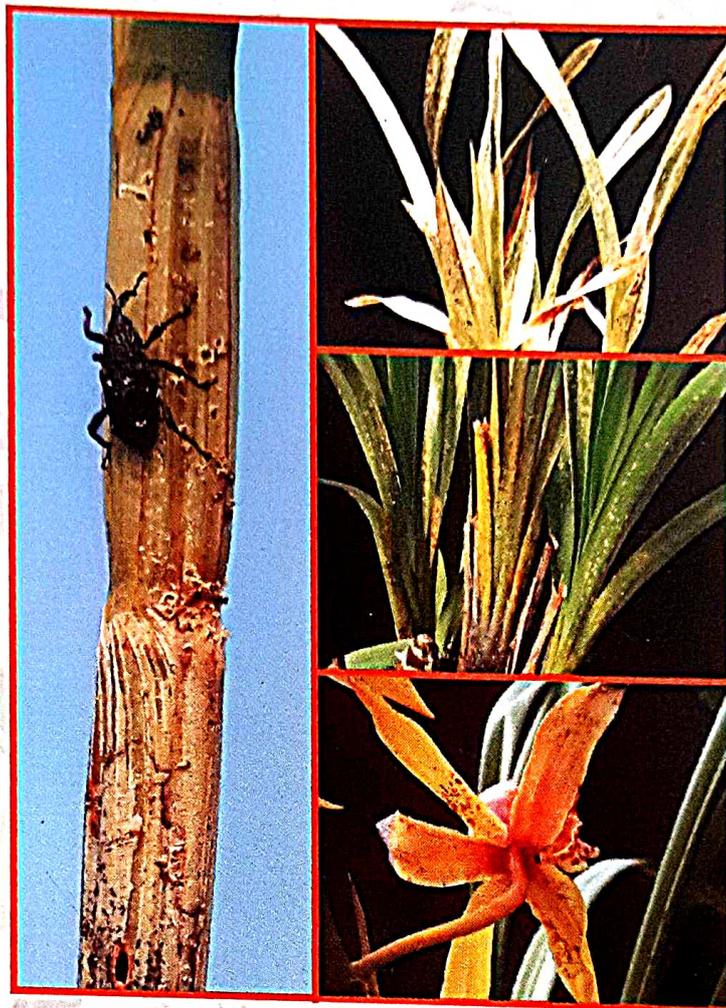


Pests of Orchids

And Their Management



Dr. V. S. Nagrare



National Research Centre for Orchids
Pakyong - 737106, Sikkim



Technical Bulletin

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Compiled and Edited by

Dr. V. S. Nagrare

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Dr. R. C. Upadhyaya

Director, National Research Centre for Orchids

Pakyong- 737 106, Sikkim

Cover page

Clockwise - Black weevil on *Dendrobium*; Mite, Ti scale and
yellow aphid on *Cymbidium*

Printed

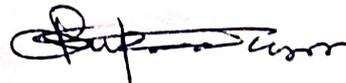
August, 2005.

Forward

Orchids are one of the important flowers in world floricultural trade. This floricultural crop needs attention because various problems it faces lead to poor quality flower production. Pests such as scale, aphid, black weevil, mite, black moth, snail etc contribute to wreck the quality and lower the production substantially. Hence the seriousness of the problems caused by the various pests cannot be ignored or undermined. In this context pest identification and management strategy assumes the utmost importance. The present technical bulletin has been conceived to facilitate the formulation and implementation of this strategy based on identification of the pest problem.

This technical bulletin covers the pest identification, nature of damage, host range, duration of occurrence and management strategy. The author has put up his best efforts to make the technical bulletin self explanatory and handy. It has been scripted and laid out in such a way that it can understand by everyone. Photograph of individual pest have been given for correct identification.

I am sure it will create greater awareness among the orchid growers about the pest problem and their management practices. This bulletin will serve equally to the needs of the researchers, students and extension workers to identify the pest problem and manage them more efficiently and effectively by following the suitable measures at right time in order to harvest the quality flowers and better returns.



R. C. Upadhyaya
Director

NRC Orchids, Pakyong, Sikkim
8th August 2005



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I. Introduction

Orchid flowers are well known for their uniqueness in shape, size, color and scent, exquisitely attractive; normally remain fresh for longer period of time in comparison to other flowers. These qualities have made orchid growing a highly profitable industry all-over the world and today more than 1.2 lac hybrids of different orchid species are known and cultivated for flowers. The orchid cut flower industry is growing at the rate of 10-20 % annually and India could do wonders with orchid cut flowers exports if this area could be promoted well considering climatic suitability and comparatively less production cost. Since the last three decades all people concerned have made concerted efforts for orchid popularization. This trend will continue to do better when more and more plants are available and more land put under cultivation. In the recent past the government and private agencies establish commercial orchid farms in and around Karnataka, Kerala, Tamil Nadu, Assam, Maharashtra for tropical orchids and in Sikkim and Darjeeling district of West Bengal for temperate orchids. They came up with cultivated orchid species and hybrids both for domestic consumption and exports. However the observations showed that lack of innovative and in depth study have left gaps that are already jeopardizing the high hopes generated in the beginning. In flower production pest invasion is known to significantly impair the production quality of plants as well as cut flowers. Therefore an attempt is being made to extend the accumulated knowledge for correct identification and management practices of pests of orchids.

II. Occurrence of different pests on orchids

Orchids are subject to attack by various kinds of pests. A clean, airy environment with optimum humidity, suitable temperature is certainly conducive to the well being of plants but not an absolute guarantee to be free from pests. Even under best conditions pest may attack the plants and only constant and attentive vigilance can keep the pests at bay. The major pests of orchids, plant portion

damaged and duration of occurrence are listed below (Table 1&2).

Table 1. Occurrence of different pests on orchid hosts

Sl. No.	Name of pest	Orchid infested	Plant portion damaged
1.	Scale		
	i. <i>Pinnaspis buxi</i>	<i>Cymbidium</i> hybrids and species	Leaf/ petiole/ pseudobulb
	ii. <i>Coccus hesperidum</i>	<i>Paphiopedilum hirsutissimum</i> , <i>Liparis</i> sp., <i>Papilionanthe</i> sp.	Leaf/ pseudobulb/ spike/ flower
	iii. <i>Lecanium</i> sp.	<i>Phaius flavus</i> , <i>Epidendrum</i> sp. <i>Dendrobium hookerianum</i>	Stem/ spike
	iv. <i>Chrysomphalus aonidum</i>	<i>Cymbidium</i> sp.	Leaf
	v. <i>Diaspis boisduvali</i>	<i>Cattleya</i> hybrids	Leaf/ petioles/ root
2.	Mite <i>Tetranychus urticae</i>	<i>Cymbidium</i> species and hybrids, <i>Dendrobium moshcatum</i>	Leaf /flower
3.	Aphid		
	i. <i>Macrosiphum</i> sp.	<i>Vanda cristata</i> , <i>Acampe papillosa</i> , <i>Dendrobium nobile</i> , <i>Goodyera procera</i> , <i>Epidendrum</i> sp., <i>Cymbidium</i> hybrids	Leaf/ bud/ flower
	ii. <i>Toxoptera aurantii</i>	<i>Cymbidium lowianium</i> , <i>Oncidium</i> Gower Ramsay, <i>Dendrobium densiflorum</i>	Flower bud/ flower
4.	Shoot borer (Black moth) <i>Peridaedala</i> sp.	Many species of <i>Dendrobium</i> , <i>Acampe</i> , <i>Aerides</i> , <i>Eria</i> , <i>Agrostophyllum</i> , <i>Arachnanthe</i> , <i>Ascocentrum</i> , <i>Epidendrum</i> , <i>Liparis</i> , <i>Saccolobium</i> , <i>Vanda</i>	Shoot
5.	Mealybug <i>Pseudococcus maritimus</i>	<i>Phaius flavus</i> , <i>Phaius tankervilleae</i> , <i>Cattleya</i> hybrid	Leaf/ flower
6.	Black weevil <i>Sipalinus</i> sp.	Species and hybrids of <i>Cymbidium</i> , <i>Dendrobium</i> , <i>Phaius</i> , <i>Coelogyne</i>	Leaf/ shoot/ pseudobulb/ cane
7.	Grasshopper	<i>Cymbidium</i> hybrid	Leaf/ bud/ flower
8.	Lepidopteran caterpillar	<i>Cymbidium</i> , <i>Cattleya</i> , <i>Thunia</i>	Flower bud/ flower
9.	Snail <i>Cryptaustenia verrucosa</i> and <i>C. heteroconcha</i>	Many species and hybrids	Pseudobulb/ leaf/ flower

Table 2. Month wise occurrence of pests on orchids

Name of pest	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec.
Scales <i>Pinnaspis buxi</i>	■	■	■	■	■	■	■	■	■	■	■	■
<i>Coccus hesperidum</i>	■	■	■	■	■	■	■	■	■	■	■	■
<i>Lecanium</i> sp.	■	■	■	■	■	■	■	■	■	■	■	■
<i>Chrysomphalus aonidum</i>	■	■	■	■	■	■	■	■	■	■	■	■
<i>Diaspis boisduvali</i>	■	■	■	■	■	■	■	■	■	■	■	■
Mite <i>Tetranychus urticae</i>			■	■	■	■	■	■	■	■		
Aphid <i>Toxoptera aurantii</i>	■	■	■	■	■	■						
<i>Macrosiphum</i> sp.		■	■	■	■							
Shoot borer <i>Peridaedala</i> sp.						■	■	■	■	■		
Mealy bug <i>Pseudococcus maritimus</i>					■	■	■	■				
Black weevil <i>Sipalinus</i> sp.					■	■	■	■	■	■	■	
Grass hopper			■	■	■	■	■					
Lepidopteran caterpillar								■	■	■	■	
Snail <i>Cryptaustenia verrucosa</i> & <i>C.heteroconcha</i>					■	■	■	■				

III. Identification, nature of damage and management practices

1. SCALES

1.1 Ti scale *Pinnaspis buxi*

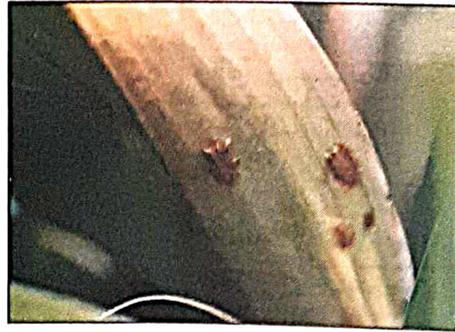
Identification: Ti scales are small about 1 to 1.5 mm long, flat bodied, elongated pear shaped without wing, legs or eyes, dead ones are dark brown and dried rather than plump.



Ti scale

1.2 Soft brown scale *Coccus hesperidum*

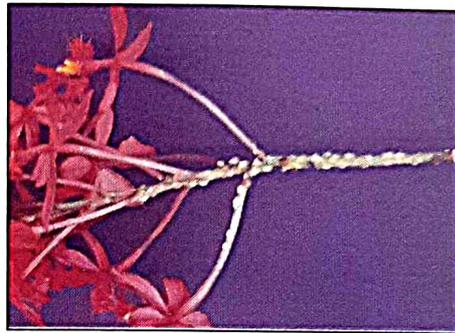
Identification: Soft brown scales are oval and more flattened than either the black or hemispherical scales. They are pale brown, dirty white or grayish mottled with dark brown on the back.



Soft brown scale

1.3 Lecanium scale *Lecanium* sp.

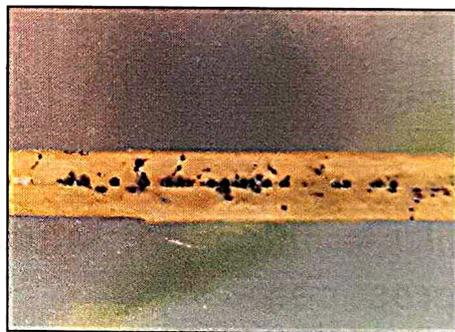
Identification: The scales are usually bowl or dome or turtle shaped, slightly longer than wide, smooth and shiny brown in colour and about 4 to 6 mm in diameter. The insect bearing protective covering of wax secreted from their body.



Lecanium scale

1.4 Florida red scale *Chrysomphalus aonidum*

Identification: These scales are circular, moderately convex, dark reddish brown to almost black margin somewhat ash grey. Size is almost 2 mm in diameter. The exuviae (cast skins) are approximately central, reddish brown or brick red, sometimes covered with grayish secretion, surrounded by a reddish brown ring.



Florida red scale

1.5 Boisduval scale *Diaspis boisduvali*

Identification: Boisduval scales are circular to oval, thin flat, white to light yellow, and semitransparent.



Boisduval scale

Size is 1.2- 2.25 mm in diameter. Exuviae (cast skin) ventral to sub central, white to light yellow.

Nature of damage: Scales suck the juices from leaves, petioles, pseudobulbs, flowers and cause loss of vigor, and deformation of infected plants. Heavy scale infestations, however, can reduce overall plant health and cause yellow leaves, leaf drop, and stunted new growth. The most visible damage caused by scales is the sticky honeydew they excrete which attracts sooty mold and dust particles that are difficult to remove. However, not all scale secret honeydew. Scales are active throughout the year but their attack is more prominent during summer.

Management: Cleanliness and regular care is necessary. Select scale free planting material to prevent early built up of pest. Prompt pruning and burning of infested parts reduces further spread, isolate infested plants from others to prevent the scales from moving from one plant to another. Scales can be removed by rubbing the scurf encrustation with toothbrush or cotton swab dipped in 70% Isopropyl alcohol or methylated spirit. Keep up the manual removal of all scales, if possible. If scales infestation found on root, repotting should be done to eradicate harboring eggs and crawlers and after gentle cleaning, roots should be sprayed with insecticides. Spraying of Malathion 0.05% or Dimethoate 0.05% or Monocrotophos 0.05% or Chlorpyrifos 0.05% or Carbaryl 0.2% would help to reduce scale damage.

2. MITE *Tetranychus urticae*

Identification: Adults are 0.4 - 0.6 mm long, oval pale greenish to yellowish, with pair of distinct dark lateral patches from orange to brick red. Active immature stages are pale green with darker margins.



Red spider mite

Nature of damage: Both nymph and adults dwell under dry and warm conditions feed on both flowers and leaves by sucking the sap from epidermal layer. The injuries due to feeding can be seen as silvery marks left on the abaxial surface of leaf which usually turns brown or black after a period of time. The affected leaves get weakened and exhibit severe mottling and wilting. Growth of plant stunted and loss of foliage occurs in the infected plant. Flowers develop purple or brown spots and are reduced in size if mite attacked at pre- bloom stage. The flowers usually are abortive, turn brown and fall off. In heavy infestation webbing appears on the plant.

Management: Eradication of severely infested plant parts reduces further multiplication of mite. Proper ventilation, irrigation and clean cultivation are essential to curtail the mite population. Application of Effective miticides Dicofol (Kelthane), Ethion, Dimethoate, Wetable sulphur, Avermectin (Avid), Bifenthrin (Talstar), Dienochlor (Pentac), Fenbutatin-oxide (Vendex), and Fluvalinate (Mavrik)) at 0.05% or Neem oil 15 ml in 10 liters of water at 10- 15 days interval provides effective control against mite.

3. APHID

3.1 Yellow aphid *Macrosiphum* sp.

Identification: This aphid is pale yellowish green to bright greenish yellow colour measuring 2-3 mm in length. Adults are winged or wingless. The wingless form has a brownish patch on the top of the abdomen.



Yellow aphid

3.2 Black aphid *Toxoptera aurantii*

Identification: Black aphids are small insects measuring 2-3 mm in length winged or wingless form formed colonies on flower bud as well as flower.

Nature of damage: Both nymph and adults suck the sap from new spike and foliage. They excrete honeydew on which sooty mold attracted. High humidity and cloudy weather fasten the population build up. Affected plants retard growth and flower quality affected. They are also believed to transmit some viral diseases.



Black aphid

Management: When the infestation begins, plants should be treated with insecticides like Imidacloprid 17.8 SL 0.05% or Dimethoate 30 EC 0.05% or Malathion 50 EC 0.05% or Enstar II (Kinoprene) 0.05% or Acephate 75 SP 0.05% or Maverick Aquaflow (Fluvalinate) 0.05% at 10-15 days interval.

4. SHOOT BORER (Black Moth) *Peridaedala* sp.

Identification: Black in colour measuring about 8-10 mm in length.

Nature of damage: Larvae feed on young shoots. Further growth of plant arrested and flower production affected. Dead shoots or yellow shoots flag on the stem.

Management: Monocrotophos 0.05 % or Econeem or Malathion 0.05 % at 10 days interval will help to control the damage.



Black moth (inset larvae and adult)

5. MEALYBUG *Pseudococcus maritimus*

Identification: Mealybugs are soft, filamentous pink or yellow colored bodied covered with white powdery wax.

Nature of damage: Both young and adult suck the sap from

leaves and petioles and secretes honeydew that attracts ants. In severe infestation sooty mold may develop on the leaves. Attacked plants look wilted and growth arrested.

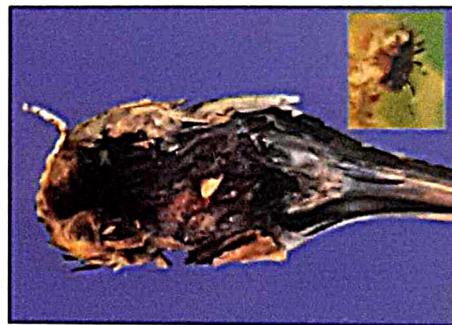


Mealybug

Management: Collection and destruction of infested plant parts reduces spread of pest. Spraying of insecticide should be taken up when crawling ants are noticed on plant. Spray of Dimethoate 0.05% or Acephate 0.05% 2 to 3 times at 15 days interval helps in checking the mealybug.

6. BLACK WEEVIL *Sipalinus* sp.

Identification: Adult weevils are black in colour measuring about 12-14 mm in length and 5-6 mm wide.



Black weevil

Nature of damage: Larvae after hatching feeds on young leaves, exudates come out from the puncture on which *Fuzarium* fungus grow.

Fungus helps in deceasing adjacent portion. Larvae enter into the shoot and thereafter pseudobulb and feed on plant tissue resulted into rotting of pseudobulb and thereby further growth arrested. Adult weevil observed to cause serious damage by feeding on plant parts of many orchids.

Management: Manual collection and destruction of adult weevil when noticed on plant.

7. GRASSHOPPER

Identification: Measuring about 3.5- 4.0 cm, gray in colour, robust and having chewing and biting type of mouthparts.

Nature of damage: Grasshopper is polyphagous. Both nymph and adult generally feed on grasses before attacking the crop. On *Cymbidium* they feed on the young leaves, unopened bud and flowers and damage the crop.



Grasshoper

Management: Remove grasses from nearby vicinity. Apply Carbaryl 5% or Malathion 5% dust @25kg/ha.

8. LEPIDOPTERAN CATERPILLAR

Identification: Excreta come out from the feeding site.

Nature of damage: Caterpillar feed on buds flowers and damage the crop.



Lepidopteran caterpillar

Management: Spray of Monocrotophos 0.05% or Malathion 0.05 % or Econeem 1.5 ml/l at 10 days interval reduces caterpillar population.

9. SNAIL *Cryptaustenia verrucosa* and *C. heteroconcha*

Identification: Slime trails leading towards damaged plant.

Nature of damage: Both young and adult feeds on young leaves, roots, flower buds and even open flowers. Slime trail leading to the plant injury is indicative of their presence. Snails prefer shady conditions. Attack is more prevalent during nights of monsoon period.



Snail

Management: Manual collection and killing by dropping in 5% salt solution is the most effective method to lower the snail population. Spreading Metaldehyde pellets 3% or two-ground spray of Metaldehyde 1% on the floor at 20 days interval gives effective control. Metal barriers may be engaged to prevent the snails to climb on the racks. Spraying of Neem oil 1.5 ml /l water on foliage will also provide good protection against the pest.

IV General rules

- Procure pest free propagation material.
- Discard and burn heavily infested plants.
- Maintain record of pest incidence.
- Practice sound crop culture in all phases of production.
- Maintain a clean, closely mowed area around the greenhouse to reduce pest growth.
- Maintain distance between plants to avoid movement of pest from one plant to another.
- Remove weed and plant debris.
- Keep doors, screens and ventilators in good repair.
- Inspect new plants thoroughly to prevent introduction of insect infested material into the greenhouse.
- Avoid wearing yellow clothing which is attractive to many insect pests which can be carried into the greenhouse from outside.
- Eliminate infestations by discarding or removing heavily infested material.
- Use sterilized potting media, tools and other equipment.

V Pesticides and their application

Preparation of spray solution

There are some formulae, which can be used to calculate the required quantities and strengths of pesticides from their known quantities and strengths.

1. To obtain the desired quantity and strength of an insecticide from the given quantity and strength of a formulation. Here Malathion 50 EC is to be diluted to 100 liters of 0.05% spray.

Solution:

$$\frac{\text{Total spray required} \times \text{Per cent strength required}}{\text{Strength of pesticide}}$$

$$= \text{Quantity of pesticide required}$$

$$\frac{100 \text{ liters} \times 0.05}{50 \text{ percent}}$$

$$= 0.1 \text{ liter}$$

The desired quantity of malathion to make 100 liters of 0.05 per cent spray will be 0.1 liter.

2. To obtain the strength of an insecticide of known quantity and strength after diluting it to a known quantity, for example: What will be the strength of 40 per cent Monocrotophos emulsion if 1 liter of it diluted to 1000 liters?

$$\frac{\text{Quantity of emulsion to be diluted} \times \text{Strength of the emulsion}}{\text{Quantity of the finished product}}$$

$$= \text{Per cent concentration of end product}$$

$$= \text{Per cent concentration of end product}$$

$$\frac{1 \text{ litre} \times 40 \text{ per cent}}{1000 \text{ liters}}$$

$$= 0.04 \text{ per cent}$$

Spraying operation

- The time of application should be decided after monitoring the pest incidence meticulously viz., only young and vulnerable life stages of the pest should be spread upon.
- The spray should be targeted on the lower surface of the leaves and the new flush. Canopy should be covered till the run off stage.
- Avoid the repeat application of particular pesticide and do not use expired pesticide.
- Prepare spray solution first in small quantity and then increase the volume to desired level by adding water.
- Avoid spraying during strong winds, cloudy days.
- Use fine nozzle as far as possible for spraying.
- Care should be taken in using chemicals because they are toxic to the plants and hazardous to human.

Ready reckoner for preparation of pesticide spray solution at desired strength

Desired strength of solution in %	Percent of active ingredient of insecticide in commercial products												
	10	20	25	30	35	40	50	60	70	75	80	85	100
Quantity of pesticides to be added per litre of water in g or ml													
0.005	0.50	0.25	0.20	0.17	0.14	0.13	0.10	0.08	0.07	0.07	0.06	0.06	0.05
0.010	1.00	0.50	0.40	0.33	0.29	0.25	0.20	0.17	0.14	0.13	0.13	0.12	0.10
0.020	2.00	1.00	0.80	0.67	0.547	0.50	0.40	0.33	0.29	0.27	0.25	0.24	0.20
0.025	2.50	1.25	1.00	0.83	0.71	0.63	0.50	0.42	0.36	0.33	0.31	0.29	0.25
0.030	3.00	1.50	1.20	1.00	0.86	0.75	0.60	0.50	0.43	0.40	0.38	0.35	0.30
0.035	3.50	1.75	1.40	1.17	1.00	0.88	0.70	0.58	0.50	0.47	0.44	0.41	0.35
0.040	4.00	2.00	1.60	1.33	1.14	1.00	0.80	0.67	0.57	0.53	0.50	0.47	0.40
0.050	5.00	2.50	2.00	1.67	1.43	1.25	1.00	0.83	0.71	0.67	0.63	0.59	0.5
0.060	6.00	3.00	2.40	2.00	1.17	1.5	1.20	1.00	0.86	0.80	0.75	0.71	0.60
0.080	8.00	4.00	3.20	2.67	2.29	2.00	1.60	1.33	1.14	1.07	1.00	0.94	0.80
0.1	10.00	5.00	4.00	3.33	2.86	2.50	2.00	1.67	1.43	1.33	1.25	1.18	1.00
0.15	15.00	7.50	6.00	5.00	4.29	3.75	3.00	2.50	2.14	2.00	1.88	1.76	1.05
0.2	20.00	10.00	8.00	6.67	5.71	5.00	4.00	3.33	2.86	2.67	2.50	2.35	2.00
0.25	25.00	12.50	10.00	8.33	7.14	6.25	5.00	4.17	3.57	3.33	3.13	2.94	2.50
0.3	30.00	15.00	12.00	10.00	8.57	7.50	6.00	5.00	4.29	4.00	3.75	3.53	3.00
0.4	40.00	20.00	16.00	13.33	11.43	10.00	8.00	6.67	5.71	5.33	5.00	4.71	4.00
0.5	50.00	25.00	20.00	16.67	14.29	12.50	10.00	8.33	7.14	6.67	6.25	5.88	5.00
0.75	75.00	37.50	30.00	25.00	21.43	18.75	15.00	12.50	10.71	10.00	9.38	8.82	7.50
0.8	80.00	40.00	32.00	26.67	22.86	20.00	16.00	13.33	11.43	10.67	10.00	9.41	8.00
1.0	100.00	50.00	40.00	33.33	28.57	25.00	20.00	16.67	14.29	13.33	12.50	11.76	10.00

Commercial chemical Pesticide

Common Name	Trade Name
Acephate	Acefate, Acemil, Agrophate, Aimthene, Asataf, Kayphate, Lancer, Orthene, Ortran, Ortril, Pilarthene, Starthene, Surpass, Tomado, Trophy, Vital.
Carbaryl	Agrovin, Agroyl, Bangwin, Carbamate, Carbamine, Carvin, Carvint, Corovin, Devicarb, Hexavin, Hockley Carbaryl, Kervin, Kirdiril, Killexcarbaryl, Limite, Murphy Lawn Pest Killer, Ravyon, Ryltex, Sevidol, Sevimol, Sevin, Twister Flow, Ace®Sevin, Bonide®Sevin, Ferti-lome®Carbaryl Garden Spray, Green Light®Liquid Sevin, Ortho®Sevin, Spectracide®Sevin.
Chlorpyrifos	Agrophos, Atlas Sheriff, Banusban, Chlorophos, Classic, Coroban, Crossfire, Danushban, Detmol, Detmolin, Dimlor, Drexar Lawn Granules, Durmet, Dursban, Empire, Fullback, Gilmore Chlorpyrifos, Gilphos, Gladiator, Gustafson, Lorsban 30 Flowable, Gustafson Lorsban 50-SI, Hexaban, Hockley Chlorpyrifos, Hyban, Lethal, Lorsban-T, Point Chlorpyrifos, Predator, Pychlorex, Pyrenone Dursban Dual Use, Pyriban, Pyrinex, Radar, Ruban, Salut, Saluthion, Schwab EX Spannit, Spannit Granules, Suban, Sulban 20, Talon, Terminate, Terraguard 48 EC, Terraguard Plus, Twin Span.
Dicofol	Acarin, Banmite, Childion, Decofol, Delcofil, Delcofol, Dicofol Protex, Fumite Dicofol Smoke, Hexakel, Hilfol, Kelthane, Micothane, Mitigan, Tagfol, Ticofol, Vikofol, Hi-Yield®Kelthane Spray
Dimethoate	Agrodimet-30, Agromat, Atlas Dimethoate 40, Atlas Sheriff, Clinex, Cifor, Corothiate, Cropgor, Cygon, Demècor, Devigon, Diemoth, Dimer, Dimex, Dimlor, Entogor, Farcron S, Hexaban, Hexagor, Hilthoate,

	Hockley Dimethoate, Hygro, Kemithoate, Kilxdimethoate, Kiltex, Maktion, Mocor, Milgor, MTM Dimethoate, Murphy Systemic Insecticide, Pamir, Paragor, Parrydimate, Perfekthion, Rasyanate, Rogor, Roxion, Salut, Salution, Sicothate, Sulgor, Tagor, Tara 909, Teletox, Trimetox, Unogor, Utkal Dimethoate, Vikagor.
Econeem	Achook, Aphidin, Aza, Azadit, Bioneem, Biopest, Field Marshal, Fortuna Aza Jai Neem, Jawan, Jeevan Crop Protector, Juerken Limonool, Margocideck, Margosan-O, Neemark, Neemazal-F, Neemgold, Neem Guard, Neem Rich, Neemolin, Neempourn, Neemosan, Neemox, Neemta, Nimbecidine, Nimbosol, Nimbasal, Neem Hit, Neem Plus, Neem Top, Neemol, Nim-76, Neemax, Neemocide, Neemactine, Neembo Bas, Nimbitor, Phytowin, Rakshak, Replin 555, Shaktiman, Sukrina, Nimbim, Swaticure, Suneem, Vapacide, Wellgro.
Ethion	Demite, Dhanumit, Ethiosul, Fosmite, Fieathion, Force, Gilmore Ethion, Lazor, Miti Cil, MIT 505, Novathion, Raythion, Rhodocide, Rothion, RP-Thion, Tafathion, Tegithion, Vegfru Fosmite, Volthion EC.
Imidacloprid	Admire, Condifor, Gaucho, Premier, Premise, Provado, Marathon, Merit.
Malathion	Agrolmal, Agromala, Bangmal, Bugtax, Chemathion, Corothion, Cythion, Emmaton, Entomol, Gilmore Malathion, Hilthion, Hockley Malathion, Karlophos, Kathion, KPmalathion, Krishi Malathion, Malahi-90, Malamar, Malathion Sandoz 50, Malaspray, Malasun EC, Malaone, Malathiozole, Malatox, Murphy Liquid Malathion, Murphy Malathion Dust, Prentox 51b Malathion

	Spray, Ramathion, Svlmalathion, Taimal, Acc@Malathion50, Bonide, Ferti-lome@Mal-A-Cide, K-Gro Malathion 50, Green Thumb@Malathion, Ortho@Malathion 50 Plus.
Metaldehyde	Slug Fest, Durham, Mesurol, Methiocarb, Snail Kill, Sluggo, Ferti-lome@Eliminate, Ferti-lome@Snail and Slug Killer Pellets.
Monocrotophos	Agromonarc, Aimocron, Azodrin, Agrocorn, Agromohare, Balvanotophos, Balvan, Corophos, Croton, Entophos, Faptopos, Gilmore Monocrotophos, Glorephos, Gyphios, Hexaphos, Hilcron, Hycrophos, Indophos, Kadett, Kagrophos, Kileximonocrotophos, Lumphos, Macrotophos, Micophos, Milphos, Mondhit, Monitar, Monocid, Monocil, Monocos, Monocron, Monocrotophos, Monodrin, Monogil, Monokem, Monophos 40, Monosect, Monosil, Monostar, Monoval SL, Mostyn Monocrotophos, Nuvacron, Paracron, Parryfos, Phoskill, Pilardin, Ramphos, Rasayanaphos, Satur, Sicocil, Sufas, Syeperotophos, Triphos, Vegfrokadett, Vimofos, Viphos.
Neem Oil	Biosol, Juerken, Kemissal, Margosal, Neem Plus, Neem Guard Biosol Neethrin, Nimlin, Tric.
Sulphur	Atlas Bolda FL, Bolda FL, Cosan/Elosal, Devisulfan, Fluidosoufre, Green Sulphur, Headland Sulphur, Hexsasul, Imber, Kenkol 400 SC, Kombat S, Kumulan, Kumulus DF, Microsol, Microsul, Microthiol Special, Murphy Mole Smokes, Pennsuc S, Saulfat, Suffa, Sulfex, Sulphur 800 SC, Sulphur 900 SC, Sulphotox, Sultron, That Big 8, That Flowable Sulphur, Thiolux, Thiovit, Top Cop, Wacker 83, Wettable Powder And Flowable Sulphur, Wetsul, Wetsulf, Yellow Sulphur.

First aid treatment for pesticide poisoning

Some of the first aid measures mentioned below could be undertaken only by a Doctor, or by someone who is specially trained for the purpose, whereas others are simple and can be carried out by anyone who can understand and follow the instruction carefully.

Swallowed poisons

If the poison has been taken internally, vomiting should be induced immediately. It can be accomplished by 1-2 tablespoonfuls of salt in glass of warm water. During vomiting, the head of the patient should be lowered with face downwards, so that content of the stomach may not enter the lungs. He should not be allowed to lie on his back. The treatment should be repeated until the vomiting fluid is clear. The patient in coma in convulsions or in unconscious stage should not be induced to vomit.

Gastric lavage (the removal of stomach contents) is the most important method for removing poisons from the stomach. Ordinarily, gastric lavage is not indicated unless the patient seen within the first 4 hr after the poison has been swallowed. Serious injury may result from the improper use of the stomach tube. Hence, only a physician should carry out this procedure. After the stomach has been emptied as completely as possible, a demulcent (a substance having a soothing effect) like raw egg white mixed with water, gelatine (2-3 tablespoonful in half liter of water) butter cream, milk mashed potato, or flour of a food grain and water should be given.

Skin contamination

If clothes have been contaminated they should be removed. The contaminated skin should be thoroughly washed with soap and water. Rapid washing is more important for reducing the extent of injury.

Inhaled poison

If the pesticide has been inhaled, the victim should be immediately removed to a place with plenty of fresh air. Tight clothes should be loosened, but the patient should be prevented from chilling. Alcohol should not be given in any form. If breathing has stopped or is irregular, artificial respiration should be given. Precautions should be taken to avoid the vigorous application of pressure to the chest.



National Research Centre for Orchids

Pakyong- 737106, Sikkim

Tele No. 03592-257954, Telefax: 03592-257289

Website : www.sikkim.nic.in/nrco, Email : nrcorchids@rediffmail.com