transfer any leaked pesticides to any secondary container for selling or storage purposes. Do not expose the pesticides to excessive sunlight or subject them to freezing.
- ✓ A half-cut drum filled with sand or saw dust must be available to assure containment of spilled or leaked products.
- ✓ Keep the pesticides away from kitchen and water sources such as wells, pumps, etc.
- ✓ Keep the pesticides away from the reach of children. Never store fodder beside pesticide packages or allow animals to graze near pesticide storage area.

CHAPTER:6

PRE-SPRAY SAFETY INSTRUCTIONS



✓Use only recommended dose as mentioned in the Label of the containers. Use gloves, goggles and tight clothing while mixing and applying pesticides.

✓Dose should be accurately calculated. Overdose & Underdose can cause crop loss and in turn also harm the health of the consumer. Proper gloves, masks, Goggles should be put on before measuring dose.

✓Use measuring cup provided in the cap of the pesticide bottle or volumetric flask to calculate proper dose of the chemicals used

✓Stand upwind of the pesticide to avoid contaminating yourself.



- ✓ Avoid applying pesticides when temperatures are extremely high or low. Be especially careful when temperatures exceed 30°C or are below 10°C. Pesticide should not be applied on a hot sunny day or during showers.
- ✓ Use extreme care to prevent the pesticide from contaminating unintended target sites
- ✓ Always wash the sprayer before spraying. It is mandatory to wear gloves while washing the sprayer tank.
- ✓ Tank must not be washed near water source. Water for mixing should not be dirty or grassy

APPLICATION SAFETY INSTRUCTIONS



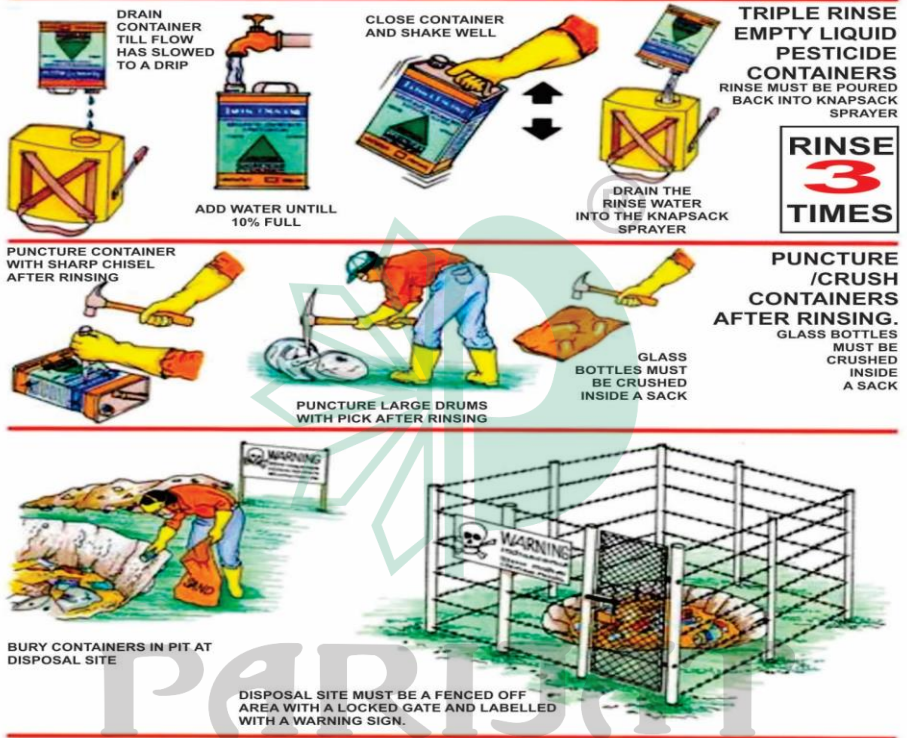
- ✓ Check the application equipment.
- ✓ Look for leaking hoses or connections, plugged or worn nozzles, and examine the seals on the filter openings to make sure they will prevent spillage of the chemicals. Calibrate your equipment before use.
- ✓ Make certain that your equipment is adjusted according to the manufacturer's specifications and meets label requirements for the product being applied.
- ✓ Do not smell the sprayer tank. Do not eat, drink, smoke or chew while preparing solution or spraying the solution.
- ✓ The operator should protect his bare feet with shoes and hands with polyethylene bags if proper PPE are not available. Always check the strap before loading the sprayer



- ✓ Don't blow/clean clogged- nozzle with mouth. Use old tooth-brush tied with the sprayer and clean with water.
- ✓ Do not use same sprayer for weedicide and insecticide.
- ✓ Proper Personal Protection Equipment (PPE) should be put on at the time of spraying. This includes a full body suit, goggles, boots, gloves, masks, hat/cap and so on. Do not chew tobacco/food while spraying.
- ✓ Children and domestic animals should not be anywhere near while spraying

POST SPRAY SAFETY INSTRUCTIONS

SAFE DISPOSAL BY TRIPLE RINSING OF EMPTY PESTICIDE CONTAINERS



- Wash the Sprayer properly with detergent after application. Never wash it near source of water and without proper PPE such as mask, gloves, etc.
- Rinse the pipe and valve. Triple Rinse is best method, however, use old toothbrush to clean the tank. If the filter screen is clogged, then gently scrub it with bristle brush or toothbrush and dump the leftovers properly



- Take bath properly after coming from field. Use soaps to clean yourself. Wash your clothes
- Do not hold children before taking bath.
- Wash your clothes after coming from field. Do not allow the dirt to mix with water source or wash sprayer near water source.
- Dump the containers and remaining pesticide properly as State Government norms or as recommended. Do not reuse the bottle at home/field as they are poisonous. Do not throw the bottle/ container/ packets near any water source

CHAPTER:7

DISPOSAL OF PESTICIDES



- After application whether a small amount of Pesticide may be left in the container or it must be empty. If pesticide is left, store it away from house under lock and key. Do not change container. For disposal refer to the following
- After rinsing the knap sack sprayer other pesticide application equipment's at the end of the IRS activities collect the rinsed water in a tightly closed lid drum or container and dispose the residual water as per Government norms or as recommended



- The containers that are made of glass, plastic or metal can be decontaminated further by the triple rinsing process.
- Never allow the leftover pesticides water to mix with the river water or dump it anywhere near the house or habituated areas.
- Never use the decontaminated containers even after decontamination for household activities.

CHAPTER:8

ORCHARD SPECIFIC SAFETY INSTRUCTIONS



Maintain ample distance from the trees while spraying as the liquid may fall upon you if you spray directly overhead. Spray at max 45-degree angle. Wear PPE to avoid poisoning. Calibrate the force of the sprayer before spraying

CHAPTER:8

ORCHARD SPECIFIC SAFETY INSTRUCTIONS



As recommended create proper basin around the tree before applying pesticides . Take precaution that the chemicals do not enter your nails while applying. It is a mandate to wear shoes/boots while following this method.



Wash the Drum properly before and after spray with detergent, do not allow the water from the drum to mix with any water source. Take care that the washing is done in isolation where children and animals cannot commonly reach

CHAPTER:9

SPECIFIC INSTRUCTIONS FOR ANIMAL SAFETY (BEES)



Bees, especially honey bees, are the most vital for pollinating food crops. Do not spray during the active foraging period of the bees.

SPECIFIC INSTRUCTIONS FOR ANIMAL SAFETY (BIRDS)



Spray only during early in the morning or late evening so that the bird population is not affected. Spray only over the canopy and not in open air to reduce chances of bird deaths.

SPECIFIC INSTRUCTIONS FOR ANIMAL SAFETY (FISH)



Pesticide should not be sprayed near water bodies or where Pisciculture is practiced. Due to mixing of Toxic items in water, the aquatic fauna may die. Read Label for cautions

SPECIFIC INSTRUCTIONS FOR ANIMAL SAFETY (ANIMALS)



Avoid washing sprayer near any water source as animals that will feed on the same water may fall ill. Do not throw pesticide container on roads, field, etc. as the animals might smell or drink the remaining and may die. Do not spray/spill chemicals near fodder. Do not let animals enter the Pesticide treated plot.

CHAPTER:10

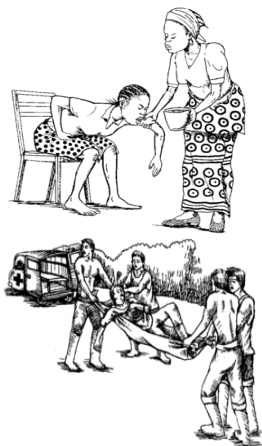
SYMPTOMS OF POISONING

The most common symptoms of Pesticide Poisoning are:

- Dizziness, Blurry Vision
- Fainting
- Vomiting, Coughing
- Headaches
- Pupil Dilation
- Foaming & Frothing from the nose or mouth
- Wheezing/ trouble in breathing
- Ataxia
- Salivation
- Redness & itching of Skin
- Abdominal Pain
- Diarrhea
- Excessive Sweating and Nausea
- Tremor in muscles



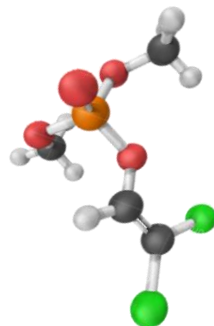
FIRST AID & DIAGNOSIS



- Quickly wash the body parts affected by the pesticides with soap and clean water.
- If eyes are affected with pesticides, then rinse the eyes for about 15 minutes with clear water.
- Do not break any blisters or apply any kind of lotions to the affected part without consulting the doctor. Remove the clothes that are being exposed by the pesticides to avoid more infection.
- If a person swallows a pesticide product, make sure to read the label claims and check if the person needs to vomit or not. Moreover, apply mouth to mouth breathing and loosen his clothes if you see the person is not breathing.
- Seek immediate medical help.
- If the label claims for vomiting then provide the person a glass of very salty water and strong-tasting edible plant such as the basil, celery, etc., just after vomiting

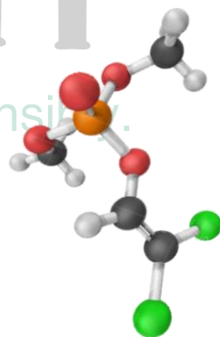
SPECIFIC FIRST AID & DIAGNOSIS

1. **Organophosphate Group** cause poisoning. Atropine and 2 PAM are the recommended antidotes for this group. (E.g.: Malathion, Parathion, Diazinon, Fenthion, Dichlorvos, etc.)
2. **Carbamates** also cause poisoning. Atropine is used in case of poisoning. However, it is recommended not to use oxime as 2 PAM. (E.g.: Carbofuran, Aldicarb, carbaryl, etc.)
3. Wear proper PPE before spraying
4. Use formulations such as ZC for Lambda cyhalothrin
5. Spray in direction of wind so that the chemicals do not fall on you
6. Cover your face properly with mask



UNIVERSAL ANTIDOTE

50% Activated
Charcoal+ 25%
Magnesium
Oxide+ 25%
Tannic Acid



SYMPTOMS OF SPECIFIC POISONING

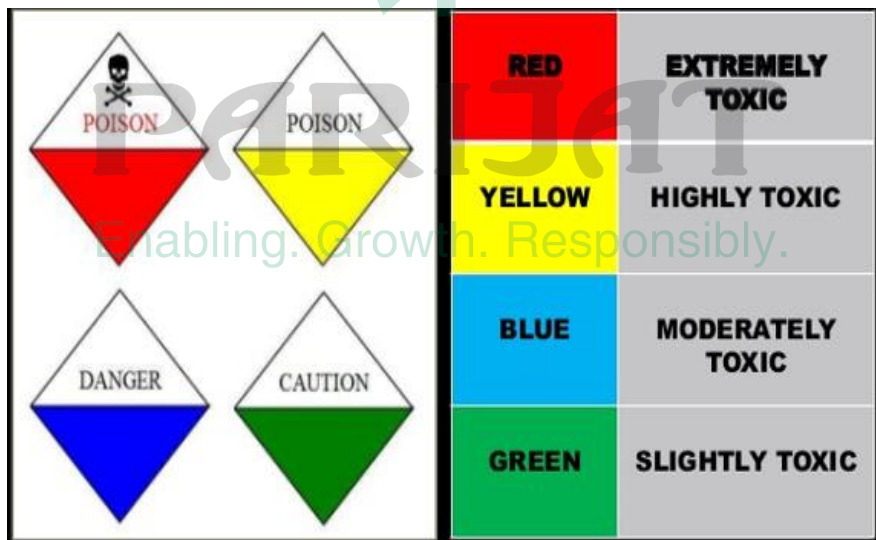
Chemicals	Problems	Remedy/solutions/ farmer practice
Lamda Cyhalothrin	Itching	Wear masks, hand gloves and eye glass
Sulphur	Itching	Wear masks, hand gloves and eye glass
Copper	Itching	Wear masks, hand gloves and eye glass
Profenophos+ Cypermethrin	Itching/ breathing problem	Wear masks, hand gloves and eye glass
Cypermethrin	Itching/ breathing problem	Wear masks, hand gloves and eye glass
Dicofol	Itching	Wear masks, hand gloves and eye glass

CHAPTER:11

THE TOXICITY TRIANGLE

CLASSIFICATION OF INSECTICIDE BASED ON LC 50

Classification of the Insecticides	Medium lethal dose by the oral route acute toxicity LD 50 mg/kg.. body weight of test animals	Medium lethal dose by the dermal route dermal toxicity LD 50 mg/kg. Body weight of test animals	Colour of identification band on the label
1	2	3	4
1. Extremely toxic	1-50	1-200	Bright red
2. Highly toxic	51-500	201-2000	Bright yellow
3. Moderately toxic	501-5000	2001-20000	Bright blue
4. Slightly toxic	More than 5000	More than 20000	Bright green



CHAPTER:12

SOME QUICK DO's & DON'T's

DO'S	DON'TS
Always buy products against proper bill.	Never buy any product without a proper (<i>kaccha</i>) bill.
Always carry pesticides with care and after inspecting the product for external damages.	Never carry excessive pesticides over back, shoulder or neck.
Wear gloves, tight clothes, face mask and other protective gear while using pesticides.	Do not wear loose clothes and keep your mouth away from contact while mixing and applying pesticides.
Store the pesticides away from the reach of the children.	Never store pesticides along with the food items or near cattle sheds.
Wash off knapsack sprayer and other equipment's properly after application of the pesticides.	Do not allow the water after cleaning the sprayer, to mix with surface water or ground water sources.
Always wash hands and other exposed parts of the body properly after pesticide application.	After application of pesticides, never eat anything or touch anyone without washing your hands.
Always check the label of the product for label claims and expiry date to avoid any misuses of the product.	Never buy expired product from the market, even though the shopkeeper provides a huge discount on the product. Dump the product properly after use

ABOUT PARIJAT INDUSTRIES (INDIA) PVT. LTD.

➤ Parijat Industries (India) Pvt. Ltd. is a three decades old Indian MNC with extensive global presence in 70 countries, 6 international offices, exclusive distribution in India, Russia, C.I.S. and West Africa

➤ Parijat have been recognized and awarded International Safety Management (2015), National Safety Council (2016), National Safety Council (2017), British Safety Council (2016), British Safety Council (2017), British Safety Council (2018), Greentech Safety Award (2015), Greentech Safety Award (2016), Greentech Safety Award (2017), Greentech Safety Award (2018), International Environment Management Award (2015), Greentech Environment Award (2017), Greentech Environment Award (2018) amongst others due to its outstanding performance in the field of Health Safety and Environment

➤ Parijat holds one of the best infrastructure facilities in the field of production and manufacturing of the Pesticides

➤ It has dedicated R&D Dept. (s) that works in close coordination with a single objective to provide best possible solution to farmers against pests



Creating Green Alternatives

**GOVT. OF INDIA
KISAN CALL CENTRE NO.
1800-180-1551**



**PARIJAT INDIA
FARMER HELPLINE NO.
1800-12300-6141**

SAFETY AWARDS



2015



2016



2017



2016



2017



2018



2015



2016



2017



2018



2018



2019



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*A CSR initiative for spreading awareness towards
Farmer Safety during Pesticide Application*



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