



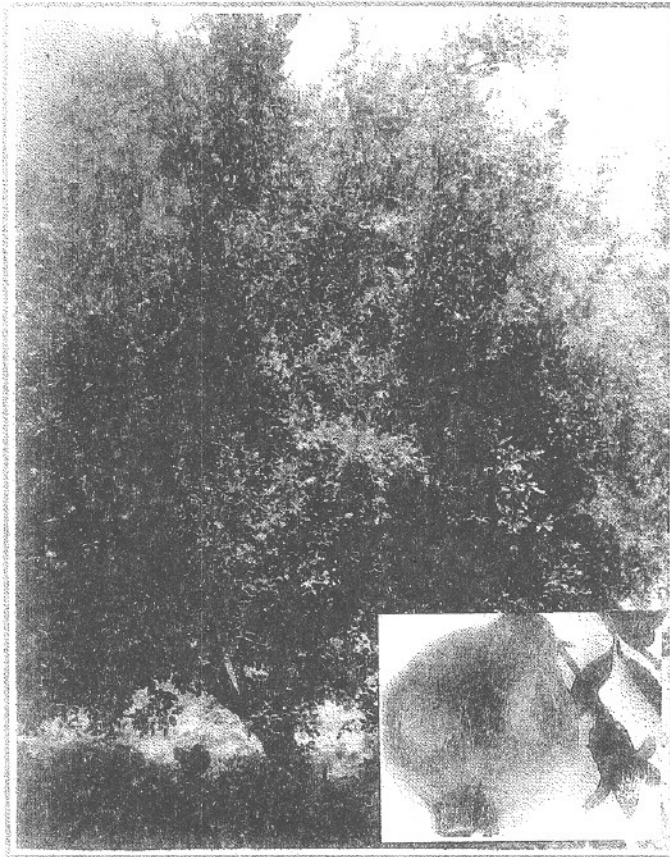
IPM PACKAGE NO. 31



INTEGRATED PEST MANAGEMENT PACKAGE

FOR

POMEGRANATE



Government of India
Ministry of Agriculture
Department of Agriculture & Cooperation
Directorate of Plant Protection, Quarantine & Storage
N. H. IV, Faridabad - 121 001.

May, 2001

IPM PACKAGE FOR POMEGRANATE

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Government of India
Ministry of Agriculture
(Department of Agriculture & Cooperation)
DIRECTORATE OF PLANT PROTECTION, QUARANTINE & STORAGE
NH IV, FARIDABAD - 121 001 (Haryana)

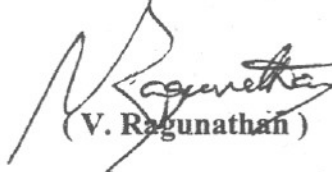
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FORWARD

Integrated Pest management (IPM) approach has been globally accepted for achieving sustainability in agriculture. It has become more relevant due to a number of advantages like safety to environment, pesticide-free food commodities, low input based Crop Production Programme etc. Though IPM approach has been taken up since 1981, its impact has not been felt until 1994. Human Resource Development has helped to sensitise extension functionaries and farmers about the usefulness of IPM.

For successful implementation of IPM, the scattered information on various components of this eco-friendly approach forms basic necessity. In this direction, initial attempts were made in 1992 to harmonise the IPM Package of Practices of various crops. Subsequently concerted efforts were made in 1998, 2001 and 2002 to update and develop IPM package of practices for agricultural and horticultural crops. Presently, IPM package of practices for 51 crops have been finalised to help the extension workers and farmers to manage the pests/ diseases and to minimise the over use/ misuse of chemical pesticides. Efforts have been made to incorporate the relevant available technical input provided by the scientists of ICAR Institutes/ SAUs and State Departments of Agriculture. However, suggestions for further improvement in future publication/ revision will be of immense help. Hopefully, these IPM Package of Practices will be useful for the Researchers, Plant Protection Workers and Farmers alike.

April 1, 2002


(V. Raguathan)

P R E F A C E

In order to minimise the indiscriminate and injudicious use of chemical pesticides, INTEGRATED PEST MANAGEMENT (IPM) has been enshrined as cardinal principle of Plant Protection in the overall Crop Protection Programme under the National Agricultural Policy of the Govt. of India. IPM is an eco-friendly approach for managing pest and disease problems encompassing available methods and techniques of pest control such as cultural, mechanical, biological and chemical in a compatible and scientific manner. The greater emphasis has been given on biological control including use of biopesticides.


With a view to provide technical knowledge to the extension functionaries and farmers in the States, first National Workshop on IPM for harmonisation of Package of Practices was organized at National Plant Protection Training Institute (NPPTI), Hyderabad during June 29-30, 1992. Subsequently workshops were organized from April 15-17, 1998 and Nov. 5-6, 1998 at Directorate of Plant Protection, Quarantine & Storage, Faridabad and IPM package of practices for 20 crops were evolved on rice, cotton, vegetables, pulses, and oilseeds. In this series, two National Workshops on IPM have been conducted at NPPTI, Hyderabad and Dte. of PPQ&S, Faridabad during May 14-17, 2001 and Feb. 20-22, 2002 respectively to update 20 available IPM Packages and develop 31 new IPM Packages specially for Horticultural crops. In these workshops, 51 IPM Package of Practices for cereal crops (Rice, Wheat, Maize, Sorghum, Millets), commercial crops (Cotton, Sugarcane, Tobacco, Tea), pulse crops (Pigeonpea, Gram, Black gram/Green gram, Pea, Rajma), oilseeds (Groundnut, Soybean, Rapeseed/Mustard, Sesame, Safflower, Castor, Sunflower, Oilpalm), vegetables (Potato, Onion, Tomato, Brinjal, Okra, Chillies, Cruciferous vegetables, Leguminous vegetables, Cucurbitaceous vegetables), fruit crops (Citrus, Banana, Apple, Mango, Guava, Grapes, Pineapple, Sapota, Pomegranate, Litchi), spice and plantation crops (Small Cardamom, Large Cardamom, Black Pepper, Ginger, Coriander, Cumin, Fennel, Coconut, Cashew and Arecanut) have been finalised.

IPM technology manages the pest population in such a manner that economic loss is avoided and adverse side effects of chemical pesticides are minimized. The IPM packages encompasses various management strategies for containing the pest and disease problems. Pest monitoring is also one of the important component of IPM to take proper decision to manage any pest problem. It can be done through Agro-Ecosystem Analysis (AESA), field scouting, light, pheromone, sticky/yellow pan traps. The economic threshold levels (ETL) of important pests and diseases are also given in the packages to take appropriate control measures when pest population crosses ETL.

These IPM packages developed with the technical inputs from experts from Indian Council of Agriculture Research, State Agricultural Universities, Central Directorate of Plant Protection, Pesticide Industries and State Departments of Agriculture/Horticulture will provide technical backup in the management of pests, diseases, weeds, nematodes and rodents in the Indian Agriculture and Horticulture. These will also be useful in reducing the pesticide residues in exportable agricultural commodities and would also help in the management of pests/diseases/weeds/nematodes which may get inadvertently introduced in the country.

IPM Package of Practices for Agricultural and Horticultural crops will be helpful to minimize the ill effects of chemical pesticides to promote the IPM for sustainable production. These packages will be useful for the researchers, extension workers and farmers alike who are engaged in the agricultural practices.

April 1, 2002


(A.D. Pawar)
Director (IPM)

ACKNOWLEDGEMENTS

The IPM Package of Practices for **Pomegranate** crop was discussed and finalised in the National Workshop on IPM held at National Plant Protection Training Institute (NPPTI), Hyderabad during May 14-17, 2001. The technical input received from the following experts is thankfully acknowledged.

- I. Chairman, Technical Session : Dr. AD Pawar, Director (IPM), Dte of PPQS, Faridabad
- II. Coordinator, Technical Session : Dr. M.P. Misra, Dy. Director (Ent.), Dte. of PPQS, Faridabad
- III. Co-chairman, Technical Session : Dr. R.P. Shukla, Principal Scientist (Ent.) CISTH (ICAR), Lucknow.
- IV. Expert input : 1. Dr. S.D. Sawant, Sr. Scientist (Ent.), NRC for Grapes (ICAR), Pune.
2. Dr. T. Manoharan, Associate Professor (Ento.), TNAU, Coimbatore.
3. Dr. G. Ramasubha Reddy, APPO, NPPTI, Hyderabad.
4. Dr. J.N. Thakur, AD(E), Central IPM Centre, Solan
5. Sh. N. M. Dev., AD(E), Central IPM Centre, Jalandhar.
6. Dr. R.P. Misra, PPO(E), Central IPM Centre, Lucknow.
7. Sh. O.P. Verma, PPO(PP), Central IPM Centre, Jammu.
8. Dr. V. K. Srivastava, PPO(PP), Central IPM Centre, Nagpur
9. Sh. M.K. Das, APPO, Central IPM Centre, Burdwan.
10. Sh. Ashok Shukla, PPO(PP), Central IPM Centre, Baroda
11. Dr. Sandeep Pandey, PPO(PP), Central IPM Centre, Lucknow.
12. Sh. S.K. Verma, PPO(E), Central IPM Centre, Patna.
13. Sh. M. Parray, SSA, Central IPM Centre, Srinagar (J&K)
14. Sh. Padam Singh, SSA, Central IPM Centre, Dimapur.
15. Dr. D. Kanungo, Jt. Director, CIL, Dte. of PPQ&S, Faridabad
16. Dr. R.B.L. Bhaskar, Jt. Director (Bio.), Dte of PPQS, Faridabad
17. Dr. Brajendra Singh, Entomologist, Dte of PPQS, Faridabad
18. Dr. B.S. Phogat, Agronomist (H), Dte of PPQS, Faridabad
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20. Sh. S.P. Kulshrestha, Dy. Director (PP), Dte. of PPQ&S, Faridabad.
21. Dr. Jasvir Singh, Asstt. Director (E), Dte. of PPQ&S, Faridabad.
- V. Technical input:
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 3. Sh. Yogesh Kumar, SSA, IPM Div., Dte of PPQS, Faridabad.
 4. Sh. R.S. Tomer, SSA, IPM Div., Dte of PPQS, Faridabad.
 5. Sh. Laxmi Chand, SSA, IPM Div., Dte of PPQS, Faridabad.
 6. Mohd. Abrar Alam, Stenographer, IPM Div., Dte of PPQS, Faridabad.
 7. Sh. N.K. Mishra, LDC, IPM Div., Dte of PPQS, Faridabad.

IPM PACKAGE FOR POMEGRANATE

I. MAJOR PESTS:

A. Pests of National Significance:

1. Insect Pests:

- 1.1 Anar butterfly, *Deudorix isocrates*
- 1.2 Stem borer beetle, *Coleosterna spinator*
- 1.3 Whitefly, *Siphoninus phillyreae*
- 1.4 Shot hole borer, *Xyleborus* sp.
- 1.5 Thrips

2. Diseases:

- 2.1 Bactiral leaf and fruit spot
- 2.2 Leaf and fruit spot (*Pseudocercospora punicae*)
- 2.3 Anthracnose
- 2.4 Leaf blight

B. Pests of Regional Significance:

1. Insect Pests:

- 1.1 Pomegranate butterfly, *Deudorix isocrates*
- 1.2 Shot hole borer, *Xyleborus* sp.
- 1.3 Pomegranate aphid, *Aphis punicae*
- 1.4 Pomegranate whitefly, *Siphoninus phillyreae*
- 1.5 Mealy bugs, *Planococcus* sp. *Drosicha* sp.

2. Diseases:

- 2.1 Fruit scab/fruit rot wilt
- 2.2 Leaf spot
- 2.3 Die back

III. IPM STRATEGIES:

1. Cultural practices:

1.1 Clean cultivation: For healthy growth, keep basin, clean in which sapling is planted.

1.2 Soil health: Avoid water logging, keep soil raked and aerated, to reduce invasion of shot hole borer. Apply *Trichoderma viride* along with FYM in the ratio of 1:40 @ 20kg/plant before monsoon..

1.3 Detection of pest: The infestation should be detected periodically by looking out for drying branches.

2. Weed management:

2.1 Remove weeds before flowering.

3. Mechanical practices:

3.1 Uproot infested trees: Infested trees should be uprooted and burnt, especially the root zone. (shoot hole borer control).

3.2 Destruction of affected parts: Prune the affected parts.

3.3 Keeping of good quality of fruits and bagging fruits: Remove and destroy all the affected fruits to reduce, the incidence of Anar butterfly.

4. Biological control:

4.1 Conservation and release of defenders: Syrphids and coccinellids should be conserved to suppress sucking pests. Release *C. montrouzieri* near the site of mealy bug.

5. Chemical control: Pesticides spray should be less toxic to natural enemies with low residual toxicity to pollinators; safe to mammals and human being.

5.1 Insect pest control

1. Apply prophylactic swab during May/June on main trunk, for the control of stem boring beetle, *(Carbaryl 50 WP 6gm + copper oxychloride 50WP 10gm + sticker 1ml + neem oil/ml/ lit. of water).
2. Cut out drying portion of the branch and swab copper-oxychloride(50% WP)on the cut end, for controlling stem boring beetle.
3. If infestation is low, drench with *Azadirachtin* (0.15%) @ 3 ml/tree around main trunk. Pour 2-3 lit. of mixtures/tree, to control shot hole borer.
4. Spray ^{of} Dimethoate 0.06% or 0.5% multineem, is useful to control thrips and aphids infestation.
5. To take up one spray of *lambda cyhalothrin(0.0025%)in evening hours, to recede the per centage damage by whitefly.

5.2 Disease management:

Apply Benomyl/thiophonatemethyl/carbendazim / bittertanol – 10 gm (in 10 litres of water) to control the fungal infection as leaf spot and fruit spot.

5.3 Insecticide resistance:

It was observed that whitefly *Siphoninus phillyreae* had gained resistance and spraying systemic insecticides were not effective. Neem based biopesticides may be more effective.

* Not as per approved usage under Insecticide Act, 1968

IV. CROP STAGE/PESTS VIS-À-VIS IPM PRACTICES

Sl.No	Crop stage/Pests	IPM Practice	Pest
1.	VEGETATIVE	Cultural practices	
		1. Avoid waterlogging and rake the soil.	Shot hole borer
		2. Detect early infestation periodically looking out for drying branches.	Stem boring beetle.
		Mechanical practices	
		1. Infested young plants should be uprooted and burnt.	Shot hole borer.
		2. Remove weeds of compositae family	Pomegranate butterfly
		Chemical control	
		1. Drench soil with Chlorpyrifos (0.05%) Once in 6 months followed by Azadirachtin 1500 ppm.	Shot hole borer Shot hole borer
2. Inject 5-10 ml of Dichlorvos (0.25%) by using a disposable syringe without needle and seal the holes with clay.	Stem boring beetle		
2.	FLOWERING AND FRUITING	Cultural practices	Anar butterfly
		1. Remove eggs from calyx	
		2. Infested trees should be uprooted and burnt, especially the root zone.	Shot hole borer
		3. Keeping basin clean	Thrips
		Mechanical practices	All pests and diseases
		1. Prune the affected parts of the plant and destroy	
2. Detect early infestation by periodically looking out for drying branches			

	<p>Chemical practice:</p> <p>1. Spray *decamethrin (0.0028%) at the time when more than 50% of fruits have set. Repeat after two weeks with *carbaxyl(0.2%) or *fenvalerate(0.005%).</p>	Anar butterfly
	<p>2. Drench soil around the main trunk with the mixture of *chlorpyriphos(2.5ml + tridimos 1 ml per litre). Use 2-3 litre mixture ^{per} tree. After three weeks repeat with *monocrotophos(1.5 ml + carbendazim 1 gm/litre) .</p>	Shot hole borer
	<p>3. If infestation is low, drench with azadirechtin (0.15%) @ 3ml/1litre around main trunk at 2-3 litres of mixture/tree with either of the fungicides.</p>	Shot hole borer
	<p>4. Examine plants per hole/excreta/gummosis. If detected inject without needle 5-10 ml dichlorovos @(0.25%) and seal the hole with clay</p>	Stem boring beetles
	<p>5. Spray all surrounding trees with quinolphos with(0.05%) or *chlorpyriphos(0.05%)</p>	Stem boring beetles
	<p>6. Spray dimethoate(0.06%) prior to flowering if <i>infestation is serious</i> spray *methyl-oxydemeton(0.04%) and repeat fortnightly.</p>	Thrips

V. SAFETY PARAMETERS IN PESTICIDES USAGE

S. No	Name of pesticide	Classification as per Insecticides Rules, 1971	Colour of Toxicity Triangle	WHO classification by hazard	First aid measures	Symptoms of poisoning	Treatment of poisoning	Waiting period (No. of days)
INSECTICIDES								
ORGANOPHOSPHATE PESTICIDES								
1.	Quinalphos	Highly toxic	Yellow	Class II – Moderately Hazardous	Remove the person from the contaminated environment.	Mild – anorexia, headache, dizziness, weakness, anxiety, tremors of tongue and eyelids, miosis, impairment of visual acuity.	For extreme symptoms of O.P poisoning, injection of atropine (2-4 mg., for adults, 0.5-1.0 mg for children) is recommended, repeated at 5-10 minute intervals until signs of atropinization occur.	
2.	Monocrotophos	Extremely toxic	Bright red	Class I b – Highly hazardous	In case of (a) Skin contact – Remove all contaminated clothings and immediately wash with lot of water and soap; (b) Eye contamination – Wash the eyes with plenty of cool and clean water; (c) Inhalation – Carry the person to the open fresh air, loosen the clothings around neck and chest, and (d) Ingestion – If the victim is fully conscious, induce vomiting by tickling back of the throat. Do not administer milk, alcohol and fatty substances. In case the person is unconscious make sure the breathing passage is kept clear without any obstruction. Victim's head should be little lowered and face should be turned to one side in the lying down position. In case of breathing difficulty, give mouth to mouth or mouth to nose breathing.	Moderate- nausea, salivation, lacrimation, abdominal cramp, vomiting, sweating, slow pulse, muscular tremors, miosis.	Speed is imperative	
3.	Dimethoate	Highly toxic	Yellow	Class II – Moderately hazardous				
4.	Dichlorvos	Highly toxic	Yellow	Class II – Moderately Hazardous				
5.	Chlorpyrifos	-do-	-do-	-do-		Severe – diarrhoea, pinpoint and non-reactive pupils, respiratory difficulty, pulmonary edema, cyanosis, loss of sphincter control, convulsions, coma and heart block.	- Atropine injection – 1 to 4 mg. Repeat 2 mg. when toxic symptoms begin to recur (15-16 minute intervals), Excessive salivation – good sign, more atropine needed;	
6.	Methyl oxydemeton	Highly toxic	Yellow	Class Ib – Highly Hazardous			- Keep airways open, Aspirate, use oxygen, insert endotracheal tube. Do tracheotomy and give artificial respiration as needed. - For ingestion lavage stomach with 5% sodium bicarbonate, if not vomiting. For skin contact, wash with soap and water (eyes- wash	
					Medical aid: Take the patient to the docotr/Primary Health Centre immediately along with the original container, leaflet and label.			

							<p>with isotonic saline). Wear rubber gloves while washing contact areas.</p> <p>In addition to atropine give 2-PAM (2-pyridine aldoxime methiodide). 1 g and 0.25 g for infants intravenously at a slow rate over a period of 5 minutes and administer again periodically as indicated. More than one injection may be required.</p> <p>Avoid morphine, theophyllin, aminophyllin, barbiturates or phenothiazines.</p> <p>Do not give atropine to a cyanotic patient. Give artificial respiration first then administer atropine.</p>
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CARBAMATES

7.	Carbaryl	Highly toxic	Yellow	Class II - Moderately hazardous		<p>Constriction of pupils, salivation, profuse sweating, lassitude, muscle incoordination, nausea, vomiting, diarrhoea, epigastric pain, tightness in chest.</p>	<ul style="list-style-type: none"> - Atropine injection 1 to 4 mg. Repeat 2 mg when toxic symptoms begin to recur (15-60 minute intervals). Excessive salivation - good sign, more atropine needed. - Keep airway open. Aspirate, use oxygen, insert endotracheal tube. Do tracheotomy and give artificial respiration as needed. - For ingestion, lavage
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							<p>stomach with 5% sodium bicarbonate, if not vomiting. For skin contact was with soap and water (eyes – wash with isotonic saline). Wear rubber gloves while washing contact area.</p> <ul style="list-style-type: none"> - Oxygen - Morphine, if needed. <p>Avoid theophyllin and aminophyllin or barbiturates.</p> <p>2-PAM and other oximes are not harmful and in fact contra indicated for routine usatge.</p> <p>Do not give atropine to a cyanotic patient. Give artificial respiration first then administer atropine.</p>
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FUNGICIDES

8.	Mancozeb	Slightly toxic	Green	Table 5 – Unlikely to present acute hazard in normal use.		Headache, palpitation, nausea, vomiting, flushed face, irritation of nose, throat eyes and skin etc.,	No specific antidote. Treatment is essentially symptomatic.
9.	Carbendazim	Slightly toxic	Green	-do-			
10.	Copper oxychloride	Moderately toxic	Blue	Class III – Slightly hazardous			
11.	Chlorothalonil	Moderately toxic	Green	Table 5 – Unlikely to present acute hazard in normal use			

12.	Benomyl		Green	Table 5 – Unlikely to present acute hazard in normal use				
13.	Thiophanat emethyl		Green	-do-				
RODENTICIDES								
14.	Zinc phosphide	Extremely toxic	Bright red	Class I b – Highly hazardous		Headache, palpitation, nausea, vomiting, flushed face, irritation of nose, throat eyes and Skin etc.	No specific antidote. Treatment is essentially symptomatic.	

BASIC PRECAUTIONS IN PESTICIDE USAGE

A. Purchase:

1. Purchase only JUST required quantity e.g. 100,250,500 or 1000 g/ml for single application in specified area.
2. Do not purchase leaking containers, loose, unsealed or torn bags.
3. Do not purchase pesticides without proper/ approved LABELS.

B. Storage:

1. Avoid storage of pesticides in the house premises.
2. Keep only in original container with intact seal.
3. Do not transfer pesticides to other container.
4. Never keep them together with food or feed/ fodder.
5. Keep away from the reach of children and livestock.
6. Do not expose to sun-light or rain water.
7. Do not store weedicides along with other pesticides.

C. Handling:

1. Never carry/ transport pesticides along with food materials.
2. Avoid carrying bulk - pesticides (dusts / granules) on head, shoulders or on the back.

D. Precautions for Preparing Spray Solution:

1. Use clean water.
2. Always protect your NOSE, EYES, MOUTH, EARS and HANDS.
3. Use hand gloves, face mask and cover your head with cap.
4. Use polyethylene bags as hand gloves, handkerchiefs or piece of clean cloth as mask and a cap or towel to cover the head (Do not use polyethylene bag contaminated with pesticides).
5. Read the label on the container before preparing spray solution.
6. Prepare spray solution as per requirement.
7. Do not mix granules with water.
8. Concentrated pesticides must not fall on hands etc. while opening sealed containers. Do not smell the sprayer tank.
9. Avoid spilling of pesticide solution while filling the sprayer tank.
10. Do not eat, drink, smoke or chew while preparing solution.
11. The operator should protect his bare feet and hands with polyethylene bags.

E. **Equipment:**

1. Select right kind of equipment.
2. Do not use leaky, defective equipment.
3. Select right kind of nozzle.
4. Don't blow/clean clogged- nozzle with mouth. Use old tooth- brush tied with the sprayer and clean with water.
5. Do not use some sprayer for weedicide and insecticide.

F. **Precautions for applying pesticides:**

1. Apply only at recommended dose and dilution.
2. Do not apply on hot sunny day or strong windy condition.
3. Do not apply just before the rains and also after the rains.
4. Do not apply against the wind direction.
5. Emulsifiable concentrate formulations should not be used for spraying with battery operated ULV sprayer.
6. Wash the sprayer and bucket etc with soap water after spraying.
7. Containers, buckets etc. used for mixing pesticides should not be used for domestic purposes.
8. Avoid entry of animals and workers in the fields immediately after the spraying.

G. **Disposal:**

1. Left over spray solution should not be drained in ponds or water lines etc. Throw it in barren isolated area, if possible.
2. The used/ empty containers should be crushed with a stone / stick and buried deep into soil away from water source.
3. Never re-use empty pesticide container for any purpose.
